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Volume 18(2), 2016



Use of geomatic technologies to determine the basis for Terroir. Spatial variation in five Ontario Chardonnay vineyards

Andrew G. Reynolds and Christiane de Savigny

Cool Climate Oenology and Viticulture Institute, Brock University, St. Catharines, ON L2S 3A1

Key words: Fruit composition, soil texture, GPS, GIS, precision viticulture
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Abstract: The aim of this study was to test the hypothesis that soil texture would play a minor role in the determination of yield components, fruit composition, and wine sensory attributes of Chardonnay (i.e. the terroir effect), and that vine size, crop size and associated fruit environment would play the major roles. Five Chardonnay vineyards in the Niagara Peninsula of Ontario, Canada were chosen for study. These vineyards were located on sites with heterogeneous soil types to allow study of the impact upon yield, fruit composition and wine sensory attributes of: 1. Soil texture with mesoclimate kept constant; 2. The comparative magnitude of effects of soil texture and vine vigor. Vineyard blocks were delineated using global positioning systems (GPS), and a series of 72 to 162 data vines per site were geo-located within a sampling grid imposed on each vineyard block. Data were collected on soil texture, soil composition, tissue elemental composition, vine performance (yield components and weight of cane prunings), and fruit composition. These variables were mapped using geographical information systems (GIS) software and relationships between them were elucidated. Soil texture and composition were occasionally correlated to yield components and fruit composition but often these relationships were site-specific. Spatial relationships were common between % sand and clay, vine size, yield, berry weight, soluble solids (Brix), and titratable acidity (TA); however, relationships were both vineyard and vintage dependent. Several spatial relationships were apparent as well between vine size, yield, Brix, TA, and various soil/petiole composition

variables, including organic matter, soil pH, cation exchange capacity, and soil/petiole N, P, K, Ca, Mg, and B. Spatial relationships between yield, berry weight, berry composition, vine size, and several soil physical variables suggest a likely soil basis to the so-called 'terroir effect'. Vine size, yield, and berry weight were stable temporally within individual vineyards despite differences in annual climatic conditions. Soil texture (% sand) was frequently associated with high vine size, yield, and berry weight. Vine size directly correlated with berry weight. TA was often correlated with vine size. Soil composition had little relationship to petiole composition, fruit composition or yield except in a few specific cases, e.g., between pH and soil K.

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A novel progressively delivered fruit bagging apparatus

Yanbin Hua, Baotong Yang, Xin-Gen Zhou, Jun Zhao and Liulin Li

College of Horticulture, Shanxi Agricultural University, Taigu 030801, Shanxi, P. R. China. College of Engineering, Shanxi Agricultural University, Taigu 030801, Shanxi, P. R. China. AgriLife Research and Extension Center, Texas A&M University System, Bea

Key words: Fruit bagging, overrunning clutch, self-locking, paper bag with rubber bands and plastic rings

Journal of Applied Horticulture, 2016, volume 18, issue 2, pages 123-127.

[Full text PDF](#) |

Abstract: Bagging fruit on the trees in the orchard is a challenge to the fruit industry in China and many other countries due to the heavy labor requirement and low efficiency of the current fruit bagging methods. In this study, we developed a novel semi-automatic apparatus for bagging fruits to overcome these disadvantages. This apparatus adopts a mechanism similar to 'overrunning clutch' using the self-locking principle between nut and bolt to achieve the paper bags being progressively delivered by a screwed pipe and slid out individually. Such apparatus is of simplicity in design and efficiency in operation with a low cost. It does not require a battery or any of other sources of power to complete the process. This article describes the design and operation procedure of this apparatus in details. To our knowledge, this is the first apparatus to complete the fruit bagging process using the paper bags with rubber bands and plastic rings based on the new mechanism of operation.

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Integrated use of GIS, AHP and remote sensing in land use planning for tropical high altitude vegetable crops

Widiatmaka

Department of Soil Science and Land Resources, Bogor Agricultural University, Indonesia

Key words: Land suitability, land availability, multi-criteria decision-making, spatial overlay, SPOT-6 imagery

Journal of Applied Horticulture, 2016, volume 18, issue 2, pages 87-99.

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Abstract: In Indonesia, Java Island still contributes a large amount of the total number of vegetables produced. In this tropical country, vegetables are produced in two different agro-ecological conditions, which are high altitude and low altitude. The rapidly increasing population growth has caused the centre's production of high altitude vegetables on Java Island to be increasingly pressured by other types of land utilization. This study was conducted in one of the production centres of tropical high altitude vegetable crops in the upper slope area of Mts Gede-Pangrango, West Java, covering an area of 78,290 ha. The research objective was to delineate the suitable land that is available for high altitude vegetables crops. In the first step, land suitability was analysed using multi-criteria decision-making methodology. The criteria used include those grouped within the parameters of land, topography, climate and ease of management; criterion consists of sub-criteria. The criteria were weighted using the Analytical Hierarchy Process, while sub-criteria were scored according to their contributions to land suitability. The weights of the criteria and scores of the sub-criteria were used for delineating land suitability in a geographic information system model. In the second step, the land availability was analysed by taking into account the constraints of forest area status designation and the spatial pattern of official land use plan map. Results of both analyses were used to delineate suitable and available land for tropical high altitude vegetables crops. The results showed that the amount of land that was suitable and available for tropical high altitude vegetables crops was 23.7% of the analysed area. The area of suitable and available land that is actually not used yet is 9% of the area analysed, which could be recommended for the expansion of vegetable crops. Land that is suitable and available, either land that is already used or land that is not yet used, could be designated as

priority lands to be protected from the pressure of non-agricultural land utilization in order to maintain the sustainability of vegetable availability

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Assessing the influence of energy cost and other factors on profitability of greenhouse businesses in Tennessee

Hiren Bhavsar, Fisseha Tegegne and Krisden Ingram

Department of Agricultural and Environmental Sciences, Tennessee State University, 3500 John A Merritt Blvd, Nashville, TN 37209, USA.

Key words: Greenhouse, energy use, middle Tennessee, profitability
Journal of Applied Horticulture, 2016, volume 18, issue 1, pages 12-15.

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Abstract: The greenhouse industry is an important sub-sector of agriculture. On average, greenhouse and nursery farms in the U.S. have 57 percent more cash receipts than all farms (Muhammed, 2000). Tennessee cash receipts for greenhouse and nursery farms was 307 percent above than the average in the US. However, greenhouse operations in Tennessee have declined over the years. The goal of this study was to acquire a better understanding of energy use by greenhouse businesses in Tennessee. The latest database containing greenhouse businesses was provided by the Tennessee Department of Agriculture. A mailed survey was used to collect data that covered questions on energy use, marketing and skill needs of the businesses. The respondents were mixed in terms of size of their operations, education and income levels. Out of the 279 surveys, 56 were returned, resulting in a 20 percent response rate. To determine the different factors affecting profitability of greenhouse operations, this study utilized correlation and chi-square tests using different variables. Results indicate that profitability of greenhouse operations is influenced by the rising energy cost, economic downturn and size of operation. The survey also indicates that growers would consider adopting alternative energy saving methods depending on their income and age. The study shows the need to assist the growers in learning more about alternative energy saving methods and technologies. This study is beneficial not only for greenhouse businesses but also other stakeholders including policy makers and those working with growers. Other researchers can also undertake similar studies using the approach used here with appropriate modification.

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Postharvest behaviour of minimally processed watercress

V.R. Logegaray, D. Frezza, A. Chiesa. and A.P. León

Departamento de Horticultura, Facultad de Agronomía, Universidad de Buenos Aires, Av. San Martín 4453 (C1417DSE) CABA, Argentina.

Key words: *Nasturtium officinale*, quality, gas concentration, chlorophyll, weight loss, ascorbic acid, reducing sugar, oxalic acid

Journal of Applied Horticulture, 2016, volume 18, issue 1, pages 16-18.

[Full text PDF |](#)

Abstract: Watercress (*Nasturtium officinale* R. Br.) is an aquatic plant of the Brassicaceae family and used as a leafy vegetable that grows in and around water. It is consumed raw or steamed and has a short shelf life of approximately seven days. The objective of this study was to evaluate the postharvest behaviour of watercress minimally processed and stored at optimal storage temperature vs. market temperature. Treatments were: shoots packed with plain film (PD961EZ, 31 µm thickness) and stored in refrigerated chambers at 1 ± 0.5 °C and 8 ± 2 °C for 10 days. Overall visual quality, gas concentration inside the packages, chlorophyll, reducing sugar, ascorbic acid, oxalic acid and weight loss were evaluated. At the end of the storage period overall visual quality, gas concentration and reducing sugars were affected by storage time and temperature, whereas dehydro ascorbic, oxalic acid and weight loss were not.

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Aroma profiling of jasmine (*Jasminum sambac* Ait.) flowers using electronic nose technology

X. Alex Isac, K.R.Rajadurai, M. Jawaharlal, K. Arul Mozhi selvan, D. Uma, Hena roy and Nabrun Bhattacharyya

¹Department of Floriculture and Landscaping, Tamil Nadu Agricultural University, India. ²Horticultural College & Research Institute for Women, Navalur kutapattu, Trichy, India. ³Department of Soil Science & Agricultural Ch

Key words: *Jasminum sambac*, Electronic Nose, MOS, volatile emission

Journal of Applied Horticulture, 2016, volume 18, issue 1, pages 19-24.

Abstract: The Jasmine (*Jasminum sambac* Ait.) flowers are highly fragrant and used for extraction of essential oil, preparation of perfumes and scented water. Since there is a growing demand for the fresh flowers, there arises a need to develop a technique to identify the flower quality in non-destructive and quickest possible manner. A study was undertaken using hand held electronic nose technology (HEN) at the Department of Floriculture and Landscaping, Tamil Nadu Agricultural University, Coimbatore during the year 2013-2015. The result showed that, the HEN device generated Aroma Index (AI) score increased over the flower development stages and varied from 0.41 in immature bud (stage I) to 4.26 in matured bud (stage V). The comprehensive study on quantum of fragrance releasing pattern at different flower opening stages (physiologically matured bud to fully opened flower) over period of time interval showed that, minimum of 5.41 was recorded in an unopened closed bud stage which gradually increased upto 41.26 in the fully opened flowers. The biochemical constituents responsible for the unique jasmine flower fragrance were identified using Gas Chromatography –Mass Spectrometry (GC-MS).

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Genetic diversity assessment in *Jasminum* species using Amplified Fragment Length Polymorphism

K.S. Nirmala, B.V. Champa and A.P. Mallikarjuna Gowda

University of Agricultural Sciences, GKVK, Bangalore 560 065. University of Horticultural Sciences, Bagalkot – 587 102. University of Horticultural Sciences, College of Horticulture, Bengaluru-560 065

Key words: Genetic diversity, *Jasminum*, AFLP, wild, cultivated

Journal of Applied Horticulture, 2016, volume 18, issue 1, pages 25-29.

Abstract: Jasmines (*Jasminum* sp.), a native of tropical and subtropical region, are esteemed for their attractive fragrant flowers and essential oil. However, very meagre information is available on the genetic relatedness among species and cultivars of jasmine. This study analyzed genetic relatedness of 48 genotypes across 26 species using Amplified Fragment Length Polymorphism markers. Of the ten sets of primers screened, four sets were selected for the present investigation on genetic diversity. A total of 212 bands were scored, of which 90.5% were polymorphic. The relationship among genotypes was analyzed using Unweighted Pair Group method of cluster

analysis. Among 48 genotypes *J. auriculatum* formed a separate node while rest of the 47 genotypes formed two major clusters with two sub clusters in each. Cluster I comprised of 28 genotypes and cluster II had 19 genotypes. It was difficult to classify the genotypes either based on geographical region or based on their cultivation since there was assortment of wild and cultivated species. However the results reflect a high level polymorphism suggesting occurrence of genotypes of diverse genetic background that will be useful in breeding programmes.

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Further characterization of the action of pyridinedicarboxylic acids: multifunctional flower care agents for cut flowers of spray-type carnation

Shigeru Satoh, Yoshihiro Nomura, Shigeto Morita, and So Sugiyama

¹Faculty of Agriculture, Ryukoku University, Otsu 520-2194, Japan. ²Graduate School of Life and Environmental Sciences, Kyoto Prefectural University, Kyoto 606-8522, Japan. ³Kyoto Prefectural Institute of Agricultural Biotechnology, Seika Town, Kyoto 619-0224, Japan. * E-mail: ssatoh@agr.ryukoku.ac.jp

Key words: pyridinedicarboxylic acids; spray-type carnation; carnation cultivars; flower bud; time to flower opening; vase life; gross flower opening

Journal of Applied Horticulture, 2016, volume 18, issue 1, pages 3-6.

[Full text PDF |](#)

Abstract: Pyridinedicarboxylic acid (PDCA) analogs accelerate flower opening and retard senescence, which markedly extend the vase life of spray-type Light Pink Barbara (LPB) carnation. In the present study, we characterized the activity of these chemicals to develop a novel flower care agent for a practical use. A representative PDCA analog 2,4-PDCA is effective in a wide range of spray-type carnation cultivars, Barbara, Beam Cherry, Candle, Collin, Rascal Green and Scarlet Ostara, as well as LPB and Mule. Treatment of LPB flowers for the initial 24 h with 2,4-PDCA at 5 and 10 mM was almost as effective as the continuous treatment with the chemical at 2 mM.

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Morphological characterization of herbaceous *Phyllanthus*

spp. from Kerala

Shafna Kalarikkal, P. S. Udayan and M. Asha Sankar

¹Department of Plantation Crops & Spices, College of Horticulture, Vellanikkara, Thrissur District, Kerala, ² P.G. Department of Botany & Research Centre, Sree Krishna College, Ariyannur P.O., Guruvayur, Thrissur District, Kerala,

Key words: *Phyllanthus* spp., Kerala, herbaceous, morphology
Journal of Applied Horticulture, 2016, volume 18, issue 1, pages 30-33.

Abstract: *Phyllanthus amarus* Schum and Thonn belonging to Euphorbiaceae is reputed for its hepatoprotective activity against Hepatitis B virus. Preponderance of other herbaceous *Phyllanthus* spp. often leads to deliberate adulteration or substitution, lowering the efficacy of medication. Hence surveying agro ecological zones of Kerala and characterizing natural population of *Phyllanthus* spp. morphologically will ensure the correct identity. Exploratory surveys were conducted adopting purposive sampling procedure and accessions of *Phyllanthus* spp. were collected from different agro-ecological zones of Kerala (coastal, plains, midlands and high altitude regions) representing northern, central and southern Kerala. The collected accessions were identified using morphological key characters of herbaceous *Phyllanthus* spp. as described in Flora of Madras Presidency by Gamble and Fischer (1915-1936). No considerable variations were observed for characters like, growth habit, branching pattern, leaf margin, capsule colour, capsule shape and flower colour. Accessions representing *P. amarus* were found to have oblong leaflet shape, obtuse apex and round base. Dark green, light green and purple green stem colour and faintly mucronate to mucronate leaf apices were observed for the collected accessions of *P. urinaria*. The accession of *P. maderaspatensis* had obcordate leaf apex. Number of sepals and pedicel length were identified to be the non variable quantitative characters in *Phyllanthus*. Highest plant height, was observed for *P. virgatus* var. *gardnerianus*, inferring that it is the tallest herbaceous *Phyllanthus* spp among the collected ones. Broad leaves were observed in *P. rheedei* and longest leaflets in *P. virgatus* var. *gardnerianus* and *P. virgatus* var. *virgatus*.

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Optimizing the initial steps of immature endosperm culture of seeded banana (*Musa sapientum* L.) cultivar Bhutia of Bangladesh

P.R. Paul, A.H.K. Robin and M.R. Hossain

Department of Genetics and Plant Breeding, Bangladesh Agricultural University, Mymensingh-2202, Bangladesh.

Key words: *Musa sapientum* L, seeded banana, endosperm culture, seedlessness, triploid, callus blackening, cold treatment

Journal of Applied Horticulture, 2016, volume 18, issue 1, pages 34-38.

Abstract: The local Bangladeshi banana varieties, possessing similar brix percentage to that of commercial varieties, grow well under adverse conditions with minimum care but are less popular due to the presence of seed. Endosperm culture of seeded banana can produce triploid seedless varieties which can be cultivated commercially in unsuited environments with less agricultural inputs. The current study was conducted to optimize the initial steps of endosperm culture using the immature endosperm of seeded banana cultivar Bhutia. Young fruits at various stages were collected from the local banana gardens to find out suitable developmental stage of endosperm for culture. Endosperms of juvenile fruits at 25 days age, exhibited jelly state, was selected for culture because endosperm explants at that age survived the most in MS medium. It was observed that non-treated explants produced larger calli comparatively quickly than that of cold-treated explants. Largest calli (0.41 cm) within shorter time period (27 days after inoculation) was produced in MS medium additionally supplemented with 0.5 ppm 1-Naphthaleneacetic acid (NAA) besides 0.5 ppm 2,4-Dichlorophenoxyacetic acid (2,4-D) and 0.5 ppm Kinetin (Kn). The produced calli gradually became blackish in appearance and higher ascorbic acid content (480 mg/100g) was observed in blackish calli. Avoiding the blackening of calli derived from endosperm of seeded banana would be a challenge to establish a successful triploid production protocol in future.

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A rapid screening method for salt stress tolerance of onion genotypes

Fatih Hanci, Esra Cebeci and Ayse Fidanci

Atatürk Central Horticultural Research Institute, Yalova-Turkey.

Key words: Onion, *Allium cepa* L., *in vitro*, callus, salinity, embryo, explant

Journal of Applied Horticulture, 2016, volume 18, issue 1, pages 39-43.

Abstract: Salinity is one of the major limitations for onion growth and

productivity all over the world. There are several methods to determine of salt stress tolerance of plants such as germination tests, pots trials, *in vitro* experiments etc. This study was conducted for optimisation of rapid and practical method to compare onion genotypes under salinity conditions. In the first stage of the study, three explant types and twenty one combinations of plant growth regulators were tested for optimization of callus protocol. Callus indicate percentage (%), callus fresh weight (mg) and callus dry weight (mg) were measured on the 31st day. According to results, the best medium (MS + 2 mg/L 2,4-D + 0,5 mg/L BAP) and explant type (mature zygotic embryo) for the proliferation of callus were determined. After choosing the best hormone and explant type, the effect of salinity on callus induction was tested using different level of NaCl. Akgun-12 consistently performed the best in callus culture. Responses of onion cultivars were different for different parameters. The proposed method was simple to perform, as no long time is required, and offers a possibility to screen genotypes in any time of year.

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A new and simple baiting technique for easy isolation of *Phytophthora palmivora* Butl. from bud rot affected tissue of coconut

K.M. Sharadraj and R.Chandra Mohanan

Central Plantation Crops Research Insitute (ICAR), Kasaragod 671124 Kerala, India.

Key words: Baiting, coconut, bud rot disease, *Phytophthora palmivora*.

Journal of Applied Horticulture, 2016, volume 18, issue 1, pages 44-47.

Abstract: Earlier studies using different methods of isolations revealed that it is extremely difficult rather impossible in certain cases to isolate the pathogen, *Phytophthora* sp. from bud rot disease of coconut due to the presence of high population of other microorganisms like bacteria and fungi in the rotten tissue. Hence, it was very much imperative to develop an easy technique for isolations of *Phytophthora* sp. from samples collected from various locations. In the modified baiting method, different treatments were given to infected tissues before baiting with susceptible healthy plant tissues. Among the different treatments given to infected tissue, the treatment of keeping infected tissue in carbendazim (Bavistin 50 WP) 125 ppm + rifampicin 200 ppm solution was found to be better for successful infection of baits and successive isolation of *Phytophthora palmivora* (Mean 30%) irrespective of the baits used. Out of the seven types of baits used in this treatments, rachillae of young unopened

coconut inflorescence, leaves of *Loranthus parasiticus* (L.) Merr. and leaves and young fruits of badam tree (*Terminalia catappa* L.) were found to be superior to others (with 33-37% success in isolation) and they were statistically on par. Tender leaves of badam tree yielded the highest percentage (37) of isolation of *P. palmivora*, when used as bait in the treatment carbedazim + rifampicin solution containing rotten bud tissue of coconut palms. Hence it can be used for large scale isolation of *P. palmivora*.

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Population distribution of *Helicotylenchus* species on *Parkia biglobosa* (Jacq) Benth and its association with some horticultural crops in Southern Guinea Savanna Ecological Zone of Nigeria

F.Y. Daramola

Department of Biological Sciences, Covenant University, Ota Nigeria.

Key words: *Helicotylenchus* spp, *Parkia biglobosa*, population distribution, rainfall pattern, temperature changes, horticultural crops, *Celosia argentea*, *Colocasia esculentum*, *Azadirachta indica*, frequency rating, nematodes, Nigeria
Journal of Applied Horticulture, 2016, volume 18, issue 1, pages 48-53.

Abstract: The African locust bean (*Parkia biglobosa* Benth) is a perennial, deciduous fruit tree that is important for its myriad medicinal and nutritional benefits. The association of the spiral nematodes of the genus *Helicotylenchus* spp. with *P. biglobosa* has not been previously reported in Nigeria. Three *P. biglobosa* trees from University of Ilorin in the Guinea Savanna Ecological zone of Nigeria were purposively selected for nematode sampling for a period of five months (May to September). Eighteen field and horticultural crops were also surveyed to assess the population density of *Helicotylenchus* spp on selected agricultural crops in the local environment. Soil samples were collected monthly from the rhizosphere of *P. biglobosa* trees and also from the field crops to a depth of about 15 cm and within a 25 cm radius from the base of the plants. Vermiform nematodes were extracted from 250 g each of the composite samples using a modified Baermann extraction tray set-up. The spiral nematodes were frequently encountered in association with all the crops. Higher soil population of *Helicotylenchus* spp was recorded on *Celosia argentea*, *Colocasia esculenta* and *Azadirachta indica* at relative densities of 55.33, 42.11 and 25.6, respectively. The African locust bean trees also supported population build-up of *Helicotylenchus* spp which were found at a frequency rating of 100% in all the soil samples. Higher soil population of

Helicotylenchus spp were recorded in June and September, coinciding with the two rainfall peaks while lower nematode population was recorded in August, at the lowest ambient temperature. The study indicated spiral nematodes as abundant and often associated with many agricultural crops at University of Ilorin, Guinea savanna of Nigeria. *P. biglobosa* was a suitable host for *Helicotylenchus* spp while the rainfall pattern and temperature changes influenced the population distribution of soil nematodes in the local environment.

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Rose rootstocks position and auxins affect grafting take of Inca

Millicent Adhiambo Otiende, Julius Omondi Nyabundi and Kamau Ngamau

University of Kabianga, P.O Box 2030-20200, Kericho, Kenya. ¹Maseno University, P.O Box Private bag, Maseno, Kenya. ²Jomo Kenyatta University of Agriculture and Technology, P.O. Box 62,000 – 00200 Nairobi, Kenya.

Key words: Cutting position, rose rootstocks, NAA concentration, IBA concentration, endogenous carbohydrate, grafting take

Journal of Applied Horticulture, 2016, volume 18, issue 1, pages 54-60.

Abstract: Inadequate grafting take of some of the rose cultivars may cause economic losses. The study was conducted to determine the effects of cutting position (top, middle and bottom) of *Rosa hybrida* rootstocks (Natal Briar and Rosa Progress) and auxins (0 %, 0.4 % IBA and 0.2 % NAA) on rooting and grafting take of rose cultivar Inca. Changes in endogenous carbohydrate content during rooting were measured on days 0, 3 and 7 after sticking. The experiment was factorial in a completely randomized design. Interaction between cutting position and rootstock was significant ($P \leq 0.05$) for most of the parameters measured. The shoot height, root number, percent rooting and grafting take increased towards the basal position in Rosa Progress. In Natal Briar, the shoot and root growth parameters increased towards the top though non significant except grafting take that significantly increased towards the basal position. The auxin treated cuttings recorded significantly ($P \leq 0.05$) higher grafting take and rooting percentage than the control. 0.4 % IBA exhibited higher shoot height, leaf number and root number than 0.2 % NAA. The rootstock Natal Briar recorded significantly ($P \leq 0.05$) higher rooting percentage and grafting take than Rosa Progress. Middle and top position cuttings of Rosa Progress and Natal Briar recorded higher carbohydrate content, respectively than bottom position cuttings. Bottom position recorded

higher sucrose content on day 3 than days 0 and 7 after planting in Rosa Progress. Natal Briar exhibited significantly ($P < 0.05$) higher carbohydrate content than Rosa Progress. The increase in growth with top position cuttings of Natal Briar could be attributed to high carbohydrate content. The high growth responses in bottom position cuttings of Rosa Progress could be attributed to high sucrose content on day 3 after planting. The stem cuttings of rootstocks for top grafting rose cultivar Inca should be taken from bottom position cuttings of both rootstocks, and auxins should be applied to increase rooting and grafting take.

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Effect of plant density on mini-tuber production potential of potato varieties through micro-plants under net-house in North Eastern Himalayan region

A.K. Srivastava, S.K. Yadav, L.C. Diengdoh, R. Rai and T.K. Bag

ICAR-Central Potato Research Station, Shillong- 793 009 (Meghalaya), India.

Key words: Potato, micro-plants, plant density, yields potential, net-house.

Journal of Applied Horticulture, 2016, volume 18, issue 1, pages 61-63.

Abstract: The present study was conducted to standardize the crop geometry under net-house with micro-plants of two popular potato varieties, Kufri Himsona and Kufri Girdhari planted at two spacing *viz.*, 20 x 10 cm and 15 x 10 cm at Central Potato Research Station, Shillong during 2013 and 2014. The effect due to spacing and varieties was significant for all the plant growth and yield parameters except for plant survival among varieties. Plant survival was better in all treatments (> 80%). The plant growth was superior in terms of plant height, at wide spacing (20 x 10 cm) although canopy cover was more at narrow spacing (15 x 10 cm). Kufri Himsona exhibited better growth with more stem height, number of leaves/plant, stems per plant and better canopy cover at 30 DAP than Kufri Girdhari. Kufri Himsona yielded better in terms of numbers and weight of mini-tubers per plant as well as per unit area compared to the variety Kufri Girdhari. More number of tubers per plant was observed at closer spacing (15 x 10 cm) but better yield per plant was obtained at wider spacing (20 x 10 cm) due to increased competition for nutrients, space, sunlight *etc.* leading to an increase in number of tubers per plant but subsequent decrease in total tuber yield per plant at closer spacing. At closer spacing more small sized tubers were harvested (<3g to 20g) while at wider spacing more larger sized tubers were harvested (over 20g). Among varieties, Kufri Himsona yielded more large sized tubers as compared to Kufri Girdhari.

Thus depending on the seed size requirement and availability of area under net house, either narrow or wide spacing can be followed for production of mini-tubers from potato micro-plants in North Eastern Himalayan region.

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Assessment of genetic diversity in cucumber varieties using RAPD markers

Mahbube Someh, Ghaffar Kiani, Gholam Ali Ranjbar and Seyyed Mohamad Alavi

Department of Biotechnology and Plant Breeding, Sari Agricultural Sciences and Natural Resources University, Sari, Iran. ²Genetics and Agricultural Biotechnology Institute of Tabarestan, Agricultural Sciences and Natural Resources University, Sari, Iran.

Key words: Cucumber, Genetic diversity, Cluster analysis, RAPD markers

Journal of Applied Horticulture, 2016, volume 18, issue 1, pages 64-67.

Abstract: Cucumber (*Cucumis sativus* L.) is one of the most economically important plants in many countries of the world. The identification of cultivars is extremely important both for cultivation and breeding of crop plants. There is little known about the genetic relationships between cucumber genotypes in Iran. The genetic diversity and the relationships among 20 cucumber varieties were evaluated by RAPD markers. A total of 155 bands were generated with 15 RAPD primers, out of which 114 bands were polymorphic (73 %). The mean polymorphism index content (PIC) was 0.24. Considerable levels of polymorphism were observed within cucumber varieties. Cluster analysis based on Jaccard similarity coefficients grouped varieties into three main clusters. The data obtained from this study can be used to select suitable parents in hybridization breeding programs in cucumber.

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Impact of seed priming on vigour in onion (*Allium cepa* L.) seeds

C.N. Muruli, K. Bhanuprakash and B.C. Channakeshava

¹University of Agricultural Sciences, Bengaluru-560065, India. ²ICAR-Indian Institute of Horticultural Research, Bengaluru-560089, India. ³University of Agricultural Sciences, Bengaluru-560065, India.

Key words: Onion seeds, seed priming, seed vigour, seed ageing
Journal of Applied Horticulture, 2016, volume 18, issue 1, pages 68-70.

Abstract: An investigation was undertaken to identify the effect of seed priming on vigour in fresh and aged seeds of onion (var. Arka Kalyan). It was observed that seed priming with GA₃ (50 ppm), KNO₃ (3 %) and PEG (-1.5 Mpa) were shown significant impact on germination and vigour. Aged seeds responded to the priming treatments effectively than fresh seeds. Among various treatments studied, there was an increase of germination in fresh seeds to the extent of 5 % due to treatment with GA₃, whereas in aged seeds it was to the extent of 11 % due to PEG treatment.

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Prohexadione-Ca provokes positive changes in the growth and development of habanero pepper

H. Ramrez, J. Mendoza-Castellanos, L.J. Ramrez-Prez, J.H. Ranca•o-Arrijoja V. Robledo-Torres, and R. Mendoza-Villarreal

¹Departamento de Horticultura, ²Direccien de Investigaci•n, Universidad Aut•noma Agraria Antonio Narro, Calz. Antonio Narro N•. 1923, Saltillo, Coahuila, C.P. 25315. Mexico.

Key words: *Capsicum chinense* Jacq., growth retardant, capsaicin, antioxidants, gibberellins.

Journal of Applied Horticulture, 2016, volume 18, issue 1, pages 7-11.

[Full text PDF](#) |

Abstract: In recent years, the cultivated area of habanero pepper (*Capsicum chinense* Jacq.) has grown in Mexico as a result of increasing the culinary diet among consumers and the knowledge on its high healthy components such as antioxidants, vitamins and nutrients. The actual worldwide demand of this vegetable requires the application of new production systems in order to increase yield per hectare as well as to improve the fruit quality of this commodity. The use of growth retardants is an alternative for this challenge, therefore, the effect of prohexadione-Ca (P-Ca) was evaluated on the vegetative growth, gibberellins at the stem apex, yield and antioxidants content in ripen fruits of habanero pepper cv. Jaguar. The dosages of P-Ca

were: 0, 100, 175 and 250 mg L⁻¹ sprayed to seedlings at one (10 days after transplanting) or two (10 and 31 days after transplanting) occasions. Results showed that P-Ca temporally reduced growth in height and diameter of main stem. This effect was related with a reduction in the synthesis of gibberellins A1, A4 and A7 at the apex. The fruit number and yield per plant increased with one application of P-Ca (at 175 mg L⁻¹). The content of capsaicin and total carotenoids showed a remarkable increment in ripen fruits when plants have received one application of P-Ca at any concentration.

Volume 18(1), 2016

Effect of chemicals and physical means on harvesting span, yield and quality of litchi (*Litchi chinensis* Sonn.) cv. Rose Scented

M. Pal, R.L Lal, P. Nautiyal and P. Joshi

Department of Horticulture, College of Agriculture, G.B. Pant University of Agriculture and Technology, Pantnagar-263145, U.S. Nagar (Uttarakhand), India. E-mail: pankajnautiyal2009@gmail.com

Key words: Shade, GA3, BA, litchi, quality, maturity time

Journal of Applied Horticulture, 2016, volume 18, issue 1, pages 71-75.

Abstract: An investigation was carried for extending harvesting span of litchi (*Litchi chinensis* Sonn.) cv. Rose Scented on twenty year old litchi trees at Pantnagar, U.S. Nagar (Uttarakhand, India). The experiment consisted of 10 treatment [30% shade net (T1), 50% shade net, (T2), 20 ppm GA3 (T3), 40 ppm GA3 (T4), 20 ppm BA (T5), 40 ppm BA (T6), 4% KNO₃ (T7), perforated polyethylene bagging (T8), STS, 10 m Mol (T9) and Control (T10)] in Randomized Block Design with four replications. The application of KNO₃ @ 4% resulted in significantly higher fruits set per panicle (64.93). Maximum fruit drop of 79.05 per cent was observed under control while under shade net (30%) 71.91 per cent fruit drop was checked. Shade net (50%) checked the fruit cracking (4.49%) whereas; maximum fruit cracking took place in untreated trees. The maximum delay in harvest (16 days) was recorded in shade net 50% closely followed by shade net 30% (14 Days). Significantly more fruit yield per tree (116.50 kg) was recorded in shade net (50%). Treatment of GA3 (40 ppm) being *at par* with BA @ 20 and 40 ppm exhibited significantly more TSS, total sugars and non-reducing sugars. Application of KNO₃ @ 4% exhibited significantly highest reducing sugars and significantly lower titratable acidity, however, difference in ascorbic acid content were found to be non-significant among different treatments. Shading delayed the

harvesting span and maximized fruit quality and yield of litchi.

Volume 18(1), 2016

Media standardization for pre-hardening and hardening of *in vitro* regenerated plantlets of Gerbera cultivars

S.K. Patra and S. Beura

Department of Floriculture and Landscaping, College of Agriculture, OUAT, Bhubaneswar, India

Key words: Gerbera, pre-hardening, hardening, MS liquid medium

Journal of Applied Horticulture, 2016, volume 18, issue 1, pages 76-79.

Abstract: Experiment was carried out to standardize media for pre-hardening and hardening of *in vitro* regenerated plantlets taking two cultivars of gerbera namely Red Star and Jallisse. During hardening, soil, sand, FYM and coco peat mixture with a proportion of 1:1:1:1, 1:1:1:2, 1:1:2:1, 1:2:1:1, ½:1:1:1, ½:1:1:2, ½:1:2:1, ½:2:1:1, respectively and control (only soil) were tried for transplanting the regenerated plants. Among these, soil: sand: FYM: coco peat in ½:1:1:2, ½:2:1:1 and ½:1:1:1 proportion for cv. Jallisse and ½:1:1:2 proportion for cv. Red star were found to be most promising combinations for 100% survival of regenerated plants in both the cultivars.

Volume 18(1), 2016



PCR mediated detection of sex and PaLCuV infection in papaya - A review

Sangeeta Saxena, Vijay K. Singh and Saurabh Verma

Department of Biotechnology, Babasaheb Bhimrao Ambedkar University, Vidya Vihar, Lucknow., India

Key words: Geminivirus, multiplex PCR, Begomovirus, PaLCuV, coat protein.

Journal of Applied Horticulture, 2016, volume 18, issue 1, pages 80-84.

[Full text PDF |](#)

Abstract: The global papaya cultivation faces a major threat from various fungal and viral diseases, apart from the uncertainty in the identification of sex

at juvenile stage. In case of papaya, only female and hermaphrodite plants bear fruits and the diagnostics discriminating male, female and hermaphrodite based on molecular markers used widely for sex determination, can be of great help. On the other hand, the papaya cultivation faces major challenge by leaf curl disease, which needs to be detected timely and simultaneously along with respective sex in order to achieve a higher yield. This review highlights the significance and detection of papaya sex and virus using molecular approaches; however, the authors feel that using multiplex PCR, a reliable and cost-effective technique giving results in a single attempt is by far the best approach. These molecular diagnostics may save papaya industry and give farmers a complete package of healthy (virus free) female/hermaphrodite seedling.

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Volume 17(3), 2015



Inoculation of sweet potatoes with AM fungi produced on-farm increases yield in high P soil

D.D. Douds Jr., J. Lee, J.E. Shenk and S. Ganser

USDA-ARS ERRC, 600 E. Mermaid Lane, Wyndmoor, PA 19038 [DD, JL];
Shenk's Berry Farm, 911 Disston View Drive, Lititz, PA 17543 [JS]; and Eagle
Point Farm, 477 Hottenstein Road, Kutztown, PA 19530 [SG].

Key words: Arbuscular mycorrhizal fungi, on-farm inoculum, *Ipomoea batatas*, sustainable agriculture

Journal of Applied Horticulture, 2015, volume 17, issue 3, pages 171-175.

[Full text PDF](#) |

Abstract: Vegetable farmers who grow seedlings for later outplanting to the field have the opportunity to incorporate arbuscular mycorrhizal [AM] fungus inocula into potting media to produce plants ready to benefit from the symbiosis upon outplanting. Inocula of AM fungi are available commercially or may be grown on-farm. The impact of AM fungus inoculum produced on-farm upon yield of sweet potato (*Ipomoea batatas* L.) was studied in a field experiment over six site-years. Rooted cuttings were inoculated with AM fungi either directly in the planting hole or were grown first in a greenhouse in potting media amended with AM fungus inoculum. Controls received the same compost and vermiculite mixture in which the inoculum was grown. Available P levels in the soil ranged from 242 to 599 kg ha⁻¹. Mean increase in yield of sweet potatoes of the inoculated plants for the experiment was statistically significant at 10.0 ± 1.9 % over uninoculated controls. Further, roots collected at the time of harvest indicated significantly greater colonization by AM fungi of previously inoculated plants than in controls which became colonized by the indigenous population of AM fungi. Utilization of AM fungi produced on-farm reliably increased the yield of sweet potato in high P soils.

Volume 17(3), 2015



Comparative effects of kaolin and calcium carbonate on apple fruit surface temperature and leaf net CO₂ assimilation

H.L. Alvarez, C.M. Di Bella, G.M. Colavita, P. Oricchio and J. Strachnoy

Facultad de Ciencias Agrarias, National University of Comahue, Ruta 151 km 12, 8303 Cinco Saltos R.N., Argentina Instituto de Clima y Agua – INTA – Los Reseros y Las Cabañas S/N (B1712WAA), Castelar, Buenos Aires, Argentina.

Key words:

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[Full text PDF |](#)

Abstract: The use of reflective particles on apple fruits has been suggested as a tool to diminish its thermal charge and thus mitigate stress effects caused by high temperature. The products effectiveness is often expressed in terms of damaged fruit, however it is influenced by the sensitivity of the variety, growing conditions and application method. Therefore, it is necessary to quantify the temperature of the fruits surface (FST) achieved according to the residue deposited to determine the degree of thermal protection for each product. Moreover, the residue deposited in the canopy enhances the albedo on the leaves reduces the availability of incidental light. The goal of this work was to evaluate the efficiency of reflective particles in the reduction of superficial temperature of the fruits and its effect on net CO₂ assimilation rate (A_{CO_2}) in apple trees (*Malus domestica*, Borkh). The fruits were treated with: one, two and four (1X; 2X and 4X) applications of kaolin (treatment K) or calcium carbonate (treatment C) at 2.5% P/V and untreated fruit as control. The residue effect on A_{CO_2} was evaluated in individual leaves at 2X concentration. Both products showed a thermic protective effect as compared with control. The protection degree depended upon the concentration. The highest temperature of the control was 49.8 °C and in these conditions kaolin was significantly more effective than carbonate, the thermic reduction was 1.9 °C vs. 1.3 °C at 2X and 2.5 °C vs 2.1 °C at 4X for kaolin and carbonate, respectively. At 1X there were no statistical differences between products. In turn A_{CO_2} is only negatively affected under low intensities of light (< 700 $\mu\text{moles m}^2 \text{s}^{-1}$ of PAR). Higher radiation levels compensate the shading effect over leaves and also the maximum A_{CO_2} (A_{max}) was not affected.

Volume 17(3), 2015



Use of optical sensors to monitor *Gaillardia* Foug. nitrogen status

Bruce L. Dunn, Arjina Shrestha, Carla Goad and Amir A. Khoddamzadeh

Department of Horticulture and Landscape Architecture, Oklahoma State University, 358. Ag Hall, Stillwater, Oklahoma, USA. 74078-6027. Department of Statistics, Oklahoma State University, 301F MSCS Bldg., Stillwater, Oklahoma, USA. 74078-6027. Department

Key words: Blanket flower, fertilizer, plant quality, greenhouse, NDVI, SPAD
Journal of Applied Horticulture, 2015, volume 17, issue 3, pages 181-185.

[Full text PDF](#) |

Abstract: Greenhouse production of *Gaillardia* is becoming increasingly popular for potted production due to growing interests in drought tolerant plant material. The objective of this study was to see if nondestructive handheld sensors could be used to monitor nitrogen (N) status in *Gaillardia aristata* 'Arizona Apricot'. Topdressed fertilizer treatments of 0, 4, 8, 10, or 12 g of controlled release fertilizer (CRF) 16N-3.9P-10K were added to greenhouse grown plants. Individual plants were scanned from 10 pots per treatment for Normalized Difference Vegetative Index (NDVI) and Soil-Plant Analyses Development (SPAD) over eight different sampling dates starting 7 days after fertilizer treatment application (DAT). Height, width, leaf N concentration, and number of panicles were also recorded. Linear, cubic, and quadratic trends were seen for NDVI and SPAD. Plant height was greatest in the 10 g treatment, but was not different than any other treatment. Plant width was greatest in the 12 g treatment, but was not different from the 4 g and 10 g treatments. Number of panicles was highest in the 12 g treatment, but was not different from the 10 g fertilizer treatment. Neither sensor showed correlations with leaf N concentration 7 DAT; however, the NDVI sensor showed the earliest correlation with leaf N concentration starting 14 DAT. Both sensors were correlated with each other at 35, 42, and 56 DAT. Results from this study indicate that 10 g CRF was sufficient for plant growth and flowering. Both sensors can be used to predict N status in potted *Gaillardia*; however, consistency in sample collection and sampling time may be necessary to correlate values with N status.

Volume 17(3), 2015



***Lactuca sativa* biofertilization using biofilm from *Bacillus* with PGPR activity**

Mirta Esther Galelli, Gabriela Cristina Sarti and Silvia Susana Miyazaki

rea de Agroalimentos. Departamento de Biología Aplicada y Alimentos. Facultad de Agronomía. Universidad de Buenos Aires. Av. San Martín 4453, C1417DSE. Argentina.

Key words: *Lactuca sativa*, biofertilizer, *Bacillus subtilis* subsp. *spizizenii*, PGPR activity, biofilm production, glycerol, culture conditions, immobilized cells, inoculant, sessile bacteria, planktonic bacteria, rhizosphere.

Journal of Applied Horticulture, 2015, volume 17, issue 3, pages 186-191.

[Full text PDF |](#)

Abstract: Biofertilizers can be an alternative to chemical fertilizer as they increase sustainable soil fertility without causing pollution; however, their major problem is the poor survival of the free cells in the soil. A possible solution is the use of cells immobilized in biofilms; it provides a more suitable microenvironment for prolonged cell survival and allows the interaction of the bacterium and its metabolites with the plant. In this work, the planktonic *Bacillus subtilis* subsp. *spizizenii* showed a PGPR activity on *Lactuca sativa*, increasing the weight, 64 % the aerial part and 68 % the roots growth. This bacterium was able to produce a thick biofilm using glycerol as a sole carbon source. Different culture conditions were evaluated for biofilm production. The shear stress and the oxygenation during bacterial culture affected negatively the biofilm formation; a mechanically disrupted biofilm never recovered its integrity. The optimum temperature for biofilm production was between 30 °C and 37 °C. The presence of different divalent cations salts affected the biofilm formation; 2 mM MgSO₄ and 1 mM FeSO₄ in static growth culture increased the biofilm production 36 % and 72 % respectively, and CoSO₄ and CuSO₄ affected negatively its formation. The immobilized cells had a PGPR effect; it showed a higher benefit as a biofertilizer than the planktonic form, producing an increment of 39 % of the aerial part and 59 % the roots growth.

Volume 17(3), 2015



***In vitro* explant sterilization and bud initiation studies of four strawberry cultivars**

M. Munir, S. Iqbal, J.U.D. Baloch and A.A. Khakwani

Fronteir Agriculture, SOYL Precision Crop Production Division, Newbury, RG14 5PX, United Kingdom. Faculty of Agriculture, Gomal University, Dera Ismail Khan, KPK, Pakistan.

Key words: Strawberry, *Fragaria* • *ananassa*, explants sterilization, *in vitro* bud initiation, media formulation

Journal of Applied Horticulture, 2015, volume 17, issue 3, pages 192-198.

[Full text PDF |](#)

Abstract: A series of *in vitro* experiments were conducted using four strawberry cultivars to investigate their survival response to different disinfectants, explants regeneration response to liquid and solid media, *in vitro* bud initiation response to BAP enriched media, clonal multiplication response to various BAP concentrations in MS and Knop media and bud initiation response to sugars sources. Highest meristem survival (75%) was recorded in cultivars Osogrande and Toro when treated with 0.5% NaOCl for 15 minutes, however, 75% explants of Chandler survived when treated with 1% NaOCl for 10 minutes. Similarly, maximum survival (58-71%) was observed in Chandler, Osogrande and Islamabad Local when internodal segments were treated with 0.5% NaOCl for 15 minutes. However, the survival percentage of these cultivars significantly varied at different NaOCl concentrations when petioles segments were used as explants. The results of second experiment indicated that highest rate of survival (79.20%) was achieved in Toro when meristems were cultured on solid MS media containing 0.5 mg/L GA₃. In another experiment, maximum percentage (83) of bud initiation was recorded in Osogrande at 0.5 mg/L BAP. Findings of experiment regarding clonal multiplication of *in vitro* shoots derived from meristem showed that maximum buds formation per culture (25, 20 and 15) were obtained in MS media containing 1.5 mg/L BAP and 0.1 mg/L IBA in cultivars Osogrande, Chandler and Islamabad Local respectively, however, similar buds formation response was varied with the cultivars when knop media was used. Similarly, when sugar sources were studied cultivar Osogrande initiated highest number of buds (20) at sucrose based MS media containing 0.8 mg/L Kinetin and 0.2 mg/L NAA, however, cultivars Chandler and Islamabad Local initiated 15 buds at sucrose based MS media containing 0.6 mg/L Kinetin and 0.2 mg/L NAA.

Volume 17(3), 2015



Quantifying postharvest losses along a commercial tomato supply chain in Fiji: A case study

S.J.R. Underhill and **Salesh Kumar**

Faculty of Science, Health, Education and Engineering, University of the Sunshine Coast, Maroochydore DC, Queensland, 4558, Australia. Queensland Alliance for Agriculture and Food Innovation, The University of Queensland, St Lucia Qld 4072, Australia.

Key words: Pacific, Fiji, supply chain, postharvest horticulture, food wastage, food security.

Journal of Applied Horticulture, 2015, volume 17, issue 3, pages 199-204.

[Full text PDF](#) |

Abstract: This paper reports on a detailed case study of postharvest losses along a commercial small holder tomato supply chain in Fiji. It is the first systematic quantification of postharvest horticultural losses undertaken in Fiji. Postharvest loss was measured from harvest through to product arrival at the Suva municipal fruit and vegetable markets, with post-municipal market loss determined using simulated storage conditions. In this study, 32.9% of the harvested product was removed from the commercial supply chain due to rots (8.8%), failure to ripen (8.9%), insufficient volume fill a carton (7.8%), physical damage during transport (0.1%) and fruit being over-ripe (6.4%). Poor temperature management during on-farm product ripening and limited on-farm postharvest hygiene were key contributors to the observed loss. In trace-back studies to identify the end-use of all product removed from the commercial chain, of the 32.9% total commercial postharvest loss, 11.0% was consumed at home and/or traded within the village, 6.3% was fed to domestic livestock, and a further 14.7% ended up as on-farm waste or dumped at the municipal refuge. Based on simulated ambient storage condition, once the fruit arrived at the municipal markets, daily postharvest loss thereafter was between 8.3% and 13.4%. Overall accumulative postharvest losses based on three days post-market ambient storage was 60.8%. Postharvest ripening, storage and transport conditions along the supply chain are discussed.

Volume 17(3), 2015



Evaluation of colour behavior during ripening of Banganapalli mango using CIE-Lab and RGB colour coordinates

V. Eyarkai Nambi, K. Thangavel, S. Shahir and V. Geetha

Department of Food and Agricultural Process Engineering, Tamil Nadu Agricultural University, Coimbatore, India.

Key words: Banganapalli, ripening, RGB, Lab colour values, colour coordinates, ripening prediction, colour changes, total colour difference

Journal of Applied Horticulture, 2015, volume 17, issue 3, pages 205-209.

[Full text PDF |](#)

Abstract: Machine dependent (RGB) and machine independent (CIE-Lab) colours were measured during ripening of Banganapalli mangoes, at 24 h interval and evaluated throughout the ripening period. The machine dependent colour coordinates red (R), green (G) and blue (B) were extracted from the digital images of mangoes taken every day. All the colour coordinates were increasing significantly during the ripening of mango. In total colour difference, major change was observed during 10th day. A steep rise was found in hue angle between 10-11th day of ripening. Chroma was increasing up to 20th day and started decreasing. It was found that, the R and G would be more suitable to predict the ripening colour change rather than B value. In case of ratios, the red ratio (R/B), the green ratio (G/B) and both blue ratios would be suitable to predict the ripening of mangoes. These observations could be used as one of the nondestructive tools for mango quality evaluation, mango ripening and optimization studies.

Volume 17(3), 2015



Morphological characteristics and ancestry of Japanese garlic clones • An overview

Yoshihiko Shiga, Sakio Tsutsui and Tetsuo Mikami

Hokkaido Agricultural Laboratory for Business Development, Eniwa, 061-1405, Japan.

Key words: *Allium sativum* L., garlic, genetic diversity, germplasm, morphological characteristics

Journal of Applied Horticulture, 2015, volume 17, issue 3, pages 210-212 .

[Full text PDF |](#)

Abstract: Garlic (*Allium sativum* L.) is an ancient and clonally propagated crop that has been under rather continuous selection since antiquity. In Japan, each garlic-growing region had its own local cultivars (clones) at one time. This is still the case in some regions, but with expanding transport networks and the requirements for high yield of commercial quality, only a few clones dominate the garlic production in the country. Here we describe the morphological characteristics of Japanese garlic clones. The review also focusses on the possible ancestry of Japanese garlics inferred from molecular genetic analysis.

Volume 17(3), 2015

Effect of intercrops on productivity, quality, leaf nutrient status and relative economic yield of apple cv. Red Delicious

Rifat Bhat, Sharbat Hussain, W.M. Wani, F.A. Banday and M.K. Sharma

Division of Fruit Science, Sher-e-Kashmir University of Agricultural Sciences & Technology of Kashmir, Shalimar, Srinagar 190 025, Jammu and Kashmir, India.

Key words: Intercropping, productivity, quality, leaf nutrient status, apple, relative economics

Journal of Applied Horticulture, 2015, volume 17, issue 3, pages 213-216 .

Abstract: The present investigations were conducted to assess the effect of intercrops like maize, pea, strawberry, cabbage, red clover, french bean, oats and clean cultivation (control) on productivity, quality, leaf nutrient status and relative economic yield of apple cv. Red Delicious. The results obtained revealed that the intercrops of leguminous nature like (pea, red clover, french bean) resulted in higher productivity, better quality fruits and increased leaf nutrient content in apple as compared to heavy feeder (requiring high level of soil nutrients) crops like maize, oats, strawberry and cabbage. However the apple plants intercropped with control (clean cultivations) performed better than heavy feeder crops. The impact of intercrops on relative economics of apple (system equivalent yield) revealed that the apple plants intercropped with pea gave a net income of Rs 291814.00 per ha with benefit : cost ratio of 1.71 followed by cabbage Rs 224428.00 per ha with the benefit: cost ratio of 1.41 and red clover with a net income of Rs 232395.00 with benefit : cost ratio

of Rs 1.40, respectively.

Volume 17(3), 2015

Analysis of *Aegle marmelos* (L.) Corr. diversity using citrus based microsatellite markers

Chandra Kant Sharma and Vinay Sharma

Department of Bioscience and Biotechnology, Banasthali University, Rajasthan, India-304022.

Key words: Simple sequence repeat, *A. marmelos* (L.) Corr., heterozygosity.

Journal of Applied Horticulture, 2015, volume 17, issue 3, pages 217-221.

Abstract: Analysis of diversity by citrus based microsatellite set in *Aegle marmelos* (L.) Corr. was undertaken because molecular markers are DNA based markers and reveal the genetic diversity which is more universal. Genetic diversity of *A. marmelos* was measured by using 10 microsatellite markers. A total of 47 alleles were detected in *A. marmelos* across the 10 loci investigated, all these alleles were polymorphic, thus revealing a level of 100% polymorphism. The number of observed alleles assorted flanked by 4 to 7 with mean 4.7 ± 1.059 alleles at each locus. The experimental no. of alleles intended for every 10 loci gone beyond the effectual no. of alleles that assorted between 1.384 and 3.164 with an average value 1.995 ± 0.11 . In present study the mean observed heterozygosity was $0.127 + 0.06$, which was not more than heterozygosity (expected). The expected heterozygosity varied from 0.164 (CCSM147) to 0.685 (CT19) with mean value 0.407 ± 0.177 . Since, observed heterozygosity is less than the expected heterozygosity seems to be due to inbreeding.

Volume 17(3), 2015

Enhancement of *in vitro* corm production in *Gladiolus* by periodically replacement of liquid media using coir matrix

A.K. Bera, T.R. Maity, A. Samanta, A. Dolai, B. Saha and S. Datta

Mahishadal Raj College, Mahishadal-721 628, West Bengal, India. Haldia Institute of Technology, Haldia-721 657, West Bengal, India.

Key words: Efficient protocol, coconut coir, *in vitro* corms, *Gladiolus*, RAPD, genetic fidelity

Journal of Applied Horticulture, 2015, volume 17, issue 3, pages 222-224.

Abstract: An efficient protocol was developed for mass scale *in vitro* corm production of *Gladiolus* (cv. 'White Friendship') using liquid culture and coconut coir explored as a matrix. The culture was initiated from the basal portion of the innermost leaf of the sprout. The cut surface of responding explant was swelled in MS solid basal media supplemented with 2 mg L⁻¹ NAA. Ten to fifteen shoot buds were observed when the responding explant was transferred in MS media with 2 mg L⁻¹ BAP and 0.2 mg L⁻¹ NAA. The high frequency of *in vitro* corms were initiated in liquid MS media supplemented with 0.5 mg L⁻¹ NAA and 6% sucrose in coir matrix. The corms with highest mean fresh weight (4570 mg) and diameter (25 mm) developed on periodically replaced media (every three weeks) than unchanged media. Using RAPD profiling, the genetic fidelity of *in vitro* raised corms were tested.

Volume 17(3), 2015



Physico-mechanical properties of sapota (*Achras sapota* L.)

Suchita V. Gupta, Vaishali R. Wankhade, Bhagyashree N. Patil and P.M. Nimkar
Department of Agricultural Process Engineering, Dr. Panjabrao Deshmukh
Krishi Vidyapeeth, Akola, 444104 Maharashtra.

Key words: Sapota fruit, dimensions, physical properties, post-harvest processing

Journal of Applied Horticulture, 2015, volume 17, issue 3, pages 225-229.

[Full text PDF |](#)

Abstract: Most of the sapota fruit processing methods employed is still traditional. It becomes imperative to characterize the fruits with a view to understand the properties that may affect the design of machines to handle their processing. Objectives of this study were to generate data for physical and mechanical properties of sapota fruit (cv. Kalipatti) in order to facilitate the design of some machines for its processing. The moisture content of sapota fruit was found to be 72 to 76% wb. The results showed that linear dimensions varied from 62.19 to 50.10 mm in length, 42.16 to 31.90 mm in width, and 41.42 to 27.40 mm in thickness. Average weight and volume of fruit were measured as 55.50 to 38.20 g and 587.7 to 408.3 cc, respectively. The bulk density, true density and porosity were 0.915 g/cc, 1.053 g/cc and 13.10%, respectively. The geometric mean diameter, sphericity and surface area were obtained as 41.81 mm³, 0.75, and 19715.81 mm², respectively. The average

static coefficients of friction were measured as 0.20, 0.18, 0.12 and 0.15 on plywood, galvanized iron, glass and acrylic surfaces, respectively. The average peak cutting force, energy used for cutting, specific energy, ultimate cutting stress and deformation of fresh sapota was found to be 73.96 N, 228.42 N cm, 1.23 N/cm, 0.40 N/cm² and 3.18 cm, respectively. The average peak puncture force, energy used for puncture, specific energy, ultimate puncture stress and deformation of fresh sapota fruit was found to be 62.17 N, 25.50 N cm, 0.13 N/cm, 0.33 N/cm² and 0.42 cm, respectively.

Volume 17(3), 2015

Performance of cocopeat amended media mixtures on growth and flowering of chrysanthemum

Simrat Singh, R.K. Dubey and S.S. Kukal

Department of Floriculture and Landscaping, Department of Soil Science, Punjab Agricultural University, Ludhiana-141004, India.

Key words: Chemical properties, cocopeat, farm yard manure, leaf mould, potted chrysanthemum, physical properties

Journal of Applied Horticulture, 2015, volume 17, issue 3, pages 230-235.

Abstract: Restricted pot volume and inadequate gaseous exchange in root zone environment restricts satisfactory growth and development of chrysanthemum plants. To this effect, an experiment was conducted to study the performance of cocopeat amended media mixtures in improving the root zone environment for satisfactory growth and flowering of chrysanthemum. The growing media mixtures such as farm yard manure and leaf mould as base media (25%) were amended with varying proportions each of soil: cocopeat (CP) as 75%:0; 50%:25%; 25%:50% and 0%:75% on volume basis. The media mixtures amended with increasing proportion of CP lowered the pH, bulk density, particle density and weight of the pots. The plants raised in media mixtures with increasing proportions of CP were observed to be well anchored and exhibited excellent quality of flowers. Utilizing 75% CP as a growing media amendment in FYM proved to be the best media mixture for ideal growth and performance of potted chrysanthemum. Better aggregate stability provided by the base media and increased K content in CP coupled with improved physical characteristics of media mixtures provide a suitable reason to utilize CP as an alternative light weight potting media for an ideal display of pot mums.

Volume 17(3), 2015



Characterization of single spore isolates of *Volvariella volvacea* (Bulliard: Fries) Singer

A. Kaur and H.S. Sodhi

Department of Microbiology, Punjab Agricultural University, Ludhiana-141004, India.

Key words: *Volvariella volvacea*, single spore cultures, growth, enzyme activity, yield

Journal of Applied Horticulture, 2015, volume 17, issue 3, pages 236-240.

[Full text PDF |](#)

Abstract: *Volvariella volvacea* is a tropical mushroom with variable biological efficiency which may be stabilized through isolation of single spore cultures. Eighty seven single spore cultures (VAT-1 to VAT-87) of *V. volvacea* strain VV132 were isolated from three fruit bodies. The single spore cultures were characterized for their growth and enzyme producing capability followed by yield trials. Maximum growth rate was recorded in VAT- 81 and maximum biomass production was recorded in VAT-15 and VAT-82. On the basis of growth characteristics, twelve single spore cultures were selected for enzyme activity and cultivation trials along with the parent strain VV-132. Maximum endo-1,4- β -glucanase (EC 3.2.1.4) activity was recorded in VAT-82 (0.158U/h/mg). Maximum xylanase (EC 3.2.1.8) activity and exo-1,4- β -glucanase (EC 3.2.1.91) activity were recorded in VAT-15 (0.155U/h/mg and 0.083U/h/mg, respectively). The laccase (EC 1.10.3.2) activity was maximum for VAT-73 (3.66U/min/mL). In comparison to parent strain *V. volvacea* VV132, five single spore cultures VAT-15, VAT-26, VAT-33, VAT-73 and VAT-81 had shown higher yield whereas the number of fruit bodies was higher for single spore culture VAT-81. During the present study, these five *V. volvacea* single spore cultures have been identified as high yielding strains.

Volume 17(3), 2015

Software for monitoring the nutrient and irrigation levels in oil palm

K.L. Mary Rani, B. Narsimha Rao and M. Rambabu

Indian Institute of Oil Palm Research, Pedavegi, Andhra Pradesh., India.

Key words: Oil palm, software, database, irrigation, module, yield
Journal of Applied Horticulture, 2015, volume 17, issue 3, pages 241-242.

Abstract: Oil palm requires adequate irrigation and demands a balanced and adequate supply of nutrients for its growth and yield. Under irrigated conditions, studies were undertaken to standardize fertilizer and irrigation dose through fertigation and micro irrigation to improve nutrient and water-use efficiency, respectively. For these studies, the palm-wise data needs to be compiled and analysed to know the performance of various treatments. Software requirement analysis was done to identify the input and output characteristics of the experiments and related data management. Database modules were designed and developed in MS Access using the Visual Basic for Applications to record the palm-wise data on different characters and to retrieve information in the form of various reports for the selected period like day, month and year. User friendly screens were designed for this purpose. The software enables to retrieve the data on treatment means for various parameters and export it to Excel format for further analysis using any statistical software. The software was tested for its function and is implemented.

Volume 17(3), 2015



PRSV resistance in papaya (*Carica papaya* L.) through genetic engineering: A review

Swati Kumari, Mala Trivedi and Maneesh Mishra

ICAR - Central Institute for Subtropical Horticulture, Rehmankhera, P.O. Kakori, Lucknow, India. Amity Institute of Biotechnology, Amity University, Lucknow Campus, Uttar Pradesh, India.

Key words: Transgenic papaya, coat protein, papaya ring spot virus, microprojectile, *Agrobacterium*

Journal of Applied Horticulture, 2015, volume 17, issue 3, pages 243-248.

[Full text PDF |](#)

Abstract: Papaya is the first fruit crop which was not only successfully genetically engineered but also deregulated and commercialized. Pathogenic derived resistance was utilized for harnessing PRSV resistance. *Coat protein* gene from PRSV was invariably used to confer resistance against papaya ring spot virus. Microprojectile transformation has been the most preferred

pathway. However, several reports are also available involving *Agrobacterium* pathway. Majority of workers found somatic embryos as the explant of choice for genetic manipulation in papaya compared to other explants. This paper highlights the global status of development of genetically engineered papaya for viral resistance.

Volume 17(2), 2015



Shade effects on growth, flowering and fruit of apple

S.S. Miller, C. Hott and T. Tworkoski

USDA-ARS, 2217 Wiltshire Road, Appalachian Fruit Research Station, Kearneysville, WV 25430, USA.

Key words: Apple, carbohydrate, fruit quality, productivity

Journal of Applied Horticulture, 2015, volume 17, issue 2, pages 101-105.

[Full text PDF](#) |

Abstract: Light is a critical resource needed by plants for growth and reproduction. A major portion of the apple (*Malus x domestica* Borkh.) tree's canopy is subjected to shade during most daylight hours each day and such shade may affect productivity. The current research determined effects of morning, afternoon, and all-day shading on processes that are significant to orchard productivity. In 1996 'Ginger Gold'/M.9 apple trees were planted in the field near Kearneysville, WV and shade treatments were imposed from 2002 to 2005. Trunk and branch growth were reduced consistently by morning shade (MS) compared to no shade (NS) and full shade (FS) and afternoon shade (AS) had intermediate effects. Total branch growth from 2002 to 2005 was 164, 168, 145, and 157 cm for FS, NS, MS, and AS, respectively. Although shade affected yield inconsistently from year-to-year, total yield from 2002 to 2005 was 7.8, 201.6, 72.5, and 110.6 kg/tree for FS, NS, MS, and AS, respectively. Time of shading clearly affected yield with full shade causing the greatest reduction, followed by partial shade treatments, MS and AS. Concentrations of soluble carbohydrates, particularly sorbitol, were greater in leaves of AS compared to MS. It is postulated that MS may have adversely affected photosynthesis at a time of day that was most conducive to high net assimilation. Planting and training apple trees to minimize shade, especially morning shade, may benefit orchard productivity.

Volume 17(2), 2015



Black rot control and bud cold hardiness of "Noiret" winegrape

Eric T. Stafne, Becky Carroll and Damon Smith

Coastal Research and Extension Center, Plant and Soil Sciences Department, Mississippi State University, Poplarville, MS, USA 39470, 1-601-403-8939.

¹Agricultural Hall, Department of Horticulture, Oklahoma State University, Stillwater, OK, USA

Key words: Disease control, disease severity, *Guignardia bidwellii*, interspecific hybrid, organic, vine stress, *Vitis* spp.

Journal of Applied Horticulture, 2015, volume 17, issue 2, pages 106-108.

[Full text PDF](#) |

Abstract: Black rot, caused by *Guignardia bidwellii* (Ellis) Viala and Ravaz, and bud cold hardiness are both management issues in eastern U.S. viticulture. Black rot infections lead to vine stress, resulting in premature defoliation and rotten fruit, potentially compromising cold acclimation of the vine. No studies have targeted bud cold hardiness in relation to severity of prior season black rot infection. Thus, in 2011, •Noiret•, a hybrid winegrape, was subjected to four black rot control treatments: conventional (C), organic 1 (O1), organic 2 (O2), and no spray (N). Leaves and fruit were scored for black rot severity. The O1 and N treatments had the highest level of leaf and fruit disease severity and were not significantly different. The C treatment had the least amount of leaf and fruit disease severity and the O2 treatment was intermediate and significantly different from the O1, N, and C treatments. Bud samples were taken in January, February, and March 2012 and exposed to subzero temperatures (-21 •C, -23 •C, -26 •C, -29 •C) in an ethylene glycolbath to assess if prior season black rot infection impacted primary bud hardiness. In January and March nearly all buds were still alive at -21•C and -23•C, but -29•C caused more damage. Black rot control treatments were not a statistically significant factor in the bud hardiness experiment. This could be due to black rot severity being below a critical threshold for impact or the vines had enough time to recover in late summer and fall to reach full mid-winter hardiness.

Volume 17(2), 2015



High efficiency *Agrobacterium*-mediated transformation of sour orange (*Citrus aurantium* L.) using gene encoding Citrus Tristeza Virus coat protein

Mohammad Mehdi Sohani, Mohammad Hosein Rezadoost, Amir Hosein Zamani, Mohammad Reza Mirzaii and Ali Reza Afsharifar

Biotechnology Department, College of Agricultural Sciences, University of Guilan, Rasht, Iran. ²Plant Virology Research Center, College of Agriculture, Shiraz University, Shiraz, Iran.

Key words: Acetosyringon, *vir* gene induction, virus induce gene silencing, Citrus tristeza virus

Journal of Applied Horticulture, 2015, volume 17, issue 2, pages 109-114.

[Full text PDF |](#)

Abstract: Citrus trees are widely grown in tropical and subtropical climates due to their luscious taste, nutritional and medical benefits. Citrus fruits are native to southeastern Asia and are among the oldest fruit crops domesticated by humans. Breeding programs including the incorporation of genetic resistance to pests and diseases are necessary in this crop. Citrus tristeza virus (CTV) is of particular importance due to its rapid epidemic resulting in severe plant damage. The present research was aimed at transforming *Citrus aurantium* with a gene encoding virus coat protein from CTV through *Agrobacterium*-mediated transformation. P25 coat protein gene was identified and then isolated from different CTV strains. Two regions of the gene were conserved among the genera and subcloned as a single chimera into a pFGC5941 silencing vector. Epicotyls-originated explants of *C. aurantium* were transformed by EHA105 strain of *Agrobacterium tumefaciens*. Some of the effective factors in gene transformation were examined by inoculation methods with *Agrobacterium* such as Acetosyringon effect (0, 50, and 100 μ M), inoculation time (5, 10, 15, 20, and 25 min), and co-cultivation period (1, 2, 3 and 4 days). Based on our results, maximum number of transformed plants (13.7%) were obtained under combined treatment of 50 μ M acetosyringone after 15 min inoculation time and 2 days of co-cultivation with *Agrobacterium*. One of the advantages of the current protocol is regeneration of explants through direct organogenesis which avoid callus phase and consequently somaclonal variation.

Volume 17(2), 2015



Characterization of a new leaf-compound radish mutant (*Raphanus sativus* L.)

Fenghua Wang, Guangyuan Li, Shuangchen Chen, Yan Jiang and Shaoxian Wang
Forestry College, Henan University of Science and Technology, Luoyang
471003, China.

Key words: Radish, mutant, compound leaf, microstructure, SRAP

Journal of Applied Horticulture, 2015, volume 17, issue 2, pages 115-120 .

[Full text PDF |](#)

Abstract: Previously we have developed a method, which uses two criteria, 'time to flower opening' and 'vase life', for characterizing flower opening profiles in cut spray-type flowers of carnation. These two criteria were used to evaluate the activities of flower preservatives, which accelerate flower bud opening, resulting in shortening the time to flower opening, and delay senescence, resulting in extension of vase life. In the present study, we developed the third criterion 'gross flower opening' which characterizes the ability of flower buds to open. Using this criterion the activity of analogs of pyridinedicarboxylic acids was successfully evaluated in addition to the previously-reported evaluation of their activity of acceleration of flower bud opening and extension of vase life.

Volume 17(2), 2015



Effect of various factors on shoot regeneration from citrus epicotyl explants

Randall P. Niedz*, Joseph P. Albano and Mizuri Marutani-Hert

Agricultural Research Service, U.S. Horticultural Research Laboratory, 2001
South Rock Road Ft. Pierce, FL34945-3030, USA

Key words: Water, nonionic surfactants, gelling agents, malachite green, sodium sulphate, *Citrus sinensis* L. Osbeck. x *Poncirus trifoliata* L. Raf., C. sunki Hort. ex Tanaka. x *Poncirus trifoliata* L. Raf., C. paradisi Macf., C. sinensis L. Osbeck

Journal of Applied Horticulture, 2015, volume 17, issue 2, pages 121-128.

[Full text PDF](#) |

Abstract: The effect of various treatments on shoot organogenesis from seedling epicotyl explants from various scion and rootstock polyembryonic citrus types was determined. Treatments included water source, gelling agent, explant insertion, seed size, light intensity, malachite green, nonionic surfactants, and sodium sulphate. Tap water, with the highest levels of SO₄²⁻, Ca²⁺, K⁺, Mg²⁺, and Na⁺, resulted in the most shoots compared to the other 5 sources, suggesting a mineral nutrient effect. Carrageenan produced fewer shoots than agar and gellan gum. Explants inserted into the medium produced more shoots than those cultured on the surface, presumably because of better exposure to water and nutrients. Seed size, light intensity, malachite green, and sodium sulphate had no effect on the number of shoots regenerated. Triton X-100 at 0.1 % resulted in significantly fewer shoots; otherwise, nonionic surfactants had no effect.

Volume 17(2), 2015



Suitable and available land for cashew (*Anacardium occidentale* L.) in the island of Lombok, Indonesia

Widiatmaka, Wiwin Ambarwulan, Atang Sutandi, Kukuh Murtilaksono, Khursatul Munibah and Usman Daras

Department of Soil Soil Science and Land Resources, Bogor Agricultural University, Indonesia. Geospatial Information Agency, Indonesia. ³Indonesian Agency for Agricultural Research and Development, Ministry of Agriculture, Indonesia.

Key words: Geographic information system, horticultural crop, land evaluation, land use planning

Journal of Applied Horticulture, 2015, volume 17, issue 2, pages 129-139.

[Full text PDF](#) |

Abstract: Cashews have a potential economic value for local people, and as a conservation plant that is appropriate for small islands, which usually have limited resource capacities. The research for this paper was conducted on Lombok Island, Indonesia with the objective to delineate the potential areas for cashew, based on land availability and land suitability. Land availability was

analyzed by taking into account the land use and land cover maps interpreted from SPOT-6 imagery, a Forest Areas Status map and a map from the Official Spatial Land Use Plan. The evaluation of the land's suitability for cashews was conducted at a land mapping unit resulting from a soil survey, carried out at a scale of 1:25,000. The suitability analysis was done using a maximum limitation method, where the suitability level was defined by the lowest soil characteristics which determined the plant's requirements. The land evaluation criteria were established in previous research, which included this island as an area of criteria establishment. The research results show that the land on this island has suitability status for cashews ranging from S2 (moderately suitable) to N (not suitable). The limiting factors include water availability, nutrient retention, available nutrients and rooting media, some of which can be improved. According to the available and suitable land, an area of 4,075.6 ha can be assigned as first priority, 18,167.3 ha as second priority and 43,582.8 ha as third priority for cashew expansion areas.

Volume 17(2), 2015



Effects of pre-harvested N-(2-chloropyridin-4-yl)-N-phenylurea (CPPU) spraying on the improvement of flower quality of *Dendrobium Sonia Earsakul*

S. Abdullakasim, K. Kaewsongsang, P. Anusornpornpong and P. Saradhuldhath
Department of Horticulture, Faculty of Agriculture at Kamphaeng Saen,
Kasetsart University, Kamphaeng Saen, Nakhon Pathom-73140, Thailand.

Key words: *Dendrobium*, cytokinin; BA, inflorescence, pseudobulb, deformed flower

Journal of Applied Horticulture, 2015, volume 17, issue 2, pages 140-144.

[Full text PDF](#) |

Abstract: Improvement of flower quality is a major concern which plays a part in the enhancement of the marketability of the *Dendrobium* cut flower. In this study, both synthetic cytokinins: N-(2-chloropyridin-4-yl)-N-phenylurea (CPPU) and N-6-benzyladenine (BA), were foliar sprayed at rates of: 1, 5 or 10 mg L⁻¹ and 100, 200 or 400 mg L⁻¹, respectively, on current pseudobulbs of the *Dendrobium Sonia Earsakul* with 45-50 cm in length. The treatments were applied thrice at fortnight intervals, prior to terminal bud initiation. The results revealed that an application of 10 mg L⁻¹ CPPU significantly increased the

numbers of inflorescence per pseudobulb (from 1.1 to 1.7 flowers), and the number of flower on an inflorescence was increased from 12.2 to 13.8 flowers. The length and the diameter of flower inflorescence, having 10 mg L⁻¹ CPPU application, also increased from 49.4 cm to 55.1 cm, and 0.57 cm to 0.66 cm, respectively. In addition, the largest flower width and the highest fresh inflorescence weight were also obtained with application of 10 mg L⁻¹ CPPU treatment. Despite the application of BA, at 400 mg L⁻¹, enhancing the highest amount of flower counts of inflorescence (at 14.8 flowers), 33.3% of those inflorescence obtained at least one deformed flower. Overall, the results suggest that CPPU spray has a higher potential to elevate flowers, along with the inflorescence qualities of *Dendrobium Sonia Earsakul*. Furthermore, according to this study, CPPU has lower effects upon abnormal flower shapes, and their times of harvest.

Volume 17(2), 2015

Production, quality and aroma analysis of sapodilla (*Manilkara achras* (Mill) Fosb.) wine

K. Ranjitha, C.K. Narayana, T.K. Roy and A.P. John

Division of Post Harvest Technology, Division of Plant Physiology and Biochemistry, Indian Institute of Horticultural Research, Hessaraghatta Lake P. O., Bangalore-560089, India.

Key words: Sapodilla, wine, yeast, phenolics, wine clarification, head space volatiles

Journal of Applied Horticulture, 2015, volume 17, issue 2, pages 145-150.

Abstract: Process was standardized for preparation of fermented beverage from sapodilla (*Manilkara achras* (Mill) Foseberg). The starter culture using yeast strain *Saccharomyces cerevisiae* UCD 522 fermented juice from two sapodilla varieties viz., Cricket Ball and Oval, to obtain wines with 10.1-11.2 % alcohol, 0.44- 0.58 % acidity, 3.6-3.9 pH, 0.26-0.28 % residual sugar, 300-645 mg/L phenolics and <0.09 % volatile acidity in six to nine days at 18 °C. Retention of peel while pulping improved the phenolics level; but reduced the sensory quality of wine. Bentonite dosage and period required for clarification was optimized as 0.04 % for 14 days and 0.08 % for 21 days for production of wine from peeled fruits of Cricket Ball and Oval varieties, respectively. Sensory evaluation of dry, sweet, and flavored wines revealed the potential market acceptability of the wines. Head space volatile analysis showed the presence of new odorous compounds like esters and short chain fatty acids during vinification of sapodilla juice. Methoxy compounds and carbonyl fractions were

less in the finished wine compared to natural juice.

Volume 17(2), 2015

Effect of planting date on growth, development, aerial biomass partitioning and flower productivity of marigold (*Tagetes erecta* L.) cv. Siracole in Indo-gangetic plains of West Bengal

Khumukcham Joshna and P. Pal

Department of Floriculture and Landscaping, Faculty of Horticulture, Bidhan Chandra Krishi Viswavidyalaya (BCKV) Mohanpur, Nadia-741252, West Bengal, India.

Key words: Carotene, Meteorological Standard Weeks, planting time, *Tagetes erecta* L. cv. Siracole.

Journal of Applied Horticulture, 2015, volume 17, issue 2, pages 151-154.

Abstract: The investigation was carried out to evaluate the growth, flowering, yield and quality of African marigold cv. Siracole, as influenced by different planting dates. The crop planted on 9th June (T₃) was found to have the highest plant height (96.93 cm). Maximum number of primary (5.3) and secondary (14.15) branches/plant, total fresh weight (502.00 g/plant), contribution by stem (385.00 g/plant) to the total fresh weight, higher dry (126.25 g/plant) matter accumulation and also the dry matter accumulation in stem per plant (98.00 g/plant) were found maximum with 12 April (T₁) planting. The individual leaf area (4.73 sq cm) on 90 days after planting was significantly higher in the crop planted on 16 May (T₂). It took minimum days (13.01 days) from visible bud to colour shown and bud emergence to full bloom (20.16 days), maximum diameter of individual flower (3.99cm) were found with 12 April (T₁) planting. Heaviest flower (2.55 g) was recorded with October 12 (T₇) planting. 16th May (T₂) planting produced maximum number (7434.67) of flowers per plot (6.4 m²). Maximum carotene content was noted with 12th October (T₇) planting. Crops planted between 50th MSW (T₉) 2011 to 3rd MSW (T₁₀) 2012 produced very less crop biomass, dry matter content and flower yield.

Volume 17(2), 2015

Diversity of bee foraging flora and floral calendar of Paithan taluka of Aurangabad district (Maharashtra), India

Bhalchandra Waykar and R.K. Baviskar

Department of Zoology, Dr. Babasaheb Ambedkar Marathwada University, Aurangabad-431004 (Maharashtra), India.

Key words: Bee flora, floral calendar, honey flow period, dearth period, *Apis dorsata*, *A. cerana indica*, *A. florea*, *A. mellifera*.

Journal of Applied Horticulture, 2015, volume 17, issue 2, pages 155-159.

Abstract: The study was conducted at Paithan taluka of Aurangabad district during October 2012–September 2013 to identify existing bee flora and to determine honey flow and dearth period to develop the floral calendar. The flowering plants were visited and observed for the presence of honey bees and their foraging activities. Plants were reported as bee foraging species when at least three honey bees had visited the flowers within the period of 10 minutes. The result revealed that 63 plant species were useful to honeybees as source of food, out of which 41 were wild and 22 were agro-horticultural plants. The identified flora was further grouped into nectar, pollen and both nectar and pollen supplying plants. Out of 41 wild bee plant species, 17 were nectar producing, 4 were pollen producing and 20 were both nectar and pollen producing. Results also revealed that out of 22 agriculture bee plant species, 6 were nectar producing, 5 were pollen producing and 11 were both nectar and pollen producing. Mid-October to mid-December was identified as honey flow period of the year, having number of flowering plants. Mid-May to mid-August was the critical dearth period with few flowering plants. Based on the availability of flora, major characteristics of these plant species, utility status and flowering duration, the bee floral calendar was developed for Paithan taluka of Aurangabad district. The result indicated that the area has rich bee flora and is suitable for commercial bee keeping. Paithan taluka has four honey bee species, viz., *Apis dorsata*, *A. cerana indica*, *A. florea* and *A. mellifera*. Among these, *A. florea* and *A. dorsata* were dominant bee species, whereas *A. mellifera* was introduced species and only few colonies of *A. cerana indica* were observed.

Volume 17(2), 2015

Development of an efficient *in vitro* regeneration protocol in fig (*Ficus carica* L.)

S.S. Dhage, V.P. Chimote, B.D. Pawar, A.A. Kale, S.V. Pawar and A.S. Jadhav

State Level Biotechnology Centre, Mahatma Phule Krishi Vidyapeeth, Rahuri-413722, Maharashtra, India.

Key words: Fig, regeneration, genotype-specific, shoot tip culture, multiple shooting, rooting

Journal of Applied Horticulture, 2015, volume 17, issue 2, pages 160-164.

Abstract: The present investigation was undertaken to develop an efficient *in vitro* regeneration protocol in four fig cultivars *viz.*, Poona Fig, Brown Turkey, Conadria and Deanna. Highest shoot tip establishment was observed in Deanna (100 %), followed by Conadria (79.2 %) and Brown Turkey (76.7 %) on MS medium supplemented with 2.5 mg/L 6-benzylaminopurine (BAP), 0.5 mg/L gibberellic acid (GA₃). Establishment of shoot tips was very poor in cultivar Poona Fig (11.7-13.3 %). Further inoculation of shoots on MS medium supplemented with 1.0 mg/L indole-3-butyric acid (IBA) resulted in both multiple shooting as well as rooting. Significant number of newly formed shoots were observed in Conadria (4.7) and Deanna (3.8) as against in Brown Turkey (1) and Poona Fig (0.6). Highest root induction was observed in Conadria (73.3 %), followed by Deanna (52.2 %), Brown Turkey (26.7 %) and Poona Fig (24.4 %). These results confirmed that the shoot bud establishment and multiple shoot induction in fig is highly genotype specific. As the response of popular cultivar Poona Fig to shoot tip culture was very poor, tender leaf explants were further used for regeneration study. Optimum regeneration was observed using MS medium supplemented with 4.0 mg/L 2,4-dichlorophenoxy acetic acid (2,4-D) for callusing; 7 mg/L thidiazuron (TDZ) and 0.25 mg/L ?-naphthalene acetic acid (NAA) for shooting and 1.0 mg/L IBA for rooting.

Volume 17(2), 2015

Effect of packaging in extending shelf life of fresh curry leaves

Dawn C.P. Ambrose, S.J.K. Annamalai and Ravindra Naik

Central Institute of Agricultural Engineering, Regional Centre, Coimbatore-3, Tamil Nadu, India.

Key words: Curry leaf, prepackaging, color scores, physiological weight loss, volatile oil

Journal of Applied Horticulture, 2015, volume 17, issue 2, pages 165-168.

Abstract: Curry leaf, which is a leafy spice, used in Asian culinary has limited shelf life. Investigation was carried out to extend the shelf life of fresh curry

leaf by prepackaging in different packaging materials *i.e.*, polyethylene bags of 38 and 75 micron thickness, polypropylene bags of 20 and 38 micron thickness and stored under ambient (30±2°C) and refrigerated (5±1°C) conditions. It was found that prepackaging fresh and stripped curry leaf in polypropylene bag of 20 micron thickness with 0.1 % vent area of 5 mm diameter vent could prolong the keeping quality for 4 days under ambient storage. Also under refrigerated condition, under the same packaging treatment, the sample kept well for a period of 16 days in polyethylene bag of 75 micron thickness.

Volume 17(2), 2015



Cloning and characterisation of *APETALA3*-like and *PISTILLATA*-like B class MADS-box genes from sweet cherry

Kenji Beppu, Hidemi Sumida and Ikuo Kataoka

Faculty of Agriculture, Kagawa University, Miki, Kagawa 761-0795, Japan.

Key words: *AP3*, class B gene, double pistils, *PaPI*, *PaTM6*, *PI*, *Prunus avium*
Journal of Applied Horticulture, 2015, volume 17, issue 2, pages 87-91.

[Full text PDF |](#)

Abstract: We isolated *APETALA3* (*AP3*)-like and *PISTILLATA* (*PI*)-like cDNA clones called *PaTM6* and *PaPI* from sweet cherry (*Prunus avium*). *PaTM6* showed very high similarity to the *TM6* lineage of *AP3* of other Rosaceae species. *PaTM6* contained three amino acid residues (F, T, M) within the MADS box and the (H/Q)YExM sequence near the K box, both of which are characteristic of the *AP3* subfamily. A paleo *AP3* motif was present at the C-terminal end of *PaTM6*. *PaPI* showed very high similarity to *PI* of other Rosaceae species. *PaPI* had the serine residue and the KHEXL sequence within the MADS box and near the K box, respectively, both of which are characteristic of the *PI* subfamily. A *PI* motif was present at the C-terminal end of *PaPI*. Both *PaTM6* and *PaPI* genes were expressed specifically in petals and stamens, the same expression patterns as those of class B MADS-box genes. These results indicated that *PaTM6* and *PaPI* are homologues of *AP3* and *PI*, respectively.

Volume 17(2), 2015



Three criteria for characterizing flower opening profiles and display values in cut spray-type carnation flowers

So Sugiyama, Shigeto Morita and Shigeru Satoh

Graduate School of Life and Environmental Sciences, Kyoto Prefectural University, Kyoto 606-8522, Japan. ¹Kyoto Prefectural Institute of Agricultural Biotechnology, Seika Town, Kyoto 619-0224, Japan.

Key words: Flower bud opening, display value, pyridinedicarboxylic acids senescence, spray-type carnation, vase life.

Journal of Applied Horticulture, 2015, volume 17, issue 2, pages 92-95.

[Full text PDF](#) |

Abstract: Previously we have developed a method, which uses two criteria, 'time to flower opening' and 'vase life', for characterizing flower opening profiles in cut spray-type flowers of carnation. These two criteria were used to evaluate the activities of flower preservatives, which accelerate flower bud opening, resulting in shortening the time to flower opening, and delay senescence, resulting in extension of vase life. In the present study, we developed the third criterion 'gross flower opening' which characterizes the ability of flower buds to open. Using this criterion the activity of analogs of pyridinedicarboxylic acids was successfully evaluated in addition to the previously-reported evaluation of their activity of acceleration of flower bud opening and extension of vase life.

Volume 17(2), 2015



Evaluation of sensors for sensing characteristics and field of view for variable rate technology in grape vineyards in North Dakota

Ganesh C. Bora, Purbasha Mistry and Dongqing Lin

Department of Agricultural and Biosystems Engineering, North Dakota State University, Fargo, USA, ¹Natural Resource Program, North Dakota State University, Fargo, USA.

Key words: Vineyards, sensors, variable rate technology (VRT), tree-sensing
Journal of Applied Horticulture, 2015, volume 17, issue 2, pages 96-100.

[Full text PDF |](#)

Abstract: Sensors have been used to detect tree sizes for agrochemical and fertilizer applications in grape vineyards. Rugged and reliable sensors are required to measure the size and quality of tree canopy volume for variable rate fertilizer application. Real time sensing is important as size of the tree changes with time due to biological factors and management practices. This study evaluated ultrasonic sensor, optical sensor and a laser sensor for their sensing characteristics and field of view (FoV) in a range of conditions. The FoV was established by moving targets perpendicular to the centerline on both sides. The maximum sensing range of sensors varied from 6 to 8 m with ultrasonic sensor having the highest range. The beam widths for ultrasonic sensors were found to be wide (maximum 950 mm) whereas optical sensor has a narrow maximum beam width of 70 mm. The laser sensor has a sharp beam and did not work well in outdoor environment with plant materials. Statistical analysis was also done for sensors and found that *P* value is lower than 0.001 and *R*² value closer to 1.0 which indicates significant better result in the vineyard for sensing characteristics.

Volume 17(1), 2015

Effect of vineyard shading on the composition, sensory quality and volatile flavours of *Vitis vinifera* L. cv. Pinot Noir wines from mild tropics

K. Ranjitha, S. Shivashankar, G.S. Prakash, P. Sampathkumar, T.K. Roy, and E. R. Suresh

Division of Post Harvest Technology, Division of Plant Physiology and Biochemistry, Division of Fruit crops, Indian Institute of Horticultural Research, Hessaraghatta Lake P.O., Bangalore-560089, India.

Key words: *Vitis vinifera*, Pinot Noir, aroma, GC MS, mesoclimate, headspace volatiles, phenolics.

Journal of Applied Horticulture, 2015, volume 17, issue 1, pages 03-06.

Abstract: The effect of vineyard shading on the composition, sensory quality and volatile flavours of grape wines from *Vitis vinifera* L. cv. Pinot Noir under Bangalore conditions, a region endowed with mild tropical climate, was studied. Wines from 50 and 75 per cent shaded vineyards were found to have better sensory appeal, significantly higher titratable acidity and lower levels of

phenolics than those from open conditions. The wine colour parameters *viz.*, hue and chroma, were significantly superior in wines prepared from berries of open vineyards. Head space volatile analysis showed that wines from shaded vineyards possessed higher levels of Pinot Noir aroma varietal specific compounds such as phenyl ethyl alcohol, methyl anthranillate, methyl and ethyl hexanoate, linalool, octanoic acid, and decanoic acids. The study showed the possibility of improving Pinot Noir wine quality by vineyard shade management in warmer viticulture areas...

Volume 17(1), 2015



Determining nitrogen fertility status using optical sensors in geranium with controlled release fertilizer

Bruce L. Dunn, Arjina Shrestha and Carla Goad

Department of Horticulture and Landscape Architecture, Oklahoma State University, Stillwater OK 74078-6027. USA. Department of Statistics, Oklahoma State University, Stillwater OK 74078-6027, USA.

Key words: *Pelargonium*, nutrition, plant growth, reflectance sensors, NDVI, SPAD, CRF

Journal of Applied Horticulture, 2015, volume 17, issue 1, pages 07-11.

[Full text PDF](#) |

Abstract: Greenhouse production of geraniums is popular for sales in the spring, and monitoring plant nutrition is important for high quality plants. The objective of this study was to evaluate if nondestructive handheld sensors could be used to quantify nitrogen (N) status in *Pelargonium hortorum* 'Maverick Red' using controlled release fertilizer (CRF). Fertilizer treatments of 0, 4, 8, 10, or 12 g of 16N-9P-12K were topdressed on greenhouse grown plants. Individual plants were scanned from 10 pots per treatment for Normalized Difference Vegetative Index (NDVI) and Soil-Plant Analyses Development (SPAD) over eight different sampling dates starting 7 days after fertilizer treatment application (DAT). Height, width, number of flowers, number of umbels and leaf N concentration were also recorded. Linear and quadratic trends were seen for both NDVI and SPAD. Plant height and width was highest in the 12 g treatment, but was not different than the 8 g or 10 g treatments. Number of flowers was highest in the 10 g treatment, but was not different from the 8 g and 12 g treatments. Number of umbels was not significantly different among fertilizer treatments, but all were greater than the

control. For all measurement dates, a correlation was seen for fertilizer rate and leaf N concentration. Neither sensor showed correlations with leaf N concentration at 7 DAT or 14 DAT; however, both were correlated with each other and leaf N concentration starting 28 DAT. Results from this study indicated that 8 g CRF produced the best quality plants. Both NDVI and SPAD can be used to predict N status in potted geraniums grown with CRF, but consistency in sample collection and sampling time may be necessary to correlate the values with N status.

Volume 17(1), 2015



Computational prediction and characterization of miRNA from coconut leaf transcriptome

S. Naganeeswaran, T.P. Fayas, K.E. Rachana and M.K. Rajesh

Bioinformatics Centre, Division of Crop Improvement, Central Plantation Crops Research Institute, P.O. Kudlu, Kasaragod 671124, Kerala, India.

Key words: miRNAs, RNA, gene expression, *in silico*, miRBase, coconut, leaf transcriptome

Journal of Applied Horticulture, 2015, volume 17, issue 1, pages 12-17.

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Abstract: Micro RNAs (miRNAs) are single stranded, small and non-coding endogenous RNA molecules, which control the gene expression at the post-transcriptional level either by suppression or degradation. Because of its highly conserved nature, *in silico* methods can be employed to predict novel miRNAs in plant species. By using previously known plant miRNAs available at miRBase, we predicted 16 miRNAs, which belongs to 11 miRNA families, and also targets for seven potential miRNAs in coconut leaf transcriptome. A majority of these seem to encode transcription factors. To the best of our knowledge, this is the first report of *in silico* prediction and characterization of miRNA from coconut. These findings form an useful resource for future research into miRNA prediction and function prediction in coconut and for studies on their experimental validation and functional analyses.

Volume 17(1), 2015

Evaluation of different fertilizer types in potato crop under

various irrigation regimes

B.S. Sekhon and C.B. Singh

Department of Soil Science, Punjab Agricultural University, Ludhiana-141004.

Key words: Potato, India, complex fertilizer, farmyard manure, irrigation, contrasts

Journal of Applied Horticulture, 2015, volume 17, issue 1, pages 18-21.

Abstract: India is the second largest producer of potatoes in the world. Shallow root system makes potato crop an inefficient nutrient consumer and sensitive to water stress. Anecdotal evidence hints that many potato growers of northwest India prefer complex NPK fertilizers or compound NP fertilizers over the straight fertilizers because they believe the former to be more efficient on agronomic basis. Thus, this study was aimed at conducting a comparative evaluation of various fertilizer sources across different irrigation and FYM regimes over two years on a loamy sand soil. A field experiment in split-split plot design was used with one additional blocking factor of soil variability. The main plot involved two FYM levels (0 and 50 t ha⁻¹) and three irrigation water pan evaporation (IWPE) based irrigation regimes (IR1 with IWPE 2.0, IR2 with IWPE 1.4, and IR3 with IWPE 0.8) in sub-plots. Four fertilizer treatments in sub-sub plot involved a check (T0); T1 with N,P, and K respectively from straight fertilizers urea, single superphosphate (SSP), muriate of potash (MOP); T2 with P from DAP, remaining N from urea, and K from MOP; T3 with P from NPK complex (12:32:16) fertilizer and the remaining N from urea and K from MOP. General trends in tuber yield and irrigation water use efficiency (IWUE) during the year 2011 and statistically proven results of various *a priori* single degree of freedom contrasts showed that NPK complex fertilizer and NP compound fertilizer performed better than straight fertilizers.

Volume 17(1), 2015

Basal heat improves adventitious root quality in *Plumeria* (*Plumeria rubra* L.) stem cuttings of different sizes

S. Caruso and G. Iapichino

Department of Agricultural and Forest Sciences, University of Palermo, Viale delle Scienze, Palermo.

Key words: *Plumeria rubra*, propagation, adventitious roots, bottom heat, cutting size, frangipani

Journal of Applied Horticulture, 2015, volume 17, issue 1, pages 22-25.

Abstract: Root development of hardwood cuttings of *Plumeria rubra* was investigated in relation to basal heat and the size of cuttings. Terminal cuttings of a clone grown in Sicily were trimmed to various lengths, ranging from 10 to 26 cm. To verify the cutting rooting response to basal heat, half of the cuttings were placed on a basal heated bench (28 ± 3 °C, constant temperature) while the remaining were placed on an unheated bench (16-18 °C during the night and 20-22 °C during the day). Percent rooting and cutting survival were not affected by basal heat and cutting length. However, basal heat positively affected number of roots, length of longest root and bud growth. Increases in the length of the cutting resulted in a parallel increase in adventitious root formation. Medium (16-20 cm) and long (22-26 cm) length cuttings exposed to basal heat exhibited the best development in terms of number of roots, root length and bud growth. We suggest that in the Mediterranean region the use of basal heat and of medium/long size cuttings may be beneficial to propagators wishing to produce *P. rubra* rooted cuttings with well-developed root system.

Volume 17(1), 2015

Effects of benzyl adenine and gibberellic acid pre-treatments on dormancy release, flowering time and multiplication of oriental lily (*Lilium longiflorum*) bulbs

Maureen N. Situma, Mariam Mwangi and Richard M.S. Mulwa

Department of Crops, Horticulture & Soils, Egerton University, P.O. Box 536, Egerton - 20115, Kenya.

Key words: Lily, bulb, dormancy, gibberellic acid, benzyl adenine, chilling, flowering

Journal of Applied Horticulture, 2015, volume 17, issue 1, pages 26-30.

Abstract: Dormancy in Oriental lily bulbs (*Lilium* spp) is a major bottleneck in lily flower production by small scale farmers because they cannot afford expensive chilled bulbs that have been induced to break dormancy. Thus for developing alternative and low cost dormancy mitigation techniques, the study investigated the effects of lily bulb pre-treatments with benzyl adenine (BA) and gibberellic acid (GA3) on dormancy breaking, emergence rates, time to flowering and bulb multiplication. Bulbs were pre-soaked for 24 hours in prepared solutions of various concentrations of BA and GA3 (0; 25; 50; 100 and 150 mg/L) and their combinations, plus a positive control of chilled bulbs. An unbalanced factorial arrangement in a randomized complete block design with three replications was used. The experiment was repeated in two seasons. Results showed that treating bulbs with BA and GA3 significantly influenced

dormancy breaking in both the trials and was comparable with the chilling treatment. The highest sprouting was observed in bulbs treated with 50 mg/L BA (92%) and 50 mg/L GA3 (96.67%) in both trials; compared to chilled bulbs with 100% sprouting. The number of days to 50% bulb emergence was significantly reduced in trial 1 with various combinations of GA3 and BA (50 mg/L: 100 mg/L; 150 mg/L: 100 mg/L and 150 mg/L : 150 mg/L). Combining the plant growth regulators also decreased the number of days to flowering; with 25 mg/L BA + 150 mg/L GA3; 50 mg/L BA + 100 mg/L GA3; 50 mg/L BA + 150 mg/L GA3 and 100 mg/L BA + 100 mg/L GA, respectively, significantly decreasing the number of days to flowering to 124 compared with 132 for the control in trial 2.

Volume 17(1), 2015

Regulation of membrane leakage and activities of some antioxidant enzymes in petals of cut flowers of *Calendula officinalis* and *Salvia splendens* with metabolites and plant growth regulators

P. Kaur, N. Singh and D. Mukherjee

Laboratory of Plant Physiology and Biochemistry, Kurukshetra University, Kurukshetra-136119, Haryana, India.

Key words: 5-Sulfosalicylic acid, 6-benzylaminopurine, ascorbate peroxidase, catalase, ethanol, guaiacol peroxidase, malondialdehyde, membrane stability index, protein, senescence, sucrose, superoxide dismutase and vase life

Journal of Applied Horticulture, 2015, volume 17, issue 1, pages 31-39.

Abstract: This investigation was carried out to assess not only the efficacy of ethanol (EtOH) with that of sucrose (both are the product of plant metabolism) but also with 6-benzylaminopurine (6-BAP) and 5-sulfosalicylic acid (5-SSA) which are well known plant growth regulators (PGRs) to minimize the decline in certain antioxidant enzymes in the cut flowers of *Calendula officinalis* L. and *Salvia splendens* Sellow ex J. A. Schultes. An effect of sucrose was also studied when it was present either alone or in combination with other chemicals (EtOH/6-BAP/5-SSA) in the vase solution. Control cut *C. officinalis* flowers looked fresh for 1-day, while flowers in sucrose solution lasted for about 2-day whereas other chemicals could extend the vase life from 4 to 7 days. The order of effectiveness of applied chemicals was EtOH + sucrose (Suc) > 5-SSA + Suc > EtOH/5-SSA > 6-BAP > 6-BAP + Suc > Suc in *C. officinalis* whereas it was EtOH/EtOH + Suc > 5-SSA > 5-SSA + Suc > 6-BAP + Suc > 6-BAP > Suc in *S. splendens*. In both the plants, petals of untreated flowers exhibited a gradual

reduction in activities of ascorbate peroxidase (APX), catalase (CAT), superoxide dismutase (SOD); and protein levels and membrane stability index (MSI) values whereas malondialdehyde (MDA) level and guaiacol peroxidase (GPOX) activity registered increment. However, individual treatment of metabolites like ethanol and sucrose, plant growth regulators like 6-BAP and 5-SSA were able to reduce not only protein content but also activities of APX, CAT and SOD. The combined effect of EtOH + Suc was more effective than 6-BAP + Suc or 5-SSA + Suc.

Volume 17(1), 2015

Low concentrations of humic substances significantly enhanced plant growth

P. Verdi, M. Cano and E. Liem

Canadian Humalite International Inc., 15723-116 Ave, Edmonton, Alberta, Canada T5M 3W1.

Key words: *Lactuca sativa* L., deep water culture growing units, humic substances, plant, root, leaf, growth

Journal of Applied Horticulture, 2015, volume 17, issue 1, pages 40-43.

Abstract: Seedlings of lettuce (*Lactuca sativa* L.) variety Grand Rapids were grown in deep water culture growing units. The units contained growing solution with limited amount of nutrients and different concentrations of humic substances. Six treatments and one control, 12 replications each, were evaluated in a two month period. Only one plant perished from a total of 84, indicating that the growing units were effective. A liquid product containing 13,800 mg L⁻¹ humic substances of small particulate sizing (1.1 ± 0.64 µm in mean diameter) was utilized as a source of humic substances. Significant plant (root and leaf) growth was observed at low product rates between 70 and 500 mg L⁻¹, corresponding to 1 and 7 mg L⁻¹ humic substances. At increased rates, the growth was reduced. At much higher rates, plant growth was again observed, that was likely caused by the presence of nutrients in the product. These experiments demonstrated the efficacy of humic substances on plant growth, a critical finding in the context of sustainable horticulture, in which maximum yields from minimum input would be desired.

Volume 17(1), 2015

Effect of nitrogen and phosphorus nutrition on growth, flowering, flower yield and chlorophyll content of different

varieties of African marigold (*Tagetes erecta* L.)

N.D. Polara, N.N. Gajipara and A.V. Barad

College of Agriculture, Junagadh Agricultural University, Junagadh - 362 001 (Gujarat), India.

Key words: African marigold, chlorophyll content, flower yield, nitrogen, phosphorus, variety

Journal of Applied Horticulture, 2015, volume 17, issue 1, pages 44-47.

Abstract: A field experiment was conducted to study the effect of N and P₂O₅ nutrition on growth, flowering, yield and chlorophyll content of different varieties of African marigold on the medium black calcareous soil during two consecutive years. The treatments consisted of all combination of three levels of nitrogen (100, 150 and 200 kg N ha⁻¹) and three levels of phosphorus (50, 100 and 150 kg P₂O₅ ha⁻¹) with three varieties of African marigold *viz.*, Local Orange (V1), Pusa Basanti (V2) and Pusa Narangi (V3). The growth parameters like plant height, number of primary and secondary branches as well as leaf area exhibited increasing trend with increase in nitrogen level which were highest at N₃ (200 kg N ha⁻¹). The phosphorus application failed to influence the growth of plant except plant spread. The maximum total chlorophyll content, 1.452 and 1.431 mg g⁻¹, respectively was found due to addition of nitrogen and phosphorus. The higher number of flowers, diameter of flower, number of ray florets per flower and flower yield was recorded at higher level of each nutrient *i.e.* N₃ (200 kg N ha⁻¹), and P₃ (150 kg P₂O₅ ha⁻¹). Number of days to first flower was advanced with increasing levels of N. Variety Pusa Narangi produced the biggest flower diameter (6.20 cm), highest number of flowers per plant (56.34), flower yield (183.0 quintal ha⁻¹), leaf area (13.89 cm²) and total chlorophyll content (1.432 mg g⁻¹) in leaves. The interaction effect of N and P was found significant for plant spread at 60 DAT and at the end of harvest season. The combination N₃P₃ (200 kg N ha⁻¹ and 150 kg P₂O₅ ha⁻¹) recorded maximum plant spread (42.87 and 56.65 cm) at 60 DAT and at the end of harvest season, respectively. Treatment combination N₂P₃ (150 kg N ha⁻¹ and 150 kg P₂O₅ ha⁻¹) recorded significantly larger flower diameter (7.79 cm).

Volume 17(1), 2015

Effect of anti browning agents and slice thickness on drying and quality of apple slices *var.* Red Chief

D.B. Singh, N. Ahmed, A.A. Pal, R. Kumar and A.A. Mirza

Central Institute of Temperate Horticulture, Srinagar-1900 07. J & K. India.

Key words: Apple, Red Chief, anti browning agents, drying, quality, ascorbic acid, citric acid

Journal of Applied Horticulture, 2015, volume 17, issue 1, pages 48-51.

Abstract: Apples of Red Chief variety after stabilization at room temperature (20 ± 2 °C) were initially washed with chlorinated water (100 ppm sodium hypochlorite) to prevent surface contamination. After manual peeling, apples were cut in to disc shaped slices of 2 and 3 mm thickness (having uniform diameter of 20 mm) and treated with 1% ascorbic acid and 1% citric acid (anti browning agents) for studying their effect on drying time and quality of apple slices. Slice size and pre-drying treatments of ascorbic acid and citric acid has resulted in significant ($P<0.05$) variation for drying time, rehydration, dry matter contents, firmness, quality and total colour change. Significantly minimum time (300 minutes) for drying of apple slices, maximum rehydration ratio (4.9), and maximum firmness (11.9 RI) was recorded in case of 2 mm slices treated with 1% ascorbic acid and 1% citric acid. Maximum TSS (18.9° Brix) was recorded in 2 mm slices and 3 mm slices (18.7° Brix) treated with citric acid and ascorbic acid. Ascorbic acid and citric acid were effective to stabilize the ascorbic acid content and maximum (18.0 mg/100g) was recorded in case of slices of 2 mm thickness treated with 1 % ascorbic acid and 1% citric acid. Similarly size of slices and anti browning agents were significantly effective to reduce the total colour change in apple slices and minimum colour change was observed in 2 mm slices (10.0) treated with 1 % ascorbic acid and citric acid and 3 mm slices (12.25) treated with 1% ascorbic acid and 1% citric acid. It can be concluded that apple slices of 2 mm thickness and pre drying treated with 1% citric acid and 1% ascorbic acid as anti browning agents took minimum time for dehydration with minimum changes in colour, firmness, quality, and retained maximum compositional attributes with minimum browning.

Volume 17(1), 2015

Effect of different spacing and pruning levels on growth, yield and fruit quality in fig (*Ficus carica* L.) cv. Poona

Ravindra Kumar, R. Chithiraichelvan, S. Ganesh, K.K. Upreti and V.V. Sulladmath

Division of Fruit Crops; Division of Plant Physiology & Biochemistry, Indian Institute of Horticultural Research, Hessaraghatta Lake, Bangalore-560 089,

Karnataka, India. Faculty of Agriculture, Gandhigram Rural Institute (Deemed University), Gandhigram,

Key words: Fig, growth characters, pruning, fruit quality, tree spacing, fruit yield, photosynthesis, leaf water potential

Journal of Applied Horticulture, 2015, volume 17, issue 1, pages 52-57.

Abstract: Effects of tree spacing (5x2 m, 5x2.5 m, 5x3 m, 5x3.5 m and 5x4 m) and pruning (8 buds/cane, 6 buds/cane and 4 buds/cane) on growth, physiological parameters, fruit yield and quality were studied in fig cv. Poona during 3rd and 4th years of planting. Results indicated that the fig responded more to tree spacing than the pruning levels in terms of morpho-physiological characters and yield. With increase in in-row tree spacing from 5x2.5 m to 5x4 m, the vegetative growth parameters like leaf number, shoot length, internodal length, tree spread, tree height and tree circumference and the fruit yield both in terms of fruit number and fruit weight per tree declined under different pruning levels and closer tree spacing of 5x2.5 m recorded higher values. Physiological parameters like photosynthesis rate and leaf water potential remained at higher levels under closer spacing as compared to the wider spacing under different pruning levels. The increased pruning levels from 8 buds/cane to 4 buds/cane resulted in reduction of tree height while yield characters were marginally influenced by the pruning. The interaction effects between pruning and spacing levels were, however, non-significant. Under 5x2.5 m, the average fruit size and TSS recorded the highest values with no marked differences in acidity. The fruit yield calculated on per tree basis showed highest fruit number of 84.3-253.0 and 232.3-321.5 and fruit weight of 2.69-8.61 and 7.43-9.44 kg, respectively during 3rd and 4th year of planting under closer spacing of 5x2.5 m with 8 buds/cane pruning. The yield per hectare under various pruning levels recorded high values under the closer spacing of 5x2.5 m or 5x2.0 m with 8 buds/cane pruning. Overall results showed that 5x2.5 m tree spacing in combination with light pruning level of 8 buds/cane is ideal for achieving higher growth and yield in fig during 3rd and 4th year of planting.

Volume 17(1), 2015

***In vitro* cellulase activity of two wilt causing soil fusaria (*Fusarium solani* and *F. oxysporum* f. sp. *lycopersici*) and efficacy of some pesticides against the said fusaria**

S.K. Dwivedi and Enespa

Department of Environmental Science, Babasaheb Bhimrao Ambedkar

University, Lucknow-226025, U.P., India.

Key words: Wilt disease, *Fusarium solani*, *Fusarium oxysporum* f. sp. *lycopersici*, cellulolytic enzyme, pesticides, *Solanum melongena*, *Lycopersicon esculantum*

Journal of Applied Horticulture, 2015, volume 17, issue 1, pages 58-65.

Abstract: Soil-borne pathogens (*Fusarium solani* and *Fusarium oxysporum* f. sp. *lycopersici*) were isolated from the diseased plants of brinjal and tomato, identified by morphological analysis *viz.*, PCM (Phase contrast microscopy) and SEM (Scanning Electron Microscopy). These pathogens produced cellulolytic enzyme *in vitro* and the activity of this enzyme increased with the increase in age of the culture. *F. oxysporum* f. sp. *lycopersici* produced more cellulolytic enzyme than *F. solani*. The activity of cellulolytic enzyme by *F. oxysporum* f. sp. *lycopersici* was more in 14th day-old culture and decreased with the increase of culture age whereas the activity of cellulolytic enzyme produced by *F. solani* did not decrease and enzyme activity increased with the increase in the age of culture (23rd day-old culture). *In vitro* efficacy of systemic fungicides *viz.*, Roco (Thiophanate methyl 70% WP) and Chlorothalonil (non-systemic fungicide), herbicides *viz.*, Syncore (Metribuzin 70% WP), 2, 4- D (2, 4- Dichlorophenoxy acetic acid) and insecticides *viz.*, Nuvan (Dichlorvos 76% EC), Prima (Acetamiprid 20% SP) against *F. solani* and *F. oxysporum* f. sp. *lycopersici* were evaluated using poisoned food technique at 100, 200, 400 ppm concentrations on 7th day of inoculation. The fungicide (Chlorothalonil) inhibited the mycelial growth of *F. solani* by 82.34%, while Thiophanate methyl inhibited *F. oxysporum* f. sp. *lycopersici* by 77.96% respectively at 400 ppm concentration. Herbicide (Metribuzin) inhibited the mycelial growth of *F. oxysporum* f. sp. *lycopersici* and *F. solani* by 75% and 62.50%, respectively at same concentration followed by insecticides Dichlorvos (56.87%) and Acetamiprid (53.12%), respectively.

Volume 17(1), 2015

Genetic divergence studies in different nut and kernel characters of diverse walnut (*Juglans regia* L.) germplasm

Shivali Sharma, K. Kumar and Amit Kumar

Department of Fruit Science, UHF, Nauni-Solan (Himachal Pradesh), Division of Fruit Science, SKUAST-Jammu, India.

Key words: Growth, divergence, exotic cultivars, local selections, walnut germplasm

Journal of Applied Horticulture, 2015, volume 17, issue 1, pages 66-69.

Abstract: Exotic cultivars introduced from abroad and local selections from seedling population of walnut were subjected to Non-hierarchical Euclidean cluster analysis based on 12 nut and kernel characters. Studied accessions were grouped into four clusters, where cluster 1 and 3 had majority of the accessions. The clustering pattern of walnut genotypes belonging to the same eco-geographical region revealed their distribution in more than one cluster showing between geographic and genetic diversity. The first component presented maximum eigen root value and per cent variation. The mean intra and inter cluster distance (D) revealed that cluster 4 had highest intra cluster distance (2.206), while the inter cluster distance was maximum between cluster 3 and 4 (5.806). Maximum mean nut yield, nut length, nut weight and kernel weight was recorded in cluster 4, whereas, maximum kernel percentage and fat percentage was recorded in cluster 1 and 2, respectively. Minimum shell thickness was observed in cluster 2. The accessions of cluster 3 and 4 were found highly diverse from each other and will give better segregants after hybridization which can be used as a parent in further breeding programme.

Volume 17(1), 2015

Effects of foliar application of boron on leaf boron content and yield of papaya cv. Red Lady

Srilatha Vasanthu, K. Sunil Kumar, B. Padmodaya and C. Kiran Kumar Reddy
KVK, ANGR Agricultural University, Utukur, Kadapa, Andhra Pradesh-516003.
ARS, ANGR Agricultural University, Utukur, Kadapa Andhra Pradesh-516003

Key words: Papaya, boron deficiency, leaf boron, deformed fruits and yield
Journal of Applied Horticulture, 2015, volume 17, issue 1, pages 70-75.

Abstract: Boron deficiency in papaya causes deformation of apical meristem, distortion of young leaves, dwarfing of plants, fruit deformities and uneven fruit ripening that severely reduces the yield and quality. Hence, an experiment on effects of foliar application of boron on yield and quality of papaya with a commercially important variety Red lady was conducted at fifteen locations of Andhra Pradesh where the boron deficiency is wide spread due to tropical climate and high soil pH. Foliar application of 0.03 % borax at every 60 days interval from planting to harvest recorded significant increase in the leaf boron content from 18.44 mg kg⁻¹ to 26.62 mg kg⁻¹. Borax application recorded 29 % more number of fruits per plant, 37 % higher yields (65.28 kg plant⁻¹) and reduced deformed fruits (13.58 %) compared to control (21.34 %). The study

clearly indicated that, the regular supply of boron through foliar application in tropical climate is vital for realizing higher yields in papaya.

Volume 17(1), 2015

Estimates of genetic variability, heritability, genetic advance, correlation coefficients and their prospects for crop improvement in guava (*Psidium guajava* L.)

D. Singh, M.I.S. Gill, R.S. Boora and N.K. Arora

Department of Fruit Science, Punjab Agricultural University, Ludhiana-141004, Punjab. PAU Regional Fruit Research Station, Bahadurgarh, Patiala, Punjab

Key words: *Psidium guajava*, genetic variability, heritability, genetic advance, correlation

Journal of Applied Horticulture, 2015, volume 17, issue 1, pages 76-78.

Abstract: The study was conducted to assess the genetic variability, heritability, genetic advance and correlation coefficient among 35 guava (*Psidium guajava* L.) genotypes, evaluated for tree, vegetative, reproductive, fruit and seed characters during 2010 to 2013. Wide range of phenotypic variability in the studied material was observed as phenotypic coefficients of variation for different traits ranged from 8.17 for fruit width to 35.00 for number of seeds per fruit. Genotypic coefficient of variation for all the characters ranged from 6.95 to 33.11 percent. Heritability ranged from 73.97 to 99.77 percent. Very high heritability estimates were obtained for fruit length to width ratio. The genetic advance as per cent of mean was highest for number of seeds per fruit (64.52 %). Characters like seed weight per 100 g fruit, seed weight per fruit, 100-seed weight, thickness of outer flesh and fruit weight had high heritability and higher genetic advance, which indicate that the expression of these characters is governed by additive gene action. Genotypic correlation coefficients, in general, were higher in magnitude than the corresponding phenotypic correlation coefficients indicating an inherent association among various characters under study. Presence of genetic variability along with high heritability and genetic advance indicate that these genotypes can be further utilized in guava breeding programme, keeping in mind the inherent association of various agronomical important traits to combine the desired traits into a single line/cultivar.

Volume 17(1), 2015

Studies on crop residue production of cape gooseberry

(*Physalis peruviana* L.) and physico-chemical properties of sodic soil under varying levels of plant spacing and NPK fertilizers

Angrej Ali and B.P. Singh

Department of Horticulture, Narendra Deva University of Agriculture and Technology, Narendra Nagar, Kumarganj, Faizabad, Uttar Pradesh-224 229 (India).

Key words: Cape gooseberry, crop residue, NPK fertilizers, *Physalis peruviana* L., plant spacing, soil properties

Journal of Applied Horticulture, 2015, volume 17, issue 1, pages 79-84.

Abstract: The cape gooseberry (*Physalis peruviana* L.), a quick growing herbaceous crop, leaves behind a good amount of crop residue in the field after fruit harvest that can be utilized as organic source of plant nutrient supply to next crop to be cultivated. In present investigation, crop residue of cape gooseberry grown in *sodic* soil of Eastern Uttar Pradesh (India) at three planting density (S1 - 75 x 60 cm, S2 - 75 x 75 cm and S3 - 90 x 75 cm) and four levels of NPK fertilizers (F0 - without fertilizers, F1 - 60:40:40, F2 - 80:60:60 and F3 - 100:80:80 NPK kg ha) was estimated. Soil properties were also studied before and after cropping seasons. Mean data of two consecutive years recorded crop residue (fresh biomass) production 34.51, 29.7 and 27.95 t ha⁻¹ at S1, S2 and S3 plant spacing, respectively. The application of NPK fertilizers significantly increased crop residue production and mean value recorded with fertilizer level F0, F1, F2, and F3 was 22.00, 28.71, 34.24 and 36.63 t ha⁻¹, respectively. Increased plant population per unit area as well as higher doses of NPK levels showed a little improvement in bulk density, porosity, organic carbon, pH and EC of soil but influence was non-significant, however, plant spacing and NPK fertilizer treatments exhibited significant improvement in available nitrogen, phosphorus and potassium of the soil at the end of the second cropping season.

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Volume 16(3), 2014



Spatial variability in Ontario Cabernet franc vineyards III. Relationships among berry composition variables and soil and vine water status

Andrew G. Reynolds and Javad Hakimi Rezaei

Cool Climate Oenology and Viticulture Institute, Brock University, St. Catharines, ON, Canada L2S 3A1.

Key words: Global positioning systems, geographic information systems, precision viticulture, soil moisture, leaf water potential

Journal of Applied Horticulture, 2014, volume 16, issue 3, pages 167-192 .

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Abstract: The possible influence of vine water status upon berry composition was studied in ten commercial vineyard blocks of *Vitis vinifera* L. cv. Cabernet franc in the Niagara Peninsula, Ontario from 2005 to 2007. Soil texture, soil chemical composition, soil moisture and leaf water potential (?), as an indicator of vine water status, were determined on ? 80 sentinel vines in each vineyard. In each block, water status zones were identified in GIS-generated maps using leaf ? and soil moisture measurements. Areas of low soil and vine water status were positively correlated linearly and spatially with areas of high Brix, color intensity, anthocyanins and phenols, and were negatively correlated with titratable acidity. In most vineyards, areas of high and low color intensity were positively correlated linearly and spatially with areas of high and low anthocyanins and phenols. Temporal stability was also noticeable for several variables including soil moisture, yield, berry weight, Brix, anthocyanins, and phenols. These data suggest that low soil moisture and low vine water status zones in vineyards are related to corresponding areas of superior berry composition. These data further suggest that precision viticulture techniques may be utilized in this region to delineate vineyard sub-zones of differing quality levels.

Volume 16(3), 2014



Growth characteristics of micropropagated, regenerated and transgenic *Gladiolus* plants

Kathryn Kamo, Kanniah Rajasekaran and Jeffrey Cary

Floral and Nursery Plants Research Unit, U.S. National Arboretum, U.S. Department of Agriculture, Bldg. 010A, Beltsville, MD 20705-2350, USA. Food and Feed Safety Research Unit, U.S. Department of Agriculture, Southern Regional Research Center, New Orleans, LA 70003, USA

Key words: Flower bulbs, biolistics, transgenes, regeneration, tissue culture, corms, ornamentals, gene gun bombardment, callus

Journal of Applied Horticulture, 2014, volume 16, issue 3, pages 193-198 .

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Abstract: The growth characteristics of transgenic *Gladiolus* plants cvs. •Peter Pears• and •Jenny Lee• were compared to non-transformed plants either regenerated from embryogenic callus or micropropagated *in vitro*. Micropropagated and regenerated plants of •Peter Pears• showed similar sprouting percentage of corms *in vitro* and daughter corm production after one season in the greenhouse. Differences were found in the weight of corms produced *in vitro* and the length of leaves with the regenerated corms weighing less and having shorter leaves than those of micropropagated plants. Transgenic plants of •Peter Pears• had similar corm weights to those from regenerated plants, but the greenhouse sprouting percentage, leaf length, and daughter corm production was less than that of regenerated plants. Micropropagated plants of •Jenny Lee• were similar to regenerated plants in weight of corms grown *in vitro*, sprouting efficiencies, and the length of leaves. Transgenic plants of •Jenny Lee• produced larger corms *in vitro* than regenerated plants, and both the final weight of transgenic corms and leaf length after one season in the greenhouse were comparable to that of regenerated plants of •Jenny Lee•. •Jenny Lee• plants were less affected by the regeneration and transformation conditions than •Peter Pears•.

Volume 16(3), 2014



Study of morphological and histological changes in melon

plants grown from seeds irradiated with UV-B

V.P. Sosa-Flores, F. Ram•z-Godina, A. Benavides-Mendoza, H. Ram•z

Departamento de Horticultura, Departamento de Fitomejoramiento, Universidad Autónoma Agraria Antonio Narro, Buenavista, Saltillo, Coahuila, C. P. 25315, M•cho.

Key words: Irradiance, photoreceptors, signaling, seed irradiation, seed priming, *Cucumis melo*.

Journal of Applied Horticulture, 2014, volume 16, issue 3, pages 199-204 .

[Full text PDF |](#)

Abstract: It is well known that exposure of plant seedlings or plants to UV-B radiation induces changes in gene expression resulting in biochemical and morphological modifications. However, there is little information on the effects and potential utility of irradiation of seeds with UV-B. The aim of this study was to apply UV-B radiation in melon seeds using various irradiation times and then assess the effect on growth and morphology of the plant. Seeds of cultivar 'Topmark' were exposed to UV irradiation with wavelength centered at 302 nm, for periods of 0, 15, 30 and 45 minutes (UV dosages of 0, 99, 198 and 297 mJ cm⁻², respectively). The irradiated seeds were seeded in a mixture of peat moss and perlite for greenhouse germination. Morphological parameters such as plant height, stem diameter, number of leaves, leaf area, fresh and dry weights were evaluated. Stomatal frequency, stomatal index, and length and width of stomata were studied. Histological analyses were conducted to determine the areas of the stem vascular bundle and xylem vessels, width and length of vascular bundles, and the area of the lumen of xylem vessels. The analysis of variance indicated significant differences between treatments, with the treatment of 15 minutes (99 mJ cm⁻²) of seed exposure to UV-B radiation generating 24.87 and 32.42 % more fresh and dry weight of the plants, respectively. Stomatal index was augmented on the adaxial surface by 52.26, 7.14 and 13.55 %, in the treatments of 99, 198 and 297 mJ cm⁻², respectively, in contrast with the control treatment, while the length of stomata was increased by 6.99% in the treatment with 30 minutes exposure time (198 mJ cm⁻²). Stomatal frequency was unchanged by exposure to radiation. The irradiation of the seeds caused decrease in P, Ca and Na in the leaves of plants.

Volume 16(3), 2014



Characterization of normalized difference vegetation index of eight poinsettia (*Euphorbia pulcherrima* L.) cultivars during bract color development

Yun-wen Wang, Bruce L. Dunn, Li Jiang and Daryl B. Arnall

Department of Grassland Science, College of Animal Science and Technology, China Agricultural University, Beijing 100193, The People's Republic of China.
Department of Horticulture and Landscape Architecture, Oklahoma State University, Stillwater OK 740

Key words: *Euphorbia pulcherrima*, NDVI, bract colour, greenhouse
Journal of Applied Horticulture, 2014, volume 16, issue 3, pages 205-209 .

[Full text PDF |](#)

Abstract: Normalized difference vegetative index (NDVI) values are vegetative indices, calculated from active canopy sensor measurements using the reflectance values for red and near-infrared. Use of NDVI sensors offers the possibility of rapid, non-destructive readings that correlate with plant properties such as plant biomass and plant nutrition when plants are green, however, the affects of color on NDVI sensor readings has not be investigated. Poinsettia cultivars •Enduring Marble•, •Ice Punch•, •Winter Rose Early Red•, •Prestige Red•, •Prestige Maroon•, •Peterstar White•, •Maren•, and •Orange Spice• were analyzed by an NDVI sensor starting four weeks after transplanting and through bract color development. The results indicated that cultivar effect, time effect and the interaction of cultivar and time on NDVI value were significant ($P < 0.0001$). An increase of NDVI value occurred from initial measuring date, and reached the greatest value (ranged from 0.718 to 0.837) between week 6 and week 7 for all cultivars except •Orange Spice• and •Winter Rose Early Red•. From the peak readings, all NDVI values in tested cultivars declined significantly, especially after bract coloration. This result demonstrated an inverse relationship with increased bract coloration and reduced NDVI readings, so use of NDVI readings to detect N deficiencies should be before bract coloration in poinsettias. However, the NDVI sensor could be used to monitor bract colour development. Because the effects of cultivar, time, and the interaction between cultivar and time were significant, standards using a pocket NDVI sensor in specific cultivars during determined growth stages may need to be established at each growing facility.



Improving vase life of carnation cut flowers by silver nano-particles acting as anti-ethylene agent

F. Koohkan, N. Ahmadi and S.J. Ahmadi

Department of Horticultural Sciences, Tarbiat Modares University, Tehran, Iran.
Jaber Ibne Hayyan Research Laboratories, Nuclear Science and Technology Research Institute, Tehran, Iran.

Key words: Chlorophyll, inductively coupled plasma (ICP), vase solution, ethylene

Journal of Applied Horticulture, 2014, volume 16, issue 3, pages 210-214 .

[Full text PDF |](#)

Abstract: Most of the carnation cultivars are sensitive to exogenous ethylene and their petals exhibit autocatalytic ethylene production during senescence. Compounds containing silver have been shown to act as anti-ethylene agent in improving postharvest characteristics of cut flowers. The experiment was conducted in a completely randomized design with three replications by applying four concentration of silver nano-particles in vase solution of cut carnation cultivar •Miledy•. ICP-AES analyses revealed that the higher amount of silver was absorbed in various tissues of plants treated with 5 mg L⁻¹, compared to other concentrations. Cut stems of •Miledy• cultivar receiving 5 mg L⁻¹ of silver nano-particles showed the highest vase life and the lowest rate of ethylene production. The tissue accumulation of Ag element was generally higher in basal stem ends and leaves treated with 5 mg L⁻¹ than other concentrations. The results of ICP and ethylene measurement showed that silver nano-particles reduced ethylene production as well as bacterial growth in vase solution and resulted improved vase life of carnation.

Volume 16(3), 2014



Molecular and agromorphological assessment of cashew (*Anacardium occidentale* L.) genotypes of India

R. Dasmohapatra, S. Rath, B. Pradhan and G.R. Rout

Department of Fruit Science, Department of Plant Breeding & Genetics,

Department of Agricultural Biotechnology, College of Agriculture, Orissa University of Agriculture & Technology, Bhubaneswar- 751 003, Odisha, India,

Key words: Cashew, genetic similarity, molecular marker, genetic variability
Journal of Applied Horticulture, 2014, volume 16, issue 3, pages 215-221 .

[Full text PDF |](#)

Abstract: Morphological and PCR based molecular markers were used to assess the genetic diversity of cashew (*Anacardium occidentale* L.) genotypes of India. Wide genetic variation was observed in respect to nut yield, nut weight, shelling percentage, plant height, trunk girth of the potentially superior genotypes. A wide variation was noticed with regards to fruit quality, colour of fruits, nut yield, nut weight, shelling percentage and apple weight. Twenty RAPD primers and 14 ISSR primers were used to detect the genetic variability among and between the genotypes. One hundred eighty-eight polymorphic bands and 31 monomorphic bands were observed by using both RAPD and ISSR primers. Twenty RAPD primers yielded 19 monomorphic and 84 polymorphic bands with percent of polymorphism was 81.55%. Of a total 116 ISSR bands generated by using 14 ISSR primers, 104 bands (89.65 %) were found to be polymorphic. Cumulative data generated from these two markers precisely arranged genotypes into 14 clusters. It was also noted that the var. BBSR-1 and Vengurla-7 were grouped into a single cluster and phenotypically they are similar with each other. Two dimensional scaling by principal component analysis indicates that some of the genotypes are out grouped. The major bands having 300 - 600 bp generated with PCR based markers can be used for identification of genotypes. This information will be useful for cashew improvement program as well as to assess the variety purity certification program.

Volume 16(3), 2014

Influence of fluidised bed drying on the quality and storage of *Murraya koenigii* leaves

Dawn C.P. Ambrose, S.J.K. Annamalai and Ravindra Naik

Central Institute of Agricultural Engineering-Regional Centre, Coimbatore-641 003.

Key words: Curry leaf, drying, temperature, air velocity, rehydration ratio, volatile oil

Journal of Applied Horticulture, 2014, volume 16, issue 3, pages 222-224 .

Abstract: In the present investigation, the effect of drying temperature and air velocity on the quality of *Murraya koenigii* leaves was studied. Freshly harvested, washed and stripped *M. koenigii* leaf (curry leaf) was dried at different air temperature of 40, 45 and 50 °C temperature and at 2, 3 and 4 m/s air velocity in a fluidised bed dryer from an initial moisture content of 184.5 % (dry basis) to a final moisture of around 5% (dry basis). The drying rate decreased with the decrease in the moisture content at all drying temperatures. Drying studies revealed that fluidised bed drying at 45 °C and 4 m/s air velocity was found to maintain the quality of dried curry leaf in terms of rehydration ratio and volatile oil content. The dried leaves packed in 38 micron thickness and stored under ambient condition (30.2 °C) for a period of one month resulted in better product as seen from the volatile oil content and overall acceptability for 4m/s fluidised bed dried sample at 45 °C.

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Effect of pulsing, 1-methyl cyclo propene (1-MCP) and packaging treatments on postharvest physiology of cut rose cv. First Red

S. Muthu Kumar, V. Ponnuswami and M. Jawaharlal

Horticultural College and Research Institute, Tamil Nadu Agricultural University, Coimbatore - 641 003, Tamil Nadu, India.

Key words: Pulsing, 1-MCP (1-methyl cyclo propene), packaging, physiology, vase life

Journal of Applied Horticulture, 2014, volume 16, issue 3, pages 225-230 .

Abstract: An experiment was conducted to study the influence of different pulsing, pre packaging (1-Methyl Cyclo Propene) and packaging treatments on postharvest physiology, quality and vase life of cut rose flowers cv. First Red. Among the treatments, W1 (Pulsing with 200 ppm 8-HQC and 10 % sucrose + pre packaging treatment with 0.18 % of 1 - MCP/m³ for 6 hours + polythene wrapping) was found superior and it was associated with the highest values for appearance (score 5 - excellent), stem strength (90⁰ angle), relative water content (92.95 per cent), water uptake (11.53 g stalk⁻¹), freshness of flowers (100 per cent) and vase life (6.3 days). The same treatment W1 (Pulsing with 200 ppm 8-HQC and 10 % sucrose + pre packaging treatment with 0.18 % of 1 - MCP/m³ for 6 hours + polythene wrapping) exhibited the lowest values for physiological loss in weight (3.58 per cent), transpirational loss of water (2.01 g stalk⁻¹), loss of membrane integrity (7.48 per cent) and peroxidase activity (0.016 units g⁻¹ of fresh weight of flowers).

Volume 16(3), 2014



Effects of temperature, moisture and salinity on seed germination of *Artemisia annua* L. grown under Tarai conditions of Uttarakhand

P. Chaturvedi, D. Bisht and S. Tiwari Pandey

Department of Biological Sciences, Department of Agronomy, G.B.P.U.A.&T., Pantnagar-263145, India.

Key words: *Artemisia annua*, artemisinin, seed germination, moisture stress, salinity

Journal of Applied Horticulture, 2014, volume 16, issue 3, pages 231-234 .

[Full text PDF |](#)

Abstract: Each plant species has its own set of germination requirements consisting of both intrinsic and extrinsic factors. The present investigation was aimed to study the effect of various extrinsic factors *viz.*, temperature, moisture and salt concentrations affecting *ex situ* seed germination of different populations of *Artemisia annua* growing in Tarai region of Uttarakhand. All the populations were susceptible to changes in abiotic conditions *viz.*, moisture and salinity levels in dose dependent manner. All, invariably, showed maximum germination at alternate day/night temperature (25/20 °C) than under constant temperatures. Among the different populations, V-IV, a non-pigmented, early flowering population was the most tolerant one as it showed broader range of germination percentage ranging from 66.6.1 at -5 bar to 40.0.7.6 at -15 bars and 62.7.7.0 at 0.2% NaCl to 9.3.1.3 at 0.8% NaCl, respectively.

Volume 16(3), 2014

Prevalence of some threatening pests and disease of litchi (*Litchi chinensis* Sonn.) in Bihar state of India

Vinod Kumar, Ajit Kumar Dubedi Anal and Vishal Nath

National Research Centre for Litchi, Mushahari, Muzaffarpur, Bihar-842002, India.

Key words: Litchi, red weevil, looper, leaf folder, bagworm, leaf and twig blight

Journal of Applied Horticulture, 2014, volume 16, issue 3, pages 235-240 .

Abstract: Studies were conducted to assess the prevalence and damage caused by four threatening pests *viz.*, red weevil (*Apoderus blandus*), looper (*Perixera illepidaria*), leaf roller (*Dudua aprobola*), bagworm (*Eumeta crameri*) and one disease, 'leaf and twig blight' (caused by *Colletotrichum gloeosporioides* Penz., and *Gloeosporium* sp.) at National Research Centre for Litchi (NRCL) that were hitherto either unnoticed or of minor importance. Fixed plot surveys at the NRCL Experimental Farm and scouting surveys in farmers' litchi orchard in major litchi growing areas of Bihar state were conducted during 2011-2012. The studies revealed the damaging potential and period of occurrence of these pests and disease in the major litchi growing areas. *A. blandus* was prevalent round the year except during extreme cool and hot weather months whereas *P. illepidaria* was prevalent from September-November and *E. crameri* during November-February. Peak infestation of *D. aprobola* was during July-February. Infestation of *A. blandus*, *D. aprobola*, and *E. crameri* drastically affected the growth of tree whereas *P. illepidaria* damaged the September flush that bears panicle in the ensuing season. The 'leaf and twig blight' disease was prevalent from the beginning of August to the end of February. These pests and disease are now important not only in Bihar but also other litchi growing states of India. Considering their importance, there is a need for continuous surveillance particularly during the likely period of occurrence so that effective management strategies can be adopted. This paper reports occurrence of *E. crameri* on litchi for the first time from India.

Volume 16(3), 2014

Physiology and biochemical changes in accelerated aged tomato (*Solanum lycopersicum* Mill.) seeds

V. Vijayalakshmi, S. Poonguzhali, K. Ramamoorthy and N. Natarajan

Department of Seed Science and Technology, Tamil Nadu Agricultural University, Coimbatore.

Key words: Tomato hybrid CO-3, accelerated ageing, physiological parameters, correlation, germination

Journal of Applied Horticulture, 2014, volume 16, issue 3, pages 241-244 .

Abstract: The effect of physiological and biochemical changes were studied in seeds of TNAU tomato hybrid (CO-3) exposed to accelerated ageing for a

period of 10 days and investigated for speed of germination, per cent germination, shoot, root length, dry matter production and biochemical attributes *viz.*, free amino acids (FAA), electrical conductivity (EC), volatile aldehydes production - seedling length bio assay (BA), dehydrogenase (DH) and peroxidase (POD) activity against untreated control (fresh) seeds. E.C., FAA and BA were negatively correlated with speed and percentage germination, root/shoot lengths, dry matter production, DH and POD activity. Speed of germination was highly and positively correlated with per cent germination (0.923), root length (0.971), dry matter production (0.940), dehydrogenase (0.776) and peroxidase activity (0.676) and it was negatively correlated with free amino acid content (-0.990) and electrical conductivity (-0.936).

Volume 16(2), 2014

White nectarines bloom, harvest degree days, yield and fruit traits over a span of five years in the intermountain region of the United States

Esmail Fallahi, Bahar Fallahi, Michael J. Kiester and Thomas M. Elias

Pomology and Viticulture Program, University of Idaho, Parma Research and Extension Center, 29603 U of I Lane, Parma, ID 83660, USA

Key words: cultivar performance, fruit flavor, nectarine selection, stone fruit adaptability

Journal of Applied Horticulture, 2014, volume 16, issue 2, pages 103-106 .

Abstract: White-fleshed nectarines have gained popularity in recent years but there is limited information on their adaptability. Thus, the objective of this trial was to investigate growing degree-days (GDD; base temperature of 4.4 °C), full bloom and harvest dates, fruit quality, and yield of five white-fleshed nectarines [*Prunus persica* var. *nectarine*] under conditions of southwest Idaho in the Intermountain Region of the United States during 2003-07. The average response analyses over these years indicated that 'Arctic Jay' and 'Arctic Pride' bloomed earlier, while 'Arctic Mist' bloomed later than other cultivars. Arctic Jay was the earliest and Arctic Snow was the latest cultivar to harvest and needed 136 days and 181 days between full bloom and harvest, respectively. On average, 'Arctic Pride', 'Arctic Mist', and 'Arctic Snow' were harvested after the second half of September, and the periods between bloom and harvest for these cultivars were 166, 180, and 181 days, respectively. The difference between the earliest and latest cultivar for full bloom dates was only 2 days or 14 °C GDD, while the range for harvest dates was 16 days or 608.2

°C GDD. 'Arctic Jay' had excellent fruit quality attributes and on average, was harvested on 21 August. 'Arctic Pride' had moderately large fruit size and high SSC and extremely attractive skin and flesh color, but had moderately low yield. Considering all factors evaluated in this project, 'Arctic Jay', 'Arctic Queen', and 'Arctic Pride' were suitable choices for early, mid, and late season cultivars, respectively. 'Arctic Mist' could have some potential for planting in this study. The growing season was not sufficient to mature 'Arctic Snow' and thus not recommended for the region.

Volume 16(2), 2014

QTL analysis associated with oleoresin content in intraspecific RIL population of chilli (*Capsicum annuum* L.)

Neeraj Dwivedi, Rajesh Kumar, Rakesh Kumar Singh and Major Singh

Indian Institute of Vegetable Research, Post Bag-01, PO- Jakhini (Shahanshahpur), Varanasi-221 305, India. Department of Biochemistry, Faculty of Science, Banaras Hindu University, Varanasi-221005, India.

Key words: Carotenoids, pepper, Simple Sequence Repeats, Quantitative Trait Loci

Journal of Applied Horticulture, 2014, volume 16, issue 2, pages 107-111.

Abstract: Quantitative trait loci (QTLs) for oleoresin content were mapped in intraspecific advance recombinant inbred line (RIL) populations of chilli derived from cross between two contrasting parents 'California Wonder' and 'LCA235'. Oleoresin content of each RILs were estimated for 2 years (F_8 and F_9) along with parents. Three classes of molecular markers; simple sequence repeats (SSR), sequenced characterized amplified region (SCAR) and random amplified polymorphic DNA (RAPD) were used to generate linkage maps. A total of two QTLs for oleoresin content were mapped on two linkage group (LG). QTL *Qole.iivr-2.1* and QTL *Qole.iivr-3.3* contributed a minimum and maximum phenotypic variation of 8.74 and 32.4%, respectively over the years. The results of this investigation may be useful in improving the nutritional quality of pepper. The genomic regions of stable QTLs identified may serve as potential target regions for fine mapping and development of molecular markers for manipulation of yield and morphological traits in pepper.

Volume 16(2), 2014



Effect of storage on some physical and chemical characteristics of vermicast

A.K. Harit, M. Karthikeyan, S. Gajalakshmi and S.A. Abbasi

Centre for Pollution Control and Environmental Engineering, Pondicherry University, Chinnakalapet, Puducherry 605014, India.

Key words: Vermicast properties, vermicast storage, *Eudrilus eugeniae*, neem leaf litter, nutrient

Journal of Applied Horticulture, 2014, volume 16, issue 2, pages 112-116.

[Full text PDF |](#)

Abstract: It is widely acknowledged that vermicast has beneficial effect on plant growth but little is known on how the manner and duration of storage affect the vermicast quality. In an attempt to cover this knowledge-gap we have carried out a study on changes in physical and chemical properties of vermicast as function of ageing when it is stored. The study revealed that most of the characteristics of the castings were retained during the first 60 days of storage. Further as storage was continued, the physical properties such as total and water filled pore space were reduced by 11 and 40%, respectively. The water holding capacity of castings also reduced about 82% and *exhibited* high degree of water repellency. Whereas, the bulk density and particle density of castings increased two-fold. These changes may impede the water availability, oxygen diffusion and plant root penetration in the field. The nitrogen loss of 49% was recorded due to intense ammonia volatilization. There was more than 75% loss in potassium and phosphorus content and a significant reduction in the concentration of minor and trace nutrients. These changes in the properties of castings reduced the beneficial impact of vermicast on plant growth.

Volume 16(2), 2014

Effect of fertigation through drip and micro sprinkler on pod characters in cocoa (*Theobroma cacao* L.)

C. Krishnamoorthy and K. Rajamani

Directorate of Extension Education, Tamil Nadu Agricultural University, Coimbatore - 641 003, Tamil Nadu, India.

Key words: *Theobroma cacao* L., fertigation, drip, micro sprinkler, water soluble fertilizer, straight fertilizer, pod characters

Journal of Applied Horticulture, 2014, volume 16, issue 2, pages 117-121.

Abstract: A field experiment to study the influence of fertigation through drip and micro sprinkler of N, P and K fertilizers on pod characters of cocoa (*Theobroma cacao* L.) was conducted at Coimbatore, India during January 2010 to December 2011. The experiment was laid out with thirteen treatments replicated three times in a randomized block design. The study revealed that, fertigation with 125 per cent RDF (Recommended Dose of Fertilizer) as water soluble fertilizer by drip irrigation (T₄) recorded the highest pod length (17.72 cm), pod girth (28.69 cm), pod weight (541.88 g), husk weight (387.83 g), pod volume (610.55 cc) and number of pods per tree per year (59.49) as against 12.98, 12.76, 31.69, 29.51, 34.66 and 21.05 % increase over the control (T₁), respectively. The same treatment (T₄) recorded the lowest number of cherelle's per tree (9.59) and pod value (16.11).

Volume 16(2), 2014

Effect of pruning intensity on bud fruitfulness, yield and anthocyanin content of grape (*Vitis vinifera*) hybrid H-516 trained on bower system

Gurpreet Singh, N.K. Arora and M.I.S. Gill

Department of Fruit Science, Punjab Agricultural University, Ludhiana- 141 004, India.

Key words: Grape, *Vitis vinifera*, pruning, fruitful buds, anthocyanin, H-516, Punjab Purple.

Journal of Applied Horticulture, 2014, volume 16, issue 2, pages 122-125.

Abstract: The present study was conducted to standardize the pruning technique in recently released grape hybrid H-516 for processing purpose. The grapevines trained on bower system of training were pruned at 2, 3, 4 and 5-bud level during last week of January. The maximum per cent fruitful buds were recorded at 2-bud level followed by 3, 4 and 5-bud pruning level. The significantly higher number of bunches per fruitful bud (2.23 at 4th node) were observed in pruning done at 4-bud level. The yield per vine was highest (15.2 kg yield per vine) in pruning treatments where 4-buds were retained. Bunch weight and size did not differ significantly with various pruning levels. Anthocyanin (52.24 mg/100g) and total soluble solids content (18.13%) was

maximum whereas, acid content (0.53%) was minimum with 4-bud pruning treatment. Present study suggested that in grape hybrid H-516, at the time of pruning, 4-buds per cane should be retained for better yield and improved fruit quality.

Volume 16(2), 2014



Embryo culture and embryo rescue studies in wild *Musa* spp. (*Musa ornata*)

M. Dayarani, M.S. Dhanarajan, K. Arun, S. Uma and Padma Narayani

Sathyabama University, Chennai, Jaya College of Arts & Science, Chennai.
National Research Centre for Banana, Trichy, India.

Key words: Banana, *M. ornata*, seed germination, embryo rescue, *in vitro* germination, Rhodochlamys.

Journal of Applied Horticulture, 2014, volume 16, issue 2, pages 126-130.

[Full text PDF |](#)

Abstract: Seed set in *Musa* spp. is known to vary greatly among seed-fertile cultivars, but germinate at an intractably low rate in soil thus making breeding of plantains and bananas difficult. Hence, there is an increased interest in *in vitro* germination of both intact seeds and excised zygotic embryos. The present work deals with the influence of maturity and hormonal factors on germination and regeneration of *Musa ornata* seeds through embryo culture and embryo rescue. Embryos extracted from seeds harvested at various maturity stages were cultured in MS media with different concentrations of plant growth regulators. Good embryo recovery was seen in seeds from 80 and 100% mature fruits. Maturity status of embryos played a key role in direct and indirect regeneration. Medium rich in auxins led to callus (M_8) formation at all maturity levels, leading to indirect regeneration. Good direct regeneration was observed from 100% mature embryos, in media supplemented with 6-benzylaminopurine (M_4). Study revealed that zygotic embryos of *M. ornata* could be rescued and regenerated through callus when harvested at 80% maturity and media augmented with Kinetin (M_6) gave the best regeneration. In general, medium rich in auxins led to callus formation at all maturity levels. Therefore, *in vitro* embryo culture and embryo rescue provide a potential tool for recovery and perpetuation of wild *Musa* species.

Volume 16(2), 2014

Antifungal potential of native strain isolated from rhizosphere soil of *Valeriana jatamansi* from temperate regions of Himachal Pradesh

Anjali Chauhan, Praveen Pal Balgir and Chand Karan Shirkot

Department of Basic Sciences, Dr. Y. S. Parmar University of Horticulture and Forestry, Nauni, Solan-173 230 (HP), Department of Biotechnology, Punjabi University, Patiala (Punjab).

Key words: *Bacillus*, *Aneurinibacillus*, PGPR, antifungal, antibiotic resistance, *Valeriana jatamansi*

Journal of Applied Horticulture, 2014, volume 16, issue 2, pages 131-135.

Abstract: Plant growth promoting rhizobacteria (PGPR) are commonly used as inoculants for improving the growth and yield of agricultural crops. The use of PGPR is steadily increasing in agriculture and offers an attractive way to replace chemical fertilizers, pesticides and supplements. Thus the present study focuses on the phenotypic and genotypic characterization of potent PGPR isolates with multiple plant growth promoting (PGP) traits and antifungal potential against different phytopathogenic fungi. Biochemical, molecular and phylogenetic characterization of four effective PGPR isolates (CKMV1, CKMV2, CKMV3 and CKMV4) of *Valeriana jatamansi* demonstrated that three strains belonged to genus *Bacillus* spp. and one belonged to *Aneurinibacillus* spp. The strain CKMV1 identified as (*Aneurinibacillus aneurinilyticus*) on the basis of 16S rDNA homology showed a considerable antifungal potential against different phytopathogens along with multiple PGP traits like phosphate solubilization, IAA production, HCN production, siderophore production. Significant growth inhibition of phytopathogenic fungi by CKMV1 was obtained in the order *Sclerotium rolfsii* > *Rhizoctonia solani* > *Phytophthora cactorum* > *Alternaria* spp. > *Fusarium oxysporum*. Thus, the secondary metabolite producing *A. aneurinilyticus* strain CKMV1 exhibited innate potential of plant growth promotion and biocontrol activities *in vitro* which can further be used as biofertilizer as well as biocontrol agent.

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Distribution of phytonematodes associated with stone and nut fruits in Kashmir valley, India

Tarique Hassan Askary, Mohammad Islam Shah Waliullah and Mohammad

Maqbool Mir

Division of Entomology, Sher-e-Kashmir University of Agricultural Sciences and Technology, Main Campus, Shalimar, Srinagar-190025, Jammu and Kashmir, India. Division of Pomology, Sher-e-Kashmir University of Agricultural Sciences and Technology, Main Ca

Key words: Phytonematodes, distribution, stone fruits, nut fruits, soil, rhizosphere, peach, plum, apricot, walnut, cherry, almond

Journal of Applied Horticulture, 2014, volume 16, issue 2, pages 136-140.

Abstract: Soil samples were collected from the rhizosphere of stone fruits *viz.*, peach, plum, apricot, cherry and nut fruits *viz.*, almond and walnut from three year old nurseries at five different localities of Kashmir valley and processed to assess the population density of phytonematodes at each locality. Ten species/genera of plant parasitic nematodes *viz.*, *Pratylenchus penetrans*, *Paratylenchus juglansi*, *Meloidogyne hapla*, *Tylenchorhynchus* spp., *Criconema* spp., *Rotylenchus* spp., *Xiphinema basiri*, *Longidorus* spp., *Hoplolaimus* spp. and *Helicotylenchus indicus* were recorded. The most common nematode species which was frequently found in the rhizosphere of the surveyed fruit crops were *Pratylenchus penetrans* and *Helicotylenchus indicus*. *Meloidogyne hapla* was also common in all the fruit crops except peach and walnut. *Paratylenchus juglansi* was reported from the rhizosphere of walnut only. Absolute frequency of *P. penetrans* and *Tylenchorhynchus* spp. in almond and *H. indicus* in walnut was 100% in three different localities. Absolute density and prominence value of *H. indicus* was highest *i.e.* 665 in walnut followed by 623 of *P. penetrans* in cherry and 618 of *Tylenchorhynchus* spp. in almond at separate localities of the survey. Presence of varying densities and types of plant parasitic nematodes associated with stone and nut fruits reveal that plant parasitic nematodes form an important component in temperate fruit ecosystem which needs to be investigated for assessing the role of relative virulence of a particular species, host specificity and tolerance level in host.

Volume 16(2), 2014

Studies on osmotic dehydration of banana cv. Poovan and Dwarf Cavendish

T. Shanmugasundaram and K. Haripriya

Department of Horticulture, Faculty of Agriculture, Annamalai University, Annamalainagar-608002, Tamil Nadu, India.

Key words: Banana, post harvest loss, osmotic dehydration, value addition.

Journal of Applied Horticulture, 2014, volume 16, issue 2, pages 141-145.

Abstract: The study was undertaken on osmotic dehydration of banana varieties *viz.*, Poovan (AAB) and Dwarf Cavendish (AAA) to investigate the effect of temperature, sample thickness and osmotic time on the rate of osmosis. The results revealed that the maximum water loss and solid gain after osmosis were 57.9 and 15.5 per cent in Poovan and 53.1 and 11.8 per cent in Dwarf Cavendish. The moisture content of Poovan slices reduced from 2.03 kg H₂O kg⁻¹ dry matter (DM) to as low as 0.31 kg H₂O kg⁻¹ DM when osmosed in 60 °B syrup at 75 °C. In case of Dwarf Cavendish, the moisture content reduced from 2.84 to 0.38 kg H₂O kg⁻¹ DM under similar conditions.

Subsequent air dehydration resulted in further loss of moisture and the moisture content was reduced to a range of 0.03 to 0.18 kg H₂O kg⁻¹ DM after 4 to 8 h of drying.

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Genetic variation, heritability and correlation analysis of forty seven pear genotypes under subtropics

Dimpy Raina, W.S. Dhillon and P.P.S. Gill

Department of Horticulture, Punjab Agricultural University, Ludhiana, India.

Key words: *Pyrus species*, correlation, heritability, genetic advance, variability

Journal of Applied Horticulture, 2014, volume 16, issue 2, pages 146-148.

Abstract: A study was undertaken to analyze the variation, heritability and correlation for vegetative and fruit characters for forty seven genotypes of pear at PAU, Ludhiana. Highest range of variation was recorded in fruit weight (70.0-213.0), TSS/acid ratio (19.7-69.0) and acidity (0.2- 0.5) with the mean of 151.11g, 43.70, and 0.29%, respectively. The PCV and GCV were observed maximum for the fruits number per spur, acidity, fruit weight and TSS/acid ratio. Heritability estimates were observed high for fruit weight (100%), flower number per spur (99.95%), TSS/acid ratio (99.79%), leaf breadth (99.73%) and fruit breadth (99.24%). A highly significant positive genotypic and phenotypic correlation was observed for fruit length with fruit weight (0.7463 and 0.7439), fruit breadth (0.5345 and 0.5318), TSS (0.2684 and 0.2667) and low significant with TSS/acid ratio (0.1796 and 0.1740). Similarly, positive significant genotypic correlation of fruit number per spur and flower number per spur was recorded with leaf breadth (0.2816 and 0.2814) and leaf length (0.5823 and 0.3598), respectively.

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Direct and residual effect of integrated nutrient management on crop productivity and physico-chemical characteristics of allfisols in okra-pea cropping system

M.A. Chattoo, N. Ahmed, G.R. Najar, Angrej Ali, Z.M. Dar and Q.A.H. Dar
Faculty of Agriculture, Sher-e-Kashmir University of Agricultural Sciences & Technology, Wadura Campus, Sopore (Jammu & Kashmir)-193 201, India.
Central Institute of Temperate Horticulture, Rangreth, Srinagar (Jammu & Kashmir)-190 005, India.

Key words: Allfisols, INM, inorganic fertilizers, okra-pea productivity, organic manures, soil quality.

Journal of Applied Horticulture, 2014, volume 16, issue 2, pages 149-153.

Abstract: A field experiment was conducted on direct and residual effect of integrated nutrient management on crop productivity and physico-chemical characteristics of allfisols in okra-pea cropping system in Kashmir valley. The okra was grown as main crop and pea as residual crop. The experiment was laid out in simple square lattice design having 25 treatments with two replications. The pooled data revealed that integrated nutrient management significantly influenced the productivity of main as well as residual crop, physico-chemical properties and microbial activity of experimental soil. Among various treatments under study, treatment T₂₄ (FYM, sheep manure, poultry manure and vermicompost (3, 2, 0.5, 0.6 tonnes ha⁻¹, respectively) along with biofertilizers (*Azospirillum* and *Phosphobacteria*; both as seed inoculant @ 1.0 kg ha⁻¹ and as soil inoculant @ 2.5 kg ha⁻¹) and 50 % recommended dose (RDF) of fertilizers (N:P₂O₅:K₂O, 60:30:30 kg ha⁻¹, respectively) resulted significantly maximum fruit yield of okra (272.71 q ha⁻¹) and pod yield of pea (123.56 q ha⁻¹). The physico-chemical characteristics of the soil under study showed an improvement with organics application as compared to initial, control and RFD. Soil under the treatment T₂₄ showed lowest bulk density, particle density and pH; and highest porosity, EC, and organic carbon content. Available nutrients in soil (nitrogen, phosphorus, potassium and sulphar) and microbial population (fungi and bacteria) were also recorded maximum with treatment T₂₄.

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Pollen studies in tuberose cultivars and hybrids

P. Ranchana, M. Kannan and M. Jawaharlal

Department of Floriculture and Landscaping, HC& RI, TNAU, Coimbatore-641003, India

Key words: Tuberose, single types, pollen, selfing

Journal of Applied Horticulture, 2014, volume 16, issue 2, pages 154-156.

Abstract: Pollen studies were conducted in ten single type genotypes of tuberose (*Polianthes tuberosa*) viz., Shringar (Mexican Single x Pearl Double), Prajwal (Shringar x Mexican Single), Phule Rajani (Mexican Single x Shringar), Calcutta Single, Hyderabad Single, Kahikuchi Single, Mexican Single, Pune Single, Navsari Local and Variegated Single at TNAU, Coimbatore, India. Studies revealed that pollen grains were round in shape, pollen viability in acetocarmine stain was 96.73% in the genotype 'Variegated Single' and the germination was maximum (99.21%) in 15% sucrose solution with other chemicals. Pollen tubes grew to a length of 1234.949 microns 24 hours after the dehiscence of anther. Among the genotypes under study, the highest fruit set was 89% under natural open pollination and 0% under artificial self pollination.

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Characterization of karonda (*Carissa carandas*) accessions under arid region

P.R. Meghwal, S.K. Singh, Akath Singh and Rakesh Pathak

Central Arid Zone Research Institute, Jodhpur-342003, Rajasthan, India.

Key words: Karonda, genetic diversity, RAPD, accessions, precocity

Journal of Applied Horticulture, 2014, volume 16, issue 2, pages 157-160.

Abstract: *Carissa carandas*, native to India is an underutilized fruit crop with tremendous phyto-therapeutic and nutritive importance. Seven diverse accessions and a released variety were evaluated for morphological, biochemical and molecular diversity. The test accessions varied significantly with regard to all the morphological characters except plant height and number of stipules per node. The accession, CZK2011 and CZK 2031 recorded 30 and 3% higher fruit yield over the variety Pant Manohar while other accessions gave almost equal fruit yield to variety Pant Manohar. The accessions CZK2012, CZK2021 and variety Pant Manohar were found precocious due to

first fruiting at three years of age. Seven primers detected low intra-specific variation amounting to 25 % polymorphism and exhibited 11.1 to 57.1% polymorphism in banding pattern indicating narrow genetic base in the available germplasm. The accessions CZK2011, CZK2022 and CZK2031 may be recommended for cultivation in arid zone on account of their higher yield and bigger sized fruits.

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Genotypic variability in grain amaranthus (*Amaranthus hypochondriacus* L.) under varied plant densities

S. Ramesh Kumar and G. Mohammed Yassin

Department of Horticulture, Vanavarayar Institute of Agriculture, Manakkadavu, Tamil Nadu Agricultural University, Pollachi, -642 103.

¹Department of Horticulture, Pandit Jawaharlal Nehru College of Agriculture and Research Institute, Tamil Nadu

Key words: *Amaranthus hypochondriacus*, grain yield, variability parameters, selection

Journal of Applied Horticulture, 2014, volume 16, issue 2, pages 161-164.

Abstract: In grain amaranthus (*Amaranthus hypochondriacus* L.) ten genotypes were evaluated for twelve characters under four plant density levels viz., very high-30 •20 cm (D₁), high-30•0 cm (D₂), normal-45•0 cm (D₃) and low plant density-45•0 cm (D₄) levels to study the different selection parameters for grain yield and its eleven contributing morphological and quality traits. The study was conducted at College Orchard, Department of Horticulture, Pandit Jawaharlal Nehru College of Agriculture and Research Institute, TNAU, Karaikal during *rabi* 2007. The results revealed that the GCV was maximum in high plant density when compared to very high, normal and low plant density levels for the characters viz., fresh weight of the inflorescence, length of the rachis per inflorescence, grain yield per plant and total carbohydrates. In all the four plant density levels, leaf area at 50 per cent flowering, fresh weight of the inflorescence, number of secondary branches per inflorescence and total carbohydrates recorded high magnitude of genetic variability in combination with high heritability and genetic advance as per cent of mean.

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Spatial variability in Ontario Cabernet franc vineyards. II. Yield components and their relationship to soil and vine water status

Andrew G. Reynolds and Javad Hakimi Rezaei

Cool Climate Oenology and Viticulture Institute, Brock University, St. Catharines, ON, Canada L2S 3A1

Key words: Global positioning systems, geographic information systems, precision viticulture, soil moisture, leaf water potential

Journal of Applied Horticulture, 2014, volume 16, issue 2, pages 87-102.

[Full text PDF](#) |

Abstract: The possible influence of vine water status on grapevine yield components was studied in ten *Vitis vinifera* L. Cabernet franc vineyards in the Niagara Peninsula, Ontario from 2005-2007 using geomatic techniques. Soil texture, soil chemical composition, soil moisture and leaf water potential (?; vine water status), were determined on ? 80 sentinel vines in each vineyard. Water status zones were identified in GIS-generated maps using leaf ? and soil moisture measurements. Areas of low soil moisture and low vine water status were negatively correlated linearly and spatially with vine size, yield, and berry weight. The frequency of relationships between variables was vineyard- and vintage-dependent. Spatial variability in soil moisture was temporally-stable in all vineyards across the three vintages (8-10 sites; 2005-06, 2006-07, 2005-07), while vine size (6-7 sites), berry weight (2-7 sites) and yield (2-5 sites) were likewise moderately-stable, but leaf ? was not (two sites). These data suggest that low soil moisture and low vine water status zones in vineyards are related to corresponding areas of low yield and vine size. These data further suggest that precision viticulture techniques may be utilized in this region to delineate yield-based or vine vigor-based vineyard sub-zones that relate to differing quality levels.

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Spatial variability in Ontario Cabernet Franc vineyards: I. Interrelationships among soil composition, soil texture, soil

and vine water status

Andrew G. Reynolds and Javad Hakimi Rezaei

Cool Climate Oenology and Viticulture Institute, Brock University, St. Catharines, ON, Canada L2S 3A1.

Key words: Global positioning systems, geographic information systems, soil moisture, leaf water potential

Journal of Applied Horticulture, 2014, volume 16, issue 1, pages 03-23.

[Full text PDF](#) |

Abstract: Spatial variability of vine water status and its relationship to soil moisture (SM) and physical properties was studied in ten vineyard blocks of *Vitis vinifera* L. Cabernet Franc in the Niagara Peninsula, Ontario, using geomatic techniques. Soil texture, soil chemical composition, SM, and leaf water potential ($v|/$; vine water status), were determined on ~ 80 sentinel vines per vineyard. Water status zones were identified in vineyard-specific GIS-generated maps using leaf $v|/$ and SM measurements. SM was temporally consistent for nine of ten sites (2005-2006), all sites (2006-2007), and eight sites (2005-2007). Vine water status was temporally consistent for two sites (2005-2006) and three sites (2006-2007), but leaf $v|/$ zones were transient at some sites with temporally variable spatial distribution (except one site with consistent water status zones 2005-2007). SM and leaf $v|/$ consistently were directly-correlated spatially with % clay, % organic matter (OM), cation exchange capacity (CEC), soil pH, base saturation (BS), soil K/Ca/Mg. Low SM and water status zones were related to low % clay, OM, CEC, soil pH, BS, soil K/Ca/Mg zones. This indicate that precision viticulture may be applied to soil texture, SM, or leaf $v|/$ -based vineyard sub-zones that could relate to differing quality levels.

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Effect of glycinebetaine application on photosynthesis, sugar content, invertase activity and plant yield of hot pepper (*Capsicum annuum* L.) under water stress condition

R.M. Bhatt, N.K. Srinivasa Rao, K.K. Upreti and A.D.D.V.S. Nageswara Rao

Indian Institute of Horticultural Research, Hessaraghatta Lake Post, Bangalore 560 089, India.

Key words: Carbon exchange rate, drought, glycinebetaine, hot pepper, plant yield

Journal of Applied Horticulture, 2014, volume 16, issue 1, pages 24-28.

Abstract: A study was conducted to evaluate the response of hot pepper (*Capsicum annuum* L.) to foliar applied glycinebetaine (GB) under water stress condition. Three varieties of hot pepper e.g. Arka Lohit, Pusa Jwala and Arka Haritha were subjected to water stress at flowering stage. The plants applied with GB had the greater plant height, leaf area, fruit fresh and dry mass under water deficit conditions. GB application increased the P_N under water deficit condition. It was attributed to an improvement in stomatal conductance under water stress. There was a varietal difference in invertase activity and total sugar contents to GB application under water stress. Higher yield and better water use efficiency (WUE) were found in GB applied plants. The plants treated with GB 10 days before and at the time of imposing water stress (T2) responded better. The results suggested that exogenous GB ameliorates the negative effects of water stress in hot pepper.

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Linking certain physical characteristics with postharvest needle abscission resistance in balsam fir

M.T. MacDonald, R.R. Lada and R.S. Veitch

Christmas Tree Research Center, Dalhousie Agricultural Campus, Bible Hill, Nova Scotia, Canada, B2N 5E3.

Key words: *Abies balsamea*, break strength, Christmas tree, conifer, needle density, needle retention, senescence, xylem pressure potential procedures

Journal of Applied Horticulture, 2014, volume 16, issue 1, pages 29-31.

[Full text PDF](#) |

Abstract: Balsam fir trees are the most popular choice for Christmas trees in Atlantic Canada and a major export commodity, despite postharvest needle abscission challenging the industry's viability. The objective of this study was to determine if any needle or branch biophysical and/or morphological characteristics may be linked with needle abscission resistance (NAR) in balsam fir. A total of 17 different parameters were measured in branches of clones that belonged to low, medium, or high needle abscission resistant groups. Of the parameters measured, branch diameter, initial mass, needle density, break strength, and needle retention duration were significantly ($P <$

0.05) different between genotype groups. It was found that high NAR genotypes had a 9.1% smaller diameter, 25.0% lower initial mass, 33.2% lower needle break strength, 32.4% lower needle density, and 91% longer needle retention than low NAR clones. Of these factors, needle density was the best predictor for needle retention duration ($R^2 = 47\%$). Identification of these parameters is an important first step to understand physiological and genetic linkage for development of Christmas trees with high NAR.

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Optimal soil conditions for organic highbush blueberry growth: Assessment of early results

B. Hoover, D. Fuglie and R. Miller

Department of Biology, Eastern Mennonite University, 1200 Park Road, Harrisonburg, VA-22802.

Key words: Soil, organic, sustainable, mulch, Duke, Bluecrop, Jersey, Chandler, Bluegold, *Vaccinium corymbosum*, *Ericaceae*

Journal of Applied Horticulture, 2014, volume 16, issue 1, pages 32-39.

Abstract: To ascertain optimal soil conditions for creating an organic and sustainable blueberry operation, 160 highbush blueberry plants representing five different cultivars (Duke, Bluecrop, Jersey, Chandler, and Bluegold) were planted at Knoll Acres Farm, Harrisonburg, Virginia in 2009 within four soil treatment plots (horse manure, sheep manure, pine straw, and Planters Choice mulches). To define optimal growth conditions, selected soil characteristics and plant vigor assessments including photosynthesis and respiration activities as well as plant growth measurements were recorded. Statistical analyses indicated that soil treatments of pine straw and Planters Choice mulches produced significantly higher plant growth values than horse and sheep manure mulches. Among the five cultivars, Chandler bushes thrived the best, based on growth parameters except for bush height. Including cost/benefit considerations, pine straw mulch was the most economical and effective treatment among four mulches tested.

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Comparative efficacy of vermicomposted paper waste and inorganic fertilizer on seed germination, plant growth and fruition of *Cyamopsis tetragonoloba*

M. Karthikeyan, S. Gajalakshmi and S.A. Abbasi

Centre for Pollution Control and Environmental Engineering, Pondicherry University, Chinnakalpet, Puducherry-605014, India.

Key words: Vermicompost, paper waste, plant growth, *Cyamopsis tetragonoloba*.

Journal of Applied Horticulture, 2014, volume 16, issue 1, pages 40-45.

Abstract: The aim of the present study was to assess the influence of vermicompost generated from the paper waste spiked with cow dung slurry on the germination, plant growth and fruition of cluster bean. Two kinds of treatments were studied: (i) vermicast was applied to the soil at the rates of 5, 7.5, 10 t ha⁻¹ and (ii) amounts of essential nutrients equivalent to those present in the vermicast treatments in inorganic form was amended to the soil. There was a control with only soil without any nutrient supplement. The finding is in contrast to the reports on the beneficial impacts of vermicast on plant growth. In the present study, the inorganic fertilizer treatment exhibited better seed germination and plant growth than the equivalent vermicast treatments. The results indicate that the dose of vermicompost used in the present study was not sufficient to satisfy the nutrient demand of plant species studied. Additional fertilization would have improved the crop productivity.

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AM fungi shields *Coleus forskohlii* from root rot incidence

L. Srimathi Priya and K. Kumutha

Department of Agricultural Microbiology, Tamil Nadu Agricultural University, Coimbatore- 641 003, Tamil Nadu, India.

Key words: AM fungi, plant growth promoting rhizobacteria, *Coleus forskohlii*, colonization, root rot index, peroxidase, polyphenol oxidase, superoxide dismutase, alkaloid.

Journal of Applied Horticulture, 2014, volume 16, issue 1, pages 46-49.

Abstract: This study was taken up to determine the combined effect of arbuscular mycorrhizal (AM) fungi and plant growth promoting rhizobacteria (PGPR) in controlling root rot caused by *Macrophomina phaseolina* in *Coleus forskohlii*. AM root colonization was up to 70-73 per cent under combined inoculation of *Scutellospora* sp + *Pseudomonas fluorescens* + *Trichoderma viride* and 44-45 per cent under individual inoculation. A correlation analysis indicated that more the AM root colonization (73 per cent) less the root rot (28

per cent) incidence. The activity of the defense enzymes *viz.*, peroxidase, polyphenol oxidase and superoxide dismutase was found to be high at 30 days after inoculation of the pathogen in the co-inoculated treatments. Another correlation study between AM colonization and enzyme activity, showed low root rot index. There was a loss in the alkaloid content due to pathogen infection, yet, the combined treatments recorded a threefold increase in disease suppression.

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Canopy management in mango (*Mangifera indica* L.) cv. Alphonso with reference to flowering, yield and quality characters under ultra high density planting

B. Gopu, T.N. Balamohan¹, P. Soman² and P. Jeyakumar³

Department of Fruit Crops, Horticultural College and Research Institute, Tamil Nadu Agricultural University, Coimbatore (TN), India. ¹Horticultural College and Research Institute for Women, Trichy, Tamil Nadu Agricultural University, Coimbatore

Key words: Mango pruning, flowering, fruit set, fruit yield and quality.

Journal of Applied Horticulture, 2014, volume 16, issue 1, pages 50-53.

Abstract: An experiment was conducted to study the effect of different pruning levels on flowering, yield and quality characters in Alphonso mango under Ultra High Density Planting from 2010-2011 at Jain Irrigation Systems Pvt. Limited (JISL) Farms, Udumalpet, Tripur District, Tamil Nadu. The treatments included control, light pruning, moderate pruning, heavy pruning, 50 per cent removal of past season growth and total removal of past season growth and imposed on five-year-old uniform sized Alphonso trees grown under a close spacing of 3 x 2 m. The minimum number of days taken for first flowering and 50 per cent flowering were recorded by the control. The highest number of panicles per tree and the maximum number of panicles produced per sq.m canopy area were recorded in the control. However, highest percentage of hermaphrodite flower per panicle and per cent fruit set were found in the treatment T₅ (50 per cent removal of past season's growth and tipping). Fruit and yield characters were influenced by different pruning levels. Treatment T₂ (light pruning) recorded the highest mean fruit weight, fruit length, fruit volume, fruit pulp weight and stone weight. However, treatment T₃ (moderate pruning) registered highest fruit circumference. Highest pulp to stone ratio was observed in T₄ (Heavy pruning) followed by T₂ (light pruning).

Highest number of fruits per tree and yield per tree were observed in control. Highest total soluble solids, total sugars and non reducing sugars of the fruit were observed in T₆ (total removal of past season's growth). The maximum acidity and ascorbic acid content were observed in control. Maximum total carotenoid content was recorded in T₃ (moderate pruning) and reducing sugars in T₄ (heavy pruning).

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Comparative evaluation of common bean (*Phaseolus vulgaris* L.) germplasm for seed physical and culinary traits

P.A. Sofi¹, S.A. Wani², M.Y. Zargar¹, F.A. Sheikh¹ and T. Shafi¹

¹ Regional Research Station (SKUAST-K), Wadura, Sopore-193201, J&K.

² Directorate of Research, SKUAST-K, Shalimar-191121, J&K, India

Key words: Common bean, hydration capacity, swelling capacity, water absorption

Journal of Applied Horticulture, 2014, volume 16, issue 1, pages 54-58.

Abstract: The amount of water absorbed during soaking by dry beans before cooking may be a reliable indicator of the amount of time required to render them soft and palatable to eat. The present study was undertaken in kharif 2012 at Regional Research Station Wadura. Fifty diverse germplasm accessions (local and exotic) representing different growth habits and market classes were compared with Shalimar Rajmash-1, a high yielding bush variety released by SKUAST-K, for 12 seed morphological and physical characters namely seed colour, seed brilliance, seed shape, seed coat pattern, dry seed weight, soaked seed weight, seed length, seed breadth, seed coat proportion, water absorption ratio, hydration capacity and swelling capacity. There was a broad range of variation in the traits studied as revealed by the range and coefficient of variation (%). The CV was highest for swelling capacity (18.62) followed by water absorption (16.281), hydration capacity (13.61), soaked seed weight (10.712), dry seed weight (3.056) and coat proportion (1.221). However, CV was very low for seed length and seed breadth owing to low variation in these traits. The correlation between different traits was also worked out and revealed that highest correlation was recorded between dry weight and soaked weight (0.874) followed by hydration capacity and swelling capacity (0.720), seed dry weight and hydration capacity (0.710), dry weight and water absorption (0.308), indicating that the seeds with greater cotyledon mass absorbed more water and that greater water absorption leads to greater

swelling. However, negative correlations were recorded between coat proportion and water absorption (-0.550) and between dry weight and coat proportion (-0.325). Seed physicochemical traits including the traits used in present study could be effectively used for comparing large set of germplasm lines for cooking qualities as the varieties that have high hydration and swelling capacities are usually fast to cook.

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Physical properties and transmission of papaya ringspot virus

Isha Bhojer, Mina D. Koche, Santoshi Pudake and N.B. Ninawe

Department of Plant Pathology, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola-444104 (Maharashtra). India.

Key words: Papaya, ringspot virus, physical properties, aphid

Journal of Applied Horticulture, 2014, volume 16, issue 1, pages 59-60.

Abstract: Experiment was conducted *in vitro* to see the different physical properties and transmission of papaya ring spot virus with different aphid species. The virus was found to be inactivated between temperature 50 to 55° C and between the dilutions of 10⁻³ to 10⁻⁴. It remained viable upto 24 hours at temperature 28 to 30°C and 5 days at 6 to 8°C temperature. The virus was transmissible by five aphid species *Aphis gossypii* (Glover), *Aphis craccivora* (Koch), *Acyrtosiphon pisum* (Buczacki S. and Harris K.), *Dactynotus carthami* (Hille Ris Lambers), *Aphis nerii* (Boyer de Fonscolombe) in non persistent manner.

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Effect of integrated application of phosphorus and phosphate solubilizing microorganisms on root colonization, productivity and seed quality of *Cucurbita pepo* L.

J. Hamzei and S. Najjari

Department of Agronomy and Plant Breeding, Faculty of Agriculture, Bu-Ali Sina University, Postal Code: 6517833131, Hamedan, Iran

Key words: *Cucurbita pepo* L., fertilizer, linoleic acid, mycorrhiza fungi, oil percentage, symbiosis.

Journal of Applied Horticulture, 2014, volume 16, issue 1, pages 61-65.

Abstract: Phosphorus is a major nutrient and its deficiency limits plant growth of pumpkin (*Cucurbita pepo* L.). The investigation was aimed at studying integrated application of phosphorus on growth and production of pumpkin. Co-inoculation of phosphate solubilizing microorganisms (PSM) (mycorrhiza and bacteria) with and without seed inoculations, and P chemical fertilizer at 0, 25, 50, 75 and 100% of recommended fertilizer were applied in a factorial experiment in randomized complete block design with three replications. Data indicate that PSM and P fertilizer show significant effects on all traits. Maximum oil yield (41.80 g m⁻²) and linoleic acid (68.30%) were obtained with PSM and 50% of the recommended P fertilizer. Seed yield was significantly increased in response to inoculation of PSM in the presence of low levels of P fertilizer. However, maximum mycorrhizal colonization obtained in 25% recommended P fertilizer. A high level of P fertilizer had a negative effect on the activity of PSM. On the other hand, a low level of phosphorus with PSM has a stimulative impact on root colonization and productivity of pumpkin and favoured the activities of PSM.

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Processing and quality evaluation of blended guava watermelon squash

J. Shankara Swamy and A.K. Banik

Department of Postharvest Technology, Bidhan Chandra Krishi Viswa Vidhyalaya, Mohanpur, West Bengal-741 252, India.

Key words: Blended guava-watermelon squash, blended fruit beverages, xanthan gum, non-enzymatic browning and stability.

Journal of Applied Horticulture, 2014, volume 16, issue 1, pages 66-70.

Abstract: Guava fruit juices are pleasant when diluted with other tropical fruit juices due to its too acidic or strongly flavoured and less coloured nature, thus blending offers the opportunity to adjust sugar and acid ratios and eliminates some defects in juice quality or nutritional attributes by proper combination of juices and further adjustments in ingredients. Guava-watermelon squash at different ratio (50:50, 75:25, 25:75) of pulp blending level containing 40 °Brix TSS and 1% of acidity were prepared with incorporation of different concentrations of xanthan gum, an exocellular polysaccharide produced by obligately aerobic bacteria *Xanthomonas campestris*, to investigate the effect of different ingredients on the product quality and stability during 180 days of

storage. There were little changes in quality parameters, TSS, pH, titratable acidity, ascorbic acid during the storage and 0.5% w/w of xanthan gum gave stability to the product during storage. Blended guava-watermelon squash (75:25) having 0.3% of xanthan gum, 40 °Brix TSS, 1% acidity showed highest overall acceptability during the storage period.

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Effect of pre-treatment and drying temperature on quality of dehydrated cauliflower (*Brassica oleracea* var. *botrytis*)

R. Ranjan, M. Longkumer and J. Kabir

Department of Post Harvest Technology of Horticultural Crops, Faculty of Horticulture, Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, Nadia, West Bengal, 741252, India.

Key words: Cauliflower, pretreatment, drying temperature, quality, dehydration.

Journal of Applied Horticulture, 2014, volume 16, issue 1, pages 71-75.

Abstract: Cauliflower curd were pre-treated with hot water blanching + 0.125% KMS, with/without microwave blanching for 5 minutes and were dehydrated at three levels of temperature *viz.*, 65, 60 and 55 °C at different treatment combinations. Considering the dehydration characters and quality after dehydration and storage it was found that T₂ (hot water blanching + 0.125% KMS + microwave blanching + drying at 65 °C) was the best treatment followed by T₄ (hot water blanching + 0.125% KMS + microwave blanching + drying at 60 °C) and T₅ (hot water blanching + 0.125% KMS + drying at 55 °C). In T₂, time taken for complete dehydration (445 minutes) and moisture content (3.62%) was least. Further, the moisture content after 6 month of storage was also less (9.63%), drying rate (135.74%) and dehydration ratio (10.70) was medium after dehydration. Ascorbic acid retention was maximum during storage in the treatment. Sensory evaluation also supported the superiority of this treatment.

Volume 16(1), 2014

Planting density and corm size effects on flower yield and quality of cut-freesia (*Freesia* hybrid) in Ethiopia

Tewodros Bezu¹ and Nigusse Kassa²

School of Plant Sciences, College of Agriculture and Environmental Sciences, Haramaya University, Ethiopia. College of Agriculture & Veterinary Medicine, Jimma University, Ethiopia.

Key words: Cut-flower, freesia corm, freesia hybrid, Ethiopia

Journal of Applied Horticulture, 2014, volume 16, issue 1, pages 76-79.

Abstract: Greenhouse experiment was conducted at Freesia Ethiopia Plc., located at Sululta, Ethiopia, to determine the effects of planting density and corm size on flower yield and quality of cut-freesia. Planting densities 90, 100 and 110 corms per m² and corm sizes of 3, 3.5 and 4 cm in circumference were evaluated on two varieties 'Volante' and 'Casino' using Randomized Complete Block Design in factorial arrangement (3 x 3 x 2) with three replications. Emergence date, flowering date, cut flower yield and quality parameters were recorded and analyzed. Consequently, increment of planting density resulted highest number of cut-flowers. Corm size difference positively influenced the stem length, spike length and cut-flowers yield. Significant interaction effects were also found between corm sizes and varieties on yield and quality traits. In general, using the biggest corm and highest planting density exhibited superior result for the greenhouse production of the stated varieties. However, to come up with complete recommendations, further investigations should be conducted in line with other agronomic packages and varieties of economic viability.

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Effect of processing and storage on bioactive compounds and antioxidant activity of carrot juice

S. Kapoor and P. Aggarwal

Department of Food Science and Technology, Punjab Agricultural University, Ludhiana-141 004

Key words: Carrot juice, bioactive compounds, antioxidant activity, processing, storage

Journal of Applied Horticulture, 2014, volume 16, issue 1, pages 80-84.

Abstract: Fresh carrot juice is one of the widely consumed vegetable juice during winter season. Recipe for ready-to-serve carrot ginger juice was standardized with the addition of sugar, salt and ginger on the basis of sensory evaluation. The effect of processing and storage on bioactive compounds and

antioxidant activity of control and ready-to-serve carrot ginger juice was studied. Among the various combinations prepared, 4% sugar, 0.6% salt, 0.8% ginger and 0.05% citric acid showed highest overall acceptability on the basis of sensory scores and was chosen for further analysis. Total phenolic content was determined by using Folin-Ciocalteu reagent and antioxidant activity was determined by using DPPH assay. During processing, significant losses were found in bioactive compounds and antioxidant activity of control and carrot ginger juice. The study revealed that carrot ginger juice was found to retain more antioxidant activity compared to control juice due to addition of ginger. Storage of six months had no significant effect on TSS and acidity of processed carrot juices. However, storage led to significant decrease in bioactive compounds and thus decreased antioxidant activity of carrot products.

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Seasonal changes in endogenous hormone and sugar contents during bud dormancy in tree peony

Philip M.P. Mornya and Fangyun Cheng

Center for National Flower Engineering Research, College of Landscape Architecture, Beijing Forestry University, Beijing-100083, China. School of Forestry and Horticulture, Njala University, Sierra Leone, West Africa.

Key words: Bud dormancy, carbohydrates, plant hormone, temperature, tree peony

Journal of Applied Horticulture, 2013, volume 15, issue 3, pages 159-165.

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Abstract: The trial to investigate hormonal and sugar changes in tree peony buds associated with dormancy was conducted in the field at the Beijing Forestry University Experimental Site in China during autumn, winter and spring seasons (2009/2010 and 2010/2011), the periods of dormancy development and release. The experimental design was randomized complete block with three replications. The hormone and sugar levels were determined using the enzyme-linked immunosorbent assay (ELISA) technique and spectrophotometer, respectively. Winter temperature accumulated abscisic acid (ABA) and sugars in tree peony buds which most likely induced dormancy. Spring temperature, on the other hand, degraded ABA and sugars, and accumulated gibberellic acid (GA₃) that possibly released dormancy in tree peony buds indicating that environmental temperature was the key regulator of hormone and sugar levels that influenced bud dormancy and growth. The results suggest that accumulation of ABA, GA₃ and sugars in buds during dormancy or bud-break stage appears to be directly related to the degree of temperature experienced at that stage. While ABA and sugar accumulated with decreasing temperature, GA₃ accumulated with increasing temperature. It is likely that the reduction of ABA and sugars played an important role in bud dormancy release or alteration in bud growth of tree peonies. Seasonal patterns of sucrose and starch were almost the same in buds of the tested tree

peony cultivars which contradicts previous studies suggesting converse relationship in terms of accumulation in winter. However, seasonal accumulation of endogenous compositions varies with cultivar. Among the investigated cultivars, ?Luoyang Hong? (LH) not only accumulated less ABA, GA₃ and sugars but also released bud dormancy earlier than the ?Zhao Fen? (ZF) and ?High Noon? (HN), suggesting that the level of these internal compositions in LH is less responsive to seasonal temperature change. The ability of buds to simultaneously accumulate ABA and sugar reserves while in dormant state may provide a significant adaptive advantage for peonies to survive the erratic climate, particularly in temperate regions, which could be one of the reasons for the geographically widespread of the genus *Paeonia* in the world.

Volume 15(3), 2013

Cultivation of high antioxidant activity *Alchemilla* spp. (Rosaceae) for sustainable use

A. Vitkova, A. Gavrilova, M. Delcheva, A. Trendafilova and M. Todorova

Department of Plant and Fungal Diversity and Resources, Institute of Biodiversity and Ecosystem research, Bulgarian Academy of Sciences, Sofia, Bulgaria, Faculty of Forestry, University of Forestry, Sofia, Bulgaria. Institute of Organic Chemistry with Ce

Key words: *Alchemilla achtarowii* Pawl., *A. jumrukczalica* Pawl., *A. mollis* (Buser.) Rothm., medicinal plants, endemics, *ex situ*, biological productivity, flavonoids, tannins

Journal of Applied Horticulture, 2013, volume 15, issue 3, pages 166-172.

Abstract: Guidelines for introduction and *ex situ* cultivation of species from genus *Alchemilla*, known by its curative properties for a variety of health disorders are presented for the first time. Subject of the study are the rare and protected Bulgarian species *Alchemilla achtarowii* Pawl., *A. jumrukczalica* Pawl. and *A. mollis* (Buser.) Rothm., which showed high antioxidant activity in our recent research. Transplant material from natural populations grown in two live collections in the regions of Vitosha Mt. (1404 masl) and West Rhodopes Mt. (1500 masl) (Bulgaria) was used. The growth and development rate of the new plants was assessed according to the method of phenological observations. Nine morphometrical indices were studied and the biological productivity of the species was determined in *ex situ* conditions. The quantities of flavonoids (calculated as % quercetin) and tannins (calculated as % pyrogallol) during the different phenological stages of *ex situ* plant development were assessed via

spectrophotometric methods. Several differences between the species in the two experimental stations were summarized as dependent on the ecological conditions. All results of the study were used to elaborate methodological instruction for successful cultivation of the species in field conditions.

Volume 15(3), 2013

Influence of rootstocks on salinity tolerance of Thompson Seedless grapevines

Ajay Kumar Upadhyay, Jagdev Sharma and J. Satisha

National Research Centre for Grapes, Pune ? 412 307, Maharashtra, India.

Key words: Rootstocks, Thompson Seedless, salinity tolerance, grapes, sodium, chloride, nutrients, saline irrigation

Journal of Applied Horticulture, 2013, volume 15, issue 3, pages 173-177.

Abstract: Salinity is one of the most important abiotic stresses affecting the productivity of the grapes in India. The response of vines differs under such conditions. Dogridge rootstock though introduced in the country to deal with salinity and moisture stress, tolerance was found lacking under such conditions. A study was conducted to evaluate the salinity tolerance of Thompson Seedless vines raised on different rootstocks and on own root at two salinity levels viz., 2 and 4 dSm⁻¹. The rootstocks included were 110R and 1103P from *Vitis berlandieri* x *Vitis rupestris* parentage, Dogridge (*Vitis champinii*) and St. George (*Rupestris du Lot*). The irrigation water salinity was manipulated using sodium chloride. Thompson Seedless vines raised on 110R and 1103P rootstocks did not show marginal necrosis and leaf blackening symptoms at both salinity levels whereas other rootstocks showed mild to severe symptoms. All stock-scion combinations recorded significantly higher bunch weight than own rooted vines. Highest yield was recorded in the 1103P rootstock at both the salinity levels which was on par with 110R rootstock. Significant differences existed between rootstocks and own root at both the salinity levels with the lowest mean petiole Na values recorded in case of vines raised on 110R. High content of Na in vine tissues (>1.0%) grafted on Dogridge rootstock suggest that this rootstock could not exclude Na under saline irrigation. Though below the threshold levels, at 4 dSm⁻¹ level, Dogridge rootstock recorded significantly higher chloride in petioles than other rootstocks. The sodium ?potassium ratios in leaf blade and petiole were least in case of 110R and 1103P rootstocks whereas higher values were recorded in case of other stock-scion combinations and on own roots. Highest accumulation of sodium in vegetative parts was recorded in vines grafted on Dogridge

whereas the rootstocks 110R and 1103P, accumulated highest K, Mg, Ca and P.

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Advancing Alphonso mango harvest season in lateritic rocky soils of Konkan region through manipulation in time of paclobutrazol application

M.M. Burondkar, Shailendra Rajan, K.K. Upreti, Y.T.N. Reddy, V.K. Singh, S.N. Sabale, M.M. Naik, P.M. Nigade and Pooja Saxena

Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, Maharashtra. Central Institute of Subtropical Horticulture, Rehmankhhera, Lucknow. Indian Institute of Horticultural Research, Bangalore, India.

Key words: Early season, Alphonso, mango, lateritic rocky area, Konkan, paclobutrazol, flowering, harvesting season

Journal of Applied Horticulture, 2013, volume 15, issue 3, pages 178-182.

[Full text PDF |](#)

Abstract: The present study, aimed at advancing Alphonso mango harvest season through manipulation in time of soil application of paclobutrazol (PBZ) [soil application on 15th of May, June, July, and August]; foliar spray of KNO₃ (3%) [August and September], was conducted during 2010 to 2012 cropping seasons in red lateritic rocky soil of Konkan (Maharashtra, India). Results of individual years and mean for three years revealed that significant earliness in flowering (85.4 day) and advancement in harvesting (82 day) was achieved with the application of PBZ on 15th May. PBZ application on 15th June was relatively less effective in inducing early flowering (56 day) and harvesting (69 days). However, the greater extent of flowering (72.23 %) and fruit yield per tree (40.72 kg/tree) were recorded with PBZ applied at recommended time *i. e.*, on 15th August. Individual fruit weight was higher in KNO₃ sprayed tree in the months of August (268g) and September (265.5 g), whereas fruit T.S.S. was higher (19.37 °Brix.) in trees receiving PBZ on 15th August. The findings of study indicated huge potential for realizing about 5-6 times higher returns from Alphonso produced in February-March months as compared to May harvest.

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Incidence and distribution of *Citrus tristeza virus* in citrus cultivars in Ibadan, southwest Nigeria

K.T. Kareem, B.O. Odu, V.C. Umeh, V.A. Chikaleke, K.E. Oke, O. Arogundade, A.O. Adediji and O.O. Odedara

National Horticultural Research Institute, Ibadan, Oyo State, Nigeria.

Department of Plant Science and Crop Protection, Obafemi Awolowo University, Ile-Ife, Osun State, Nigeria. Department of Crop Protection and Environmental Biology, University of Ibadan

Key words: *Citrus sinensis*, *Citrus tristeza virus*, ELISA, absorbance, rootstock, Nigeria

Journal of Applied Horticulture, 2013, volume 15, issue 3, pages 183-186.

Abstract: A survey was conducted on a 33 year old orchard to determine the incidence and distribution of *Citrus tristeza virus* (CTV), genus *Closterovirus* in different citrus cultivars at National Horticultural Research Institute (NIHORT), Ibadan, Nigeria. Compound enzyme-linked immunosorbent assay (Compound ELISA) was used to detect the presence of CTV in the citrus leaf samples. The results revealed 100% incidence in all the varieties tested. Of all the sweet oranges (*Citrus sinensis*) budded on Cleopatra mandarin rootstock, Washington Navel had the least plant survival of 2 out of the 12 planted with a canopy spread of 7.91 m and fruit yield of 7.00 kg per tree. It also had the highest mean ELISA reading with an absorbance ($A_{405\text{nm}}$) of 3.4780 while Bende had the least titre of 3.2158 with plant survival of 12 out of the 12 trees planted and fruit yield of 57.70 kg per tree. No significant difference was observed in Agege variety of sweet orange budded on different rootstock types and their ELISA values ranged from 3.283 to 3.384. Among the seedling trees, White grape recorded the highest mean ELISA value of 3.4698 while the average ELISA values of the other seedling trees were not statistically different from each other with their titres ranging between 3.2712 and 3.3615. The results establish the pandemic status of CTV in NIHORT orchard. The use of resistant cultivars and cross protection are recommended as effective, economical and environment-friendly means of preventing the incidence and spread of CTV.

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Physiological and yield response of okra (*Abelmoschus esculentus* Moench.) to drought stress and organic mulching

Anant Bahadur, Amit Kumar Singh and S.N.S. Chaurasia

Division of Vegetable Production, Indian Institute of Vegetable Research, Varanasi 221 305, India.

Key words: Okra, *Abelmoschus esculentus*, drought stress, organic mulch, gas exchange, water use efficiency

Journal of Applied Horticulture, 2013, volume 15, issue 3, pages 187-190.

Abstract: A field experiment was carried out on okra by imposing water deficit and using organic mulches during spring-summer of 2009 and 2010 at Indian Institute of Vegetable Research, Varanasi, India. The treatments comprised of three levels of irrigation scheduling (5, 10 and 15 days intervals) and three level of mulch (pea straw, dry grass mulch at 7.0 t ha⁻¹ and ?no mulch?). Significant differences on physiological and yield attributes were observed in various irrigation treatments and organic mulches. Organic mulching enhanced the stomatal conductance and photosynthesis by 127-154% and 50-59%, respectively over no mulch. Similarly, there was 16 and 33% reduction in photosynthesis, and 33 and 36% reduction in stomatal conductance in 15 days irrigation scheduled plant as comparison to 5 and 10 days schedule, respectively. The maximum photosynthesis and stomatal conductance was registered with irrigation at 10 days coupled with organic mulching. Similarly, irrigation at 5 or 10 days recorded 40.3 and 45.6% higher pod yield, respectively over longer intervals. Significantly higher yield was noticed in both organic mulches over no mulch. Maximum pod yields (103.55 and 116.73 q ha⁻¹) were recorded respectively, with irrigation at 10 days interval and mulching either with pea straw or dry grass. Mulched plants exhibited very proportional allocation of drymatter in various plant parts. The maximum water use efficiency of 351.60 kg ha⁻¹cm⁻¹ was recorded in treatment comprising irrigation scheduling at 10 days interval and mulching with dry grass.

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Strawberry regeneration and assessment of runner quality in subtropical plains

R.M. Sharma, A.K. Singh, Sushil Sharma, F.A. Masoodi and Uma Shankar

Division of Fruit Science, S.K. University of Agricultural Sciences and Technology, Jammu-180009. Department of Horticulture, G.B. Pant University of Agriculture & Technology, Pantnagar, Uttarakhand. Division of Agricultural Engineering, S.K. University o

Key words: Shading, light, plant growth, runner production, survival, crop duration

Journal of Applied Horticulture, 2013, volume 15, issue 3, pages 191-194.

Abstract: Strawberry (*Fragaria x ananassa* Duch.) is one of the most important soft fruits and its cultivated area has increased significantly during the last few years in subtropics but the margin of profit is reduced due to lack of runnering caused by high temperature and high light intensity. The objective of the study was to exploit the possibility of its regeneration in subtropical areas by moderating the effect of high temperature and light intensity through the use of shading nets. Of the 4 shading levels, use of 50% shading tended to produce highest number of runners in Chandler (11.44/plant) and Oso Grand (16.33/plant) cultivars. The runners produced under shadings (25-75%) were significantly vigorous in respect of number of leaves (8.38/plant), leaf area (69.70 cm²), crown diameter (13.49 mm) and root length (11.26 cm) but the highest root dry matter (6.37 g/plant) was observed in the runners produced under 0% shading. In the plants regenerated under subtropical conditions, shadings resulted higher survival rate, early cropping, longer picking duration, higher fruit yield and average fruit weight than the plants raised under 0 % shading in subtropical as well as temperate areas. The use of 50% shading treatment during regeneration tended to increase the picking duration (44.70 days), fruit yield (278.08 g/plant) and fruit weight (14.22g) of strawberries. The runners of Chandler excelled over Oso Grand statistically in respect of picking duration and fruit yield.

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Drip irrigation with fertigation in soil-less media for tomato under controlled cultivation

Barikara Umesha, S. Santhana Bosu, K.P. Rema and A.R. Murumkar

College of Agricultural Engineering & Research Institute, TNAU, Coimbatore-03, Kerala Agricultural University, Thrissur (Kerala), Indian Institute of Technology, Roorkee, India

Key words: Drip irrigation, fertigation, micro irrigation, soil-less media, tomato

Journal of Applied Horticulture, 2013, volume 15, issue 3, pages 195-197.

Abstract: A field experiment was conducted at Department of Soil and Water Conservation Engineering, Tamil Nadu Agricultural University, Coimbatore, during 2009 to 2010 to study the effect of drip irrigation with fertigation in soil-less culture under controlled cultivation for Tomato. The highest yield per plant

(2.16 kg/plant) and yield per hectare (112 t/ha) was registered in Peat: Vermicompost (T₄F₂) and the lowest yield per plant was recorded in Coir pith : Vermicompost (T₂F₁) (1.07 kg and 55.48 t/ha) under polyhouse condition. The highest water use efficiency (1972.87 kg/ha cm) was obtained in T₄F₂ and the lowest was obtained in T₂F₂ (977.30 kg/ha cm) in poly house. The highest N fertilizer use efficiency (700 kg/ ha.kg of N) was recorded in T₄F₂ at 80 % of fertigation and the least efficiency was noted in T₂F₁ (277 kg/ ha kg of N). The highest K fertilizer use efficiency (560 kg/ ha.kg of K) was recorded in T₄F₂ at 80 % of fertigation and the least efficiency (222 kg /ha.kg of K) was noted in T₂F₁. The highest benefit cost ratio 2.33 was recorded in T₄F₂. The results of the study indicated that the controlled cultivation of tomato in soil-less media has more benefits, in terms of yield, water and fertilizer use efficiency, and benefit cost ratio.

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Genetic expression of CMS based hybrids for yield and its attributing traits in chilli (*Capsicum annuum* L.)

Krishna Ji, S.S. Solankey, Sanjay Kumar and Diwaker Singh

Division of Crop Improvement, Indian Institute of Vegetable Research, Varanasi 221 305. Department of Horticulture, Udai Pratap Autonomous College, Varanasi 221 002.

Key words: Chilli, CMS lines, cluster analysis, combining ability, hybrid
Journal of Applied Horticulture, 2013, volume 15, issue 3, pages 198-201.

Abstract: Eight chilli genotypes including four lines (CCA-4261, CCA-4257, IC-395318 and VR-339) and four testers (DSL-2, EC-519636, EC-566320 and Pusa Jwala) were crossed to obtain 16 F₁ hybrids. The lines (females) included three cytoplasmic male sterile (CMS) lines (CCA-4261, CCA-4257 and IC-395318) and one fertile line (VR-339). The 24 genotypes (4 lines, 4 testers and 16 resulting F₁ hybrids) were evaluated for growth and yield contributing traits. Correlation studies indicated that yield per plant was significantly correlated with fruit weight, total fruit weight per plant and plant height at both genotypic and phenotypic levels, whereas, it was positively associated with fruit length, fruit diameter and number of fruits per plant. The lines CCA-4261, CCA-4257, VR-339 and EC-566320 were grouped under cluster I while IC-395318 and EC-519636 grouped in cluster II. Analysis of variance for

combining ability revealed that lines and testers exhibit adequate variation for all the characters. Highest phenotypic coefficients of variability obtained from fruit yield and the lowest from fruit diameter. Based on *per se* performance, heterosis and SCA effects, the hybrids IC-395318 × EC-566320, CCA-4261 × EC-519636 and VR-339 × EC-566320 were found superior hybrids for yield and its attributing traits. These elite hybrids may be tested for yield and other quality traits under different agro-climatic conditions for commercial exploitation of hybrid vigour.

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Spray pollination: An efficient and labour saving method for kiwifruit (*Actinidia deliciosa* A. Chev.) production

Sharmistha Naik and Vishal Rana

Department of Fruit Science, Dr Y.S. Parmar University of Horticulture and Forestry. Nauni, Solan-173230.

Key words: Artificial pollination, liquid pollen extenders, kiwifruit, agar, gelatin, arrowroot powder, sago powder, gum *Acacia*, fruit set, fruit weight

Journal of Applied Horticulture, 2013, volume 15, issue 3, pages 202-206.

Abstract: Artificial pollination using liquid pollen extenders is a labour saving method as well as it also increases the efficiency of pollination. An attempt was made to develop effective and relatively cheap pollen extenders for spray pollination and also to compare different pollination methods. Different liquid pollen extenders containing basal sucrose solution (BSS) (0.2M sucrose) plus 0.1% agar/0.01% gelrite/0.9% sago powder/1.4% arrowroot powder/1.0% gelatin/0.005% gum *Acacia* were evaluated for spray pollination. Quantity of pollen used in all these extenders was 0.25 g per 50 mL of extender. Maximum fruit set (89.63%) and A-grade fruits weighing > 80g (10.22%) were recorded in BSS + 1.4% arrowroot powder. Positive correlations were observed between fruit weight × fruit length ($r=0.882$), fruit weight × fruit diameter ($r =0.852$) and fruit weight × number of seeds/fruit ($r=0.980$). Regression equations showing relationships between fruit weight, fruit length, fruit diameter and number of seeds/fruit were computed and were found to be highly reliable. Spray pollination using automizer was observed to be more than two times efficient as compared to hand pollination. The pollination efficiency would further be improved using pressure sprayers and/or tractor mounted sprayers.

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Genotypes x environment interaction studies on early blight disease of tomato

A.K. Singh, N. Rai, R.K. Singh, R.P. Singh and Vineeta Singh

Indian Institute of Vegetable Research, Post Box No. 01, P.O. Jakhini (Shahanshahpur), Varanasi-221305, Department of Botany, Udai Pratap Autonomous P.G. College, Varanasi-221002, Department of Mycology & Plant Pathology, Institute of Agricultural Science

Key words: Tomato, *Solanum lycopersicum*, early blight, *Alternaria solani*, percent disease incidence (PDI), area under disease progress curve (AUDPC)

Journal of Applied Horticulture, 2013, volume 15, issue 3, pages 207-210.

Abstract: Experiments were conducted for three years to study the interaction between tomato genotypes and environment against early blight disease caused by *Alternaria solani*. Fifty one genetically diverse genotypes of tomato were screened in field conditions against early blight in Rabi season of 2006-09 at Indian Institute of Vegetable Research, Varanasi, India. Results revealed that genotype LA-3980 was resistant while, EC-520058, EC-520060, EC-520061, EC-520070, EC-521080, WIR-3928 and H-88-78-1 were highly resistant. All the resistant and highly resistant lines belong to wild species except H-88-78-1 and LA-3980. Only three genotypes, EC-520061, EC-520070 and H-88-78-1 were stable in each environment for resistance to early blight disease in tomato. Relationship of environment with resistant genotypes indicated that EC-520061, EC-520070, WIR-3928 and H-88-78-1 had low regression coefficient ($b < 1$) and low deviation from regression ($sd^2 = < 1$) than others ($b = > 1$ and $sd^2 = > 1$) indicating stable and adaptive genotypic resistance to early blight. Hence these genotypes may be used as donor parent for development of early blight resistant/ tolerant varieties / lines.

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Genetic variability and trait association in sprouting broccoli (*Brassica oleracea* var. *italica* Plenck) under temperate Kashmir valley conditions

K. Habib, N. Ahmad, P.A. Sofi, S.H. Khan and T. Shafi

Division of Vegetable Sciences, SKUAST-K, Shalimar, 191121, J&K. Central Institute of Temperate Horticulture, Old Airport Road, Srinagar, J&K. Regional Research Station, SKUAST-K, Wadura Sopore, 193201, J&K, India

Key words: Broccoli, genetic variability, genetic advance, diallel
Journal of Applied Horticulture, 2013, volume 15, issue 3, pages 211-214.

Abstract: Ten diverse broccoli genotypes selected from germplasm collection maintained at SKUAST-K, Shalimar were crossed in all possible combinations excluding reciprocals. Forty five F₁ crosses (excluding reciprocals) were generated through a 10 x 10 diallel mating design. Each genotype was represented by two rows of ten plants each at spacing 60 x 45 cm in a Randomized Block Design with 3 replications in Rabi 2008 and 2009. Data was recorded on five randomly selected competitive plants from each replication for 16 metric traits. Phenotypic and genotypic coefficient of variation was moderate to high in lateral head yield, lateral head number, main head yield and total carotenoids and low for days to central head harvest, days to central head initiation, plant height and plant spread. Broad sense heritability was comparatively moderate to higher in plant height, head length, days to central head initiation, lateral head yield, main head yield, total head yield and total carotenoids content but low for ascorbic acid content, plant spread and dry matter content. Genetic advance was high (> 20.%) for lateral head yield and total carotenoids content while it was low (<5%) for ascorbic acid, peduncle length and dry matter content. Among various traits, the plant spread, head diameter, leaf number, leaf area, lateral head number, main head yield and lateral head yield possessed positive correlation with total yield at genotypic level while plant height, head length, ascorbic acid and total carotenoids had negative correlation with total yield at genotypic level. However, main head yield, lateral head yield, head diameter and lateral head number had highly significant positive correlation with total head yield.

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Storage life improvement of custard apple (*Annona squamosa* L.) fruits cv ?Balanagar? by postharvest application of antioxidants

A. Venkatram and A. Bhagwan

College of Horticulture, Rajendranagar, Dr. Y.S.R. Horticultural University, Hyderabad - 500030, A.P, India. Fruit Research Station, Sangareddy, Medak - 502110, A.P, India.

Key words: Antioxidants, custard apple, firmness, ripening, storage life, total soluble solids

Journal of Applied Horticulture, 2013, volume 15, issue 3, pages 215-219.

Abstract: The effect of postharvest application of various concentrations of antioxidants [500, 1000 ppm of sodium benzoate (SB) and ascorbic acid (AA) and 50, 100 ppm of benzyl adenine (BA)] on storage life of custard apple (*Annona squamosa* L.) fruits of cv 'Balanagar', stored at 15°C, was studied at Fruit Research Station, Sangareddy, A.P., India. Various physico-chemical parameters like physiological loss in weight (PLW), firmness, spoilage, ripening, days taken for ripening, storage life, total soluble solids (TSS) and ascorbic acid were estimated at an interval of 2 days during storage. Fruits treated with BA (100 ppm) recorded the lower PLW than untreated fruits. The highest firmness was recorded in fruits treated with BA (100 ppm), whereas maximum days taken for ripening was recorded with BA (50 and 100 ppm) and SB 500 ppm. Fruits treated with BA (100 ppm) or SB (500 ppm) or AA (1000 ppm) recorded lower spoilage and correspondingly increased the storage life up to 11, 10.5 and 10 days, respectively, whereas, untreated fruits recorded a storage life of 8.5 days only. The lowest TSS and the highest ascorbic acid were recorded with fruits treated with BA (100 ppm), whereas untreated fruits recorded highest TSS and the lowest ascorbic acid. From the present investigation, it can be concluded that postharvest application of BA (100 or 50 ppm) increases the storage life of custard apple by 29.41 per cent (2.5 days) over untreated fruits.

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Influence of different sources of nutrients on growth, yield and quality of *Khasi* mandarin grown under mid hills of Arunachal Pradesh (India)

P. Suresh Kumar, V.K. Choudhary, M. Kanwat and A. Sangeetha

ICAR Research Complex for NEH Region, AP Centre, Basar, Arunachal Pradesh-791 101. India

Key words: Citrus, mandarin, organic manure, pig manure, poultry manure, fruit quality, yield

Journal of Applied Horticulture, 2013, volume 15, issue 3, pages 220-223.

Abstract: A field trial was laid out on 11 year old *Khasi* mandarin trees with 12 different doses organic sources (20, 40, 60, 80 kg each of FYM, pig manure and poultry manure) and three different doses (200, 100, 100; 400, 200, 200; and 600, 400, 400 g NPK / tree) of inorganic fertilizers to evaluate the effect of different nutrient sources on growth and yield performance of *Khasi* mandarin. Highest number of fruits per plant was recorded with 600, 400, 400 g NPK application. Plant height (6.96 m), crop canopy (5.7 x 5.6 m) and yield

were also highest with full dose of NPK. However, stem diameter (86.8 cm) was highest with the application of 80 kg pig manure. The physico-chemical characteristics of fruits showed that peel weight (32.14 g) and thickness (4.2 mm) were more with full dose application of NPK, while segment weight (87.52 g) and fruit weight (120.4 g) were highest with 80 kg application of FYM. Inorganic fertilizers other than reducing TSS have profound effect on the increase in acidity which in turn reduced the TSS: acid ratio. It can be concluded that 80 kg FYM or 80 kg pig manure application would replenish the depleted nutrients on the *hasi* mandarin growing soils and maintain soil health.

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Effect of light intensity and soil media on establishment and growth of *Curculigo latifolia* Dryand

Reza Farzinebrahimi, Rosna Mat Taha and Kamaludin A Rashid

Institute of Biological Sciences, Faculty of Science, University of Malaya, Kuala Lumpur-50603, Malaysia.

Key words: *Curculigo latifolia* Dryand, lembu, soil media, light intensity, leaf growth, plant height

Journal of Applied Horticulture, 2013, volume 15, issue 3, pages 224-226.

Abstract: Growth and survival percentage of *Curculigo latifolia* Dryand under different light intensity and various soil media was studied to work out suitable growing conditions for the species. Three light intensity (25, 50 and 100%) and soil media consisting topsoil, organic manure and sand as 1:1:1 (T1), 2:3:1 (T2) and 3:2:1 (T3) were used as treatments for planting *C. latifolia*. When multiplied by rhizomes, the survival rates in all treatments were 100%, however the leaf growth and number were influenced by light intensity and soil media. There were no significant differences of leaf growth between T1 and T3 under 50% light and T2 under 100 % light. However, in T2 under 25% light higher leaf number and in T1 (1:1:1) under 50% light higher plant height was observed. The species was successfully regenerated by rhizomes for the present study. The study revealed that light intensity has significant effect on plant height and leaf number of *C. latifolia*. Soil media influenced the height and leaf number with different effect under varying light intensities.

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Effect of method of orchard establishment and propagation

on growth and development of aonla (*Emblica officinalis* Gaertn.) plants in wastelands

R.S. Negi, B.S. Baghel and U.S. Gautam

Deendayal Research Institute Krishi Vigyan Kendra, Satna (MP)-485331, India. College of Horticulture, JNKVV, Mansour (MP), India. Zonal Project Directorate, Zone- VII (ICAR), Jabalpur (MP), India.

Key words: Aonla, *in situ*, *ex situ*, method of orchard establishment, method of propagation, budlings/graft

Journal of Applied Horticulture, 2013, volume 15, issue 3, pages 227-231.

Abstract: To standardize the rehabilitation technology for degraded pasture/ grazing lands through aonla (*Emblica officinalis*), an experiment was conducted at Krishi Vigyan Kendra, Deendayal Research Institute, Satna for two consecutive years with 5 methods of orchard establishment (*in situ* raising of seedlings/rootstocks, transplanting of one month old seedlings/rootstocks raised in poly bags, transplanting of one year old seedlings/rootstocks raised in poly tubes, transplanting of *ex situ* raised grafts/budlings in poly bags and transplanting of *ex situ* raised grafts/budlings in nursery) and 5 methods of propagation, *i.e.* patch, shield, chip, forkert budding and wedge grafting. Growth parameters were higher in the plants raised by transplanting of one month old polythene raised seedling method for orchard establishment. The *in situ* raising of seedlings was found to be next suitable method in respect of growth parameters. Among the different methods of propagation, chip budding recorded the maximum growth of budlings closely followed by patch budding. The interaction between method of orchard establishment and propagation registered better growth of budlings under transplanting of one month old polythene raised seedling and performing chip budding next year. Based on these results, transplanting one month old seedlings/rootstocks raised in poly bags and performing chip budding next year during last week of June can be recommended for the rehabilitation of wastelands on a commercial scale for the economic utilization of such wastelands through aonla cultivation.

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Effect of modified atmospheric packaging on chilling injury and shelf-life of custard apple fruits

R.A. Patil, D.V. Sudhakar Rao and B. Manasa

Department of Horticulture, University of Agricultural Sciences, GKVK Campus, Bengaluru-560 065. Division of Postharvest Technology, Indian Institute of

Horticultural Research, Hesaraghatta, Bengaluru-560 089. India.

Key words: MAP, custard apple, *Annona squamosa*, ripening rate, chilling injury, firmness, TSS, packaging film, temperature

Journal of Applied Horticulture, 2013, volume 15, issue 2, pages 100-105.

Abstract: Laboratory experiment was conducted to study the effect of modified atmospheric packaging on chilling injury and shelf-life of custard apple fruits at the division of Postharvest Technology, Indian Institute of Horticultural Research (IIHR), Hesaraghatta, Bengaluru, during September-October, 2009. The experiment was conducted in factorial completely randomized design. Three different kinds of flexible films viz. low density polyethylene (LDPE), Cryovac Opti 300 and Cryovac PD-961 of 30 x 25 cm size were used for packaging of fruits as main treatment. Eight fruits were packed in each film bag and these packs were further master packed in ventilated CFB boxes. The boxes were then stored in "Walk-in" cold rooms maintained at 8, 12 and 15 °C (85-90 % RH), respectively. The observations were recorded at weekly intervals. Results of the study revealed that MAP of custard apple fruits with LDPE or Cryovac PD-961 film could alleviate the chilling injury at 8 °C to considerable extent, besides extending the storage life. The non-packed control fruits could be stored up to three weeks at 8 °C, but these fruits lacked desirable appearance due to development of chilling injury. At 12 °C, the fruits could be kept in unripe condition up to two weeks, when the fruits were packed either in LDPE or Cryovac PD-961 film, when compared to four days in non-packed fruits at room temperature. These fruits ripened normally without chilling injury (CI) in three days when they were shifted to RT after unpacking. It can be concluded that the storage life of custard apple fruits could be extended at 12 °C without any CI by packing the fruits in LDPE or Cryovac PD-961 film.

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Effect of plant bio-regulators on fruit growth, quality and productivity of pear [*Pyrus pyrifolia* (Brum.) Nakai] cv Gola under tarai condition

Manoj Kundu, Ritu Joshi, P.N. Rai and L.D. Bist

Department of Horticulture, College of Agriculture, G.B. Pant University of Agriculture and Technology, Pantnagar- 263145 (Uttarakhand), India

Key words: Pear, plant bio-regulators (PBRs), trunk soil line pore (TSLP), productivity, total sugar content, TSS to acid ratio.

Journal of Applied Horticulture, 2013, volume 15, issue 2, pages 106-109.

Abstract: Pear (*Pyrus* spp.) mainly cultivated in the temperate Himalayan region of India, is an important fruit crop. Although, it is a temperate fruit but *tarai* region of northern India have great potential for growing different low chilling cultivars of this fruit. But the main problem of these low chill cultivars in this area is vigorous growth with shy bearing habit with heavy fruit drop and poor fruit growth resulting very low yield with much inferior fruit quality as compared to fruits produced in temperate region. Plant bio-regulators have the great potential to boost up reproductive growth resulting higher yield with better quality fruits under *tarai* region. Hence, a field experiment was conducted to study the role of different plant bio-regulators (PBRs) to prevent fruit drop and to improve fruit growth, quality and the productivity of low chill pear cv Gola. Fifteen years old Gola trees were foliar sprayed or soil drenched with different PBRs *viz.*, gibberellin (GA₃), benzyl adenine (BA) and paclobutrazol (PP₃₃₃) at petal fall (PF) stage followed by two and four weeks after PF or at late fall stage. The results indicate that different treatments had significant effect on all the parameters studied. Minimum fruit drop and maximum productivity was depicted in foliar and soil application of PP₃₃₃ followed by foliar spray of GA₃. However, fruit growth (length and width) and volume at maturity and total sugar content was recorded maximum in combined application of GA₃ and BA. Foliar as well as soil application of PP₃₃₃ was also found effective for increasing the sugar content of the fruit while maximum TSS to acid ratio was also recorded in these two treatments. Based on results, it could be said that the foliar as well as the soil application of PP₃₃₃ is highly effective for controlling shy bearing problem with minimal fruit drop and improved fruit quality resulting higher productivity of marketable fruits of better quality.

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An efficient selfing technique for inbred development-A prerequisite for hybrid production in petunia

K. Swathi, Tejaswini and K.V. Jayaprasad

Division of Ornamental Crops, Indian Institute of Horticultural Research, Hesserghatta, Bangaluru-560089, India

Key words: Bagging, hybrids, inbreds, inbreeding depression, petunia

Journal of Applied Horticulture, 2013, volume 15, issue 2, pages 110-113.

Abstract: Petunia is one of the important bedding plants and occupies an ever increasing demand in flower seed industry. The present study was carried out to evaluate various selfing techniques to identify the efficient one for the production of large quantity of seeds in short duration to facilitate inbred development. Different selfing techniques like threading, manual pollination, bagging of single bud and bagging of multiple buds were tried in three inbred lines and also their interactions were studied. The results indicated that bagging of multiple buds took minimum days to seed set, higher pod weight and highest number of seeds/mg. Seed germination percentage was high in manual pollination followed by bagging of multiple buds. Inbred lines IIHRP-WT gave best results as compared to other inbred lines. Interaction of this inbred line with bagging of multiple buds gave good seed quality results like higher pod weight and number of seeds/mg.

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Performance of novel insecticide for management of onion thrips (*Thrips tabaci* L.)

Durga Singh, R.P.S. Shaktawat and I.S. Naruka

Krishi Vigyan Kendra and Department of Plantation and Spice Crops, College of Horticulture, Mandsaur (MP)-458001 India

Key words: *Thrips tabaci*, onion, fipronil, lambda-cyhalothrin, thiacloprid, deltamethrin, malathion

Journal of Applied Horticulture, 2013, volume 15, issue 2, pages 114-116.

Abstract: Onion thrips (*Thrips tabaci* L.) is a major pest of onion (*Allium cepa* L.) of family *Alliaceae* in India and widely spread in summer season. For the control of its infestation, the crop is sprayed intensively with insecticides. In order to find out the most efficient and eco-friendly method of thrips control, an experiment was conducted at Shajapur (M.P.) during the year 2007 and 2008 to assess the thrips population. Thrips population was counted at 15 days interval. Thrips population was peaked in February when they reached the maximum mean values ranging between 15.30 and 153.45 thrips per plant. The seven treatments of insecticides *i.e.* fipronil 5 % SC, lambda-cyhalothrin 5 % EC, lambda-cyhalothrin 4.9 % CS, thiacloprid 21.7 % SC, deltamethrin 11 % w/w EC, malathion 50 % EC were applied at 30, 45 and 60 days after transplanting of onion crop for management of onion thrips. Among all the insecticides applied fipronil 5 % SC and lambda-cyhalothrin 4.9 % CS was the most effective insecticide in reducing the thrips population and increasing the weight of exportable bulb and yield of onion as compare to control and other

insecticides. Fipronil 5 % SC treatment reduced the thrips population by 98.56 percent over control and increased the bulb yield by 124.90 percent compared with control.

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Studies on parasitoid complex of mealybug infesting grapes in Maharashtra

U. Amala, D.S. Yadav and A.M. Bhosale

Department of Entomology, National Research Centre of Grapes, Solapur Road, P.B. No. 3, Manjri Farm, Pune - 412 307, Maharashtra, India

Key words: *Maconellicoccus hirsutus*, parasitization, *Leptomastix dactylopii*, Encyrtidae, *Anagyrus dactylopii*, mummies, *Planococcus citri*, *Coccidoxenoides perminutus*

Journal of Applied Horticulture, 2013, volume 15, issue 2, pages 117-119.

Abstract: Survey was conducted to investigate the parasitoid complex of mealybug infesting grapes in the vineyards during 2012 to 2013. The parasitized mummies of mealybugs were collected and held in the test tubes until the parasitoid emerged out. The emerged parasitoids were identified and preserved. Three encyrtid parasitoids viz., *Coccidoxenoides perminutus* Girault, *Anagyrus dactylopii* Howard, *Leptomastix dactylopii* Howard were found to effect parasitization of the mealybugs. *A. dactylopii* was found specific to pink hibiscus mealybug, *Maconellicoccus hirsutus*. *L. dactylopii* and *C. perminutus* were found parasitizing *Planococcus citri*. Percent parasitization of mealybug by *C. perminutus*, *A. dactylopii* and *L. dactylopii* was 56.25, 72.72 and 81.81 per cent, respectively during the peak incidence of mealybugs. Mean population of *C. perminutus*, *A. dactylopii* and *L. dactylopii* were 6.3, 5.4 and 5.9 individuals per vine.

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Population dynamics of red pumpkin beetle on cucumber in mid-hill Himalayas

Sheikh Khursheed, Desh Raj and Nisar A. Ganie

Department of Entomology, College of Agriculture, CSK Himachal Pradesh Agricultural University Palampur-176 062 (H.P.) India.

Key words: Red pumpkin beetle, *Aulacophora foveicollis*, cucumber,

population dynamics

Journal of Applied Horticulture, 2013, volume 15, issue 2, pages 120-123.

Abstract: The population dynamics of *Aulacophora foveicollis* Lucas in relation to abiotic factors was studied on cucumber (*Cucumis sativus*), var. 'Khira-90' during 2009 and 2010. Incidence of red pumpkin beetle in field indicated that its initial activity and peak period varied with the locations and prevailing weather conditions. At Palampur, the insect was found active from second fortnight of April with three peaks during 2nd and 4th weeks of May and 3rd week of July, 2009 whereas, one major peak during 2nd week of May was recorded in 2010. At farmer's field, Bara (Hamirpur) the insect first appearance was noticed during first fortnight of March and reached to its peak during 3rd and 2nd weeks of April, 2009 and 2010, respectively. The highest plant infestation (100 %) was observed when the crop was at its early growing stage. The correlation studies revealed that average minimum temperature showed significant negative correlation at farmer's field whereas other weather parameters had no significant effect on the beetle population at Palampur as well as Bara.

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Effect of N-sources on nitrogen use efficiency and nutrient content of *Ocimum canum* plants grown using nutrient film technique (NFT)

Hassan A. Hamouda, A.A. El-Sayed, Mohamed M. El-Fouly, A.A. Fawzi, B.M. Mansour and H.A. Bosila

Fertilization Technology Department, National Research Centre, Cairo-Dokki-Egypt

Key words: *Ocimum canum*, nutrient film technique (NFT), nitrogen utilization, uptake

Journal of Applied Horticulture, 2013, volume 15, issue 2, pages 124-127.

Abstract: The aim of the study was to investigate which nitrogen source gives the highest vegetative growth, nutrient uptake and highest nitrogen use efficiency of *Ocimum canum* plant. Nutrient film technique was used to grow *O. canum* using different nitrogen sources; Nitrate (calcium and potassium nitrate) (N), urea (U) and Ammonium nitrate (AN) in the same dose. Results showed that in general, growth parameters and nutrient uptake by whole plant and different plant organs were significantly higher in nitrate treatment in comparison with the other sources. The nutrient solution containing ammonium

nitrate gave the highest number of leaves, number of branches, height and leaf area per plant, as well as fresh and dry weights. Nitrogen use efficiency of N treatment (57 %) was a little bit higher than of AN (53 %), while U nitrogen utilization was much lower (NUE = 31). In conclusion, when growing *O. canum* using NFT, it is recommended that N should be supplied as ammonium nitrate.

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Pollen storage and use for enhancing fruit production in kiwifruit (*Actinidia deliciosa* A. Chev.)

Sharmistha Naik, Poonam and Vishal Rana

Department of Fruit Science, Dr Y.S. Parmar University of Horticulture and Forestry, Nauni, Solan-173 230, India.

Key words: Kiwifruit, pollen storage, pollen viability, *in vitro* pollen germination, absolute pollen viability, TTC staining.

Journal of Applied Horticulture, 2013, volume 15, issue 2, pages 128-132.

Abstract: Insufficient pollination due to asynchrony between staminate and pistillate blossoms in kiwifruit and unfavourable environmental conditions results in reduced fruit size and unequal fruit shape. In the present investigation an attempt was made to develop a simple and reliable method for storage of kiwifruit pollen and their utilization in hand pollination in following year. Pollen were stored at different temperatures [room temperature (25 ± 2 °C), 4, 0 and -20 °C] for a period of one year. Pollen viability was determined at monthly intervals using 2,3,5-triphenyltetrazolium chloride (TTC) staining and percent *in vitro* germination using 14 % sucrose, 1.7 mM calcium nitrate and 3mM Boric acid. Initial TTC stainability (78.83 %), *in vitro* germination (65.55%) and absolute viability (51.72 %) of fresh pollen went on reducing with storage periods. -20 °C was the best temperature at which maximum viability of kiwifruit pollen can be retained up to one year. Pollination using pollen stored for one year showed that pollen stored at -20 °C were able to set 100 % fruits, pollen stored at 0 °C could set 36 % fruits, while there was no fruit setting with pollen stored at room temperature and 4 °C. These findings have practical implications for kiwifruit production in India. Artificial pollination with stored pollen can circumvent several uncertainties of natural pollination and guarantee adequate pollination in kiwifruit.

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Evaluation of *makoi* (*Solanum nigrum* L.) germplasm for

growth, yield and quality

C.S. Ravi, B.S. Sreeramu, A.P. Mallikarjuna Gowda and G.R. Smitha

Department of Horticulture, University of Agricultural Sciences, Gandhi Krishi Vignan Kendra, Bengaluru-560065, Karnataka, India.

Key words: Germplasm, growth, heritability, makoi, quality, yield.

Journal of Applied Horticulture, 2013, volume 15, issue 2, pages 133-137.

Abstract: Evaluation of seventeen genotypes of *makoi* (*Solanum nigrum* L.) revealed maximum dry herbage yield in MG-1 (209.07 g) followed by MG-14 (161.73 g). While, for total alkaloid content the genotype MG-13 (0.23 % w/w) recorded highest followed by MG-16 (0.22 %w/w). The genotype MG-14 had maximum total alkaloid yield (12.26 kg ha⁻¹) followed by MG-13 (11.91 kg ha⁻¹). Result of genetic studies revealed that phenotypic coefficient of variation was higher than genotypic coefficient of variation for all the traits studied, indicating environmental influence on expression of these characters. Both GCV and PCV were high for total alkaloid yield, moderate to high for remaining traits and low for days to maturity. High heritability coupled with high genetic advance was recorded for leaf area, total alkaloid content and total alkaloid yield indicating the presence of additive gene effects. Hence, selection can be employed for improvement of these characters in *makoi*. Dry herbage yield per plant was found to be positive and highly significant genotypic association with fresh herbage yield, leaf area, number of leaves, plant spread and plant height and significant with total alkaloid content. The total alkaloid yield had positive and highly significant genotypic correlation with total alkaloid content. The total alkaloid yield had the maximum direct positive effect on dry herbage yield followed by number of leaves and fresh herbage yield. The total alkaloid content and dry herbage yield had the maximum direct effect on total alkaloid yield.

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Response of magnesium oxide treatment and method of drying on quality of dried lasoda (*Cordia myxa* Roxb.) fruits

M.R. Choudhary, S. Dadheech, S.P. Singh and R.S. Dhaka

S.K.N. College of Agriculture, Jobner, Distt. Jaipur, Rajasthan, India.

Key words: Drying, magnesium oxide, blanching, solar drier, NEB, organoleptic acceptance.

Journal of Applied Horticulture, 2013, volume 15, issue 2, pages 138-141.

Abstract: Dried lasoda fruits are generally used as off-season vegetable in kitchen for preparing curry, pickle, 'Pachkutta', a special five star hotel dish and snacks. The aim of the study was to determine effect of concentration of magnesium oxide and drying method on quality attributes of lasoda fruits *viz.*, protein content, ascorbic acid, organoleptic acceptance, solid gain ratio and minimum non-enzymatic browning (NEB). Mature, green and uniform sized lasoda fruits were selected and blanched in various concentrations of magnesium oxide (0.1, 0.2, 0.3 and 0.4 %) before drying and dried under different drying methods (open sun, solar and oven). The statistically better quality dried lasoda fruits were obtained when blanched with 0.2 % magnesium oxide solution and dried in a solar drier.

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Performance of different potato genotypes under aeroponics system

Margaret Chiipanthenga, Moses Maliro, Paul Demo, Joyce Njoloma and Navin Khumar

Bunda college of Agriculture, University of Malawi

Key words: Aeroponics, tissue culture, potato genotypes, potato seed, potato, *Solanum tuberosum*

Journal of Applied Horticulture, 2013, volume 15, issue 2, pages 142-146.

Abstract: Potato yields in developing countries are below potential yield because potato production is mainly constrained by lack of quality seed. Lack of potato seed systems to provide farmers with quality clean and certified potato seed has led majority of farmers save their own seed. Such potato seed is characterized by systemic viral and bacterial diseases that are transmitted from generation to generation and this leads to low crop yields. The study was aimed at exploring the use of tissue culture and aeroponics techniques in the production of quality potato seed. Potato plantlets were produced in the tissue culture laboratory at Bvumbwe Research Station, 15° 41' 0" South, 35° 8' 0" East in Thyolo district of Malawi and then transferred to an aeroponics facility at Njuli Estate, 15° 41' 0" South, 35° 8' 0" East in Chiradzulu district of Malawi. The four potato genotypes did not differ on plant growth performance, but responded differently to aeroponics system in terms of mini tuber yield and stolon numbers. Genotypes CIP381381.20 and CIP381381.13 showed superiority among the other tested genotypes in terms of tuber number per plant. Genotype CIP381381.20 produced significantly higher number of stolons

than the rest. In this study, on an average 30 tubers were produced per plant under aeroponics system which is six times more than the conventional (use of soil-based substrate) seed potato production system under screen house conditions (5 tubers per plant) under Malawian conditions.

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Impact of mechanical planting depth and density on agronomic parameters of organic potato *Solanum tuberosum* L.

S. Chehaibi, B. Douh, El B. Mohandes Dridi and M.W. Hadj Bechir

Higher Institute of Agronomy of Chott Meriem, University of Sousse, Tunisia

Key words: Mechanical planting densities, mechanical planting depths, organic potatoes, yield, leaf area

Journal of Applied Horticulture, 2013, volume 15, issue 2, pages 147-149.

Abstract: Demand for organic produce is expected to increase due to increasing concern in urban society about food quality. However, crop management options are extremely limited in an organic system, often leading to reduced yields. The objective of this study was to evaluate the effects of different mechanical planting densities (3.05 and 3.91 plant/m²) and depths (0.07 and 0.12 m) on the agronomic parameters under organic culture. Field study was conducted at the Higher Institute of Agronomy of Chott Meriem, Tunisia from February to June. The results indicate that different treatment combinations could affect the vigor and growth of the plant, size of tubers and weight of fresh and dry matter of different plant organs, as well as the final yield. Moreover, it was shown that planting in-row spacing of 0.41 m and depth of 0.12 m improved the growth parameters of the plant. This study showed that there is a relationship between the number of plants per square meter and the crop yield. Indeed, yields with the density of 3.91 plant/m² was higher than that of 3.05 plant/m² (13.75 and 10.83 t/ha, respectively).

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Population dynamics and development of suitable pest management module against major insect pests of tomato (*Solanum lycopersicum* L.)

S.M. Chavan, Sushil Kumar and S.S. Arve

Department of Entomology, N.M. College of Agriculture, Navsari Agricultural University, Navsari-396 450, Gujarat, India.

Key words: Aphid, *Chrysoperla*, *Helicoverpa*, IPM, leaf miner, mirid bug, population dynamics, tomato, *Trichogramma*, whitefly

Journal of Applied Horticulture, 2013, volume 15, issue 2, pages 150-155.

Abstract: Investigation on the population dynamics and evaluation of pest management modules against major insect pests of tomato were carried out at Navsari Agricultural University, Navsari, south Gujarat in *rabi*, 2007-08. Results revealed that aphid and whitefly population commenced from transplanting with 1.35 aphids leaf⁻¹ and 0.37 whiteflies leaf⁻¹, reached to peak level (7.31 aphids leaf⁻¹ and 6.01 whiteflies leaf⁻¹) at 11 WAT. Peak level of percent infested leaves by leaf miner was 31.75 % at 10th WAT. The higher population of *Helicoverpa* on foliage (2.80-3.40 plant⁻¹) was noticed during third week of January to end of February (10-16 WAT). The population of mirid bug, which acts as a potential predator of sucking pests reached peak (1.90-2.05 plant⁻¹) when population of aphid and whitefly reached maximum. Correlation studies between insect pest population/damage and weather parameters showed that there was significant negative correlation of aphid ($r = -0.491$) and whitefly ($r = -0.449$) with maximum temperature and negative significant correlation with minimum temperature ($r = -0.645$, $r = -0.599$). Further, the wind velocity showed significantly positive correlation with aphid ($r = 0.574$) and whitefly ($r = 0.534$) population. The wind velocity gave positive and significant correlation with the population of mirid bug as natural enemies. The IPM module was found most promising in reducing the population of aphids (2.1 leaf⁻¹), whitefly (2.4 leaf⁻¹), *Helicoverpa* larva (1.0 plant⁻¹) on foliage. Besides, it reduced leaf infestation by leaf miner (17.8 %) and fruit infestation by *Helicoverpa* (15.4 %) and increased yield (36445 kg ha⁻¹). The sole insecticidal module was equally effective as IPM module in recording low population of aphids (2.2 leaf⁻¹), whitefly (2.5 leaf⁻¹), *Helicoverpa* (1.1 plant⁻¹), leaf infestation (18.3 %), fruits infestation (16.3 %) and also increased fruit yield (34684 kg ha⁻¹). The biological module and botanical module ranked third and fourth in efficacy with respect to pest control. Besides pest management, population of mirid bugs (0.8 plant⁻¹) as natural enemy was also conserved in IPM module. The net ICBR obtained in IPM module was 1:9.45 which was comparable to the insecticidal module (1:15.92).

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Molecular biology of *Tomato spotted wilt virus*: An update

Saurabh Kulshrestha, Anshul Sharma and Chandrika Attri Seth

Faculty of Biotechnology, Shoolini University of Biotechnology and Management Sciences, Bajhol, Solan, Himachal Pradesh, India.

Key words: TSWV, Thrips, L RNA, M RNA, S RNA, Intergenic region

Journal of Applied Horticulture, 2013, volume 15, issue 2, pages 71-80.

Abstract: Advances in understanding of *Tomato spotted wilt virus* (TSWV) molecular biology are reviewed. TSWV, a type species of the genus *Tospovirus*, is an enveloped virus that causes high economical losses in many crops worldwide. It is transmitted by several species of thrips and multiplies in insect cells. The most important vector is *Frankliniella occidentalis* which transmits TSWV in a persistent propagative manner. Several factors are known from both virus and vector side which plays important role in virus acquisition by thrips and its subsequent transfer. TSWV is a segmented negatively strand RNA virus. RNA of TSWV is partitioned among three negative or ambisense single stranded RNA (ssRNA) labeled as L, M and S in order of decreasing size, (approximately 8897, 4821 and 2916 nucleotides long, respectively). These RNA segments encode various proteins like N and Ns by S RNA; NSm and G1/G2 by M RNA and RdRp by L RNA. Intergenic region present in M and S RNA of TSWV helps in proper transcription of different genes encoded by M and S RNA. The different proteins encoded by TSWV genome help the virus in protection, cellular movements, vector transmission, replication and recently in RNA silencing suppressor activity. The present review focuses on basic structure, genome organization, molecular basis of transmission and recent advances in TSWV detection.

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Differential response of citrus rootstocks to CuEDTA concentration in sand culture

Joseph P. Albano, Kim D. Bowman and P. Chris Wilson

United States Department of Agriculture, Agricultural Research Service, United States Horticultural Research Laboratory, Fort Pierce, Florida 34945-3030, USA.

Key words: Orange tree, grove, orchard, nutrient toxicity, nutrient deficiency, chelates

Journal of Applied Horticulture, 2013, volume 15, issue 2, pages 81-86.

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Abstract: Florida citrus groves that have been under continuous production for many years often have high levels of soil-fraction copper (Cu) from the use of Cu-containing fertilizers and pesticides. On such groves, citrus trees may develop Cu toxicity, a disorder that impacts both plant growth and nutrition. The objectives of this study were to investigate the growth and nutritional response of six citrus rootstock seedling varieties grown in sand in 3.8 L containers to increasing concentrations of Cu-ethylenediaminetetraacetic acid (CuEDTA). Citrus rootstocks included in the study were: 'Swingle' citrumelo [SC (*Citrusparadisi* x *Poncirus trifoliata*)], 'Volkamer' lemon [VL (*C. volkameriana*)], 'Cleopatra' mandarin [CM (*Citrus reticulata*)], 'Flying Dragon' trifoliolate [FD (*P trifoliata*)], 'US-812' [US812 ('Sunki' mandarin x 'Benecke' trifoliolate)], and 'US-897' [US897 (CMx FD)]. Incorporated into a complete nutrient solution, Cu was supplied at 0.05, 0.25, 1.00 and 2.00 mg L⁻¹. Citrus rootstock but not Cu treatment was significant for root and leaf dry mass with FD and VL having the least and greatest total plant dry mass, respectively. Rootstock and Cu treatment was significant for root and leaf Cu. As a mean of Cu treatments, foliar Cu ranged from 4.05 ug g⁻¹ (CM) to 7.74 ug g⁻¹ (US812); and root Cu ranged from 30.18 ug g⁻¹ (FD) to 61.08 ug g⁻¹ (VL). Rootstock but not Cu treatment was significant for Ca, K, Mg, P, Fe, Mn and Zn. 'Volkamer' lemon had significantly higher levels of foliar Ca, K, and Mg than the other rootstocks; and along with US812, the highest level of foliar Fe. For all nutrients analyzed except for Mg, accumulation was greater in roots than in leaves. Magnesium, as a mean of rootstocks, accumulated equally in roots and leaves. Subjective visual observations of plants at harvest for nutrient disorder revealed that young terminal-growth leaves of VL and SC in the highest Cu treatment (2.00 mg L⁻¹) showed few to pronounced symptoms of a micronutrient-type disorder, respectively, that correlated with increasing Cu treatment. Based on visual symptoms in the highest Cu treatment (interveinal chlorosis and leaf/leaflet deformation/cupping), plants segregated as follows from greatest to least expression of the observed micronutrient-like disorder: SC > CM/FD > US812/US897 > VL.

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Growth control and flower promotion of *Salvia* with benzyladenine foliar sprays

Dennis J. Carey, Barbara A. Fair, Wayne Buhler, Ingram McCall and Brian E. Whipker

Department of Horticultural Science, North Carolina State University, Raleigh,

NC 27695-7609,

Key words: 6-Benzylaminopurine, N⁶-Benzyladenine, Configure, cytokinin, meadow sage, plant growth regulator

Journal of Applied Horticulture, 2013, volume 15, issue 2, pages 87-89.

Abstract: Foliar sprays of benzyladenine (BA) at concentrations of 100 to 1600 mg L⁻¹ were applied 14 days after potting (DAP) onto *Salvia nemorosa* (L.) 'Caradonna' to determine if it would increase branching and flowering. At 28 DAP, BA foliar sprays > 400 mg L⁻¹ controlled plant height, > 200 mg L⁻¹ resulted in smaller plant diameter, 100 mg L⁻¹ controlled growth index and inhibited flowering. Phytotoxicity in the form of leaf edge necrosis was observed at 1600 mg L⁻¹ BA. Flowering was delayed by two to three weeks with > 400 mg L⁻¹ BA, however the plants were more compact, and the total number of flower stalks produced increased by 350 %. Total growing time to achieve maximum increased flower stalk number was an additional 21 days and growers will have to determine if the trade-off of flower delay is worth having more compact plants with 350 % more flowers. In a second experiment, BA was applied 13 DAP as a foliar spray at 0, 125, 250 and 500 mg L⁻¹ to *Salvia* 'Ultra Violet', *Salvia* 'Marcus?', and *Salvia* 'May Night'. Plant height, number of flowering shoots, and flowering dates were recorded. Growth control effect was not observed with BA on 'Ultra Violet' plants, and control effect was limited and inconsistent for both 'May Night' and 'Marcus?'. Thus, cultivar response to BA varies, and individual trials will have to be conducted to determine BA suitability as a growth enhancer.

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Ecophysiological performance of eight *Jatropha curcas* L. provenances cultivated in Tunisia

Z. Nasr, M.L. Khouja, R. Aini, A. Hammadi, H. Manai and B. Mimouni

Institut National de la Recherche en Genie Rural, Eaux et Forets Rue Hedi Karray, BP10 2080 Ariana - Tunisia

Key words: Biodiesel crops, irrigated jatropha, semi-arid areas, genetic diversity, global warming

Journal of Applied Horticulture, 2013, volume 15, issue 2, pages 90-94.

Abstract: Bio-diesel crops are presented as a potential tool to mitigate global warming. However, these crops are often highly water consuming, which limits their use in semi-arid areas. In this respect, the *Jatropha* is considered by

many researchers as the most appropriate species in these dry conditions. The aim of our investigation was to study the possibility of its use in Tunisia regarding its behavior in semi-arid area of the north-west region. Eight provenances of *Jatropha curcas* L. introduced from Brazilia (5), Surinam (1), Mosambic (1) and Tanzania (1) were compared on the basis of their ecophysiological performance. Results showed variability in photosynthesis, leaf transpiration, chlorophyll content and leaf growth between accessions during the growing season. Average photosynthesis and leaf transpiration values ranged from 7 to 13 $\mu\text{mol m}^{-2} \text{s}^{-1}$ and from 2.5 to 3.5 $\text{mmol m}^{-2} \text{s}^{-1}$, respectively. Specific dry matter per unit leaf area varied from 50 g m^{-2} to 90 g m^{-2} . Provenances from the Mozambic and Prana with the lowest biomass per unit leaf area and high photosynthetic capacity are more likely to offer greater productivity in semi-arid zone.

Volume 15(2), 2013

Effect of explants, bacterial cell density and overgrowth-control antibiotics on transformation efficiency in tomato (*Solanum lycopersicum* L.)

B.D. Pawar, A.S. Jadhav, A.A. Kale, V.P. Chimote and S.V. Pawar

State Level Biotechnology Centre, Mahatma Phule Krishi Vidyapeeth, Rahuri, Maharashtra, India.

Key words: *Agrobacterium*, *GUS*, transformation, *Solanum lycopersicum* L.

Journal of Applied Horticulture, 2013, volume 15, issue 2, pages 95-99.

Abstract: Improved protocol for *Agrobacterium* mediated transformation of tomato cultivar, "Dhanshree" was developed by optimizing various parameters that affect transformation efficiency. In the present investigation, *Agrobacterium* strain EHA 105 harboring a pBI121: *gus* gene construct was used for transformation. The kanamycin concentration was standardized and 50 mg/L was found to be optimum based on lethal effect to the explants. Effect of varying concentration of *Agrobacterium* on the transformation efficiency of cotyledon explants revealed that the concentration of 0.2 at OD₆₀₀ was optimum. Cotyledons proved to be better for transformation as compared to hypocotyls and leaf explants. Highest transformation efficiency was obtained in 7-14 days old cotyledon which was precultured for one day on the MS medium containing 2 mg/L zeatin and 0.2 mg/L IAA. It was then co-cultivated with *Agrobacterium* for 3 days on the same medium composition used for preculture. Subsequently the explants were transferred to selective shooting medium supplemented with 50 mg/L kanamycin, 250 mg/L cefotaxime and

250 mg/L carbenicillin. These explants were maintained for 6-8 weeks which resulted in more than 12 % transformation efficiency as judged by *GUS* assay technique.

Volume 15(1), 2013



Characterization and biostimulation of benzene biodegradation in the potting-mix of indoor plants

F.R. Torpy, P.J. Irga, D. Moldovan, J. Tarran and M.D. Burchett

Plants and Indoor Environmental Quality Group, Centre for Environmental Sustainability, School of the Environment, Faculty of Science, University of Technology, Sydney; PO Box 123 Broadway, NSW 2007, Australia

Key words: VOC, microorganisms, indoor air quality, indoor plants, Biolog EcoPlate, biostimulation

Journal of Applied Horticulture, 2013, volume 15, issue 1, pages 10-15.

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Abstract: Over 900 volatile organic compounds (VOCs) have been detected in indoor air, where they cause acute and chronic health problems to building occupants. Potted-plants can significantly reduce VOC levels in indoor air, the root-zone bacteria of the potting mix effecting most of the VOC biodegradation. In this study, a baseline community level physiological profile (CLPP) was established for the potting mix bacteria of the indoor plant species, *Spathiphyllum wallisii* 'Petite', using Biolog EcoPlates, to provide information on the functional abilities of this community. Changes in the CLPP resulting from benzene exposure were then determined and following the identification of the carbon sources associated with changes in the CLPP, biostimulant solutions were formulated and applied to fresh potted-plant specimens. Biostimulation of benzene removal was observed, with increases in removal rates of about 15%, providing proof-of-concept for the biostimulation of this process. The findings further elucidate the mechanisms of bacterial activity associated with removal of indoor airborne benzene, and could be applied to increase VOC biodegradation rates, augmenting the uses of indoor plants in improving building environmental quality.

Volume 15(1), 2013

Grafting onto African eggplant enhances growth, yield and fruit quality of tomatoes in tropical forest ecozones

G.O. Nkansah, A.K. Ahwireng, C. Amoatey and A.W. Ayarna

Forest and Horticultural Crops Research Centre, Institute of Agricultural Research, College of Agriculture and Consumer Sciences, University of Ghana, Legon, Accra, Ghana.

Key words: Grafting, African eggplant, *Solanum lycopersicum*, *Solanum aethiopicum*, rootstock, scion, tomato, yield

Journal of Applied Horticulture, 2013, volume 15, issue 1, pages 16-20.

Abstract: Field experiments were conducted at the Teaching and Research farm of the University of Ghana Forest and Horticultural Crop Research Centre (FOHCREC), Okumaning-Kade to investigate the effect of grafting on growth, yield, disease resistance and fruit quality of tomatoes grafted onto two different African eggplant rootstocks. Two commercial tomato varieties ('Tropimech' and 'Roma') were used as scions and two African eggplant varieties ('Aworoworo' and 'Green') were used as rootstocks. The scion/rootstock combinations or treatments were 'Roma/Green', 'Tropimech/Green', 'Roma/Aworoworo', 'Tropimech/Aworoworo', 'Roma/Roma', 'Tropimech/Tropimech', and Roma non-grafted (control) and Tropimech nongrafted (control). The results indicated that, grafted tomatoes on African eggplant rootstocks performed better in terms of growth, yield, earliness, disease incidence and shelf life than non-grafted or control plants. Pooled mean data indicated significant differences in terms of percent fruit set, fruit number and weight among the treatments. Percent fruit set was higher for tomato on Africa eggplant (67.9) compared to the self grafted (58.7) and the control (52.6). Fruit number/plant and yield of tomato on the African eggplant was 16.2 and 1120.7g/plant compared to the control (10.8 and 916g/plant) while the self grafted had 13.2 and 1064.9g/plant, respectively. The shelf life of grafted tomatoes onto egg plant was significantly higher (25.4 days) compared to control (13.6 days). Grafting did not significantly affect Brix (%), pH and acidity of tomato. Grafted plants significantly recorded low disease incidence compared to non-grafted ones. The study indicated that the use of grafting on eggplant in the humid forest zone of Ghana can boost tomato production considerably.

Volume 15(1), 2013



Post-tsunami collection of polyembryonic mango diversity from Andaman islands and their *ex situ* reaction to high sodium in sodic soil

T. Damodaran, Shailendra Rajan, Ram Kumar, D.K. Sharma, V.K. Misra, S.K. Jha and R.B. Rai

Central Soil Salinity Research Institute, RRS, Lucknow, India

Key words: Polyembryony, mango, natural selection, tsunami, Andaman Islands, sodium toxicity, tolerance, sodic soils, mortality

Journal of Applied Horticulture, 2013, volume 15, issue 1, pages 21-25.

[Full text PDF |](#)

Abstract: The study includes collection of polyembryonic mango types from tsunami affected areas of the South Andaman district where trees are under natural selection pressure for salt tolerance and screening of collections against high sodium in sodic soils *ex situ*. Forty two accessions were located and collected on the basis of phenotypic expression and indentation level in tsunami. Out of which 15 diverse polyembryony types from different locations were evaluated for survival and growth in sodic soils of pHe 9.51 and sodium (Na⁺) 21.20 meq/L at Lucknow. The mortality percentage and relationship between the salt tolerance potential of the selections and Na⁺ / K⁺ ratio, root length and shoot length were investigated. Based on mortality in *ex situ* screening, collected types were classified into different groups. An increase in pH and Na⁺ concentrations led to higher mortality (96.67 -100.00 %) in polyembryonic seedlings when compared to salt tolerant types (3.33-16.678 %). Six accessions GPL-1, GPL-3, ML-3, ML-4, ML-2 and GPL-4 exhibited tolerance to high soil sodium content and pH. Accessions GPL-1 and ML-2 collected from sites affected by inundation of sea water during tsunami under acid saline soil conditions were found to have the highest tolerance level. These accessions accumulated comparatively higher amounts of K⁺ ions in leaves than other accessions. They also had lower Na⁺ / K⁺ ratio which was even lower than the other tolerant collections. The collections demonstrated an increase in the root and shoot length and significant negative correlation with mortality of the seedlings ($r= 0.97$ and 0.98 , respectively). The study revealed the importance of natural selection of mango polyembryony seedlings for salt tolerance and scope of its utilization.

Volume 15(1), 2013

Improvement of somatic embryogenesis and plant

regeneration of seven date palm (*Phoenix dactylifera* L.) cultivars: Effect of cytokinins and activated charcoal

Mona M. Hassan, Ibrahim A. Ibrahim, Mohsen K.H. Ebrahim and Ewald Komor
Central Laboratory for Date Palm Research and Development, Agricultural Research Centre, Giza, Egypt

Key words: activated charcoal, cytokinins, date palm cultivars, shoot formation, somatic embryos

Journal of Applied Horticulture, 2013, volume 15, issue 1, pages 26-31.

Abstract: This study presents a procedure for the rapid development of a large number of somatic embryos and shoots from seven date palm cultivars (Barthamuda, Sakkoty, Malkaby, Shamia, Khalas, Barhee and Medjool). Clusters of leaf meristem explants were cultured on Murashige and Skoog medium supplemented with 0.1 mg/L naphthalene acetic acid and cytokinins (benzyl adenine, kinetin or 2-isopentenyl adenine) at 0.05 or 0.1 mg/L, in the presence or absence of activated charcoal. Regeneration to newly formed embryos and shoot formation was significantly ($P < 0.05$) promoted in all cultivars using a culture medium with 0.05 mg/L benzyl adenine in the absence of activated charcoal. The presence of charcoal was inhibitory to shoot formation in all cases, except on the medium with 0.05 mg/L benzyl adenine, where it stimulated 33% shoot formation. This medium plus activated charcoal is therefore the recommended one for shoot formation. The number of somatic embryos and shoots generated was greatest with cultivars Barthamuda, Barhee and Sakkoty, while Medjool had the lowest number. The healthy shoots were suitable for acclimatization to form plantlets in soil.

Volume 15(1), 2013

Genetic transformation of cabbage (*Brassica oleracea* var. capitata) with synthetic *cry1F* gene to impart resistant to diamondback moth (*Plutella xylostella*)

H.M. Mahadeva Swamy, S.N. Nagesha, Prakash M. Navale, T.K.S. Gowda, R. Asokan and Riaz Mahmood

Department of Biotechnology, University of Agricultural Sciences, GKVK, Bangalore 560 065

Key words: Synthetic *cry1F* gene, *Agrobacterium tumefaciens*, cabbage, transformation, regeneration, kanamycin

Journal of Applied Horticulture, 2013, volume 15, issue 1, pages 3-9.

Abstract: Insect-resistant crops have been one of the major successes of applying plant genetic engineering technology to agriculture. There is an urgent need for improvement in vegetable production, especially in developing countries where the economic, health and environmental benefits of bioengineered vegetables could be of great importance. In this view a synthetic cry1F gene coding for an insecticidal crystal protein of *Bacillus thuringiensis* (Bt) was transformed to cabbage cultivar 'Hare Krishna' by co-cultivating hypocotyls explants with *Agrobacterium tumefaciens* mediated transformation. The transformed plants resistant to kanamycin were regenerated on selection medium. Confirmation of transgene in putatively transformed plants was carried out by using *nptII* and cry1F gene specific primers. Multiple shoot regeneration of hypocotyl and shoot tip explants of cabbage after co-cultivation with *Agrobacterium* was optimized and medium containing 2 mg/L BAP was observed to be the best for shoot regeneration after co-cultivation. In this study, 45 and 32.5% transformation efficiencies were achieved for hypocotyl and cotyledonary leaf explants, respectively using the optimized procedure.

Volume 15(1), 2013

Growth and development response of *Antirrhinum* to plant growing media

Farhat Naz, Jalal-Ud-Din Baloch, M. Munir and A.A. Khakwani

Faculty of Agriculture, Gomal University, Dera Ismail Khan, KPK. Pakistan;
Frontier Agriculture, SOYL Division, Recommendations Dept., Newbury, United Kingdom

Key words: *Antirrhinum majus*, snapdragon, growth and development, growing media

Journal of Applied Horticulture, 2013, volume 15, issue 1, pages 32-37.

Abstract: The seedlings of *Antirrhinum majus* L. cv. 'Orchid Rocket Mixed' at four leaf stage (two cotyledonary leaves and two true leaves) were planted in 15 cm diameter pots containing seven combinations of plant growing media viz., river sand, silt, leaf mold, river sand+silt (1:1), river sand+leaf mold (1:1), silt+leaf mold (1:1) and river sand+silt+leaf mold (1:1:1). The experiment was laid out in 'Randomised Complete Design' while each pot was considered as a replicate. Three equally spaced plants were kept in one pot in one replication and there were three replications in each treatment. Plant

growth and development parameters indicated that plant height was significantly ($P < 0.05$) affected by growing media and time interval. Plants grown in leaf mold attained maximum height than the other treatments. A linear and significant ($P < 0.05$) increase in leaf development was observed in seven growing media such as plants grown in leaf mold media produced maximum number of leaves than the others. Similarly, plants grown in leaf mold media took minimum time to flowering, maximum number of flower buds per spike, maximum number of branches per plant, and maximum stem, leaf and plant fresh and dry weight.

Volume 15(1), 2013

Temperature effects on phenological development and yield of Snapmelon

S. Sarkar, A. Saha, P. Hazra and M. Pandit

Department of Vegetable Crops, Faculty of Horticulture, Bidhan Chandra Krishi Viswavidyalaya, Mohanpur-741252, West Bengal, India

Key words: Temperature, phenophases, growing degree days, yield, snapmelon.

Journal of Applied Horticulture, 2013, volume 15, issue 1, pages 38-42.

Abstract: The aim of the study was to workout relationship between phenological development and yield of snapmelon in relation to temperature that could be predicted with easily obtainable weather station data and used as an aid in projecting harvest dates along with potential yield. Temperature is one of the most important elements of the climate which determines the potential productivity level of a crop. Heat unit requirement was used for characterizing the thermal response in snapmelon (*Cucumis melo* var. *momordica*) for the assessment of yield potential of a crop in different growing environments. A field experiment was carried out to find out the phenophasic development and yield attributes of snapmelon in relation to ambient air temperature and to find out suitable varieties for commercial cultivation of snapmelon with eight genotypes as influenced by three sowing dates. The studies revealed that the snapmelon sown on 22nd January, accumulated lower number of growing degree days with higher heat use efficiency, among the genotypes tried. Efficiency of converting thermal regime to yield formation was higher when the crop was sown on 22nd January and it decreased with the delayed sowing. A sharp decline in crop duration as well as days to flowering occurred with the rise in temperature irrespective of the varieties. Where as fruit weight, fruit diameter and fruit length were varietal characteristics and

not influenced by the different environmental conditions. Genotype IC-102K-Bh (V₄) was found to be the best cultivar with regard to early female flower initiation and yield as the cultivar utilized the thermal regime for yield most efficiently.

Volume 15(1), 2013

Effect of 1-methylcyclopropene on postharvest physiology and quality of cut rose flowers

S. Muthu Kumar and V. Ponnuswami

Horticultural College and Research Institute, Tamil Nadu Agricultural University, Coimbatore - 641 003, Tamil Nadu, India

Key words: 1-methylcyclopropene, vase life, cut roses

Journal of Applied Horticulture, 2013, volume 15, issue 1, pages 43-46.

Abstract: A lab experiment was conducted on a Hybrid Tea rose variety "First Red" to study the effect of 1-Methyl Cyclo Propene on post harvest quality of cut rose flowers. Pretreatment of flower stem with 1-Methyl Cyclo Propene was carried out in airtight chamber. The experiment was laid with 0.18 % of 1-MCP / m³ for 6 hours and 0.18 % of 1-MCP / 2m³ for 6 hours along with control. The treatment 0.18 % of 1-MCP / m³ for 6 hours recorded the lowest mean values for physiological loss in weight (11.43 per cent), loss of membrane integrity (31.63 per cent), transpirational loss of water (5.23 g stalk⁻¹) and peroxidase activity (0.031 units g⁻¹ of fresh weight) during the entire vase life period while the control recorded the highest mean values for physiological loss in weight (25.36 per cent), loss of membrane integrity (53.82 per cent), transpirational loss of water (8.44 g stalk⁻¹) and peroxidase activity (0.057 units g⁻¹ of fresh weight). Besides, the cut rose flowers treated with 0.18 % of 1-MCP/ m³ for 6 hours had highest relative water content of 78.16 per cent and water uptake of 6.80 g stalk⁻¹. Flowers exposed to 0.18 % of 1-MCP/ m³ for 6 hours maintained higher mean values for appearance (score 4 - very good) and stem strength (82.40 ° angle) during the entire course of study. The cut rose flowers exposed to 0.18 % of 1-MCP/ m³ for 6 hours had significantly enhanced the vase life and recorded the longest vase life of 4.3 days whereas the control recorded the shortest vase life of 2.6 days.

Volume 15(1), 2013

Studies on hybrid vigour in bitter gourd (*Momordica*

***charantia* L.) for earliness, yield and quality characters**

C. Thangamani and L. Pugalendhi

Department of vegetable crops, Horticultural College and Research Institute,
Tamil Nadu Agricultural University, Coimbatore-641003, India

Key words: *Momordica charantia* L., diallel mating, diverse parents, relative heterosis, heterobeltiosis, standard heterosis, earliness, yield and quality

Journal of Applied Horticulture, 2013, volume 15, issue 1, pages 47-56.

Abstract: Evaluation of ninety hybrids of bitter gourd resulting from full diallel mating of ten genetically diverse genotypes for earliness, yield and quality characters had revealed the presence of heterotic vigour. Fifty nine hybrid combinations were found to exhibit negative significant heterobeltiosis for days to first female flower appearance and the hybrid CO-1 x GL had registered favourable values for this trait. The hybrid CO-1 x MC-105 registered negative significant relative heterosis, heterobeltiosis and standard heterosis for node at which the first female flower appears. The heterosis for sex ratio was found to be in the desired direction in UB x GL and seventy six hybrids showed significant negative heterobeltiosis for sex ratio. The highest significant relative heterosis (KR x UB) and heterobeltiosis (MC-10 x KR) for fruit length was also observed. The highest positive and significant standard heterosis was observed in the hybrid Priyanka x GL for fruit length. The estimate of heterobeltiosis for fruit weight had shown positively significant value for fifteen hybrids, and it was the highest in KR x USL. Among the ninety hybrids, sixteen hybrids had registered positive and significant heterobeltiosis values for number of fruits per vine, and the hybrid Preethi x MC-30 had the highest value for this trait. The highest positive heterobeltiosis for yield of fruits per vine was recorded in KR x USL followed by Preethi x MC-30. However, the estimates of standard heterosis for fruit yield revealed that the hybrid Preethi x MC-30 had the highest positive significant value followed by the hybrid KR x USL. In order of merit the hybrids *viz.*, Preethi x MC-30, KR x USL and MC-105 x MC-10 were noted to be the top performing hybrids with respect to yield and quality parameters since they had showed significant heterotic values.

Volume 15(1), 2013

Effect of different growth media on the growth and flowering of beefsteak begonia (*Begonia erythrophylla*)

Henry A. Akintoye, Olusola O. AdeOluwa, Olukemi Y. Akinkunmi

Floriculture Improvement Programme, National Horticultural Research

Institute, P.M.B.5432, Ibadan, Nigeria.

Key words: Flowers production, plant characters, responses, rooting, beefsteak begonia

Journal of Applied Horticulture, 2013, volume 15, issue 1, pages 57-61.

Abstract: Experiments were conducted over a two-year cropping season to determine the effect of growth media on rooting, growth and flowering. Nine growth media *viz.*, river sand (RS), topsoil + poultry manure (T+P), topsoil (T), river sand + poultry manure (RS+P), sawdust (S), topsoil + river sand + poultry manure (T+RS+P), topsoil + sawdust (T+S), sawdust + river sand (S+RS), topsoil + poultry manure + river sand + sawdust (T+P+RS+S) were used for the study. It was found that growth media significantly ($P>0.05$) affected the number of branches and branch length per plant; number of leaves and number of flowers per plant. The quantity of flowers produced per week varied according to each growth media as follows: Begonia planted in topsoil + poultry manure (4:1) produced the highest number of flowers per plant, while sawdust + river sand (3:1) produced the least number of branches per plant, branch length per plant, number of leaves per plant and number of flowers per plant in the two years of the experiment. The slow growth, poor development and late blooming in soil + sawdust (4:1) and sawdust + river sand (3:1), could be as a result of inadequate nutrients in the substrates. Topsoil + poultry manure (4:1) growth medium (with or without river sand), appeared to be the suitable growth medium that will significantly enhance early rooting, establishment, growth and development of beefsteak begonia and sustain flower production for a good length of time.

Volume 15(1), 2013

Studies on fungicide treatment of soil and seed tuber for control of potato black scurf (*Rhizoctonia solani* Khun) in Argentina

J.D. Mantecón

Facultad de Ciencias Agrarias, UNMDPy Estacion Experimental Agropecuaria, INTA. CC 276, 7620 Balcarce, Provincia de Buenos Aires, Argentina.

Key words: *Rhizoctonia*, scurf, soil inoculum, Kennebec, sclerotia, fludioxinil, pencycuron

Journal of Applied Horticulture, 2013, volume 15, issue 1, pages 62-64.

Abstract: During 2008 to 2010 growing seasons, three trials were conducted

on fungicide treatment of soil and seed tuber for control of potato black scurf at INTA Balcarce Experimental Station, Argentina in randomized complete block design. Before planting, fungicides Monceren 25SC (pencycuron 25%) at 1.25 L/t and Celest 25FS (fludioxinil 2.5%) at 0.5 L/t were sprayed on potato whole seeds. After planting, the same fungicides were sprayed on each row at 2.5 and 1.0 L ha⁻¹, respectively. Whole healthy (no symptoms) and diseased (15-20% surface covered by sclerotia) seeds of Kennebec cultivar were used. Artificial inoculations to the soil were made with *Rhizoctonia solani* AG3 anastomosys group. Disease incidence was registered every year. Yields were recorded and each tuber was grouped according to health. Fungicides showed better results than both checks and reduced plant disease incidence in the field. Inoculated check showed 50% of unhealthy plants while the fungicides reduced it to 10%. Yield increase of marketable tubers was 42% better in fungicide treatments than in the inoculated check. Both fungicides produced more healthy tubers than the inoculated check or uninoculated check. Yield increase of healthy tubers was 45% higher when compared with the inoculated check. Fungicide seed treatment was better when disease seeds were used and fungicide soil treatment was better than healthy seeds.

Volume 15(1), 2013

Effect of pruning and fruit thinning on yield and fruit weight of peach (*Prunus persica* (L) Batsch) cv. Shan-i-Punjab in sub-mountain zone of Punjab? An on-farm study

Gurteg Singh and Sat Pal Saini

Krishi Vigyan Kendra (PAU), Haveli Kalan, Ropar -140 001, Punjab, India.

Key words: Key words: *Prunus persica*, pruning, fruit thinning, fruit yield, fruit weight, farmer practice

Journal of Applied Horticulture, 2013, volume 15, issue 1, pages 65-68.

Abstract: Fruit and shoot management in peaches (*Prunus persica* L.) is an important intervention to improve fruit quality and its yield. Studies were conducted through on-farm trials at farmer's fields in Ropar (Punjab) district during 2006-2009 to evaluate the technology of pruning and fruit thinning and its effects on crop yield and fruit quality in six-year-old peach cv. *Shan-i-Punjab* trees with three treatments viz., T₁=50% pruning of fruitful shoots + cutting of dead and diseased wood in early-January, T₂=T₁+ Fruit thinning during mid-March and T₃=No pruning and no fruit thinning (Farmer Practice-FP). The pruning treatments caused the development of an abundant number

of long shoots, which are valuable for fruiting. Mean fruit yield was 50 kg per plant in T₁; 48 kg per plant in T₂ and 32 kg per plant in T₃ (FP). Mean fruit yield was 56.25 % higher in T₁ over T₃ (FP) and by 50.00% higher in T₂ over T₃ (FP). Results revealed that mean fruit weights were 55.10, 70.10 and 41.00 grams in T₁, T₂ and T₃ respectively during 2006-07. Mean fruit weight was 34.39 % higher in T₁ over T₃ (FP) and it was 70.97 % higher in T₂ over T₃ . Similar trend was observed during the following years 2008 & 2009 at all the locations except in 2009 where non-significant reduction in fruit yield was noticed in T₂ over T₃ . The highest benefit cost ratio was obtained in T₂ (3.31) followed by T₁ (3.20) and T₃ (2.32). It was concluded that economic fruit yield can significantly be obtained by imposing 50% pruning of fruited shoots and cutting of dead and diseased wood during early January followed by fruit thinning in mid- March in peaches cv. Shan-i- Punjab in sub mountain zone of Punjab.

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Volume 14(2), 2012

Postharvest microbial diversity on major cultivars of Indian mangoes

S.N. Jha, Pranita Jaiswal, K. Narsaiah, Rishi Bhardwaj, Poonam Preet Kaur, Ashish Kumar Singh, Rajiv Sharma and R. Kumar

Agricultural Structures and Environmental Control Division, Central Institute of Postharvest Engineering & Technology, Ludhiana 141004, India.

Key words: Bacteria, biochemical, diversity, filamentous fungi, mango, relative abundance

Journal of Applied Horticulture, 2012, volume 14, issue 2, pages 102-109.

Abstract: Microbial diversity on fruit surface of nine mango cultivars (Alphonso, Banganapalli, Chausa, Dashehri, Kesar, Langra, Mallika, Maldah and Neelam) harvested from orchards of nine Indian states (Andhra Pradesh, Bihar, Gujarat, Karnataka, Maharashtra, Orissa, Punjab, Tamil Nadu and Uttar Pradesh) were studied using standard methods. A total of 47 fungal and 123 bacterial isolates were purified from 761 mango samples, which included 63 Gram positive and 60 Gram negative bacterial isolates. The relative abundance of Gram positive, Gram negative bacteria and different filamentous fungi varied among cultivars. Gram positive bacteria dominated on Langra of Uttar Pradesh, while Dashehri from Punjab showed dominance of Gram negative bacteria. Among total fungal isolates, the common genera were *Aspergillus* and *Fusarium*, while among bacterial isolates, the most common genera were *Bacillus*, *Aeromonas*, *Pseudomonas*, *Lactobacillus*, *Citrobacter*, *Mycobacterium* and *Serratia*. Alphonso and Kesar variety from Maharashtra showed maximum and minimum fungal diversity, respectively. Genera and species identified include members known for spoilage of fruits; having all types of pectinase and cellulase activities and those used in biocontrol of plant pathogens.

Volume 14(2), 2012

Effect of dehydration on keeping quality of white button mushroom, *Agaricus bisporus* Lange (Sing.)

M.P. Singh, H.S. Sodhi, A. Singh and P.K. Khanna

Department of Microbiology, Punjab Agricultural University, Ludhiana,
Department of Processing and Food Engineering, Punjab Agricultural
University, Ludhiana-141004, India.

Key words: *Agaricus bisporus*, cabinet drying, microwave-oven drying, color index, texture index, carbohydrates, proteins, lipids

Journal of Applied Horticulture, 2012, volume 14, issue 2, pages 110-113.

Abstract: White button mushrooms, *Agaricus bisporus* (strains U3 and S11) were dried in cabinet at two temperatures (45 and 55°C) and microwave oven at 380W for 30 minutes. Dried mushrooms were subjected to physical (color, texture, rehydration ratio, dehydration ratio), biochemical (carbohydrates, proteins and lipids) and microbiological (total bacterial count) parameters after three months of storage period. In strain U3, carbohydrate content was highest in 0.1% KMS treated mushrooms dried at 45°C, protein ranged between 3.43 to 3.89 g/100 g of fresh mushrooms, lipid content ranged between 0.06 to 0.30 g/100 g of mushrooms and the total bacterial count ranged between 1.48 to 2.07 log cfu/g which was within the permissible limits of dried fruit products while in microwave oven dried mushrooms there was no significant difference in two strains in terms of carbohydrate, protein and lipid contents. Bacterial count was found to be within the permissible limit of dried fruit products (1.85-2.17 log cfu/g). The weight of dried mushrooms remained almost constant throughout the storage period of 3 months. However, cabinet drying was preferred for most of the color and texture index parameters. Springiness was maximum for microwave oven dried mushrooms of S11 strain treated with 0.1% KMS, followed by the unwashed mushrooms. Resilience ranged between 0.23 to 0.33 in all the treatments. Cohesiveness was maximum in unwashed mushrooms of U3 dried at 55°C, followed by cabinet dried mushrooms of S11 strain (55°C) both unwashed and 0.1% KMS treated. Chewiness and gumminess were also maximum for cabinet dried unwashed mushrooms of U3, followed by microwave oven dried 0.1% KMS treated mushrooms. *A. bisporus* was most acceptable in cabinet drying for 0.1% KMS treated U3 strain at both 45°C and 55°C while in case of microwave oven drying, total color difference (2.88 for U3 and 2.58 in S11) was minimum and rehydration ratio (1.91 to 3.06) was found to be maximum for U3 strain.

Volume 14(2), 2012

Relationship of nutritional status of field grown Thompson Seedless grapevines with powdery mildew incidence

Jagdev Sharma, A.K. Upadhyay, Indu S. Sawant and S.D. Sawant

National Research Centre for Grapes, Pune (MS)-412307, India.

Key words: Powdery mildew, nutritional status, grapevines, potassium, disease incidence

Journal of Applied Horticulture, 2012, volume 14, issue 2, pages 114-117.

Abstract: Relationship between nutritional status of open field grown Thompson Seedless grapevines and powdery mildew incidence was studied for two years at two growth stages. Amongst different nutrients, potassium showed highest degree of significant and negative correlation with the powdery mildew disease rating ($r = -0.817$ and -0.875) at two growth stages. Regression analysis also revealed the importance of potassium nutrition in powdery mildew incidence. During the first year of the study, N, P, K, Ca, Mg and Na when regressed together accounted for 82.7 % ($R^2 = 0.826$) variation in disease incidence and potassium alone accounted for 66.8 % variation in disease incidence ($R^2 = 0.667$). During the second year N, P, K, Ca, Mg and Na when regressed together accounted for 85.7 % ($R^2 = 0.857$) variation in disease incidence and potassium alone accounted for 76.6 % variation in disease incidence ($R^2 = 0.765$).

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Effect of plant bio-regulators on physico-chemical characteristics of three apple varieties 124 during ambient storage

B.L. Attri, Hare Krishna, B. Das, N. Ahmed and Akhilesh Kumar

Central Institute of Temperate Horticulture, Regional Station, Mukteshwar - 263 138, Uttarakhand, India.

Key words: Apple varieties, salicylic acid, Ca-EDTA, physico-chemical characters, ambient storage, anti-oxidants

Journal of Applied Horticulture, 2012, volume 14, issue 2, pages 118-123.

Abstract: For extending the shelf life, a study was carried out on the effect of bio-regulators *viz.*, salicylic acid and Ca-EDTA on three apple varieties *viz.*, Fanny, Golden Delicious and Vance Delicious. The selected fruits were dipped for 30 minutes in aqueous solution of salicylic acid @ 200 ppm, Ca-EDTA @ 0.4% ppm and control (distilled water dip). The treated fruits were stored in CFB boxes at ambient temperature (18-20°C) for 60 days. During storage, the effect of bio-regulators on various physico-chemical characteristics such as TSS, acidity, ascorbic acid, sugars and antioxidants of apple fruits were studied

at 10 days interval. The results revealed that the fruits treated with bio-regulators had significantly better retention of firmness and low PLW (12.10, 12.80 and 13.69%) as compared to control (20.26, 18.75 and 19.35%) during storage for 60 days. The TSS, acidity, ascorbic acid, sugars and antioxidant contents in the treated fruits were stable, whereas in untreated ones the conversion rate was faster. During storage, salicylic acid and Ca-EDTA slowed down respiration rate resulting better shelf life of apple. The treated fruits of Golden Delicious had a shelf life of 60 days as compared to 40 days in control. The study revealed that the shelf life of the apple fruits could be increased with better physico-chemical characteristics using bio-regulators like salicylic acid and Ca-EDTA.

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Influence of biofertilizers on plant growth, fruit yield, nutrition and rhizosphere microbial activity of pomegranate (*Punica granatum* L.) cv. Kandhari Kabuli

Muzaffar Mir and Som Dev Sharma

Dr. Y.S. Parmar University of Horticulture and Forestry, Nauni, Solan (H.P), India-173230.

Key words: Pomegranate (*Punica granatum* L.), azotobacter, mycorrhizal fungi, PSB, soil enzymes

Journal of Applied Horticulture, 2012, volume 14, issue 2, pages 124-128.

Abstract: The present study represents the positive response of biofertilizers in pomegranate cuttings followed by their transplantation in field conditions. Nursery and field experiments were carried out to assess the effectiveness of selected N₂-fixing bacteria, phosphate solubilizing bacteria and AM fungi alone or in combination, on the growth and biomass production of *Punica granatum*. In both experiments, the combined treatment of *Azotobacter chroococcum* + *Glomus mosseae* was found to be the most effective. Besides enhancing the rhizosphere microbial activity and concentration of various metabolites and nutrients, these bioinoculants helped in better establishment of pomegranate plants under field conditions. A significant improvement in the plant height, plant canopy, pruned material and fruit yield was evident in 6-year-old pomegranate plants in field conditions. In view of the above results, use of biofertilizer technology may be adopted for the establishment and development of other horticultural plant species in rainfed agroecosystem..

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Resistance evaluation of the pistachio rootstocks to *Meloidogyne* species in Iran

Mehrdad Madani, Ahmad Akhiani, Mahmoud Damadzadeh and Ahmad Kheiri

University of Tarbiat Modares, College of Agriculture, Plant Pathology Department, Tehran, Iran. Present address: University of Manitoba, Soil Science Department, Winnipeg, MB, Canada. Plant Pest and Disease Research Institute. Ministry of Agriculture and

Key words: *Pistachio vera*, root knot nematodes, gall index, eggmass index, cultivar

Journal of Applied Horticulture, 2012, volume 14, issue 2, pages 129-133.

Abstract: Pistachio (*Pistacia vera*) is a edible nut native to Iran, the country that ranks first in worldwide pistachio production. Root-knot nematodes (RKN), *Meloidogyne* species, are among the most important pathogens that restrict the cultivation of pistachio in Iran. The objective of this study was to evaluate resistance of native pistachio rootstocks for resistance to isolates of *M. incognita*. Greenhouse experiment was conducted to determine the reaction of eleven cultivars of *P. vera* and six accessions of wild pistachio viz *P. mutica*, *P. khinjuk*, *P. terebintus*, *P. atlantica*, *P. atlantica* sub sp *mutica* and *P. atlantica* sub sp *cabilica*, against five selected populations of RKN. *Meloidogyne incognita* and *M. javanica* were identified based on the morphological characters, and esterase isozyme phenotype. Resistance was characterized based on root gall and egg mass indices and nematode reproduction. Resistance to *M. incognita* was detected among the cultivars and wild accessions of pistachio. There was a significant interaction among nematode populations and host genotypes, suggesting the presence of virulent pathotypes among the *M. incognita* isolates. These data suggest that it will be possible to development cultivars with resistance as a means of suppressing damage to pistachio that is caused by RKN.

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Biology and seasonal activity of semilooper, *Dichromia orosia* (Cramer) (Lepidoptera: Noctuidae) on anthmool, *Tylophora asthmatica* Wight and Arn.

L. Saravanan and Vipin Chaudhary

Directorate of Oil Palm Research, Pedavegi-534 450, Andhra Pradesh, India.
Directorate of Medicinal and Aromatic Plants Research, Boriavi-387 310,

Gujarat, India.

Key words: *Dichromia orosia*, *Tylophora asthmatica*, biology, seasonal activity, longevity

Journal of Applied Horticulture, 2012, volume 14, issue 2, pages 134-138.

Abstract: *Dichromia orosia* (Cramer), a near monophagus pest was observed to cause severe defoliation to its host plant, anthonomus (*Tylophora asthmatica* Wight and Am), an important medicinal plant used in Ayurvedic formulations to treat asthma world over. Biology and seasonal activity of the pest was studied during 2009-10 at Anand, Gujarat. Though incidence was observed throughout the year, however, the pest activity was more during July, August, December, January and February months. The pest completed its life cycle in 24.53±0.40 days (Eggs 3-4, larvae 10-14 and pupae 6-7 days). The longevity of the male and female was 15.70±0.68 and 19.70±0.42 days, respectively. Each female laid an average of 178.5±17.66 eggs, mostly on the under surface of the leaves in 12.20±0.49 days of oviposition period. The larvae developed through five instars in 12.9±0.35 days and pupal period lasted for about 6.8±0.11 days. Correlation of peak pest population periods with corresponding and previous Standard Meteorological Weeks (SMW) revealed that prevalence of maximum temperature (27.5-30.2°C) mean temperature 29.31 °C, high RH and low rainfall recorded in increase of larval population.

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Occurrence of false smut on date palm (*Phoenix dactylifera* L.) in the southern coastal plains of Yemen)

M.H. Abdul Sattar, A. Rashid Yassin Ibrahim and Watheq A. Aulaqi

Plant Protection Section, Horticulture and Food Technology Section, El Kod Agricultural Research Station (AREA), Abyan Governorate, Republic of Yemen.

Key words: Date palm, *Graphiola phaeniceis*, Southern coastal plain, Yemen.

Journal of Applied Horticulture, 2012, volume 14, issue 2, pages 139-143.

Abstract: Twelve date palm cultivars were evaluated for field resistance to *Graphiola* leaf spot caused by *Graphiola phaeniceis* (Moug) Poit. The disease incidence and number of sori were compared on both surface of leaf, pinnae position on leaves and plant age. Cultivars, Gizaz, Tha'al and Khodari showed negligible infection and fewer number of sori on the leaf surface and rachis. Symptom of disease was absent on leaves and rachis in cultivar Sagae. These cultivars differed significantly from susceptible cultivars viz., Shahree,

Soqotree and Khalas ($P=0.01$). Abundant distribution of sori caused a drastic reduction of the leaf area covered by the fungus. Adaxial leaf surface trapped more number of sporidia and significant differences were detected among test cultivars ($P=0.05$). The temperature ranging between 32-38°C in summer and humidity accompanied by heavy dew in the night and early morning favored the development of infection. Correlation of age of cultivar "Shahree" and disease incidence revealed that older trees are more susceptible to disease.

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Resource use efficiency of orange and kinnow cultivation in Jammu region of J&K state

Jyoti Kachroo, Anil Bhat and Dileep Kachroo

Sher-e-Kashmir University of Agricultural Sciences and Technology - Jammu, Chatha - 180009, Jammu and Kashmir, India.

Key words: Orange, kinnow, resource use efficiency, regression coefficient
Journal of Applied Horticulture, 2012, volume 14, issue 2, pages 144-145.

Abstract: Orange and kinnow occupy an important place in the horticultural industry of the country as well as in J&K state. In the present study, resource use efficiency of orange and kinnow was analysed. The regression coefficient values of selected inputs under orange orchards, mainly human labour, manures + fertilizers, irrigation, plant protection and training/ pruning varied significantly at the five age groups of five years from 5th to 28th years, corresponded to overall values as 0.955, 0.012, -0.012, 0.013 and -0.050, respectively. Out of which human labour, manures + fertilizers and plant protection with positive sign indicated that with one per cent increase in the use of these inputs, the output could be increased by 0.96 per cent in case of human labour and 0.01 per cent each in other two inputs. The regression coefficient of training/ pruning was statistically significant but negative indicating that one per cent increase in expenditures on training/ pruning could decrease the output to the extent of 0.05 per cent. The marginal value productivities of human labour, manures + fertilizers and plant protection were positive with their values at 0.185, 110.452, 0.076, respectively, whereas that of training/ pruning (-0.638) and irrigation (-0.054) were negative thereby indicated that there still existed scope of investing on human labour, manures + fertilizers and plant protection. The overall regression coefficient values obtained from kinnow cultivation were 0.029, -0.024, 0.016, 0.015 and 0.138 for human labour, manures + fertilizers, irrigation, plant protection and training/ pruning, respectively, out of which human labour and training/

pruning were statistically significant, indicating that one per cent increase in expenditures on these two inputs could increase the output to the extent of 0.03 per cent and 0.14 per cent, respectively. The regression coefficients of irrigation, plant protection and manures + fertilizers were non significant. The marginal value productivities of human labour, irrigation, plant protection and training/ pruning were positive with their values at 0.031, 0.025, 0.014 and 0.175, respectively, whereas that of manures + fertilizers (-0.027) was negative thereby indicating that there still existed scope in the investment on human labour, irrigation, plant protection and training/ pruning.

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Enhancing water relations and vase life of cut tulip (*Tulipa gesneriana* L.) using floral preservatives

R. Kumar, N. Ahmed, D.B. Singh and O.C. Sharma

Laboratory of Post Harvest Technology, Central Institute of Temperate Horticulture, Srinagar-190 007, Jammu and Kashmir, India.

Key words: Floral preservatives, sucrose, aluminium sulphate, 8-HQS, *Tulipa gesneriana*, water relations, vase life

Journal of Applied Horticulture, 2012, volume 14, issue 2, pages 146-151.

Abstract: The influence of different floral preservatives were assessed to determine their effect on the water relations and vase life of cut tulip cv. Yellow Purissima. Uniform size scapes of tulip at bud colour break stage were kept in ten different treatments of floral preservatives comprised of sucrose-(2, 4 and 6%), aluminium sulphate (100, 200 and 300 ppm) and 8-HQS (100, 200 and 300 ppm) along with control (distilled water). All the preservatives improved water relations and vase life of cut tulip significantly in comparison to control. The greatest cumulative water balance and maximum vase life were recorded in 8-HQS 300 ppm (10.5 g/scape and 10.1 days) followed by aluminium sulphate 300 ppm (9.67 g/scape and 8.9 days) over control (2.53 g/scape and 5.4 days), respectively. Maximum fresh weight change (10th day) was recorded in 8-HQS 300 ppm (105.13%) followed by aluminium sulphate 300 ppm (103.75%) in comparison to control (89.91%). The floral preservatives delayed the senescence of cut tulip by improving water uptake and post harvest physiology, thereby maintained better water balance leading to improved fresh weight and vase life.

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Effect of root substrates and seed cover materials on the germination and growth of organic tomato transplants

Kurt O. Taylor, Muchha R. Reddy, Carl E. Niedziela Jr., Mary M. Peet and Godfrey Gayle

Department of Natural Resources and Environmental Design, North Carolina Agricultural and Technical State University, 1601 East Market Street, Greensboro, NC 27411

Key words: *Solanum esculentum*, vermicompost, feather meal, kelp meal, seedlings, root media.

Journal of Applied Horticulture, 2012, volume 14, issue 2, pages 83-87.

[Full text PDF |](#)

Abstract: In two experiments, seeds of tomato (*Solanum esculentum* L.) cultivar 'Celebrity' were planted in four root substrates (Grower's Mix 20, Fafard 4P, Johnny's 512 Select and Sunshine Planter's) in 72-cell plastic plugs trays using different cover materials. In physical property evaluations, the four substrates had similar total porosity. However, Johnny's 512 Select had the highest container capacity and bulk density while Fafard 4P and Sunshine Planter's had the largest air space. There was some seasonal variation between the germination and growth results of the two studies. The use of root substrate, coir, or vermiculite resulted in better germination than leaving the seeds uncovered, with the exception of the seeds germinated in Johnny's 512 Select in Experiment 1. Also, in Experiment 1, tomato seedlings were the tallest and heaviest when grown in Grower's Mix 20. Using newspaper to cover seeds reduced germination in Experiment 2. Tomato seedlings grown in Grower's Mix 20 and Johnny's 512 Select were equal or greater in shoot height or weight as compared to those grown in the conventional substrate Fafard 4P.

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Ginger juice enhanced growth of aromatic chilli during *in vitro* culture and acclimatization

K. Bodhipadma, S. Noichinda, P. Luangsriumporn, C. Meenapa, K. Nathalang, and D.W.M. Leung

Department of Agro-Industrial Technology, Faculty of Applied Science, King Mongkut's University of Technology North Bangkok, Bangsue, Bangkok 10800

Thailand.

Key words: Acclimatization, aromatic chilli, ginger juice, root elongation, root induction

Journal of Applied Horticulture, 2012, volume 14, issue 2, pages 88-91.

Abstract: Stem explants excised from seedlings of aromatic chilli (*Capsicum frutescens* L) grown under aseptic conditions were cultured on basal medium alone (control), and basal medium supplemented with 5, 10 or 20 mL/L juice of ginger rhizome of 6 or 10 months old (herein referred to as YGE and OGE, respectively). At the end of 6 weeks of culture, the average number of roots formed per stem explant was higher when cultured on media supplemented with the three different levels of YGE or OGE (except 5 mL/L) compared to the control. Roots, formed in stem explants cultured on media containing the different levels of YGE (except 20 mL/L) and OGE, were longer than those cultured on basal medium. Particularly notable was that the average length of roots formed in stem explants cultured on medium supplemented with 5 mL/L OGE was more than double that of the control. Prior culture on media containing the different levels of YGE had no promotive effect on the number of leaves per exflasked plantlet compared to the control at the end of three weeks of acclimatization but the plantlets cultured previously on 5 or 10 mL/L YGE were taller than the control. The best performance of plantlets regarding leaf number and stem height after acclimatization was exhibited by those cultured previously on medium containing 10 mL/L OGE as they had at least 20% more leaves and were taller than the control.

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Water retention characteristics of soil bio-amendments used as growing media in pot culture

S.S. Kukal, Debasish Saha, Arnab Bhowmik and R.K. Dubey

Punjab Agricultural University, Ludhiana, 141004, India.

Key words: Bio-amendments, growing media, bulk density, water retention, air filled porosity, easily available water, water buffering capacity

Journal of Applied Horticulture, 2012, volume 14, issue 2, pages 92-97.

[Full text PDF](#) |

Abstract: The efficacy of the natural bio-amendments in improving physical condition as well as water retention characteristics of the growing media in pot culture was studied on ten different compositions of growing media. The treatments comprised of (i) soil as sole medium; (ii) soil + sewage sludge (SS) in the ratio of 1:1; (iii) soil + SS + coir (CP) in the ratio of 1:1:1; (iv) soil + vermicompost (VC) in the ratio of 1:1; (v) soil + VC + CP in the ratio of 1:1:1; (vi) soil + farmyard manure (FYM) in the ratio of 1:1; (vii) soil + FYM + CP in the ratio of 1:1:1; (viii) soil + SS + VC in the ratio of 1:1:1; (ix) soil + SS + FYM in the ratio of 1:1:1 and (x) soil + FYM + VC in the ratio of 1:1:1. The bulk density of media composition soil+SS+CP, soil+VC+CP and soil+FYM+CP was 24.2, 27.5 and 27.5% lower than the media containing only soils (1.32 mg m⁻³), respectively. The water holding capacity (WHC) was lowest (45.4%) in sole soil treatment and it was 6.3, 5.6 and 6.1 times higher in soil+SS+CP, soil +VC+CP and soil+FYM+CP, respectively. The volumetric water retention at various suctions was significantly improved by addition of the organic amendments with soil. The magnitude of the differences in water retention among the treatments became wider at the higher suctions. The combination of soil+VC+CP showed the highest amount of water retention among all the treatments at all the suctions. The air filled porosity was highest (190.7%) in soil+FYM+CP media and lowest (25.3%) in sole soil media. Significant increase in easily available water was observed with the incorporation of coir with sewage sludge, vermicompost and FYM. The water buffering capacity was lowest in media with only soil (7.56%) and the media containing soil+VC+CP recorded the highest (24.7%) water buffering capacity.

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Isolation of biomolecules of pharmacological importance from *Garcinia indica* fruit and evaluation of total antioxidant activity.

P. Gayathri and P. Govindaraju

Department of Biochemistry, Centre for Plant Molecular Biology & Biotechnology, Tamil Nadu Agricultural University, Coimbatore - 641 003, Tamil Nadu, India.

Key words: *Garcinia indica*, methanol, ethylacetate, chloroform, hexane, FRAP, antioxidant

Journal of Applied Horticulture, 2012, volume 14, issue 2, pages 98-101.

Abstract: An investigation was undertaken to study the antioxidant activity of various solvent extracts of the fruit of *Garcinia indica* using FRAP assay and to

separate the compounds in the potential extract through TLC, HPLC and analyse using GC-MS. The study revealed that methanol and ethyl acetate extracts showed a higher antioxidant value than the other extracts. The compounds present in the methanol extracts were separated by TLC, HPLC and analysed using GC-MS. The results of TLC revealed the separation of two different spots in case of phenols and a single spot in case of alkaloids. The eluted compounds, subjected to HPLC, separated into 8 peaks in case of phenolics and 8 peaks in case of alkaloids with varying retention time. The HPLC fractions were subjected to GC-MS to identify the compounds in comparison with the Wilcon-NIST library. The study is useful in identifying the bioactive compound for anticancer activity using cell lines.

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Effect of light emitting diodes (LEDs) on postharvest needle retention of balsam fir (*Abies balsamea* L.)

R. Scott Veitch, Rajasekaran R. Lada and Mason T MacDonald

Nova Scotia Agricultural College, Department of Environmental Science, P. O. Box 550, B2N5E3, Bible Hill, Nova Scotia, Canada.

Key words: Abscission, *Abies balsamea*, balsam fir, conifer, light emitting diode, needle retention, postharvest, senescence

Journal of Applied Horticulture, 2012, volume 14, issue 1, pages 13-17.

[Full text PDF |](#)

Abstract: Two experiments were conducted to understand the effect of light emitting diodes on postharvest abscission in balsam fir (*Abies balsamea* L.) branches. In one experiment, branches were pre-exposed to the fluorescent light, LEDs, or darkness for 1, 4, 8, 12, 24, or 48 h. In a second experiment, branches were constantly exposed to fluorescent lights, LEDs, or darkness. The response variable was needle retention duration (NRD). A 48-hour exposure time to red, white, or blue LEDs significantly ($P < 0.001$) increased NRD by approximately 75, 118, or 127%, respectively, compared to a cool white fluorescent lighting or darkness. Constant exposure to any LED significantly ($P < 0.001$) improved NRD compared to fluorescent lights or darkness, though white and red LEDs were most effective. It is speculated that LED-promoted needle retention could possibly be due to changes in carbohydrate synthesis similar to those observed during cold acclimation.

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Increased regeneration ability of transgenic callus of carrot (*Daucus carota* L.) on B5-based regeneration medium

YuanYeu Yau and Kevin Yueju Wang

USDA-ARS Vegetable Research Crops Unit and Department of Horticulture, University of Wisconsin-Madison, 1575 Linden Drive, Madison, WI53706, USA. Present address: Department of Natural Resources, Northeastern State University, Broken Arrow, OK 74014, USA.

Key words: *Agrobacterium*, carrot, callus, genetic transformation, regeneration
Journal of Applied Horticulture, 2012, volume 14, issue 1, pages 152-156.

Abstract: The *in vitro* development of a whole plant from a single cell is a characteristic feature of plants. Successful embryogenesis and regeneration during *in vitro* tissue culture are influenced by different factors including medium components. In this study, we compared two regeneration media (MSIII, B5) and a mixture of these media (MSIII+B5) for the regeneration of plants from putative transgenic carrot calli. Seventeen times more plantlets were regenerated on B5 medium than on either MSIII or MSIII+B5 medium. A total of 432 plantlets were regenerated on B5 medium, compared to only 24 and 28 plantlets on MSIII and MSIII+B5, respectively. Plantlets regenerated on B5 medium were generally healthier and bigger than those regenerated on either MSIII or MSIII+B5 medium. Fifty-two plantlets, 7-9 cm in length, were observed on the B5 regeneration medium, while no plants having 7-9 cm length were observed on either MSIII or MSIII+B5 medium after 4 months. This study demonstrated that B5 is a better medium than MSIII or MSIII+B5 medium for carrot callus regeneration and can be used routinely and efficiently for carrot genetic transformation experiments. The transgenic nature of the regenerated plants was confirmed by both GUS staining assay and Southern hybridization analysis.

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Effect of deficit drip-irrigation scheduling regimes with saline water on pepper yield, water productivity and soil salinity under arid conditions of Tunisia

K. Nagaz, M.M. Masmoudi and N. Ben Mechlia

Institut des Regions Arides, 4119 Medenine, Tunisia. INAT, 43 avenue Charles Nicolle, 2083 Tunis, Tunisia.

Key words: Arid, salinity, drip irrigation, irrigation scheduling, deficit irrigation, pepper, yield, water productivity

Journal of Applied Horticulture, 2012, volume 14, issue 1, pages 18-24.

[Full text PDF](#) |

Abstract: A two-year study was carried out to assess the effect of different irrigation scheduling regimes with saline water on soil salinity, yield and water productivity of pepper under actual commercial-farming conditions in the arid region of Tunisia. Pepper was grown on a sandy soil and drip-irrigated with water having an EC_i of 3.6 dS/m. Four irrigation treatments were based on the use of soil water balance (SWB) to estimate irrigation amounts and timing while the fifth consisted of using farmers practices. SWB methods consisted in replacement of cumulated ET_c when readily available water is depleted with levels of 100% (FI), 80% (DI-80) and 60% (DI-60). FI was considered as full irrigation while DI-80 and DI-60 were considered as deficit irrigation regimes. Regulated deficit irrigation regime where 40% reduction is applied only during ripening stage (FI-MDI60) was also used. Farmer method consisted of applying the producer method corresponding to irrigation practices implemented by the local farmers. Results on pepper yield and soil salinity are consistent between the two-year experiments and showed significant difference between irrigation regimes. Higher soil salinity was maintained over the two seasons, 2008 and 2009, with DI-60 and FM treatments than FI. FI-MDI60 and DI-80 treatments also resulted in low EC_e values. Highest yields for both years were obtained under FI (22.3 and 24.4 t/ha) although we didn't find significant differences with the regulated deficit irrigation treatment (FI-DI60). However, DI-80 and DI-60 treatments caused significant reductions in pepper yields through a reduction in fruits number/m² and average fruit weight in comparison with FI treatment. The FM increased soil salinity and caused significant reductions in yield with 14 to 43%, 12 to 39% more irrigation water use than FI, FI-MDI60 and DI-80 treatments in 2008 and 2009, respectively. Yields for all irrigation treatments were higher in the second year compared to the first year. Water productivity (WP) values reflected this difference and varied between 2.31 and 5.49 kg/m³. The WP was found to vary significantly among treatments, where the highest and the lowest values were observed for DI-60 treatment and FM, respectively. FI treatment provided significant advantage on yield and water productivity, compared to FM in pepper production under experimental conditions. For water-saving purposes, the FI irrigation scheduling is recommended for drip irrigated pepper grown under field conditions and can be used by farmers to optimize the use of saline water and to control soil salinity.

In case of limited water supply, adopting deficit irrigation strategies (FI-DI60 and DI-80) could be an alternative for irrigation scheduling of pepper crop under the arid Mediterranean conditions of Tunisia.

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Observations on leaf morphology of male and female *Actinidia chinensis* plants

W. Liu, M. Yang and H. Liang

College of Life Sciences, Zhongkai University of Agriculture and Engineering, Guangzhou, China.

Key words: *Actinidia chinensis*, gender identification, leaf, morphology
Journal of Applied Horticulture, 2012, volume 14, issue 1, pages 25-28.

Abstract: Differences of leaf morphology between male and female plants of *Actinidia chinensis* were observed by means of microscopic and scanning electron microscope (SEM) observations. The experimental results showed that ratios of guard cell length to width were significantly different between male and female plants, which were greater than 3 in male plants and lower than 3 in female plants. Leaf shapes and petiole appearance were slightly different among different cultivars, however, the special parameter related to gender could not be found. Male seedlings and female seedlings germinated from seeds in the same fruit could be identified according to ratio of guard cell length to width. It is suggested that ratio of guard cell length to width may be used as a good marker to distinguish male plants from female plants in *A. chinensis*.

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Growth and foliar nutrient concentration response of *Clerodendrum thomsoniae* to increasing fertilization

Karen I. Davis, Carl E. Niedziela Jr., Brian E. Whipker and Muchha R. Reddy

Department of Natural Resources and Environmental Design, North Carolina Agricultural and Technical State University, Greensboro, NC 27411,
Departments of Biology and Environmental Studies, Elon University, Elon, NC 27244, Department of Horticultural Scie

Key words: Bleeding glory-bower, glory tree, fertilizer, nitrogen, phosphorous, potassium, *Clerodendrum thomsoniae* Balf.

Journal of Applied Horticulture, 2012, volume 14, issue 1, pages 29-32.

Abstract: The growth response, root substrate environment, and foliar nutrient concentrations of clerodendrum were evaluated in a range of fertilizer concentrations. A green-leaf selection of clerodendrum was grown for 129 days using a complete fertilizer containing micronutrients at concentrations of 50, 100, 200, 300 and 400 mg L⁻¹ N. Shoot length and dry weight; root substrate electrical conductivity (EC); and foliar N, P, K, Cu, and Mn levels increased with increasing fertilizer concentration, while root substrate pH and foliar Mg and S decreased. The response of foliar Ca, Fe, Zn, and B concentrations to fertilizer concentration was not significant. Although clerodendrum grown with 100 to 400 mg L⁻¹ N had similar foliar N, P, and K concentrations by mean separation, foliage was lighter green at <100 mg L⁻¹ N; thus 200 mg L⁻¹ N is recommended because it provided adequate fertility without excessive shoot growth.

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Influences of severe water stress on photosynthesis, water use efficiency and proline content of almond cultivars

Kazem Barzegar, Abbas Yadollahi, Ali Imani and Noorollah Ahmadi

Department of Horticultural Science, Faculty of Agriculture, Tarbiat Modares University, Tehran, Iran. Department of Horticultural Science, Seed and Plant Improvement Institute (SPII), Karaj, Iran.

Key words: Drought tolerance, Pn, WUE, RWC, Proline, *Prunus dulcis* Mill.

Journal of Applied Horticulture, 2012, volume 14, issue 1, pages 33-39.

Abstract: Using drought tolerant almond cultivars under arid and semiarid regions such as Iran is important factor affecting production yield, especially in rainfed orchards. To evaluate responses of almond cultivars to drought stress under field condition, the experiment was carried out on six commercial cultivars namely 'Azar', 'Marcona', 'Mission', 'Nonpareil', 'Sahand', and 'Supernova'. Net photosynthesis rate (Pn) and water use efficiency (WUE) data during three stress periods indicated that Pn decreased in stress treatments, but WUE increased under stress treatments. The highest Pn occurred in 'Azar' in July and August, and the highest WUE was recorded in 'Sahand' and 'Supernova'. Leaf abscission in 'Sahand' was very high and Supernova had no significant abscission. Leaf relative water content (RWC) showed a downward trend from June to August. In 'Azar', 'Nonpareil' and 'Supernova' cultivars, RWC resulted from severe stress treatment had close relationship with RWC in well-

watered treatment. This result may be due to osmoregulation in leaves of stressed plants. So these cultivars could keep high water content in their leaves and tolerate severe drought stress conditions than other investigated cultivars. The highest and lowest proline accumulation was observed in the leaves of 'Marcona' and 'Sahand', respectively; both 'Marcona' and 'Sahand' were sensitive to drought stress than 'Supernova' which showed medium proline accumulation. In almond, accumulation of proline in response to longer interval between irrigation is a general trait and cannot be used as indicator for defining the tolerant trees. In general, 'Supernova' and 'Azar' showed best response under drought stress.

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Selection of resistant source to early blight disease in tomato among the *Solanum* species

A.K. Singh, N. Rai, R.K. Singh, Major Singh, R.P. Singh, Smita Singh and Satyandra Singh

Indian Institute of Vegetable Research, P.B.- 5002, P.O.-BHU, Varanasi, (U.P.) India - 221005, ¹Udai Pratap Autonomous P.G. College, Varanasi, (U.P.) India-221005

Key words: Early blight, *Alternaria solani*, *Solanum habrochaites*, resistant, AUDPC

Journal of Applied Horticulture, 2012, volume 14, issue 1, pages 40-46.

Abstract: Resistance to early blight (EB) disease of tomato caused by *Alternaria solani* was assessed by examining various parameters of the disease progress. For this study twenty three diverse tomato genotypes were screened under replicated trials for over three years (2007-2009) using artificial inoculation under controlled conditions as well as under natural epidemics at Indian Institute of Vegetable Research, Varanasi, UP, India. Tested genotypes showed significant difference in their response to *A. solani* and disease severity. Area under disease progress curve (AUPDC) was positively correlated with percent disease index (PDI) and negatively with resistance. Of the 23 genotypes, only two *i.e.* EC-520061 (*Solanum habrochaites*) and H-88-78-1 (*S. lycopersicum*) were highly resistant (PDI < 5.0; AUDPC < 200 and r value > 0.12) for EB disease under field and glasshouse environments. Characterization using molecular markers also indicated their resistance. It was concluded that there are significant differences between resistant and susceptible tomato lines against EB disease and some of the lines should be considered resistant rather than tolerant. Hence, the choice of resistant lines

can be utilized in future breeding programmes for development of early blight resistant/tolerant cultivars of tomato.

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Water requirement of pomegranate (*Punica granatum* L.) plants upto five year age

D.T. Meshram, S.D. Gorantiwar, H.K. Mittal, N.V. Singh and A.S. Lohkare

National Research Center on Pomegranate, Shelgi Bypass, NH-9, Solapur-413 006. Maharashtra, India.

Key words: Pomegranate, reference crop evapotranspiration (E_{Tr}), actual evapotranspiration (ET), crop coefficient (kc), area factor (Fa)

Journal of Applied Horticulture, 2012, volume 14, issue 1, pages 47-50.

Abstract: The study was carried out to estimate reference crop evapotranspiration, develop crop coefficient, area factors and estimates of pomegranate evapotranspiration for Pune region of Maharashtra. The crop coefficient values were estimated on weekly basis from the concept of shaded area approach that is widely used for the deciduous crops. Shaded area was estimated at 12.00-13.00 h with the help of specially prepared plywood board of different sizes with grid marking of size 20 x 20 cm for 5 randomly selected pomegranate trees each from 2 orchards of different ages. The values of water to be applied to pomegranate plantation spaced at 4.5 x 3 m and irrigated by the drip irrigation system of 90 % efficiency were estimated for 1st, 2nd, 3rd, 4th and 5th year of pomegranate orchard for *Ambe Bahar*, *Mrig Bahar* and *Hasta Bahar*. The values of water to be applied presented in this paper would be useful for the appropriate irrigation water management of pomegranate.

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Effect of different mulch materials on the incidence and severity of okra mosaic virus (OMV) in okra

K.T. Kareem, O.O. Alamu, R.K. Egberongbe and O. Arogundade

National Horticultural Research Institute, PMB 5432, Idi-Ishin, Jericho, Ibadan, Oyo State, Nigeria.

Key words: Okra, okra mosaic virus, mulches, disease severity, *Azadirachta indica*, *Eugenia uniflora*, *Terminalia catappa*, *Panicum*, black plastic polythene, fruit yield

Journal of Applied Horticulture, 2012, volume 14, issue 1, pages 51-55.

Abstract: The study was conducted from June to September, 2010 to assess the impact of different mulch materials on the incidence and severity of okra mosaic virus (OMV) in okra cv. 'LD 88-1' in Ibadan, Nigeria. The overall effects of the different mulches were assessed on the incidence and severity of OMV and the resultant effect on the number of pods and pod biomass. The mulches assessed in the field experiment were *Azadirachta indica* (neem) leaves, *Eugenia uniflora* (pitanga) leaves, *Terminalia catappa* (tropical almond) leaves, *Panicum* clippings and black plastic polythene. Positive and negative controls included hoe-weeded and unweeded plots, respectively. Results indicated that at 5 weeks after sowing (WAS), there was no significant difference in the OMV incidence on plants mulched with *A. indica*, *E. uniflora* and *T. catappa* with values ranging from 11.91 to 15.48% while a low virus incidence of 0.5% was recorded for the plastic mulched plants. The mean virus disease severity ranged from 0.7 to 4.0 on a scale of 1-4 scoring system with plastic mulched plants showing little or no symptom of OMV at 5 WAS. However, the plants on the unweeded plots were stunted with deformed fruits. Similar trend was observed at 7 WAS with plastic mulched plot having the least incidence and severity score while the unweeded plot has the highest OMV incidence and severity. Of all the mulch materials, plots mulched with *Panicum* produced the least yield values while plastic mulch induced the highest yield on the okra plants. Comparing the mean number of pods of weeded and unweeded control plots; the weeded plot produced average value of 23.0±0.1 pods/plant while the unweeded plot produced average of 12.0±0.15 pods/plant. The results obtained showed that mulches especially plastic are effective in controlling okra mosaic virus.

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Effect of putrescine, GA₃, 2, 4-D, and calcium on delaying peel senescence and extending harvest season of navel orange

H.A. Kassem, H.A. Marzouk and R.S. AlObeed

Department of Plant Production, College of Food and Agricultural sciences, King Saud University, Saudi Arabia., department of Pomology, Faculty of Agriculture, Alexandria University, Alexandria, Egypt.

Key words: Putrescine, GA₃, 2, 4-D, calcium, peel senescence, Navel orange

Journal of Applied Horticulture, 2012, volume 14, issue 1, pages 56-62.

Abstract: The present study was conducted in 2007/2008 and 2008/2009 seasons in order to extend harvest season and maintain fruit quality for better marketability of Washington navel oranges growing in clay soil by preharvest foliar sprays of GA₃, 2,4-D, putrescine and calcium either alone or in combinations. Fruits were harvested on two different harvest dates, the first was at the estimated commercial harvest date (middle December), and the second was late in the harvest season (during February). At both harvesting dates, all spray treatments delayed fruit softening, peel ageing and fruit color break and decreased creasing and fruit drop. Also, fruit TSS, sugars and vitamin C contents increased. The treatments had positive influence on extending harvest season without any deterioration in fruit characteristics. Spraying the different substances in combinations gave better results, especially with putrescine.

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***In vitro* free radical scavenging activity of aonla (*Embllica officinalis*) varieties at various stages of fruit development**

S. Haripriya, E. Vadivel, R. Venkatachalam and P. Gayathri

Horticultural College and Research Institute, Department of Biochemistry, Centre for Plant Molecular Biology & Bioinformatics, Tamil Nadu Agricultural University - 641 003, Tamil Nadu, India.

Key words: Aonla, free radical scavenging, DPPH, ascorbic acid, total soluble sugars

Journal of Applied Horticulture, 2012, volume 14, issue 1, pages 63-66.

Abstract: An investigation was undertaken to assess the free radical scavenging activity of aonla (*Embllica officinalis*) varieties viz., BSR-1, Chakaiya, Krishna and NA-7 at various stages of fruit development viz., initial stage, one-fourth maturity stage, half maturity stage, three-fourth maturity stage and full maturity stage using DPPH assay to identify the variety and stage of fruit development for maximum antioxidant activity. The experimental DPPH assay revealed that the free radical scavenging activity was significantly different among the aonla varieties and also at various stages of fruit development in each variety. It was also found that the DPPH free radical scavenging activities of fresh aonla fruit extracts were found to be significantly higher ($P < 0.05$) than the radical scavenging activity of the standard ascorbic acid at varying concentrations. The pattern of total soluble sugars accumulation and free radical scavenging activity at various stages of fruit development in each aonla variety studied were discussed in detail.

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Response of some Egyptian sweet melon (*Cucumis melo* var. *Aegyptiacus* L.) cultivars to water stress conditions

E.A. Ibrahim

Vegetable Research Department, Horticulture Research Institute, Agricultural Research Center, Giza, Egypt.

Key words: *Cucumis melo*, sweet melon, cultivars, water stress, drought resistance.

Journal of Applied Horticulture, 2012, volume 14, issue 1, pages 67-70.

Abstract: Drought is a wide-spread problem, seriously influencing sweet melon (*Cucumis melo* var. *Aegyptiacus* L.) production and quality. Therefore, identification or development of tolerant genotypes is of immense importance for sweet melon production in drought prone areas. Two field experiments were conducted in clay loam soil at Baramoon Experimental Farm, Dakahlia Governorate, Egypt during the two summer seasons of 2008 and 2009, to evaluate five sweet melon cultivars (Shahd El-Dokki, Ananas El-Dokki, Ismaelawi, Kahera-6 Improved, Albasosi) under regular irrigation and stress conditions (drought conditions were imposed after first irrigation and created by reducing the frequency of irrigation by one half to that of irrigated crop, *i.e.*, missing alternate irrigation) using a split plot design with three replicates. Drought susceptibility index, relative yield reduction and relative yield values were used to describe yield stability and yield potential. Results indicated that exposure of sweet melon cultivars to water stress lead to significant decrease in fruit weight, fruit length, fruit width, fruit flesh thickness and total yield per plant. Whereas, water deficit caused significant increase in total soluble solids. The tested cultivars markedly varied among them in all estimated characters. The interaction between irrigation levels and cultivars had significant effects on all traits under study in both seasons. Cultivars with the highest yield and yield components under non-stress conditions had the highest yield and yield components under stress conditions. On the basis of the drought resistance indices, Kahera-6 Improved was relatively stress susceptible, whereas Albasosi was more tolerant and stable cultivar therefore detailed studies are warranted for validating its drought tolerance characteristic.

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Avoiding the use of plant growth regulator in geranium production by application of a cyclic deficit irrigation

strategy

Patrick Riga

Department of Plant Production and Protection, Basque Institute of Agricultural Research and Development (NEIKER-Tecnalia), Parque Tecnológico de Bizkaia, P. 812, E-48160 Derio, Spain.

Key words: Daminozide, *Pelargonium peltatum*, water stress.

Journal of Applied Horticulture, 2012, volume 14, issue 1, pages 7-12.

Abstract: Plant growth regulators (PGRs) are commonly used in ornamental plant production to improve the decorative value of the plants and to meet marketable targets. The PGRs mostly used in ornamental plant culture are chemical growth retardants that control the size of plants, improve compactness and enhance flowering. However, the use of PGRs has been restricted under current legislation, and modified culture practices should be implemented to produce the desired quality of plants. Ornamental plant quality traits are determined by the genetic background of the plant and environmental conditions such as water availability. In the present study, the responses of growth and flower production in geranium (*Pelargonium peltatum* L.) subjected to cyclic deficit irrigation (CDI) were characterized to evaluate the technique as an alternative to the application of a plant growth regulator (daminozide). The leaf water potential of plants under CDI was lower than in control and PGR-treated plants. Moreover, the aerial dry mass, stem dry mass, leaf number, leaf blade area, specific leaf area and stem number of plants under CDI and PGR-treated plants were similar. However, the percentage of plants with at least one opened flower and the number of inflorescences per plant were increased by CDI. The marketable quality of the plants subjected to CDI was higher than that of the PGR-treated plants. Moreover, the water use efficiency of plants under CDI was 21% higher than that of PGR-treated plants, leading to a 10% reduction in the total water consumption during production.

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Micropropagation of strawberry cultivar Sweet Charlie through axillary shoot proliferation

R. Rekha, Pallavi Mandave and Neelambika Meti

Department of Plant Biotechnology, Rajiv Gandhi Institute of IT and Biotechnology, Bharati Vidyapeeth Deemed University, Pune- 4110046, Maharashtra, India.

Key words: Axillary shoot proliferation, strawberry, runner tips, TDZ, daughter runners

Journal of Applied Horticulture, 2012, volume 14, issue 1, pages 71-73.

Abstract: A protocol for micropropagation of strawberry cv. Sweet Charlie was standardized through axillary shoot proliferation from runner tips. Medium supplemented with TDZ (1 mg/L) alone was favourable for the induction of multiple shoots and daughter runners from runner tips. Such shoots were successfully multiplied for four times on MS incorporated with 0.5mg/L each of BAP, IBA and 1.0 mg/L of GA₃. Rooting of subcultured shoots was achieved on MS medium containing 0.5 mg/L of kinetin alone and along with 0.5 mg/L of IBA. Ex agar plants were harvested regularly after three weeks of growth period for their acclimatization in both cocopeat and soil. The survival rate of tissue cultured plants was 85%.

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Potential use of shea nut (*Vitellaria paradoxom*) butter as skin coat for ripening and improved storage of banana

E.K. Tsado

School of Agriculture and Agricultural Technology, Federal University of Technology, P.M.B., 65. Minna - Niger State.

Key words: Shea butter tree (*Vitellaria paradoxa*), banana, ripening, storage, wax coating

Journal of Applied Horticulture, 2012, volume 14, issue 1, pages 74-76.

Abstract: The study was designed to assess the effect of locally produced butter from nuts of shea butter trees (*Vitellaria paradoxom*) on the ripening and storage of banana. A simple complete randomized experimental design was used to test the effect of coating matured banana fingers with shea butter oil before storage under three temperature conditions viz., 35, 25 and 10 °C. Each treatment was replicated three times. Results showed a significant effect of different storage temperatures. Days to ripening between coated and uncoated bananas, and the interaction with storage temperatures were not statistically different. A taste panel's results of assessing the effect of coating treatment on the textual quality of ripe bananas did not show any significant difference neither was there an effect on the appeal of ripened bananas. The result showed that banana fingers stored in the refrigerator at 10°C lasted beyond 53 days of storage irrespective of the treatment. At 25 °C, the coated fingers took 15.7 days to ripen while the uncoated lasted 8 days. Coated

banana fingers stored at 35 °C took 11.3 days to ripen but the uncoated ripened after 6 days. The use of shea butter for shelf life prolongation is discussed while the test is continuing.

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Allelopathic effect of orchard soils on seedling growth of rough lemon (*Citrus jambhiri* Lush.)

R.P.S. Dalal, Navjot, A. Thakur, A.S. Sidhu and J.S. Brar

Punjab Agricultural University, Regional Station, Bathinda 151001, India.

Key words: Allelopathy, *Citrus jambhiri*, old orchard soils, seedling growth, nutrients.

Journal of Applied Horticulture, 2012, volume 14, issue 1, pages 77-80.

Abstract: An experiment was conducted to study the allelopathic potential of old orchard soils on the seedling growth of rough lemon. Soils from the root zone spheres of eight orchards of mango, aonla, peach, pomegranate, citrus, pear, ber, guava and virgin soil as a control was used for raising the seedlings. The rough lemon *Jatti khatti* seedlings of one and a half year old raised in aonla, ber and peach orchard soil as growing media showed the reduction in shoot length (40-50%), leaf number (46-63%), leaf area/ plant (62-69%) and shoot dry weight (79-83%). The root length was most inhibited by ber, aonla and peach orchard soils. The percent reduction in root dry weight (11.23-34.48%) of the seedling was not in equal proportion to reduction in root volume (42.55- 55.86%). Root dry weight density varied between 0.55-0.96 g mL⁻¹ and root: shoot ratio between 1.42-1.82. Whereas, in citrus, mango, pomegranate, ber and guava orchard soils, the percent reduction in root dry weight was in equal proportion to root volume and root dry weight density varied between 0.41-0.49 g mL⁻¹ and root: shoot ratio between 0.44-0.72. The shoot and root growth of the seedlings was at par when raised in citrus and pomegranate orchard soil as growing media. Leaf N and P contents increased, whereas, Ca and Mg decreased in all the orchard soils except citrus and pomegranate orchard soils as growing media. Leaf Fe, Cu and Mn contents in all the orchard soils as growing media were in toxic range except citrus and pomegranate orchard soils. Overall, the orchard soils of deciduous fruit plants showed more allelopathic effect than the soils growing evergreen fruit plants in citrus cultivation.

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Intraspecific somatic hybridization of mango (*Mangifera indica* L.) through protoplast fusion

Ramezan Rezazadeh, Dion K. Harrison and Richard R. Williams

The University of Queensland Gatton, School of Agriculture and Food Sciences, Gatton Qld 4343, Australia.

Key words: Flow cytometry, Haden, Keitt, Tommy Atkins, Kensington Pride, *Mangifera indica* L., PEG, PEMs, RAF, somatic embryo.

Journal of Applied Horticulture, 2011, volume 13, issue 2, pages 101-107.

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Abstract: Somatic hybridization of mango via protoplast fusion was attempted at cultivar level. Enzymatically isolated protoplasts from leaves of greenhouse-grown seedlings of cvs. 'Tommy Atkins', 'Keitt' and 'Haden' and from proembryonic masses (PEMs) of cv. 'Kensington Pride' were used. Protoplasts were fused by polyethylene glycol (PEG), embedded in Ca-alginate beads and cultured in shallow liquid culture on shaker (30 rpm). After 4 weeks, Ca-alginate beads were depolymerized and released microcolonies of PEMs were plated onto the solid culture media. After two consecutive subcultures, fast growing large clumps of PEMs were picked up and cultured as PEMs line for analyses. Flow cytometry analysis of 242 PEMs lines revealed 41 tetraploid lines. DNA fingerprinting of the regenerated embryos from the tetraploid lines showed that only four lines were somatic hybrids, all resulting from 'Haden' + 'Kensington Pride' protoplast fusions. By contrast, the tetraploid lines from 'Keitt' + 'Kensington Pride' and 'Tommy Atkins' + 'Kensington Pride' were autotetraploids. Root-tip chromosome counts on resulting germinated cotyledonary embryos confirmed that somatic hybrid embryo lines had a chromosome number of $2n=4x=80$ compared to diploid parents ($2n=2x=40$). Of 50 deflasked somatic-hybrid, *in vitro* plantlets with true leaves only 3 plantlets formed the healthy apical bud (meristem) in the soil and grew normally.

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Application of extended BBCH Scale for phenological studies in mango (*Mangifera indica* L.)

Shailendra Rajan, Divya Tiwari, V.K. Singh, Pooja Saxena, Shilpi Singh, Y.T.N. Reddy, K.K. Upreti, M.M. Burondkar, A. Bhagwan and Richards Kennedy
Central Institute for Subtropical Horticulture, Rehmankhera, Lucknow. Indian Institute of Horticultural Research, Bangalore.

Key words: BBCH scale, Biologische Bundesanstalt, Bundessortenamt and Chemische Industrie, mango, phenology, phenophase, flowering, growth

Journal of Applied Horticulture, 2011, volume 13, issue 2, pages 108-114.

[Full text PDF |](#)

Abstract: Phenological studies are important for understanding the influence of weather dynamics on vegetative growth, flowering and fruiting on mango. BBCH (Biologische Bundesanstalt, Bundessortenamt and Chemische Industrie) scale was used for data recording and to assess utility of the scale in mango phenological studies. Phenological stages of the mango were recorded at weekly intervals on 60 shoots of cultivar Totapuri at five diverse locations for testing usefulness of scale under different diverse ecologies and data from one location, *i.e.*, Lucknow (26° 54' N and 80° 48' E) was used for analysis. Existing BBCH scale was modified on the basis of data recorded for mango in which seven out of 10 principal stages were used, starting with bud development (stage 0) and ending with maturity of fruit (stage 8). Three digit scale was used for inclusion of the mesostages between the principal and secondary growth stages. Highly recurring flowering phenophases were 511 (18 %), 513 (20 %) recorded in standard week 9 and 517 (45 %) in standard week 11 (March). Other important phenophases, 619 (38 %) and 709 (10 %) occurred during standard weeks 13 and 22 to 23, respectively. A high degree of variation in shoots representing principal growth stages *viz.*, vegetative bud, leaf and shoot development was observed due to simultaneous transition of the stages during standard week 33 to 42 and 4 to 24. Limitations of existing BBCH scale and comprehended modifications have been proposed and discussed. The study revealed that the extended BBCH-scale for mango can be widely used because of its utility in describing all phenophases pertaining to bud, shoot, leaf, panicle and fruit development and indicated the incisive growth pattern of the shoots and seasonal variation. This is the first report on quantitative analysis of mango phenological data using BBCH scale.

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Fruit quality during ripening and cold storage of two Japanese plum varieties cultivated in Tunisia

Hatem Mabrouk and Slah Mejri

Laboratoire d'arboriculture fruitiere. Laboratoire des Industries agro-alimentaires. Institut national Agronomique de Tunisie : 43, Avenue Charles Nicolle 1082 -Tunis-Mahrajene-Tunisie.

Key words: Japanese plum, *Prunus salicina* L., maturity, fruit quality, cold storage, Tunisia.

Journal of Applied Horticulture, 2011, volume 13, issue 2, pages 115-118.

Abstract: Fruit Quality attributes of two Japanese plum (*Prunus salicina* L.) varieties 'Black Diamond' and 'Fortune' cultivated in Tunisia were monitored during fruit ripening on the tree and cold storage. A five years old commercial orchard was used for the study. Harvested fruits were stored in cold rooms at temperature less than 2°C and relative humidity around 90%. Beginning at two weeks before harvest, until the end of the cold storage period, samples of 20 fruits were taken at irregular time intervals and used for the determination of soluble solids concentration (SSC), titratable acidity (TA) and fruit firmness. At harvest, values of SSC were similar for both varieties reaching 15 and 14.8%, respectively for 'Black Diamond' and 'Fortune'. During cold storage, the increase in SSC was nil for 'Fortune' and very low (0.2%) for 'Black Diamond'. In contrast, values of TA were different for 'Black Diamond' and 'Fortune', the former was more acidic at harvest and during cold storage. TA values ranged between 0.94 and 1.24 % malic acid at harvest and 0.8 and 1% at the end of storage period. The sugar to acid ratio (SSC/TA) showed a continuous increase during ripening and cold storage for both varieties. Values of SSC/TA, differed largely between the two varieties, at all sampling dates. Fruit Firmness decreased during ripening and cold storage for both cultivars. At harvest 'Fortune' fruits were more firm (28.44 N) than 'Black Diamond' (21.77 N). At the end of cold storage, these values were as low as 10.64 N for 'Black Diamond' and 15.64 N for 'Fortune'. A linear regression analysis showed that the rate of firmness decrease during cold storage was very similar for both cultivar and reached a value of 0.23 N day⁻¹. Thus, fruit firmness could be used to determine harvest time and to predict cold storage duration

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Effects of ⁶⁰Co y-ray radiation on kiwifruit grafted buds

H. Liang, YJ. Hu, W.M. Pang, W. Liu and M.X. Yang

College of Life Sciences, Zhongkai University of Agriculture and Engineering, Guangzhou, China.

Key words: Kiwifruit, radiation, top grafting, ^{60}Co y-ray, breeding

Journal of Applied Horticulture, 2011, volume 13, issue 2, pages 119-121.

Abstract: The aim of this study was to determine the feasibility of radiation treatment of the grafted buds in kiwifruit improvement. After treated with 50 Gy ^{60}Co y-ray, buds from different fruit spurs of *Actinidia* were top grafted onto the heavily pruned mature vines with 50 -100 grafted buds per stock plants and the grafted plants were under intensive cultural practices for high survival rate of the grafting. The experimental results showed that treatment with ^{60}Co y-ray increased SSR diversity and phenotypic variations of the kiwifruit canes produced from the grafted buds. Selection of the favourable variants from a large population (canes from different plants) in a limited area of kiwifruit orchard was possible and some of favourable variants from the grafted populations were selected and rapidly propagated for further utilization in kiwifruit improvement.

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Development of internal browning during low temperature storage of pineapple cv. 'Trad-Srithong' fruit harvested at different times of the day

P. Youryon, C. WongsAree, W.B. McGlasson, S. Glahan and S. Kanlayanarat

Postharvest Technology Program, School of Bioresources and Technology, King Mongkut's University of Technology Thonburi, Bangkok 10140, Thailand.

Postharvest Technology Innovation Centre, Commission on Higher Education, Bangkok 10400, Thailand. University

Key words: *Ananas comosus*, CAM plant, fruit acidity, harvesting time, black heart

Journal of Applied Horticulture, 2011, volume 13, issue 2, pages 122-126.

Abstract: Pineapple plants cv. 'Trad-Srithong' (*Ananas comosus* L.) were found to exhibit crassulacean acid metabolism (CAM). The concentrations of organic acids were higher in mature crown and stem leaves harvested at 0600 than at 1200 h but there were no significant differences in acid concentrations among fruit harvested at these times. Fruit of 'Trad-Srithong' (Queen group)

are highly sensitive to internal browning (IB), a form of chilling injury, when stored at $<15\text{ }^{\circ}\text{C}$. Fruit were harvested at 0600 and 1200 h and stored at 8, 13 and $20\text{ }^{\circ}\text{C}$. IB developed in fruit stored at 8 and $13\text{ }^{\circ}\text{C}$ after 10 days but no symptom developed in control fruit stored at $20\text{ }^{\circ}\text{C}$. Time of day, when the fruit were harvested had no effect on the development of IB in 'Trad-Srithong' fruit. TA increased in fruit during storage at all temperatures. Juice extracted from the pulp had higher TA and lower pH than the core tissue and symptoms of IB were more severe in the flesh surrounding the core. Ascorbic acid decreased late during storage period.

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Irrigation water quality and nitrogen for yield and water-use efficiency of potato in the arid conditions of Tunisia

K. Nagaz, K. Khlouj, I. Toumi, F. El Mokh, M.M. Masmoudi and N. Ben Mechlia
Institut des Regions Arides, 4119 Medenine, Tunisia. INAT, 43 avenue Charles Nicolle, 2083 Tunis, Tunisia.

Key words: Potato, salinity, nitrogen, yield, water use efficiency, arid
Journal of Applied Horticulture, 2011, volume 13, issue 2, pages 127-133.

Abstract: Field studies were conducted on a sandy soil during spring of 2004 and 2007 in an arid region of southern Tunisia to determine the effect of water quality and nitrogen on yield, yield components and water use efficiency (WUE) of "Spunta", a potato (*Solanum tuberosum* L.) cultivar. Irrigation water of two qualities *viz.*, canal water (3.25 dS m^{-1}) and saline water (5.2 dS m^{-1}) was used. Nitrogen was applied at the rate of 0, 100, 200 and 300 kg ha^{-1} . For all treatments, irrigations were scheduled when readily available water in the root zone (35% of the total available water) was depleted. Yield, yield components, water supply and soil salinity were measured. Findings are globally consistent between the two experiments. Results showed that soil salinity values remained lower than those of ECiw and were lowest under emitters and highest midway to the margin of wetted bands. Potato yield significantly decreased under the use of saline water. The reduction in potato yield was mainly attributed to reduction in the number of tubers per m^2 and tuber weight. WUE decreased significantly with increasing irrigation water salinity. Potato yield, yield components and WUE increased with an increase in nitrogen rates. The N application rate of 300 kg ha^{-1} gave good yield and higher WUE of potato in Southern Tunisia.

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Effect of cycloheximide on postharvest performance of cut spikes of *Consolida ajacis* cv. Violet Blue

Waseem Shahri and Inayatullah Tahir

Plant Physiology and Biochemistry Research Laboratory, Department of Botany, University of Kashmir, Srinagar-190006, India.

Key words: *Consolida ajacis*, vase life, postharvest performance, soluble proteins, sucrose, senescence.

Journal of Applied Horticulture, 2011, volume 13, issue 2, pages 134-138.

Abstract: A study was conducted to examine the effects of pulse treatment with different concentrations of cycloheximide (CHI) on postharvest performance of cut spikes of *Consolida ajacis* cv. Violet Blue in distilled water and sucrose 0.2 M+HQS 100 mg/L. The present investigation revealed that at a particular threshold concentration (0.01 mM), it delays senescence and above that it prevents flower opening and promotes senescence. Cycloheximide at 0.01 mM concentration enhanced vase life, besides maintaining higher fresh and dry mass of flowers and soluble protein content in the sepal tissue. The fact that cycloheximide delays petal/sepal senescence demonstrates that the synthesis of particular suicide proteins, probably enzymes responsible for degradation of cellular constituents, orchestrates the cell death programme. Postharvest performance of spikes was much better in spikes pretreated with 0.01 mM CHI and transferred to sucrose+HQS and this can be used as an effective treatment to improve postharvest longevity in this flower system.

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Response of olive cultivars (*Olea europaea* L.) to induced water stress

N.R. Bhat, H. AlMenaie, M. Suleiman, LAIMulla, B. Thomas, P. George, S. Isat Ali and G. D? Cruz

Kuwait Institute for Scientific Research, P. O. Box 24885, 13109 Safat, Kuwait.

Key words: Olive, evapotranspiration, cultivars, adaptability, deficit irrigation, water stress

Journal of Applied Horticulture, 2011, volume 13, issue 2, pages 139-143.

Abstract: The ability of olives to adapt harsh environmental conditions makes

its cultivation possible where plants are frequently exposed to high temperatures and scarcity of water. As the annual crop evapotranspiration far exceeds the rainfall in Kuwait, supplemental irrigation is essential for plant production. Under this conditions, efficient irrigation strategy is crucial for sustainable olive production. Therefore, the irrigation study comprising of five cultivars (Arbequina, Barnea, Coratina, Koroneiki and UC13A6) and three levels of irrigation (50, 75 or 100% of ET_p) was conducted during 2006 - 2008. The results showed that none of the cultivars was adversely affected by even the highest water stress level (50% of ET_p), indicating that these cultivars were able to tolerate severe and prolonged drought conditions. However, cultivar differences in plant height, stem diameter, number of branches and weight of pruned materials were significant at $P < 0.01$. Overall, cultivars Barnea and Coratina exhibited better adaptability to deficit irrigation and grew more vigorously than other cultivars. UC13A6 was most affected by the harsh growing conditions of Kuwait.

Volume 13(2), 2011

Heavy metals scavenging of soils and sludges by ornamental plants

Prasann Kumar, Biswapati Mandal and Padmanabh Dwivedi

Department of Plant Physiology, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi-221005, India. department of Soil Science and Agriculture Chemistry, BCKV, West Bengal, India.

Key words: *Bougainvillea glabra*, *Croton* spp., *Toona ciliata*, *Quisqualis indica*, *Albizia lebeck*, *Ficus benjamina* *Variegata*, hyper-accumulation, heavy metals, phytoremediation, sewage treatment plants, sewage, sludge, scavenging capacity, woody plants.

Journal of Applied Horticulture, 2011, volume 13, issue 2, pages 144-146.

Abstract: The recent developments to identify or evolve high biomass crop plants having capabilities to accumulate heavy metals suggest that phytoremediation of metal contaminated soil can be a viable alternative to most conventional clean up technology. Comparative study of heavy metals concentration in the roots, shoots and leaves of different woody plants species *e.g.* *Bougainvillea glabra*, *Croton* spp, *Quisqualis indica*, *Ficus benjamina* *Variegata*, *Toona ciliata*, and *Siris (Albizia lebeck)* indicated their high heavy metals scavenging capacity. For studying the heavy metal content of sewage sludge and plant species, solid sludge and plants were collected from seven Sewage Treatment Plants (STPs) *viz.*, Howrah, Garulia, Bhatpara, Nabadwip,

Srirampur, Kona, Chandannager, and from the Periurban areas viz., Nadia/ Chakdaha/Ektapur (N/C/E), Pumlia (N/C/P), Sikarpur (N/C/S), Tatla (N/C/T). Sludge samples were taken from heaps at various places in the pile of each plant, using an auger. Around 6-10 individual samples were mixed together and pooled sample were used for analysis. The concentration of Cd, Pb, Cr, and Ni in the roots of plants at STP ranged from 0.805 to 1.03, 9.24 to 32.6, 10.62 to 15.56, and $<0.05 \text{ mg kg}^{-1}$, respectively. Whereas, Cd, Pb, Cr, and Ni content in the shoots of plants at STPs ranged from 1.55 to 1.7, 9.27 to 22.6, 5.35 to 11.03, and $<0.05 \text{ mg kg}^{-1}$, respectively. In the leaves, Cd, Pb, Cr, and Ni content ranged from 1.76 to 3.58, 9.1 to 22.76, 8.76 to 12.02, and $<0.05 \text{ mg kg}^{-1}$, respectively. Therefore, above mentioned plant species can be selected for scavenging heavy metals from soils and sludges.

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Influence of paclobutrazol application on the flower size and yield of China aster (*Callistephus chinensis* (L.) Nees)

Dilip Kumar Mishra and L.P. Yadava

K.V.K., Kasturbagram, Indore, M.P. -452020, Central Institute for Subtropical Horticulture, Lucknow-227107, India.

Key words: Paclobutrazol, China aster, *Callistephus chinensis* (L.) Nees, flower quality, yield

Journal of Applied Horticulture, 2011, volume 13, issue 2, pages 147-149.

Abstract: The effects of method of application and concentration of paclobutrazol on flower stalk length, flower size, flower longevity and yield of China aster were studied. Thirty five days old seedlings of China aster cv. Poornima were treated with paclobutrazol @ 0, 25, 50, 100 and 200 ppm through root dip, soil drench and foliar spray methods. Length of flower stalk and flower size significantly decreased with increased concentrations of paclobutrazol except in case of flower size when applied as foliar spray. Contrarily, flower longevity not influenced adversely with increased concentration of paclobutrazol, whether applied as root dip or soil drench or foliar spray. In each application method, flower yield was significantly higher at 25 ppm paclobutrazol. However, drench application of paclobutrazol was consistently more effective than foliar or root dip treatments with regard to length of flower stalk. Among the different levels and methods of paclobutrazol application, plants treated with 25 ppm as foliar spray proved to be superior over control and rest of the treatment combinations by increasing flower diameter and yield of cut flower as compared to control.

Volume 13(2), 2011

Optimization of growth regulators and explant source for micropropagation and cost effective *ex vitro* rooting in ? Poshita? Winter Cherry (*Withania somnifera* L.)

A.A. Waman, B.N. Sathyanarayana , K. Umesha, Balakrishna Gowda, T.H. Ashok, M. Rajesh and R.G. Guruprakash

Plant Tissue Culture Laboratory, Department of Horticulture, Department of Forestry and Environmental Sciences, Department of Plant Biotechnology, University of Agricultural Sciences, GKVK, Bengaluru-560 065, Karnataka, India.

Key words: Ashwagandha, Indian ginseng, *In vitro*, low cost options, medicinal plant, plant growth regulators, *Withania somnifera*

Journal of Applied Horticulture, 2011, volume 13, issue 2, pages 150-153.

Abstract: *Withania somnifera* (L.) Dunal., one of the 32 prioritized medicinal plants of India, is well known for its importance in the *Ayurveda* system of medicine. Attempt was made to establish an efficient plant regeneration protocol for a commercial cultivar 'Poshita' and to acclimatize the plantlets *ex vitro*, so as to reduce the cost. Results revealed that shoot induction was possible only after an intervening callus phase, irrespective of the concentration of growth regulators present in the nutrient pool. Nodal explant cultured on MS media supplemented with 1 mg L⁻¹ BAP + 0.5 mg L⁻¹ NAA showed superiority in callus induction capacity over epicotyls and leaves. Nodal segments when cultured on a media containing BAP alone could induce shoots in cent per cent explants. Highest number of shoots (5.8) was obtained in media containing 2 mg L⁻¹ BAP. Number of adventitious buds was found to be maximum (13) with epicotyl explant and 1 mg L⁻¹ BAP combination. Nodal explants cultured on high concentration of BAP (4 mg L⁻¹) showed highest incidence of malformed shoots (4.3). A total of 66.7 % plantlets could root and establish *ex vitro* even without auxin treatment and survival rate increased (87.5%) with increase in IBA concentration to 500 mg L⁻¹. The present protocol can be exploited on a commercial scale to obtain maximum benefits from the improved cultivar. Furthermore, *ex vitro* hardening can help to reduce the cost of production and thereby make the tissue culture industry more profitable.

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Associative effect of biofumigation and biocontrol agents in management of root knot nematode *Meloidogyne hapla* in Gerbera

B. Anita, N. Selvaraj and R.M. Vijayakumar

Horticultural Research Station, Ooty, Nilgiris-643001, India.

Key words: Gerbera, *Meloidogyne hapla*, biofumigation, mustard, biocontrol agents

Journal of Applied Horticulture, 2011, volume 13, issue 2, pages 154-156.

Abstract: Protected cultivation is an emerging technology in Nilgiris for raising cut flower crops. Due to controlled environmental condition and continuous growing of crops, the root-knot nematode *Meloidogyne hapla* has emerged as a major problem in gerbera cultivation causing enormous yield loss. The damage progressively increases if proper sanitation control measures are not followed during the polyhouse cultivation. In the absence of Methyl Bromide, it is necessary to use other options. Biofumigation was evaluated to control soil borne nematode parasites with the aim to develop bio-pesticides, which could be effective against root knot nematodes without deteriorating soil environment. Two field trials were conducted to study the effect of combined use of biofumigants and bioagents on the nematode population. Mustard crop was ploughed *in situ* before flowering and covered with a plastic mulch for one month in polyhouses. The biocontrol agents *viz.*, *Pseudomonas fluorescens* and *Trichoderma viride* were tried either alone or in combination with biofumigation. The stem length, flower yield and nematode population in soil were recorded. The study conducted at two different locations indicated that biofumigation with mustard followed by soil application of *P. fluorescens* @1.25 kg/ha at the time of planting significantly suppressed the population of *M. hapla* in soil by 67.5 to 67.8% and enhanced the flower yield of gerbera by 41 to 44%.

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Organic manures and bio-fertilizers effectively improve yield and quality of stevia (*Stevia rebaudiana*)

K. Umesha, G.R. Smitha, B.S. Sreeramu and A.A. Waman

Department of Horticulture, University of Agricultural Sciences, Gandhi Krishi Vignan Kendra, Bengaluru-560065, Karnataka, India. Directorate of Medicinal and Aromatic Plants Research, Boriavi, Anand-387 310, Gujarat, India

Key words: Bio-fertilizers, glycoside content, green manures, organic manures, quality, stevia, yield.

Journal of Applied Horticulture, 2011, volume 13, issue 2, pages 157-162.

Abstract: The influence of different organic manures, bio-fertilizers and green manures on growth, yield and glycoside content of stevia (*Stevia rebaudiana*) was studied over a period of three years (2004-2007). Various organic supplements *viz.*, farm yard manure (15 and 25 t ha⁻¹), vermicompost (1 and 2 t ha⁻¹), neem cake (0.5 and 1 t ha⁻¹) and bio-fertilizers *viz.*, *Azospirillum*, phosphorus solubilizing bacteria and VAM (each @ 0 and 10 kg ha⁻¹) were applied. The results of eleven harvests revealed that all the growth parameters *viz.*, plant height, number of branches and plant spread were influenced by various organics and bio-fertilizers and showed variation from season to season (harvest to harvest) and plants responses did not followed a definite trend. Dry leaf yield during first (6.16 t ha⁻¹) and second year (4.34 t ha⁻¹) of cropping was maximum with the treatment receiving FYM (25 t ha⁻¹) + vermicompost (2 t ha⁻¹) + neem cake (1 t ha⁻¹) + bio-fertilizers (10 kg ha⁻¹) and differed significantly. However, in third year of cropping the treatments had no significant influence on the dry leaf yield. Both the glycosides *i.e.*, stevioside (7.8 %) and rebaudioside content (3.4 %), and glycoside yield were also highest in the above said treatment.

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Application of BABA and s-ABA for drought resistance in apple

T Tworkoski, M. Wisniewski and T Artlip

USDA-ARS, 2217 Wiltshire Road., Appalachian Fruit Research Station, Kearneysville, WV25430, USA.

Key words: Abscisic acid, P-aminobutyric acid, dehydration, gas exchange, priming, water potential, *Malus domestica*

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[Full text PDF |](#)

Abstract: Limited fresh water is a global problem that adversely affects crops, including young apple (*Malus x domestica*) trees. Innovative technologies will be needed to ensure tree survival and productivity. Recently, selected

chemicals have been used to prepare plants for avoidance and recovery from water stress by a process termed priming. Two priming compounds, abscisic acid (ABA) and DL-P-aminobutyric acid (BABA) have been shown to confer plant protection against a range of biotic and abiotic stresses. Our objective was to determine the resistance to and recovery from dehydration of apple seedlings treated with s-ABA and BABA. Three greenhouse experiments were conducted in which combinations of s-ABA and BABA were applied as a root drench to one-year-old 'Royal Gala' apple trees and responses to dehydration were evaluated. Changes in leaf water potential (ψ_w), stomatal conductance (g_s), transpiration (E), leaf ABA and growth were measured during dehydration and rehydration. In two experiments, pretreatment with BABA reduced early morning E but BABA was not as effective as s-ABA in delaying dehydration-induced wilt of shoot tips. In another experiment during the second week without water both BABA- and s-ABA-treated trees had 42 to 62% higher leaf ψ_w , respectively, and 45% lower leaf ABA than unwatered controls. Higher leaf ψ_w was not consistently associated with reduced g_s and E suggesting that mechanisms other than increased stomatal resistance may provide drought resistance. Compared with control trees, there was nearly 80% more shoot growth following rewatering after dehydration in trees that were primed with BABA and s-ABA (1.0 mM each). Leaf senescence was more evident in s-ABA- than BABA-treated trees and, although growth resumed after dehydration, the amount of growth varied with concentration of the priming treatments. Both individual compounds provided dehydration protection to young apple trees but in combination they were not clearly superior to either compound alone.

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Wood chip mulch thickness effects on soil water, soil temperature, weed growth and landscape plant growth

Simon J. van Donk, Dale T Lindgren, Daniel M. Schaaf, James L. Petersen and David D. Tarkalson

University of Nebraska-Lincoln, West Central Research and Extension Center, 402 West State Farm Road, North Platte, NE 69101-7751, USA.

Key words: Wood chips, mulch thickness, 'Husker Red', *Penstemon*, soil water, soil temperature, weeds, neutron probe

Journal of Applied Horticulture, 2011, volume 13, issue 2, pages 91-95.

Abstract: Wood chip mulches are used in landscapes to reduce soil water evaporation and competition from weeds. A study was conducted over a three-

year period to determine soil water content at various depths under four wood chip mulch treatments and to evaluate the effects of wood chip thickness on growth of 'Husker Red' *Penstemon digitalis* Nutt. plants. The effects of four wood chip thicknesses (depth of application: 0, 2.5, 5, and 10 cm) on soil water content, weed numbers, soil temperature, and height, width, stalk number, and first flower date of 'Husker Red' *Penstemon* were investigated. The addition of mulch, at all mulch thicknesses, conserved soil water compared to when no mulch was used. The differences in soil water content likely influenced some of the plant growth factors measured. Weed numbers were significantly higher at 0 and 2.5 cm mulch thickness compared to 5 and 10 cm thickness. In general, mid-day soil temperatures were highest at the shallower soil depths in the unmulched plots. Flowering plants in 2008 in the unmulched treatment were slightly shorter than in the mulched treatments. There were no significant differences in the number of flower stalks per plant although there was a trend for a lower number of stalks with the mulched treatment. The time of first flower was, on an average, about 2 days earlier for the unmulched treatment compared to the 10 cm mulch thickness. Wood chip mulch helped conserve soil water, which in turn had some effects on plant growth.

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Systematic evaluation of table grapes in search of suitable cultivars for high deserts in the United States

Esmaeil Fallahi

University of Idaho, Parma Research and Extension Center, 29603. U of I Lane, Parma, ID-83660, USA.

Key words: Cold region table grapes, cultivar evaluation, grape genotype, grape adaptability, high desert table grape. Intermountain West region

Journal of Applied Horticulture, 2011, volume 13, issue 2, pages 96-100.

Abstract: Long-term adaptability and feasibility of table grape production under the high desert conditions of southwest Idaho in the Intermountain West region of the United States were studied systematically in two phases. In the first phase, 'Alborz', 'Challenger', 'Italia', 'Emerald', 'Red Globe', 'Delight', 'Fantasy', 'Flame' and 'Fresno' (all *Vitis vinifera* L.) and NY36095, NY47616, 'Glenora', 'Reliance', 'Vanessa', 'Saturn', 'Jupiter' (hybrids of *Vitis labrusca*) had overall better berry quality and consumer preference than other tested grapes. In the second phase, 'Ralli' (also called 'Anahita' in the Intermountain West), 'Kashishi', and 'Autumn Royal' had excellent berry size and quality. 'Anahita' was harvested between Sept 1 and Sep 30. Both 'Kashishi' and 'Autumn Royal'

were late-season grapes and matured between Sept 15 and Oct 15. 'Princess' was harvested between Sept 5 and Sept 30. This grape had outstanding flavour but the fruit set was low and clusters were small (268 g). 'Alborz' was harvested between Sept 1 and Sept 30, and with proper thinning, this cultivar had outstanding clusters and berries. Considering all viticultural and quality attributes, we recommend 'Alborz' as a potentially successful table grape for planting in small or large commercial scales under conditions of this study.

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Evaluation of SPAD chlorophyll fluorescence for on-site nitrogen assessment in drip fertigated sweet corn

Lydia L.M. KitongaMwanza, John Swiader and Richard M.S. Mulwa

Egerton University, Department of Environmental Science, P. O. Box 536, Egerton, Kenya. Department of Natural Resources and Environmental Sciences, University of Illinois, Urbana IL 61801. Egerton University, Department of Crops, Horticulture and Soils, P

Key words: Sweet corn, SPAD-chlorophyll, N-fertilizer, silking

Journal of Applied Horticulture, 2011, volume 13, issue 1, pages 13-17.

Abstract: This study was conducted over two growing seasons to evaluate the potential use of the Minolta SPAD-502 chlorophyll meter for rapid onsite determination of plant N status in a drip-fertigated nitrogen cropping regime of sweet corn. Four N fertilizer rates (0, 84, 168, and 336 kg N ha⁻¹) were applied to two sweet corn cultivars ('Kandy Plus' and 'Sugar Ace') in a factorial split-plot design. Leaf SPAD and leaf total N concentration were measured at 4 different growth stages (seventh leaf stage (V7), tenth leaf stage V10), silking (R1) and milking (R3) in season one and three sampling stages (V6, V10 and R1) in 2002. In season two, leaf N concentrations and leaf 'SPAD chlorophyll' measurements increased early in the season up to silking (R1 growth stage) and declined thereafter. Leaf N concentrations and leaf SPAD readings were positively correlated. Critical SPAD values (readings associated with the lowest N fertilizer rate and providing the highest marketable ear yield) were estimated as 52.8, 52.1 and 59.0 at V7, V10 and R1 in season one; in season two the values were 51.0, 49, and 56.5 respectively. Regressing N rate on yield placed maximum ear yields at 13.8 tons ha⁻¹ with 174.8 kg N ha⁻¹ in season one and 9.7 tons ha⁻¹ with 306.2 kg ha⁻¹ in season two. Increase in leaf SPAD readings at silking reflects a strong sink/source relationship among leaves for absorbed N. The positive relationship between leaf SPAD readings and leaf N status is due to the responsiveness of SPAD-chlorophyll to N fertilizer application. These

results indicate that the SPAD meter can be used effectively to assess sweet corn N status early in the season, and at this time it is possible to correct any N deficiencies that might compromise yields.

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Induced chlorophyll mutations in *Delphinium malabaricum* (Huth) Munz.

Firdose Kolar, Nilesh Pawar and Ghansham Dixit

Laboratory of Cytogenetics and Plant Breeding, Department of Botany, Shivaji University, Kolhapur - 416 004.

Key words: *D. malabaricum*, mutagens: EMS, SA, gamma rays, chlorophyll mutants

Journal of Applied Horticulture, 2011, volume 13, issue 1, pages 18-24.

[Full text PDF](#) |

Abstract: The phenotypic response of *Delphinium malabaricum* to chemical mutagens (EMS and SA) and physical mutagen (gamma rays) were studied. It was observed that *D. malabaricum* manifested specific reactions to the treatments with EMS, SA and gamma rays. Different mutation frequencies and width of mutation spectra were induced under the action of different concentrations of the applied mutagens. Eleven different types of chlorophyll mutants namely albina, albina-green, xantha, aurea, chlorina, viridis, yellow viridis, tigrina, striata, maculata and variegated type were identified in the treated populations and chlorophyll mutation frequency was calculated on plant population basis. Frequency of viridis mutants were highest followed by xantha and other types in all the treatments. The treatments of EMS were found to be more efficient than SA and gamma rays in inducing chlorophyll mutations. The highest frequency of chlorophyll mutations (9.74%) was reported in the 0.25% EMS. Quantitative estimation of chlorophyll pigments was also done in different kinds of chlorophyll mutants and chlorophyll content was found in the following decreasing order: chlorina > maculata > variegated > striata > tigrina > viridis > yellow viridis > albina green > aurea > xantha > albina. The study of induced genetic variability for frequency and spectrum of chlorophyll mutations is the first report in *D. malabaricum*.

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Walnut cracking device

Josef Bukac

Bulharska 298, 5102 Jaromer-Josefov, Czech Republic.

Key words: Walnut, nut size, powered nutcracker

Journal of Applied Horticulture, 2011, volume 13, issue 1, pages 25-26.

Abstract: A powered walnut cracker is a device that does its job with a minimum of human effort. We offer a design consisting of an adjustable upper board, the lower board is replaced by chains or belts on which the nut is placed. The walnut moves, it touches the upper board and rotates while being cracked. The use of inexpensive bicycle parts is the advantage of this approach.

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Performance of asparagus under the desert conditions of Arabian Peninsula: A pilot study

N. Kameswara Rao and Mohammed Shahid

International Center for Biosaline Agriculture, P.O. Box 14660, Dubai, UAE.

Key words: Arabian Peninsula, *Asparagus officinalis*, crop diversification, desert environment, vegetables

Journal of Applied Horticulture, 2011, volume 13, issue 1, pages 27-29.

Abstract: The performance of asparagus (*Asparagus officinalis* L.) under the desert conditions of the Arabian Peninsula was evaluated. Ten cultivars introduced from six countries were studied. Two months old seedlings were transplanted into field plots in February 2007 and spears produced in the second year were harvested over a period of four weeks. Significant differences were found among cultivars for the number and quality of spears. The average number of spears harvested per plant varied between 5.0 and 26.4 and the spear yield between 36.3 and 159.2 g plant⁻¹. The spear number and yield were highest in cultivar PI 277824. Seed yields from the first year of harvest varied from 29.7 to 136.2 g plant⁻¹ among cultivars. In many cultivars, spear yields obtained in the second year were comparable to the yields reported from the productive environments in the tropics. The results show that asparagus has considerable potential for cultivation under the desert conditions of the Arabian Peninsula.

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An improved protocol for rapid and efficient *Agrobacterium* mediated transformation of tomato (*Solanum lycopersicum* L.)

M. Manamohan, M.N. Prakash, G. Sharath Chandra, R. Asokan and S.N. Nagesha)

Corresponding author : Division of Biotechnology, Indian Institute of Horticultural Research, Hesaraghatta Lake PO. Bangalore-560089, Karnataka, India.

Key words: *Agrobacterium* mediated transformation, tomato transformation, hypocotyls, regeneration, transgenic tomato.

Journal of Applied Horticulture, 2011, volume 13, issue 1, pages 3-7.

Abstract: Transformation of tomato with heterologous genes requires rapid and efficient transformation protocols. *Agrobacterium* mediated transformation protocol of tomato (*Solanum lycopersicum* L.) cv. 'Arka Vikas' using *dreb1A* gene under *Rd29A* promoter in pCAMBIA 2301 binary vector was optimized by varying parameters such as type of explant, type and concentrations of hormones. Hypocotyls were found to be the best explants for shoot regeneration in tomato compared to cotyledons with 53.2 and 22.8% shoot regeneration, respectively. In the shoot regeneration medium, 0.1 mgL⁻¹ IBA as a source of auxin gave nearly 50% higher shoot regeneration than IAA at similar concentration. With this protocol it was possible to obtain transformed plants within a period of 77 days with a high regeneration and transformation efficiency (34%) compared to over 120 days using earlier published protocols. The T₁ generation plants segregated in a 3:1 ratio for the transgene and Southern blot analysis of the selected plants had shown the transgene integration was at a single locus. With this method it is possible to rapidly and efficiently generate transgenic tomato plants.

Volume 13(1), 2011

Salinity tolerance in *Chrysanthemum morifolium*

T.S. Rahi and Bajrang Singh

National Botanical Research Institute, Rana Pratap Marg, Lucknow, U.P., India.

Key words: *Chrysanthemum morifolium*, 'Jayanti', 'Flirt', nutrient concentration, nutrient uptake, salinity levels

Journal of Applied Horticulture, 2011, volume 13, issue 1, pages 30-36.

Abstract: The scarcity of fertile land for growing ornamental crops has received attention on the utilization of salt affected soils for floriculture. Two cultivars of *Chrysanthemum morifolium* viz. 'Flirt' and 'Jayanti' were evaluated under three salinity levels (EC 4, 6 and 8 dS/m) of irrigation water along with control (irrigating with non-saline water). The experiment consisting of eight treatments with three replications was conducted in earthen pots with randomized block design. The pots were filled with sandy loam soil and 20 days old rooted cuttings were planted @ three cuttings per pot. The growth parameters viz., plant height, number of buds and flowers per plant; fresh and dry weight as well as chlorophyll content increased significantly with increasing salinity levels. 'Jayanti' appeared to be more salt tolerant in comparison to 'Flirt' in their floral morphology as well as in productivity. Nitrogen and phosphorus concentrations were reduced in plants as salinity increased. There was a relatively high N concentration in 'Flirt' cultivar. The concentration of other nutrients such as potassium, calcium and magnesium increased significantly with increasing salinity levels. This increase in nutritional uptake did not show any detrimental effect of Na toxicity in the salinized plants. As a result, nutrient use efficiency of nitrogen and phosphorus was enhanced with increasing salinity levels. Growth and flower yield both indicated that *C. morifolium* which is a plant of halophytic origin can be raised successfully as an ornamental cash crop in moderate saline environment, particularly 'Jayanti' cultivar. However, its critical limit to higher salinity tolerance is yet to be worked out.

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Callus mediated plant regeneration of two cut flower cultivars of *Anthurium andraeanum* Hort.

Sunila Kumari, J.R. Desai and R.R. Shah

Department of Floriculture and Landscaping, ASPEE College of Horticulture and Forestry, Navsari Agricultural University, Navsari - 396 450. Department of Horticulture, College of Agriculture, Indira Gandhi Agricultural University, Raipur-492 006, India.

Key words: 6-Benzyl amino purine, adenine, *Anthurium andraeanum* Hort., callus, callus index, *in vitro* regeneration, kinetin, leaf explant, micropropagation, photoperiod, shoot regeneration, thiazuron

Journal of Applied Horticulture, 2011, volume 13, issue 1, pages 37-41.

Abstract: Plant regeneration of *Anthurium andraeanum* cultivars 'Pumasillo' and 'Corallis' has been achieved through adventitious shoots formation from callus. Young brown leaf lamina was used as explants for indirect organogenesis. These were disinfected using sodium hypochlorite (5%), ethanol (70 %) and HgCl₂ (0.1%). The results showed that both the varieties responded differently to callus induction, callus proliferation and shoot initiation treatments. In 'Corallis', the maximum number of cultures initiated callus on Nitsch medium supplemented with 5 mgL⁻¹ adenine and 2 mgL⁻¹ BAP while in Pumasillo, maximum number of cultures initiated callus on modified MS medium supplemented with 5 mgL⁻¹ adenine and 3 mgL⁻¹ BAP. Maximum shoot regeneration was observed on modified MS supplemented with 0.01 mgL⁻¹ TDZ in both the cultivars. Rooting medium was (modified half-strength MS salts) supplemented with 0.5 mgL⁻¹ IBA and 0.04% active charcoals. The callusing frequency of 'Pumasillo' was higher as compared to 'Corallis'. Rooted plantlets were successfully acclimatized in polythene covered plastic trays containing cocopeat. Later on the hardened plantlets were successfully transplanted to commercial potting medium (1:1:1:1 cocopeat: rice husk: sand: FYM) and were transferred to poly house with survival rate of ninety per cent.

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Development of high frequency multiple shoots in the yellow cactus, *Selenicereus megalanthus*

S.W. Goveas, S.K. Nivas and L.D. Souza

Laboratory of Applied Biology, St. Aloysius College, Mangalore-575003, Karnataka, India.

Key words: *Selenicereus megalanthus*, *in vitro*, yellow pitaya, multiple shoots, MS-Murashige and Skoog

Journal of Applied Horticulture, 2011, volume 13, issue 1, pages 42-43.

Abstract: An efficient micropropagation system via multiple shoot induction directly from seedlings of *S. megalanthus* was developed. Seeds were germinated on Murashigae and Skoog (MS) basal medium supplemented with 6-Benzyl amino purine (BAP). The shoot tips of the germinating seedlings started callusing when left on the same medium. After two weeks, the entire shoot apex portion of epicotyl gave rise to a friable callus, portions of which started becoming green and morphogenetic. The callus gave rise to multiple shoots. The highest number of shoots *i.e.* 18.6 was produced on MS medium supplemented with 1.5 mgL⁻¹ BAP. The shoots, 3-4 cm in length, when

transferred to MS basal medium supplemented with 1.0 mgL⁻¹ IBA, rooted within one week.

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Effect of pollen grain-water suspension spray on fruit set, yield and quality of 'Helali' date palm (*Phoenix dactylifera* L.)

Adel D. Alqurashi

Faculty of Meteorology, Environment and Arid Land Agriculture, Department of Arid Land Agriculture, King Abdulaziz University, P.O.Box. 80208, Jeddah 21589, Saudi Arabia.

Key words: Date palm, pollen grain suspension, pollination, yield, fruit quality
Journal of Applied Horticulture, 2011, volume 13, issue 1, pages 44-47.

Abstract: During 2008 and 2009 seasons, the effect of pollen grain-water suspension spray at different concentration on fruit setting, yield and quality of 'Helali' date palm cultivar growing under Hada-Alsham conditions, KSA was examined. The results showed that fruit set, bunch weight and total yield per tree were significantly higher when spray pollinated at 0.5, 1.0 and 1.5 g L⁻¹ than the traditional pollination. In this respect, there were no significant differences among spray pollination at 0.5, 1.0 and 1.5 g L⁻¹. However, spray pollination at 2.0 g L⁻¹ gave fruit set percentage similar to traditional pollination. At harvest, the Rutab percentage in bunches was not affected by the method of pollination. At both the Bisir and Rutab stages, fruit, flesh and seed weight, diameter and length were not significantly affected by any of the pollination treatments. The biochemical characteristics of fruit such as TSS, acidity, vitamin C, total phenols and soluble tannins were not significantly affected by any of the pollination treatments at both stages. The concentrations of TSS and acidity were higher at the Rutab than at the Bisir stage. However, the concentrations of vitamin C, total phenols and soluble tannins were greatly lower at the Rutab than at the Bisir stage. This study showed the possibility to pollinate 'Helali' date trees by pollen grain-water suspension spray with optimum amount of pollen grains with no further need for thinning especially under hot arid conditions. However, more research work is required to standardize the optimum concentration of pollen grain-water suspension and the response of each date palm cultivar to this pollination technique.

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Effect of salinity and temperature on seed germination indices of *Zinnia elegans* L.

S. Zivdar, E. Khaleghi and F. Sedighi Dehkordi

Department of Horticulture Science, College of Agriculture, Shahid Chamran University, Ahwaz, Iran.

Key words: Germination percentage, germination rate, length of rootlet, salinity, zinnia

Journal of Applied Horticulture, 2011, volume 13, issue 1, pages 48-51.

Abstract: Laboratory studies were conducted to determine the effect of salinity and temperature on seed germination of zinnia plant with two temperature regimes (25 and 30 °C) and 5 levels of salinity (distilled water as control and 3, 6, 9 and 12 dSm⁻¹) in a factorial completely randomized design. Analysis of variance showed significant difference ($P < 0.05$) between different levels of salinity, and salinity and temperature interactions on germination percentage, germination rate and length of rootlet. But temperature treatment only influenced rootlet length ($P < 0.05$). Mean comparison of seed germination percentage showed that increasing salinity decreased the seed germination. The highest rootlet length was recorded in the control (8.273 cm) and the lowest (1.92 cm) was at 12 dSm⁻¹ of salinity. The effect of temperature on the germination percentage, germination rate and length of rootlet determined that the highest germination percentage and length of rootlet was at 25 °C temperature. The study on the interaction of temperature and salinity exhibited that highest percentage of germination, germination rate and length of rootlet were in control at 25°C, whereas it was lowest at 30°C and 12 dSm⁻¹ salinity.

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Impact of cefotaxime on *in vitro* shoot elongation and regeneration in banana (*Musa acuminata*)

Pooja Manchanda, Ajinder Kaur and Satbir Singh Gosal

School of Agricultural Biotechnology, Punjab Agricultural University, Ludhiana, Punjab -141004, India.

Key words: Suckers, tissue culture, transformation, shoot length, fresh weight, antibiotic

Journal of Applied Horticulture, 2011, volume 13, issue 1, pages 52-56.

Abstract: This is the first report of antibacterial and growth promoting effectiveness of cefotaxime in banana tissue culture. Young suckers (3-13 cm diameter) of commercially important banana varieties *viz.*, 'Grand Naine' and 'Robusta' were regenerated into shoots on MS-medium supplemented with 6-benzylaminopurine (BA, 5 mgL⁻¹) and multiplied on Banana Multiplication Medium (BMM) for 7 cycles of 3 weeks each. Shoots were separated and cultured on BMM supplemented with IBA (1.0 mgL⁻¹) and cefotaxime at various concentrations *viz.*, 0, 100, 200, 300, 400, 500, 600 and 700 mgL⁻¹. Maximum shoot multiplication and elongation with respect to number of shoots, shoot length and plantlet fresh weight in both the genotypes was obtained with cefotaxime used at the rate of 400 and 500 mgL⁻¹ in the medium. Among the different varieties, on the basis of mean of 50 shoot cultures, number of shoots per culture and shoot length was highest in *cv.* Robusta *i.e.* 7.20 (41.6% increase over control) and 8.50 cm (30.5% increase over control), respectively. Whereas, plantlet fresh weight was highest in *cv.* Grand Naine (494.8 mg, 38.9% increase over control) after 3 weeks of culturing with cefotaxime used at the rate of 500 mgL⁻¹. Results revealed significant differences among varieties and media for different shoot multiplication and elongation parameters. Therefore, use of cefotaxime during tissue culture and genetic transformation of banana can improve frequency of shoot multiplication and transformation, respectively.

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Combining ability for yield and associated traits in Sudanese okra (*Abelmoschus esculentus* L.) collection

Y.A. ALKamal, A.I. Abdalla and A.A. Taha

University of Al Zaeim Al Azhari -Faculty of Agriculture, Khartoum North - P.O. Box 1432- Sudan

Key words: *Abelmoschus esculentus*, okra, combining ability, line x tester analysis

Journal of Applied Horticulture, 2011, volume 13, issue 1, pages 57-60.

Abstract: Seven lines of okra *Abelmoschus esculentus* [L.] (MOENCH) were evaluated for general and specific combining ability using three diverse testers following a line x tester mating design as described by Kempthorne (1957). Twenty one F₁'s hybrids along with ten parental lines were raised at the Demonstration Farm of the Faculty of Agriculture, University of Al Zaeim Al Azhari, Sudan, using randomized complete block design with three replications.

Analysis of variance revealed significant differences among genotypes existing for yield and associated traits ($P=0.01$), indicating the presence of sufficient genetic variability in the material studied. Significant variability existed among hybrids ($P=0.01$) for number of pods per plant, length of pod, pod yield per plant and 100 seeds weight. Estimation of general combining ability effect identified lines HSD 1835, HSD1840 and HSD 2550 as a good general combiners for pod dry weight ($P=0.05$). Among testers Sinnar was found to be a good general combiner for number of pods per plant, length of pod, yield per plant, number of seed per pod and 100 seeds weight. Estimation of specific combining ability effect identified hybrids HSD 2550 x Sinnar as the best parent combination for number of pods per plant and yield per plant. HSD2543 x Sinnar and HSD1840 x Clemson Spineless recorded as the best parental combination for length of pod. The additive as well as non-additive gene effects played significant role in the inheritance of yield and yield related traits with predominance of additive gene action in the inheritance of major yield contributing traits. Testers contribution percentage were significantly higher for number of pods per plant (77.04%), pod dry weight (40.06 %) and number of seeds per pod (45.04%). The percentage contributions of the interaction were significantly higher and evident in the rest of the traits.

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Effects of mulching materials and NPK fertilizer on the growth, yield and quality of *Telfairia occidentalis*

J.O. Olaniyi and M.A. Ajao

Department of Agronomy, Faculty of Agricultural Sciences, Ladoké Akintola University of Technology, P.M.B 4000, Ogbomoso, Oyo State, Nigeria.

Key words: *Telfairia occidentalis*, growth, yield, NPK fertilizer application rates, mulching materials.

Journal of Applied Horticulture, 2011, volume 13, issue 1, pages 61-65.

Abstract: Field experiments were conducted at the Teaching and Research Farm, Ladoké Akintola University of Technology, Ogbomoso ($8^{\circ} 10'N$ and $4^{\circ} 10'E$) to determine the effect of mulching materials and rates of NPK fertilizer application on the growth and yield of fluted pumpkin (*Telfairia occidentalis*). The trials consisted of three levels (0, 250 and 350 kg ha⁻¹) NPK and four types of mulching materials (white polyethylene, black polyethylene, saw dust and *Panicum* grass). A factorial arrangement fitted into complete randomized block was used and replicated three times. Plant height and number of leaves increased as the NPK rate increased, irrespective of the mulching materials.

The yield and yield components of telfairia increased as the NPK rate increased from 0 up to 250 kg ha⁻¹ and then declined at 350 kg NPK ha⁻¹. These were significantly ($P < 0.05$) improved by the main effects of fertilizer and mulching materials. Although, the best performance of telfairia in term of yield and quality were obtained from white polyethylene mulching material, this was comparable with that of dry *Panicum* grass mulching material. Except for fibre and vitamin C contents, telfairia seeds contained higher quality attributes investigated under this study than leaves. Therefore, the yield and quality of telfairia could significantly be improved by the application of NPK fertilizer at the optimum rate of 250 kg ha⁻¹ with and without mulching.

Volume 13(1), 2011

Response of *Gaillardia aristata* Pursh to salinity

N.K. Rao and Mohammed Shahid

International Center for Biosaline Agriculture (ICBA), P.O. Box 14660, Dubai, UAE.

Key words: Blanket flower, *Gaillardia aristata* Pursh, ornamental plants, salinity tolerance, sandy soil, urban greenery

Journal of Applied Horticulture, 2011, volume 13, issue 1, pages 66-68.

Abstract: The performance of *Gaillardia aristata* Pursh, irrigated with saline water was studied with the objective to identify herbaceous ornamentals for saline landscapes. Seeds were sown directly into field plots of sandy soil and irrigated with saline water at electrical conductivity (EC_w) of 2 (control), 5, 10 and 15 dSm⁻¹. Increase in salinity reduced the plant stand by 38% at 5 dSm⁻¹, 50% at 10 dSm⁻¹ and 67% at 15 dSm⁻¹, in comparison with the control. Increased salinity also decreased the mean height, number of branches and dry weight of the plants, but the differences among treatments lower than 15 dSm⁻¹ salinity were statistically insignificant ($P > 0.05$). Compared with the control, the number of flowers per plant declined by 57% at 5 dSm⁻¹, 61% at 10 dSm⁻¹ and 67% at 15 dSm⁻¹. The differences in flower production among 5, 10 and 15 dSm⁻¹ treatments were not significant ($P > 0.05$). The flower diameter was significantly reduced at 15 dSm⁻¹, but was not affected at the lower salinities. The results show that *G. aristata* could be successfully cultivated upto irrigation water salinity level 10 dSm⁻¹ in sandy soils.

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Development of a low cost hydroponics system and a formulation for the tropics

M.D.J.S. Saparamadu, W.A.P. Weerakkody, R.D. Wijesekera and H.D. Gunawardhana

Department of Chemistry, University of Colombo, Colombo 03, Sri Lanka.
Department of Crop Science, Faculty of Agriculture, University of Peradeniya, Peradeniya, Sri Lanka.

Key words: Hydroponics nutrients, tomato, hydroponics in tropics
Journal of Applied Horticulture, 2011, volume 13, issue 1, pages 69-71.

Abstract: Simplified hydroponics is a low cost aggregate hydroponics system which is practiced under natural climatic conditions with hand watering. Rice hull, a waste material, which is mostly under utilized and a mixture of rice hull and sand (3:2) was used in this system. A new nutrient formulation (NF) was developed using locally available commercial grade chemicals. A buffer system was incorporated to the nutrient formulation, ensuring that the pH was maintained in the optimum range. NF was composed of (in ppm), N = 167, P = 80, K = 281, Ca = 234, Mg = 57, S = 251, Cu = 0.01, Fe = 3.9, Zn = 0.13, Mn = 1.2 and Mo = 0.13. A field trial was carried out for NF in the wet zone in Sri Lanka for tomato plants in simplified hydroponics system. The nutrient uptake was monitored by measuring the changes in weekly average electrical conductivity (EC) of the root solution (compared to the EC of the applied nutrient) of tomato plant beds. The pH of the root solution was in the suitable range and no adjustment was required indicating sufficient buffering in the formulation. The nutrient cost involved to produce 1 kg of tomato was about 70% less than other commercially available nutrients formulation.

Volume 13(1), 2011

Growth and yield of French bean (*Phaseolus vulgaris* L.) under organic farming

M. Prabhakar, S.S. Hebbar and A.K. Nair

Division of Vegetable Crops, Indian Institute of Horticultural Research, Hesaraghatta Lake, Bangalore-560089, Karnataka, India.

Key words: Organic farming, French bean, nutrients, growth and yield parameters, yield

Journal of Applied Horticulture, 2011, volume 13, issue 1, pages 72-73.

Abstract: A field experiment was conducted during 2007-2010 to study the effect of levels of organic manure and conventional practices on growth and yield of French bean grown organically. The trial was carried out in organic experimental block of IHR farm, Hesaraghatta, Bangalore. The trial included four levels of organic manure nutrient and two inorganic nutrient supply treatments. The treatment which received 100 per cent recommended dose of N (RDN) through organics produced the highest pod yield (17.77 t/ha) followed by treatments which received 75 per cent RDN through organics and conventional practices (17.45 and 15.93 t/ha). Plant growth parameters such as plant height (45.5 cm), number of leaves per plant (42.9), leaf area per plant (2706 cm²), nodules per plant (43.9), pod weight per plant (160.1g) and pod length (14.7 cm) were also comparatively higher in this treatment resulting in better pod yield. Application of recommended dose of chemical fertilizer in conjunction with farm yard manure recorded higher values for growth and yield parameters like number of leaves, leaf area, dry matter production, number of pods, pod weight per plant and pod length which also resulted in significantly higher pod yield as compared to the treatment which received recommended dose of chemical fertilizer only.

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Genetic variability in late *kharif* (Rangada) onion (*Allium cepa* L.)

R.K. Singh, S.R. Bhonde and R.P. Gupta

National Horticultural Research and Development Foundation, Chitegaon Phata, Post-Darna Sangavi, Taluqa-Niphad, Nashik, 422 003, Maharashtra, India.

Key words: *Allium cepa*, correlation, late *kharif*, heritability, onion, variability
Journal of Applied Horticulture, 2011, volume 13, issue 1, pages 74-78.

Abstract: An investigation was carried out to study the genetic variability in late *kharif* germplasm of onion at Nashik, Maharashtra (India). The mean data indicated that the highest gross yield (41.17 t/ha) and marketable yield (39.13 t/ha) was recorded in line 744 and was at par with line 682 (39.07 t/ha) and (34.39 t/ha). A wide range of variability was observed for gross yield (19.65 to 41.17 t/ha), marketable yield (10.05 to 39.13 t/ha), bulb size index (20.40 to 35.90 cm²), bolters (0.00 to 40.83%), doubles (0.00 to 47.50 %), thrips/plant (8.75 to 25.80) and plant height (54.95 to 71.80 cm). A higher magnitude of coefficient of variation was recorded for bolters (112.78 -112.65%), followed by doubles (86.35-86.16%), thrips/plant (37.55-37.36) and marketable yield (29.34 and 29.90 %). Highest heritability was noted in doubles, gross yield,

bulb diameter, plant height, bolters and thrips/plant. The genetic advance as percent of mean ranged from 3.93 to 231.73. High genetic advance noted in bolters (231.73 %), doubles (177.12 %), thrips/plant (76.56%) and marketable yield (54.53%) and rest of others characters showed medium to low genetic advance. Gross yield, marketable yield, doubles, bolters, thrips/plant and bulb size index indicated higher estimates of genetic advance as percent of mean coupled with high heritability, suggesting the involvement of additive genetic variance for these traits. Marketable yield was significantly and positively correlated with plant height, neck thickness, bulb diameter, bulb size index, weight of 20 bulbs, and gross yield and negatively correlated with bolters, doubles and days for bulb initiation at genotypic and phenotypic levels. Plant height, leaves/plant, bulb diameter, bulb size index, weight of 20 bulbs and days for bulbs initiation. The study revealed that a wide range of variability for important characters exists in germplasm offering a good scope for developing improved onion varieties suitable for cultivation in Maharashtra.

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Effect of *Glomus fasciculatum* on the growth and yield of tomato (*Solanum lycopersicum* L.) in *Meloidogyne incognita* infested soil

Iniobong Edet Okon and Edet A. Imuk

Department of Botany, University of Calabar, Calabar, Nigeria. Department of Soil Science, University of Calabar, Calabar, Nigeria.

Key words: *Glomus fasciculatum*, *Meloidogyne incognita*, *Solanum lycopersicum*, nutrient uptake, yield.

Journal of Applied Horticulture, 2011, volume 13, issue 1, pages 79-81.

Abstract: The effect of *Glomus fasciculatum* inoculation on the growth and yield of tomato (*Solanum lycopersicum* L.) in a *Meloidogyne incognita* infested soil was investigated in a pot experiment. *G. fasciculatum* greatly enhanced the growth and yield of tomato in both non-nematode and nematode infested soils. Growth was greatly impeded to the point of no flowering or fruiting in non-mycorrhizal nematode infested soil treatments. While the adverse effect of nematode to the growth of tomato can be attributed to impaired transport of water and nutrients, the enhanced growth in mycorrhizal plants was associated with increased water and nutrient uptake, resulting improved growth which must have conferred more vigour on them to reduce the pathogens' effect.

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Flower bud initiation in southern highbush blueberry cv. O? Neal occurs twice per year in temperate to warm-temperate conditions

Mar?a Pescie, Marcelo Lovisololo, Alberto De Magistris, Bernadine Strik and C?sar L?pez

Facultad de Ciencias Agrarias - Universidad Nacional de Lomas de Zamora, Ruta 4, Km. 2. (1836). Llavallol - Pvcia. de Buenos Aires, Argentina.
Department of Horticulture, Oregon State University, 4017 ALS, Corvallis, OR 97331, USA.

Key words: *Vaccinium sp.*, southern highbush blueberry, flower bud initiation, flower bud differentiation, day length, temperature

Journal of Applied Horticulture, 2011, volume 13, issue 1, pages 8-12.

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Abstract: In Argentina, southern highbush blueberry (*Vaccinium sp.*) exhibits two periods of vegetative growth in the same year, the first one in spring (spring growth, SpG), arising from vegetative buds on one-year-old wood, and the second in summer, from vegetative buds formed on spring growth, just after harvest (summer growth, SmG). Histological studies confirmed that flower bud initiation (FBI) occurred at the end of December on SpG and at the end of March on SmG. On SmG, FBI occurred under an 8 h photoperiod, and shortening daylength. However, on SpG, FBI was observed under increasing daylength (up to 15 h) and an average temperature of 22.5 ?C. Basal florets in apical floral buds were always in a more advanced reproductive stage on SpG than on SmG during the season. The two peaks in volume of fruit harvested were likely a result of differences in the ontogeny of buds on SpG and SmG shoots in the previous year.

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Processing and quality evaluation of guava squash

J. Shankara Swamy and A.K. Banik

Department of Post Harvest Technology, Bidhan Chandra Krishi Viswa Vidhyalaya Mohanpur, West Bengal-741 252, India.

Key words: Guava squash, xanthan gum, non-enzymatic browning, stability.
Journal of Applied Horticulture, 2011, volume 13, issue 1, pages 82-84.

Abstract: Guava (*Psidium guajava*), called as apple of the tropics, is one of the most common fruits in India. Excellent flavour and nutritive value aid to its great potential for preparation of beverages like squash and ready to serve (RTS). A study was undertaken to produce a stable and organoleptically preferred guava squash with proper suspension of fruit pulp supplementing the squash soluble dietary fibre with xanthan gum at five different concentrations (0.1 to 0.5%). Bottled guava squash of cv. Allahabad Safeda was prepared with 25% pulp, 40% total soluble solids (TSS), and 1% acidity with different concentration levels of xanthan gum, an exocellular polysaccharide produced by obligatory aerobic microorganism, *Xanthomonas campestris*. The stability of the products was studied by chemical and sensory evaluation of bottled squash during 180 days of storage. There were little changes in the quality parameters viz., TSS, pH, titratable acidity and ascorbic acid during storage. Non-enzymatic browning in guava squash increased with prolonged storage. Xanthan gum (0.5% W/W) gave stability to the product during 180 days of storage. Overall, acceptability was highest in pure guava squash containing 0.1% of xanthan gum, 40% of TSS and 1% of acidity during the 180 days of storage period.

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Effect of pine bark, pine straw and red oak amendments on pH of potting medium

M. Burner and D.H. Pote

Research Agronomist and Research Soil Scientist, Dale Bumpers Small Farms Research Center, U.S. Department of Agriculture, Agricultural Research Service (USDA-ARS), 6883 South State Highway 23, Booneville, Arkansas 72927. USA

Key words: Growth media, *Pinus taeda*, *Quercus falcata*, soil amendments
Journal of Applied Horticulture, 2010, volume 12, issue 2, pages 102-106.

Abstract: Our objective was to determine temporal effects on medium pH caused by decomposition of three organic amendments incorporated with topsoil. Pine (*Pinus taeda* L.) bark, pine (*Pinus taeda* L.) straw, and red oak (*Quercus falcata* Michx. var. *falcata*) were ground to uniform particle size, incorporated with a silt loam topsoil at two rates (1:29 and 1:10 amendment: soil, w:w basis, referred to as 1X and 3X, respectively), placed into greenhouse pots, and sampled during 12 months to determine medium pH in comparison to an unamended topsoil (control). Compared to the control, pine straw, pine bark, and red oak 3X increased soil medium pH. All media except pine straw increased pH during the study. At any given sampling date, pine straw 3X had lower pH than the control, while red oak either did not differ from, or had higher pH than the control. By the end of the sampling period, pine bark and pine straw media had lower pH than the control. While statistically significant, change in medium pH caused by any of these substances would be trivial for most horticultural crops, and easily corrected by use of other liming or acidifying amendments.

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Vapour heat quarantine treatment for Taiwan native mango variety fruits infested with fruit fly

ThiNghiem Le, ChingChang Shiesh, HueyLing Lin and Elsa Lee

Graduate School of Horticultural Department, Chung Hsing University, 250 Kuo Kang Road, Taichung, Taiwan. Horticultural Department, Chung Hsing University. 250 Kuo Kang Road, Taichung, Taiwan.

Key words: Vapour heat, oriental fruit fly, quarantine pests, 'Tuu Shien' mango
Journal of Applied Horticulture, 2010, volume 12, issue 2, pages 107-112.

Abstract: The objective of the research was to evaluate the efficacy of Vapour heat treatments (VHT) to disinfest the Taiwan native mango variety fruits (Tuu Shien) from the oriental fruit fly (*Dacus dorsalis* Hendel) and the effect of the treatments on the quality of mango fruits. The three stage treatment of forced air at 30°C for 30 minutes, 30 to 48°C for 60 minutes, and then 48°C forced hot air with saturated humidity over the mango fruit surface until the fruit centre temperature reached 46.5°C and fruit was held for 40 minutes. Survival tests showed that both second and third generation instars were more susceptible to the VHT than eggs and there were no surviving oriental fruit fly after 46.5°C for 40 min. The quality of local mango fruits treated with VHT and stored at ambient temperature (28 ± 3°C) for 6 days was not significantly different from the control.

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A world of flowers: Dutch flower auctions and the market for cut flowers

M. Steen

School of Economics and Business Administration, Norwegian University of Life Sciences, P.O. Box 5003, N-1432 Aas, Norway.

Key words: Flower markets, flower production and trade, volatility, Dutch flower auctions, price analysis

Journal of Applied Horticulture, 2010, volume 12, issue 2, pages 113-121.

Abstract: This paper gives an overview of international flower production, consumption and trade, focusing on the Dutch flower auctions in Aalsmeer, the world's leading flower trading centre. Data on prices and traded volumes for three important species of cut flowers (roses, chrysanthemums and carnations) for the period 1993-2008 are analyzed. Flower prices and traded volumes are extremely volatile. Although part of this volatility is predictable, because of regular seasonal variations in demand, a large proportion of the observed volatility is due to sudden shifts in supply. The real prices of cut flowers declined during this period, and there was a clear shift in consumer preferences toward roses and away from carnations. In addition, consumption of roses and carnations shifted from clearly seasonal toward more year-round consumption, while consumption of chrysanthemums followed consistent

seasonal cycles throughout the period. During this period, non-European producers increased their market shares. This development can be traced to a significant decrease in cut flower prices relative to energy prices, especially after 2003.

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Sex determination in *Pistacia* species using molecular markers

Esfandiyari, G.H. Davary Nejad, F.A. Shahriyari and M. Kiani

Horticulture Department, Ferdowsi University of Mashhad, Khorasan Razavi Province, Islamic Republic of Iran, Plant Breeding and Biotechnology Department, Ferdowsi University of Mashhad, Khorasan Razavi Province, Islamic Republic of Iran. Plant Research In

Key words: *Pistacia* spp, sex identification, SCAR- PCR, juvenile stage.

Journal of Applied Horticulture, 2010, volume 12, issue 2, pages 122-124.

Abstract: Sex identification in *Pistacia* species are economically desirable. Regarding long juvenile stage in *Pistacia* species and lack of morphological method to identify sex in this stage, molecular marker could facilitate breeding program. Aim of the study was to identify a marker, closely linked to sex locus in *Pistacia atlantica* Desf *mutica*, *P. khinjuk* and *P. vera* var. Sarakhs. For this purpose, samples were collected from male and female individual trees from each species and their band patterns were analysed according to band specific presence or absence. Twenty Random Amplified Polymorphic DNA (RAPD) primers and a pair Sequence Characterized Amplified Regions (SCAR) primer were tested to determine sex in wild *Pistacia* species. Among RAPD primers, only BC1200 amplified a specific sex band which was present in female plant. The results indicated that all individual samples amplified an approximately 300 base pairs fragment in female trees which was absent in male samples. Although sex determination mechanism in *Pistacia* is unknown, it might be controlled by single locus acting as a trigger. However, SCAR technique is a reliable technique to identify gender genotypes in seedling stage of *Pistacia* species, that would help to save time and expenses in breeding program.

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Genetic diversity of cultivated elephant foot yam (*Amorphophallus paeoniifolius*) in Kuningan, West Java as revealed by microsatellite markers

Edi Santosa, Yoko Mine, Miki Nakata, Chunlan Lian and Nobuo Sugiyama

Faculty of Agriculture, Bogor Agricultural University, Bogor 16680, Indonesia.
Faculty of Agriculture, Tokyo University of Agriculture, Funako 1737, Atsugi,
Kanagawa 243-0034, Japan. Graduate School of Agricultural and Life Sciences,
The University of Tok

Key words: *Amorphophallus paeoniifolius*, clonal propagation, cluster analysis, genet, genetic diversity, Indonesia, SSR

Journal of Applied Horticulture, 2010, volume 12, issue 2, pages 125-128.

Abstract: Ten microsatellite markers were used to clarify the genetic diversity of cultivated elephant foot yams collected in 13 villages in the Kuningan District, West Java, Indonesia. Each pair of primers generated four to five alleles, with an observed heterozygosity of 0.000-1.000 and an expected heterozygosity of 0.064-0.551. These markers identified seven likely genets (clonal individuals) in the Kuningan population. Of 61 individual plants surveyed in this study, 55 plants distributed throughout the Kuningan District belonged to the same genet, while the another genet represented by a plant (ramet). These ramets were restricted to the villages located on the main road between Kuningan City and Central Java. Cluster analysis shows that the seven genets can be classified into three groups, with two groups showing a restricted distribution in the villages located on the road leading to Central Java. Elephant foot yam plants with berries were rarely observed in the Kuningan District. It is likely that a single genet has become the dominated local cultivar, possibly because of the limited genetic diversity of elephant foot yam in the Kuningan District, its reproduction by clonal propagation and the selection of a specific cultivar by farmers.

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Effect of grafting on vegetative growth and quantitative production of muskmelon (*Cucumis melo* L.)

A. Radhouani and A. Ferchichi

Dry Lands and Oasian Cropping Laboratory, Institute of Arid Regions, El Jorf
4119, Medenine, Tunisia.

Key words: Muskmelon, grafting, vegetative growth, indexes of growth, quantitative production

Journal of Applied Horticulture, 2010, volume 12, issue 2, pages 129-134.

Abstract: Plants of muskmelon variety "Calypso" were used as scion and non grafted control while two hybrids (*Cucurbita maxima* x *Cucurbita mushata*), TZ148 and Ferro as rootstocks. Grafted and non-grafted plants were grown under a monotunnel heated and irrigated by geothermic water in the South of Tunisia. Plants were grown in soilless culture on sand and compost. This trial has revealed that, on sand as well as on compost, grafted plants were more vigorous than self-rooted ones. This vigor was highlighted by values of length and volume of roots, plant height, stem diameter, leaf area and fresh and dry matter of leaves. Indexes of growth represented by LAI, SLA, RGR and NAR were strongly improved by grafting particularly by TZ148. This improvement implied a hasty vegetative growth. Moreover, precocity of production was greater for grafted plants. In addition to their early production, grafted plants produced more fruits on sand and compost. The average weight of fruits was enhanced, too, by this agricultural practice. Thus, the major part of fruits produced by grafted plants had a weight superior to 600g.

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Quality and physiological responses of Fuji apple to modified atmosphere packaging during cold storage

XiaoLong Li,, JianWen Tian, Mark A. Ritenour, JiaZheng Li, ShuYa Song, HuiLing Ma

College of Life Science, Northwestern A & F University, Yangling, 712100, Shaanxi, China. Germplasm resources institute of Ningxia Agricultural Sciences Academy, Yinchuan, 750021, Ningxia Autonomous region, China. Ningxia Science and Technology Agency, Y

Key words: Polyolefin film, scald, core browning, respiration rate, ethylene production, modified atmosphere packaging.

Journal of Applied Horticulture, 2010, volume 12, issue 2, pages 135-139.

Abstract: Modified atmosphere packaging (MAP) with polyolefin bags made of modified polyvinyl chloride (mPVC), micro-perforated polyethylene (mpPE), modified polyethylene (mPE), plastic film mulch (control-1), and polyvinyl chloride with holes (control-2) were evaluated for their ability to preserve quality of Fuji apple during storage at 0 to 1°C. The results showed that atmosphere in mPVC bag was adjusted to 2.73%~2.38% CO₂ and 15.70%~18.13% O₂ while in mpPE, mPE and control-1 bag CO₂ levels were elevated and O₂ level declined to 0.10-0.72%, 20.53~20.9%, respectively. In mPE bag, fruits recorded significantly less weight loss than other packagings throughout

the storage, while fruit in mPVC, fresh weight loss was same as in control-1. The overall fruit quality of flesh firmness (FFF), soluble solid content (SSC) and ascorbic acid remained at almost the same level in each packaging during the first 40 days of storage, and changed thereafter. Control-1 resulted in significantly lower FFF than other packagings till day 220 and SSC showed the same trend as in control-2. Respiration rate of fruit in mPVC, control-1 and control-2 peaked on day 220 and those in mpPE and mPE peaked on day 240. Ethylene production of fruit in each packaging increased since day 40 and peaked on day 80 for mPE and control-1, day 100 for mpPE and control-2, on day 120 for mPVC. A second peak for mPE appeared on day 120. Each packaging resulted a dramatic increase and drop of SOD activity in fruit in the first 40 days. After about 220 days of storage, superficial scald and core browning occurred on fruit in mpPE, mPE, control-1, control-2 by 2.4-6.0% and 1.2-1.6%, 6.3-7.9% and 15.8-17.3%, 0-1.6% and 4.4-4.6%, 15.4-16.1% and 3.2-4.5%, respectively while no such incidence was observed in mPVC. Decay and disorder developed faster when storage duration increased.

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Horizontal and vertical soilless growing systems under Cyprus conditions

Damianos Neocleous, Charalambos Kaittanis, Nicos Seraphides and Polycarpou Polycarpou

Agricultural Research Institute, Ministry of Agriculture, Natural Resources and Environment, P.O. Box 22016, 1516 Nicosia, Cyprus.

Key words: Lettuce (*Lactuca sativa*), strawberry (*Fragaria x ananassa*), horizontal system, vertical system, hydroponics

Journal of Applied Horticulture, 2010, volume 12, issue 2, pages 140-144.

Abstract: Under the impact of new cultivation and socioeconomic trends, and the aspiration for agricultural sustainability, a research study was conducted under Cyprus conditions. Lettuce (*Lactuca sativa* cvs. 'Paris island', 'Lollo rosa', and 'Oakleaf') and strawberry (*Fragaria x ananassa* cv. 'Camarosa') plants were used to evaluate horizontal and vertical growing setups in a 'closed' soilless system. For lettuce, the vertical system provided more marketable lettuce per system's surface area compared to the horizontal setup. However, the horizontal system provided greater lettuce mass and higher percentage marketable yield than the vertical one. The nitrate content of all lettuce cultivars was not significantly different between the two systems and remained lower than the European standards all over the experiment. For strawberry,

the vertical setup offered higher yield compared to the horizontal one. The quality characteristics were not different between the two systems. These results suggest that the studied setups and the 'closed' soilless system can be used as a tool for the improvement of Cyprus greenhouse production, water use efficiency and prevention of environmental damage from regular disposal of hydroponics solution. The possibility of an improved greenhouse production system could be considered as technique of choice under semi-arid Cyprus and E. Mediterranean conditions using such materials.

Volume 12(2), 2010

Improving yield and fruit quality of date palm by organic fertilizer sources

H.A. Kassem and H.A. Marzouk

Department of Plant Production, College of Food and Agricultural Sciences, King Saud University, Kingdom of Saudi Arabia. Department of Pomology, Faculty of Agriculture, Alexandria University, Alexandria, Egypt.

Key words: Organic, inorganic, fertilization, quality, Zaghoul dates, yield, poultry manure, cow dung, town refuse compost

Journal of Applied Horticulture, 2010, volume 12, issue 2, pages 145-150.

Abstract: A field study was carried out during 2007 and 2008 seasons on twenty-six years old Zaghoul cultivar of date palm growing in clay silt soil. One level of nitrogen alone or plus P and K from mineral (ammonium nitrate alone or ammonium nitrate + calcium superphosphate + potassium sulphate, NPK) and organic sources [poultry /chicken manure (CM), cow dung (CD) and town refuse compost (TR)] were applied either alone or in combinations to study their influence on the yield and fruit physico-chemical quality. The results revealed that applying organic manure either alone or combined with mineral fertilizers increased palm yield and enhanced fruit colour as compared with mineral fertilization alone. CM and CD resulted in the best fruit weight, fruit flesh weight and length. Fruit TSS, anthocyanin and sugars content increased while, tannins content was decreased by CM and CD as compared with combining organic manure with NPK or mineral alone. However, fruit acidity was not affected by any of the treatments when compared among each others. In general, micronutrients contents were significantly higher in fruits by applying organic manure alone than organic manure combined with NPK or mineral fertilization alone. Organic manure fertilization alone (especially CM and CD) resulted in decreasing lead, cadmium, nitrate and nitrite content than mineral fertilization.

Volume 12(2), 2010

Effects of arbuscular mycorrhizal inoculation on growth performance of *Piper longum* L. (Piperaceae) under sterilized soil conditions

R.K. Singh and P. Gogoi

Department of Botany, Rajiv Gandhi University, Itanagar - 791112. India.

Key words: Arbuscular mycorrhizal, *Piper longum*, total biomass, chlorophyll content, *Glomus*

Journal of Applied Horticulture, 2010, volume 12, issue 2, pages 151-154.

Abstract: A green house study was carried out to investigate the effect of inoculation with four native arbuscular mycorrhizal fungi (AMF), *Glomus mosseae*, *G. fasciculatum*, *G. clarum* and *G. versiforme* on growth performance of a medicinally important plant "Long pepper" (*Piper longum* L.). Inoculation with all AMF species enhanced plant growth, however, significant variation in effectiveness of the four AMF species was observed in relation to both root and shoot growth. A significantly higher total biomass (0.84g/plant) was observed in *G. fasciculatum* and *G. clarum* inoculated plants. The performance of *G. fasciculatum*, *G. clarum* and *G. versiforme* were statistically on par to each other in increasing the chlorophyll content over the control plants. The root colonizing capacity of *G. fasciculatum* was found to be significantly higher, the next being *G. versiforme*.

Volume 12(2), 2010

Chemical composition and larvicidal activity of the essential oil of Iranian *Laurus nobilis* L.

Verdianrizi Mohammadreza

Department of pharmacognosy, Faculty of Pharmacy, Tehran University of Medical Sciences, Tehran, Iran

Key words: *Laurus nobilis* L., essential oil, hydro distillation, larvicidal activity

Journal of Applied Horticulture, 2010, volume 12, issue 2, pages 155-157.

Abstract: The chemical composition of the essential oil obtained from the aerial parts of *Laurus nobilis* L., was examined by GC and GC/MS. The main components of the oil were identified. 1,8-cineole was the major component in

the oil together with α -terpinyl acetate, terpinene-4-ol, α -pinene, β -pinene, p -cymene, linalool and terpinene-4-yl-acetate. The essential oil was tested against *Anopheles stephensi* and *Culex pipiens* larvae. The results obtained show that the essential oil could be considered as natural larvicidal agents.

Volume 12(2), 2010

Evaluation of different substrates on yield and fruit quality of sweet pepper using open soilless culture

Muhtaseb Jalal

The National centre for Agricultural Research and Extension, PO Box-93. Postal code: 11623, Jordan..

Key words: Tuff, sand, soil, sweet pepper, soilless, fruit quality, yield
Journal of Applied Horticulture, 2010, volume 12, issue 2, pages 158-160.

Abstract: This study was conducted at Jordan Valley to evaluate the use of locally available tuff and sand substrates in comparison with soil for growing sweet pepper (*Capsicum annum* L. cv. Reehan) using an open soilless culture. Treatments were randomly distributed according to RCBD with three replications. Sweet pepper plants, grown in soil or tuff gave higher total yield (6.0, 5.5 and 8.7, 6.5 ton/1000m², respectively) and yield/plant (2.0, 1.58 and 1.3, 1.38 kg/plant, respectively) in both the years, while those grown in sand produced the least. Fruit weight of plants grown in soil was the highest in the first season (200.6 g) followed by tuff and lastly the sand (177.0 and 169.4 g, respectively), however, it was not affected by the substrates in the second season. Substrates had little effect on fruit length in both seasons and fruit diameter in the first season, but, in the second season those grown in soil gave the highest diameter (74.4 mm) followed by those in tuff and sand (70.6 and 70.3 mm, respectively). This study indicated that open soilless system using tuff as a substrate may be suitable for sweet pepper production without dramatic changes in yield or fruit quality and it saved about 65-70% of water applied by conventional farmers for sweet pepper production under plastic house.

Volume 12(2), 2010

The influence of chlorination on the phytotoxicity and the production of *Zinnia elegans*

H.E. Palmucci, Z. Premuzic, L. Mascarini, C. Campetella and V. Lopez

Catedra Fitopatologia. Catedra Quimica Analitica. Catedra Floricultura.

Intensificando. Catedra Estadistica. Facultad de Agronomia, Universidad de Buenos Aires (FAUBA) Av. San Martin 4453. Capital Federal (1416) TE: 4524-8063. PROYECTO UBACyT G005, Argen

Key words: Chlorination, *Zinnia elegans*, phytotoxicity, soil-less culture, disinfection, chemical treatment.

Journal of Applied Horticulture, 2010, volume 12, issue 2, pages 161-164.

Abstract: Chlorination constitutes a practical and economical chemical control method for the disinfection of recycled nutrient solutions in soil-less growing systems. Although the chlorination can prevent the development of pathogenic organisms, the use of inadequate doses of chlorine could produce damages to the culture and environment. It is necessary to select doses for each plant species that do not cause damages nor produce undesirable effects on the productivity and quality. *Zinnia* sp. in South America has large potential for cultivation as an ornamental potted or vase flower. Tests for disinfection of the recycled nutrient solution were performed with different chlorine quantities (control, 11, 22, 44 and 88 mg L⁻¹) to evaluate the potential phytotoxicity and effects on the flower production (weight and number) of *Zinnia elegans* var. Enana. The production and phytotoxicity were analyzed in relations with the contents of macronutrients (N, P, Ca, and K), sodium and chlorides levels in leaves and related chemical changes (pH, EC and chlorides) in the nutrient solution. The results showed improvement of the development of foliage, roots and the production of flowers with the doses of 11 and 22 ppm, associated to a minor toxicity. The larger doses did not surpass the toxicity levels, although affected the productivity and quality of plants. These results enabled us to select doses under the value of 22 ppm for futures effectiveness test to control pathogens.

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Effects of water inclusion in microclimate modification systems for warm and cool season vegetable crops on temperature and yield

N. Bumgarner and S. Verlinden

Division of Plant and Soil Sciences, West Virginia University, P.O. Box 6108,

Morgantown, WV26506-6057, USA.

Key words: Slitted polyethylene low tunnel, spun-bonded row cover, water tubes, organic vegetable production, tomato (*Solanum lycopersicon*), lettuce (*Lactuca sativa*), radish (*Raphanus sativus*), bell pepper (*Capsicum annuum*)

Journal of Applied Horticulture, 2010, volume 12, issue 2, pages 87-92.

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Abstract: Four microclimate modification methods including spun-bonded and slitted low tunnels both with and without the addition of water-filled plastic tubes were tested for their effect on early and total yields of warm and cool season vegetable crops in Morgantown, West Virginia, USA. Peppers, tomatoes, radishes, and lettuce were organically grown in 2006 and 2007. Early season pepper yields were higher when water tubes were included with low tunnels while early tomato yields did not differ. Total yields for warm season crops in some microclimate modification treatments were higher than the control, and harvests started up to four weeks earlier in the spring. Cool season crop yields in the four treatments showed no increase over the control despite one to three weeks earlier harvests for radish and lettuce. These results show potential for earlier safe planting dates and increased yield, especially in warm season vegetable crops using low tunnels and water tubes. Additionally, economic analysis demonstrated a potential for increased profits over control plots using these microclimate modification techniques.

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Changes in inner contents of 'Kyoho' grape berry during the growth and ripening period

T Ban, A. Nakatsuka, K. Akaura, S. Matsumoto, M. Ishimaru and H. Itamura
Faculty of Agriculture, Tokyo University of Agriculture and Technology, Saiwai-cho, Fuchu, Tokyo, 183-8509, Japan; ^BFaculty of Life and Environmental Science, Shimane University, Nishikawatsu-cho, Matsue, Shimane, 690-8504, Japan; Department of

Key words: Flesh firmness, 'Kyoho' grape, magnetic resonance imaging, ripening, sugar contents

Journal of Applied Horticulture, 2010, volume 12, issue 2, pages 93-96.

Abstract: The grape berry morphologically consists of epidermis, an outer wall, an inner wall and placenta. The inner contents such as soluble solids, organic acids and moisture distribution of grape berries are dramatically

changed during the veraison between the growth and ripening period. However, we know little about the changes in the inner contents of the outer wall, inner wall and placenta. Our purpose of the study is to clarify the tissue specificity of the total soluble solids content, sugar composition, flesh firmness and moisture distribution of 'Kyoho' grape berry during growth and ripening period. The moisture distribution of the grape berries was analyzed with magnetic resonance imaging (MRI). The total soluble solids contents of the outer wall were higher than those of the inner wall during the investigation period. In this study, fructose, glucose and sucrose were detected in the berries. The concentrations of these sugars in the outer wall were higher than those in the inner wall; however, the components of these sugars were not different between the outer wall and inner wall. Even within the same berry, the flesh firmness and the moisture distribution were different from one part of the tissue to another. These results indicate that the growth rate of grape berry varies considerably among the different parts of the berry.

Volume 12(2), 2010

Optimization of guava edible coating using response surface methodology

Mohd Zahid, C.S. Cheow, A.R. Norizzah, Z.M.S. Halimahton and M.S. Adi

Faculty of Applied Science, Universiti Teknologi MARA, Malaysia (UiTM), Shah Alam 40450, Selangor, Malaysia.

Key words: Response surface methodology (RSM), guava, stearin, olein, beeswax, weight loss

Journal of Applied Horticulture, 2010, volume 12, issue 2, pages 97-101.

Abstract: Application of edible coating represents a method that can extend the shelf life of picked guava by minimizing the loss of weight mainly due to natural migration process of moisture and gases. Response surface methodology (RSM) was employed to search for best composition of edible coating which comprised of three variables namely palm stearin, palm olein and beeswax. Based on central composite rotatable designs of RSM and weight loss as response, 15 coating compositions were established involving 8 factorial points, 6 axial points and 1 centre point. From the RSM-generated model, optimum coating composition for minimizing guava weight loss was identified as palm stearin 4.5% (w/v), palm olein 1% (v/v) and beeswax 1% (w/v). Under this optimum composition, the predicted weight loss of coated guava was 7.18%, whereas, the experimental weight loss of coated guava was 7.51% after tenth days of storage period. The RSM-predicted and experimental weight

loss were not significantly different from each other. The weight loss of uncoated guava was 3 times higher (25%) after 8 days of storage as compared to coated guava. Thus, the use of optimum composition of edible coating provides acceptable alternative for post harvest control of weight loss of guava during storage.

Volume 12(1), 2010

Effects of different photoperiods on flowering time of facultative short day ornamental annuals

JalalUDDin Baloch, M. Qasim Khan, M. Munir and M. Zubair

Faculty of Agriculture, Gomal University, Dera Ismail Khan, Pakistan; School of Plant Sciences, The University of Reading, Reading, UK; University College of Agriculture, Bahauddin Zakariya University, Multan, Pakistan.

Key words: Ornamental annuals, short day plants, flowering, photoperiod, facultative short day plants

Journal of Applied Horticulture, 2010, volume 12, issue 1, pages 10-15.

Abstract: An experiment was carried out to study flowering response of six facultative short day plants (zinnia cv. Lilliput, sunflower cv. Elf, French marigold cv. Orange Gate, African marigold cv. Crush, cockscomb cv. Bombay and cosmos cv. Sonata Pink) under four distinct controlled photoperiods (8, 11, 14 and 17 h d⁻¹). A curvilinear facultative response was observed in almost all cultivars studied. zinnia, sunflower, French marigold, African marigold, cockscomb and cosmos took minimum time to flower when grown under 8 h d⁻¹ photoperiods however it was significantly ($P < 0.05$) increased when photoperiod was increased to 17 h d⁻¹. These findings revealed plant scheduling prospect that is, the flowering time of facultative SDPs grown under long day photoperiod can be extended in order to continue supply of these plants in the market

Volume 12(1), 2010

Efficacy and physical properties of ground, composted rice hulls as a component of soilless substrate for selected bedding plants

Song, Paul V. Nelson, Carl E. Niedziela Jr., and D. Keith Cassel

Korea National College of Agriculture and Fisheries, 11 Dongwhari Bongdam

Hwasunsi Kyonggido, R.O. Korea 445-890, Department of Horticultural Science, North Carolina State University, Raleigh, NC 27695-7609, Department of Biology, Elon University, Elon, N

Key words: Rice hulls, root substrate, soilless, root media, *Impatiens walleriana*, *Verbena Xhybrida*,

Journal of Applied Horticulture, 2010, volume 12, issue 1, pages 16-20.

Abstract: Ground, composted rice hulls were combined as a root substrate component with peat moss and coir at five rice hulls percentages (0, 25, 50, 75, and 100) in a factorial design. Seventy-five percent of the rice hull particles were 0.51 to 1.40 mm and 90% of the particles were 0.51 to 2.00 mm. In physical property evaluations, increasing the percentage of rice hulls in both the peat moss and coir series of substrates increased the dry bulk density and airspace at container capacity; however, as air space increased, container capacity and available water decreased. In the first two of three plant growth experiments, *Impatiens walleriana* Hook. f. 'Super Elfin White' was grown in 288 cell plug trays. In the third experiment, *Verbena Xhybrida* Voss. 'Romance Deep Rose' was grown in 48 cell bedding plant flats. Due to problems with high pH in the coir, only the peat moss growth results were reported. Overall, growth was best in 25% rice hulls plus 75% peat moss. Rice hulls increased substrate Ca^{2+} and Mg^{2+} in both the peat moss and coir. Adding rice hulls to the substrate increased K^{+} in peat and decreased K^{+} in coir. There was no effect of rice hulls on substrate NO_3^{-} -N, NH_4^{+} -N, and PO_4 -P in the substrate solution. Ground, composted rice hulls are a potential alternative component of soilless substrate for plugs and bedding plants.

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Diallel analysis for fruit traits among tomato recombinant inbred lines derived from an interspecific cross *Solanum lycopersicum* x *S. pimpinellifolium*

Marchionni Bast?, D.R. Liberatti, S.L. Mahuad, G.R. Rodriguez, G.R. Pratta, R. Zorzoli and L.A. Picardi

CONICET, Ctedra de Genetica, Facultad de Ciencias Agrarias UNR, CC 14 S2125ZAA, Zavalla, Argentina. FONCyT, Ctedra de Genetica, Facultad de Ciencias Agrarias UNR, CC 14 S2125ZAA, Zavalla, Argentina. CIUNR, Ctedra de Genetica, Facultad de Ciencias Agr

Key words: Plant breeding, diallel analysis, combining ability, *Solanum lycopersicum*, recombinant inbred lines

Journal of Applied Horticulture, 2010, volume 12, issue 1, pages 21-25.

Abstract: Five recombinant inbred lines, generated from a single interspecific cross *S. lycopersicum* x *S. pimpinellifolium*, were crossed in a complete diallel combination without reciprocal. Fruit quality traits were analyzed according to Griffing (1956), method 2, model 1 (fixed effects). Significant general and specific combining ability (GCA and SCA) effects were found for all traits. Weight, reflectance percentage, chroma index, firmness, soluble solids content, pH and titratable acidity presented SCA values greater than GCA values, indicating nonadditive effects. Both additive and nonadditive effects were significant in determining diameter and shape. Positive unidirectional dominance was found for shape, shelf life and chroma index, while negative unidirectional dominance was involved in the expression of weight, diameter, height, reflectance percentage and firmness. Bidirectional dominance was found for soluble solids content, pH and titratable acidity. In spite of being a genetic pool generated from a single interspecific cross, high levels of genotypic and phenotypic variability was found among the fifteen genotypes for important agronomic traits. Both additive and nonadditive effects were important in the genetic determination of these traits.

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Pepper (*Capsicum annuum* L.) responses to surface and drip irrigation in southern Tunisia

Mohamed Thabet and Khemaies Zayani

Institut des Regions Arides, 4119 Medenine, Tunisie. Institut Supérieur des Sciences et Technologie de l'Environnement BP 1003, Hammam-Lif2050, Tunisie.

Key words: Arid, drip irrigation, border irrigation, yield, *Capsicum annuum*.L, water use.

Journal of Applied Horticulture, 2010, volume 12, issue 1, pages 26-29.

Abstract: Field experiments were performed to study the impact of two different irrigation systems (surface drip and surface) on water use efficiency and yield components of a pepper crop (*Capsicum annuum*. L). Irrigation scheduling was carried out based on estimated crop evapotranspiration (ET_c) using crop coefficients for pepper and reference evapotranspiration ET_o calculated using the Penman-Monteith equation (Allen *et al.*, 1998). The crop received total water needs computed according to Veirmeiren and Jobling (1983) procedure for surface drip irrigation. Border irrigation was scheduled by

Cropwat model (Smith, 1992). Experimental plots were irrigated simultaneously during the appropriate duration for each one and received the same nutrients (N, P, and K) ratio. Comparison was made on fruit number per plant, fruit weight, fruit weight by harvest and yield per unit surface. The results showed that compared with surface irrigation, drip irrigation presented a significant difference in total fruit yield and water use during cropping season (May to September). With drip irrigation, average yield was 19.73 kg m² which was 68% greater than that irrigated with surface irrigation (11.90 kg m²). Applied water volume by unit production (m³/kg) was 0.38 for drip and 1.05 for border, respectively. Drip irrigation increased fresh pepper fruit yield with a reduction of 60% in water use compared to traditional surface irrigation.

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Anthocyanins accumulation and genes-related expression in berries of cv. Tannat (*Vitis vinifera* L.)

O. Borsani, G. GonzalezNeves, M. Ferrer and J. Monza

Laboratorios de Bioquímica and Viticultura - Enología, Facultad de Agronomía, Avda. Garzon 780 CP 12900. Montevideo, Uruguay, Instituto Nacional de Vitivinicultura, Dr. Pouey 463. Las Piedras, Uruguay.

Key words: Anthocyanins, anthocyanidins, berries, hydric deficit, *Vitis vinifera* L.

Journal of Applied Horticulture, 2010, volume 12, issue 1, pages 3-9.

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Abstract: Anthocyanins accumulation and gene expression in berries of *Vitis vinifera* L. cv. Tannat trained in Lyre system was investigated. Expression of genes involved in anthocyanins biosynthetic pathway as chalcone synthase (*CHS*), flavonoid 3-hydroxylase (*F3H*), dihydroflavonol 4- reductase (*DFR*), and UDP-glucose flavonoid-3-O- glucosyl transferase (*UFGT*) was examined. On the other hand, the influence of plant architecture, Lyre and vertical shoot positioned (VSP) trellis systems, on anthocyanins accumulation and gene expression was also analyzed. Final contents of total anthocyanins were not affected by trellis systems but varied in two years with different water deficit imposition period. However, the individual profile of the genes and anthocyanidins modified according to the moment of water deficit imposition (*veraison* or harvest) and by the trellis systems (Lyre or VSP). Analysis of gene

expression in Lyre along the berry development period showed that low leaf water potentials after *veraison* cause an earlier and greater induction compared with expression in a year with low leaf water potential at harvest. At harvest, the hydric deficit induced an increase in the expression of CHS, *F3H* and *DFR* genes and a higher total anthocyanins content. The study revealed that plant architecture affect the expression of anthocyanins related gene in berries possibly by modifying the canopy microclimate.

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***In vitro* flowering and shoot multiplication of *Gentiana triflora* in air-lift bioreactor cultures**

Yaser Hassan Dewir, Nisha Singh, Siveshni Govender and Pragashnee Pillay
School of Biological & Conservation Sciences, University of KwaZulu-Natal, Westville Campus, Private bag X54001, Durban 4000, South Africa.
Department of Horticulture, Faculty of Agriculture, Kafrelsheikh University, Kafr El-Sheikh 33516, Egypt.

Key words: Bioreactor, *in vitro* flowering, Gentian, mass propagation, microponics

Journal of Applied Horticulture, 2010, volume 12, issue 1, pages 30-34.

Abstract: Hormonal control of flower induction *in vitro* was investigated in Gentian. The effect of PBZ concentrations on flowering was studied in plantlets cultured in MS medium containing 30 g L⁻¹ sucrose. Paclobutrazol (PBZ) concentration at 1.0 mg L⁻¹ induced the highest flowering in terms of flowering percentage (91.5%), number of flowers, days to first flowering, flower length and flower diameter. PBZ did not trigger flowering but it rather stimulated flowering and its role seemed to be additive but not essential for flowering. Comparison between solid and bioreactor cultures (continuous immersion with a net) revealed that shoot multiplication and growth were more efficient using bioreactor culture. The highest shoot number per explant (29.9) was obtained in bioreactor culture. Regenerated shoots were cultured microponically for 6 weeks. Hundred percent of plants rooted and were acclimatized successfully in growing media containing perlite: vermiculite (1:1).

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Diversity and efficiency of wild pollinators of watermelon (*Citrullus lanatus* (Thunb.) Mansf.) at Yatta (Kenya)

N. Njoroge, B. Gemmill, R. Bussmann, L.E. Newton and V.W. Ngumi

Jomo Kenyatta University of Agriculture and Technology, Botany Department, P. O. Box 62000 Nairobi, Kenya. Food and Agriculture Organization of the United Nations, Viale delle Terme di Caracalla, 00100 Rome, Italy. Economic Botany, Missouri Botanical Garden

Key words: Native pollinators, watermelon, visitation patterns, pollen deposition

Journal of Applied Horticulture, 2010, volume 12, issue 1, pages 35-41.

Abstract: *Citrullus lanatus* (Thunb.) Mansf. (Watermelon) is an important crop plant in Kenya. Being monoecious, watermelon is entirely dependent upon pollination services usually by insects for production. Although the centre of origin for this plant is thought to be tropical Africa, essentially not much has been studied of its pollination requirements in this region. The current study investigated the identity of the wild pollinators of watermelon, their behaviour and relative pollination efficiencies at Yatta, a farm near Thika (Eastern Province). The main pollinator for this crop was found to be the honey bee, *Apis mellifera* but three wild species of *Lasioglossum* were found as important pollinators. These wild bees have a significantly higher ($P < 0.0001$) pollen deposition on stigmas of watermelon than honeybees. One of the *Lasioglossum* (*Ctenonomia*) sp. 4 deposited on average three times as much pollen as the honeybee. At about the time of stigmatic receptivity, the number of visits by this species to female flowers increases until it equals visits to male flowers irrespective of number of flowers per plot. This behavioural pattern coupled with the high pollen deposition potential makes *Lasioglossum* (*Ctenonomia*) sp. 4 a superior candidate as an alternatively managed pollinator for watermelon. Knowing that visitation occurs mostly in the morning, and that flowers last only for one day, spraying can be done in the later hours of the day when the pollinators have virtually stopped foraging on the flowers. In view of the reported pollinator decline globally, the wild pollinator species reported in this study warrant further investigation on their nesting biology and potential for domestication.

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***In vitro* mass propagation of Sikkim Himalayan Rhododendron (*R. dalhousiae* Hook. f.) from nodal segment**

Bhusan Gurung and K.K. Singh

G.B. Pant Institute of Himalayan Environment and Development, Sikkim Unit, Pangthang, Post Box 24, Gangtok, East Sikkim-737101, India.

Key words: Micropropagation, shoot formation, rooting, acclimatization, *Rhododendron dalhousiae*, Sikkim Himalaya

Journal of Applied Horticulture, 2010, volume 12, issue 1, pages 42-45.

Abstract: The first successful micropropagation protocol was developed for an important Sikkim Himalayan *Rhododendron*, *R. dalhousiae* Hook. f. also known as Lahare Chimal in Sikkim. *In vitro* raised shoot tip explants from *R. dalhousiae* were used to produce multiple shoots on a medium containing various concentrations of growth regulators. Among the combinations used, Murashige and Skoog (MS) medium containing 5 mg L⁻¹ 2-isopentenyladenine (2iP) along with additives such as, 100 mg L⁻¹ polyvinyl pyrrolidone (PVP), 100 mg L⁻¹ ascorbic acid, 10 mg L⁻¹ citric acid was found to be best for induction of multiple shoots within 12 weeks of culture. The combination of 5 mg L⁻¹ 2iP + 1 mg L⁻¹ indole-3-acetic acid (IAA) resulted in further multiple shoot production than using them alone. Rooting of shoots *in vitro* was achieved on MS medium containing 0.2 mg L⁻¹ indolebutyric acid (IBA). Rooted plantlets were transferred to small polythene bags containing autoclaved fresh peat moss and soil (1:3) and maintained with a high humidity for acclimation. These *in vitro*-raised plants grew normally in greenhouse and natural habitat (arboretum of the Institute) without showing any morphological variation. The protocol developed from the present study could be used for large scale multiplication of *R. dalhousiae* in a limited time.

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Induction of multiple shoots in *Amomum hypoleucum* Thwaites A threatened wild relative of large cardamom

M. Bejoy, M. Dan, N.P. Anish, Githa Ann George and B.J. Radhika

Plant Genetic Resource Division, Tropical Botanic Garden and Research Institute, Palode, Trivandrum 695 562, Kerala, India.

Key words: *Amomum hypoleucum*, micropropagation, tissue culture, Zingiberaceae

Journal of Applied Horticulture, 2010, volume 12, issue 1, pages 46-49.

Abstract: An efficient and repeatable micropropagation protocol has been established for *Amomum hypoleucum*, a lesser known threatened medicinal plant of the family Zingiberaceae. Eighty percent of the rhizome nodes from greenhouse grown plants, cultured on MS medium supplemented with 1 mg L⁻¹ BA and 0.5 mg L⁻¹ IAA, showed axillary bud break in 8-10 days. Multiple

shoots proliferated from such shoot explants when transplanted to medium with 3 mg L⁻¹ BA and 1 mg L⁻¹ TDZ. An average of 9.2 shoots could be recovered in two months and about 65-70% of the shoots showed simultaneous rooting. Isolated shoots were also rooted in medium fortified with 0.5 mg L⁻¹ NAA. Plantlets, transferred to the field after acclimatization in greenhouse conditions, showed 85% survival.

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Effect of nitrogen concentration and growth regulators on growth and nitrate content of lettuce.

Damianos Neocleous

Agricultural Research Institute, Ministry of Agriculture, Natural Resources and Environment, P. O.Box 22016, 1516Nicosia, Cyprus.

Key words: *Lactuca sativa*, nitrogen, gibberellin, kinetin, growth, TNC

Journal of Applied Horticulture, 2010, volume 12, issue 1, pages 50-53.

Abstract: Lettuce plants (*Lactuca sativa* L. cv. 'Paris Island') were grown in an unheated plastic greenhouse to determine the effects of solution nitrogen concentration and growth regulators (gibberellin and kinetin) on growth (fresh and dry head weight) and tissue nitrate content (TNC). The plants were grown in plastic containers with perlite and supplied with a basic nutrient solution supplemented with nitrogen (N) corresponding to 50, 100, 150, and 200 ppm NO₃-N. Growth regulators; gibberellin (GA₃) and kinetin were applied at different doses independently and in combination. Fresh, dry weight and TNC were responsive to N application level. However, fresh and dry weights were similar at 150 and 200 ppm and TNC at 100 and 150 ppm nitrogen supply. Gibberellin (GA₃) and gibberellin and kinetin in combination (GA₃+kinetin) enhanced fresh and dry weight and TNC compared to the control. There were few differences in response to application rates. Therefore, where lettuce plants are grown in similar conditions and low NO₃ accumulation is desirable, together with high yield and good size, the best N application level is 150 ppm NO₃-N and growth regulators application may enhance yield. However their use in reducing the nitrate content is not recommended.

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Fruit ripening of Solo Sunrise, Tainung #2 and Red Lady

papaya at two temperatures

S. Protain, M. Mohammed and L.A. Wilson

The University of the West Indies, Department of Food Production, Faculty of Science and Agriculture, St. Augustine, Trinidad, West Indies.

Key words: Papaya, ripening, climacteric, ethylene, colour, firmness
Journal of Applied Horticulture, 2010, volume 12, issue 1, pages 54-58.

Abstract: The process of ripening was evaluated in three papaya cultivars, Solo Sunrise (SS), Tainung #2 (T2) and Red Lady (RL) with different mean fruit weights of 387, 1364 and 2266 g and fruit cavity void volumes of 56, 334 and 502 mL and fruit weight/cavity void volume ratios of 6.9, 3.8 and 4.3 g mL⁻¹, respectively. The evaluation was done by comparing physiological determinants of the ripening process; ethylene (C₂H₄) generation and respiratory CO₂ production, measured at two temperature ranges, 20-22°C and 28-30°C, by sampling cavity void volumes, with physico-chemical quality characteristics of ripening: skin colour, flesh firmness and pH. Fruit ripening of the three cultivars was delayed at the lower temperature range as measured both by physiological determinants including pre- and peak climacteric rates and physico-chemical quality characteristics. However, cv RL showed slower ripening than cvs SS and T2 at both temperature ranges, probably partly related to its low fruit weight/cavity void volume of 4.3 g mL⁻¹. Moreover, there were negative temporal displacements for skin degreening compared with those for flesh softening, respiration and ethylene generation in fruit of the three cultivars. Fruits of cvs SS and T2 were fully ripened in 8 days after harvest (DAH) and RL fruits in 10 DAH at the lower temperature range. Values for C₂H₄ generation and CO₂ production measured in the fruit cavity are judged to be sensitive indicators of the progress in the process of ripening.

Volume 12(1), 2010

Effect of winter foliar application of urea on some quantitative and qualitative characters of flower and fruit set of orange cv ?Valencia?

S. Akbari Chermahini, N. Moallemi, A. Shafei Zargar

Department of Horticulture, Chamran University, Ahvaz, Iran, Safiabad- Dezful Agricultural Research Center, Dezful, Iran.

Key words: Nitrogen, flowering, fruit set, 'Valencia' Orange

Journal of Applied Horticulture, 2010, volume 12, issue 1, pages 59-61.

Abstract: Yield of fruit tree is determined primarily by flowering intensity and subsequent fruit set. Flower number and fruit set are also influenced by endogenous nitrogen level. This research was concerned with the effect of winter foliar application of urea on flowering and fruit-set of 30-year-old 'Valencia' orange on sour orange rootstock at Safiabad Agricultural Research Center of Dezful. Treatments included urea foliar application at 3 levels (0, 0.5, 1%) and 2 times of application (6 and 9 weeks before full bloom). The experimental design was a factorial randomize complete block with 4 replications. Nitrogen percentage in leaf, flower number, ovary diameter and fruit set were studied. Results showed that winter application of urea increased the level of N for 2 weeks. Different levels of urea increased the number of flowers, ovary diameter and fruit set. The higher concentration of urea (1%) had more effect. Considering the time of application, urea spray 9 weeks before full bloom had the highest effect on flowering but urea spray 6 weeks before full bloom resulted in higher ovary diameter and fruit set.

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Management of root-knot nematode (*Meloidogyne incognita* (Kofoid and White) Chitwood) in ashwagandha (*Withania somnifera* Dunal.) and senna (*Cassia angustifolia* Vahl.) using non-chemicals

S. Ramakrishnan, R. Umamaheswari, T Senthilkumar and M. Samuthiravalli
Department of Nematology, Centre for Plant Protection Studies, Tamil Nadu Agricultural University, Coimbatore - 641

Key words: *Cassia angustifolia*, *Meloidogyne incognita*, *Pseudomonas fluorescens*, *Withania somnifera*, non-chemicals

Journal of Applied Horticulture, 2010, volume 12, issue 1, pages 62-64.

Abstract: Experiments were conducted for the management of root knot nematode, *Meloidogyne incognita* using non-chemicals under controlled and field conditions in medicinal crops viz., ashwagandha (*Withania somnifera*) and senna (*Cassia angustifolia*). All the treatments comprising of bioagents, organic amendments and humic acid were effective to suppress *M. incognita* population and to increase the plant biomass and yield of economic parts of these crops. Among the treatments, the use of plant growth promoting rhizobacterium, *Pseudomonas fluorescens* available commercially in talc formulation (2.6×10^6

cfu g⁻¹) at 2.5 kg ha¹ as soil application recorded the lowest nematode population accompanied with highest economic yield.

Volume 12(1), 2010

Studies on the suitability of cling-stone and free-stone low chilling peach cultivars for canning and other processed products

P. Aggarwal, A.K. Bakshi and J.S. Kanwar

Department of Food Science and Technology & Department of Horticulture, Punjab Agricultural University, Ludhiana-141004.

Key words: Cling stone, peach, Shan-i-Punjab, cultivar, canning
Journal of Applied Horticulture, 2010, volume 12, issue 1, pages 65-68.

Abstract: Two cling stone peach cultivars "Shan-i-Punjab" and "Tropic Beauty" and one free stone cultivar "Florda Grande" were processed for canning (whole and halves) and beverages (squash and nectar). Fruits of Shan-i-Punjab were found to have the best characteristics for canning (as whole) and for making pulp based beverages (nectar and squash) with maximum ascorbic acid content (17 mg/100 g) and pulp yield (47.62%). Organoleptically Shan-i-Punjab fruits were found to have the highest acceptability scores *i.e.* 8.50 for canned peaches, 8.58 for squash and 8.38 for nectar among all the cultivars studied on a 9-point Hedonic scale judged by eight semi-trained panelists and general consumers. Florda Grande also received the higher acceptability scores (8.50) for its canned peach halves because of its tough texture. The fruits of Florda Grande were not much suitable for pulp based beverages, whereas those of Tropic Beauty were found acceptable for canning as well as for making beverages at zero time and also after six months storage.

Volume 12(1), 2010

Spectrophotometric determination of total alkaloids in some Iranian medicinal plants

Shamsa Fazel, Monsef Hamidreza, Ghamooshi Rouhollah and Mohammadreza Verdianrizi

Department of Medicinal Chemistry, Faculty of Pharmacy, Tehran University of Medical Sciences, Tehran, Iran. Department of Pharmacognosy, Faculty of Pharmacy, Tehran University of Medical Sciences, Tehran, Iran.

Key words: BCG, total alkaloids, medicinal plants, determination
Journal of Applied Horticulture, 2010, volume 12, issue 1, pages 69-70.

Abstract: A simple spectrophotometric method based on the reaction with Bromocresol Green (BCG) was developed for determination of total alkaloids in medicinal plants. A yellow complex forms and is easily extractable by chloroform at pH 4.7. The absorbance of the complex obeys Beer 's law over the concentration range of 4-13 ug atropine per mL of chloroform. This procedure can be carried out in the presence of other compounds without interference.

Volume 12(1), 2010

Characterization of promising okra genotypes on the basis of Principal Component Analysis

R.K. Sharma and K. Prasad

S.C.I. India Ltd., Bhagalpur - 812001, Bihar. Department of Food Engineering and Technology, SLIET, Longowal - 148 106, Punjab.

Key words: Okra, *Abelmoschus esculentus*, correlation, variance, principal component.

Journal of Applied Horticulture, 2010, volume 12, issue 1, pages 71-74.

Abstract: Twenty selected genetically diverse okra strains were evaluated using Principal Component and cluster analysis for the extent of variability and relationship between various economically important traits for the purpose of genetic improvement. The trial was laid out in a randomized block design (RBD). Positive significant correlation for days to 50% flowering (DF) with days to first harvest (DFH), number of pod per plant (NP) with pod yield per plant (PY) and pod yield per plot (PYP) ($P < 0.001$) and PY with PYP ($P < 0.001$) and negative correlation was observed for pod weight (PW) with NP ($P < 0.01$). The analysis of extracted components, component pattern and Eigen values revealed that the first two principal components alone accounted for 53.25% of variance. First component was found heavily loaded with days to 50% flowering (DF), days to first harvest (DFH), pod length (PL), pod diameter (PD) and pod weight (PW), which comprised of fourteen genotypes in three clusters. The matrix obtained from principal component analysis revealed that the genotype Pb- 57 and HRB-9-2 found their positions in same cluster in principal space. Dominating similar prominent phenotypic characters formed separate place in principal space as coherent cluster. Cluster based inter breeding of genotypes would exhibit high heterosis and is also likely to produce new

recombinants with desired characters in okra.

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Efficacy of some essential oils on controlling powdery mildew on zinnia (*Zinnia elegans* L.)

M.A. Hegazi and G.A.N. ElKot

Department of Horticulture (Floriculture), Department of Agriculture Botany (Phytopathology), Faculty of Agriculture, Kafr El-Sheikh University, Kafr el-Sheikh, Egypt.

Key words: *Zinnia elegans*, essential oils, powdery mildew, biocontrol agents.
Journal of Applied Horticulture, 2010, volume 12, issue 1, pages 75-80.

Abstract: A field experiment was carried out during two successive seasons at the Experimental Farm of the Faculty of Agriculture, Kafr El-Sheikh University to evaluate some essential oils as biocontrol agents for powdery mildew on *Zinnia elegans*, L. Marjoram, clove, cinnamon, garlic, ginger and fennel oil were used as a foliar spray at 2 levels (250 and 500 ppm) beside Kema zein 75% and distilled water as a control. The plants were sprayed four times beginning from June 15th with one week interval by a hand atomizer as soon as the first sign of powdery mildew detected on plants. Disease incidence and severity as well as vegetative parameters such as plant height, number of branches per plant, leaf area, fresh and dry weights of shoots, root length and fresh and dry weights of roots were determined in the two seasons. Peroxidase and polyphenol oxidase activities were determined after 24 hour from the last spray in leaves samples. The highest significant decrease in disease incidence and severity and the best results for most of the studied growth and flowering parameters and total green colour were recorded when plants were sprayed with ginger, cinnamon and clove oils, respectively each at 500 ppm compared to the other treatments in both seasons. In addition, the activities of peroxidase (POX) and polyphenol oxidase (PPO) enzymes increased as a result of oil spray on plants. In conclusion, these findings provide a rational basis for possible utilization of these essential oils as a safe and alternative method to fungicides for controlling powdery mildew in zinnia plants.

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The valuation of olive orchards: A case study for Turkey

Sait Engindeniz, Murat Yercan and Hakan Adanacioglu

Ege University, Faculty of Agriculture, Department of Agricultural Economics, Bornova-Izmir/Turkey.

Key words: Capitalization rate, orchards, income capitalization approach, olive, valuation.

Journal of Applied Horticulture, 2010, volume 12, issue 1, pages 81-84.

Abstract: Valuation of orchards is an important issue in condemnation, taxation, loan, insurance, inheritance, and purchase-sale cases. The approach to be used for orchards may vary according to the purpose of appraisal, age of the establishment, obtainable data, and according to the current regulations. In this study, land and tree values of olive orchards in a selected region from Turkey were determined by the periodic income capitalization approach. For this aim, four villages were selected and data was collected from 55 farmers selected randomly. While determining the value of the olive orchards with trees, past values approach was used. The capitalization rate for the income capitalization approach was determined as 5.32%. The value of bare land of olive orchards over periodic net income was calculated to be \$ 19,684.87/ha. Tree values per hectare varied between \$ 9,189.86 and \$ 16,768.13 according to tree ages.

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Volume 11(2), 2009

Evaluation of the FAO CROPWAT model for deficit irrigation scheduling for onion crop in a semiarid region of Ethiopia

Samson Bekele Diro and Ketema Tilahun

Amhara Regional Agricultural Research Institute, Sekota, Ethiopia. Amhara Regional Agricultural Research Institute, Sekota, Ethiopia. Present address: School of Agricultural and Wine Sciences, Charles Sturt University, Locked Bag 588, Wagga Wagga NSW2678,

Key words: Growth stages, deficit irrigation, Ethiopia, CROPWAT model, onion
Journal of Applied Horticulture, 2009, volume 11, issue 2, pages 103-106.

Abstract: Deficit irrigation conserves water and minimizes adverse effects of excess irrigation. In this study, the applicability of the CROPWAT model in management of deficit irrigation was evaluated at Sekota Agricultural Research Center, Ethiopia. Water was applied using low head drippers. There were eight treatments with three replications: stress at 1st, 2nd, 3rd, and 4th growth stages and partial stresses of 50% ETC, 75% ETC with two controls of 25% ETC and 100% ETC of the water requirement throughout the growing season. The input data for CROPWAT program were climatic, rainfall, crop and soil data. Yield reductions simulated by CROPWAT program were comparable with yield reduction measured under field condition. Model efficiency and correlation coefficients of 98% were obtained. Based on the above comparative analysis, CROPWAT program could adequately simulate yield reduction resulting from water stress.

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Evaluation of grafting effect on tomato crop yield and *Fusarium* crown and root rot disease

Mahmoud M Hamdi, Naima Boughalleb, Neji Tarchoun and Lassaad Belbahri

¹Department of Agronomic and Economic Sciences, Higher School of Agriculture of Kef, 7119, Kef Tunisia, ²Department of Biological Sciences and Plant Protection, Higher Institute of Agronomy of Chott Mariem, 4042, Sousse, Tu

Key words: *Tomato, Lycopersicon esculentum, graft, Fusarium crown and root rot, grafting, Beaufort x Bochra, Beaufort x Amal, Kemerit x Bochra and Kemerit x Amal, rootstock*

Journal of Applied Horticulture, 2009, volume 11, issue 2, pages 107-110.

Abstract: *Tomato, Lycopersicon esculentum, is an important vegetable crop in Tunisia and many other Mediterranean countries. Fusarium crown and root rot of tomato are new diseases in the area, first reported during 2000-2001 crop season, threatening tomato production. Being a soil-borne pathogen, effective disease control methods of Fusarium crown and root rot are limited thus requiring the alternative measures for disease management. In this study the efficacy of grafting commercial Tomato cultivars Bochra and Amal, used as scions, onto a new rootstock Beaufort and Kemerit RZ was examined in controlled and natural conditions. Grafting was found, in this study, to be an effective method to attenuate the impact of Fusarium wilt, Fusarium crown and root rot. Moreover, grafting increased tomato growth parameters, yield and improved fruit quality.*

Volume 11(2), 2009

The effect of upper-limit of soil water content on tomato and cucumber

Jianming Li, Xiaoyan Wang, Zhirong Zou and M.H. Behboudian

College of Horticulture, Northwest A&F University, Yangling, Shaanxi Province 712100 China, Department of Foreign Languages, Northwest A&F University, Yangling, Shaanxi Province 712100 China, Institute of Natural Resources, Massey University, Palmerston

Key words: *Upper-limit, soil water content, yield, fruit quality, tomato, cucumber*

Journal of Applied Horticulture, 2009, volume 11, issue 2, pages 111-112.

Abstract: *This study was conducted to determine the optimum upper limit of soil water content (SWC) for tomato and cucumber from early stages after transplanting. Five different upper limits of SWC were tested at the lowest limit of 60% of field capacity (FC) for tomato and of 75% for cucumber. Stem growth, root viability, yield and fruit concentrations of vitamin C and total soluble solids were significantly affected by the treatment. The highest yield and best fruit quality was obtained at 85% of FC for tomato and at 90% for cucumber. This suggests that irrigating to FC does not necessarily result in higher yields and better fruit quality.*

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Growth, nutrient uptake and nitrogen use efficiency of *Ficus hawaii* grown on nutrient film techniques (NFT) using different N-sources

Mohamed M. ElFouly, A.A. ElSayed, A.A. Fawzy, B.M. Mansour, A. Bosila and Hassan A. Hamouda

Fertilization Technology Department, National Research Centre, Cairo-Dokki-Egypt and Horticulture Department, Faculty of Agriculture, Al-Azhar University, Cairo-Egypt.

Key words: *Ficus hawaii*, N use efficiency, N forms, nutrient film technique, nutrient uptake

Journal of Applied Horticulture, 2009, volume 11, issue 2, pages 113-118.

Abstract: Nutrient film technique was designed and used to grow *Ficus hawaii* using different nitrogen sources, nitrate (calcium and potassium nitrate (N), urea (U) and ammonium nitrate (AN) in the same dose. Aim of the study was to investigate the most proper form of nitrogen, which gives the highest vegetative growth and nutrients uptake in the early growth of the plants. Results show that in general, AN gave the highest vegetative growth parameters expressed as plant height, number of branches plant⁻¹, leaves plant⁻¹, leaf area, fresh and dry weight. AN favoured apical growth, while U favoured lateral growth. Shoot/root ratio was highest in the AN treatment. Nutrients uptakes by the whole plant was much higher in the case of AN then U and N. Nitrogen use efficiency was highest in AN followed by U (more or less similar) and lowest in case of N.

Volume 11(2), 2009

Effects of grafted eggplants on allelopathy of cinnamic acid and vanillin in root exudates

Chen Shaoli, Zhou Baoli, Wang Ruhua and Xi Haijun

College of Horticulture, Shenyang Agricultural University, Shenyang 110161, China; Heilongjiang August First Land Reclamation University, Daqing 163319, China.

Key words: Grafting, root exudates, cinnamic acid, vanillin, autotoxicity

Journal of Applied Horticulture, 2009, volume 11, issue 2, pages 119-122.

Abstract: *Cinnamic acid and vanillin are the allelochemicals commonly exist in eggplant root exudates. With pot culture experiment, the effects of grafted eggplants on allelopathy of cinnamic acid and vanillin in eggplants root exudates were studied. The results showed that cinnamic acid and vanillin had allelopathic effects on eggplants, lower concentration of cinnamic acid and vanillin (0.1 mmol L^{-1} or 0.5 mmol L^{-1}) could promote the growth and physiological metabolism of eggplants, while higher concentration (from 1 mmol L^{-1} to 4 mmol L^{-1}) had slightly promotive or inhibitive effects on eggplants. Meanwhile, this study suggested grafting could relieve autotoxicity of cinnamic acid and vanillin, and significant difference in the regulation intensity for the autotoxicity was found between cinnamic acid and vanillin. Grafting decreased the amounts of cinnamic acid and vanillin, especially of vanillin. The maximum reduction amount of cinnamic acid reached 68.96%, and that of vanillin reached 100%. Under the stress of exotic cinnamic acid and vanillin, especially of exotic cinnamic acid, grafting relieved the autotoxicity of the two substances on eggplants. Compared with own-rooted eggplant, grafted eggplant had a higher plant height and a larger stem diameter, its leaf chlorophyll content increased by 5.26-13.12%, root electric conductivity and MDA content decreased, and root SOD activity enhanced. Grafting was found to be one of the most effective methods for relieving replanting problems caused by autotoxicity.*

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Low cost hydroponics devices and use of harvested water for vegetable and flower cultivation

A. Das and D. Sing Majhi

Department of Plant Physiology, Faculty of Agriculture, Bidhan Chandra Krishi Viswavidyalaya, Nadia, WestBengal-741252.

Key words: *Rainwater, tap water, pond water, distilled water, hydroponics*
Journal of Applied Horticulture, 2009, volume 11, issue 2, pages 123-126.

Abstract: *Low cost hydroponics devices were designed using plastic trays and buckets. Cultivations of tomato, chilli, cauliflower and marigold cv. Inca were tested in these devices using rain water, pond water, tap water and distilled water for nutrient solution preparation. The vegetables were grown as multiple plant cultures in plastic trays and marigold cv. Inca in single plant culture in small buckets. Direct use of tap water and pond water created chlorosis in some plants that could be overcome by boiling of water before use. In rain*

water tomato and chilli plants performed the best. However, cauliflower curd yield was the best in tap water. Marigold cv. Inca bloomed well in all categories of water. Water qualities were the major factor for crop growth. Rainwater could be more safely used. The devices and procedures are recommended for the kitchen gardeners of the urban and soil stress areas.

Volume 11(2), 2009

Caffeine, phenol and protein contents of thirty-seven clones of Nigerian robusta coffee (*Coffea canephora* Pierre ex. Froehner)

S.S. Omolaja

Plant Breeding Group, Cocoa Research Institute of Nigeria (CRIN), P.M.B. 5244, Ibadan, Nigeria.

Key words: Caffeine, phenol, protein, *Coffea canephora*, Nigeria

Journal of Applied Horticulture, 2009, volume 11, issue 2, pages 127-131.

Abstract: A study was carried out to characterise thirty-seven *Coffea canephora* clones using three biochemical characteristics, namely caffeine, phenol and protein content. The phenol and caffeine contents were determined by gravimetric method, while protein was assessed by polyacrylamide gel electrophoresis (PAGE) of floral bud. Caffeine content among the clones ranged from 1.1 to 1.5% on dry matter basis (dmb). C36 a high yielding clone, had relatively low caffeine content, hence it is a suitable clone that could be included in any breeding programme for low caffeine coffee in Nigeria. All the Niaollou (M) clones had high caffeine content. Phenol content in the berry pulp of the clones ranged from 2.6 to 15.6%. Averaged over clones, phenol content of berry pulp (9.5 %) was significantly ($P < 0.05$) higher than leaf phenol content (4.5 %). The coefficient of variation for pulp phenol was high (35.3), thus indicating that, rapid response to selection for favourable phenol percentage might be feasible. The high level of phenol found in some clones may be valuable in breeding for resistance to some major diseases and insect pests of coffee. There were differences in the mobility and intensity of protein bands in the clones. The variation in the protein banding patterns of the different *C. canephora* clones observed provides further information on the existing genetic diversity of the coffee clones in addition to that provided by agro-botanical characters.

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Bunch covering impact on the ripening time, marketable yield and fruit quality of ?Zaghloul? dates

A.M. El Assar

Tropical Fruits and Date Palm Research Department, Horticulture Research Institute, Giza, Egypt.

Key words: *Polypropylene, dates, bunch covering, "Zaghloul", ripening time, fruit quality*

Journal of Applied Horticulture, 2009, volume 11, issue 2, pages 132-135.

Abstract: *This study targets to investigate the efficiency of date bunch covering treatments by using different bag types such as the polypropylene muslin, staved-plastic (polyethylene) or cecile tissue in comparison with uncovered bunches (control) in the same orchard (from the mid of July to mid of September) in Rossitta region (Rasheid), Behera province, Egypt. Quantity and quality of marketable yield for "Zaghloul" dates, beside the ripening time were assessed through two consecutive seasons. The main notice was, all kinds of used covers reduced the damage caused by birds, blights and wasps as well as no incidence of diseases was observed under the experimental covers. Polypropylene muslin treatment decreased the dropped fruits in both study seasons, consequently it increased the marketable yield. Fruits under the polypropylene muslin bags were late in the ripening. Date bunches under the staved-plastic covers were statistically superior than all other treatments regarding fruits quality and were early in the ripening. There were statistical differences in fruit quality traits and fruits ripening time according to the bunch cover types.*

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A study on adaptation of tomato ecotypes from northern latitudes under southern Iran conditions

Naser Alemzadeh Ansari and Reza Mamghani

Faculty of Agriculture, Shahid Chamran University, Ahwaz, Iran.

Key words: *Ecology, temperature stress, growth habit, tomato*

Journal of Applied Horticulture, 2009, volume 11, issue 2, pages 136-142.

Abstract: *Tomato hybrids and cultivars from northern latitudes are tolerant to temperature variations and are early maturing crops. In order to produce new cultivars for southwest of Iran, it is necessary and useful to study adaptation of*

genotypes in this area. The seeds of 74 cultivars from Moscow and 8 hybrids from Netherlands were germinated and then transplanted to Jiffy-pots under plastic tunnels before being transferred to the soil in the field. Growth habits, leaf and inflorescence forms, fruit weight, fruit number, yield in each harvest, total yield and earliness were recorded. There were differences among cultivars for all measured characteristics. Some cultivars had relatively good tolerance to high temperature, and could produce fruits at temperatures higher than 30°C. The tested varieties had different growth habits. Maximum yield was obtained from determinate types, M66, M63, M49 and M48. For most cultivars, the largest fruits were produced in the first harvest while the next harvests had smaller fruits. A negative correlation was observed for fruit numbers and average fruit weight. Also, some cultivars including M39, M46, M74, M40, and M35 exhibited early and more uniform yield per plant compared with control varieties. Some cultivars such as M48 and M66 had late maturity with higher yield as compared with control. The tested entries were classified on the basis of leaf shape, inflorescence, fruit number and weight. Maximum difference was between controls and M27.

Volume 11(2), 2009

Effect of hot-water and cold treatments on reducing contamination in almond tissue culture

Shekafandeh and M. Ghasemi

Department of Horticultural Science, College of Agriculture, Shiraz University, Shiraz, Iran.

Key words: Benzyladenin (BA), late-flowering, nodal segments, proliferation, hot water

Journal of Applied Horticulture, 2009, volume 11, issue 2, pages 143-145.

Abstract: In this study, hot-water and cold treatments were used for eradication of explant contamination, and also the effect of plant growth regulators on shoot proliferation was evaluated. The explants were nodal segments of a late flowering almond cultivar 'Sharood 7'. Experiments were carried out in a complete randomized design with 25 replications. All hot-water treatments eliminated fungal contamination. The best hot-water treatment was 50°C in which 88% of explants were both free of contamination and necrosis followed by 76% at 47.5°C and 56% at 45°C. The best proliferation rate obtained in 1.5 mg L⁻¹ BA in combination with 0.1 mg L⁻¹ IBA (5.25 shoots per explant) which was significantly higher than 1 mg L⁻¹ (2.65 shoots per explant). Cold treatments only (2 and 4 days in 4°C) delayed fungal

contaminations for 7 days, so it was impossible to assess bacterial contamination.

Volume 11(2), 2009

Health evaluation of cactus collection in botanical garden at Cluj-Napoca, Romania

Gyorgy Feszt and Lucica Mihalte

Alexandru Borza Botanical Garden, 42 Republicii Street, Cluj-Napoca, Romania, University of Agricultural Sciences and Veterinary Medicine, Faculty of Horticulture, 3-5 Manastur Street, 400372, Cluj-Napoca, Romania.

Key words: Cacti, Cactaceae, diseases, attack degree, attack intensity
Journal of Applied Horticulture, 2009, volume 11, issue 2, pages 146-149.

Abstract: In terms of artificial collections, cacti receive a specific microclimate, which ensures constant physical parameters leading to a low resistance and high susceptibility to attack by pests and diseases. The Cactaceae collection of the botanical garden "Alexandru Borza", Cluj-Napoca, Romania counts more than 4100 plants belonging to 115 genera. Following inventory collection, 4069 plants were studied. Preliminary assessment results that the radicular system of the best represented Cactaceae species is much worse than those stems. Genus: *Astrophytum*, *Aylostera*, *Echinocereus*, *Notocactus*, *Weingartia* had disease incidence of grade 2 (the area affected by 26?50%). The highest intensity of the attack was reported in the genus *Echinocereus* (47.24). In calculating the attack degree there was a greater uniformity in genus *Aylostera* (36.34), *Echinocereus* (37.46), *Rebutia* (37.83); *Weingartia* (33.37). In considerable stem attack by pathogens, the highest attack frequencies were recorded in *Astrophytum* (51.75); *Ferocactus* (65.76) and *Notocactus* (58.18). The attack intensity, expressed in intensity degrees, reached value 2 (30.79) in the case of *Cleistocactus* genus, whereas the other genera remained under grade 1.

Volume 11(2), 2009

Nutrient content changes in strawberry plant parts at different development stages

Mohamad Fattahi and Mansuor Gholami

Department of Horticulture, Faculty of Agriculture, Bu-Ali Sina University, Hamadan, Iran.

Key words: *Strawberry, nutrient, development stages, plant fragments*
Journal of Applied Horticulture, 2009, volume 11, issue 2, pages 150-152.

Abstract: *The objective of the investigation was to study the effect of different development stages on distribution of mineral nutrients in the growing leaves, roots, petioles and fruits. Strawberry plants were grown in a greenhouse in perlite medium and fertigated with Hoagland solution. Mineral nutrient concentration was determined at three development stages viz., flowering, fruiting and the end of fruiting. Also nutrient concentration was determined in different organs at fruiting stage. Our results show that nutrient uptake was variable at different development stages. Leaf and petiole were the main sinks for Ca at fruiting stage and also for Mg and K in petioles, Fe in root, Mn in leaf. Results indicated that plant have different uptake pattern at various development stages. Results on the element uptake by different organs at various development stage is indicative of their relative requirement at different stages.*

Volume 11(2), 2009

Growth, yield and productivity responses of okra-papaya mixture to intercropping in South West Nigeria

O.O. Olubode, I.O.O. Aiyelaagbe and J.G. Bodunde

Department of Horticulture, University of Agriculture, P.M.B. 2240, Abeokuta, Ogun State, Nigeria.

Key words: *Abelmoschus esculentus (L.) Moench., papaya, growth and yield, intercropping sequence, productivity efficiency indices, profit margin.*

Journal of Applied Horticulture, 2009, volume 11, issue 2, pages 153-159.

Abstract: *Field experiments were conducted between 2006 and 2007 at the University of Agriculture, Abeokuta, South Western Nigeria, to determine the growth and yield responses of okra (*Abelmoschus esculentus*) grown in orchards of two papaya (*Carica papaya* L.) varieties, 'Homestead Selection' and 'Sunrise Solo', at three different stages of papaya growth. Different sequences of okra sowing were; at three weeks before papaya (early), same time with papaya (simultaneous) and three weeks after papaya (late). Results showed that early and simultaneous introduction of okra performed significantly better than the late, with respect to plant height, number of leaves, leaf area, number of pods, pod weight plant⁻¹ and total pod yield. All the okra intercrops experienced competitive effects that reflected in reduced yield more pronounced in Homestead Selection than in Sunrise Solo. The productivity*

efficiency index recorded intercropping advantages for the okra in mixture compared to the sole okra with a land equivalent ratio (LER) > 1.0 while the area harvest equivalent ratio (AHER) was more descriptive of the trends observed among the sequences. In cv Homestead Selection, the highest profit margin (47.64 %) was recorded in the simultaneous papaya-okra intercrop, followed by early (44.57 %). A similar trend was observed in cv Sunrise Solo, where simultaneous and early okra introduction had a profit margin of 40.06 and 39.72%, respectively. Late sequence had the least profit margin in both papaya cultivars. .

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Constraints as perceived by the vegetable growers regarding the adoption of IPM technologies in cauliflower cultivation: an empirical study

Prabuddha Ray and Sarthak Chowdhury

Department of Agricultural Extension, Agricultural Economics and Agricultural Statistics, Palli Shiksha Bhavan (Institute of Agriculture), Sriniketan, Visva-Bharati, P.O. Sriniketan, Dist. Birbhum, 731 236, West Bengal, India.

Key words: *Brassica oleracea L. var. botrytis*, constraints, adoption of IPM technologies, cauliflower cultivation, knowledge and information constraints, rank score

Journal of Applied Horticulture, 2009, volume 11, issue 2, pages 160-164.

Abstract: The present study revealed that among all the various types of constraints perceived by the respondents regarding the adoption of Integrated Pest Management (IPM) technologies in the cauliflower (*Brassica oleracea L. var. botrytis*) production, the lack of knowledge of the respondents about the Economic Threshold Limit (ETL) concept (under the category of knowledge and information constraints) had the first rank closely followed by the lack of knowledge of the respondents regarding the bio-pesticides (under the category of knowledge and information constraints). The lack of knowledge of the respondents about the IPM techniques (under the knowledge and information constraints category) enjoyed third position, closely followed by lack of training of the respondents on the proper use of pesticides (under category of administrative and managerial constraints). The result clearly indicate that among six different categories of perceived constraints, knowledge and information constraints with a rank score of 2769 enjoyed first rank position, distantly followed by administrative and managerial constraints (with a rank score of 1586) in the second position, technological and communication

constraints with a rank score of 1249 in the third position, socio-economic constraint (rank score of 828) in the fourth position.

Volume 11(2), 2009



ISSR, anthocyanin content and antioxidant activity analyses to characterize strawberry genotypes

Samir C. Debnath and Elodie Ricard

Atlantic Cool Climate Crop Research Centre, Agriculture and Agri-Food Canada, P.O. Box 39088, 308 Brookfield Road, St. John's, NL A1E 5Y7, Canada. Institut Polytechnique LaSalle Beauvais, Rue Pierre Waguet, BP 30313, F-60026 Beauvais Cedex, France

Key words: Anthocyanin content, antioxidant activity, *Fragaria x ananassa* Duch., ISSR markers, strawberry

Journal of Applied Horticulture, 2009, volume 11, issue 2, pages 83-89.

[Full text PDF |](#)

Abstract: Data on molecular markers, anthocyanin contents and antioxidant activities are increasingly used in breeding programs of many horticultural crops. Inter simple sequence repeat (ISSR) analysis, anthocyanin contents and antioxidant activities were used to characterize 10 strawberry (*Fragaria x ananassa* Duch.) cultivars and nine breeding lines. Fifteen primers generated 240 polymorphic ISSR-PCR bands. Cluster analysis by the unweighted pair-group method with arithmetic averages (UPGMA) revealed a substantial degree of genetic similarity among the genotypes ranging from 45% to 73% that were in agreement with the principal coordinate (PCO) analysis. Wide genetic diversity was observed among the strawberry genotypes for anthocyanin contents and antioxidant activities. The ISSR analysis together with data for antioxidant activities and anthocyanin contents in strawberries could be used for germplasm management and more efficient choices of parents in current strawberry breeding programs.

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The effect of high daytime temperatures on inhibition of flowering in ?Koroneiki? olives (*Olea europaea* L.) under chilling and non-chilling nighttime temperatures

Nasir S.A. Malik and Joe M. Bradford

United States Department of Agriculture, Agricultural Research Service 2413 E. Hwy 83 Weslaco, Texas 78596.

Key words: flowering, inflorescence, *Olea europaea* L., olive, temperature effects.

Journal of Applied Horticulture, 2009, volume 11, issue 2, pages 90-94.

Abstract: Regulation of flowering in 'Koroneiki' olives by various regimes of daytime and nighttime temperatures was investigated. The trees flowered profusely under chilling (2.5°C; 569 inflorescences tree⁻¹) and non-chilling nighttime temperatures (8.3°C; 729 inflorescences tree⁻¹) when daytime temperatures were kept optimal (18.3°C). Chilling nighttime temperatures (2.5°C) did not produce any greater number of inflorescence than non-chilling temperatures of 8.3°C. High daytime temperatures (26.6°C) strongly inhibited flowering at both chilling and non-chilling nighttime temperatures (i.e., 0.5 and 0.0 inflorescences tree⁻¹ under chilling and non-chilling temperatures, respectively). Mildly high daytime temperatures (23.9°C) also inhibited flowering but there were significantly more inflorescences per tree at 23.9°C (220 and 127 inflorescences tree⁻¹ under chilling and non-chilling nighttime temperatures, respectively) than at 26.6°C. There was no significant difference in the number of inflorescences tree⁻¹ between chilling and non-chilling nighttime temperatures at both inhibitory daytime temperatures; i.e. 23.9°C and 26.6°C. The trees that were kept vegetative by high daytime temperatures (26.6°C), but given flower inducing nighttime temperature for three months, when returned to optimal flower inducing conditions did not flower before the normal induction period (70-80 days), indicating that inhibitory daytime temperatures canceled any effects of nighttime flower inducing temperatures. Surprisingly, trees kept vegetative in growth chamber at a high daytime temperature (26.6°C) produced fewer inflorescences compared to trees kept vegetative in the greenhouse where temperatures were less controlled but generally, with a few exceptions, remained between 15-20°C in the night and 25-30°C during day.

Volume 11(2), 2009

Leaf N and P in different growth habits of peach: Effects of root system morphology and transpiration

Thomas Tworowski, Ralph Scorza and D. Michael Glenn

USDA-ARS, 2217 Wiltshire Rd., Appalachian Fruit Research Station,

Kearneysville, WV, 25430, USA.

Key words: Orchard management, tree root system, tree nutrient uptake, *Prunus persica*

Journal of Applied Horticulture, 2009, volume 11, issue 2, pages 95-98.

Abstract: Adequate mineral nutrition is critical for high fruit quality and sustained yield of fruit trees. In this experiment, peach [*Prunus persica* L. (Batch)] trees with different shoot and root growth habits were evaluated for leaf nitrogen (N) and phosphorus (P) concentrations after fertilizer applications in the greenhouse and field. In the field during 2008, Compact trees had higher root length density than Pillar and Standard trees (6.2, 3.8, and 3.7 mm cm⁻³, respectively). Compact trees also had higher foliar P (0.21%) but the same N (1.3%) as Standard and Pillar trees (P concentrations of 0.14 and 0.11%, respectively) when fertilizer was applied once in the greenhouse. Following multiple applications of fertilizer, Compact tree leaves had the same P (approximately 0.21 and 0.29% in the greenhouse and field, respectively) as the other growth habits. After multiple fertilizer applications, Pillar trees had the greatest increase in foliar N and P, which was associated with high transpiration rates. Pillar, Compact, and Standard had transpiration rates of 3.0, 2.1, and 2.3 mmol H₂O m⁻² s⁻¹, respectively. The data indicate that peach trees with fibrous roots systems may have an advantage to absorb nutrients such as P that move primarily by diffusion, when the nutrient is present in low concentrations in the soil. However, under conditions of high soil fertility, fibrous root systems did not improve nutrient uptake and trees with greater transpiration rates absorbed greater levels of nutrients. Different growth habits of peach have diverse root systems and transpiration rates that affect nutrient uptake and, consequently, the selection of tree growth habit should be considered in orchard soil management plans. Growth habits with more fibrous root systems may require reduced inputs of nutrients with low diffusion coefficients.

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Influence of fungicides and *Phytophthora capsici* resistant/tolerant cultivars on bell pepper yield and farm-gate revenues

Jamie R. Stieg, S. Alan Walters, Jason P. Bond and M. Babadoost

Department of Plant, Soil, and Agricultural Systems, Southern Illinois University, Carbondale, IL 62901, USA.

Key words: *Capsicum annuum*, chemical control, economics, *Phytophthora capsici*, *Phytophthora blight*, disease management, disease resistance/tolerance
Journal of Applied Horticulture, 2009, volume 11, issue 2, pages 99-102.

Abstract: *Phytophthora blight*, caused by *Phytophthora capsici* Leonian, is a widespread and destructive disease of bell pepper (*Capsicum annuum* L.). Bell pepper yield, farm-gate revenues and *Phytophthora blight* incidence were determined during 2005 and 2006 in a *P. capsici*-infested field near Shawneetown, Illinois. The study evaluated 12 bell pepper cultivars (one resistant, three tolerant, and eight susceptible to *P. capsici*) with or without a recommended fungicide treatment (mefenoxam at transplant and dimethomorph + copper alternated with manganese ethylenebisdithiocarbamate + copper at 10 day intervals). Bell pepper plants receiving fungicide applications showed less *Phytophthora blight* incidence throughout the growing season and produced greater yield and farm-gate revenues compared to untreated plants. Additionally, *P. capsici*-resistant 'Paladin' and *P. capsici*-tolerant 'Alliance', 'Aristotle X3R', and 'Revolution' produced greater yields ($> 17,800$ and $33,800 \text{ kg ha}^{-1}$ for 2005 and 2006, respectively) and farm-gate revenues [$> \$12,700$ and $\$27,000$ (USA) ha^{-1} for 2005 and 2006, respectively] compared to the susceptible cultivars. Therefore, in fields with a high incidence history of *Phytophthora blight*, 'Paladin' could be a reliable choice for commercial bell pepper production. However, 'Alliance', 'Aristotle X3R', and 'Revolution' may be preferred by growers due to the added benefits of bacterial spot [*Xanthomonas campestris* pv. *vesicatoria* (Doidge) Dye] resistance and better fruit quality compared to 'Paladin'. Furthermore, this research indicates that plant resistance and/or tolerance should not be relied upon as the only method of *P. capsici* control and growers should also incorporate fungicides into their management program to provide additional protection.

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Extracting within-experiment precision of horticultural experiments useful for meta-analysis

Guido Knapp, Bimal K. Sinha and Dihua Xu

Department of Statistics, TU Dortmund University, 44221 Dortmund, Germany,
 Department of Mathematics and Statistics, University of Maryland, Baltimore
 County, 1000 Hilltop Circle, Baltimore, MD 21250, USA

Key words: *Duncan's multiple range test, Student-Newman-Keuls multiple range test, Fisher's LSD test, standardized mean differences, ratio of means, random effects meta-analysis.*

Journal of Applied Horticulture, 2009, volume 11, issue 1, pages 10-16.

[Full text PDF |](#)

Abstract: *For combining results from independent experiments, it is essential that information about the precision of the estimates of treatment effects is available. In publications of horticultural experiments, the results of multiple comparisons tests are often reported without sufficient information about the precision of the experiments. Based on limited information of the precision of an experiment such as treatments with the same letter are not significantly different, we develop a method for extracting a possible range of the precision of the experiment which can then be used for meta-analysis. The procedure is demonstrated using a real data example where alternatives to methyl bromide are studied in pre-plant soil fumigation. We also provide an R program which computes the possible range of the precision.*

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Is CropSyst adequate for management-oriented simulation of growth and yield of processing tomato ?

Onofri Andrea, Beccafichi Catia, Benincasa Paolo, Guiducci Marcello and Tei Francesco

Department of Agricultural and Environmental Sciences, University of Perugia, Borgo XX giugno, 74, 1-06121, Perugia (Italy).

Key words: *Processing tomato, CropSyst, simulation, modelling, dry matter partitioning*

Journal of Applied Horticulture, 2009, volume 11, issue 1, pages 17-22.

[Full text PDF |](#)

Abstract: *The model CropSyst has proven useful for management-oriented simulations of growth and yield of cereals and other field crops, but no scientific information is available with reference to processing tomato. The aim of this paper was to parameterise and validate the crop module of CropSyst for the simulation of potential fruit production in processing transplanted tomato (*Lycopersicon esculentum* Mill.). Parameterisation and calibration were*

performed by using field data from an experiment carried out in 1997 in Central Italy. The same set of parameters was validated against five independent experiments, carried out on the same location in 1998, 1999, 2000, 2001 and 2002. The simulation of aerial biomass was always very good, with RRMSE values ranging from 7.5 to 13.4% and modelling efficiencies (EI) always above 0.976. The simulation of LAI was very good during the first part of growing season (up to 40-50 days after transplanting), while the decreasing trend in the final part of growing cycle was not always reliably simulated. Indeed, RRMSE for LAI ranged from 13.5 to 26.8% and EI ranged from 0.849 to 0.966. The differences between simulated and observed final fruit yield were below 10%, except in one year (18% in 2001), confirming the practical value of this model, for management and legislative purposes. For research purposes, it is confirmed that the simulation of dry matter partitioning is a crucial issue in vegetable crops such as tomato, wherein the growth of sources and sinks coexists for a main part of crop cycle.

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Starch degradation characteristics in relation to physiological and biochemical properties during growth and maturation of apple fruit

Manasikan Thammawong and Osamu Arakawa

Faculty of Agriculture and Life Science, Hirosaki University, Bunkyocho, Hirosaki 036-8561, Japan.

Key words: Amylopectin, amylose, *Malus domestica* Borkh., starch degradation, total hydrolytic activity.

Journal of Applied Horticulture, 2009, volume 11, issue 1, pages 23-30.

Abstract: Fruit maturity indices, i.e. respiration rate and ethylene production, amylose (AM) and amylopectin (AP) content, total hydrolytic activity, and sugar content were investigated during the growth and maturation of 'Tsugaru' (early-maturing) and 'Fuji' (late-maturing) apples (*Malus domestica* Borkh.). Different starch degradation characteristics during the growth and maturation processes were observed between 'Tsugaru' and 'Fuji'. By iodine staining, the loss of starch in 'Tsugaru' was observed earlier than in 'Fuji'. The different degradation patterns of starch were also demonstrated through the observations on AM and AP content. In 'Tsugaru', AM and AP degraded rapidly between 95 to 110 days after full bloom (DAFB) and almost all starch were lost rapidly at 125 DAFB with simultaneous increases in rate of respiration and production of ethylene. However, in 'Fuji', starch degraded gradually

throughout growth and maturation process and was clearly degraded at 170 DAFB with a low level of ethylene production and decreased respiration. In both the cultivars, content of AM and AP were highest in the outer cortex and lowest in the inner cortex. Starch degradation was observed simultaneously in 3 different tissue zones and there was little difference in the total hydrolytic activity among tissue zones in both cultivars. These results suggest that starch hydrolysis in the apple flesh began simultaneously rather than preferentially in any one tissue zone. For sugar content, although differences among tissue zones were not clear, it increased distinctly with loss of starch content. Moreover, sugars from the degradation of accumulated starch and sugar translocation seem to influence mainly the sweetness quality as the fruit ripens.

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Applications of GIS to Citriculture in South Texas

Reginald S. Fletcher

United States Department of Agriculture, Agricultural Research Service, Kika de la Garza Subtropical Agricultural Research Center, 2413 E. Hwy. 83, Weslaco, Texas 78596

Key words: Citriculture, citrus, *Citrus spp.*, Geographic Information System (GIS), soil survey geographic data (SSURGO), Topologically Integrated Geographic Encoding and Referencing (TIGER) data, grapefruit, *Citrus paradisi*, oranges, *Citrus sinensis*

Journal of Applied Horticulture, 2009, volume 11, issue 1, pages 3-9.

[Full text PDF](#) |

Abstract: The South Texas citrus industry needs an inventory of soil properties within existing citrus (*Citrus spp.*) orchards, wants data at the county level showing soils that are suitable for citrus production, and would value any information related to the establishment of citrus orchards. This study discusses integration of citrus, soil survey geographic data (SSURGO), and U.S. Census spatial and tabular data with geographical information system (GIS) technology for citriculture. For this study, Hidalgo County Texas was evaluated because it is the major citrus producing county in South Texas. The spatial and tabular data and commercial GIS software were used to inventory selected soil chemical and physical properties within citrus groves, to identify orchards that may be affected by urban expansion, and to select potential sites

for establishing new citrus orchards. Results indicated that citrus, SSURGO, and U.S. census spatial and tabular data integrated with GIS technology can be a powerful tool for citriculture. The information provided in this study should appeal to producers, extension agents, scientists, and government agencies within the U.S. and abroad.

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Water usage and water use efficiency of drip-irrigated tomato under deficit irrigation

Berhanu Kebebew and Ketema Tilahun

Oromia Irrigation Development Authority, Addis Ababa, Ethiopia. Haramaya University, Ethiopia. Present address: School of Agricultural and Wine Sciences, Charles Sturt University, Locked Bag 588, Wagga Wagga, NSW 2678, Australia

Key words: Crop factor, drip irrigation, Ethiopia, tomato, water use efficiency.
Journal of Applied Horticulture, 2009, volume 11, issue 1, pages 31-34.

Abstract: Efficient irrigation is essential for sustainable use of available water resources. A field experiment was conducted on two tomato cultivars (Melka Shola and Melkassa Marglobe) and four irrigation deficit levels (0%ET_c, 25% ET_c, 50%ET_c, and 75%ET_c). The objective was to determine crop factor (K_f) and water use efficiency (WUE). The K_{cf} values of 0.62, 0.65, 0.70, and 0.71 during the respective four growth stages of the crop were determined. The highest (91.23 kg ha⁻¹ mm⁻¹) and lowest (81.62 kg ha⁻¹ mm⁻¹) water use efficiencies were recorded in 25 and 0% deficit levels, respectively. The yield and WUE of Melka Shola cultivar was higher than that of Melkassa Marglobe. Generally, it was found that irrigating the tomato crop with 75% of ET_c (i.e. 25%ET_c deficit) is the best irrigation practice in the area. In terms of both yield and WUE, Melka Shola tomato cultivar was found to perform better than Melkassa Marglobe.

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Effects of antibrowning agents on the shelf life of fresh-cut green jackfruit (*Artocarpus heterophyllus* Lam.)

Boodia Navindra, Ruggoo Arvind and Boodoo B. Hassina

Faculty of Agriculture, University of Mauritius, Reduit, Mauritius.

Key words: Antibrowning agents, citric acid, ascorbic acid, *Artocarpus heterophyllus*, minimal processing, green jackfruit, moderate vacuum packaging.

Journal of Applied Horticulture, 2009, volume 11, issue 1, pages 35-40.

Abstract: Green mature jackfruits were minimally processed into cubes, dipped in solution of citric acid (0 and 1%) and ascorbic acid (0, 1 and 2%), vacuum packed at 550 mbar atmospheric pressure in 80 urn laminated low density polyethylene vacuum pouches and stored at 2-4°C for 15 days. A control was prepared, using water. Quality parameters like colour, firmness, pH, titratable acidity and total soluble solids were determined during storage. Colour parameters indicated increase in browning during storage. A significant increase ($P < 0.05$) in titratable acidity and significant decrease ($P < 0.05$) in pH were observed in all treatments. Texture significantly decreased ($P < 0.05$) in all treatments during storage. Combinations of the browning inhibitors were more effective than when applied individually. Citric acid and ascorbic acid when applied together resulted in non-significant change ($P > 0.05$) in microbial counts, browning, and colour lightness. Treatment of 1% citric acid and 2% ascorbic acid in combination with moderate vacuum packaging and low temperature storage was found most effective in inhibiting browning and deterioration of fresh-cut green jackfruit for up to 15 days.

Volume 11(1), 2009

Sucrose synthase and acid invertase activities in relation to the floral structures abortion in pepper (*Capsicum annum* L.) grown under low night temperature

N?ji Tarchoun Salah Rezgui and Abdelaziz Mougou

Centre Regional des Recherches en Horticulture et Agriculture Biologique BP47-4042 Sousse, Tunisia, Institut National Agronomique de Tunisie (INAT) 43, av. Charles Nicolle 1082 cite mahrajene Tunis- Tunisia

Key words: Abortion, bud and flower, hot pepper, low night temperature, sucrose synthase, acid invertase.

Journal of Applied Horticulture, 2009, volume 11, issue 1, pages 41-45.

Abstract: Effects of low night temperature were investigated on two local hot pepper varieties ('Beldi' and 'Baklouti') grown at day/night temperature of either low night temperature regime (25°C/10°C) or optimum night temperature regime (25°C/20°C). The negative effect of low night temperature

on floral structure differentiation was registered on both varieties. The deleterious effect was more sensitive on bud stage than on flower buds stage. Abortion of these structures was less important in 'Beldi' than in 'Baklouti'. Floral structure abortion induced by low night temperature was negatively and significantly correlated with soluble acid invertase activity on 'Beldi' ($r=-0.82$), while on 'Baklouti', both sucrose synthase and insoluble acid invertase activities were correlated with floral abortion ($r=-0.78$). Under low night temperatures, sucrose synthase and soluble acid invertase activities were reduced to 50%, while the insoluble acid invertase activity was reduced by more than 90%. Enzymatic activities and flowers abortion correlation show a differential response between these two parameters and the developmental stages of flowers.

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Use of plastic shades to regulate growth of korarima

(Aframomum corrorima (Braun) P.C.M. Jansen) S. Eyob

Horticulture Department, Awassa College of Agriculture, Hawassa University, P. O.Box 5, Awassa, Ethiopia.

Key words: Korarima, *Aframomum corrorima*, Mesketo, photon flux density, plastic shade, tree shade, growth regulation

Journal of Applied Horticulture, 2009, volume 11, issue 1, pages 46-49.

Abstract: Korarima (*Aframomum corrorima (Braun) P.C.M. Jansen*), a slow growing and persistent under tree shade as an under-story perennial plant, is native to Ethiopia. When it is grown in full sunny condition, all plants die off a few weeks after planting, but the effect of different shading materials on its growth is not known. Half a year old korarima plants were planted under differently coloured plastic shades (red, green, blue and clear) and coffee (*Coffea arabica L.*) tree shade to regulate the growth. The coffee tree shade was used as control. Varying levels of photosynthetic photon flux density (PPFD) and red to far red (R/FR) ratio of light were recorded under different shaded and open conditions. The korarima plant responded differently to the different plastic and coffee tree shades. Average plant height, number of leaves per plant, number of sprouts per plant, chlorophyll content, leaf area, total fresh and dry weights were significantly different when recorded at different stages of growth, highest being recorded under the blue plastic cover. The minimum efficiency was achieved under control..

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Effect of growth regulators on in vitro plant regeneration of female papaya using axillary bud as an explant

Renu Singh, Ram C. Yadav and Neelam R. Yadav

Department of Biotechnology and Molecular Biology, CCS Haryana Agricultural University, Hisar. 125004, India.

Key words: Auxins, axillary bud, benzylaminopurine (BAP), cytokinins, indole acetic acid (IAA), *Carica papaya* L., α -naphthalene acetic acid (NAA), proliferation, silver nitrate (AgNO_3)

Journal of Applied Horticulture, 2009, volume 11, issue 1, pages 50-53.

Abstract: A study was carried out on mature female papaya (*Carica papaya* L.) plant of Selection 1 cultivar by using axillary bud as an explant and media supplementation with the main aim to assess the effect of growth regulators (auxins, cytokinins) and silver nitrate on in vitro regeneration of female papaya plant. Total of 28 media were used for shoot regeneration while for root regeneration total of eight media were tested supplemented with different growth hormones. Based on the results of this study, for shoot proliferation, MS basal medium supplemented with BAP (1.0 mg L^{-1}) and BAP (2.0 mg L^{-1}) + NAA (0.1 mg L^{-1}) was found to give the best results while MS medium supplemented with IBA (2.0 mg L^{-1}) gave best rooting percentage. Besides, auxins and cytokinins, effect of silver nitrate (AgNO_3) on plant regeneration from axillary buds taken from mature female papaya plant was also carried out.

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Effects of the addition of clinker ash to the propagation medium on rooting of rabbiteye blueberry cuttings

T Ban, H. Kitazawa, S. Matsumoto, N. Kobayashi, K. Tokumasa, M. Kobatake and T Asao

^AFaculty of Life and Environmental Science, Shimane University, 2059

Kamihonjyo, Matsue, Shimane, 690-1102, Japan, ^BUnited Graduate School of Agricultural Science, Tottori University, Koyama-cho Minami Tottori, Tottori, 680

Key words: Clinker ash, cutting, propagation, rabbiteye blueberry, rooting

Journal of Applied Horticulture, 2009, volume 11, issue 1, pages 54-55.

Abstract: The recommendation for a propagation medium of rabbiteye blueberry (*Vaccinium ashei* Reade) in Japan includes the incorporation of peat moss and Kanumatsuti (a volcanic ash deposit). This experiment compared the use of coal ash (clinker ash) and Kanumatsuti to peat moss as soil conditioner for rooting rabbiteye blueberry cutting. The numbers of cuttings survived and the root dry weight of plants propagated in clinker ash- peat moss mixes were almost the same as cuttings propagated in kanumatsuti- peat moss mix. While the quadratic model between the root dry weight and the clinker ash content in the medium was significant, the maximum root dry weight was estimated to reach about 0.2 g when the proportion of clinker ash in the medium was about 40%. These findings indicate that clinker ash can be used in the propagation medium of rabbiteye blueberry.

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Persian walnut (*Juglans regia* L.) grafting as influenced by different bench grafting methods and scion cultivars

Babak Dehghan, Kourosh Vahdati, Darab Hassani and Reza Rezaee

Department of Horticulture, College of Abouraihan, University of Tehran, Tehran, Iran, Agricultural and Natural Resources Research Center, West Azerbaijan, Uromia, Iran, Department of Horticulture, Seed and Plant Improvement Institute (SPII), Karaj, Iran.

Key words: Callus formation, grafting techniques, graft survival, greenhouse, sawdust, walnut cultivars.

Journal of Applied Horticulture, 2009, volume 11, issue 1, pages 56-58.

Abstract: The study was conducted to determine the effects of different grafting methods and scion cultivars on walnut grafting under controlled conditions in March 2006. Four walnut cultivars ('Z53', 'Hartley', 'Pedro' and 'Serr') were grafted using three bench grafting methods (side stub, omega and whip tongue) onto dormant two years old Persian walnut seedlings as rootstock. The plants after grafting were covered with moist sawdust with relative humidity of 85- 90% and stored in a humid room at 26-28 °C for 21 days. Based on the results, the highest grafting success was observed with omega (84.33%) followed by side stub (41.89%) and whip tongue (24.31%) grafting, respectively. Significant variations were also observed in graft take and scion growth. The differences among walnut cultivars (scion) on grafting take and scion growth were not significant. However, the scions x grafting methods interaction was significant and 'Hartley' variety grafted by omega method showed the highest graft take (88.44%) among all combinations. A significant positive correlation ($R^2 = 0.84$) was observed between the callus

quality and graft takes in all grafting methods.

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Extraction and determination of α -solanine in eggplant fruits

Zhiwen Li, Baoli Zhou, Yuwen Ding and Xiang Liu

College of Horticulture, Shenyang Agricultural University, Shenyang 110161, China; College of Agriculture and Bioengineering, Tianjin University, Tianjin 300072, China.

Key words: *Eggplant, α -solanine, HPLC, extraction, ultrasonic wave*
Journal of Applied Horticulture, 2009, volume 11, issue 1, pages 59-63.

Abstract: *A simple and effective high-performance liquid chromatographic (HPLC) method for determination of α -solanine in eggplant fruits is described in our study. A new extraction method is established for extracting α -solanine in eggplant fruits. Single and orthogonal tests were designed to analyze the effect of different extraction methods and ultrasonic wave extraction condition on extraction of α -solanine in eggplant fruits. HPLC separation was achieved on a Waters Nova-pak C18 column with the mobile phase acetonitrile-0.05N potassium dihydrogen phosphate (55:45, V/V). The flow rate was 0.7 mL min⁻¹ and the UV absorbance was monitored at 202 nm. The optimal extraction method was ultrasonic wave extraction in 70% methanol for 60 minutes at 50°C, and with material to liquid ratio of 1:10. Under the optimal extraction conditions, the average content of α -solanine in skins and flesh of dried eggplant fruits was 0.107±0.006 and 0.626±0.004 mg g⁻¹, respectively. The average recovery efficiency was 97.97%.*

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Morphogenetic and biosynthetic potential of in vitro grown *Hypericum perforatum* under stress and normal conditions

M. Altaf Wani, G.R. Lawania, R.A. Bhat, Iffiat Fayaz, A. Nanda and Gazenfar Gani
Division of Plant Breeding and Genetics, SK University of Agricultural Sciences and Technology of Kashmir, Srinagar, India. Division of Plant Breeding and Genetics, Allahabad Agricultural Institute-Deemed University, Allahabad, India. Division of Floricult

Key words: *Hypericum perforatum, hypericin, pseudohypericin, hyperforin, HPLC, saline stress*

Journal of Applied Horticulture, 2009, volume 11, issue 1, pages 64-67.

Abstract: Three different strains of *Hypericum perforatum* viz. HP-1, HP-2, and HP-3 were subjected to different levels of saline stress (0.25, 0.5, 0.75 and 1.0% with NaCl) and high pH regime (8.5, 9.0, 9.5 and 10.0 with NaOH). Gradual loss in callus growth was observed in all the three strains in response to both kinds of stress. However, high pH showed more drastic effect than saline stress. All the three strains showed higher content of pseudohypercin than hypercin. Change in hypercin production was negligible, however remarkable change was observed in pseudohypercin production in response to both kinds of stress. HP-2 strain produced higher content of hypercin than HP-1 and HP-3 strains under normal as well as under stressfull regime. Proteins were affected qualitatively as well as quantitatively. Maximum numbers of proteins were isolated from control cultures at the retention time of five minutes. Among the three strains maximum numbers of proteins were isolated from HP-3 strain. High pH reduced number of proteins to 12 and 3 while salinity increased number of proteins to 42 and 52 in HP-1 and HP-2, respectively due to accumulation of low molecular weight proteins in response to saline stress.

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Growth and interference of invasive Russian knapweed on ? Valcatorce INTA? onion

*Carlos R. Bezic, Armando A. Dall Armellina, Omar A. Gajardo, Lucrecia M. Avil?s
and Silvia L. Ca??n*

Weed Ecology and Control Research Group, CURZA-University of Comahue
(8500) Viedma, Rio Negro province, Argentina.

Key words: *Acroptilon repens*, *Allium cepa*, plant competition, partial additive experiment, plant invasion, irrigated agriculture.

Journal of Applied Horticulture, 2009, volume 11, issue 1, pages 68-72.

Abstract: Russian knapweed is an invasive creeping perennial herb which affects crops by competition and allelopathy. Herbicides available for use in onion are not able to control Russian knapweed in a crop context. Conversely, recommended products for Russian knapweed are not selective for the crop. The aims of this work were to study Russian knapweed biomass production and propagation for a range of increasing densities in an experimental onion culture and to characterize the productive response of onion plants under these conditions. A partial additive experiment was carried out to study Russian

*knapweed interference (variable density, 0-64 ramet m⁻²) on onion transplants (constant density, 40 pl m⁻²) under greenhouse conditions in Viedma, Argentina (40° 03' S; 62° 48' O). Although no differences among treatments were found for weed final aboveground biomass, low density treatments (0, 2 ramet m⁻²) were lower than 64 ramet m⁻² for belowground biomass. Final weed density was proportional to initial conditions. For onion, total (-54%) and commercial bulb yield (- 56 %) were reduced by weed competition with > 32 ramet m⁻². While size 3 bulbs (50-70 mm eq. diam.) were less represented at weed densities higher than 16 ramets m⁻², size 4 ones (70-90 mm eq. diam.) were not present in this condition. For *A. repens*, traits such as the rate of vegetative propagation, high competitive ability, mainly belowground, and high propagule pressure support its high invasive potential.*

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Cauliflower hybrids for spring production in a southern mediterranean area

M. Sciortino and G. Iapichino

Dipartimento di Scienze e Tecnologie Agroambientali, Università degli Studi di Bologna, Via Fanin 44, 40127, Bologna, Italy. Dipartimento di Agronomia Ambientale e Territoriale, Sezione di Orticoltura e Floricoltura, Università degli Studi di Palermo, Via

Key words: *Brassica olearacea L. var. botrytis L., planting density, cultivars, quality*

Journal of Applied Horticulture, 2009, volume 11, issue 1, pages 73-77.

Abstract: *New cultivars (F₁ hybrids) of cauliflower (Brassica olearacea L. var. botrytis L.) were evaluated at four crop densities (1.3, 1.7, 2.2 or 3.3 plants m⁻²) for spring harvest crop in a Southern Mediterranean area (western coast of Sicily). The F₁ hybrids ('White-Flash', 'Milky-Way' and 'White Excel') having white head, usually cultivated in Northern Italy and Europe in the autumn, were used. The aim was the introduction of new varieties which can fill the gap from mid May to mid July, now existing in the Sicilian cauliflower production, which is based on autochthonous ecotypes of green head varieties, e.g. 'Cavolfiore Verde di Palermo'. Crop density significantly influenced the growth and the phenology of the new hybrids. It was positively correlated to earliness, total marketable yield and inversely to unmarketable product percentage and head size. The best crop density was found to be 2.2 plants m⁻². Among the cultivar tested 'White Flash' and 'Milky Way' appeared particularly suited for a*

spring harvest in the experimental environment. They gave high yields with a minimum discard and uniform heads of approximately 1 kg of weight each.

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The effect of different sowing times on development and efficiency of some Chinese cabbage varieties (*Brassica campestris* sbsp. *pekinensis*)

Funda Eryilmaz Acikgoz

Faculty of Agriculture, Namik Kemal University, Tekirdag, Turkey.

Key words: *Chinese cabbage (*Brassica campestris* sbsp. *pekinensis*), sowing times, development, efficiency*

Journal of Applied Horticulture, 2009, volume 11, issue 1, pages 78-80.

Abstract: *The aim of the study was to determine the effect of different sowing times on development and efficiency of some Chinese cabbage varieties (*Brassica campestris* sbsp. *pekinensis*) under Corlu conditions. The study was conducted in Corlu County which has a tougher climate than its Province Tekirdag where a similar research had been done before. The research was conducted in 2000 and three different sowing times (15 August, 15 September and 15 October) and four domestic varieties (Tokat-2, Tokat-5, Tokat-29 and Tokat-89) were used. The variety, Tokat-89 and the sowing time of 15 September were found to be the most suitable variety and sowing time, respectively. The variety and time of sowing recorded superiority for head weight, level of hardness and head quality.*

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Volume 9(2), 2007

Seasonal changes in texture, sugar and organic acid contents and activities of some ammonia-assimilating enzymes in lettuce

Dulal Chandra, Toshiyuki Matsui, Haruo Suzuki, Yusuke Kosugi and Koichi Fujimura

Department of Applied Biological Science, Faculty of Agriculture, Kagawa University, 2393 Ikenobe, Miki-Cho, Kagawa 761-0795, Japan, Kagawa Prefectural Agricultural Experiment Station, Busshouzan, Takamatsu, Kagawa 761-8078, Japan. Kagawa University, 239

Key words: Ammonia, amination, asparagine synthetase, crispness, deamination, glutamine synthetase, *Lactuca sativa*, sugar.

Journal of Applied Horticulture, 2007, volume 9, issue 2, pages 101-107.

Abstract: As a cool weather crop, lettuce (*Lactuca sativa* L.) is very sensitive to the changes in temperature during growth. This study investigated the textural, compositional and some biochemical changes in the outer and inner leaf tissues of two crisphead lettuce cultivars ('Bittsu' and 'Cisco') harvested in different seasons. The result demonstrated that in colder months, the crispiness of lettuce leaves reduced significantly and higher amount of sugars, organic acids and ammonia were accumulated. In general, between the two cultivars, 'Bittsu' contained higher amount of sugars and organic acids, while 'Cisco' contained higher amount of ammonia. However, inner leaf tissues contained higher amount of ammonia than outer leaf tissues in both cultivars. The level of fructose was found to be higher than glucose and sucrose in all cases while malic acid was the main component in organic acid fraction. The activities of ammonia-assimilating enzymes such as glutamine synthetase (GS; EC 6.3.1.2) and asparagine synthetase (AS; EC 6.3.5.4) either decreased or nearly remain constant depending on the tissue types during the colder months. Outer leaf portion showed higher GS activity than inner leaf tissues. However, both of aminating and deaminating activity of glutamate dehydrogenase (GDH, EC 1.4.1.2) decreased in the outer leaves whereas deamination activity slightly increased in the inner leaf tissues during warmer harvest months.

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Rooting and growth response of grapevine nurslings to inoculation with arbuscular mycorrhizal fungi and irrigation intervals

Alaa Eldin Khalil Omar

Department of Horticulture, Faculty of Agriculture, Kafr El-Sheikh University, Kafr El-Sheikh 33516, Egypt

Key words: Arbuscular mycorrhizal fungi, grape, irrigation, nurslings
Journal of Applied Horticulture, 2007, volume 9, issue 2, pages 108-111.

Abstract: This study was conducted during two successive seasons (2005 and 2006); in the experimental farm of Faculty of Agriculture, Kafr El Sheikh University; with the aim to investigate the influence of arbuscular mycorrhizal fungi (AMF) inoculation and irrigation intervals on growth of grapevine nurslings cv. Ruby King. Two mix mycorrhizal fungi including *Glomus fasciculatum* and *Glomus mosseae* were used for inoculation. The AMF inoculated and non-AMF nurslings were irrigated at 3, 6 and 9 days interval. The results showed that a combined treatment of AMF inoculation and irrigation at 3 days intervals recorded the highest values in terms of length of main root, total root length, root volume, root dry weight (%), top/root ratio, number of fine roots (< 2 mm), number of small roots (2-5 mm), number of leaves and leaf area per nursling. These results are of practical importance, as they highlight the potential of using mycorrhizal fungi inoculation for root development and growth improvement in grapevine nurslings and hence increases its adaptability upon transfer from the nursery to the open field.

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Influence of applied lysophosphatidylethanolamine on fruit quality in Thompson Seedless table grapes

Ji Heun Hong, Sung Kee Hwang, Guk Hoon Chung, and A. Keith Cowan

Biotech Institute, GlonetBU, Doosan Corporation, Yongin 449-795, Korea; AKConsulting, Grahamstown 6140, South Africa.

Key words: Firmness, plant growth regulators, size, soluble solids content, titratable acidity

Journal of Applied Horticulture, 2007, volume 9, issue 2, pages 112-114.

Abstract: The effect of foliar applications of lysophosphatidylethanolamine

(LPE) on 'Thompson Seedless' (*Vitis vinifera* L.) was evaluated to determine the suitability of this plant amendment aid as a management tool in table grape production. LPE at 10 mg L⁻¹ was sprayed on vines at two different stages of berry growth and development. Treatments were: 1) 4 weeks after fruit set; 2) 6 weeks after fruit set; and 3) 4 and 6 weeks after fruit set. Soluble solids content (SSC) of berries at all harvest dates was significantly higher for vines treated with LPE compared to the control. Titratable acidity (TA) gradually decreased during ripening, and by the third harvest, TA of berries from vines treated with LPE was lower than that of control. All the treatments resulted in higher fruit firmness when compared to control. However, there were no significant differences in firmness of berries from vines given LPE treatment at different stages of growth. LPE treatment increased berry size, although no significant difference in size between single and sequential applications of LPE was observed. These results indicate that LPE may play a role in plant hormone-associated regulation of berry growth and development.

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Thidiazuron effects on physiochemical characteristics of carnation during pre and postharvest periods

Esmail Chamani, Daryl C. Joyce, Behroz Esmaeilpour

Department of Horticulture, Faculty of Agriculture, University of Mohaghegh Ardabili, Ardabil, Iran.

Key words: *Dianthus caryophyllus* 'Lunetta', preharvest, postharvest, Thidiazuron, vase life.

Journal of Applied Horticulture, 2007, volume 9, issue 2, pages 115-117.

Abstract: Experiments were conducted to determine the effects of Thidiazuron (TDZ) applied at preharvest stage under glasshouse conditions on *Dianthus caryophyllus* 'Lunetta'. Thidiazuron at 0, 1, 10, 100, and 1000 uM was applied as a foliar spray arranged in completely randomized design. Time to flowering was recorded, and relative stem length, total nitrogen and tissue water content were measured at harvest. Postharvest vase life, relative fresh weight changes, and solution uptake were also measured. TDZ treatments decreased relative stem length compared to the control (0 uM). TDZ treatment tended to decrease total nitrogen and water content of tissues slightly, but not significantly ($P > 0.05$). TDZ at 100 uM significantly increased the vase life of cut carnation flowers compared to the control. TDZ treated flowers tended to maintain higher relative fresh weight, with positive differences for the 100 uM

TDZ treatment being apparent at day 5, 7 and 9 of vase life. Solution uptake was higher in TDZ treated flowers.

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Comparative morphology and RAPD analysis of some turfgrass cultivars grown in Saudi S. Arabia

NasserAlKhalifah, E.Askari, andA.E. Shanavaskhan,

King Abdulaziz City for Science and Technology (KACST), Post Box 6086, Riyadh 11442, Saudi Arabia.

Key words: Miyako, Nagissa, Tifgreen, Tifway, Zoysiagrass, Bermudagrass, RAPD, morphology

Journal of Applied Horticulture, 2007, volume 9, issue 2, pages 118-122.

Abstract: With the increasing number of turfgrass cultivars, development and use of reliable identification methods is becoming important. Random amplified polymorphic DNA (RAPD) markers along with morphological markers proved useful for cultivar identification. Seven turfgrass cultivars encompassing four bermudagrass and three zoysiagrasses were grown under uniform greenhouse conditions and their key diagnostic features were described. Bulk samples of leaves were collected from each cultivar and subjected to RAPD analysis using standard protocols. Out of the 35 Operon primers used, 20 detected polymorphism among the cultivars. 'Nagissa' and 'Miyako' zoysiagrasses showed close genetic relationship as compared to the rest of the cultivars. They had the highest value in the similarity matrix for Nei and Li's coefficient (0.802) while one variant of Miyako clustered with Bermuda-1. Tifgreen Bermuda and Bermuda-2 also clustered together while 'Tifway' stood apart. Analysis of the morphological data showed that the variant of 'Miyako' belonged to the *Zoysia* genus but its genetic affinity with Bermudagrass needs to be explained. Within and between species, the cultivars having similar leaf-texture showed a tendency to cluster together.

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Occurrence and detection of sweet potato virus disease (SPVD) in West Bengal

B. Sinha and J. Tarafdar

Department of Plant Pathology, Bidhan Chandra Krishi Viswa Vidyalaya, Mohanpur, Nadia-741252, West Bengal, AICRP on Tuber Crops, Directorate of

Research, BCKV, Kalyani, West Bengal. India.

Key words: Sweet potato, viruses, symptoms, NCM-ELISA, coat protein
Journal of Applied Horticulture, 2007, volume 9, issue 2, pages 123-126.

Abstract: The natural occurrence of sweet potato virus disease (SPVD) in 26 Indian sweet potato cultivars was evaluated at Horticultural Experimental Field of the B.C.K.V. University, West Bengal during 2004-2005 seasons based on the possible symptoms and serology. The leaves from virus suspected plants were indexed for viruses by nitrocellulose membrane enzyme-linked immunosorbent assay (NCM-ELISA) and coat protein study. Disease incidence was highest in Pol-4-9 during 2004 (12.87%) and 2005 (25.19%). Results were confirmed in several seropositive plants with higher incidence and diversity of viruses. Sweet potato feathery mottle virus (SPFMV), sweet potato cauliflower mosaic like virus (SPCaLV), Sweet potato mild speck virus (SPMSV) and C-6 virus were detected serologically in single or mixed infections in many leaf samples of the cultivars. The frequency of C-6 virus was very high (73.07%) followed by SPCaLV (34.61%), SPFMV (26.92%) and SPMSV (23.07%). Attempt was made to characterize the virus coat protein of the partially purified virus from the leaves with most frequently observed symptoms. Protein analysis by sodium dodecyl sulfate polyacrylamide gel electrophoresis revealed a major protein band of 65 kDa, and 38 kDa which were assumed to be the viral coat proteins of associated virus. Minor protein bands of 24 kDa were also observed. The viral protein degraded upon storage at 4°C over time to yield a protein band of 22 kDa.

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Effects of UV-C and salicylic acid on quality of 'Muskule' table grapes during cold storage

Erdinc Bal and Demir Kok

Namik Kemal University, Horticulture Department, Agricultural Faculty, Tekirdag/Turkey.

Key words: Grape, UV-C treatment, salicylic acid, storage, sensory evaluation
Journal of Applied Horticulture, 2007, volume 9, issue 2, pages 127-131.

Abstract: Muskule grape variety which has table and late maturing attributes, was used for this study. Storage of table grapes requires stringent control of gray mold, which is caused by *Botrytis cinerea* Pers. In spite of the fact that the use of sulfur dioxide (SO₂) in controlling gray mould is common practice, it

has some advantages and disadvantages. Thus, physical, natural organic elicitors and biological methods have been used for delaying decays. In this study, UV-C (0.25kJ m^{-2}), salicylic acid (1, 2, 3mM) and $\text{Na}_2\text{S}_2\text{O}_5$ (0.4g powdered sodium metabisulfate pads) treatments were used to reduce quality losses during the cold storage of Muskule grape. Treated clusters were placed into polyethylene container and packaged with polyethylene bags having 10.5 a thicknesses and stored at $0\pm 1\text{ }^\circ\text{C}$ and $90\pm 5\%$ relative humidity throughout 100 day. At the end of 100 day, weight loss (%), soluble solids content (%), titratable acidity ($\text{g } 100\text{ mL}^{-1}$), pH of fruit juice, sensory evaluation, view of cluster skeleton and decay rate (%) were determined at 20 days interval. SA (3mM) + UV-C combined treatment and SA (3mM) treatment were found to be effective depending on examined criterion.

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Characterization of new apricot cultivars by RAPD markers

A. Uzun, O. Gulsen, Y.AkaKacar, V.Aras, A. Demirel, M. Bircan, S. Paydas and A. Yildiz

Alata Horticultural Research Institute, Erdemli, Mersin, Turkey-33740;
Department of Horticulture, University of Cukurova, Adana, Turkey-0'330.

Key words: Apricot, *Prunus armeniaca*, RAPD, molecular markers

Journal of Applied Horticulture, 2007, volume 9, issue 2, pages 132-135.

Abstract: Molecular markers are the most widely used tools in cultivar and species identification. The objective of this study was to characterize some Turkish and European cultivars and new apricot cultivars derived by hybridization between Turkish and European apricot cultivars using RAPD markers. Five new, two local cultivars, and four promising hybrids from Turkey, and 13 cultivars from Europe, North America, South Africa were characterized. Sixty RAPD primers produced 57 polymorphic and 79 monomorphic markers, totaling 136. All the 136 markers were used to construct a dendrogram based on UPGMA. All cultivars were distinguished from each other with the similarity value ranging from 0.90 to 0.96. Known hybrids were grouped between or close to either one of parental genotypes. This study may imply narrow genetic diversity among the most widely grown apricot cultivars in the world.

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Telfairia production: Consideration for alleviating rural poverty among Nigeria women

Odiaka Ngozi Ifeoma, Akoroda Malachy and Odiaka Emmanuel

Department of crop Production, College of Agronomy, University of Agriculture, Makurdi, Benue State, Nigeria, Department of Agronomy, University of Ibadan, Ibadan, Oyo State, Nigeria; Cooperative Extension Centre, University of Agriculture, Makurdi, Benu

Key words: *Telfairia occidentalis* Hook. F., fluted pumpkin, gender, production, constraints, poverty, profit, sustainability, Nigeria.

Journal of Applied Horticulture, 2007, volume 9, issue 2, pages 136-139.

Abstract: Gender roles in telfairia leaf production were investigated in Makurdi using a survey based questionnaire administered to 50 farmers to identify gender-disaggregated roles in telfairia production. The survey showed that women have major role as producers and marketers of telfairia leaves. Women and girls provided 80.0% of labour requirements for hole digging, sowing, irrigation, weeding, harvesting and marketing. The men cleared land and dug holes while girls and boys in primary and secondary schools assisted in weeding and hole digging. The results also revealed that a typical telfairia farm using N10,650.00 (US\$84.5 at N126/dollar) worth of seeds produced 16.5 t/ha of leaves valued at N212,400.00 (US\$1,685.7) with 85.0% profit. Seed accounted for 60.7% of total cost of production, while irrigation cost was 20.3%. A minimum take-off fund of N210,572 (US\$1671.2) was needed to give revenue of N386,000 (US\$2920.6) and a gain of 83% per hectare. Total fruit equivalent of fruits/shoots produced 2,056 fruits and the price of fruit equivalent of fruits/ shoots produced N514,000 (US\$4079.4) with a gain of 144%. Two major constraints to leaf production were high cost of quality seeds (36.1% of respondents) and water pumps (13.9% of respondents). Women participation in telfairia vegetable production, marketing and utilization in Makurdi can provide a means of livelihood and appreciable income for women in rural and urban areas, which is capable of sustaining the running of the home and enhancing the living standards of women.

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Minerals in pericarp of tomato (*Solanum lycopersicon* L.) fruit and its ripening behaviour

Vijay Paul and G.C. Srivastava

Division of Plant Physiology, Indian Agricultural Research Institute, New Delhi-

110 012, India.

Key words: *Solanum lycopersicon*, minerals, pericarp, ripening, tomato, fruit
Journal of Applied Horticulture, 2007, volume 9, issue 2, pages 140-145.

Abstract: Two contrasting varieties of tomato (*Solanum lycopersicon* L.) fruits i.e. 'Pusa Gaurav' (slow ripening type) and 'Pusa Ruby' (fast ripening type) were examined for Ca, P, K, Zn, Cu and Mn contents in the fruit's pericarp portion. Fruits were examined either at different ripening stages during their maturation on the plant itself or at different intervals during storage when harvested at green mature stage. Ca was found to be higher in 'Pusa Ruby'. 'Pusa Gaurav', on the other hand, showed higher content of P, Zn, Cu, Mn but low K in comparison to 'Pusa Ruby'. The roles of these minerals were explained towards their stabilizing effect on plasma membrane and cell wall along with their involvement in the antioxidative system and thereby determining the rate of ripening.

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Screening cultivated okra, related species and their interspecific hybrid derivatives for resistance to powdery mildew (*Erysiphe cichoracearum* DC)

T. Prabu, S.D. Warade, M.A. Jatkar and P.H. Ghante

Department of Horticulture, Mahatma Phule Krishi Vidyapeeth, Rahuri, College of Horticulture, Pune -411 005, Department of Plant Pathology, Mahatma Phule Krishi Vidyapeeth, Rahuri -413 722. India.

Key words: Okra, powdery mildew resistance, inter-specific hybrids, amphidiploids

Journal of Applied Horticulture, 2007, volume 9, issue 2, pages 146-149.

Abstract: Okra germplasm, consisting of 85 accessions, which included cultivars, related species and their inter specific hybrids was screened for two seasons, while their amphidiploids, backcrosses and F₃ generations were screened for one season for powdery mildew resistance (*Erysiphe cichoracearum* DC) under severe field epiphytotic conditions. Only the wild species *A. caillei-2* and *A. moschatus-1* were found immune while two biotypes of *A. tetraphyllum*, *A. manihot* spp. *manihot*, *A. manihot* spp. *tetraphyllum*, *A. manihot* (L.) Medikus and *A. angulosus* were found highly resistant to powdery mildew in both seasons. *A. tuberculatus-1*, *A. caillei-1*, *A. ficulneus* and cultivars of *A. esculentus* were susceptible. Reaction of inter specific hybrids,

backcrosses and amphidiploids revealed that the resistance in *A. caillei*-2, *A. angulosus* and *A. manihot* spp. tetraphyllus were partially dominant. Further, it was observed that in F₃ generations, only the lines of *A. caillei* -2 inter specific hybrid derivatives (lines derived from hybrids having *A. caillei*-2 as one parent) were found highly resistant to powdery mildew.

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Low-temperature threshold and growth degree day (GDD) for two pistachio cultivars

Yousef Gholipour

Iran's Pistachio Research Institute, Qazvin Station, No."8, Beheshti Blvd. Agri. & Natural Resources Research Center, Qazvin, Iran.

Key words: Pistachio, chilling injury, growth degree day, flowering, fruit development

Journal of Applied Horticulture, 2007, volume 9, issue 2, pages 150-152.

Abstract: Chilling threshold and growth degree day (GDD) of two main pistachio pistillate cultivars were determined. Layout was factorial based on a complete randomized design with three factors, two cultivars (Qazvini and Ouhedi), 5 thermal levels (+2, 0, -2, -4 and -6 °C) and three developmental stages including dormant bud, swelling bud and fully bloomed flowers for chilling studies. Critical temperature for reversible tissue colour change was determined as -4°C at bud stage, -2°C at blooming bud and +2°C at flower. Decreasing temperature down to two more degrees (*e.g.* -6 °C at bud) could shift the damage into the irreversible browning injury. For GDD measurements, three factors, including cultivar, thermal accumulation (calculation based on +4.5°C) and phenological stages were considered. Kernel filling period varied in two cultivars; Ouhedi's bigger kernel required more time to grow fully and more growth degrees day. Qazvini needed 2561.044 GDD and 138.5 days for total bearing period (flowering to harvest), and 623.363 GDD and 30 days for kernel filling period. Ouhedi needed 2917.823 GDD and 160 days for total period, and 730.61 GDD and 33.5 days for kernel filling.

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High frequency *in vitro* shoot regeneration of *Capparis deciduas* from shoot tip culture

S.N. Saxena, S Janjharia, A.K. Sharma, R. Sharma and G. Singh

Plant Biotechnology Centre, Rajasthan Agricultural University, Bikaner-334006

Key words: *Capparis deciduas*, shoot tip culture, plant growth regulators, micropropagation, 6-benzyl amino purine, naphthaline acetic acid, indole butyric acid, arid horticulture.

Journal of Applied Horticulture, 2007, volume 9, issue 2, pages 153-156.

Abstract: *Capparis deciduas* is an important constituent of desert ecosystem, however, due to population pressure on the land their stands are reducing at an alarming rate. Establishment through root suckers and seeds being very slow and cumbersome, remains the major bottleneck for their reestablishment in the area. Thus, realizing the constraint, a rapid and efficient micropropagation protocol for multiple shoot regeneration employing shoot tip explant was developed. The protocol is more efficient and reproducible than reported earlier. Maximum number of explants (100%) responded on Murashige and Skoog (MS) medium supplemented with 6-benzyl amino purine (BAP) 7 mg L⁻¹ and naphthaline acetic acid (NAA) 0.1 mg L⁻¹ while number of shoots per explant were maximum (8.5) on alone BAP 7 mg L⁻¹. Regenerated shoots could be rooted best on MS medium supplemented with indole butyric acid (IBA) 1 mg L⁻¹. Rooted shoots could be hardened and transplanted in to the field.

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Fruit chemical composition of hazelnut cultivars grown in Portugal

A.P. Silva, A. Santos, J. Cavalheiro, C. Ribeiro, F. Santos and B. Gonçaves

'CECEA - Centre for Agricultural Sciences and Engineering, University of Trás-os-Montes e Alto Douro, Apt. '0'3, 500'-80' Vila Real, Portugal, Department of Plant Science and Agricultural Engineering; CETAV - Centre for Technological, Environmental and Li

Key words: Crude fat, crude protein, free oc-amino acids, neutral detergent fibre, proximate analysis, starch

Journal of Applied Horticulture, 2007, volume 9, issue 2, pages 157-161.

Abstract: Chemical composition (crude protein, crude fat, starch, neutral detergent fibre - NDF and free a-amino acids) of six hazelnut cultivars (Butler, Ennis, Fertile de Coutard, Grossal, Merveille de Bollwiller and Segorbe) was investigated. Genotype significantly affected fruit nutritive value. Crude protein

ranged from 12-17 g 100 g⁻¹ dry weight (dw) in cultivar Ennis and Merveille de Bollwiller, respectively; crude fat was 50-62 g 100 g⁻¹ dw in cvs. Fertile de Coutard and Butler; starch varied from 1.0 to 2.4 g 100 g⁻¹ dw in cvs. Segorbe and Butler; and NDF was 8-14 g 100 g⁻¹ dw in cvs. Merveille de Bollwiller and Ennis. Total free α -amino acids content ranged from 144 mg 100 g⁻¹ dw (cv. Segorbe) to 413 mg 100 g⁻¹ dw (cv. Butler). The essential amino acids content varied between 23 mg 100 g⁻¹ dw (cv. Butler) to 55 mg 100 g⁻¹ dw (cv. Merveille de Bollwiller). Alanine was the main amino acid found (62% of total amino acids) and methionine was the lowest (0.3%). Based on the available data on the phytochemical content of hazelnuts, including the data presented in this study, there is a high likelihood that this fruit will provide positive health benefits.

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Fruit quality characterization of seven clementine cultivars

Bouchra Chahidi, Mohamed ElOtmami, Fran?ois Luro, Ikbal Srairi, and M'hamed Tijane

Department of Horticulture, Institut Agronomique et Veterinaire Hassan II, Complexe Horticole d'Agadir, BP 728, Agadir 80 000, Morocco, Faculte des sciences Mohamed V, 4 Avenue Ibn Battouta B.P. 1014 RP, Rabat, Morocco; Department of Horticulture, Institut Agr

Key words: *Citrus clementina* Hort. ex Tan, maturity index, rind color, rind firmness, juice sugar content, juice titratable acidity.

Journal of Applied Horticulture, 2007, volume 9, issue 2, pages 162-166.

Abstract: For a citrus grower to choose the right clementine cultivar for a given region or market, it is very important to know the characteristics of that cultivar particularly in terms of the development of its internal as well as external quality attributes. In particular, it is very important to know when the maturity index is attained along with the rate of color change, sugar accumulation, acid dissipation, firmness loss, etc. This paper describes the results obtained for several quality attributes (rind color, firmness, juice content, juice titratable acidity and soluble solids content) of seven clementine cultivars sampled at different stages of maturity. All of the cultivars reached minimum maturity index (sugar / acid ratio greater than 7.0) by early November. The rate of rind color change is significantly influenced by picking period and is the main attribute that differs among most of the clementine cultivars. In addition, 'Guerdane', the new clementine cultivar, is the only cultivar that matures much later (January-February) and has the

characteristics of a late-maturing cultivar both internally (juice quality) and externally (rind color).

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Production of mini-tubers from vine cuttings of *Dioscorea rotundata* (white yam)

Oyetunji, O.J. Kabeya, M, Shiwachi, H.

Department of Botany and Microbiology, University of Ibadan, Nigeria.
International Institute of tropical Agriculture (IITA), Ibadan, Nigeria.

Key words: *D. alata*, *D. rotundata* Poir, cultivars, IBA, mini tuber, root formation, vine cuttings, survival, white yams.

Journal of Applied Horticulture, 2007, volume 9, issue 2, pages 167-172.

Abstract: The multiplication ratio for seed yam production is very low compared to other tuberous crops. Seven clones of *Dioscorea rotundata* Poir (white yam) were evaluated for production of mini tubers from their vine cuttings. Three to four nodes leafy vine cuttings were prepared from the middle portion of the lateral branches collected from mother plants 127, 134 and 141 days after planting (DAP). The lower portion of these nodes were wounded with a clean razor blade and then dusted with 1.0% Indole-3 butyric acid (IBA) powder in order to promote rooting. The mini tubers were harvested 115 DAP. The developed mini tubers varied in sizes among the tested cultivars from 1.9 to 4.2g. The weights were found to be genotype dependent. The survival rate of the planted vine cuttings ranged from 31.1 to 77.1% while the average total number of roots per vine ranged from 5.1 to 5.8. The average number of tubers per vine was 1.8 ± 0.8. If these number and weights of mini tubers can be obtained from propagation of vine cuttings, there will be tremendous increase in propagating material thereby making yam cultivation less expensive and also allowing the ware yam only for consumption and other uses.

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Retranslocation of nutrients and zinc sulphate fertilization of banana plants in central Amazon

A. Moreira, L.A.C. Moraes, J.C.R. Pereira and C. Castro

'Embrapa Cattle Southeast, Rodovia Washington Luiz, Km 234, C.P. 339, 13560-970, Sao Carlos, Sao Paulo State, Brazil; ²Embrapa Western Amazon, C. P. 3'9, 69011-970, Manaus, Amazonas State, Brazil; ³Embrapa Soybean, C.P. 23', 8600'-970

Key words: Critical leaf zinc concentration, foliar nutrients, nutrient mobility, *Musa* spp.

Journal of Applied Horticulture, 2007, volume 9, issue 2, pages 91-96.

[Full text PDF |](#)

Abstract: Banana cultivation is ranked as one of the agricultural activities of greatest economic importance and social significance in Brazil. The area under banana cultivation in Brazil (516,000 ha) is larger than India and Ecuador, leading countries in production, but with rather lower productivity due to lack of adequate crop management, particularly fertilizer application. The objective of this work was to investigate the rate of nutrient retranslocation and the effect of fertilization on the yield and uniformity of banana bunches cultivated in central Amazon region. Two field experiments were conducted in a xanthic Ferralsol (dystrophic Yellow Latosol) - predominant soil of the region, examining: a) the nutrient translocation rate in twelve plants; and b) the efficiency of zinc use, in a completely randomized blocks in split plot design with four rates of ZnSO₄ (0, 30, 60 and 120 g plant⁻¹ cycle⁻¹) and two application times (in the hole together with the seedling or applied in the fifth month after planting), with four replicates. Under the local edaphoclimatic conditions, the results show that N, P, K, Mg and Cu have a high retranslocation rate. The plant yield was influenced by the rates of ZnSO₄, with the most efficient application method being in the planting hole. Results indicated that at high concentrations, zinc had mobility in the phloem from the leaves to the fruits. The proposed critical leaf zinc concentration at the start of inflorescence was 12.9 mg kg⁻¹ for the third leaf.

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Response of tomato plants to deficit irrigation under surface or subsurface drip irrigation

Miguel A. del Amor and Francisco M. del Amor

Consejeria de Agricultura y Agua de la Region de Murcia. Plaza Juan XXIII. 30008 Murcia, Spain. Instituto Murciano de Investigacion y Desarrollo Agrario y Alimentario. C/Mayor s/n. 30150 La Alberca. Murcia. Spain.

Key words: Yield, crop quality, total soluble solids (TSS), drought, stress, *Solanum lycopersicon* L.

Journal of Applied Horticulture, 2007, volume 9, issue 2, pages 97-100.

[Full text PDF |](#)

Abstract: Field studies were conducted to compare the yield and fruit quality of processing tomatoes in surface and subsurface drip irrigation, with 100 and 50% of crop evapotranspiration (ETc). The results showed that when irrigation was reduced by 50% ETc the subsurface treatment showed higher water content at root depth compared with the on-surface treatment. At 50% ETc subsurface irrigation yield increased by 66.5% compared with the surface treatment. However at 100% ETc no significant difference in total fruit yield was observed between irrigation methods. The superficial and water-stressed treatment increased the pH and the acidity of the fruits but the subsurface treatment did not show differences with respect to the full-irrigation treatments. Our results show that the subsurface drip irrigation method could be reasonably applied for processing tomato when water resources are limited.

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Developmental influence of *in vitro* light quality and carbon dioxide on photochemical efficiency of PS II of strawberry leaves (*Fragaria x ananassa*)

John H. Miranda and Richard Williams

School of Agronomy and Horticulture Science, The University of Queensland, Gatton, Qld.4343, Australia. Present address: Brisbane South Lifestyle Support Services, 48 Duke Street Kangaroo Point, Q 4169

Key words: Carbon dioxide enrichment, air flow, photo system II, photochemical efficiency of PS II (FV/FM), photosynthetic photon flux (PPF), photoinhibition, dry weight, chlorophyll and nitrogen.

Journal of Applied Horticulture, 2007, volume 9, issue 1, pages 13-16.

[Full text PDF |](#)

Abstract: The influence of light quality and carbon dioxide concentration on the development of photosynthetic functional structures of strawberry leaves *in vitro* was examined. We assessed the photochemical quenching parameter of chlorophyll a photochemical efficiency of photo system II (PSII) of strawberry leaves *in vitro* in a factorial set up. The main effects of light quality; averaged over CO₂ enriched, air flow and closed systems, increased the initial chlorophyll fluorescence value from 485 for yellow light developed PS II system of leaves to 1142 for white light (control) developed ones. The photochemical efficiency of PSII significantly increased from 0.64 under white light to 0.80 for yellow light developed leaves. The leaves developed under blue light were similar to that of control white light for many chlorophyll fluorescence parameters except the initial chlorophyll fluorescence level. The increase in photochemical efficiency of PSII of strawberry leaves can be attributed to lower initial fluorescence values. Under blue light the total dry weight and total chlorophyll content were increased. The possible role of high mercury peak of white light and photoinhibition during development *in vitro* is discussed.

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Characterization of environmental stress-regulated anthocyanin production and growth of cranberry callus

Yu Zhou and Bal Ram Singh

Department of Chemistry and Biochemistry, University of Massachusetts Dartmouth, 285 Old Westport Road, North Dartmouth, MA 02747 USA.

Key words: Anthocyanin, biosynthesis, callus, cranberry, Ericaceae, growth, light, pH, temperature, *Vaccinium macrocarpon* Ait

Journal of Applied Horticulture, 2007, volume 9, issue 1, pages 17-21.

Abstract: Cranberry callus was successfully induced from cranberry (*Vaccinium macrocarpon* Ait, Ericaceae) leaves by using Gamborg's B5 medium containing phytohormones at 25°C in the dark. Anthocyanin-producing cranberry callus was obtained only under conditions of continuous light exposure. Red light and UV light exposure of the callus enhanced anthocyanin content by 41.3 and 29.3%, respectively. The light-dependent anthocyanin production in the callus was regulated by temperature. Anthocyanin content in the callus decreased 81.1% at 42°C, 58.9% at 37°C, 47.0% at 30°C, and increased 10.4% at 4°C, compared to the callus maintained at 25°C after 48 hours of incubation at the given temperature. A temperature decrease of 10°C from 25 to 15°C resulted in a critical increase of the anthocyanin production in the callus, irrespective of differences in pH of culture medium. The growth of

the callus cultured in medium at pH 7.0 was 6.2-fold higher than in the same medium at standard pH of 5.8.

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Effect of forcing at different times on bud burst, flowering and fruit development of low-chill peach cultivar 'Premier'?

Sutasinee Maneethon, Kenji Beppu, Naoko Kozai, Ryosuke Mochioka and Ikuo Kataoka

Faculty of Agriculture, Kagawa University, Miki, Kagawa, Japan 761-0795;
²University Farm, Faculty of Agriculture, Kagawa University, Sanuki, Kagawa, Japan 769-2304

Key words: *Prunus persica* Batsch cv. 'Premier', low-chill peach, forcing culture, bud break, flower characteristics, fruit growth

Journal of Applied Horticulture, 2007, volume 9, issue 1, pages 22-25.

Abstract: Response of low-chill peach cultivar 'Premier' to early forcing culture was studied. Three-year-old trees were forced in a glasshouse from 15 November, 1 and 15 December and 1 and 15 January. Symptoms of insufficient chilling were detected when forcing was started from 15 November and 1 December. Bud break was delayed and sporadic. The flower and leaf buds forced from 15 December and 1 and 15 January rapidly burst within 15 days after the onset of the treatments. The final burst rate exceeded 70%. Generally, flowering started 10-15 days after flower bud burst. The size of the flowers from the trees forced from 15 November and 15 January was smaller than that recorded at other forcing times. Earliest harvest started under forcing from 15 December and 1 January. These results suggested that by using this low-chill cultivar, forcing could be initiated from mid-December, more than one month earlier than for high-chill cultivars, with complete dormancy release, in this region.

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2,4-D and NAA supplementation mitigates autotoxicity of strawberry in hydroponics

H. Kitazawa, T. Asao, T. Ban, Y. Hashimoto, T. Hosoki

United Graduate School of Agricultural Sciences, Tottori University, Koyama-cho Minami, Tottori, Tottori 680-8553, Japan; Faculty of Life and Environmental Science, Shimane University, Kamihonjo, Matsue, Shimane 690-

1102, Japan; Department of Soil Science

Key words: Autotoxicity, 2,4-dichlorophenoxyacetic acid (2,4-D), hydroponics, 1-naphthaleneacetic acid (NAA), strawberry (*Fragaria x ananassa* Duch.).

Journal of Applied Horticulture, 2007, volume 9, issue 1, pages 26-30.

Abstract: In order to mitigate the autotoxicity in growing plants in closed hydroponic systems, the effects of foliar applications of 2,4-dichlorophenoxyacetic acid (2,4-D) and 1-naphthaleneacetic acid (NAA) on the growth of strawberry were investigated. Although the growth of strawberry plantlets was not affected by the auxin treatments in the fresh nutrient solution, the auxin treatments recovered the growth in the used nutrient solution. Benzoic acid, a compound reportedly accumulating in the reused nutrient solution of strawberry hydroponics, resulted in a significant decrease in the growth of strawberry plantlets at 50 uM concentration, compared to the growth in the nutrient solution without benzoic acid. Mitigation of the growth inhibition caused by the previously used nutrient solution or addition of the high concentration of benzoic acid in the fresh solution was demonstrated by immersing strawberry leaves in the auxin solutions (0.45 and 4.5 uM 2,4-D or 5.4 and 54.0 uM NAA) for two seconds before transplanting. The number of flowers and harvested fruits, and the fruit yield of strawberry plants grown in the greenhouse for about 33 weeks were reduced by the non-renewing the nutrient solutions. These values recovered in the 5.4 uM NAA treatment and were not significantly different from the control (renewal of the nutrient solution). These results suggested that reductions in the number of flowers and the yield of strawberry in closed hydroponic systems appear to be related to the allelochemicals exuded by the plant itself. The auxin such as NAA would avoid the growth reduction of strawberry caused by autotoxicity. The 5.4 uM NAA treatment may be the most effective for alleviating autotoxicity of strawberry and increasing the yield.

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Ectopic expression of Mn-SOD in *Lycopersicon esculentum* leads to enhanced tolerance to salt and oxidative stress

Yueju Wang, Michael Wisniewski, Richard Meilan, Sandra L. Uratsu, Minggang Cui, Abhaya Dandekar and Leslie Fuchigami

Department of Horticulture, Oregon State University, Corvallis, OR, 97331-7304, USA; USDA-ARS, 45 Wiltshire Road, Kearneysville, WV, 25430-9606,

USA, Forestry & Natural Resource Department, Purdue University, West Lafayette, IN, 47907-2072, USA, Department

Key words: Superoxide dismutase, oxidative stress, salt stress, transgenic tomato.

Journal of Applied Horticulture, 2007, volume 9, issue 1, pages 3-8.

[Full text PDF |](#)

Abstract: Production of reactive oxygen species (ROS) is associated with a number of physiological disorders in plants. Superoxide dismutase (SOD) catalyzes the breakdown of superoxide (O_2^-) into O_2 and H_2O_2 and provides the first line of defense against the toxic effects of elevated levels of ROS. The effect of increased expression of Mn superoxide dismutase (Mn-SOD) on salt stress tolerance was studied using transformed tomato (*Lycopersicon esculentum* cv. Zhongshu No. 5) plants. Northern blots confirmed expression of the heterologous Mn-SOD in transgenic plants. Strong Mn-SOD enzyme activity was detected by native PAGE in transformed plants. Transgenic plants showed resistance to the superoxide-generating herbicide methyl viologen (MV, 10^{-4} M). The total SOD activity was one and one half- to two-fold higher, and APX (ascorbate peroxidase) activity was six to seven fold higher in transgenic, than in wild-type (WT) plant under MV stress. Germination of transgenic tomato seeds at a NaCl concentration of 150 mM was greater than wild-type seeds. When exposed to salt stress, roots of transgenic plants were less stunted and leaf injury was lower than that observed in WT plants. Also, the total APX activity of transgenic plants was 4 to 5 fold higher than that of WT under NaCl (200 mM) stress.

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Tolerance of lilyturf (*Liriope muscari*) and four perennial ornamental grasses to preemergent herbicides

James T. Cole and Janet C. Cole

Department of Horticulture and Landscape Architecture, Oklahoma State University, Stillwater, OK 74078-6027, USA

Key words: *Briza media*, *Chasmanthium latifolium*, *Imperata cylindrica*, *Liriope muscari*, *Pennisetum alopecuroides*, phytotoxicity, weed control.

Journal of Applied Horticulture, 2007, volume 9, issue 1, pages 31-36.

Abstract: Tolerance of field- and container-grown lilyturf (*Liriope muscari* (Decne.)), (Liliaceae) and four species of ornamental grasses (Poaceae),

perennial quaking grass (*Briza media* L.), Japanese bloodgrass (*Imperata cylindrica* (L.) Beauv. 'Red Baron'), river oats (*Chasmanthium latifolium* (Michx.) Yates) and dwarf fountain grass (*Pennisetum alopecuroides* (L.) Spreng. 'Hameln'), to five preemergent herbicides (isoxaben, oryzalin, oxadiazon, oxyfluorfen, and prodiamine) was evaluated. Grasses were planted in the fall of 1997 and in the spring of 1998. Herbicides were applied to the fall planting in the spring of 1998. The April, 1998 plantings received herbicide applications within two or 45 days after planting. Herbicides were applied within two days of planting in May and June of 1998. All species in the field and containers were damaged most by oxyfluorfen, followed by oxadiazon; however, injury was not as severe with oxadiazon as with oxyfluorfen. The oxadiazon-treated plants recovered more quickly than oxyfluorfen-treated plants. Plants were least damaged by prodiamine, oryzalin, and isoxaben. Field-grown Japanese bloodgrass, dwarf fountain grass and lilyturf were generally less damaged when herbicide was applied in June, regardless of planting date or herbicide applied than by the April herbicide application. Prodiamine, oryzalin, or isoxaben caused few phototoxicity symptoms in the species tested, but oxyfluorfen and oxadiazon caused unacceptable injury.

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Effect of cultivars on storage losses in onion under hot conditions

Naser Alemzadeh Ansari

Faculty of Agriculture, Shahid Chamran, University, Ahwaz, Iran.

Key words: *Allium cepa*, *Aspergillus niger*, cultivars, life storage, onion
Journal of Applied Horticulture, 2007, volume 9, issue 1, pages 37-40.

Abstract: In Khuzestan (South Iran), onion bulbs are usually formed and harvested in spring and consumed either in the same season or during summer while some of these are kept for seed production. In order to study the losses in onion bulbs under hot store conditions, an experiment was conducted in autumn 2002 and spring 2003. The data were collected on five cultivars being produced at Shahid Chamran University, two local cultivars and three of those under commercial cultivation. The collected bulbs were kept in 30 x 50cm boxes, 15 cm in height. The experiment was replicated three times in completely randomized design. Data on change in number, weight of the healthy bulbs and decayed bulbs were recorded every 15 days. No bulb root was produced during the storage when maximum, average and minimum temperature were 48, 33 and 25°C, respectively with the average relative

humidity (RH) of 30%. As far as storage life was concerned, there was a significant difference among the varieties. Compared to both the local and market bulbs, those produced at Shahid Chamran University showed more storage life. Another important finding of this research was that 50% of the local and university bulbs remained unspoiled after 120 days, whereas the Taxes Yellow Grano, Taxes Early Grano and G1 had the short storage life; 50% of the stock were destroyed after 60 days. In the present study, *Aspergillus niger* was found to be the most important factor responsible for onion decay in hot stores of Khuzestan.

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N-NO₃ from cellular extract as an indicator of nutritional status of cantaloupe muskmelon in fertigation

Maria Remedios Cigales Rivero and Octavio Perez Zamora

Centro Universitario de Investigacion y Desarrollo Agropecuario Universidad de Colima. Km 40Autopista Colima-ManzanilloTecomdn, Col. 28100Mexico. InstitutoNacionaldeInvestigacionesForestales, Agricolas y Pecuarias. Campo Experimental Tecomdn.

Key words: *Cucumis melo* L., nitrogen fertilization, petiole sap, export product, soil moisture

Journal of Applied Horticulture, 2007, volume 9, issue 1, pages 41-45.

Abstract: In cantaloupe farming (*Cucumis melo* L.), the production of export quality fruit require nutritional indicators that allow an adequate management of nitrogen fertilization and irrigation water supply. This study with cantaloupe muskmelon was carried out to test four nitrogen fertilization treatments and three levels of soil moisture tension under field conditions. Nitrate content (N-NO₃) in the cellular extract was evaluated as an indicator of nutritional status. Significant correlation was found between the lowest nitrate concentrations in the petiole sap and the N fertilization doses in three different sample periods. The effect of soil moisture tension on nitrate concentration varied in both years; this was attributed to soil temperature differences. Results showed that it is feasible to establish outcome predictions of yield and quality of the fruit based on the nitrate concentration in petiole sap, concluding that this is an adequate indicator of the nutritional status of the cantaloupe plant. However, its use as a guide for managing fertilization and irrigation must include a permanent follow up of the crop that evaluates the effects of environmental factors in plant growth and uptake of the nutrients.

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Thinning response of 'Abbe Fetel' pear to lime sulphur

P.I. Garriz, H.L. Alvarez, G.M. Colavita and M.S. Gajdos

Faculty of Agriculture, Comahue National University, c.c. 85, 8303 Cinco Saltos, R.N., Argentina.

Key words: Flower thinning, fruit size, growth curves, lime sulphur, maturity, *Pyrus communis*.

Journal of Applied Horticulture, 2007, volume 9, issue 1, pages 46-49.

Abstract: Thinning is a central management activity in the production of high quality fruit required for the domestic and export market. Early thinning of fruit trees is important since it influences fruit size and the time of application affects flower bud formation for the following season. Furthermore, finding organic blossom thinners is a major challenge as hand thinning is a costly practice. At the High Valley region of Argentina (lat. 38°56' 67°59'W), lime sulphur was evaluated as flower thinner on 'Abbe Fetel' (*Pyrus communis* L.) pear trees trained to palmette leader. Treatments were 1) control, and 2) 7 % lime sulphur applied at 30 % bloom, using an orchard sprayer. Fruit diameter (FD) was recorded two weekly (n=20 per date and treatment). At 144 days after full bloom (DAFB), or initial commercial harvest, fruit weight and the maturity indices were determined. Fruits were then graded into size categories. Growth equations were developed using non linear regression and mean separations were computed with Student's t-test. The lime sulphur sprays significantly increased mean FD, starting from 115 DAFB. Logistic model best fitted the fruit growth vs. time curves. Percentage of fruits with <65mm diameter was 25 % for the control and 5.26 % for lime sulphur treatment. Treatment 2 increased final fruit weight by 16.5 %, as compared to the untreated pears. At 144 DAFB, thinned trees showed firmer fruits than the controls (64.4 vs. 61.7 N) and there were no statistical differences among treatments in soluble solids concentration and starch index. Consequently, data indicated that lime sulphur at 7 % was an effective flower thinning agent to enhance 'Abbe Fetel' pear seasonal fruit growth and quality.

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Growth, fruit yield and quality of 'Golden Delicious' apple trees under fixed partial rootzone drying

G. Talluto, V. Farina and R. Lo Bianco

Dipartimento S.En.Fi.Mi.Zo., Sezione di Frutticoltura Mediterranea, Tropicale e Subtropicale, Università degli Studi di Palermo, Viale delle Scienze 11, 90128Palermo, Italy.

Key words: Canopy size, crop load, deficit irrigation, fruit growth, fruit quality, leaf area, shoot length, stomatal conductance, yield.

Journal of Applied Horticulture, 2007, volume 9, issue 1, pages 50-55.

Abstract: We investigated the vegetative and productive responses of 'Golden Delicious' apple (*Malus domestica* Borkh.) trees to fixed partial rootzone drying under the dry climate of central Sicily. Soil water content (SWC), stomatal conductance, yield, fruit quality, fruit growth, and vegetative growth of conventionally irrigated trees (CI), where drip emitters on both sides of each tree were left open, were compared to that of fixed partial rootzone drying (FPRD) trees where only one side of the rootzone was irrigated for the entire season thus receiving 50% of the CI irrigation water. The irrigation season started on 31 July and ended on 13 September, 2004. Wet and dry rootzone sides showed significantly different SWC from 16 August until 14 September, whereas stomatal conductance of CI and FPRD trees differed significantly starting on 24 August. Relative growth rate of CI fruit was higher than that of FPRD fruit on 27 and 31 August, but fruit size was similar during the entire sampling period and at harvest. Trees of the two treatments had similar yields, number of fruits, crop load, fruit:leaf ratio, fruit quality, tree height, wood fresh and dry weight, canopy spread area, volume and density, shoot length and number, internode length, and leaf area. FPRD trees had higher yield efficiency, thinner shoots, lower leaf water content, higher canopy density and leaf dry weight and specific leaf weight than CI trees. Our observations suggest the extent of possible water savings without loss of yield and fruit quality using this partial rootzone drying strategy in 'Golden Delicious' apple orchards of central Sicily.

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Soil, plant and canopy resistance to water flow in bell pepper (*Capsicum annuum* L.) as affected by fertigation regimes

S.O. Agele

Department of Crop, Soil & Pest Management, Federal University of Technology, PMB 704, Akure, Nigeria

Key words: Bell pepper, fertigation, hydraulics, stomata, canopy, leaf

potential, water uptake

Journal of Applied Horticulture, 2007, volume 9, issue 1, pages 56-61.

Abstract: The effect of fertigation regimes on water transport properties (soil, plant and canopy resistances) through the plant to the canopy in the Soil-Plant-Atmosphere-Continuum (SPAC) was studied in bell pepper in a Mediterranean climate. The treatments consisted of fertigated drip irrigation in factorial combinations of three levels (amounts) of water application (daily, twice and once weekly) and application frequencies (2, 6 and 10 times per fertigation event). Leaf water potential and stomatal conductance were monitored while whole plant hydraulic conductance was estimated by the evaporative flux method, using the Ohm's law analogy (the slope of the water potential difference (Δy) versus sap fluxes). Canopy conductance (inverse of resistance) was estimated from vapour pressure deficit (vpd) and transpiration flux. Differences in the intervals between fertigation events altered the environment for root development and affected soil moisture status, stomatal conductance (g_s), leaf water potential (lwp), transpiration (sap) flux, and xylem and canopy water transport capacities in bell pepper. The components of the resistance elements in the SPAC differed under the fertigation treatments. Total plant resistance (R_p) increased with transpiration flux in a linear manner in addition to a proportional decrease in stomatal (g_s) and canopy conductance (g_c). Canopy component constitutes the least resistance (greatest conductance) to the flow of water, estimated soil resistance was much lower than total resistance to the flow of water, and the highest within plant resistance is contained in the root system which constituted a predominant part of total plant resistance. Bell pepper has an efficient xylem sap transport system, maintains g_s and plant water status under variable soil moisture regimes. Bell pepper water use is affected by soil environment, plant architectural and xylem traits. The mechanisms underlying differences in water use and plasticity of physiological functions in bell pepper under variable fertigation regimes appeared to be offered through changes in the magnitudes of component resistances of the water transport pathways in the SPAC. The implications of knowledge of the magnitudes of the resistances to water flow pathway in the SPAC to irrigation management is discussed.

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Chlorine disinfection: effects on hydroponics lettuce

Zdenka Premuzic, Hemilse E. Palmucci, Juan Tamborenea and Martin Nakama
Catedra de Quimica Analitica, Catedra de Fitopatologia, Investigador alumno.
Facultad de Agronomia de la Universidad de Buenos Aires (FAUBA) Av. San

Martin 4453. Capital Federal (1416), ⁴Instituto de Floricultura -INTA-CASTELAR. De los Reserrosy

Key words: *Lactuca sativa*, hydroponic, chloride, nitrate, vitamin C, nitrogen, phytotoxicity, pH, electrical conductivity

Journal of Applied Horticulture, 2007, volume 9, issue 1, pages 62-65.

Abstract: Disinfection by chlorination was applied to the solution of a soilless closed system of *Lactuca sativa* varieties, Gallega and Mantecosa. The aim was to study the effect of the addition of different doses of chlorine on the production (fresh weight and dry matter), quality (nitrates, vitamin C and nitrogen contents), and phototoxicity to lettuce (chlorosis) with regard to the chemical properties of the solution (pH, electrical conductivity EC and chlorides). Four treatments were applied: 0.55, 5.5 and 11 mg L⁻¹ (ppm) of chlorine and a control without addition of chlorine. The 11 mg L⁻¹ treatment produced a decrease in production of Gallega, presenting a 40 % lower fresh weight than the control. Both varieties presented high contents of nitrates. Gallega presented the maximum values (2920- 8158 mg kg⁻¹) and showed values under the permissible limit with the 0.55 and 5.5 mg L⁻¹ treatments. Mantecosa showed lower maximum values (3787- 5291 mg kg⁻¹), although with all the values above the limits of permission. The contents of nitrogen for both varieties exceeded the levels of sufficiency in all the treatments. This fact was related to the high nitrogen supply provided by the fertirrigation that contributed to the high nitrate contents. Gallega presented larger contents of vitamin C (19.3-28 mg.100g⁻¹) than Mantecosa (15.3?19.98 mg 100g⁻¹). Chlorination did not affect the chemical properties of the solution (pH and EC remained between the appropriate range for the species). Chloride contents in the nutrient solution were larger at the 11ppm doses; however the values remained under the toxicity levels for the species. For both the varieties, 0.55 mg L⁻¹ treatment produced the highest fresh weight and vitamin C contents and the lowest nitrate contents and toxicity symptoms (chlorosis), while 11 mg L⁻¹ treatment resulted more chlorosis and necrosis of leaves, diminishing the commercial quality of the plants.

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Tulip cultivar response to Flurprimidol preplant bulb soaks

Brian A. Krug, Brian E. Whipker, Ingram McCall and John M. Dole

Department of Horticulture Science, Box 7609, North Carolina State University, Raleigh, NC 27695-7609

Key words: Paclobutrazol, piccolo, plant growth regulators, uniconazole
Journal of Applied Horticulture, 2007, volume 9, issue 1, pages 66-68.

Abstract: Flurprimidol preplant bulb soaks (10 to 40 mg L⁻¹) were applied to tulip (*Tulipa* sp. L.) bulbs for growth control. Three tulip cultivars ('Page Polka', 'Prominence' and 'Red Present') were used to determine if the efficacy of flurprimidol varied by cultivar. Flurprimidol was compared to paclobutrazol (50 and 100 mg L⁻¹) and uniconazole (10 and 20 mg L⁻¹). Flurprimidol preplant bulb soaks significantly ($P < 0.05$) controlled tulip plant height during the greenhouse forcing when applied to 'Page Polka' and 'Prominence' at concentrations > 15 mg L⁻¹ and > 10 mg L⁻¹, respectively. A concentration of 40 mg L⁻¹ was needed to control plant height during the postharvest evaluation for 'Page Polka' while concentrations > 15 mg L⁻¹ controlled postharvest plant height for 'Prominence'. No control during forcing or postharvest was provided by any concentration tested on 'Red Present'. The differences observed indicate that the efficacy of flurprimidol as a preplant bulb soak varied with cultivars. In order to determine optimal cultivar doses, growers will need to conduct their own tulip cultivar trials, with flurprimidol concentrations ranging between 10 and 40 mg L⁻¹.

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Effect of Ni on yield, quality and N assimilation of cucumber (*Cucumis sativus* L.) grown with urea or nitrate

S.J. Tabatabaei

Faculty of Agriculture, The University of Tabriz, PO Box 51664, Tabriz, Iran

Key words: Ni, cucumber, N, yield, quality, urea, nitrate

Journal of Applied Horticulture, 2007, volume 9, issue 1, pages 69-73.

Abstract: The effects of Ni concentrations in the nutrient solution on the yield, quality and N assimilation of cucumber plants were evaluated in plants grown either with urea or nitrate as the sole N source. The cucumber plants (*Cucumis sativus* cv RS189 and Vikima) were treated with two N sources, urea and nitrate as NaNO₃ at 200 mg L⁻¹, and three concentration of Ni as NiSO₄.6H₂O (0, 0.5, and 1 mg L⁻¹). Treatments were arranged in a randomized block design with six replicates. The highest concentration of Ni in the leaves (1.2 mg kg⁻¹ DW) was observed in the urea-fed plants at 1 mg L⁻¹ Ni concentration. Addition of Ni up to 0.5 mg L⁻¹ had no effect on the fruit Ni concentration in the both urea and nitrate-fed plants. Ni supplement (0.5 mg L⁻¹) increased the

yield significantly (10 and 15% in RS189 and Vikima, respectively), in urea-fed plants but decreased when 1 mg L⁻¹ Ni applied to the solutions. Nitrate-fed plants had higher percentage of total soluble solids compared to urea-fed plants. Nitrate concentration of the fruits in urea-fed plants in both cultivars was approximately 50% less than those nitrate-fed plants. The reduction of nitrate concentration in the fruits became more pronounced as the Ni concentration increased in the solution. The rate of photosynthesis (Pn) in urea-fed plants continuously increased with the increase of the Ni concentration in the solution. Both N concentration and NR (Nitrate Reductase) activity of young leaves were higher in urea-fed plants at 0.5 mg L⁻¹ Ni concentration. Ni supplements enhanced the growth and yield of urea-fed plants by the increase of Pn, N concentration and NR activity. It can be concluded that Ni supplements (0.5 mg L⁻¹) improves yield, quality and NR activity in urea-fed cucumber plants.

Volume 9(1), 2007

Effect of different fertilizer sources on the quality of head cabbage

Emilia Atanasova, Ivanka Mitova, Ilko Dimitrov and Ira Stancheva

N. Poushkarov Institute of Soil Science, National Center of Agricultural Sciences, 7-Shosse Bankya str. 1080 Sofia, Bulgaria; Acad. M. Popov Institute of Plant Physiology, Bulgarian Academy of Sciences, Acad. G. Bonchev str., Bl. 21, 1113 Sofia, Bulgaria

Key words: Head cabbage, quality parameters, foliar fertilization, fertilizer application

Journal of Applied Horticulture, 2007, volume 9, issue 1, pages 74-76.

Abstract: The influence of different fertilizer sources on head cabbage (*Brassica oleracea* var. *capitata*, cv. Pructor) yield and quality was studied. The field experiment was carried out on alluvial - meadow soil (*fluvisol* -FAO) pH 6.5. The trial included mineral fertilizer, farmyard manure and foliar fertilizer. The highest yield values were obtained with mineral fertilization. The best quality parameters in the cabbage leaves - dry weight, total soluble sugars, cellulose, vitamin C and nitrates content were obtained in the treatments with foliar fertilization followed by the treatments with organic fertilization. The observed decrease of N and K residuals after the harvest of head cabbage crop in comparison with the initial soil reserves indicated complete absorption of fertilizers supplied and this is a very important result from ecological point of view.

Volume 9(1), 2007

Effect of sucrose concentration on somatic embryogenesis in carnation (*Dianthus caryophyllus* L.)

A. Deljou, O. Karami and P. OstadAhmadi

Department of Biotechnology, Faculty of Agriculture, Bu-Ali Sina University, Hamadan, Iran.

Key words: Carnation, embryogenic callus, somatic embryos, sucrose.

Journal of Applied Horticulture, 2007, volume 9, issue 1, pages 77-80.

Abstract: The effect of sucrose concentration was investigated on callus induction and differentiation of embryogenic callus derived from petal explants of carnation cultivar Nelson'. Embryogenic calli were produced on MS culture medium containing 9 μ M 2,4-dichlorophenoxy acetic acid (2,4-D), 0.8 μ M 6-benzyladenine (BA) and different concentrations of sucrose alone or in combination with sorbitol. In constant osmotic potential medium, number of explants containing embryogenic calli was significantly enhanced by increasing the sucrose concentration. Somatic embryos were induced on a hormone-free media containing various concentrations of sucrose alone or in combination with sorbitol. Different sucrose concentrations from 50 to 150 mM significantly increased somatic embryos. No callus and embryo formed when sorbitol was the sole carbon source. In the presence of a constant sucrose concentration, increasing the osmotic potential with sorbitol led to increase in the frequency of somatic embryos. In medium containing low concentration of sucrose (50 and 100 mM), reduced development of embryos was recorded. 90% of somatic embryos were regenerated to form the entire plantlets when they were transferred onto the half-strength MS culture medium containing 3% sucrose. Plantlets also continued to grow under greenhouse condition.

Volume 9(1), 2007

Response of tomato to transplant drench, foliar organic-complex Ca, B, K and yield enhancement amendments

Paul B. Francis and C. Robert Stark, Jr.

Division of Agriculture Faculty, University of Arkansas at Monticello, P.O. Box 3508, Monticello, Arkansas 71656, USA

Key words: Tomato, foliar nutrient amendments, B, K, Ca, yield enhancement, fruit-set, biostimulants, *Lycopersicon esculentum*

Journal of Applied Horticulture, 2007, volume 9, issue 1, pages 81-83.

Abstract: Field studies were established in 2004 and 2005 to determine the effects of transplant drench and foliar applications of organic-complex Ca, B, K amendments and a yield enhancement product, 'Perc Plus™', on the flowering, fruiting, fruit yield and market value of Italian-cv. 'Classica' and large-fruited cv. 'Amelia' tomato (*Lycopersicon esculentum* Mill.). Treatments were an organic yield enhancement applied as a transplant drench and then foliar 7 days later (TD); once a week foliar amendments of organic-complex Ca, B, and K nutrients beginning at first bloom for 4 weeks (FA); a combination of the drench and foliar treatments (TD+FA); and a control (CON). Fruit-set of 'Classica' was significantly higher for the FA and TD+FA than the other treatments in 2004, however there was no effect on yield and quality of harvested fruit. Flowering and fruit-set of 'Amelia' were not affected by drench and/or foliar amendments in either year. Total fruit yield and quality of the treated plots were not significantly different than the CON for either cultivar or year.

Volume 9(1), 2007

Variation in growth, dry matter production, nitrogen and potassium uptake by six *Musa* genotypes in a soilless culture

K.P. Baiyeri and E. Ortese

Department of Crop Science, University of Nigeria, Nsukka, Nigeria;
Department of Crop Science, Akperan Orishi College of Agriculture, Yandev,
Benue State, Nigeria.

Key words: Bananas and plantains, genotypic differences, nutrient uptake.

Journal of Applied Horticulture, 2007, volume 9, issue 1, pages 84-88.

Abstract: Six genotypes comprising a landrace and a hybrid from each of the three *Musa* major genomic groups were evaluated in a soilless potting mix. Effect of genotype on most of the growth parameters was non-significant. But the uptake (total quantity accumulated, distribution pattern and tissue concentration) of N and K was significantly ($P < 0.05$) influenced by genotype (G), age of plant at sampling (AP) and G x AP interaction. Dessert bananas had higher N uptake while 'PITA 22' (a plantain hybrid) demonstrated an exceptional propensity for K uptake. Nitrogen and potassium concentration varied with tissue, genotype and age of plant at sampling. Nitrogen concentration in roots and leaves decreased with plant age while it increased in

the corm. Potassium concentration in roots, corm and leaves increased progressively with plant age in all the genotypes. Significant differences in the quantity of N and K accumulated per plant, even though all the genotypes were planted in the same potting mix, suggested differential nutrient mining capacity of the genotypes. Implying that nutrient uptake and consequently nutrient demand varies with genotype, supplemental application would vary accordingly. The study suggested that genotype that had higher nutrient uptake will impoverish the soil faster, and thus require more external nutrient inputs to maintain/restore soil productivity.

Volume 9(1), 2007



Some changes in postharvest physiology and activities of glutamine synthetase in broccoli head supplied with exogenous sucrose during storage

Dewoowoogen P. Baclayon, Toshiyuki Matsui, Haruo Suzuki and Yusuke Kosugi
Department of Applied Biological Sciences, Faculty of Agriculture, Kagawa University, Miki, Kagawa 761-0795, Japan

Key words: Ammonia, ethylene, postharvest life, respiration, broccoli
Journal of Applied Horticulture, 2007, volume 9, issue 1, pages 9-12.

[Full text PDF |](#)

Abstract: Sugars play indispensable roles in many metabolic processes in plants. In broccoli, the level of sugars, particularly sucrose, rapidly decline few days after harvest. This study investigated the influence of exogenous application of 10% (w/v) sucrose to broccoli heads during storage at 20°C. Hydration of the head was slowed down by sucrose treatment compared with the non-treated heads which gained weight by about 5% of the initial value at the end of the experimental period. Furthermore, sucrose application enhanced ethylene production as well as respiration rate. Glutamine synthetase (GS; EC 6.3.1.2) activity was higher in the florets of sucrose-treated heads but, like the non-treated heads, the activity continuously declined until the end of the storage period. The relatively higher GS activity during the early period of storage caused the delay of the onset of ammonia accumulation by about a day. In the branchlet portion, GS activity was higher in the sucrose-treated heads until day 2 but declined thereafter. The decline in GS activity in this portion, however, did not result to ammonia accumulation.

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Volume 8(2), 2006



Induction of phenolic compounds biosynthesis with light irradiation in the Tesh of red and yellow apples

D. Bakhshi and O. Arakawa

Faculty of Agriculture and Life Science, Hirosaki University, 3 Bunkyocho, Hirosaki, Aomori, 036-8561, Japan.

Key words: Apple, light irradiation on flesh, ultraviolet-B, flavonoids, phenolic acids, high performance liquid chromatography

Journal of Applied Horticulture, 2006, volume 8, issue 2, pages 101-104.

[Full text PDF](#) |

Abstract: Effect of light irradiation on the accumulation of phenolic compounds was investigated in the flesh slices of three apple (*Malus domestica* Borkh.) cultivars. 'Fuji' and 'Jonathan' with red skin and 'Orin' a yellow-green one were used in this study. The irradiation was carried out at 10, 17, 24 and 30C for 96 hours, using a mixture of white plus ultraviolet fluorescents. Phenolic acids, anthocyanin and flavonols were the phenolics that increased rapidly by irradiation whereas flavanols, procyanidins and dihydrochalcones did not change in either mature or in ripe fruits of all the three cultivars. There was a positive correlation between anthocyanins, phenolic acids and flavonols in examined cultivars both at the mature and ripe stages. Optimum temperature for the synthesis of phenolic acids, anthocyanins and flavonols was 24C regardless to the maturity stage and variety. Total phenolic content of 'Fuji' increased through ripening but it decreased in 'Jonathan' and 'Orin'. Therefore, the irradiation to the flesh might be a very useful method for the study of the regulation mechanism of the phenolic compounds accumulation.

Volume 8(2), 2006

a* values to follow lycopene concentration during ripening and storage of tomato (cv. Caruso)

Axelle Schauwers, Ada M.C.N. Rocha and Alcina M.M.B. Morais

KaHo Sint-Lieven Campus Rabot, Departement Industrieel Ingenieur, Gebr. Desmetstraat 1, 9000 Gent Belgium; Faculdade de Ciencias da Nutricao e Alimentacao, Universidade do Porto, Rua Dr. Roberto Frias, 4200 - 465 Porto, Portugal; Corresponding author: Escol

Key words: Tomato, *Lycopersicon esculentum* Mill., lycopene, colour, ripening, storage

Journal of Applied Horticulture, 2006, volume 8, issue 2, pages 105-108.

Abstract: The ripening of tomato fruit is a highly regulated process during which colour, flavour, aroma and texture change in a coordinated manner. This research work aims to correlate the colour changes measured objectively with the lycopene concentration in tomatoes during ripening at room temperature (21 and 26°C). These results were compared with colour and lycopene content of pink and light red tomatoes stored at 14°C, temperature used to prevent ripening and therefore extend the shelf life of the fruits. The duration of heat treatment at 100°C was previously optimized in order to release the maximum lycopene from chromoplasts during extraction. An a^* value of 20 for the peel corresponds to an increase of lycopene content of *Caruso* tomato from 9 to 43 mg/100 g TSS, at room temperature. The shelf life of pink and light red tomatoes can be extended to two weeks at 14°C without loss of lycopene content, presenting the same content as green tomatoes ripened at room temperature for one week.

Volume 8(2), 2006



Effects of abusive temperatures on the postharvest quality of lettuce leaves: ascorbic acid loss and microbial growth

Maria del R. Moreira, Alejandra G. Ponce, Carlos E. del Valle, R. Ansorena and S. I. Roura

Universidad Nacional de Mar del Plata, Argentina; Consejo Nacional de Investigaciones Cientificas y Tecnicas (CONI-CET), Argentina. .Corresponding author: Moreira Maria del Rosario, Grupo de Investigacion en Ingenieria en Alimentos, Facultad de Ingenieria,

Key words: Abusive temperature storage, nutritional quality, microbiological quality, shelf life, growth models, lettuce, *Lactuca sativa*, ascorbic acid retention

Journal of Applied Horticulture, 2006, volume 8, issue 2, pages 109-113.

[Full text PDF |](#)

Abstract: Changes in lettuce leaf quality (ascorbic acid contents and microbial populations) at two abusive temperatures (8 and 15°C), simulating the commercial storage conditions for fresh vegetables were analyzed. A storage temperature of 8°C was chosen to simulate abusive refrigerated storage and a storage temperature of 15°C was chosen to simulate room temperature. Quality indicators evaluation in samples, stored at abusive temperatures were compared with sample from optimal storage temperature (0°C). First order kinetics is assumed for ascorbic acid degradation. Ascorbic acid degradation rate in lettuce leaves stored at abusive temperatures was from 2.7 to 2.9 times faster than at 0°C. The growth curve of total microbial counts was fitted with the Gompertz and Logistic models. These models allowed us to predict the vegetable microbiological shelf life. Temperature is the controlling factor for lettuce shelf life and quality; microbial quality was retained 1.6 and 4 times longer at 0°C with respect to 8 and 15°C, respectively.

Volume 8(2), 2006

Shelf-life and quality of apple fruits in response to postharvest application of UV-C radiation

Syavash Hemmaty, Noorollah Moallemi and Lotfali Naseri

Jahad-e-Daneshgahi, Urmia University, Urmia, Iran; Department of Horticulture, Shahid Chamran University of Ahvaz, Ahvaz, Iran; Department of Horticulture, Urmia University, Urmia, Iran.

Key words: UV-C irradiation, apple, 'Golden Delicious', 'Red Delicious', fruit quality.

Journal of Applied Horticulture, 2006, volume 8, issue 2, pages 114-116.

Abstract: In this study, UV-C irradiation ($1.435 > < 10^{-4}$ w cm⁻²) was used to maintain fruit quality of 'Red Delicious' and 'Golden Delicious' apple cultivars during storage. Apple fruits were irradiated in three different treatments (0, 5 and 15 min), and were stored in a cold storage at 1±1°C with 85-95% RH for 6 months. At the end of storage, irradiated fruits for 15 min had lower pH and total soluble solids/titratable acids ratio and higher titratable acids and firmness than irradiated fruits for 5 min and control fruits. A significant difference was observed among total soluble solids of irradiated 'Red Delicious' fruits for 15 min, irradiated fruits for 5 min and control fruits at the end of storage. 'Red Delicious' apples had lower total soluble solids and total soluble solids/titratable acids ratio and higher firmness than 'Golden Delicious' apples

after 6 months. Our results showed that UV-C irradiation can be used to reduce loss of fruit quality during long period storage of apples.

Volume 8(2), 2006



Effects of sugars and aminooxyacetic acid on the longevity of pollinated *Dendrobium* (Heang Beauty) Towers

S. Chandran, C.L. Toh, R. Zuliana, Y.K. Yip, H. Nair and A.N. Boyce

Institute of Biological Science, University of Malaya, 50603 Kuala Lumpur;
Asian Institute of Medicine, Science and Technology, 2 Persiaran Cempaka,
Amanjaya, 0800 Sungai Petani, Kedah Darul Aman, Malaysia

Key words: *Dendrobium*, pollination, ethylene, AOA, flowers, discoloration, sucrose, glucose

Journal of Applied Horticulture, 2006, volume 8, issue 2, pages 117-120.

[Full text PDF](#) |

Abstract: The vase life of detached pollinated *Dendrobium* (Heang Beauty) orchids are affected by loss of energy source and the production of pollination-induced ethylene. The physiological changes that follow these two events are discoloration, thinning of petals and hyponasty. In order to circumvent this problem, individual detached pollinated *Dendrobium* (Heang Beauty) flowers were treated with solutions containing different concentrations of sucrose or glucose, Aminooxyacetic acid (AOA) and a combination of sugars and AOA. Discolouration, petal thickness and hyponasty were observed and data was recorded daily. Weight loss of flowers and pH of all solutions were also measured daily. Results showed that the best treatment solution in extending the longevity of the flowers were solutions containing 4% sucrose + 0.5mM AOA. Flowers held in this treatment also showed a delay in discoloration, thinning of petals and hyponasty. The inclusion of AOA into solutions resulted in low pH and contributes to better water uptake and delayed turgor loss in flowers.

Volume 8(2), 2006

Agronomic attributes of saffron yield at agroecosystems scale in Iran

A. Koocheki, M.A. Behdani and M. Nassiri

Center of Excellence for Special Crops, Ferdowsi University of Mashhad, Mashhad, Iran; Faculty of Agriculture, The University of Birjand, P.O.Box. 97175/331, Birjand, Iran

Key words: Saffron, irrigation interval, summer irrigation, corm size

Journal of Applied Horticulture, 2006, volume 8, issue 2, pages 121-124.

Abstract: In order to study effective factors in production of saffron, a series of studies was carried out during 2001 and 2002. In these studies, four selected location, Birjand, Qaen, Gonabad and Torbat-Haydarieh were spotted as the main saffron producing areas in Iran. Data was collected from 160 saffron farms, aged between 1 and 5 years. Results indicated that age of saffron farms, corm size, irrigation interval, and summer irrigation had positive linear relationship with yield. Age of saffron farms had the most pronounced effects on yield and was the most important component in all linear equations. Age of farms, irrigation intervals and corm size were major factors contributing to yield. The longest irrigation interval was observed for Gonabad (24 days) and the shortest was for Torbat-Haydarieh (12 days). Highest actual yield was for Torbat-Haydarieh which is an indication of better farm management in comparison with other areas. Maximum yield of 4 kg ha⁻¹ was frequent but many farms produced over 7 kg ha⁻¹ yield.

Volume 8(2), 2006

Effect of bud scale removal and AOA on bud break and ACC content of 'Muscat Bailey A' grapevines

Ali R. ElShereif, Fusao Mizutani, Justus M. Onguso and A.B.M. Sharif Hossain

Faculty of Agriculture, Ehime University, Hattanji 498, Matsuyama City, Ehime 799-2424, Japan; Horticulture Department, Faculty of Agriculture, Kafr El-Sheikh University, 33516 Kafr El-Sheikh, Egypt.

Key words: Aminooxy acetic acid, AOA, 1-aminocyclopropane-1-carboxylic acid, bud break, bud scale removal, dormancy, ethylene biosynthesis, grape.

Journal of Applied Horticulture, 2006, volume 8, issue 2, pages 125-128.

Abstract: A study was carried out to examine the effect of bud scale removal (BSR) and aminooxy acetic acid (AOA) on bud break and 1-aminocyclopropane-1-carboxylic acid (ACC) content of 'Muscat Bailey A' grapevines using single-eye cuttings. Samples were collected monthly from October to February. Single-eye cuttings were subjected to these treatments; BSR, BSR + AOA,

control and AOA. The results show that in October and November, BSR and BSR + AOA were more effective on bud break without big difference between the two treatments. Whereas, control and AOA were found to be more effective from December up to February. In October, ACC content recorded a marked increase after one week and decreased afterwards under BSR and BSR + AOA. However, it showed a continuous increase under control and a reverse trend under AOA. In November, it increased after one week and decreased in the fourth week under all treatments. A continuous increase was recorded in December under all treatments. In January, there was no significant change under control with time and AOA treatment exhibited decline with time, while BSR and BSR + AOA treatments recorded small increment and then decreased. In February, it decreased under all treatments with time. The results indicate that bud break of grapevine seems to be associated with the promotion of ethylene biosynthesis caused by wounding stress.

Volume 8(2), 2006

Effect of exogenous application of anti-stress substances and elemental sulphur on growth and stress tolerance of tissue culture derived plantlets of date palm (*Phoenix dactylifera* L.) cv. 'Khalas'¹ during acclimatization -

Mohamed. A. Awad, A. A. Soaud and S. M. ElKonaissi

Department of Aridland Agriculture, College of Food and Agriculture, UAE University, P.O.Box. 17555 Al-Ain, United Arab Emirates. Permanent address: Faculty of Agriculture, Pomology Department, Mansoura University, El-Mansoura/Egypt.

Key words: Tissue culture, acclimatization, elemental sulphur, gamma aminobutyric acid, salicylic acid, aspirin, vitamin E, oleic acid, ABG-3168, *Phoenix dactylifera* L.

Journal of Applied Horticulture, 2006, volume 8, issue 2, pages 129-134.

Abstract: There is a high demand for date palm plantlets regenerated via tissue culture techniques. However, such plantlets require a long acclimatization period extending 12-18 months before transplanting in the open field. The effect of foliar and soil application of anti-stress substances and elemental sulphur, respectively, on growth and survival percentage of tissue culture-derived 'Khalas' date palm plantlets during acclimatization were studied. The results showed that application of salicylic acid, acetyl salicylic acid (aspirin), elemental sulphur, plantacur-E (a vitamin E formulation containing 25% α -tocopherol) at 1%, and oleic acid at 100 ppm, significantly

increased plantlet survival percentages compared to the control. In this respect, gamma aminobutyric acid (GABA) at 20 mM was the most effective treatment compared to 10 mM and the control. Salicylic acid, aspirin, elemental sulphur and plantacur-E (at 2%) significantly increased the concentrations of Fe, Mn, Zn, and Cu in leaflets compared to the control. However, the macro nutrients showed no clear response to the applied treatments. Application of 250 ppm of the ethylene biosynthesis blocker, ABG-3168 (ABG), inhibited the growth of plantlets, and completely suppressed growth at 500 ppm, suggesting the potential role of ethylene biosynthesis in subsequent plantlet development. Irrigation with 10,000 ppm sea water for two months decreased chlorophyll concentration and increased electrolyte leakage by 2-3 fold compared to the control and the other treatments. GABA at 20 mM significantly increased chlorophyll concentration and decreased electrolyte leakage of leaflets compared to all the saline water treatments. In contrast, ABG at 250 ppm significantly decreased chlorophyll concentration and increased electrolyte leakage of leaflets by about 3-fold compared to all the saline water treatments. These results show potential role of GABA, salicylic acid, aspirin and oleic acid conducive for improved survival percentage of plantlets and stress tolerance during acclimatization.

Volume 8(2), 2006



Impact of *Anthurium* spp. genotype on callus induction derived from leaf explants, and shoot and root regeneration capacity from callus

Duong Tan Nhut, Nguyen Duy, Nguyen Nhu Ha Vy, Chau Diem Khue, Dinh Van Khiem and Do Nang Vinh

Department of Plant Biotechnology, Dalat Institute of Biology, 116 Xo Viet Nghe Tinh, Da Lat, Lam Dong, Vietnam; Institute of Agricultural Genetics, Ha Noi, Vietnam.

Key words: *Anthurium andraeanum*, genotypes, leaf explants, callus induction, shoot regeneration, root regeneration.

Journal of Applied Horticulture, 2006, volume 8, issue 2, pages 135-137.

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Abstract: In this study, the most critical step in *Anthurium* micropropagation was the induction of primary calli from leaf segments. Genotype played an

important role during *in vitro* multiplication of *Anthurium*. Callus induction from leaf segments was examined in ten *Anthurium* cultivars: 'Carnaval', 'Neon', 'Choco', 'Sonate', 'Midori', 'Pistache', 'Tropical', 'Safari', 'Arizona' and 'Cancan' on MS medium supplemented with 1 mg L⁻¹ BA, 0.08 mg L⁻¹ 2,4-D, 30 g L⁻¹ glucose, 8 g L⁻¹ agar and adjusted to pH 6.0. After 100 days, leaf segments of eight genotypes formed calli, among them, cultivar 'Pistache' had the highest callus induction ratio (65.1%) and two genotypes, 'Carnaval' and 'Cancan', showed no response. After multiplication, calli were subcultured on shoot regeneration medium, 1/2 MS with NH₄NO₃ level adjusted to 0.206 g L⁻¹, added with 20 g L⁻¹ glucose, 1 mg L⁻¹ BA, 8 g L⁻¹ agar and adjusted to pH 6.0. Shoots were obtained from all cultivars with different potential of shoot regeneration. The average number of shoots per explant in 'Tropical' (10.1) was higher than that of 'Choco' (4.3) and 'Pistache' (3.5), and shoots (at least 10 mm high) were excised and cultured on rooting medium, 30 g L⁻¹ glucose, 8 g L⁻¹ agar and 1 g L⁻¹ activated charcoal added to 1/4 MS medium. All shoots consistently formed roots after 30 days and plantlets developed well after being transferred to the nursery. The propagation process took 10 and a half months to complete.

Volume 8(2), 2006

A one step *in vitro* cloning procedure for Red Globe grape: The influence of basal media and plant growth regulators

M.S. Barreto, A. Nookaraju, N.V.M. Harini and D.C. Agrawal

Plant Tissue Culture Division, CSIR National Chemical Laboratory, Pune - 411 008, India.

Key words: Auxin pulse, benzyladenine, grape, micropropagation, Red Globe, *Vitis vinifera*

Journal of Applied Horticulture, 2006, volume 8, issue 2, pages 138-142.

Abstract: Earlier studies have shown that the degree of success at each stage of micropropagation in grapevine is genotype dependent; hence it becomes imperative to optimize culture conditions for rapid propagation of a variety. Present report describes two approaches of *in vitro* propagation of a *Vitis vinifera* cultivar, Red Globe. In one approach, whole plants could be developed from single node segments by bud break and direct rooting *in vitro*. Eight different basal media tried showed different morphogenetic responses. In second approach, multiple shoots were induced in nodal segments cultured on MS basal medium supplemented with BA (8.88 µM). Also, second crop of shoots could be induced in left over nodal segments devoid of shoots. Rooting

of shoots could be induced *in vitro*, both in semi-solid or liquid media and also *ex vitro* by pulse treatment of IAA (2.85 μM) + NAA (2.70 μM). Plant establishment in later case was 80%. A simple procedure described here can complement conventional methods, currently being used in propagation of this important grape variety.

Volume 8(2), 2006

Anthocyanin accumulation in the hypocotyl and petal of Red Agati (*Sesbania grandiflora*), an ornamental legume

Kitti Bodhipadma, Sompoch Noichinda, Sasikan Udomrati, Goravis Nathalang, Boonyuen Kijwijan and David W.M. Leung

Department of Agro-Industrial Technology, Faculty of Applied Science, King Mongkut S Institute of Technology North Bangkok, Bangsue, Bangkok, 10800, Thailand; Department of Biology, Faculty of Science, Mahidol University, Bangkok, 10400, Thailand;

Key words: Red Agati, anthocyanin, *Sesbania grandiflora*, histology, development

Journal of Applied Horticulture, 2006, volume 8, issue 2, pages 143-146.

Abstract: Seeds of Red Agati (*Sesbania grandiflora*), an ornamental leguminous tree, were germinated *in vitro* under both light and dark conditions for 7, 10, 15, 20 and 25 days. The localization of anthocyanin-containing cells and level of total anthocyanin content of hypocotyl from several developmental stages were determined. In the hypocotyl of light-grown seedlings, anthocyanin-containing cells were observed in epidermal and sub-epidermal layer and peripheral cortex while none was found in that of dark-grown seedlings. On day 7, the hypocotyl of light-grown seedlings had the highest anthocyanin content (290 $\mu\text{g/g}$ FW). Moreover, Red Agati's petal at various developmental stages was also examined for the total anthocyanin content. It was found that the petal of 3 cm length had the highest total anthocyanin level (455 $\mu\text{g/g}$ FW). It is concluded that the hypocotyl of light-grown Red Agati seedlings is an attractive alternative source of anthocyanins to the petal as the seedlings can be raised and be made available throughout the year.

Volume 8(2), 2006

Effect of different stalk lengths and certain chemical substances on vase life of gerbera (*Gerbera jamesonii* Hook.) cv. 'Savana Red'

M.A. Meman and K.M. Dabhi

N. M. College of Agriculture, Department of Horticulture, Navsari, Gujarat Agricultural University.

Key words: Gerbera, *Gerbera jamesonii* Hook., stalk length, chemicals, vase life, sucrose, citric acid, HQC

Journal of Applied Horticulture, 2006, volume 8, issue 2, pages 147-150.

Abstract: An experiment was carried out to determine the effect of different stalk lengths and certain chemical substances on vase life of gerbera (*Gerberajamesonii* Hook.) Cv. 'Savana Red'. Twenty treatment combinations consisting of four chemicals viz., sucrose 4 %, sucrose 4 % + 8-HQC 250 ppm, sucrose 4 % + aluminum sulphate 100 ppm, sucrose 4 % + citric acid 250 ppm, along with control (distilled water) and four lengths of stalk viz., 30, 40, 50, and 60 cm. The vase solution of sucrose 4% + 8-HQC 250 ppm and stalk length of 60 cm, individually and in combination increased fresh weight of flowers by promoting solution uptake. These treatments are also beneficial for improving the vase life of flowers and useful life of flowers, opening of disc florets, with bright, shining red colour and freshness for a longer duration.

Volume 8(2), 2006

Micropropagation of *Parthenocissus quinquefolia* (L.) from seedling explants

Yun Li, Daling Feng, Zhenyuan Sun and Chen Niu

College of Biological Sciences and Biotechnology, Beijing Forestry University, Beijing, 100083, China. ¹ Current address College of Life Science, Hebei Agricultural University, Baoding, 071001, China. ²Research Institute of Forestry,

Key words: *Parthenocissus quinquefolia*, axillary buds, micropropagation, B₅ medium, benzylaminopurine (BA), indole-3-butyric acid (IBA), indole-3-acetic acid (IAA), a-naphthaleneacetic acid (NAA)

Journal of Applied Horticulture, 2006, volume 8, issue 2, pages 151-154.

Abstract: *Parthenocissus quinquefolia* L. was successfully micropropagated through axillary bud multiplication from seedling explants. Shoot tips were isolated from seedlings and cultured on B₅ medium supplemented with 1.33-2.22 uM benzylaminopurine (BA) and 0.107 uM a-naphthaleneacetic acid (NAA) to induce axillary buds. The sprouted axillary buds formed multiple shoots

when cultured on B₅ medium supplemented with 2.22 uM BA and 0.246-0.49 uM indole-3-butyric acid (IBA). The elongated shoots rooted in B₅ medium containing 0.49 uM IBA and they survived from acclimatizing in soil to grow into healthy plants.

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Effects of organic manure on okra (*Abelmoschus esculentus* (L.) Moench) production

J. OfosuAnim, E.T. Blay, and M.E. Frempong

Department of Crop Science, University of Ghana, Legon, Ghana,

Key words: *Abelmoschus esculentus*, okra, organic manure, soil characteristics, yield

Journal of Applied Horticulture, 2006, volume 8, issue 2, pages 155-158.

Abstract: The effect of different organic manures (cow dung, poultry manure and compost) on the yield of okra, soil physical and chemical characteristics was investigated at the University of Ghana, Legon. Results obtained revealed that the application of recycled garden solid waste compost, poultry manure and cow dung improved the soil physical condition, particularly, structure and drainage, increased nutrient and organic matter levels and enhanced the yield components of okra plants. Inorganic fertilizer improved only chemical properties, but soil physical properties such as structure was not improved. There were improvements in pod yield, yield components and pod fibre content on all manured plots. The study clearly indicated the superiority of poultry manure over cow dung and compost as a source of manure for okra production.

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Economic rationale of commercial organic fertilizer technology in vegetable production in Osun State of Nigeria

T Alimi, O.C. Ajewole, O.O. OlubodeAwosola and E.O. Idowu

Agricultural Economics Department, Faculty of Agriculture, Obafemi Awolowo University, Ile- Ife, Osun State, Nigeria, Department of Agricultural Economics

and Extension Services, Faculty of Agricultural Sciences, University of Ado-Ekiti, Ado-Ekiti, Ekiti

Key words: Vegetable, commercial organic fertilizer, marginal rate of return, constraints, Osun State, Nigeria

Journal of Applied Horticulture, 2006, volume 8, issue 2, pages 159-164.

[Full text PDF](#) |

Abstract: The fragility and high susceptibility of the soils in Nigeria to degradation and loss of nutrients make augmentation through the use of fertilizers necessary to obtain reasonable crop yield. The use of market oriented organic fertilizer is being encouraged to improve soil fertility and there is the need to determine the economic rationale of this technology. This study determined the change in net income of users of commercial organic fertilizer (UCOF) relative to non-users of fertilizers (NUF) in vegetable crop production in Osun State of Nigeria to find out if its use should be encouraged based on economic reason only. Nested sampling technique was used in selecting UCOF and NUF respondents. Data on yield, quantities and prices of inputs and output; and reasons for non-use of commercial organic fertilizer were collected and analyzed using descriptive and inferential statistics, partial budgetary technique, sensitivity analysis and importance ranking. Analyses indicated that UCOF applied 610kg ha^{-1} of commercial organic fertilizer resulting in additional yield ($3,375\text{kg ha}^{-1}$) and rate of returns (401%) over and above the NUF, making the use of organic fertilizer technology economically superior to non-use of fertilizers. Constraints to the use of commercial organic fertilizer are doubtful efficacy, offensive odour, heavy weed infestation, bulkiness and lack of funds in descending order of importance which if eliminated will boost demand for commercial organic fertilizer and improve production of vegetable for consumption.

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Technical and economic aspects of utilizing Fibrous wool composts in horticulture

K.C. Das, P.A. Annis, E. W. Tollner and S. Dudka

Department of Biological and Agricultural Engineering; Department of Textiles, Merchandising and Interior; Department of Crop and Soil Sciences, The University of Georgia, Athens, GA 30602-4435, USA.

Key words: Bioconversion, wool, composting, wood wastes, economic analysis.

Journal of Applied Horticulture, 2006, volume 8, issue 2, pages 165-169.

Abstract: Composts produced from a mixture of fibrous wool by-products and other components (e.g., wood-shavings, cotton-gin trash, yard waste, biosolids, *etc.*) have a high concentration of nitrogen and low concentrations of regulated trace elements. Some have low soluble salts content and have slightly acidic to neutral pH. These composts met standards of the US EPA of an exceptional quality product and were successfully used to grow ornamental crops in a greenhouse and to establish turfgrass from seeds. Market research showed that the turfgrass industry and retail garden centers would be the largest and most profitable markets for fibrous wool-based composts and potting mixes. Cost-volume-profit analysis (CVP) indicated that production and sale of about 17,200 tonnes per year of the compost product would be a break-even point in units for a hypothetical compost production and marketing business. Since composting is also a waste management operation, revenues from accepting waste (tipping fees) does improve business profitability.

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Effect of pollen source on productivity, maturity and fruit quality of 'Hayyani' date palm

J Muhtaseb and H Ghnaim

Irrigated Research Program, National Center for Agricultural Research and Technology Transfer (NCARTT), P.O. Box: 639, Baqa'a, Jordan.

Key words: Male, pollen, Hayyani, pollination, maturity, fruit quality, date palm, *Phoenix dactylifera* L.

Journal of Applied Horticulture, 2006, volume 8, issue 2, pages 170-172.

Abstract: To study the effect of pollen source on the productivity, maturity and fruit quality of 'Hayyani' date palm, one local and three commercial male varieties were used during 2002. Effect of pollen source on 'Hayyani' fruit-set and yield was statistically not significant, however, trees pollinated with 'Mejhool' pollen recorded the highest fruit-set and yield. The largest fruit weight, length and diameter were obtained when trees pollinated with 'Barakah' male. In addition, pollen source had no or little effects on 'Hayyani' fruit maturity, however, fruits of trees pollinated with 'Jarvis' male matured earlier while in trees pollinated with 'Barakah' showed delayed maturity. Moreover, 'Hayyani' trees pollinated with 'Barakah' pollen gave the highest fruit flesh %.

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Transgenic tomato (*Lycopersicon esculentum*) overexpressing cAPX exhibits enhanced tolerance to UV-B and heat stress

Yueju Wang, Michael Wisniewski, Richard Meilan, Minggang Cui and Leslie Fuchigami

Department of Horticulture, Oregon State University, Corvallis, OR, 97331-7304, USA, ^BUSDA-ARS, 45 Wiltshire Road, Kearneysville, WV, 25430-9606, USA, ^CForestry & Natural Resource Department, Purdue University, West Lafayette, IN, 47907-2072, U

Key words: *Lycopersicon esculentum*, overexpression, ascorbate peroxidase (APX), heat, UV-B, oxidative stress, sunscald.

Journal of Applied Horticulture, 2006, volume 8, issue 2, pages 87-90.

[Full text PDF](#) |

Abstract: Reactive oxygen species (ROS), such as hydrogen peroxide, superoxide and hydroxyl radicals, are by-products of biological redox reactions. ROS can denature enzymes and damage important cellular components. Plants develop antioxidant enzymes, such as superoxide dismutase (SOD) and ascorbate peroxidase (APX) to scavenge ROS and detoxify them. The effect of increased cytosolic ascorbate peroxidase (cAPX) on heat and UV-B stress tolerance was studied using transformed tomato (*Lycopersicon esculentum* cv. Zhongshu No. 5) plants. This research demonstrates, in either laboratory or field tests, the potential to enhance tolerance to heat, UV-B, and sunscald stress by gene transfer. Overexpression of cAPX in transgenic tomato enhanced resistance to heat (40 °C) and UV-B stress compared to wild-type plants. When leaf disks were placed at 40 °C for 13 hours, the electrolyte leakage of disks from wild-type were 93%, whereas two tested transgenic lines (A9, A16) exhibited 24% and 52% leakage respectively. When fruits of wild-type and transgenic plants were exposed to UV-B (2.5mW cm⁻²) for five days, the extent of browning was 95%, and 33%, and 37%, respectively. In field tests, the detached fruits from field-grown transgenic plants showed more resistance to exposure to direct sunlight than fruits from wild-type plants. APX activity in leaves of cAPX transgenic plants was several folds higher than in leaves of wild-type plants when exposed to heat, UV-B, and drought stresses.

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The effect of anti-hail nets on fruit protection, radiation, temperature, quality and probability of 'Mondial Gala¹' apples

Ignasi Iglesias and SimA Alegre

Institut de Recerca i Tecnologia Agroalimentàries (IRTA) - Estacio Experimental de Lleida, Avda. Rovira Roure, 191. 25198-Lleida, Spain.

Key words: Apple, *Malus x domestica* Borkh., 'Mondial Gala', net, hail protection, insurance, radiation, temperature, humidity, vigour, fruit colour, quality, cost, benefit.

Journal of Applied Horticulture, 2006, volume 8, issue 2, pages 91-100.

[Full text PDF](#) |

Abstract: The effects of crystal (transparent) and black nets on the protection of fruits from hail, the interception of light, temperature, humidity and fruit quality were evaluated over four seasons (from 2000 to 2003) at the IRTA-Experimental Station, Lleida (NE-Spain) on 'Mondial Gala' apples (*Malus x domestica* Borkh.). Nets demonstrated their efficiency for fruit protection against hail; decreased maximum orchard temperatures and increased minimum temperatures and relative humidity. Based on PAR values, on sunny days, the black net intercepted 25% more incident radiation than the control and the crystal net intercepted 12% more. The use of black net resulted in a significant reduction of colour intensity and days taken for maturity, and provided lower average yields for fruit harvested at the first picking. The crystal net was associated with intermediate values between black net and control, or similar values to those of the control. Both nets reduced fruit temperature and the incidence of sunburn improving global skin quality. The black net increased the vigour of the trees. Fruit firmness was not affected by the use of nets. Soluble solid content decreased when black net was used, while maturity was delayed in some seasons. There were no consistent effect with respect to titratable acidity and fruit cracking. The annual cost of the anti-hail nets was 1874 to 1612 ? ha¹, respectively, for crystal and black nets, depending mainly on the durability of the net. The annual cost of insurance was 760 ? ha¹ and was determined by site, cultivar, yield and price insured, and was lower than that of covering by nets. The gross profit corresponding to the crystal net (8896 ? ha¹) was lower to the control/insurance (9223 ? ha¹) and greater to the black net (7842 ? ha¹) because of the reduction in fruit colour. With 'Mondial Gala' apples, the use of both colour nets was not economically beneficial compared to the control.

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Biodegradable paper/polymerized vegetable oil mulches for tomato and pepper production

Randal L. Shogren and Monica David

Plant Polymer Research Unit, National Center for Agricultural Utilization Research, USDA/ARS, 1815 N. University St., Peoria, IL 61604, University of Illinois Extension, 1201 South Dorner Drive, Urbana, IL 61801, Corresponding author.

Key words: Degradable mulch, soybean oil, sustainable agriculture, vegetable production

Journal of Applied Horticulture, 2006, volume 8, issue 1, pages 12-14.

[Full text PDF |](#)

Abstract: This project was undertaken to compare the efficacy of a biodegradable paper/cured vegetable oil mulch with newspaper/straw and bare soil for reducing weed growth and promoting vegetable yields. There were no significant differences in total tomato (*Lycopersicon esculentum*) or pepper (*Capsicum annum*) yields between the different mulch types. The coated paper and newspaper/straw mulches were effective in preventing weed growth around the plants while hand weeding was required for the bare soil plots. After 3 months, there was slight degradation (a few cracks, names are necessary to report factually on available data; however the USDA neither guarantees nor warrants the standard of the product, and the use of the name. USDA implies no approval of the product to the exclusion of others that may also be suitable. holes) of the coated paper mulches but not enough to allow noticeable weed penetration or detachment of the buried edge. Paper/cured oil mulch rolls appear to be a convenient and effective alternative to laborious hand weeding or spreading of newspaper and straw for vegetable gardening.

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Compact 3U as a novel lighting source for the propagation of some horticultural plants

D.T. Nhut, M.T. Ngoc Huong, D.V. Khiem and J.A. Teixeira da Silva

Department of Plant Biotechnology, Dalat Institute of Biology, 116 Xo Viet Nghe Tinh, Dalat, Lam Dong, Vietnam. Faculty of Agriculture, Kagawa University, Miki-cho, Kagawa, 761-0795, Japan.

Key words: Compact 3U, Neon, *Cymbidium* 'Tim Hot', *Lilium longiflorum*, *Fragaria vesca* cv. 'My Da'

Journal of Applied Horticulture, 2006, volume 8, issue 1, pages 15-20.

[Full text PDF |](#)

Abstract: A novel lighting system (Compact 3U) was successfully applied to the micropropagation of some horticultural plants. *Cymbidium* 'Tim Hot', *Lilium longiflorum* and *Fragaria vesca* cv. 'My Da' shoots were used for this study. To compare *in vitro* growth of plantlets placed under Neon and Compact 3U lighting systems, *Fragaria vesca* cv. 'My Da' shoots were cultured on $1/2$ MS medium supplemented with 1 gl^{-1} activated charcoal, 30 gl^{-1} sucrose and 8 gl^{-1} agar under two lighting sources at $45 \text{ } \mu\text{molm}^{-2}\text{s}^{-1}$. After three weeks of culture, the shoot and root length, leaf area and fresh weight of strawberry plantlets under Compact 3U system were significantly higher than those grown under Neon system. To clarify the effect of irradiance of Compact 3U system on the development of plantlets, *Cymbidium* 'Tim Hot' shoots were cultured on MS medium supplemented with 0.5 mg l^{-1} NAA, 1 gl^{-1} activated charcoal, 100% coconut water, 25 gl^{-1} sucrose and 8 gl^{-1} agar, *Lilium longiflorum* and *Fragaria vesca* cv. 'My Da' shoots were cultured on V MS medium supplemented with 1 gl^{-1} activated charcoal, 30 gl^{-1} sucrose and 8 gl^{-1} agar at different irradiances: (1) Neon at $45 \text{ } \mu\text{molm}^{-2}\text{s}^{-1}$ (control), and Compact 3U at: (2) $45 \text{ } \mu\text{molm}^{-2}\text{s}^{-1}$, (3) $60 \text{ } \mu\text{molm}^{-2}\text{s}^{-1}$, and (4) $75 \text{ } \mu\text{molm}^{-2}\text{s}^{-1}$. The results showed that plantlets of the three genera adapted differently to irradiances and lighting sources, but in all, the growth of plantlets were better under the Compact 3U system. Furthermore, *ex vitro* plantlets derived from Compact 3U system also developed better than those from Neon system.

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Effect of slow release fertilizer on the growth of containerized *Actinotus helianthi* La bill.)

Lotte von Richter and Catherine A. Offord

Botanic Gardens Trust, Sydney, Mount Annan Botanic Garden, Mount Annan Drive, Mount Annan, NSW2567, Australia.

Key words: Nutrition, controlled-release fertiliser, nitrogen, *Actinotus helianthi*, flannel flower, cut flower

Journal of Applied Horticulture, 2006, volume 8, issue 1, pages 21-24.

Abstract: Two controlled-release fertiliser (CRF) formulations, Nutricote Total ? 13N : 5.7P : 10.8K (N13) and Nutricote Total ? 18N : 2.6P : 6.6K (N18), were applied at 0, 1.25, 2, 2.5, 5 and 10 kg m⁻³, to flannel flower (*Actinotus helianthi* Labill.) seedlings grown in soil-less potting mix in containers. After five months, during peak spring flowering, a number of characters relating to the quality of the cut flower product of this species were assessed. As the rate of fertiliser application increased, the plant height, total number of stems, number of flowering stems and number of flowers and buds increased. There were significantly more stems and flowers overall, and more flowering (saleable) stems, in the N18 treatments at all application rates. Plant height was not affected by fertiliser formulation. Basal foliar necrosis, which scored highly in the control treatment (0 fertiliser), was reduced by fertiliser application.

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Growth and flowering response of snapdragons after release from apical dominance

Muhammad Munir and Farhat Naz (United Kingdom &

School of Plant Sciences, The University of Reading, Reading, UK. Faculty of Agriculture, Gomal University, D.I. Khan. Pakistan.

Key words: *Antirrhinum majus*, snapdragon, apical dominance, growth, flowering.

Journal of Applied Horticulture, 2006, volume 8, issue 1, pages 25-28.

[Full text PDF |](#)

Abstract: Plants of an early flowering *Antirrhinum* cultivar 'Chimes White' were pinched at 4, 5, 6, and 7 leaf-pair stage to observe the effects on flowering time and plant quality. Though control plants flowered earlier (81 days) than the pinched ones, they produced less number of flower buds. Flower time and rate of progress to flowering in pinched plants increased linearly and significantly. The quality of pinched plants regarding branch numbers, leaf area, plant height, plant fresh weight etc. was significantly improved in all treatments. Many plant growth parameters were successfully fitted by the

second degree polynomial model whereas linear model indicated a good fit in reproductive development.

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Postharvest control of soft-rot fungi on grape berries by fungicidal treatment and *Trichoderma*

Y A. Batta

Department of Plant Production and Protection, Faculty of Agriculture, An-Najah National University, P. O. Box 425 (Tulkarm), West Bank, Palestine

Key words: Grape, *Rhizopus stolonifer*, *Mucor piriformis*, *Trichoderma harzianum*, difenoconazole, captan, cyprodinil + fludioxonil, metalaxyl + mancozeb, postharvest

Journal of Applied Horticulture, 2006, volume 8, issue 1, pages 29-32.

Abstract: The present research deals with the effect of postharvest treatment of grape berries with four commonly used fungicides and two forms of *Trichoderma harzianum* on the infection with soft-rot fungi- *Rhizopus stolonifer* and *Mucor piriformis*. This effect was evaluated by comparison of the external diameter of rot-lesion in treated and untreated berries, in addition to comparison of percent reduction in external rot-lesion diameter relative to control. Results indicated that the infection with *R. stolonifer* and *M. piriformis* was significantly reduced ($P<0.05$) in all treated berries in comparison with untreated control berries. The highest reduction in mean external rot-lesion diameter was obtained for both *R. stolonifer* and *M. piriformis* when inoculated berries were treated with Score? (difenoconazole) applied at 0.35%(v/v) or Switch? (cyprodinil + fludioxonil) applied at 0.20%(w/v) or formulated *T. harzianum* conidia in invert emulsion applied at 9.6×10^8 conidia/ml of formulation (13.5, 13.2, and 19.3 mm, respectively for *R. stolonifer*; 7.2, 7.5, and 19.2mm, respectively for *M. piriformis*). The greatest decrease in percent reduction in external rot-lesion diameter relative to control was also obtained for both the fungal species when inoculated berries were treated with the same type of fungicides (Score? and Switch?) and *Trichoderma* (formulated *T. harzianum* in invert emulsion) (60.9, 61.7, and 44.1%, respectively for *R. stolonifer*; 74.5, 73.4, and 31.9%, respectively for *M. piriformis*). Overall results indicate that the most effective treatment obtained on grape berries could be integrated with other control measures being usually used in grape berry-rot management plans by alternating fungicidal treatment (e.g. Score? or Switch?) with application of formulated *T. harzianum* conidia in invert emulsion.

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Effect of grafting on growth and yield of tomato (*Lycopersicon esculentum* Mill.) in greenhouse and open-field

E.M. Khah, E. Kakava, A. Mavromatis, D. Chachalis and C. Goulas

University of Thessaly, School of Agricultural Sciences, Department of Agriculture, Crop Production and Agricultural Environment, Fytoko Street, 38446, N. Ionia, Magnesias, Volos, Greece; **National Agricultural Research Foundation (N.AG.RE.F.), Plant Protec

Key words: *Lycopersicon esculentum*, *Lycopersicon hirsutum*, grafting, rootstock, scion, tomato, yield.

Journal of Applied Horticulture, 2006, volume 8, issue 1, pages 3-7.

[Full text PDF |](#)

Abstract: Seedlings of tomato (*Lycopersicon esculentum* Mill.) cv. 'Big Red' were used as scion and rootstock (self-grafted) and non-grafted control, while two hybrid tomatoes 'Heman' and 'Primavera' were used as rootstocks. Grafted and non-grafted plants were grown in the greenhouse and in the open-field. Grafted plants (BH and BP) were more vigorous than the non-grafted ones in the greenhouse as well as in the open-field. Plants grafted onto 'Heman' and 'Primavera' produced 32.5, 12.8% and 11.0 and 11.1% more fruit than the control (B) in the greenhouse and the open-field, respectively, whereas self-grafted plants BB had a lower yield in both cultivation conditions. However, the self-rooted plants B presented earliness in their performance, probably due to the lack of stress that followed the grafting operation. Quality and qualitative fruit characteristics were not affected by grafting.

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Nitrogen metabolism of *Aloe vera* under long-term diluted seawater irrigation

Liu ZhaoPu, Zhao GengMao, Liu Ling, Zheng QingSong

College of Resources and Environmental Sciences, Nanjing Agricultural University, Nanjing, 210095, P.R. China.

Key words: Amino acid, aloe qualities, nitrate, protein, total nitrogen
Journal of Applied Horticulture, 2006, volume 8, issue 1, pages 33-36.

Abstract: Diluted seawater such as 10% (10 volumes of seawater and 90 volumes of freshwater), 25%, 50%, 75% and 100% were used to irrigate *Aloe vera* L. during four successive years in Ledong region, Hainan Province of China. The effect of seawater irrigation on nitrogen metabolism of aloe plant was studied. Total nitrogen content of aloe leaves ranged from 1.48 to 1.56 % of dry matter, and no significant differences were observed between control (freshwater irrigation) and seawater treatments. The total nitrogen content of *aloe* roots, in the range of 0.74 to 0.85 % of dry matter, was much lower than that in the leaves. There was no significant difference in total nitrogen content of roots between control and seawater treatments. It is suggested that seawater treatments do not affect nitrogen uptake and transport in aloe plant. The nitrate content in aloe leaves irrigated with seawater was much lower than that with fresh water irrigation, and a continuous decline in nitrate content was noted with increasing seawater concentration. The nitrate/total nitrogen ratio also tends to decrease in leaves suggesting that nitrate has been assimilated into osmoregulated substances under seawater stress. The amino acid content of aloe plant was not affected, while the ratios of amino acid/total nitrogen significantly increased under seawater stress as compared with control. The protein content and protein/total nitrogen ratios were not affected by seawater treatment except for 100%, suggesting that there was a favourable transformation from amino acids to proteins under salt stress. It is concluded that a long term irrigation by diluted seawater on leachable sandy soil with excessive annual rain precipitation could effectively maintain yield and improve the quality of aloe.

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Relationship between soil and leaf mineral nutrient concentration and yield of selected citrus species

L.Andrews and R.A.I. Brathwaite

Caroni Research Station, Waterloo Road, Carapichaima, Republic of Trinidad and Tobago, Faculty of Science and Agriculture, The University of the West Indies, St. Augustine Campus

Key words: Citrus, Valencia, Ortanique, mandarin, mineral nutrition, yield, fruit set, fruit quality

Journal of Applied Horticulture, 2006, volume 8, issue 1, pages 37-41.

Abstract: Low yields of citrus in Trinidad prompted an investigation to determine whether infield yield variation in citrus was due to differences in plant nutrition induced by field variability. Selected trees of three cultivars (Valencia orange (*Citrus sinensis*), Portugal mandarin (*C. reticulata*) and Ortanique tangor (*C. sinensis* x *reticulata*) were monitored for one to two years and indicators of yield such as percent fruit set, fruit count and fruit quality measured. Leaf nutrient content of the trees and nutritive factors of the soil in the root zone were also determined. Nutrient deficiencies were found in the fields of all the three cultivars. The most common deficiencies were of calcium, zinc and magnesium. There was limited evidence of yield correlation with soil pH ($P = 0.012$), and leaf phosphorus content ($P = 0.02$), Zn ($P = 0.005$) and N ($P = 0.001$). DRIS analysis supported the notion that infield yield variability was associated with nutrients that were limiting. Percent fruit set was associated with Ca/Mg ratio ($r = 0.542$, $P = 0.045$; $r = 0.607$, $P = 0.016$) and foliar concentration of micro elements Cu ($r = 0.738$, $P = 0.003$; $r = 0.667$, $P = 0.007$) and Fe ($r = 0.507$, $P = 0.064$; $r = 0.573$, $P = 0.026$) in 1997 for one field each of Valencia orange and Portugal mandarin, respectively. The most commonly derived relationship for fruit quality was a negative relationship of leaf nitrogen concentration with fruit weight. A positive relationship between leaf concentration of manganese and peel thickness occurred in Portugal mandarin for the two years of the study.

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Studies with thidiazuron on the vase life of cut rose Flowers

Esmail Chamani, Donald E. Irving, Daryl C. Joyce, MosaArshad

Centre for Native Floriculture, School of Agronomy and Horticulture, The University of Queensland, Gatton, Queensland 4343, Australia; 'Horticulture Department, Agriculture Faculty, Mohaghegh Ardebil University, Ardebil, Iran, "Horticulture Department

Key words: Postharvest, thidiazuron, vase life, *Rosa hybrida*, lateral shoot, pulse treatment, cut flower, longevity

Journal of Applied Horticulture, 2006, volume 8, issue 1, pages 42-44.

Abstract: Effects of postharvest-applied thidiazuron (TDZ) on the vases life of 7 rose cultivars (*Rosa hybrida* L.) were investigated. Cut rose flowers were pulse-treated with TDZ for 24 hours at 22 °C. Application of 20, 60 and 100 uM TDZ to 'Memoire' rose did not affect vase life when compared with the control (0 uM TDZ). Similarly, pulse treatments with 10 uM TDZ did not affect the vase life of cvs. 'Champagne', 'Laser', 'Magnum', 'Neon' and 'Tresor 2000' roses compared with their untreated controls, but did increase the vase life of 'First

Red' by 2 days (+11.5 %). Lateral shoot development was a common side effect of TDZ treatment.

Volume 8(1), 2006

Growth behaviour of apple cactus (*Cereus species*) in a hyper-arid environment

Ahmed A. ElObeidy

Department of Fruit Horticulture, Faculty of Agriculture, Cairo University, Giza, Egypt.

Key words: Apple cactus, *Cereus*, drought resistance, hyper-arid environment, water use efficiency.

Journal of Applied Horticulture, 2006, volume 8, issue 1, pages 45-49.

Abstract: Introducing new crop with high water use efficiency into the hyper-arid environment will participate in curb rising demand of water. Apple cactus (*Cereus species*) characteristics fit with most of the requirements of a drought tolerant crop with very high water-use efficiency. Several *Cereus* species were introduced into a desert, characterized with rare rainfall and high temperatures. The introduced fruiting species were *Cereus hexagonus*, *C. peruvianus*, *C. peruvianus monstrose* and *C. validus*. *C. pachanoi* was introduced as a rootstock. *C. peruvianus* cuttings survived storage up to eight months. Horizontal position of the cuttings during storage encouraged the development of lateral branches. Plants were propagated by cuttings, acclimatized and then transplanted into the field in the desert. Growth and development of the introduced species were assessed under the new environment. All the introduced species grew successfully except *C. validus* that was eliminated during the first summer. *C. peruvianus monstrose* was characterized with dramatic contraction of the stem in the dry condition. The main stem of *C. peruvianus*, *C. peruvianus monstrose*, *C. hexagonus* and *C. pachanoi* grew 9.2, 10.2, 8.1 and 15 cm/month, respectively. *C. peruvianus* developed the highest number of sprouts. *C. Peruvianus*, *C. peruvianus monstrose* and *C. hexagonus* unite with the *C. pachanoi* to form successful grafts with percentage of success 80, 53 and 86.5, respectively. *C. validus* failed completely to unite with *C. pachanoi*. *C. peruvianus* and *C. peruvianus monstrose* were the most promising in the new hyper-arid environment in terms of adaptability and healthy growth.

Volume 8(1), 2006

Assessment of genetic diversity and relationships among some grape varieties using ISSR markers

Manjusha Dhane, S.A.Tamhankar, S.G. Patil, G.S. Karibasappa and V.S. Rao
Genetics Group, Agharkar Research Institute, G. G. Agarkar Road, Pune-411004. National Research Centre for Grapes, Manjri Farm, Pune-412307.

Key words: Diversity, genetic relationships, ISSR markers, grape varieties
Journal of Applied Horticulture, 2006, volume 8, issue 1, pages 50-52.

Abstract: As a result of large-scale introduction, the origin and authenticity of many grape varieties is unclear and the subject of some controversy. This has led to confusion regarding their correct identification. Molecular markers have proved to be useful to analyze the genetic relationships as well as diversity between different grape varieties. In the present study, 34 grape varieties have been characterized using Inter Simple Sequence Repeat (ISSR) markers. Out of 93 ISSR primers screened initially, 11 showed good polymorphism. Total 174 bands were obtained, out of which 145 were polymorphic. The pair wise similarity indices were calculated from the band data. Cluster analysis of the varieties resulted in the formation of two main clusters, one belonging to *Vitis vinifera* and other to *V. labrusca*. Varieties belonging to *V. vinifera* appeared more diverse and formed distinct sub-clusters based on their colour, flavour and seeds. Out of 34 varieties screened, 10 varieties with green/yellow berries were grouped together in one subcluster and 15 with red/black berries in the other. Three varieties with green/ yellow berries, Italia, Queen of Vineyard and Thompson seedless were grouped with the varieties with red/ black berries. The cluster of labrusca varieties showed homogeneity and had five varieties except Dakh, which belongs to vinifera. Concord separates initially from all other varieties. Incidentally, Concord is a pure selection from *V. labrusca*, while other varieties like Bangalore Blue, Black Muscat, Catawba and Muzzafar Nagar in labrusca group, may be the hybrids of *V. abrusca* x *V. vinifera*. The current study thus revealed that genetic relationships among grape cultivars could be assessed using ISSR markers.

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Impact of polyethylene glycol-induced water stress on growth and development of shoot tip cultures from different banana (*Musa* spp.) cultivars

K.H. Mohsen, Ebrahim, IbrahimA. Ibrahim, HamdyA. Emaraand Ewald Komor
Botany Department, Faculty of Science, Tanta University, Tanta 31527, Egypt.

Genetic Engineering and Biotechnology Research Institute, Minufiya University, Egypt, Department of Plant Physiology, Bayreuth University, D-95440 Bayreuth, Germany

Key words: Banana (*Musa* spp. L.), medium (solid/liquid), micropropagation, osmotic stress, polyethylene glycol (PEG), proline, sugars

Journal of Applied Horticulture, 2006, volume 8, issue 1, pages 53-57.

Abstract: Shoot tip explants of the Egyptian banana cultivars Maghraby, Valery, Grand Nain and Hindy were tested for their tolerance to water stress. Shoot survival, shoot growth and root growth stimulation in presence of polyethylene glycol (PEG) was strongest in cultivar Hindy followed by Grand Nain, Maghraby and Valery. The accumulation of soluble sugars and proline in shoots was positively correlated with the applied polyethylene glycol concentration, while the reverse was true for N, P and K content. The cultivar Hindy exhibited higher metabolite accumulation response and cultivar Maghraby the least. The effects were most clear on liquid medium whereas solid (agar) medium exerted some additional effects increasing the osmotic stress at low PEG concentrations and alleviating the PEG effect at high PEG concentrations. In conclusion, the cultivar Hindy appeared to be the most tolerant to water stress because of strong accumulation of compatible solutes and greater stimulation of root development.

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Effect of gibberellin treatment on parthenocarpic ability and promotion of fruit swelling in papaya

Fredah. K. Rimberia, S. Adaniya, M. Kawajiri, N. Urasaki, S. Kawano, T. Etoh and Y. Ishimine

Faculty of Agriculture, University of the Ryukyus, Nishihara, Okinawa 903-0213, Japan. Southern Plant Co., Ltd., Kochinda, Okinawa 901-0401, Japan. Okinawa Prefectural Agricultural Experiment Station, Sakiyama, Naha, Okinawa 903-0814, Japan. Faculty of

Key words: Fruit swelling, gibberellins, papaya (*Carica papaya*), parthenocarpy, sex types.

Journal of Applied Horticulture, 2006, volume 8, issue 1, pages 58-61.

Abstract: To improve the productivity of vegetable papaya in subtropical regions, 1) fruit setting rate (parthenocarpic ability) and fruit productivity between sex types (females and hermaphrodites) and among cultivars; and 2)

effect of gibberellins (GAs) on fruit swelling, was studied. In both sex types, the number of fruits per tree correlated more closely with fruit yield than with individual fruit weight. Females produced higher number of fruits per tree, thus attaining a higher fruit yield than hermaphrodites. A variation in parthenocarpic ability was observed among cultivars, and this ability was higher in female plants than in hermaphrodites. These results suggest that it is possible to grow female cultivars with high parthenocarpic ability. However, parthenocarpic fruits were significantly smaller than those produced by pollination. GA treatment was found to be effective for promoting fruit swelling under greenhouse conditions. Thus, in the greenhouse production of papaya, GA treatment was more efficient than hand pollination. Based on these results, we suggest that in subtropical regions, efficient production of papaya fruit for use as a vegetable may be realized by selection and cultivation of female cultivars with high parthenocarpic ability and promotion of fruit swelling by GA treatment.

Volume 8(1), 2006

Effect of mineral concentration on *in vitro* explant growth of almond (*Prunus amygdalus* var. Binazir)

Mohammad E. Amiri

Department of Horticulture, University of Zanjan, Zanjan, Iran.

Key words: Hyperhydration, medium composition, multiplication, root formation, tissue culture, *Prunus amygdalus*

Journal of Applied Horticulture, 2006, volume 8, issue 1, pages 62-64.

Abstract: A study was undertaken to determine the potential of mineral dependent growth of almond *in vitro*. Shoot-tip of almond (*Prunus amygdalus* L. var. Binazir) was subcultured on four different concentrations (4, 6, 8, 10 gl^{-1}) of gelled modified de Fossard medium (de Fossard, 1976) with four relative concentrations (0X, 0.2X, 1X and 2X basal medium) containing BA 0.75 mg l^{-1} and NAA 0.75 mg l^{-1} . As mineral concentration increased, both growth and multiplication rate significantly ($P=0.05$) increased. But increase was not proportional. There was a negative relationship between mineral concentration and root formation. Agar concentration affected the percentage of root formation and hyperhydration. The greatest amount of growth (fresh weight 29%, and dry weight 0.30%) were obtained in the high (2X) mineral concentration with low agar (6 gl^{-1}) treatment after 8 weeks culture period. The highest multiplication rate (7-8 number month $^{-1}$) was also obtained in the same treatment (2X mineral and 6 gl^{-1} agar concentrations). No

hyperhydration was observed in high agar concentration treatments. This means, increasing agar concentration resulted in decreased hyperhydration phenomenon, however, growth and multiplication rate decreased as agar concentration increased. Highest percentage (68%) of root formation was obtained in low mineral and low agar concentration treatment. Multiplication rate was 2-4 month⁻¹ at low (0.5X) concentration and increased to 7-8 at high (2X) concentration.

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Chemical effect of reclaimed water on soil and rose plant grown in soil and tuff media

M.I.Sai, A. Fardous. M. Muddaber. S. El Zuraiqi L. Al Hadidi. I. Bashabsheh
Water Management and Environment Research Program. National Center for Agricultural Research and Technology Transfer "NCARTT". Jordan, BALQA - Baq'a, P.O.Box 639, 19381.

Key words: Rose, *R. indica*, *R. canina*, *R. hybrida*, salinity, reclaimed water, media, rootstock, sodium, tuff

Journal of Applied Horticulture, 2006, volume 8, issue 1, pages 65-69.

Abstract: The effect of three irrigation regimes of low quality water (the effluent of reclaimed wastewater from Ramtha treating plant) on soil, drained water and plant tissue chemical composition of First Red cut flower rose cultivar grown on three rootstocks *Rosa indica*, *Rosa canina*, and Natal Briar was investigated for two successive years 2003 and 2004 in two planting media soil and Zeotuff. Phosphorus showed intermediate levels in both depths. Potassium in soil accumulated at high levels, especially at 0-20 cm depth. Manganese, copper, and zinc showed no accumulation in soil, iron reached high levels in both depths of soil. Less salinity build up was shown by the three irrigation treatments in soil than water drained from tuff beds regardless of rootstock used for the First Red rose cultivar during the first year, 2003. Both EC and SAR reached a steady status throughout the second year 2004. Based on the nutrient standards mentioned for rose tissue in the literature, the only macro and micro element accumulation was recorded for sodium in the tissue of First Red rose planted in both media during both years and iron in both media during the first year only, regardless of water treatment.

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Partial ringing and liquid nitrogen effects on shoot growth

and fruit quality of peach

J. M. Onguso, F. Mizutani, A.B.M. Sharif Hossain and A. R. ElShereif

The Experimental Farm, Faculty of Agriculture, Ehime University, 498 Ko, Hattanji, Matsuyama City, Ehime 799 - 2424, Japan.

Key words: Brix, dwarfing techniques, liquid nitrogen, partial ringing, total shoot length

Journal of Applied Horticulture, 2006, volume 8, issue 1, pages 70-74.

Abstract: Effect of partial ringing and liquid nitrogen application on the growth and fruit quality of peach was studied. Twelve five-year-old peach trees (*Prunus persica* [L.] Batsch.), cv. 'Hikawa Hakuho' grafted on wild peach rootstock were randomly selected for this experiment in April 2004. A 4 cm wide partial ring of bark was removed from eight of them at a height of 25 cm above the graft union leaving a 5 mm connecting strip. Four of the ringed trees were treated with liquid nitrogen at the ringed portions while the rest were intact trees as controls. Both partial ringing and partial ringing plus liquid nitrogen treatment led to reduced shoot length, fruit acidity, total shoot length and weight of pruned branches but increased soluble solids content. Liquid nitrogen had little additive effect on partial ringing in terms of these parameters. Both treatments had a similar effect on tree and fruit characteristics as evidenced by similar bark width recovery and fruit diameter. The use of partial ringing plus liquid nitrogen application in commercial peach orchards promises to be slightly more efficient in causing shoot length reduction while improving fruit quality.

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Performance of three sweet orange varieties grafted on four rootstocks under Jordan Valley conditions

J. Muhtaseb, H. Ghnaim and A. Sheikh

Irrigated Agriculture Research Program, National Center for Agriculture Research and Technology Transfer (NCARTT), Jordan. Ministry of Agriculture, Jordan.

Key words: Fruit quality, rootstocks, sweet orange, *Citrus sinensis*, juice content

Journal of Applied Horticulture, 2006, volume 8, issue 1, pages 75-77.

Abstract: Fruit quality of three orange varieties: 'Salustiana', 'Pineapple' and

'Hamlin' grafted on four rootstocks viz., Sour orange (*Citrus aurantium*), 'Cleopatra' mandarin (*C. reticulata*), *C. volkameriana* and *C. macrophylla* were evaluated in Jordan Valley. Results indicated that sweet orange grafted on *C. macrophylla* and *C. volkameriana* gave the largest fruit weight, diameter and length, while those grafted on 'Cleopatra' mandarin gave the smallest fruit. In addition, 'Salustiana' on *C. macrophylla*, 'Pineapple' on 'Cleopatra' mandarin and 'Hamlin' on both *C. volkameriana* and 'Cleopatra' mandarin gave the highest juice percentage, however, 'Salustiana' on sour orange, 'Pineapple' on *C. macrophylla* and 'Hamlin' on sour orange and *C. macrophylla* had the least. Orange trees on sour orange and 'Cleopatra' mandarin gave the highest TSS percentage, while on *C. volkameriana* and *C. macrophylla* it was low. Moreover, 'Salustiana' grafted on *C. macrophylla* gave low juice pH while on 'Cleopatra' mandarin it gave high juice pH, the opposite was observed for 'Pineapple' and 'Hamlin'

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Comparison of bananas ripened by two methods for textural sale-grades

Sunita Singh and S.D. Kulkarni

Agro Processing Division, Central Institute of Agricultural Engineering, Nabibagh, Berasia Road, Bhopal (MP), India.

Key words: Banana handling, artificial ripening, texture, Ethephon, banana beverage, texture, and banana grades.

Journal of Applied Horticulture, 2006, volume 8, issue 1, pages 78-81.

Abstract: This study reflects on varied maturity levels of available raw and ripe bananas at market level, scope of improvements in quality of bananas by ripening technique and to generate newer avenues for value addition. Raw bananas from the market were ripened in June month both by crude market and standard BIS methods. The final ripeness textural range differed due to ripening methods used {28.56 N (crude market method) and 46.57 N (BIS method) a 63.06 % increase} as compared to available ripe grades in market (same month -June) (13.01 ? 0.99 N) entering after ripening by crude method. Initial texture of available raw grades used as above (June month) was 99.36 ? 10.84 N. The over-ripe bananas (~15 % of bananas available for sale in mandi) if used for beverage yielded an alcoholic drink (with ~8 % alcohol). The processed over-ripe bananas were compared to sale of over-ripe bananas to show potential value addition.

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Use of a chlorophyll meter and plant visual aspects for nitrogen management in tomato fertigation

Paulo Cezar Rezende Fontes and Charles de Araujo

Departamento de Fitotecnia, Universidade Federal, 36570-000, Viçosa-MG, Brazil

Key words: *Lycopersicon esculentum* Mill, unheated greenhouse, drip irrigation, SPAD, plant nutrition

Journal of Applied Horticulture, 2006, volume 8, issue 1, pages 8-11.

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Abstract: This study evaluated the feasibility of using SPAD-502 chlorophyll meter and plant visual aspect for N management in drip fertirrigated tomato plants (*Lycopersicon esculentum* Mill.) under unheated greenhouse. Two separate experiments were carried out at Universidade Federal de Viçosa - MG ? Brazil in leached and non-leached soils under greenhouse. Six treatments were evaluated in a randomised complete-block design with four replicates. In treatment 1, N was applied at the time SPAD reading in leaf dropped below a critical value previously established for the specific plant physiological stage (SPAD-1). In treatments 2 and 3, SPAD critical values were increased 20 % (SPAD-2) and decreased 10% (SPAD-3), respectively. In treatment 4, the visual aspect of tomato plant (PVA) was utilized as a criterion of N management. In treatments 5 and 6 (check), N rates were 280 and 0 kg N ha⁻¹, respectively. Total applied N rates ranged from 0 to 594 kg N ha⁻¹. In both the experiments, total and marketable fruit yields were highest in SPAD-1 treatment which only differed from the check plot. All five criteria allowed high total tomato fruit yields but, as experiments average, N use efficiency was highest with the PVA treatment. The highest net income was obtained with SPAD-1 treatment and was associated with the highest yield. The results indicate that a SPAD meter can provide a quantitative measure of the N requirement of the tomato plants as long as appropriate SPAD critical values are established. Visual ratings of plant canopy needs to be more evaluated and improved.

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Constraints in production and marketing of pistachio in Iran

and the policies concerned

Reza Sedaghat and S. Suryaprakash

Iranian Pistachio Research Institute, Iran, Department of Agricultural Economics, University of Agricultural Sciences, Bangalore, India.

Key words: Pistachio, Iran, export, production problems, productivity, economics

Journal of Applied Horticulture, 2006, volume 8, issue 1, pages 82-84.

Abstract: Pistachio is one of the most important agricultural crop in Iran. The country earns sizable income from pistachio export. To be globally competitive, the production and trade of pistachio must be economically viable especially in long run. This paper aims to analyze the constraints in production and marketing of Pistachio in Iran. Necessary data were collected through personal interview of randomly selected sample of farmers and exporters/ processors. One hundred farmers and ten processor/ exporters interviewed in Kerman province and Tehran city (Iran), in the crop year 2003-04. The Garret ranking technique was adopted to identify the constraints. Farmers and traders were asked to rank the problems considered. Farmers ranked 14 problems into 9 different categories. Differences between scores adopted for different categories were low and they varied from 74 to 87, indicating that all the problems are important from producer's point of views. On the other hand, traders ranked only 12 given problems among 17. They classified each and every problem into a distinct category. Score variations were comparatively high varying from 19 to 60 indicating that there is significant difference between different categories of problems. The results of tabular analysis of export data showed that pistachio industry of Iran was facing a negative growth rate of production, productivity, export quantity and export value during the period 1991-2002.

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Preharvest bagging of litchi fruits influence their storage potential.

Jiang YueMing; Su XinGuo; Jiang YueLin; Li YueBiao; Lin WenBin

South China Institute of Botany, The Chinese Academy of Sciences, Guangzhou LeYiJu 510650, China.

Key words: bagging, crop quality, fruits, storage disorders, storage life, storage quality, titratable acidity

Journal of Applied Horticulture, 2005, volume 7, issue 2, pages 105-107.

Abstract: Litchi fruit has a very short shelf life after harvest. To determine the potential of fruit bagging for extending storage life, litchi fruits were enclosed in 0.05 mm white polyethylene bags at 0, 1, 3, 5 and 7 days before normal harvest. At commercial maturity, bagged and unbagged litchi fruits were picked and then held individually in closed but vented containers for 6 days at 20 degrees C and 95-100% relative humidity in the dark. Bagging of fruits before normal harvest markedly delayed skin browning and reduced rot development of litchi fruit during storage. The best inhibition of the browning and disease development of litchi fruit was observed when the fruit was bagged 3 days before normal harvest. Bagged fruits had lower levels of total soluble solids (TSS) and titratable acidity (TA), but no significant differences in the TS and TA between bagged and unbagged fruits after 6 days of storage were recorded for flesh tissues. Thus, bagging fruit before normal harvest had the potential to reduce rots, main

Volume 7(2), 2005

Combining ability estimates in virus resistant and susceptible lines of chilli (*Capsicum annuum* L.).

Venkataramana, C; Reddy, K M; Sadashiva, A T; Reddy, M K

Division of Horticulture, GKVK, University of Agricultural Sciences, Bangalore, India.

Key words: chillies, crop yield, crosses, diallel analysis, disease resistance, flowering date, fruits, general combining ability, genetic effects, genetic

variance, genotypes, maternal effects, plant height, plant pathogens, reciprocal effects, ripening, specific c

Journal of Applied Horticulture, 2005, volume 7, issue 2, pages 108-112.

Abstract: Combining ability analysis of 8x8 diallel cross (including reciprocals) was carried out during kharif 2001 in Bangalore, Karnataka, India involving Cucumber mosaic virus (CMV) resistant and susceptible lines of chilli. The variances for general combining ability (gca) and specific combining ability (sca) were highly significant for all the characters, suggesting the importance of both additive and non-additive gene action. The sca variance played an important role in the genetic control of days to 50% flowering, days to 50% ripening, fruit width, plant height, plant spread, number of fruits per plant, green fruit yield per plant and percent CMV incidence. On the contrary, additive gene action was observed for fruit length. The genotype VR-27 was judged to be the best general combiner for fruit yield per plant and Perennial, Punjab Lal, Punjab Gucchedar and Pant C-1 proved to be good general combiners for percent CMV incidence. The crosses Punjab Gucchedar x Pant C-1 and Tiwari x EG-174 had greater sca effect

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Morphological, biochemical and elemental analysis of *Elaeagnus umbellata*, a multipurpose wild shrub from Pakistan.

Sabir, S M; Riaz, K

University College of Agriculture, Rawalakot - 12350, Azad Kashmir, Pakistan.

Key words: ascorbic acid, branches, calcium, canopy, chemical composition, chlorophyll, essential oil plants, fruits, iron, leaf area, leaves, magnesium, medicinal plants, multipurpose trees, nonreducing sugars, phosphorus, plant composition, plant height, plant mor

Journal of Applied Horticulture, 2005, volume 7, issue 2, pages 113-116.

Abstract: *Elaeagnus umbellata* is a native multipurpose plant from Himalayan regions of Pakistan. The berries of the plant are rich in vitamins, flavonoids, essential oil, lycopene and other bioactive compounds. To compare various populations of *E. umbellata* for morphology and chemical composition, five populations from different areas of district Bagh were compared using plant and fruit characters. Chemical analysis of berries showed variation in vitamin C (13.8-16.9 mg/100 g), seed oil (5.7-6.1%), oil in pulp (7.6-8.1%), reducing sugar (6.8-8.4%), non-reducing sugar (1.4-2.2%), protein (2.5-5.1%) and

chlorophyll content (5.3-6.8%) in leaves, while the mineral element composition revealed high contents of potassium (175-375 ppm), sodium (20-40 ppm), calcium (70-110 ppm), magnesium (70-86.6 ppm), iron (78.5-95 ppm) and phosphorus (110-133 ppm). Significant variation in morphological characters including plant height, number of branches per plant, number and size of thorns, number of leaves, leaf area, plant canopy, stem

Volume 7(2), 2005

Effect of partial ringing on the shoot growth, fruit yield and quality of peach.

Hossain, A B M S; Mizutani, F; Onguso, J M; El Shereif, A R; Yamada, H

The Experimental Farm, Faculty of Agriculture, Ehime University, Hattanji, Matsuyama 799-2424, Japan.

Key words: bark, buds, crop quality, fruit set, fruits, growth, peaches, ringing, shoots

Journal of Applied Horticulture, 2005, volume 7, issue 2, pages 117-120.

Abstract: A study was conducted in southern Japan to investigate the effects of partial ringing (bark removal) on peach (*Prunus persica* cv. Hikawahakuho). The bark was cut once at 2 cm length x 2 mm width and 8 cm length x 2 mm width of bark in experiment 1, and cut once or weekly at 2 cm length x 2 mm width of bark in experiment 2. Control plants were not subjected to partial ringing. Ringing reduced shoot and bark growth and increased flower bud and fruit set in comparison to the unringed control. Tree circumference was higher above the ringed portion than the lower part of partially ringed trees. Fruit weight and maturity degree were also higher in ringed trees than unringed ones. The results indicate that partial ringing can be used for dwarfing peach trees and enhancing fruit quality.

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Manifestation of heterosis for certain economic characters in round-fruited brinjal (*Solanum melongena* L.) under Tarai conditions of Uttaranchal, India.

Biswajit Panda; Singh, Y V; Ram, H H

Department of Vegetable Science, G.B. Pant University of Agriculture and Technology, Pantnagar - 263 145, India.

Key words: aubergines, crop yield, diallel analysis, fruits, heterosis, hybrids, maturity, yield components

Journal of Applied Horticulture, 2005, volume 7, issue 2, pages 121-123.

Abstract: Hybrid advantages as consequences of fruit yield and its component characters were studied in 10 round-fruited aubergine hybrids along with their 5 genetically diverse parents in half-diallel manner during 2002-03 in Uttaranchal, India. Appreciable heterosis was recorded over mid, better and standard parents for all the characters. Heterosis to the extent of 8.8, 18.6, 28.0, 41.1 and 59.5% over standard parent (Pant Rituraj) was recorded for fruit length, fruit diameter, total number of fruits per plant, total weight of fruits per plant and early yield, respectively. Heterosis for yield was the cumulative effect of heterosis for most yield attributing characters. The highest yielding hybrid was PB-62 x T-3 (4.5 kg per plant), followed by PR x PB-61 (4.2 kg per plant), with 41.1 and 32% standard heterosis, respectively. The hybrid PR x PB-61 combination was also earliest in maturity with 59.5%, followed by PR x PB-60 showing 41.3% standard heterosis. These two crosses could be exploited as commercial hybrids i

Volume 7(2), 2005

Effect of water diluted extract of plants and cakes on weight, whiteness and toughness of harvested button mushroom.

Mishra, S K; Singh, R P

Department of Plant Pathology, G.B. Pant University of Agriculture and Technology, Pantnagar - 263 145 (Uttaranchal), India.

Key words: crop quality, edible fungi, hemp, Indian mustard, limes, linseed, mushrooms, non wood forest products, plant extracts, storage quality, temperature

Journal of Applied Horticulture, 2005, volume 7, issue 2, pages 124-126.

Abstract: Water-diluted extracts of 23 plants (*Achyranthes aspera*, *Aegle marmelos*, *Argemone mexicana*, *Azadirachta indica*, *Callistemon lanceolatus* [*Callistemon citrinus*], *Calotropis gigantea*, *Cannabis sativa*, *Chrysanthemum indica* [*Chrysanthemum indicum*], *Citrus aurantiifolia*, *Cleome viscosa*, *Clerodendrum indicum*, *Dahlia pinnata*, *Datura stramonium*, *Dombeya spectabilis*, *Erigeron canadensis* [*Conyza canadensis*], *Eucalyptus citriodora*, *Evolvulus alsinoides*, *Juniperus chinensis*, *Lantana camara*, *Parthenium hysterophorus*, *Pedilanthus tithymaloides*, *Thuja orientalis* [*Platyclusus*

orientalis] and *Tridax procumbens*) and 2 cakes (linseed and mustard [? Indian mustard]) were used as washing agents to improve the weight, whiteness and toughness of harvested sporophores of button mushroom (*Agaricus bisporus*) stored at 5 and 25 degrees C. The weight of sporophores increased by 6.66% just after washing them with water diluted extracts of plants and cakes. At the end of the experiment (12th day), the weight declined by 1.87-4.38% among th

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Pistillate flower abscission in Persian walnut (*Juglans regia* L.) under mild winter climates of Himachal Pradesh.

Amit Kumar; Kumar, K; Sharma, S D

Department of Fruit Breeding & Genetic Resources, University of Horticulture and Forestry, Nauni-Solan (H.P.) 173 230, India.

Key words: abscission, cross pollination, flowers, genotypes, open pollination, self pollination, walnuts

Journal of Applied Horticulture, 2005, volume 7, issue 2, pages 127-129.

Abstract: Pistillate flower abscission (PFA) was investigated in 18- to 20-year-old trees of 13 indigenous selections and 7 exotic cultivars of Persian walnut (*Juglans regia*) subjected to different modes of pollination, i.e. natural (open) pollination, self (hand) pollination and cross pollination, during 1999 and 2000 in Solan, Himachal Pradesh, India. PFA ranged from 12.40 to 100.00% under natural pollination, 8.47 to 62.36% under self pollination and 12.33 to 100.00% under cross pollination in the first year. The corresponding values of PFA were 13.22 to 97.66, 9.11 to 60.40 and 13.50 to 96.67%, respectively, in the following year. In unpollinated flowers, PFA ranged from 0 to 100.00% in 1999 and from 5.33 to 94.33% in 2000. The results indicate no clear trend towards this economically important phenomenon and suggest that PFA is neither exactly due to genetic differences nor entirely due to mode of pollination.

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Genetic variability, heritability and genetic advance for quality traits in carrot (*Daucus carota* L.).

Paramjeet Kaur; Cheema, D S; Neena Chawla

Department of Vegetable Crops, Punjab Agricultural University, Ludhiana - 141

004, India.

Key words: carotenes, carrots, dry matter, genetic variation, heritability, phenotypic variation, sugar content, total solids

Journal of Applied Horticulture, 2005, volume 7, issue 2, pages 130-132.

Abstract: Genetic variability, heritability and genetic advance for different quality characters, i.e. total soluble solids (TSS), dry matter, carotene, juice yield and total sugars, were studied in 28 carrot genotypes grown during 2002/03 and 2003/04 in Ludhiana, Punjab, India. Analysis revealed the existence of considerable amount of genetic variability for all characters studied. Carotene content exhibited the highest value of genotypic and phenotypic coefficient of variation, heritability (broad sense) and genetic advance as percentage of mean, indicating that this character can be effectively improved through selection.

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Influence of arbuscular mycorrhizae on the performance of chilli (bell) pepper (*Capsicum annuum* L.).

Oyetunji, O J; Osonubi, O

Department of Botany and Microbiology, University of Ibadan, Ibadan, Nigeria.

Key words: abscission, biomass production, chillies, crop yield, endomycorrhizas, flowering, flowers, fruiting, fruits, inoculation, mycorrhizal fungi, mycorrhizas

Journal of Applied Horticulture, 2005, volume 7, issue 2, pages 133-136.

Abstract: A semi-controlled experiment was conducted in a greenhouse to evaluate the influence of arbuscular mycorrhizas (*Glomus mosseae*, *G. etunicatum* or both) on chilli pepper (tatase) production in sub-humid soils of the tropics. The mycorrhizas were inoculated by placing 10 g of inoculum in each hole opening made in a container in which 4-week-old seedlings were transplanted. *G. etunicatum* was effective in improving the biomass production of tatase as well as its flowering and fruiting potential. Mycorrhizal inoculation also reduced the number of abscised flowers and fruits. Dual inoculation with both mycorrhizas did not improve its performance in comparison to the single inoculation with *G. etunicatum*.

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Effect of drip water application at sub-surface on grapevine performance - a case study.

Jagdev Sharma; Upadhyay, A K; Adsule, P G

National Research Centre for Grapes, Manjri Farm P.O., Pune - 413 307, India.

Key words: application methods, crop yield, grapes, plant water relations, subsurface irrigation, trickle irrigation, water use efficiency

Journal of Applied Horticulture, 2005, volume 7, issue 2, pages 137-138.

Abstract: To minimize the expenditure on irrigation water, the efficiency of sub-surface application of drip water was evaluated for one year (from April 2003 to April 2004) on a 6.475-ha drip-irrigated commercial vineyard at Ghuli Garden in Shohale, Solapur district, Maharashtra, India. The vines had suffered from moisture stress during the year preceding the experimentation. In the present study, 3-year-old Y-trellis-trained and drip-irrigated Thompson Seedless vines were used to compare the efficiency of the two methods of irrigation. The vineyard had a shallow soil with a high infiltration rate. For the subsurface method, the irrigation water from drippers was applied below the soil surface at 4 inches depth. The sub-surface method of irrigation produced a higher yield than the surface drip irrigation (12.49 and 8.16 t/ha, respectively). The water use efficiency of sub-surface method was 28.91 kg grapes/mm irrigation compared to only 18.88 kg grapes/mm irrigation with surface drip irrigation. The results of this st

Volume 7(2), 2005

Effect of growth retardants on vegetative growth, yield and fruit quality of high density peach trees.

Ratan Kumar; Rai, R M; Singh, R B; Pant, N

Horticultural Experiments and Training Centre, Chaubattia (Ranikhet), Almora - 263 651, Uttaranchal, India.

Key words: acidity, application rates, chlormequat, crop quality, firmness, fruiting, fruits, growth, growth retardants, internodes, paclobutrazol, peaches, plant growth regulators, plant height, shoots, total solids

Journal of Applied Horticulture, 2005, volume 7, issue 2, pages 139-141.

Abstract: An experiment was conducted during 1999 and 2000 to evaluate the effects of foliar spraying with cycocel [chlormequat] (CCC; 500, 1000 and 1500 ppm) and cultar (paclobutrazol; 500, 1000 and 1500 ppm) on the growth, yield

and fruit quality of peach cv. Paradelux growing in high-density orchards in Chaubattia, Uttaranchal, India. Cultar at 1500 ppm was most effective in reducing the plant height, extension growth and shoot internode length. Both cycocel at 1500 ppm and cultar at 1000 ppm increased the fruit number and yield, but had no significant effect on fruit weight. Fruit firmness increased under 1000 and 1500 ppm cultar treatment in the second year. However, total soluble solids and acidity were not affected by both growth retardants. Cultar at 1000 ppm was the best treatment in terms of controlling vegetative growth and fruiting of young peach trees.

Volume 7(2), 2005

Testing potting mixes with addition of dried blood, blood and bone and bentonite.

Kahl, H; Krug, A

School of Horticulture, Christchurch Polytechnic Institute of Technology, P.O. Box 540, Christchurch, New Zealand.

Key words: bentonite, blood, bones, cabbages, growing media, lettuces, plant development, seed germination, slow release fertilizers, tomatoes, weight

Journal of Applied Horticulture, 2005, volume 7, issue 2, pages 142-144.

Abstract: An experiment was conducted to study the effect of dried blood or blood and bone and bentonite, as a slow release fertilizer, on germination rate of lettuce, tomato, and white and red cabbages, plant yield and the attraction of sciarid flies (*Sciaridae*) and whiteflies (*Trialeurodes vaporariorum*). The potting mixes comprised: standard mix (60 litres compost + 20 litres sand + 20 litres composted bark + 300 g gypsum + 200 g kelp powder) + 250 g dried blood, 250 g blood and bone, 125 g bentonite (a); standard mix + 250 dried blood, 250 g blood and bone (b); standard mix + 125 g bentonite (c); and standard mix (d). The germination rate for lettuce and tomato was similar for the mixes with and without blood and bone. The germination of red and white cabbages was strongly affected by the presence of blood and bone. Only 13 seeds out of 80 germinated in the samples with blood and bone compared with a total number of 80 germinated seeds out of 80 in the samples without blood and bone. In the mixes with bentonite, 113

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Growth and leaf physiology of sun- and shade-grown Sargent viburnum (*Viburnum sargentii* K.) "Onondaga"

potted plants.

Ferrini, F; Mancuso, S; Nicese, F P

Dipartimento di Ortoflorofrutticoltura, University of Florence, Viale delle Idee, 50019, Sesto Fiorentino, Florence, Italy.

Key words: chlorophyll, gas exchange, growth, leaves, light intensity, ornamental plants, ornamental woody plants, plant morphology, plant physiology, shading, woody plants

Journal of Applied Horticulture, 2005, volume 7, issue 2, pages 63-66.

Abstract: To verify the effects of reduced light intensity on plant growth and on selected morphological and physiological characteristics of the leaves, 50 uniform two-year-old, asexually propagated plants of *Viburnum sargentii* 'Onondaga' were subjected to two shading levels (52 and 14% of the full solar radiation) for the entire growing season. A third group of 25 plants was grown in full sun and used as control. No differences were found in terms of leaf gas exchange, while leaf chlorophyll content was lower in the full sun-grown plants. A significantly higher chlorophyll a/b ratio was also found in this plants. Leaves were smaller in the heavy-shaded plants, which also showed a lower weight and specific leaf weight (leaf weight/area ratio). These plants also showed a reduced growth for all the parameters considered, while no differences were found between the full sun-grown plants and the mid-shaded ones. Based on our results, *V. sargentii*, though classified as a facultative shade species, can also be used in full

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Microponic and hydroponic techniques in disease-free chrysanthemum (*Chrysanthemum* sp.) production.

Duong Tan Nhut; Nguyen Trinh Don; Truong Thi Thuy An; Tran Pham Thanh Van; Nguyen Hong Vu; Phan Xuan Huyen; Dinh Van Khiem

Department of Plant Biotechnology, Dalat Institute of Biology, 116 Xo Viet Nghe Tinh, Dalat, Lam Dong, Vietnam.

Key words: chrysanthemums, hydroponics, in vitro culture, leaves, micropropagation, NAA, plant growth regulators, roots, shoots

Journal of Applied Horticulture, 2005, volume 7, issue 2, pages 67-71.

Abstract: Microponic and hydroponic systems for the production of disease-free chrysanthemums are described. Cuttings (3 cm in length), excised from

shoot clusters multiplied *in vitro*, were pre-treated with NAA and grown for 28 days in microponic culture system. NAA at 500 ppm for 20 min was the optimum pre-treatment, resulting in fresh weight, shoot length, root length and survival rate of 0.31 g, 5.99 cm, 3.08 cm and 100%, respectively. Cuttings were grown in hydroponic culture system to avoid mass contamination in soil. The cuttings (10 cm in length), excised from shoots multiplied *in vitro*, were pre-treated with 500 ppm NAA for 20 min and grown for 28 days. Half-strength MS medium was optimum for hydroponic culture, resulting in shoot length, number of leaves, leaf length, leaf diameter, number of roots, root length and fresh weight of 14.85 cm, 7.0, 6.46 cm, 4.82 cm, 28.6, 2.47 cm and 2.24 g, respectively. This medium also resulted in 100% survival rate after 14 days of culture.

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Response of vegetative and reproductive parameters of water stressed tuberose (*Polianthes tuberosa* L.) plants to Vapor Gard and Kaolin antitranspirants.

Al Humaid, A I; Moftah, A E

College of Agriculture and Veterinary Medicine (PO Box: 1482), King Saud University, Al-Qassim Branch, Saudi Arabia.

Key words: antitranspirants, biomass, bulbs, calcium, carbohydrates, chemical composition, crop yield, drought, flowering, growth, inflorescences, kaolin, leaves, mineral content, nitrogen, nutrient content, nutrient uptake, phosphorus, plant composition, plant nutr

Journal of Applied Horticulture, 2005, volume 7, issue 2, pages 72-78.

Abstract: The effects of different types of antitranspirants (ATs) on vegetative growth, flowering, marketable inflorescences, bulb production, elemental content, soluble sugars, and total carbohydrate concentrations of tuberose (*Polianthes tuberosa* cv. "Double"), grown under the irrigation regimes of 100, 80 and 60% of total evapo-transpiration (ET) value, were investigated. Plant biomass, number of leaves, length and weight of marketable inflorescences and bulb yield were significantly reduced by water deficit, particularly at 60% ET. The flowering period was markedly shortened under stress conditions. Under water deficit, N, P, K, Ca and total carbohydrates decreased, while soluble sugars increased in treated leaves compared to the control plants. Both types of ATs effectively enhanced plant performance, flower formation, bulb production, nutrient uptake and carbohydrate synthesis at the 80% ET treatment. The particle type AT, Kaolin, was more effective than the emulsion

type AT, Vapour Gard (VG), due to its mechani

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Resolving the identity of *Adhatoda beddomei* C.B. Clarke using morphological and molecular (RAPD) techniques.

Sunitha Bhaskaran; Ganeshan, S; Krishnappa, M; Lalitha, A

Indian Institute of Horticultural Research, Hessaraghatta Lake, Bangalore - 560 089, India.

Key words: genetic analysis, genetic mapping, plant morphology, polymerase chain reaction, quantitative traits, random amplified polymorphic DNA

Journal of Applied Horticulture, 2005, volume 7, issue 2, pages 79-82.

Abstract: Cuttings of *Adhatoda beddomei* were collected from Kerala, Karnataka and Tamil Nadu, India, while *A. vasica* [*Justicia adhatoda*] was collected from Bangalore, Karnataka. Morphological characterization was conducted for 25 qualitative and 20 quantitative traits. The 3 *A. beddomei* accessions showed similar growth patterns while *A. vasica* showed significant difference in morphological characters. Among the quantitative traits, there was a tendency among the 3 *A. beddomei* accessions to be at par while *A. vasica* showed distinct dissimilarity. All the 25 qualitative traits observed showed similarity in *A. beddomei* accessions. In *A. vasica*, 19 traits were similar to that of *A. beddomei* while 6 differed. In *A. beddomei*, there was no incidence of fruit set inspite of considerable inflorescence development. Good quality DNA was obtained from all the 4 accessions based on the A260/A280 ratio obtained. Yield was similar in all the lines, i.e. ranging from 0.67 to 2.33 micro g/mg of DNA was obtained. The banding pattern of

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Lateral shading of stockplants enhances rooting performance of guava (*Psidium guajava* L.) cuttings.

Hossain, M A; Kamaluddin, M

Institute of Forestry and Environmental Sciences, University of Chittagong, Chittagong 4331, Bangladesh.

Key words: buds, guavas, light intensity, rooting, roots, shading, shoots, topping, vegetative propagation

Journal of Applied Horticulture, 2005, volume 7, issue 2, pages 83-86.

Abstract: Two-year-old stockplants of guava were topped leaving 25-cm-tall stumps. Shoots were allowed to develop at three light levels, i.e. open sun (100% daylight), lateral shade (50% daylight) and overhead shade (12% daylight). Bud activity, shoot growth and morphology, and rooting ability were studied. Active bud percentages were higher in shaded stockplants, leading to as many shoots as in 100% daylight. Although number of nodes per shoot tended to increase in shaded stockplants, estimates of cutting yield did not largely vary with the light regimes. Light intensity had no significant effect on the rooting success of cuttings. However, shade cuttings produced significantly higher number of roots and root dry mass per cutting than those from 100% daylight. The benefits of shading on rooting performance of cuttings was more pronounced in shoots developed in 50% daylight than those in 12% daylight. Lateral shade had a positive shade effect on shoot development likely by improving physiological conditions conducive f

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Effect of different nutrient levels on anthocyanin and nitrate-N contents in turnip grown in hydroponics.

Asao, T; Kitazawa, H; Washizu, K; Ban, T; Pramanik, M H R

Faculty of Life and Environmental Science, Shimane University, 2059
Kamihonjo, Matsue, Shimane, 690-1102, Japan.

Key words: anthocyanins, application rates, hydroponics, leaves, nitrate, nutrient solutions, plant nutrition, roots, soilless culture, turnips

Journal of Applied Horticulture, 2005, volume 7, issue 2, pages 87-89.

Abstract: Seedlings of Japanese turnip (*Brassica rapa* [*B. campestris* var. *rapa*] cv. 'Tsudakabu') that were in the first-leaf stage were grown hydroponically in plastic containers containing 25, 50 and 75% of Enshi nutrient solution with either full or half dose of NO₃-N. The nutrient solutions were renewed at 2-week intervals until harvest. The experiment was conducted from 19 September (transplanting in containers) to 21 November 2002 (harvesting). The size and colour of roots from hydroponic culture were similar to that of turnip grown in soil culture, while the size of leaves was larger in the former than that in the latter. Leaf number, leaf length and width, and leaf dry and fresh weights all decreased significantly at the lowest concentration of the nutrient solution. The presence of full and half dose of NO₃-N in the 75 and 50% nutrient solution did not show significant difference in growth. Root dry and fresh weights also significantly decreased at the lowest concentration of the nutrient solution. Anthocyanin

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Effect of *Eucalyptus cladocalyx* mulch on establishment of California sycamore (*Platanus racemosa*).

Downer, A J; Faber, B

University of California Cooperative Extension, 669 County Square Drive, Suite 100 Ventura, CA 93003, USA.

Key words: composts, establishment, mulches, mulching, photosynthesis, plant residues, roots, soil water retention, stems, temperature, weed control, weeds

Journal of Applied Horticulture, 2005, volume 7, issue 2, pages 90-94.

Abstract: An experiment was conducted to determine the suitability of mulches made from *Eucalyptus cladocalyx* trimmings for the establishment of young California sycamore (*Platanus racemosa*) trees and whether composting reduced any phytotoxicity symptoms that might be associated with fresh *E. cladocalyx*. The mulches prepared from fresh and composted *E. cladocalyx* prevented the growth of annual weeds, increased soil moisture retention, reduced diffusive resistance of California sycamore and increased stem diameter compared to unmulched sycamores. The root length of sycamores was higher in soil profiles under mulched trees than in soil under unmulched ones. *E. cladocalyx* mulches reflected more photosynthetically active radiation and maintained lower surface temperature than biosolids mulch or unmulched soils. Both freshly chopped and composted eucalyptus branches were effective in promoting growth of sycamore.

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Effect of ripening media and season on postharvest quality of three tomato varieties.

Adebooye, O C; Adeoye, G O; Tijani Eniola, H

Department of Plant Science, Obafemi Awolowo University, Ile-Ife, Nigeria.

Key words: ascorbic acid, cracking, crop quality, crude fibre, cultivars, fruits, harvesting date, lycopene, moisture content, polyethylene, ripening, tomatoes

Journal of Applied Horticulture, 2005, volume 7, issue 2, pages 95-98.

Abstract: Studies were conducted during the early and late seasons of

2001/02 in Ile-Ife, Nigeria, to examine the postharvest quality of fruits of three tomato cultivars (Roma VF, Ibadan Local and NHLe 158-13) ripened on the parent plant, transparent polyethylene, black polyethylene and laboratory tabletop. Cracking resistance was tested by dropping the fruits on a concrete floor from different vertical heights (50 to 275 cm). The height at which 50% of the fruits cracked (CH50) was 100-125 cm for Ibadan Local, 150 cm for Roma VF and 220 cm for NHLe 158-13. Ripening method and harvesting season had no significant effect on the cracking tendency of the tomato cultivars. Lycopene, crude fibre and ascorbic acid contents were significantly higher in fruits harvested during the late season than the early season. All three quality parameters as well as moisture content were significantly higher in fruits ripened on the parent plant than the other ripening methods. Ether extract content was neither affected by cultivar nor se

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***Gynostemma pentaphyllum* cultivation in Sydney, Australia and its comparison with products from China.**

Razmovski Naumovski, V; Li Qian [Li, Q G]; Duke, C C

Herbal Medicines Research and Education Centre (HMREC), Faculty of Pharmacy, A15, University of Sydney, N.S.W., 2006, Australia.

Key words: chemical composition, crop yield, cultivation, medicinal plants, plant composition, plant extracts, quality controls, saponins, thin layer chromatography, traditional medicines

Journal of Applied Horticulture, 2005, volume 7, issue 2, pages 99-104.

Abstract: This paper describes the cultivation, harvesting, processing and storage of *G. pentaphyllum* in Sydney, New South Wales, Australia in comparison to its native China. The dry weight yield of Sydney-grown plants (0.50 kg/m²) was in the range of the yield obtained in China (0.4-0.5 kg/m²). The percentage of extracted material was also higher for the locally grown material (28.5%) in comparison to *G. pentaphyllum* products grown in China (10.3-18.1%). Thin layer chromatography revealed a different saponin profile for the local material compared with commercially available products, indicating its potential for use in quality control. These results suggest that Australia may be a new growing location for this traditional Chinese medicine.

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Effect of summer and winter pruning of peach as slender

spindle bush type on growth, yield and quality of fruit.

Hossain, A B M S; Mizutani, F; Onguso, J M; Yamada, H

The Experimental Farm, Faculty of Agriculture, Ehime University, 498, Hattaji, Matsuyama City, Ehime 799-2424, Japan.

Key words: buds, chlorophyll, climatic seasons, crop quality, crop yield, fruit set, fruits, peaches, plant development, pruning, regrowth, shoots, summer, winter

Journal of Applied Horticulture, 2005, volume 7, issue 1, pages 11-15.

Abstract: An experiment was conducted in Japan, to compare regenerated shoot growth, pruned shoot weight, chlorophyll content, bud formation, fruit set, fruit yield and quality in summer- and winter-pruned peach (cv. AB-1) trees. Summer pruning comprised heading cut, removal of vigorous and current season shoots on 24 July 2000, 2001, 2002 and 2003 after harvest. Winter pruning was conducted in February-March 2001, 2002, 2003 and 2004. The weight of shoots removed by summer pruning was smaller than winter pruning. The pruned shoot weight gradually decreased both in summer-pruned and winter-pruned trees. The regenerated shoot number was less and regrowth stopped within 2 months after summer pruning. Regenerated shoot length after summer pruning increased until October. Chlorophyll was higher in summer- than in winter-pruned trees in November. Leaf drop was 2 months earlier in winter- than in summer-pruned trees. The flowers were less in summer- than in winter-pruned trees. Fruit set was recorded in 2003 and 2004, and wa

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Effectiveness of selected fungicides applied with or without surfactant in controlling anthracnose on three cultivars of *Euonymus fortunei*.

Cole, J T; Cole, J C; Conway, K E

Department of Horticulture, University of Arkansas, Fayetteville, AR 72701, USA.

Key words: chemical control, chlorothalonil, copper hydroxide, cultivars, disease resistance, fungal diseases, fungicides, mancozeb, myclobutanil, plant disease control, plant diseases, plant pathogenic fungi, plant pathogens, surfactants, varietal susceptibility

Journal of Applied Horticulture, 2005, volume 7, issue 1, pages 16-19.

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Abstract: Laboratory and field experiments were conducted in Stillwater, Oklahoma and Fayetteville, Arkansas, USA, from May to August 2000, to determine the effectiveness of different fungicides applied with and without the surfactant Hyper-Active™ in controlling anthracnose caused by *Colletotrichum gloeosporioides* [*Glomerella cingulata*] on *Euonymus fortunei* cultivars Emerald Gaiety, Emerald 'n Gold and Emerald Surprise. The fungicides tested were mancozeb, copper hydroxide, trifloxystrobin, chlorothalonil, myclobutanil and azoxystrobin. These fungicides were also incorporated into potato dextrose

agar to determine the effective concentration to obtain 50% inhibition (EC50) of *C. gloeosporioides* mycelial growth. In the field, chlorothalonil and mancozeb were the most efficacious of the fungicides tested. The presence or absence of the surfactant Hyper-Active™ in fungicide spray solutions did not affect control of anthracnose symptoms. Cultivars varied in susceptibility to anthracnose. At Fayetteville, less anthracnos

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Effect of water stress on plant growth and thymol and carvacrol concentrations in Mexican oregano grown under controlled conditions.

Dunford, N T; Silva Vazquez, R

Food and Agricultural Products Research and Technology Center, Department of Plant and Soil Sciences, Oklahoma State University, Room 103, Stillwater, OK 74078, USA.

Key words: chemical composition, crop growth stage, crop yield, essential oil plants, essential oils, growth, monoterpenoids, plant composition, plant water relations, thymol, water stress

Journal of Applied Horticulture, 2005, volume 7, issue 1, pages 20-22.

[Full text PDF |](#)

Abstract: A greenhouse study was carried out to investigate the effect of moisture on the growth and thymol and carvacrol contents of Mexican oregano (*Lippia berlandieri*) under controlled conditions. There were 4 watering schemes (0.2, 0.4, 0.8 and 1.2 l water per pot per 15 days) and 3 growth phases, i.e. seedling (30 days after transplant (DAT)), full flowering (60 DAT) and maturity (90 DAT). The crop yield increased significantly with increasing moisture and age of the plant. Although on an average, the older plants contained less oil than the younger plants, the differences were not statistically significant. The total thymol and carvacrol contents of oregano oils obtained from younger plants were higher than that of the mature plants. The amount of water received by the plants did not have a significant effect on the thymol and carvacrol contents of the oil.

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Chrysophyllum lanceolatum - a new rootstock for sapota (*Achras zapota* L.).

Kalesh, K S; Shareef, S M; Mathew, S P; Chemburkar, M S

Tropical Botanic Garden and Research Institute, Palode, Thiruvananthapuram - 695 562, Kerala, India.

Key words: crop quality, crop yield, fruits, grafting, rootstocks, sapodillas, vegetative propagation

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***Trichoderma harzianum* application increases cucumber (*Cucumis sativus* L.) yield in unheated glasshouse.**

Altintas, S; Bal, U

Department of Horticulture, Tekirdag Faculty of Agriculture, Trakya University, Tekirdag, Turkey.

Key words: application rates, crop yield, cucumbers, cultivars, fruits, fungal antagonists, seedlings, seeds, yield components

Journal of Applied Horticulture, 2005, volume 7, issue 1, pages 25-28.

Abstract: A greenhouse experiment was conducted to study the effects of *Trichoderma harzianum* applications on yield and fruit characteristics of the cucumber cultivars Y-43-F1, Y-44-F1 and Y-135-F1. *T. harzianum*, obtained as a commercially available product (Trichoflow WP; 108 cfu/g) was applied to the soil root zone at 4, 10 and 24 g/m². Observations were made on total yield (g/plant), early yield (g/plant), fruit weight (g/fruit), number of fruits per plant, number of early fruits per plant, mean fruit length (cm) and mean fruit diameter (mm). The main effect of dosage was significant only for total yield for which the 4 g/m rate resulted in the highest total yield per plant (2162.44 g) followed by 24 g/m, 10 g/m and control (1931.67, 1859.11 and 1499.67 g/

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Carbon isotope discrimination and water use efficiency of grape varieties, rootstocks and budded grapevines.

Satisha, J; Prakash, G S

Indian Institute of Horticultural Research, Hessaraghata, Bangalore - 560 089, Karnataka, India.

Key words: budding, cultivars, genetic variation, grapes, plant water relations, rootstocks, water use efficiency

Journal of Applied Horticulture, 2005, volume 7, issue 1, pages 29-33.

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Dog Ridge, which is confirmed by the least CID in this combination at 50% stress.

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Ethylene and anti-ethylene treatment effects on cut 'First Red' rose.

Esmail Chamani; Ahmad Khalighi; Joyce, D C; Irving, D E; Zamani, Z A; Younes Mostofi; Mohsen Kafi

Centre for Native Floriculture, School of Agronomy and Horticulture, The University of Queensland, Gatton Queensland 4343, Australia.

Key words: cut flowers, ethylene, ethylene production, plant growth regulators, roses, senescence, silver thiosulfate, vase life

Journal of Applied Horticulture, 2005, volume 7, issue 1, pages 3-7.

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Abstract: A laboratory experiment was conducted to determine the effects of ethylene and anti-ethylene treatments on the postharvest life of cut rose cv. First Red flowers. The treatments comprised: exogenous ethylene applied at 1, 10 and 100 micro l/litre for 48 h at 22 degrees C. Ethylene at different concentrations reduced postharvest life, with 100 micro l/litre having the greatest effect. Ethylene production measurements suggested that First Red is climacteric during senescence. Pre-treatment of First Red flowers with 0.5 mM silver thiosulfate (STS) for 2 h at 22 degrees C increased vase life, but pre-treatment with 1 micro l/litre 1-methylcyclopropene (1-MCP) did not. Pre-treatment of First Red with 0.5 mM STS and, to a lesser extent, 1 micro l/litre 1-MCP for 2 h at 22 degrees C, protected flowers from subsequent exposure to 10 micro l/litre ethylene. Maximum vase life in both ethylene-treated and non-ethylene-treated First Red flowers was obtained with 0.5 mM STS.

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Ethylene and anti-ethylene treatment effects on cut 'First Red' rose.

Esmaeil Chamani; Ahmad Khalighi; Joyce, D C; Irving, D E; Zamani, Z A; Younes Mostofi; Mohsen Kafi

Centre for Native Floriculture, School of Agronomy and Horticulture, The University of Queensland, Gatton Queensland 4343, Australia.

Key words: cut flowers, ethylene, ethylene production, plant growth regulators, roses, senescence, silver thiosulfate, vase life

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Influence of paclobutrazol on early flowering and aesthetic value of China aster (*Callistephus chinensis* L. Nees).

Mishra, D K; Mishra, H R; Yadava, L P

K.A. Post Graduate Degree College, Allahabad (UP), India.

Key words: application methods, application rates, branches, flowering, growth, growth retardants, paclobutrazol, plant development, plant growth regulators, plant height, root shoot ratio, roots, shoots

Journal of Applied Horticulture, 2005, volume 7, issue 1, pages 34-37.

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drench was the most effective in retarding plant height. The highest number of branches per plant was observed with 25 ppm paclobutrazol as soil drench while lower number of branches per plant was observed with 200 ppm as soil drench. The number of leaves and total leaf area per plant significantly decreased with increased concentration of paclobutrazol irrespective of the methods of application. The soil drench method registered maximum enhancement of root:shoot ratio than foliar spray and root dip at all levels of paclobutrazol. Maximum enhancement of root:shoot length ratio was observed due to 200 ppm paclobutrazol as soil drench method. The maximum d

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Prospects for the bio-management of *Trichoderma viride* - an organism harmful to button mushroom.

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Department of Plant Pathology, G.B. Pant University of Agriculture and Technology, Pantnagar - 263 145, India.

Key words: biological control agents, edible fungi, fungal antagonists, mushrooms, plant extracts, plant pathogenic fungi, plant pathogens

Journal of Applied Horticulture, 2005, volume 7, issue 1, pages 38-42.

Abstract: Botanical biocides in forms of water, methanol and glycerol diluted plant extracts (WDPEs, MDPEs and GDPEs, respectively) of 27 botanicals, 10 fluorescent pseudomonad isolates (FPIs) and an actinomycete isolate (AI), were evaluated *in vitro* against *Trichoderma viride* and *Agaricus bisporus*. Among these, the water diluted extract (5%) of *Lantana camara* (WDELc) reduced the radial growth of *T. viride* by 28.57% along with a 38.61% growth promotion of *A. bisporus*. However, glycerol diluted extract (1%) of *Cleome viscosa* (GDECv) inhibited the growth of *T. viride* and *A. bisporus* completely. In the case of bacterial biocides, fluorescent pseudomonad isolate II (FPI-II) was effective and reduced the linear growth of *T. viride* by approximately 73.68% and enhanced the growth of *A. bisporus* by 27.59%. An actinomycete isolate showed antagonistic effect against *T. viride* and *A. bisporus* as it reduced the growth of both the fungi by approximately 7.10 and 20%, respectively. Under crop conditions, the combination of FPI-II +

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Impact of explants and gamma irradiation dosage on *In vitro* mutagenesis in carnation (*Dianthus caryophyllus* L.).

Paramesh, T H; Sona Chowdhury

Division of Ornamental Crops, Indian Institute of Horticultural Research, Hesaraghatta, Bangalore - 560 089, India.

Key words: benzyladenine, callus, carnations, culture media, explants, gamma radiation, gibberellic acid, in vitro culture, in vitro regeneration, irradiation, leaves, micropropagation, mutagenesis, NAA, plant growth regulators, survival, thidiazuron

Journal of Applied Horticulture, 2005, volume 7, issue 1, pages 43-45.

Abstract: *In vitro* shootlets of carnation (cv. IIHRS-1) were subjected to irradiation with gamma dosage of 20, 40, 60 and 80 Gy. *In vitro* shootlets required for the irradiation were generated on MS media supplemented with 0.25 mg BAP [benzyladenine], 0.1 mg NAA and 0.25 gibberellic acid/l. From irradiated shootlets, leaves were excised and used as explants for further culturing. Leaves were horizontally cut into half. The region adhering to stem was considered as the leaf base and the region that is away from the stem was considered as the leaf tip. The leaf tip and leaf base were incubated on MS media supplemented with (1) 1.0 mg thidiazuron (TDZ) and 0.1 mg NAA/l (M5) and (2) 0.3 mg TDZ, 1.0 mg BAP and 0.1 mg NAA/l (M6). Weekly observations were recorded for survival percentage, callus formation, regenerated shootlets and expansion of leaf area. The results indicated gamma-radiation at 40 Gy to be the ideal dosage for mutagenesis when mutagenesis was used in combination with regeneration. Survival percentage decrease

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Comparative study of water core in Red Delicious and Golden Delicious apples of Himachal Pradesh.

Singla, M L; Jain, S C; Shweta Sharma; Angra, S K

Central Scientific Instruments Organization, Sector 30-C, Chandigarh - 30, India.

Key words: absorbance, apples, cultivars, monitoring, nondestructive testing, plant disorders, techniques, transmission, water core

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Delicious and Golden Delicious of Himachal Pradesh, India. The principle of this method is to measure the optical density of the sample at 2 selected wavelengths and computation of the optical density difference. It has been observed that Golden Delicious is more prone to water core than Red Delicious. The technique is simple and can be conveniently implemented to develop an on-line instrument to monitor water core in apples.

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Volume 7(1), 2005

Design and development of tray type vacuum seeder and tray type dibbler for vegetable nursery.

Rathinakumari, A C; Kumaran, G S; Mandhar, S C

Section of Agricultural Engineering, Indian Institute of Horticultural Research, Bangalore, Karnataka 560 089, India.

Key words: cabbages, cauliflowers, containers, design, drilling, drills, equipment performance, mechanization, performance tests, vegetable growing, vegetables, work capacity

Journal of Applied Horticulture, 2005, volume 7, issue 1, pages 49-51.

Abstract: A tray type dibbler with capacity of 100 portrays/h and a vacuum seeder with capacity of 50 portrays/h were designed and developed. The tray type dibbler is made out of wooden board with 98 nylon pegs to dibble in the media. The tray type vacuum seeder is made of acrylic sheet and it consists of a vacuum chamber, seed plate with 98 holes to pick the seeds, vacuum pump and necessary control valves. It was observed that the seeder picked and dropped the round shaped seeds like cabbage, cauliflower and knol khol perfectly, i.e., 100% singles. For other vegetable seeds, the metering performance of the seeder was good with singles in the range of 93-97%, doubles between 3-7% and no missing was recorded. It is suggested that these handy and low cost tray type dibbler and tray type vacuum seeder are very much useful for small vegetable nursery growers.

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Selection possibilities for seed content - a determinant of fresh fruit quality in guava (*Psidium guajava* L.).

Rajan, S; Yadava, L P; Ram Kumar; Saxena, S K

Central Institute for Subtropical Horticulture, Rehmankhera, PO Kakori, Lucknow - 227 107, India.

Key words: crop quality, fruits, genetic variation, guavas, heritability, phenotypic variation, seed characteristics, seed weight, seeds, selection criteria

Journal of Applied Horticulture, 2005, volume 7, issue 1, pages 52-54.

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Abstract: A total of 68 guava accessions were studied to determine the genetic variability and heritability for fruit weight and associated seed characteristics. Data were recorded for fruit weight, number of seeds per fruit, seed weight per fruit, 100-seed weight, number of seeds per 100 g fruit and seed content. High genotypic (GCV) and phenotypic (PCV) coefficients of variation were observed for all the traits. However, GCV was maximum for pulp:seed weight ratio followed by number of seeds per fruit, 100-seed weight and number of seeds per 100 g fruit. The estimates of PCV ranged from 33.85 (average fruit weight) to 609.75% (pulp:seed weight ratio). The number of seeds per 100 g fruit, number of seeds per fruit and 100-seed weight also exhibited high levels of PCV. The estimates of heritability in the broad sense ranged from 0.558 (seed content) to 0.843 (pulp:seed weight ratio) suggesting that all the characters had high magnitude of heritability. The estimate of genetic advance as percent of mean ranged from 43.76

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Volume 7(1), 2005

Studies on genetic variability and heritability for quality traits of tomato (*Lycopersicon esculentum* Mill.) under heat stress conditions.

Hardevinder Singh; Cheema, D S

Department of Vegetable Crops, Punjab Agricultural University, Ludhiana - 141 004, India.

Key words: characteristics, firmness, genetic variation, heat stress, heritability, lycopene, pericarp, phenotypic variation, tomatoes

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Volume 7(1), 2005

Exploring suitable plant density for hydroponically grown cucumber (*Cucumis sativus* L.) in greenhouse conditions.

Pant, T; Bhatt, R P; Bhoj, A S; Kumar, N

Defence Agricultural Research Laboratory, Pithoragarh - 262 501, India.

Key words: crop yield, cucumbers, fruits, hydroponics, leaf area index, photosynthesis, plant density, protected cultivation, soilless culture, transpiration

Journal of Applied Horticulture, 2005, volume 7, issue 1, pages 58-60.

Abstract: A greenhouse experiment was conducted to identify the suitable plant density (2, 4, 6, 8 and 10 plants per m²) for growing cucumber (cv. Green Long) in recirculating hydroponic system of cultivation. An increase in plant density from 2 to 6 plants per m² significantly increased yield. A declining trend in yield and fruit number was observed at more than 6 plants per m². The leaf area index and photosynthetic rate in different treatments were also recorded. The photosynthetic and transpiration rates were maximum when plant density was maintained at 6 plants per m².

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Volume 7(1), 2005



A method for determining the vase life of cut spray carnation flowers.

Satoh, S; Nukui, H; Inokuma, T

Laboratory of Environmental Biotechnology, Graduate School of Agricultural Sciences, Tohoku University, Tsutsumidori-amamiyamachi 1-1, Sendai 981-8555, Japan.

Key words: carnations, cut flowers, methodology, preservatives, sucrose, vase life

Journal of Applied Horticulture, 2005, volume 7, issue 1, pages 8-10.

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Abstract: An attempt was made to determine the vase life of spray type carnation flowers by observing the number of open flowers, i.e. the percentage of open flowers to the total number of initial flower buds, and to evaluate the efficacy of this method. The vase life determined by this method was similar to that determined by measuring ethylene production and observing senescence symptoms of carnation flowers. The method effectively evaluated the action of preservatives, sucrose and 1,1-dimethyl-4-(phenylsulfonyl)semicarbazide in carnation flowers. The results indicated that this method can be used as an alternative method for the determination of the vase life of carnation flowers, especially those of the spray type.

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Volume 6(2), 2004



Expression of green fluorescent protein gene in litchi (*Litchi chinensis* Sonn.) tissues.

Puchooa, D

Faculty of Agriculture, University of Mauritius, Reduit, Mauritius.

Key words: callus, gene expression, genes, genetic engineering, genetic transformation, in vitro culture, in vitro regeneration, leaves, tissue culture, transgenic plants

Journal of Applied Horticulture, 2004, volume 6, issue 2, pages 11-15.

[Full text PDF](#) |

Abstract: Green-fluorescent protein (GFP) gene expression was observed in tissues of litchi (*Litchi chinensis*) after transformation using *Agrobacterium*. *In vitro* grown leaf tissues were used for transformation. After four weeks in culture, expression of GFP was apparent when the regenerated callus and the leaves were observed under fluorescence microscope fitted with a blue exciter filter, a blue dichroic mirror and a barrier filter. Although no transformed litchi plantlets were regenerated, screening for GFP gene expression may prove useful to improve transformation efficiency and to facilitate detection of transformed litchi plants.

Volume 6(2), 2004

Effects of Kaolin and Pinolene film-forming polymers on water relations and photosynthetic rate of tuberose (*Polianthes tuberosa* L.) plants under water deficit conditions.

Moftah, A E; Al Humaid, A I

College of Agriculture and Veterinary Medicine, PO Box: 1482 King Saud University, Al-Qassim Branch, Riyadh, Saudi Arabia.

Key words: antitranspirants, chlorophyll, drought, evapotranspiration, irrigation scheduling, kaolin, leaf conductance, net assimilation rate, photosynthesis, pinolene, plant water relations, stomata, turgor, water stress
Journal of Applied Horticulture, 2004, volume 6, issue 2, pages 16-22.

Abstract: The effects of pinolene-base Vapor Gard (VG) emulsion type film and Kaolin (Surround WP) particle type film antitranspirants on stomatal behaviour, water status, carbon assimilation and transpiration rate of tuberose (*Polianthes tuberosa*) cv. Double plants, grown under irrigation regimes of 100, 80 and 60% of total evapotranspiration (ET) values, were studied to select the most suitable antitranspirant for conserving irrigation water, with no detrimental effects on growth and production of tuberose plants grown in arid regions. Severe water stress decreased the stomatal frequency and conductance (gs), leaf water potential (Psi w), osmotic potential (Psi pi) and turgor potential (Psi p), relative water content (RWC), chlorophyll content (chl), carbon assimilation rate (A) and transpiration rate (E). Both types of antitranspirants effectively enhanced the performance and physiological activities of water-stressed plants particularly, at the 80% ET, but they did not compensate for the negative effects caused

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Derivation and evaluation of new nutrient norms for twelve nutrients (N, P, K, Ca, Mg, Na, S, B, Zn, Cu, Fe and Mn) in the petioles of Muscat grapes (*Vitis vinifera* L.) using the CVA, DRIS, MDRIS and CND approaches.

Kumar, P S S; Geetha, S A; Savithri, P

Department of Soil Science and Agricultural Chemistry, Agricultural College and Research Institute, Tamil Nadu Agricultural University, Coimbatore - 641 003, India.

Key words: boron, calcium, chemical composition, copper, crop yield, foliar diagnosis, grapes, iron, magnesium, manganese, mineral nutrition, nitrogen, nutrient balance, nutrient deficiencies, petioles, phosphorus, plant composition, plant nutrition, potassium, sodi

Journal of Applied Horticulture, 2004, volume 6, issue 2, pages 23-26.

Abstract: Diagnostic norms were developed from 53.2% top yielding vineyards in Tamil Nadu, India, among 940 observations on yield and petiole analyses of Muscat grapes using bivariate Diagnosis and Recommendation Integrated System (DRIS)/Modified Diagnosis and Recommendation Integrated

System (MDRIS) and multivariate Compositional Nutritional Diagnosis (CND). About 66 optimum nutrient ratios and concentrations were computed from N, P, K, Ca, Mg, Na, S, B, Zn, Cu, Fe and Mn analytical results. When several nutrients are limiting yield simultaneously, the diagnosis of nutrient disorder by multivariate CND approach is required for higher diagnostic precision. Based on the classification of NIIs, approximately 17% were severely limited by mineral nutrition and 32% of the vineyards were identified as having possible imbalances. The norm values and identification of yield limiting nutrients were close to each other with DRIS and CND, while there was no consensus with Critical Value Approach norms and diagnosis.

Volume 6(2), 2004

Effect of cytokinin and auxin on micropropagation of *Geoderum purpureum* R. Br.

Mohapatra, A; Rout, G R

Plant Tissue Culture Laboratory, Plant Biotechnology Division, Regional Plant Resource Centre, Bhubaneswar - 751 015, Orissa, India.

Key words: auxins, benzyladenine, buds, culture media, cytokinins, IAA, in vitro culture, in vitro regeneration, micropropagation, plant growth regulators, rooting, shoots, sucrose, tissue culture

Journal of Applied Horticulture, 2004, volume 6, issue 2, pages 27-29.

Abstract: Efficient and rapid micropropagation system was developed for *Geoderum purpureum* [*Geodorium purpureum*], an important terrestrial orchid, through axillary meristem culture by manipulating cytokinin and auxin. Multiple shoots were induced from axillary meristems cultured on agar-based MS medium supplemented with 2.0-3.0 mg benzyladenine/litre, 0.5-1.0 mg IAA/litre and 3% (w/v) sucrose. Maximum number of shoot buds were obtained with 3.0 mg benzyladenine and 1.0 mg IAA/litre. The rate of shoot multiplication was maintained in subsequent subculture on similar fresh culture medium. Elongated shoots were separated and rooted on half strength basal MS medium supplemented with IAA or IBA and 2% (w/v) sucrose. Maximum percentage of rooting was obtained on medium having 0.5 mg IAA/litre. Plantlets, thus developed were established in soil with 80% survival.

Volume 6(2), 2004

A study on factors affecting propagation of shade plant-*Syngonium podophyllum*.

Hassanein, A M

Genetics Laboratory, Faculty of Science, South Valley University, 82524 Sohag, Egypt.

Key words: benzyladenine, buds, carotenoids, chlorophyll, enzyme activity, enzymes, growth, IBA, in vitro culture, internodes, leaf area, light intensity, micropropagation, moisture content, peroxidase, plant growth regulators, propagation, rooting, roots, shade pla

Journal of Applied Horticulture, 2004, volume 6, issue 2, pages 30-34.

Abstract: Although all nodal segments of *Syngonium podophyllum* irrespective of their age and different concentrations of benzylaminopurine [benzyladenine] (BAP) showed axillary shoot growth, young nodes cultured on MS medium supplemented with 5 micro M BAP gave the best results. Elongated shoots were rooted on half-strength MS medium supplemented with 5 micro M IBA. Increase of the frequency of axillary bud sprouting and decrease in the frequency of root formation with the increase of light intensity were recorded, which was accompanied with increase of relative peroxidase activity. Instead of peat, soil consisted of sawdust, sand and clay (1: 1: 1) was a suitable combination producing valuable plant survival. Subjecting the plants growing in the soil to full sunlight for one day enhanced the peroxidase activity and aggressive chlorophyll degradation, thereby leading to leaf bleaching especially at relatively high temperature (40 degrees C) or low moisture content of the soil (50% field capacity). Plants grown under illu

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Effects of lateral shading on growth and morphology of shoots and rooting ability of jackfruit (*Artocarpus heterophyllus* Lam.) cuttings.

Hossain, M A; Kamaluddin, M

Institute of Forestry and Environmental Sciences, University of Chittagong, Chittagong-4331, Bangladesh.

Key words: clonal propagation, cuttings, growth, internodes, jackfruits, plant morphology, rooting, roots, shading, shoots

Journal of Applied Horticulture, 2004, volume 6, issue 2, pages 35-38.

Abstract: The study considers the effect of different levels of shade on growth and morphology of shoots and rooting ability of cuttings developed from

decapitated ground layered stock plants. Two-year-old seedling-originated stock plants of jackfruit (*Artocarpus heterophyllus*) were decapitated at the tip and layered on ground. Shoots were allowed to develop at three levels of shade: vegetational shade (75% of full sun), lateral shade (40% of full sun) and overhead shade (10% of full sun). Different levels of shade significantly affected the growth and morphology of shoots. Active bud percentages as well as number of shoots produced per stock plant with longer internodes were significantly higher in lateral shade. Rooting percentages of cuttings obtained from the shoots of vegetational, lateral and overhead shade were 80, 87 and 90, respectively. The maximum number of roots (6.2) and root dry mass (20.7 mg) were found in cuttings obtained from lateral shade, followed by overhead shade. The results are discussed in the

Volume 6(2), 2004

Improvement of postharvest quality of tomato fruits by ethanol vapour treatment.

Thakur, A K; Pandey, M

Division of Plant Physiology, Indian Agricultural Research Institute, New Delhi - 110 012, India.

Key words: crop quality, ethanol, fruits, postharvest treatment, ripening, sugar content, tomatoes

Journal of Applied Horticulture, 2004, volume 6, issue 2, pages 39-42.

Abstract: Mature-green tomato fruits (cv. 'Bombay') were exposed to ethanol vapour at 0, 1, 2, or 4 ml/kg for 24 hours at 25 degrees C. Ripening was measured as a change in fruit colour. Ethanol treatment delayed fruit ripening which was concentration dependent. Higher concentration of ethanol vapour delayed tomato fruit ripening for more days. Postharvest treatment of ethanol vapour to tomato fruits showed higher TSS, lower acidity, higher brix:acid ratio and high sugar content compared to untreated fruits. The relative association of applied ethanol concentration showed a negative association with acidity and a positive association with sugar content at red-ripe stage. There was a negative relationship between titratable acidity and sugar content in ripe tomato fruit. Postharvest use of ethanol improves the sensory quality of fruits after complete ripening.

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GIS-based land suitability assessment for Musa (ABB

group) plantation.

Boonyanuphap, J; Wattanachaiyingcharoen, D; Sakurai, K

Graduate School of Agricultural Science, Ehime University, Matsuyama, 790-8566, Japan.

Key words: bananas, databases, geographical information systems, plantations, precision agriculture

Journal of Applied Horticulture, 2004, volume 6, issue 2, pages 41343.

Abstract: Results are presented of experiments conducted in Thailand to construct the geographical databases of land suitability for Musa (ABB) group plantation, to assess land suitability for Musa (ABB) group using geographical information systems, and to select the possible lands for new banana plantations.

Volume 6(2), 2004

Selection response in vegetable amaranth (*A. tricolor*) for different foliage cuttings.

Atul Bhargava; Sudhir Shukla; Avijeet Chatterjee; Singh, S P

Division of Genetics and Plant Breeding, National Botanical Research Institute, Lucknow - 226 001, India.

Key words: branches, correlation analysis, crop yield, genetic gain, heritability, leaf cuttings, leaves, plant height, protein content, selection criteria, stems, yield components

Journal of Applied Horticulture, 2004, volume 6, issue 2, pages 43-44.

Abstract: An experiment was conducted during 2003 kharif season in Lucknow, Uttar Pradesh, India, on 29 vegetable amaranth (*Amaranthus tricolor*) cultivars to identify the suitable direct and indirect component traits that contribute towards foliage yield. The first cutting of foliage started after the third week of sowing and subsequent cuttings were conducted at 15-day intervals. Data were recorded for plant height, stem diameter, branches per plant, leaves per plant, leaf size, protein content and foliage yield. Heritability values were high for all the characters in all the cuttings and pooled values. Foliage yield showed maximum heritability in all 4 cuttings followed by plant height and leaf size. Genetic gain was highest for foliage yield followed by leaf size and stem diameter. In general, the genetic advance values were high in all the cuttings for foliage yield, plant height, leaf size and stem diameter. Only

plant height was positively correlated with foliage yield in all the cuttings. In the first and second

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Genetical studies on yield and its components in tomato.

Viveka Katoch; Vidyasagar

Department of Vegetable Science, H.P. Agricultural University, Palampur - 176 062, India.

Key words: crop yield, crosses, genes, genetic analysis, tomatoes, yield components

Journal of Applied Horticulture, 2004, volume 6, issue 2, pages 45-47.

Abstract: An experiment was conducted to understand the nature of gene effects for yield and its component characters in tomato. Six generations, (P1, P2, F1, F2, B1 and B2) of Hawaii 7998 x BT-18, Hawaii 7998 x EC 191536 and BT-18 x EC 191536, derived after crossing the bacterial wilt resistant parents, were studied following 3-parameter model of Cavalli (1952) and 6-parameter model of Jink and Jones (1958). Duplicate epistasis with relatively higher magnitude of [I] interaction (+) was observed for marketable yield per plant and number of marketable fruits per plant in Hawaii 7998 x BT-18 and BT-18 x EC 191536, thus suggesting a need for exploitation of hybrid vigour or intermating followed by selection in later generations, in these crosses. Whereas, the presence of additive effects [d and i] in Hawaii 7998 x EC 191536 indicated the importance of simple pedigree selection. For the traits related to earliness (days to 50% flowering and days to first harvest), pedigree selection in BT-18 x EC 191536 and pedigree selec

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Effect of controlled atmosphere storage on quality parameters and storage period of apple cultivars "Granny Smith" and "Jonagold".

Akbudak, B; Ozer, H; Erturk, U

Department of Horticulture Gorukle, Faculty of Agriculture, Uludag University, 16059 Bursa, Turkey.

Key words: apples, controlled atmosphere storage, controlled atmospheres, crop quality, cultivars, relative humidity, storage quality, temperature

Journal of Applied Horticulture, 2004, volume 6, issue 2, pages 48-54.

Abstract: An experiment was conducted to study the suitable atmospheric combinations for controlled atmosphere (CA) storage of apple cultivars Granny Smith and Jonagold, and revealing some physical and chemical changes occurring during the storage of these cultivars. Granny Smith and Jonagold were stored for 210 and 180 days, respectively, at 0+or-0.5 degrees C and 90 +or-5% relative humidity (RH) under the atmospheric combinations of 0:21 (CO₂:O₂) [normal atmosphere (NA)-control], 3:1, 3:1.5, 3:2 and 3:2.5. Fruits were kept at room conditions (20+or-2 degrees C and 60+or-5% RH) for 5 days at the end of storage period to determine the shelf life. Physical and chemical analyses (weight loss, respiration rate, total soluble solids, titratable acidity, pH, fruit flesh firmness, pectin esterase activity, fruit skin colour) were realized on the fruit samples taken during storage and at the end of shelf life. At the end of the study, it was determined that the fruits of apple cultivars Granny Smith and Jonagold could be store

Volume 6(2), 2004

Enzymatic and phenolic content changes in 'Pusa Seedless' grape buds during onset and release of dormancy.

Pramanick, P K; Sharma, V P; Deshmukh, P S; Singh, S K

Division of Fruits and Horticultural Technology, Indian Agricultural Research Institute, New Delhi - 110 012, India.

Key words: catalase, dormancy, dormancy breaking, enzyme activity, enzymes, grapes, peroxidase, phenols, plant development, sprouting

Journal of Applied Horticulture, 2004, volume 6, issue 2, pages 55-57.

Abstract: An experiment was conducted from 1 November 1998 to 15 March 1999 and 1 November 1999 to 15 March 2000 to study the role of hydroperoxidase enzymes (peroxidase and catalase), phenols and their relationship with the intensity of dormancy in grape cv. Pusa Seedless, grown under the subtropical conditions of north India. Catalase activity increased during the early part of the dormancy cycle then declined and was lowest at bud break. On the other hand, peroxidase activity was lowest at the initial stages of dormancy then increased and was maximum at dormancy breaking. Phenol content increased from the onset of dormancy to deep dormancy then declined and was lowest at sprouting.

Volume 6(2), 2004

Environmental impact of phosphorus overfertilization in tomato greenhouse production.

Giuffre, L; Alconada, M; Pascale, C; Ratto, S

Catedra de Edafologia, Facultad de Agronomia, Universidad de Buenos Aires, Av. San Martin 4453, 1417, Buenos Aires, Argentina.

Key words: application rates, crop yield, environmental factors, phosphorus fertilizers, protected cultivation, soil chemical properties, soil physical properties, soil properties, tomatoes

Journal of Applied Horticulture, 2004, volume 6, issue 2, pages 58-61.

Abstract: An experiment was conducted to evaluate the effect of overapplication of phosphorus fertilizers on soil properties in commercial greenhouses for tomato production and to study the relationship between soil extract P values and yields. Twenty commercial greenhouses with continuous tomato production were analysed in the horticultural belt of La Plata, Buenos Aires, Argentina, with Vertic Argiudoll soils, and compared with a control site. Composite soil samples were extracted at 0-20 cm of depth in 2 sampling dates: initial (tomato transplantation) and 6 months later (harvest). Oxidizable C, total N, Bray extractable P, and exchangeable bases in ammonium acetate extracts, were determined in dry soil samples. Electrical conductivity and pH were measured in saturated soil paste extracts. Tomato yields were determined at each experimental site. Overapplication of fertilizers was associated with physical-chemical degradation of the vertic soils of the region with visual symptoms of chlorosis, calcium deficiency, and

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Techniques to rear eggplant shoot and fruit borer, *Leucinodes orbonalis* Guenee in the laboratory for host plant resistance studies.

Harish Kumar

Proagro Seed Company, Dhumaspur Road, Badshahpur, Gurgaon, India.

Key words: aubergines, biological development, developmental stages, fecundity, fertility, infestation, insect pests, laboratory rearing, larvae, ova, oviposition, plant pests, susceptibility, synthetic diets

Journal of Applied Horticulture, 2004, volume 6, issue 2, pages 62-64.

Abstract: An efficient technique for laboratory rearing of the aubergine shoot and fruit borer (SFB) *Leucinodes orbonalis* is described. The modified oviposition chamber enhanced the overall egg-laying capacity of the adults in terms of fecundity and fertility of the eggs. For larval rearing, round-sized fruits provided a better medium than the long-sized fruits. Approximately 50% of the neonate larvae survived when released on artificial diet. No pupation was observed on the diet even 30 days after infestation. Most larvae were smaller in size compared to those reared on non-artificial diet. Aubergine did not possess resistance to SFB at the preflowering or pre-fruiting stages. However, data showed that to evaluate aubergine germplasm against SFB, the infestation can be as low as 3 or 10 larvae per plant. Aubergine infested with 3 larvae per plant should be kept for approximately 2 weeks and those infested with 10 larvae per plant for approximately 10 days prior to assessing damage by SFB.

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Evaluation of bold aonla genotypes in Konkan with unique two harvests in a year.

Kshirsagar, P J; Gavankar, M S; Chavan, V G; Pujari, K H; Deshpande, S B; Shingre, B V; Patil, B P

Regional Fruit Research Station, Vengurle, Dist. Sindhudurg, 416 516 (M.S.), India.

Key words: crop yield, cultivars, medicinal plants

Journal of Applied Horticulture, 2003, volume 5, issue 2, pages 100-101.

Abstract: Field experiments were conducted from 2000 to 2002 at 2 locations (Vengurle and Mulde) in Konkan, Maharashtra, India to evaluate the performance of the bold aonla (*Emblica officinalis* [*Phyllanthus emblica*]) cultivars NA-7, Krishna, Chakaiya and Kanchan. Based on pooled data for 3 years, Kanchan recorded the highest yields of 40.82 and 12.77 kg/tree at Vengurle and Mulde, respectively. Thus, Kanchan is highly recommended for cultivation in the Konkan region. However, for effective cross pollination and higher yield, mixed planting of Kanchan with Krishna and NA-7 could be the best strategy for aonla cultivation in the region. Monsoon season harvest proved to be superior under Konkan conditions.

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Effect of slow release multi-nutrient fertilizers on the yield and nutrient uptake in turmeric (*Curcuma longa* L.)

R. Jagadeeswaran, V. Murugappan and M. Govindaswamy

Department of Soil Science and Agricultural Chemistry, Tamil Nadu Agricultural University, Coimbatore 641 003.

Key words: Nutrient tablets, fertilizer placement, slow release fertilizers

Journal of Applied Horticulture, 2003, volume 10, issue 2, pages 100-105.

Abstract: To evaluate the efficacy of slow release NPK fertilizers in turmeric, two field experiments were conducted on a sandy clay loam soil. These slow

release NPK fertilizers are new products in the form of tablets, mixtures and coated formulations, which contains all the three major nutrients in them. Five slow release NPK fertilizer sources were tested in comparison with straight fertilizers at three NPK levels *viz.*, 75, 100 and 125 % of recommended dose in a randomized block design. The results clearly indicated that the wet rhizome yield significantly increased with increasing levels of NPK and when applied in the form of tablets. The N, P and K uptake both in shoot as well as rhizome of turmeric increased significantly up to 125 % of NPK level applied. The uptake was significantly higher in plots which received tablet form of slow release fertilizers than other fertilizer sources.

Volume 5(2), 2003

Estimates of genetic variability, heritability and genetic advance in strawberry.

Verma, S K; Singh, R K; Arya, R R

National Bureau of Plant Genetic Resources Regional Station, Bhowali, Nainital, Uttaranchal - 263 132, India.

Key words: crop yield, flowering, flowers, fruits, genetic correlation, genetic variation, heritability, petioles, phenotypic correlation, plant height, runners, strawberries, yield components

Journal of Applied Horticulture, 2003, volume 5, issue 2, pages 102-104.

Abstract: Phenotypic and genotypic coefficients of variability, heritability along with genetic advance as percentage of mean were estimated in 17 strawberry accessions, grown in 1997 in Bhowali, Uttaranchal, India, for 16 characters. Fruit length showed high coefficient of variation (104.56%). Percentage of plant flowering showed the maximum phenotypic and genetic coefficient of variations, followed by fruit volume, flower number, number of flower trusses per plant and flower disk diameter. Fruit weight, plant height, petiole length, percentage of plant flowering and fruit volume showed high heritability coupled with high genetic advance as percentage of mean, which indicated that selection can be made for improvement. The genotypic correlation coefficients were higher than the phenotypic correlation coefficients. This indicated little role of environment in the expression of genetic relationship. Fruit number per plant was positively and significantly correlated with fruit volume, fruit weight, flower disk diameter,

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Inbreeding depression in cowpea (*Vigna unguiculata* (L.) Walp.).

Pal, A K; Singh, B; Maurya, A N

Department of Horticulture, Institute of Agricultural Sciences, BHU, Varanasi - 221 005 (U.P.), India.

Key words: branches, cowpeas, crop yield, flowering date, genes, genetic diversity, genetic variance, hybrids, inbreeding depression, plant height, pods, seed weight, seeds, yield components

Journal of Applied Horticulture, 2003, volume 5, issue 2, pages 105-107.

Abstract: A study was conducted during 1999-2000 in Varanasi, Uttar Pradesh, India, to investigate the inbreeding depression between *Vigna unguiculata* and *V. sesquipedalis* [*V. unguiculata* subsp. *sesquipedalis*]. The experiment was carried out in a line x tester design and data on 30 hybrids generated from 13 parents were analysed for inbreeding depression in the F₂ generation. Observations were recorded for 13 characters, i.e. days to 50% flowering, days to 1st green pod picking, plant height, peduncle length, number of primary branches per plant, pod length, pod diameter, number of peduncles per plant, number of pods per peduncle, number of pods per plant, number of seeds per pod, green pod yield per plant and 100-seed weight. Significant and varying degrees of inbreeding depression was observed for all the parameters, indicating the presence of high degree of diversity among the parents and presence of non-additive gene action. Cross combination KLS-10 x Cowpea-263 yielded more in the F₂ generation for green pod yield

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Effect of cultivar, root container size and temperature on days to flower and number of leaves before flowering in tomato

Cyd Celeste Cagas, Miki Nakata, Mae Rose Sumugat and Nobuo Sugiyama

Graduated School of Agricultural and Life Sciences, University of Tokyo, Bunkyo-ku, Tokyo 113-8657, Japan.

Key words: *Lycopersicon esculentum* Mill., plug tray, root restriction, temperature

Journal of Applied Horticulture, 2003, volume 10, issue 2, pages 106-108.

Abstract: Seedlings of three tomato cultivars, 'Reika', 'Marryroad' and 'First

'Power' were grown in either pots or plug trays in order to clarify the interaction effect of cultivar and root container size on the number of days to flowering and the number of leaves preceding the first inflorescence under different temperature regimens. The number of days to flowering was greater in seedlings raised in plug trays than those in pots, regardless of temperature regimen. Flowering was delayed at 23/18°C compared with 30/25°C for seedlings raised in either pots or plug trays. The number of leaves preceding the first inflorescence was greater in seedlings raised in plug trays than those in pots, except for 'Marryroad' at 23/18°C. Regardless of root container size, the number of leaves preceding the first inflorescence was greater in 'First Power' than in 'Reika' and 'Marryroad' at 30/25°C. These results suggest the importance of cultivar choice for the production of tomato seedlings with a small number of leaves preceding the first inflorescence using plug trays in cool conditions.

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BSR-1 - a high yielding, self-fruitful aonla variety from Tamil Nadu.

Chezhiyan, N; Shanmugasundaram, K A

Horticultural College and Research Institute, Tamil Nadu Agricultural University, Coimbatore - 641 003, India.

Key words: ascorbic acid, brix, characteristics, chemical composition, crop quality, crop yield, crude fibre, fruits, maturation, medicinal plants, phenolic compounds, plant composition

Journal of Applied Horticulture, 2003, volume 5, issue 2, pages 108-109.

Abstract: BSR-1 is a new high-yielding (155 kg/tree, 42 952 kg/ha), self-fruitful, and late-maturing cultivar of aonla (*Emblica officinalis* [P. *emblica*]) selected from a large number of germplasm from Bhavanisagar, Tamil Nadu, India. Its fruits are flattened at the base and round at the apex, with an average weight of 27.30 g/fruit. The fruits contain high total soluble solids (18.1 degrees brix) and vitamin C (620 mg/100 g of flesh), low phenol (29.75 mg/g of flesh), and high crude fibre content (4.31%).

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A simple and rapid extraction method to determine osmolar concentration of soluble carbohydrates from rose petals

Ryo Norikoshi, Hideo Imanishi and Kazuo Ichimura

National Institute of Floricultural Science, Fujimoto, Tsukuba, Ibaraki 305-8519, Japan; Tokyo University of Agriculture, Funako, Atsugi, Kanagawa 243-0034, Japan.

Key words: Centrifugal filter device, extraction method, microwave heating, osmotic pressure, petal, rose, soluble carbohydrates.

Journal of Applied Horticulture, 2003, volume 10, issue 2, pages 109-112.

Abstract: To establish a simple and rapid extraction method for soluble carbohydrate for determination of osmolar concentration in petals by HPLC analysis, a method using a centrifugal filter device with microwave heating was developed. Rose 'Sonia' petals were placed in a centrifugal filter device and heated in a microwave oven to boiling. The centrifugal filter device was centrifuged with the petals at 12,000 g for 10 min. The resulting leached solution was subjected to HPLC analysis. No significant difference in soluble carbohydrate composition was observed between the solution obtained from this method and that obtained from a conventional extraction method in which tissues are homogenized using hot ethanol solution. Changes in soluble carbohydrate concentration with flower opening in 'Rote Rose' roses were investigated using the new method. The osmolar concentrations of glucose and fructose in the petals increased during flower opening. This increase was roughly comparable to the increase in osmotic pressure in the petals. The results suggest that the method using the centrifugal filter device with microwave heating is a simple and rapid way to determine osmolar concentration of soluble carbohydrates of rose petals.

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Physico-chemical characteristics of some promising peach cultivars grown under humid temperate mid hills of Uttaranchal.

Narendra Kumar; Dimri, D C; Nigam, J K

Department of Horticulture, G.B. Pant University of Agri & Tech., Hill Campus, Ranichauri - 249 199, (Uttaranchal), India.

Key words: acidity, ascorbic acid, brix, chemical composition, crop quality, cultivars, fruits, humid zones, peaches, physicochemical properties, plant composition, size, sugar content, sugars, temperate climate, volume, weight

Journal of Applied Horticulture, 2003, volume 5, issue 2, pages 110-111.

Abstract: Six important peach cultivars namely, Tessia Samisto, Early White Giant, Stark Early Giant, Hales Early, Crawford Early and July Elberta, were evaluated for their physico-chemical traits under humid temperate mid-hill conditions of Uttaranchal, India during 2000/01. The maximum fruit size (6.72x6.15 cm), weight (89.21 g) and volume (91.51 ml) were recorded in Crawford Early, followed by July Elberta (5.68x5.47 cm, 81.69 g and 83.14 ml, respectively). The maximum TSS (12.79 degrees Brix) and total sugars (11.56%) were also registered in July Elberta, whereas maximum acidity (0.98%) and ascorbic acid (6.42 mg/100 g) were recorded in the cultivars Hales Early and July Elberta, respectively. On the basis of these parameters, July Elberta and Crawford Early have been found superior under mid-hill conditions of Uttaranchal.

Volume 5(2), 2003

Effect of GA, NAA and CCC on growth and flowering of French marigold (*Tagetes patula*).

Tripathi, A N; Tripathi, S N; Shukla, R K; Pandey, G

Department of Horticulture, Janta College, Bakewar (Etawah), U.P. 206 125, India.

Key words: application rates, branches, chlormequat, crop yield, flowering, flowering date, flowers, gibberellic acid, growth, leaves, NAA, plant growth regulators, plant height, stems, yield components

Journal of Applied Horticulture, 2003, volume 5, issue 2, pages 112-113.

Abstract: A field trial was conducted during the winter season of 1998/99 in Etawah, Uttar Pradesh, India to determine the optimum concentration of naphthalene acetic acid (NAA), gibberellic acid (GA) and chlormequat (CCC) for application on French marigold. Spraying of NAA (50, 100 and 200 ppm), GA (100, 200 and 400 ppm) and CCC (200, 400 and 600 ppm) was done in February. Data were recorded for plant height, diameter of main stem, number of branches per plant, number of leaves per plant, days to first flowering, diameter of flowers, fresh weight of flowers, number of flowers per plant, and flower yield per plant. CCC and GA application gave quite beneficial effects on these parameters. GA at 400 ppm and CCC at 600 ppm recorded the highest flower yield per plant (127.71 g) and number of flowers per plant (78.83), respectively. These chemicals had no adverse effect on the growth and flowering of French marigold.

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Effect of root zone cooling on flower development and fruit set of 'Satohnishiki' sweet cherry

Kenji Beppu, Makito Iino and Ikuo Kataoka

Faculty of Agriculture, Kagawa University, Miki, Kagawa 761-0795, Japan.

Key words: Fruit set rate, ovule development, *Prunus avium*, soil cooling
Journal of Applied Horticulture, 2003, volume 10, issue 2, pages 113-115.

Abstract: The effects of root zone cooling on flower development and fruit set of 'Satohnishiki' sweet cherry were studied. Soil temperature in pots of the tree was maintained at approximately 11°C from bud burst until petal fall, then at about 15°C until harvest by circulating cooled water through a tube coiling the pots. Root cooling did not appreciably affect flower size, pollen germination and pollen tube elongation in pistils. However, the treatment prolonged ovule longevity and markedly increased the fruit set rate. These results suggest the possibility of applying root cooling to improve the fruit set of sweet cherries grown in warm regions.

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The economic and technical analysis of peach growing: a case study for Turkey.

Engindeniz, S; Cukur, F; Yucel, D

Department of Agricultural Economics, Faculty of Agriculture, The University of Ege, 35100 Bornova, Izmir, Turkey.

Key words: costs, crop production, crop yield, fruit growing, peaches, production economics, profitability, returns

Journal of Applied Horticulture, 2003, volume 5, issue 2, pages 114-118.

Abstract: Some technical and economic characteristics of peach growing in Kemalpaşa, Izmir, Turkey, were examined. Data were obtained from a sample of 63 peach growers. Average yield per hectare and per tree was determined to be 16 848 kg and 37.7 kg, respectively. The average orchard size was 1.09 ha. Growers preferred square planting with 4.5 m x 4.5 m spacing rather than triangle planting. Redhaven, Cresthaven, Triogem and Dixired were the major cultivars grown. Net return per hectare and per tree was determined to be \$839 and \$1.88, respectively.

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Effects of different preharvest treatments on yield and chemical quality of tomato

M. Melkamu, Tilahun Seyoum and Kebede Woldetsadik

Haramaya University, College of Agriculture, Department of Plant Science, P.O. Box 138, Dire Dawa, Ethiopia, Haramaya University, College of Agriculture, Department of Food Science and Postharvest Technology, P.O. Box 131, Haramaya, Ethiopia

Key words: ComCat?, manure, NP fertilization, yield, quality

Journal of Applied Horticulture, 2003, volume 10, issue 2, pages 116-122.

Abstract: Field experiment was conducted to study effects of preharvest treatment of ComCat? spray, organic manure, NP fertilization and the combinations of ComCat? with the two forms of fertilizers on yield and chemical quality of tomato (*Lycopersicon esculentum* Mill.). Total and marketable yields were significantly influenced by the preharvest treatments. The result showed that the use of ComCat? and its combination with organic manure gave the highest total yield of 58.5 and 55.8 t ha⁻¹, respectively. At harvest, 94 and 93% of tomatoes subjected to preharvest ComCat? and ComCat? plus organic manure treatment were marketable, respectively. The chemical quality parameters tested such as total soluble solids, pH, titratable acidity, ascorbic acid, reducing sugar and total sugar were significantly (P<0.01) affected by the preharvest treatments. The study clearly demonstrated the importance of integrated agro-technology in order to simultaneously improve the yield and quality of tomatoes.

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Effects of 1-methylcyclopropene on the postharvest life of Eksotika papaya

Phebe Ding and Ng Swee Bee

Department of Crop Science, Faculty of Agriculture, Universiti PutraMalaysia, 43400 UPM Serdang, Selangor, Malaysia.

Key words: Papaya, *Carica papaya*, 1-MCP, colour, firmness, weight loss, visual quality

Journal of Applied Horticulture, 2003, volume 10, issue 2, pages 123-128.

Abstract: Papaya is a climacteric fruit, naturally fragile and cannot resist low

temperature. Thus, prolonging the postharvest life of papaya fruit for long distance transportation is highly desirable to increase its commercialisation. 1-Methylcyclopropene (1-MCP) has been widely used to delay ripening and senescence of horticultural produces. The objective of this study was to determine characteristics of 'Eksotika' papaya treated with 1-MCP and optimum concentration of 1-MCP in prolonging postharvest life of papaya. Papayas were treated with 0, 10, 20, 30, 40 and 50 $\mu\text{L L}^{-1}$ of 1-MCP for 7 days at 21°C/90% relative humidity (RH). Then, the fruits were allowed to ripen at 26°C/70% RH. 1-MCP did not affect L^* , C^* , soluble solids concentration, titratable acidity, pH, vitamin C and weight loss of papaya. The h^0 and firmness of papaya treated with 30 $\mu\text{L L}^{-1}$ of 1-MCP showed significant high values as compared to other concentrations. Similarly, visual quality evaluation also showed that fruits treated with 30 $\mu\text{L L}^{-1}$ of 1-MCP retained green colour for 9 days and by day 13, no disease infection and shriveling was found in these fruits as compared to other concentrations. There is potential to prolong postharvest life of Eksotika papaya using 1-MCP.

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Municipal solid waste compost increased yield and decreased nitrate amount of broccoli

Gh. Peyvast, P. Ramezani Kharazi, S. Tahernia, Z. Nosratierad and J.A. Olfati
Guilan University, Faculty of Agriculture, Horticultural Department, Rasht, Iran.

Key words: Broccoli, municipal solid waste compost, nitrate, yield, quality.
Journal of Applied Horticulture, 2003, volume 10, issue 2, pages 129-131.

Abstract: A study of the nitrate uptake of Broccoli (*Brassica oleraceae* var. *italica*), grown with different amount of municipal solid waste compost (MSWC) was conducted in 2006 on open field at the University of Guilan, Rasht, Iran. The experiment was arranged in complete randomized block design with four treatments (0, 25, 50 and 100 Mg. ha^{-1} MSWC) and four replications. The results revealed that under prevailing local conditions, total yield of the broccoli was higher when fertilized with MSWC and low when compost was not applied to the planted area. The plants with the highest compost application (100 Mg ha^{-1}) gave significantly highest yield at 37.03 Mg ha^{-1} which was statistically different from other treatments. The significant differences were found also on marketable yield with an exception at lowest compost treatment. The lowest amount of nitrate (0.197 % in DM) in broccoli edible part was with application of 50 Mg. ha^{-1} compost.

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Hydroponic cultivation of carrots using modified rockwool blocks

F.M. Saiful Islam, Hiroaki Hirai and Yoshiaki Kitaya

Graduate School of Life and Environmental Sciences, Osaka Prefecture University, Sakai, Osaka 599-8531, Japan.

Key words: CO₂ concentration, CO₂ gas diffusion coefficient, *Daucus carota*, growth, harvest index, storage roots, yield

Journal of Applied Horticulture, 2003, volume 10, issue 2, pages 132-136.

Abstract: Three varieties of carrot (*Daucus carota* L.), 'Tokinashigosun', 'Hitokuchi' and 'Kurodagosun' were cultured hydroponically with rockwool blocks (56[^]8[^]30 cm high) in a greenhouse for 90 days. Two types of rockwool block, with holes and without holes were used in the study. Rockwool blocks with holes had seven rooting holes (10 cm in depth and 2.5 cm in diameter) 8 cm apart, which were filled with vermiculite for promoting root development. Rockwool blocks without holes were used as the control for comparison. Two rockwool blocks were placed side by side in a plastic box (58x18x18 cm high) and 14 plants were grown in each plastic box. The rockwool blocks were automatically sub-irrigated with a nutrient solution containing 35 ppm total N, 14 ppm P, 59 ppm K, 23 ppm Ca, 10 ppm Mg, 0.62 ppm Fe, 0.12 ppm Mn, 0.06 ppb B, 0.02 ppm Cu, 0.04 ppm Zn and 0.01 ppm Mo. The solution was added to the plastic boxes twice a day to keep the depth of the solution at 15 cm. The fresh and dry weights of the storage roots were 2 to 3 times greater in the rockwool blocks with holes than those without holes in each variety. The storage roots produced in the rockwool blocks with holes were 2 times longer than without holes in all the varieties. The diameter of storage roots was also greater in rockwool blocks with holes than without holes. Greater weights of the whole-plant and percent harvest index were obtained in the rockwool blocks with holes than in the without holes in all the varieties. Carbon dioxide concentration inside the rockwool blocks at a depth of 8 cm from the top surface and 1 cm beside the storage roots were lower in the rockwool blocks with holes (0.08%) than in the without holes (0.11%). Carbon dioxide gas diffusion coefficient in the rockwool media was greater in the rockwool blocks with holes than in the without holes. The hardness of the growing media was lower in the rockwool blocks with holes containing vermiculite than in the without holes. Therefore, better aerating conditions inside the rockwool blocks with holes containing vermiculite and lower hardness of the media would partly account for the better growth of storage roots in the rockwool blocks with holes than in the without holes in all the tested varieties.

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Screening for genetic divergence in tomato genotypes against tomato leaf curl virus

Anjaneya Reddy, M.S. Patil, P.R. Dharmatti and T Rajasekaram

Department of Plant Pathology, UAS, Dharwad-05, Department of Horticulture, UAS, Dharwad-05

Key words: Tomato leaf curl, ELISA, PCR and screening

Journal of Applied Horticulture, 2003, volume 10, issue 2, pages 137-141.

Abstract: During summer 2005 out of 50 genotypes screened for tomato leaf curl virus under field conditions, none of the lines tested were resistant, however, six genotypes showed mild infection and nine genotypes showed moderate infection. In the second season, *i.e.*, 2006 only Nandi and Vybhav showed moderate resistant reaction, along with the new commercial hybrids Hy-558, Hy-530, NS-563 and NS-719. The variety Vybhav was found superior over other varieties against the disease. The presence of virus in the symptomatic hosts was confirmed by ELISA and PCR. The plant height of the genotypes contributes to maximum extent (52.21 %) to the divergence followed by yield per plant and per cent disease incidence (10.86 % each), but the vector population contributed least (0.97 %). As a result of D² clustering, the commercial hybrids possessing lot of diversity fall in to four different clusters, cluster II had got six entries, cluster III 3 entries, cluster IV 6 entries and cluster V only one entry whereas cluster I had 50 entries.

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Occurrence of *Pseudomonas syringae* pv. *syringae* the causal agent of bacterial canker of stone fruits in Guilan province of Iran

Mostafa Niknejad Kazempour, Fahimeh Jamie and Seyed Ali Elahinia

Department of Plant Pathology, Faculty of Agriculture, University of Guilan, Iran; Center of Natural Resources research, Alborz- Karaj, Iran.

Key words: Stone fruit trees, *Pseudomonas syringae* pv. *syringae*, canker, Iran

Journal of Applied Horticulture, 2003, volume 10, issue 2, pages 142-145.

Abstract: *Pseudomonas syringae* pv. *syringae* causes canker, leafspots and

necrosis of the bark of cherry, plum, and peach fruit trees. Symptoms caused by this pathogen on leaves, blossoms, and fruit, reported as common elsewhere, are rare in Guilan cherry orchards. In this research, during survey from cherry, plum, and peach orchards in different areas of Guilan province (Talesh, Hashtpar, Astaneh-Ashrafieh and Lahijan), samples were taken from infected tissues of disease trees. For isolation of bacteria causing disease, infected tissue were crushed in bacteriological saline (0.85% w/v NaCl) and 100 μ L of juice was cultured on nutrient agar (NA) and King's B medium. Strains of bacteria rod-shaped, gram negative and aerobic bacterium were isolated. The strains produced Levan on media including sucrose. All strains made Hypersensitive Reaction (HR) on tobacco and geranium leaves. All of the isolated bacteria were oxidase, nitrate, tween 80 hydrolysis, indole and starch hydrolysis negative and could not rot potato tuber slices, produced H₂S, and grew at 36°C. The isolates could use citrate and urease. The isolates produced acid from sorbitol, galactose, myo-inositol, manitol, xylose, maltose and sucrose. Their gelatin test were positive. Based on morphological, physiological, biochemical, pathogenicity properties and total cellular protein profiles (SDS-PAGE), the predominate pathogenic type was identified as *P. s. pv. syringae*. This is the first report of the existence of *P. s. pv. syringae* on stone fruit trees in Iran.

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Fungicide soil application efficiency for the control of black scurf (*Rhizoctonia solani*) on three potato cultivars

Jorge D. Mantecón

F.C.A (UNMDP)-E.E.A.INTA, Balcarce, Agronomy Department, c.c.276,7620 Balcarce, Buenos Aires province, Argentina

Key words: Potato, black scurf, control, Argentina, fluazinam, pencycuron

Journal of Applied Horticulture, 2003, volume 10, issue 2, pages 146-148.

Abstract: In the 2004 and 2005 seasons, experiments were carried out at INTA Balcarce, Argentina on potato cultivars Kennebec, Innovator and Shepody, with different susceptibility to *Rhizoctonia solani* Kuehn. A randomized block design with four replications was created. Visual observations during the crop cycle were carried out in order to record the number of healthy and infected plants, with symptomatology of stem canker produced by *R. solani*. After harvest, the potatoes in each block were washed and weighted, the total yield recorded and the marketable and "seed" potatoes were classified into healthy, cracked or malformed tubers. The best results on

the reduction of infected plants were obtained with the highest dose of fluazinam (as Frowncide 50SC) and pencycuron (as Monceren 25SC). Commercial and "seed" tuber yields in the Spunta cultivar showed no significant differences among treatments, but with the Shepody cultivar, when the severity of the disease was high (2004) both fungicide treatments surpassed the untreated check. When the severity of the disease was low (2005), all chemical treatments registered higher commercial and "seed" tubers yields than the untreated check. In Kennebec and Spunta cultivars, all the treatments - except the lowest dose of fluazinam - accomplished a higher quantity of healthy tubers and surpassed the untreated check; although only the highest doses showed the highest yield of healthy tubers, showing a positive relationship with respect to the applied dose. Only the highest doses of fluazinam considerably reduced diseased tuber incidence in comparison to the untreated check.

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Influence of ethanol on the longevity and delayed senescence of bougainvillea flower

A.B.M. Sharif Hossain and Amru Nasrulhaq Boyce

Plant Physiology and Biotechnology Laboratory, Institute of Biological Sciences, Faculty of Science, University of Malaya, Kuala Lumpur 50603, Malaysia.

Key words: Bougainvillea flower, vase life, senescence, ethanol

Journal of Applied Horticulture, 2003, volume 10, issue 2, pages 149-153.

Abstract: The study was carried out to investigate the effect of ethanol (ET) at different concentrations on longevity and senescence delay in bougainvillea flowers. The treatments were water (control), 2, 4, 8, 10, 20, 30, 40, 50 and 70% ET. Positive response was found in case of 4, 8 and 10% of ET after a certain period of treatment application. Dry weight was higher in lower concentrations of ethanol and lower in higher concentrations. Flower longevity was 2 days longer in 4, 8 and 10% ET than in water control and other concentrations of ethanol. Petal wilting and abscission occurred 2 days later in 4, 8 and 10% ET than in control. Perianth abscission also appeared 2 days later in 4, 8 and 10% ET than in control. However, petal discoloration (color change) was later in control, 2, 4, 8 and 10% than in 20, 30, 40, 50 and 70% ET. The results showed that flower vase life was significantly affected by ethanol concentrations as well as longevity was longer in 4, 8 and 10% ET than in water control and other concentrations.

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Effect of exogenous putrescine on postharvest life of sweet cherry (*Prunus avium*) fruit, cultivar ?Surati-e Hamedan?

Mohammad Reza Zokaee Khosroshahi, Mahmood EsnaAshari and Mohammad Fattahi

Department of Horticultural Sciences, Faculty of Agriculture, Bu-Ali Sina University, Hamedan, Iran.

Key words: Sweet cherry, *P. avium*, Surati-e-Hamedan, putrescine, postharvest life

Journal of Applied Horticulture, 2003, volume 10, issue 2, pages 154-157.

Abstract: The purpose of this study was to investigate the effect of exogenous putrescine on postharvest life and quality of sweet cherry fruit, cultivar "Surati-e Hamedan" at 2°C. Fruits were treated with 0.5, 1, 2, 3 and 4 mM putrescine as well as distilled water (Control) for 10 minutes, then transferred into the fridge (2°C). The rate of ethylene production, weight loss, tissue firmness, soluble solids content, titratable acidity and pH of fruits were determined 5, 10, 15, 20 and 25 d after the beginning of storage. Parameters associated with ripening processes, including softening and loss of titratable acidity, significantly decreased by application of putrescine. Soluble solids content of cherries also increased by the putrescine treatment. In addition, cherries treated with higher concentrations of putrescine showed lower rate of ethylene production. Weight loss of the fruits was affected by putrescine in a concentration dependent manner, while putrescine did not affect pH of fruit juice.

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Relationship of arbuscular mycorrhizal fungi and *Azotobacter* with plant growth, fruit yield, soil and leaf nutrient status of mango orchards in north-western Himalayan region of India

Som Dev Sharma and Pramod Kumar

Scientist, Department of Pomology, Dr. Y S Parmar University of Horticulture and Forestry, Solan, HP-173 230 India; Research Officer(R & D Agriculture), Rashtriya Chemicals & Fertilizers Limited (GOI), Chembur, Mumbai-74, India.

Key words: AM fungi, *Azotobacter*, root colonization, correlation, mango

Journal of Applied Horticulture, 2003, volume 10, issue 2, pages 158-163.

Abstract: The present investigation was undertaken with the objective to find out the nutritional status of mango orchards cv. Dashehari located in north-western Himalayan region of India and to establish the relationship of soil microflora especially, arbuscular mycorrhizal (AM) fungi and *Azotobacter* with growth, fruit yield, and soil and leaf nutrient contents. The study revealed that the correlation between AM spore population and shoot extension growth, leaf area, fruit yield, available Cu and Zn content and leaf N, P, Cu, Zn and Mn contents was found to be positive and significant, whereas, the relationship with soil as well as leaf K content was negative but significant. *Azotobacter* count was positively and significantly correlated with fruit yield, soil organic carbon (OC) and leaf Fe content, while, it was negative and significant with leaf K content. The relationship of per cent root colonization with soil OC and available N content of orchard soil was found to be positive and significant, and with shoot extension growth, leaf area, fruit yield, electrical conductivity, available P, K, Cu, Zn and Mn content and P, K and Cu contents of leaf, it was negative but non-significant.

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In vitro and *ex vitro* seed-based propagation methods of *Echinops kebericho* Mesfin: A threatened medicinal plant

Balcha Abera, Legesse Negash and Jochen Kumlehn

Department of Biology, Faculty of Science, Addis Ababa University, P.O.Box 1176, Addis Ababa, Ethiopia; Leibniz Institute of Plant Genetics and Crop Plant Research (IPK), Plant Reproductive Biology, Correnstrasse 3, D-06466 Gatersleben, Germany

Key words: *Echinops kebericho*, Kebericho (globe thistle), rootstock, seed-based propagation, Asteraceae

Journal of Applied Horticulture, 2003, volume 10, issue 2, pages 164-168.

Abstract: Effects of seed sterilization, storage time, and temperature as well as extent of seeding survival and establishment under glasshouse versus nursery conditions were studied for *E. kebericho*. Seeds sterilized for 9 and 5 minutes in 70 % ethanol and in 10% sodium hypochlorite, respectively, germinated best (95.2 ± 1.2%) on Murashige and Skoog medium, supplemented with 10 g L⁻¹ phytoagar. Further increases or decreases in sterilization time decreased germination percentage and increased contamination, respectively. Unsterilized seeds (control) were completely

contaminated before the emergence of radicle as a result of fungal growth. Seed germination percentage declined with increasing storage time and dropped from 94.6 ± 0.4 % to 32.2 ± 1.2% in 15 months. 25 °C was an optimal temperature for best germination (94.6 ± 2.4%) of seeds. Seeds sown in pots containing a mixture of sand, nursery soil, and animal manure in a ratio of 0.5: 2.5: 0.5 respectively, germinated significantly ($P < 0.05$) compared to other soil ratios. Increase in sand or animal manure ratios decreased germination, while increase in nursery soil increased percentage and rate of germination. High percentage (96.0 ± 0.5%) germination was obtained with the seeds sown in nursery soil-surface mixed additives compared with the control. Seedlings of nursery bed origin survived best compared to those *in vitro* or pot origin seedlings. Ultimately, seedlings growth with vigorous and orthotropic developmental pattern was obtained under nursery conditions, compared to those in the glasshouse, which showed stunted and plagiotropic developmental pattern. The study found that seeds stored for less than 5 months, and at 25 °C, were the most suitable for *in vitro* and *ex vitro* propagation of *E. kebericho*.

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Micropropagation of *Spilanthes acmella* L., a bio-insecticide plant, through proliferation of multiple shoots.

Ang BoonHaw; Chan LaiKeng

School of Biological Sciences, Universiti Sains Malaysia, 11800 Penang, Malaysia.

Key words: benzyladenine, culture media, IBA, *in vitro* culture, *in vitro* regeneration, micropropagation, plant growth regulators, shoots, tissue culture

Journal of Applied Horticulture, 2003, volume 5, issue 2, pages 65-68.

[Full text PDF](#) |

Abstract: *S. acmella* [*Blainvillea acmella*] was successfully micropropagated using axillary buds as explants. The aseptic axillary buds formed multiple shoots within 5 weeks when cultured on MS medium supplemented with 2.0, 4.0, 6.0 and 8.0 mg benzyladenine (BA)/l. The addition of IBA as low as 2 mg/l into the MS medium containing BA had no significant effect on the multiple shoot formation. MS medium supplemented with 0.5 mg BA/l was sufficient for the proliferation of rooted multiple shoots. First subculturing of the *in vitro* individual shoots in the same proliferation medium could double the formation of multiple shoots.

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The impact of panicle and shoot pruning on inflorescence and yield related developments in some mango cultivars.

Yeshitela, T; Robbertse, P J; Stassen, P J C

Department of Plant Sciences, Alemaya University, P.O. Box 165 Dire Dawa, Ethiopia.

Key words: crop yield, cultivars, flowering, fruiting, fruits, growth, mangoes, pruning

Journal of Applied Horticulture, 2003, volume 5, issue 2, pages 69-75.

[Full text PDF](#) |

Abstract: In a study conducted at Bavaria Estate, Hoedspruit, the northern province of South Africa, the mango cultivars Keitt and Tommy Atkins were subjected to the following treatments over 2 seasons: (1) inflorescence removal at the point of apical bud attachment during full bloom; (2) inflorescence removal together with apical whorl of leaves subtending the inflorescence (about 5 cm from the tip) during full bloom; (3) removal of 50% of the total inflorescences (every alternate shoot of the tagged branches) together with apical whorl of leaves subtending the inflorescence during full bloom; (4) renewal pruning where 20-30% of termination shoots with weak, misshaped and small fruits were cut back to a suitable node in October; (5) postharvest pruning where termination shoots that had been bearing fruits the previous season were cut back to a suitable node; (6) removal of terminal buds just before bud break; and (7) no pruning treatments (control). Pruning at the point of apical bud attachment induced re-flowering, m

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Evaluation of DRIS and CND indexes for effective nutrient management in Muscat grapevines (*Vitis vinefera*).

Kumar, P S S; Geetha, S A; Savithri, P; Mahendran, P P; Ragunath, K P

Department of Soil Science and Agricultural Chemistry, Agricultural College and Research Institute, Tamil Nadu Agricultural University, Coimbatore - 641 003, India.

Key words: boron, calcium, chemical composition, copper, crop yield, databases, grapes, iron, magnesium, manganese, mineral content, nitrogen, nutrient content, phosphorus, plant composition, plant nutrition, potassium, sodium, sulfur, zinc

Journal of Applied Horticulture, 2003, volume 5, issue 2, pages 76-80.

Abstract: The Compositional Nutrient Diagnosis (CND) and Diagnosis and Recommendation Integrated System (DRIS) nutrient index ranges were derived from a Muscat grape database to relate nutrient concentration and indexes with berry yield. A Muscat grape database of 188 observations on commercial yields and N, P, K, Ca, Mg, Na, S, B, Zn, Cu, Fe and Mn were taken. The proportion of low-yield specimens in the survey population was computed at inflection point of variance ratio function and was associated with a Cate and Nelson statistical value (r^2) of 4.7 that was confirmed in the validation subpopulation. Critical CND nutrient indexes were found to be symmetrical about zero as follows: -0.45 to +0.45 for CND/N, -0.39 to +0.39 for CND/P, -0.45 to +0.45 for CND/K, -0.93 to +0.93 for CND/Na, -0.45 to +0.45 for CND/Ca, -0.33 to +0.33 for CND/Mg, -0.60 to +0.60 for CND/S, -1.02 to +1.02 for CND/B, -0.58 to +0.58 for CND/Zn, -0.78 to +0.78 for CND/Cu, -0.55 to +0.55 for CND/Fe, -0.16 to +0.16 for CND/Mn and -0.49 to +0.49 for

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***In vitro* establishment of tolerant clones of banana against race-1 *Fusarium oxysporum* f. sp. cubense.**

Saravanan, T; Muthusamy, M; Marimuthu, T

Agricultural Research Station, Tamil Nadu Agricultural University, Kovilpatti - 628 501, India.

Key words: clones, culture filtrates, culture media, disease resistance, enzyme activity, enzymes, fungal diseases, gamma radiation, in vitro culture, in vitro regeneration, irradiation, micropropagation, peroxidase, plant diseases, plant pathogenic fungi, plant pat

Journal of Applied Horticulture, 2003, volume 5, issue 2, pages 81-84.

Abstract: A study was conducted to develop gamma radiation-induced resistant clones of banana (*Musa* sp.) cv. Rasthali against *F. oxysporum* f.sp. cubense race-1. Shoot buds of Rasthali irradiated with 20, 40, 60, 80 and 100 Gy by using Co60 in a gamma chamber were used for *in vitro* culture establishment and to develop resistant clones. Shoot buds irradiated with 40

Gy had the maximum shoots per culture and percentage of culture establishment. Other doses of gamma radiation inhibited the culture establishment when compared to the untreated control. The shoots irradiated with 40 Gy were used to develop resistant clones against toxins of race 1. To standardize the concentration of the culture filtrate of the pathogen for the tolerant clone selection, the multiple bud clumps were cultured on MS medium supplemented with 2-15% crude culture filtrates. The growth of multiple bud clumps was completely inhibited on the medium containing 10% culture filtrate. In the successive selection, the rate of survival of the plantlets incr

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Relative selection efficiency for foliage yield and quality characters in vegetable *Chenopodium* over different cuttings.

Atul Bhargava; Sudhir Shukla; Deepak Ohri

Division of Genetics and Plant Breeding, National Botanical Research Institute, Lucknow - 226 001, India.

Key words: artificial selection, ascorbic acid, carotenoids, chemical composition, chlorophyll, crop quality, crop yield, fibre content, foliage, heritability, indirect selection, moisture content, plant composition, protein content

Journal of Applied Horticulture, 2003, volume 5, issue 2, pages 85-86.

Abstract: An experiment was conducted during 2002/03 in Lucknow, Uttar Pradesh, India to test the suitability of direct and indirect selection for high foliage yield and quality in *Chenopodium album* over successive cuttings. Thirteen germplasm lines were evaluated for moisture, chlorophyll a and b, carotenoid, fibre, protein and ascorbic acid contents and foliage yield. High heritability and moderate to high genetic advance were observed for all characters, except for moisture content, in all cuttings. Chlorophyll a exhibited the highest correlated response for the first and third cuttings, while fibre content exhibited the highest correlated response for the second cutting. A multiple selection index is suggested to enhance foliage yield. The estimates of correlated response and relative selection efficiencies were in proportion with each other although values for the latter were less than one.

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Mild heat shocks to extend the shelf life of minimally

processed lettuce

Mar?a del R. Moreiraab, Alejandra G. Ponceb, Carlos E. del Vallea, L. Pereyraa and S.I. Rourab

Universidad Nacional de Mar del Plata. Argentina, Consejo Nacional de Investigaciones Cientificas y Tecnicas (CONICET). Argentina.

Key words: Cut-lettuce, heat shock treatments, ascorbic acid, total microbial counts, sensory attributes

Journal of Applied Horticulture, 2003, volume 10, issue 2, pages 87-92.

Abstract: Changes in ascorbic acid contents, microbial population and sensory attributes of cut Romaine lettuce subjected to thermal shocks were investigated. Immersion of cut lettuce in the thermal baths produced reduction in the ascorbic acid contents between 190 and 300 g kg⁻¹, with the greater losses corresponding to the higher bath temperatures. However, the rate of ascorbic acid degradation during refrigerated storage was independent of the thermal treatment and all samples presented a sharp decrease during the first day of storage and a gradual decrease thereafter. Thermal shocks did not reduce the initial microbial population. During storage, an increment in microbial counts was observed, being more notorious in samples that had been exposed to the highest shock temperature (50 ?C). The thermal treatment at 50 ?C was the only one to delay the onset of midrib and edge browning up to four days of refrigerated storage. This midrib and edge browning was considered to the most relevant to the overall visual quality of the product.

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Relative uptake of the fungicide carbendazim by selected fruits and vegetables and keeping quality of apple and tomato after dip treatment.

Himanish Das; Jayaraman, S; Mahadeva Naika

Food Contaminants Division, Defence Food Research Laboratory, Siddarthanagar, Mysore - 570 011, India.

Key words: apples, ascorbic acid, bananas, carbendazim, carrots, crop quality, fungicide residues, fungicides, grapes, lycopene, moisture content, okras, oranges, sapodillas, spoilage, storage dips, storage life, storage losses, titratable acidity, tomatoes

Journal of Applied Horticulture, 2003, volume 5, issue 2, pages 91-95.

Abstract: A study was conducted to evaluate the uptake of carbendazim by 8 fruits and vegetables, i.e. tomato (*Lycopersicon esculentum*), apple (*Malus pumila*), carrot (*Daucus carota*), okra (*Abelmoschus esculentus*), orange (*Citrus sinensis*), grape (*Vitis vinifera*), sapota (*Achras zapota* [*Manilkara zapota*]) and banana (*Musa paradisiaca*), dipped in aqueous carbendazim suspension under laboratory conditions. The effect of carbendazim dips on the storage life of apple and tomato was also investigated. The uptake of carbendazim varied significantly, ranging from 68.97+or-2.89 to 813.64+or-11.46 micro g (mean 342.13 micro g), among the fruits and vegetables. The lowest uptake was recorded in apple, followed by banana, orange, tomato, okra, grape, sapota and carrot. Dip treatments more effectively extended the storage life of tomato than apple and at ambient (32+or-2 degrees C) than at low temperature (7+or-2 degrees C). Dip treatments also decreased the cumulative physiological loss in weight and spoilage of tomato and apple,

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Morphological changes in the apex of *Prunus persica* L. during floral transition and effects of gibberellin on flower bud differentiation

L. Andreini and S. Bartolini

Scuola Superiore S. Anna di Studi Universitari e di Perfezionamento, Piazza Martiri della Liberta 33, 56100 Pisa, Italia.

Key words: Chemical thinning, flower bud differentiation, gibberellins, meristematic apex morphology, nectarine

Journal of Applied Horticulture, 2003, volume 10, issue 2, pages 93-99.

Abstract: The aim of the research was to study the morphological and histochemical evolution of the bud meristems of 'Lavinia' nectarine cultivar. Moreover, the effectiveness of Release LC (a gibberellin chemical compound) in controlling the rate of flower bud differentiation was also evaluated. During a two-year period, the Release LC was applied in postharvest to avoid problems of possible chemical residues on marketable fruits. To determine the effect of treatment, several biological parameters such as initial flower and vegetative bud number, flower bud drop, evolution of the flower bud phenological stages, rate of bloom and fruit set were recorded. To establish the floral differentiation stage, the meristematic apices were collected before and after treatment and microscopically observed. The thin sections were analysed using histological (apex size, developmental stages of meristematic apex, co-axial stage), and histochemical (RNA fluorescent staining) techniques. In 'Lavinia' cv., the critical

phase of the meristematic apex evolution occurred from May to June (60 and 90 days after full bloom): the presence of triple apices increased rapidly, the co-axial phase was achieved, the width and height of the meristematic dome increased markedly and the RNA appeared by a weak staining. As regards the flower bud differentiation control by exogenous treatments with Release LC, the different results obtained in our experiments indicate that the efficacy of treatment strictly depends on the growth stage of a meristematic apex.

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Performance of ornamental plants under deficit irrigation.

Suleiman, M K; Bhat, N R; Bellen, R R

Aridland Agriculture and Greenery Department, Kuwait Institute for Scientific Research, P.O. Box 24885, Safat 13109, Kuwait.

Key words: canopy, drought, growth, irrigation, ornamental plants, plant height, plant water relations, rosemary, water stress

Journal of Applied Horticulture, 2003, volume 5, issue 2, pages 96-99.

Abstract: To promote efficient use of expensive water resource as well as to maintain soil productivity and health in Kuwait, it is important to ascertain plant performance with regard to different irrigation regimes. A study was conducted to determine the effects of induced water stress on the growth and greenery impact of four ornamental plants, namely *Vitex agnus-castus*, *Caesalpinia mexicana*, *Myoporum parvifolium* and *Rosmarinus officinalis*, grown under the harsh arid climate of Kuwait. Acclimatized plants of these species were planted in Salmiya in July 2002. Plants were subjected to water stress by irrigating them at the rate of 25, 50 or 100% of the daily evapotranspiration rates during that month (3.75, 7.5 or 15.0 mm/d). The irrigation was adjusted according to average monthly ET rates. Growth and visual greenery impact data were recorded at weekly intervals during the first 87 days after planting and then at monthly intervals. Soil moisture was determined at weekly intervals using field tensiometers and oven-dr

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Performance of composted vine shoots as a peat alternative in casing materials for mushroom cultivation.

Pardo, A; Juan, J A de; Pardo, J E

Centro de Investigacion, Experimentacion y Servicios del Champinon (CIES),

C/ Penicas s/n, Apartado 8, E-16220 Quintanar del Rey, Cuenca, Spain.

Key words: casing, composts, crop yield, earliness, edible fungi, fructification, mushrooms, peat, shoots

Journal of Applied Horticulture, 2003, volume 5, issue 1, pages 11-15.

Abstract: A study was conducted to evaluate the suitability of composted vine shoots (as alternative to peat) as casing material in the cultivation of mushroom (*Agaricus bisporus*). The effect of scratching on the suitability of the casing materials based on peat and vine shoots was also examined. The treatments consisted of scratched and non-scratched soil + sphagnum peat (S + SP, 4:1 v/v), soil + black peat (S+BP, 4:1 v/v) and soil + composted vine shoots (S+CV, 4:1 v/v). Based on the main production parameters measured (number of mushrooms produced, unitary weight, yield and earliness), composted vine shoots performed similarly to peat-based casing materials. However, the possibilities of using composted vine shoots are limited due to the appearance of spots caused by *Trichoderma* spp. on the fruit bodies. Scratching created an open structure in the casing layer to enable uniform and abundant fructification. In general, for the different casing types, scratching had a positive effect on fructification. This practice ind

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Factors affecting fruit abortion in a gynoecious cucumber cultivar

A. Tazuke, P. Boonkorkaew, S. Hikosaka and N. Sugiyama

College of Agriculture, Ibaraki University, Ami, Ibaraki, 300-0393, Japan,
Graduate School of Agricultural and Life Sciences, Bunkyo-ku, Tokyo, 113-8657, Japan.

Key words: Cucumber, gynoecious cultivar, fruit growth, fruit abortion, pollination, relative growth rate

Journal of Applied Horticulture, 2003, volume 10, issue 1, pages 15-19.

Abstract: Fruit growth of the gynoecious cucumber 'NK x AN8' was measured non-destructively to clarify whether the presence of fruit at lower nodes caused the abortion of fruit at upper nodes. When only one fruit per plant was allowed to grow, fruit growth could be divided into two phases: slow exponential and fast exponential. Phase change from slow to fast occurred when cumulative temperatures (CTs) after anthesis reached 38 and 54°C d for pollinated and parthenocarpic fruit, respectively. The CT was calculated as the sum of the

differences between daily temperatures and 5°C. When fruit at nodes 4 and above were allowed to grow, the first growth phase was prolonged. Furthermore, parthenocarpic fruit aborted frequently when the sum of the relative growth rate (RGR) with respect to the CT (the sum of RGRs) for fruit at lower nodes exceeded 0.1 g g⁻¹ (°C d)⁻¹. Pollination with pollen of the monoecious cucumber '028' strongly suppressed fruit abortion; a large number of fruits could develop to a commercial size even when the sum of RGRs for fruit at lower nodes exceeded 0.1 g g⁻¹ (°C d)⁻¹. These results suggested that fruit abortion is more related to the existence of actively growing fruit than to the absolute amount of dry mass accumulation in the fruit.

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Influence of pulsing and dry cool storage on cut spikes of tuberose cv. 'Double'.

Vinod Kumar; Bhattacharjee, S K; Suchitra ; Singh, K P

Division of Floriculture and Landscaping, Indian Agricultural Research Institute, New Delhi - 110 012, India.

Key words: 8 hydroxyquinoline citrate, aluminium sulfate, cold storage, crop quality, cut flower preservatives, cut flowers, fragrance, silver thiosulfate, storage life, storage quality, sucrose, vase life, water uptake

Journal of Applied Horticulture, 2003, volume 5, issue 1, pages 16-20.

Abstract: The effects of different pulsing treatments, i.e. 10% sucrose + 250 ppm aluminium sulfate (Al₂(SO₄)₃) for 12 h, 10% sucrose + 0.5 mM silver thiosulfate (STS) for 12 h and 8% sucrose + 200 ppm 8-hydroxyquinoline citrate (8-HQC) for 12 h, and durations of cold storage, i.e. 4 and 5 days, on the cut spikes of tuberose (*Polianthes tuberosa*) cv. Double were studied. Pulsing and cold storage improved the postharvest life and quality of tuberose cut flowers. Pulsing with 10% sucrose + 250 ppm Al₂(SO₄)₃ for 12 h and cold storage of cut spikes for 4 days was the best treatment combination for rachis length, delay in wilting of first, third and last opened floret pair, extension of useful life, retention of fragrance, water uptake, opening of florets, increase in diameter and length of first, third and last opened floret pair, and vase life. This treatment also recorded the maximum vase life of 8.90 days.

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Genetics of corolla colour in periwinkle: relationship between genes determining violet, orange-red and magenta

corolla

R.N. Kulkarni, K. Baskaran and Y Sreevalli

Central Institute of Medicinal and Aromatic Plants, Resource Centre,
Allalasaandra, Bangalore 560 065, India.

Key words: *Catharanthus roseus*, ornamental plant, medicinal plant, corolla colour, inheritance

Journal of Applied Horticulture, 2003, volume 10, issue 1, pages 20-23.

Abstract: In periwinkle (*Catharanthus roseus*), pink, white and red-eyed (white corolla with red centre) are three common corolla colours, which are due to epistatic interaction between two genes *R* and *W*. Violet corolla, which is not found commonly in natural populations, is reported to be due to another gene *B* which blues the pigment in pink genotypes (*R- W-*). Recently, another gene *O* and its allele *O^m* have been reported to determine two uncommon corolla colours, orange-red and magenta corolla, respectively. Since, the relationship between genes determining violet, orange-red and magenta corolla was not known, a strain possessing violet corolla and white eye (VI) was crossed with strains possessing orange-red corolla and white eye (OR) and magenta corolla and white eye (MJ-1) to study: (i) the relationship between genes involved in the production of violet, orange-red and magenta corolla, (ii) to study the possibility of producing novel corolla colours and (iii) to determine the validity of the gene interaction models proposed earlier. The F₁ plants of both crosses, VI x OR and VI x MJ-1, had violet corolla. The F₂ generation of the cross VI x OR segregated into plants with (i) violet corolla, (ii) pink corolla, (iii) orange-red corolla, and (iv) white corolla in the ratio of 45:12:3:4, while the progeny of the backcross F₁ x OR segregated into three types of plants, (i) violet corolla, (ii) pink corolla, and (iii) orange-red corolla in the ratio of 2:1:1. The F₂ generation of the cross VI x MJ-1 segregated into five kinds of plants *viz.*, (i) violet corolla, (ii) pink corolla, (iii) magenta corolla, (iv) rose corolla, and (v) white corolla in the ratio of 144:48:12:36:16, while the progeny of the backcross, F₁ x MJ-1 segregated into four types of plants *viz.*, (i) violet corolla, (ii) magenta corolla, (iii) rose corolla and (iv) pink corolla in the ratio of 1:1:1:1. The results suggested that genes involved *B*, *R*, *W*, *O/O^m* and *J* were inherited independently and that the gene *B* blues the corolla pigment in *B-RRwwO-* genotypes but not in *B-RRwwO^m-jj* and *B-RRwwO^m-JJ* genotypes. No new corolla colours were observed in the studied crosses due to the interaction between genes governing violet, orange-red and magenta corolla. The observed segregation for different corolla colours in the studied crosses was

same as that expected from independent segregation and known interactions between the genes involved, validating the earlier proposed models.

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Comparison of CVA, DRIS, MDRIS and CND norms in rhizomes of turmeric crop in Coimbatore district of Tamil Nadu.

Kumar, P S S; Geetha, S A; Savithri, P

Department of Soil Science and Agricultural Chemistry, Agricultural College and Research Institute, Tamil Nadu Agricultural University, Coimbatore - 641 003, India.

Key words: boron, chemical composition, iron, methodology, mineral content, mineral deficiencies, nutrient content, nutrient deficiencies, plant composition, plant nutrition, rhizomes, turmeric, zinc

Journal of Applied Horticulture, 2003, volume 5, issue 1, pages 21-24.

Abstract: The optimum levels for nutrients in the rhizomes of turmeric were generated by Critical Value Approach (CVA), Diagnosis and Recommendation Integrated System (DRIS)/Modified Diagnosis and Recommendation Integrated System (MDRIS) and Compositional Nutritional Diagnosis (CND).

Approximately 500 soil and rhizome samples were obtained from commercial fields in Coimbatore, Tamil Nadu, India, during July-September 2000. Using the new norms of DRIS/MDRIS for rhizomes, the extent of deficiency of none of the micronutrients (Zn, B and Fe) matched with the values assessed with the soil analysis. Approximately 17% of the turmeric growing area was limited by mineral nutrition. Approximately 23% was identified as having possible imbalances. Based on the order of requirement, predominance of Zn deficiency was well indicated by CND than DRIS.

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Internal quality characterization and isolation of lycopene specific genes from tomato

E. Hemaprabha and R. Balasaraswathi

Department of Plant Molecular Biology and Biotechnology, Centre for Plant Molecular Biology, Tamil Nadu Agricultural University, Coimbatore-641 003, Tamil Nadu, India, Department of Biochemistry, Centre for Plant Molecular Biology, Tamil Nadu Agricultural

Key words: *Lycopersicon pimpinellifolium*, *Phytoene desaturase*, RT-PCR, lycopene

Journal of Applied Horticulture, 2003, volume 10, issue 1, pages 24-29.

Abstract: Tomato (*L. esculentum* Mill), a popular vegetable in tropics is an excellent source for vitamin A, C, carotenoids and other health related components. It tops the list of industrial crops because of its outstanding processing qualities. It is valued for both its fresh and processed forms. Biochemical analysis in different wild species, varieties and hybrids of tomato showed the wild species, *Lycopersicon pimpinellifolium* LA 1593 to be a rich source for lycopene specific genes. Partial cDNA of lycopene specific *Phytoene desaturase* gene TNAU P was isolated from *L. pimpinellifolium* LA 1593 by RT-PCR technique. Sequence analysis of the partial cDNA showed 99.6% similarity with already available *Phytoene desaturase* gene from *L. esculentum*. Also, the sequence showed considerable homology with *Phytoene dehydrogenase*, *Zeta carotene desaturase* and *Phytoene desaturase* genes from *Gentian*, *Oryza*, *Momardica*, citrus and pea. The high intensity of the amplified product in *L. pimpinellifolium* coupled with 99.6 % homology to *L. esculentum* inferred that the level of expression of *Phytoene desaturase* is more in *L. pimpinellifolium*. Isolation of *Phytoene desaturase* genes can be further exploited to produce transgenic plants with increased content of lycopene by transferring the genes from wild species to cultivars.

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Association of vesicular-arbuscular mycorrhizae with ginger rhizosphere in Himachal Pradesh.

Sanjeev Sharma; Dohroo, N P

Department of Mycology and Plant Pathology, Dr. Y.S. Parmar University of Horticulture and Forestry, Solan (H.P.) - 173 230, India.

Key words: endomycorrhizas, fungal morphology, ginger, mycorrhizal fungi, mycorrhizas, rhizosphere, vesicular arbuscular mycorrhizas

Journal of Applied Horticulture, 2003, volume 5, issue 1, pages 25-26.

Abstract: Seven species of VAM fungi were found associated with ginger rhizosphere in Himachal Pradesh, India. They included *Glomus mosseae*, *G. caledonium*, *G. pulvinatum*, *Acaulospora laevis*, *A. scrobiculata*, *Gigaspora albida* and *Scutellospora minuta*. Among the different VAM fungi species, frequency of *Glomus* species was maximum. The morphological characters of

these VAM fungi are described.

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Genetic studies in mango (*Mangifera indica* L.).

Dinesh, M R

Division of Fruit Crops, Indian Institute of Horticultural Research,
Hessaraghatta, Bangalore - 560 089, India.

Key words: crop quality, crosses, cultivars, fruits, genetic variance, genetic variation, heritability, heterosis, mangoes, phenotypic variation, reciprocal effects

Journal of Applied Horticulture, 2003, volume 5, issue 1, pages 27-28.

Abstract: A study was conducted in Bangalore, Karnataka, India to determine the presence of reciprocal effects and to assess the parents best suited for the transfer of desirable characters in commercial cultivars of mango. The cultivars Alphonso, Banganapalli, Neelum, Kalapadi and Janardhan Pasand were utilized for crossing, including reciprocals. The F1 intervarietal progenies of the combinations Alphonso x Banganapalli, Alphonso x Neelum, Alphonso x Kalapadi and Alphonso x Janardhan Pasand were evaluated for different characters, i.e. fruit weight, fruit volume, total soluble solids (TSS), skin weight, stone weight and pulp percentage. The study showed that non-additive variance controls the characters. Heritability was low and the chances of hybrid vigour manifesting for the characters in the F1 generation were high. Selection of progenies can be made based on fruit size, i.e. medium-sized fruits will have good TSS and big-sized fruits will decrease this character. For the characters studied, the phenotypic coeffic

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Hybrid vigour in cabbage (*Brassica oleracea* var. capitata) under mid hill conditions of central Himalaya.

Vandna Pandey; Ahmed, Z; Narendra Kumar

Defence Agricultural Research Laboratory, Pithoragarh, Uttaranchal, India.

Key words: cabbages, crop yield, crosses, heterosis, inbred lines, yield components

Journal of Applied Horticulture, 2003, volume 5, issue 1, pages 29-31.

Abstract: Eight inbred lines of cabbage, namely Sel-2, Sel-3, Sel-4, Sel-1, Sel-36 Sector, Sel-6, Sel-5 and Sel-7, were crossed in all possible combinations (excluding reciprocals), and the 28 F1s along with their parents were planted in September 2001 in Pithoragarh, Uttaranchal, India. Sel-1 x Sel-36 Sector was identified as the best among all combinations, having significant hybrid vigour (heterosis) for biological yield, head weight, net weight of head and head size index.

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Interactive effect of irrigation and fertilization on the quality of apples.

L'ubomir, H

Slovak Water Management Enterprise, S.P., Irrigation and Drainage Branch Office, Vrakunská 29, 82563, Bratislava 211, Slovakia.

Key words: apples, application rates, buds, chemical properties, crop quality, crop yield, cultivars, fertigation, fruits, nitrogen fertilizers, NPK fertilizers, physical properties, sensory evaluation, trickle irrigation

Journal of Applied Horticulture, 2003, volume 5, issue 1, pages 3-6.

Abstract: Experiments were conducted during 1999 and 2000 in Bratislava, Slovak Republic to evaluate the effects of different irrigation and fertilizer treatments on the quality of apple cultivars Gala, Jonagold and Idared. The treatments were: (A) liquid fertilizer (80 kg N, 80 kg P₂O₅ and 125 kg K₂O/ha) combined with irrigation (fertigation); (B) liquid fertilizer (120 kg N, 80 kg P₂O₅ and 125 kg K₂O/ha) combined with irrigation (fertigation); (C) solid fertilizer (80 kg N, 80 kg P₂O₅ and 125 kg K₂O/ha) with irrigation; and (K) control, solid fertilizer (80 kg N, 80 kg P₂O₅ and 125 kg K₂O/ha) without irrigation (atmospheric precipitation only). An increased rate of N (120 kg/ha) resulted in bigger shares of Selective and Class I grade fruits. A similar effect was produced by drip irrigation and typical response of individual cultivars was confirmed. In 1999, the share of Selective grade fruits by Gala was 93.3% in the non-irrigated treatment, which declined to 39.59% in the following year. An increased rate of N and

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Reduced ethylene production in transgenic carnations transformed with ACC oxidase cDNA in sense orientation

Takayuki Inokuma, Tomoyuki Kinouchi and Shigeru Satoh

Graduate School of Agricultural Sciences, Tohoku University, Sendai 981-8555, Japan. Present address: Graduate School of Life and Environmental Sciences, Kyoto Prefectural University, Kyoto 606-8522, Japan.

Key words: ACC oxidase gene (DC-ACO1), *Dianthus caryophyllus*, ethylene biosynthesis, flower senescence, potted carnation

Journal of Applied Horticulture, 2003, volume 10, issue 1, pages 3-7.

Abstract: 'Lillipot' carnation, which is usually cultivated as a potted ornamental, was transformed with a cDNA for carnation 1-aminocyclopropane-1-carboxylate (ACC) oxidase. Two lines, which harbor an *sACO* transgene, had a vase life of cut flowers more than twice longer than that of the non-transformed (NT) control. Flowers of the long vase life lines senesced with discoloring and browning in petal margins, which is typical to ethylene-independent senescence in carnation flowers. They produced negligible amount of ethylene for the first 8 day, whereas flowers of the NT control showed a climacteric ethylene production with a maximum on day 3. Transcripts for *DC-ACS1* and *DC-ACO1* were absent in petals of the long vase life flowers undergoing senescence. The present study revealed that transformation with *sACO* transgene may be useful to generate potted carnation plants with a long display time.

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Flowering time and concentration of secondary metabolites in floral organs of *Hypericum perforatum* are affected by spectral quality

Tetsuro Nishimura, Naoka Hashimoto, Sayed M. A. Zobayed and Eiji Goto

Faculty of Horticulture, Chiba University, Matsudo, Chiba 271-8510, Japan.

Key words: *perforatum* L., artificial light, controlled environment, hyperforin, hypericin, long-day plant, St. John's wort

Journal of Applied Horticulture, 2003, volume 10, issue 1, pages 30-35.

Abstract: Hypericin and pseudohypericin are the major bioactive constituents of floral parts of *Hypericum perforatum* L., mainly used for the treatment of neurological disorders and depression. The principle objective of the current study was to evaluate the effect of blue, blue and red mixed, and red light on flowering time and concentration of hypericin, pseudohypericin and hyperforin in the floral tissues of *H. perforatum* plants. The results revealed that red light

promoted flowering and production of the three major medicinal components, indicating the influence of spectral characteristics of light on flowering of *H. perforatum* plants. Spectral quality of light was found to be an important factor in controlling the flowering of *H. perforatum* plants.

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Effect of fruit harvesting stages and processing treatments on the quality of sun dried fruits of lehsua (*Cordia myxa* Roxb.).

Fageria, M S; Preeti Khandelwal; Dhaka, R S

Post-harvest Technology Laboratory, Department of Horticulture, Rajasthan Agricultural University, SKN College of Agriculture, Jobner - 303 329, India.

Key words: ascorbic acid, blanching, carbohydrates, chemical composition, crop quality, fruits, maturity stage, organoleptic traits, plant composition, protein content, sulfitation

Journal of Applied Horticulture, 2003, volume 5, issue 1, pages 32-38.

Abstract: Fruits of lehsua (*Cordia myxa*) were harvested at 3 different maturity stages (25, 35 and 45 days after fruit set) from plants grown in Jobner, Rajasthan, India, during 2000/01 and 2001/02. Blanching and sulfitation treatments of the fruits indicated that the drying ratio, total soluble solids, ascorbic acid, protein and carbohydrate contents, and organoleptic score were higher in mature fruits, while rehydration ratio was higher in immature fruits. Ascorbic acid, protein and carbohydrate contents, and organoleptic score were significantly higher when fruits were blanched for 3 minutes with 0.3% KMS. In general, harvesting at 45 days after fruit set and blanching for 3 min with 0.3% KMS resulted in better quality of sun dried fruits of lehsua.

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Phenolics and parthenolide levels in feverfew (*Tanacetum parthenium*) are inversely affected by environmental factors

Jorge M. Fonseca, James W. Rushing, Nihal C. Rajapakse, Ronald L. Thomas and Melissa B. Riley

Department of Horticulture, Clemson University, Clemson, SC 29634-0375 USA; Coastal Research and Education Center, Charleston, SC 29414-5332 USA; Department of Packaging Sciences, Clemson University, Clemson, USA;

Department of Plant Pathology and Physiol

Key words: Asteraceae, feverfew, *Tanacetum parthenium*, time of harvest, water stress, parthenolide, phenolics

Journal of Applied Horticulture, 2003, volume 10, issue 1, pages 36-39.

Abstract: Feverfew (*Tanacetum parthenium* [L.] Schultz-Bip., Asteraceae) products have shown high variability in the market. The objective of this study was to determine whether environmental factors affect the composition of key phytochemicals in feverfew. Plants of feverfew were exposed to water stress in greenhouse and commercial field conditions. The highest yield of parthenolide (PRT) was found in plants that received reduced-water regimes. Phenolics concentration was higher in plants grown under adequate-water conditions. The effect of time of harvest on PRT concentration and phenolics content was also investigated. Increased PRT was found during afternoon hours whereas total phenolic compounds decreased during the photoperiod and increased at night. When plants were exposed to artificial light during night hours, the phenolics content remained low. Our results revealed that manipulating the environment to favour increased accumulation of PRT resulted in a decline of phenolics content in feverfew. These findings have implications on standardization of herbal products.

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Effect of water stress on growth and yield of Tenera oil palm.

Gawankar, M S; Devmore, J P; Jamadagni, B M; Sagvekar, V V; Khan, H H
Agricultural Research Station, Mulde. Dist. Sindhudurg, Maharashtra - 416 520, India.

Key words: crop yield, growth, inflorescences, leaves, oil palms, plant water relations, stems, water stress

Journal of Applied Horticulture, 2003, volume 5, issue 1, pages 39-40.

Abstract: A field experiment was conducted from 1993/94 to 1998/99 in Sindhudurg, Maharashtra, India to evaluate the effect of water stress on the growth and yield of Tenera oil palm [*Elaeis guineensis*]. Intermittent water stress (rainfed) reduced fresh fruit bunches yield by 88.46% compared with the non-stressed treatment (irrigated). Leaf production was reduced by 30% in the early growth phase and by 12.5% in the later growth phase due to water stress. Stem growth was reduced by 49.1% due to water stress. Production of male inflorescences was least affected, but female inflorescences were reduced

by 86% under intermittent water stress. This resulted in more than 91% reduction in the number of fresh fruit bunches and ultimately caused 88.46% reduction in fresh fruit bunches yield.

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Improved plant regeneration in cowpea through shoot meristem

Muthusamy Manoharan, Sharmin Khan and James O. Garner

Department of Agriculture, University of Arkansas at Pine Bluff, Pine Bluff, AR 71601, USA.

Key words: *Vigna unguiculata*, shoot meristem, regeneration, transformation, legumes

Journal of Applied Horticulture, 2003, volume 10, issue 1, pages 40-43.

Abstract: Cowpea is a highly recalcitrant nutrient-rich leguminous vegetable crop. Efforts to genetically transform cowpea with insect-resistant genes remains a challenging task due to lack of an efficient regeneration system. We have established an efficient regeneration system in cowpea through shoot meristem. Shoot meristems were isolated from embryos that were precultured for 3-5 days on Murashige and Skoog (MS) medium containing 8.9 μM benzylaminopurine (BA). The isolated shoot meristems were cultured on MS medium containing 0.89 μM BA. After 3-4 weeks, multiple shoots were separated from the explant and cultured on half-strength MS medium for elongation and rooting. More than 90% of the regenerants formed roots. The rooted plantlets were transferred first to peat pellets and subsequently to the greenhouse. The plants were allowed to flower and set seed. The efficiency of regeneration in all four cultivars ranged from 76-87%, demonstrating a significant improvement over the published protocols (1-32%). At least six to seven plantlets were obtained from each meristem. The protocol using shoot meristems is simple, efficient, rapid and genotype-independent and may be amenable for transformation through particle bombardment.

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Correlation and path coefficient analysis of yield attributes in ber (*Zizyphus* spp.).

Pareek, S; Dhaka, R S

Department of Horticulture, S.K.N. College of Agriculture, Rajasthan

Agricultural University, Jobner - 303 329, India.

Key words: correlated traits, correlation analysis, crop yield, cultivars, flowering, fruits, genotypes, harvesting, path analysis, specific gravity, yield components

Journal of Applied Horticulture, 2003, volume 5, issue 1, pages 41-42.

Abstract: Ten-year-old plants of 8 commercial cultivars of *Ziziphus mauritiana* (Gola, Seb, Umran, Mundia, Illaichi, Tikadi, Jogiya and Bagwadi) and 3 local selections of *Z. rotundifolia* [*Z. nummularia*] (Local-1, Local-2 and Local-3) were evaluated in Jobner, Rajasthan, India. Correlation and path coefficients were assessed for 13 yield attributes, i.e. duration of flowering, fruit set, fruit drop, fruit length, fruit breadth, fruit weight, stone weight, stone length, stone diameter, pulp weight, specific gravity, fruit yield and harvest duration. Fruit set, fruit length, fruit breadth, fruit weight, stone diameter, pulp weight, specific gravity and harvest duration had significant positive correlation with fruit yield. Fruit length had the highest direct positive effect on fruit yield, followed by fruit weight and fruit breadth.

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Ber germplasm screening and management of black leaf spot disease under Eastern U.P. conditions.

Pradeep Kumar; Singh, H K; Saxena, R P

Department of Horticulture, N.D. University of Agriculture & Technology, Kumarganj, Faizabad, India.

Key words: carbendazim, chemical control, copper oxychloride, disease resistance, fungal diseases, fungicides, germplasm, mancozeb, neem extracts, non wood forest products, plant disease control, plant diseases, plant pathogenic fungi, plant pathogens

Journal of Applied Horticulture, 2003, volume 5, issue 1, pages 43-44.

Abstract: Forty ber (*Zizyphus mauritiana* [*Ziziphus mauritiana*]) accessions, grown in Faizabad, Uttar Pradesh, India, were screened against black leaf spot disease (caused by *Isariopsis indica* var. *ziziphi*) during 1997-98 to 1999-2000 to determine the resistant source(s) for crop improvement. Tikri during 1997-98 and 1999-2000; Seedless during 1998-99; and ZG-3 during 1999-2000 were found immune. Guli, Seedless and Ber selection-5 during 1997-98; Guli, Darackhi-2, Ber selection-2, 3, 4 and 5 during 1998-99; and Jalandher, Kali, Bagwadi, Banarasi Peondi, Illaichi, Villaiti, Sanour-3, Chhohara, Katha,

Seedless, Darakhi-2 and Ber selection-5 during 1999-2000 were found resistant. Other accessions showed moderately susceptible to susceptible reaction against the disease. An experiment on the management of the disease was conducted with ber cv. Gola (a susceptible cultivar). Single spraying of fungicides (0.1% carbendazim, 0.2% mancozeb and 0.2% copper oxychloride) and 3.0% neem [*Azadirachta indica*] powder (Nimuri) at 10 lit

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Rapid *in vitro* propagation of grapevine cv. Crimson Seedless-Influence of basal media and plant growth regulators

A. Nookaraju, S.M Barreto and D.C. Agrawal

Plant Tissue Culture Division, CSIR National Chemical Laboratory, Pune - 411 008, India

Key words: Crimson Seedless, grapevine, micropropagation, *Vitis*.
Journal of Applied Horticulture, 2003, volume 10, issue 1, pages 44-49.

Abstract: Grapevine genotypes differ in tissue culture requirements and thus require optimized culture conditions for *in vitro* propagation. Single node segments of Crimson Seedless cultured on six different basal media *i.e.* Murashige and Skoog (MS), Eriksson (ER), Gamborg (B5), Nitsch and Nitsch (NN), Woody plant medium (WPM) and Chee and Pool (C₂d) showed different percentage of shoot initiation and morphogenetic responses. The maximum shoot initiation (90.0%) was observed in MS medium. Except ER, all other media induced rooting at the base of nodal segments in varying percentages though number and quality of roots and their establishment on transfer to pots varied greatly. WPM induced the maximum rooting in nodal segments (69.1%) with establishment rate of 100.0%. Induction of multiple shoots in nodal segments was achieved on inclusion of 6-benzyl adenine (BA) (8.87 μ M) and indole-3-butyric acid (IBA) (1.48 μ M) in the MS medium. In second sub-culture *i.e.*, at 90 days, shoot bud proliferation could be increased many fold on transfer of these initial shoot clumps to glass bottles instead of culture tubes. The maximum average number of primary shoots (19.5 per explant) was achieved on MS with BA (8.87 μ M) and IBA (1.48 μ M). Elongation of shoots was achieved on MS with BA (2.22 μ M) + α -naphthalene acetic acid (NAA) (0.54 μ M). Induction of *ex vitro* rooting and establishment of rooted shoots after transfer to pots was achieved in different efficiencies when shoots were given pulse treatment of indole-3-acetic acid (IAA) or IBA or NAA at 57.08, 49.0 and 53.71 μ M, respectively, for 5 or 10 min. Survival of *in vitro* and *ex*

vitro-rooted shoots on potting was 90.0 and 100.0%, respectively.

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Selection parameters for genetic improvement in *Chenopodium* grain yield in sodic soil.

Atul Bhargava; Sudhir Shukla; Katiyar, R S; Deepak Ohri

Division of Genetics and Plant Breeding, National Botanical Research Institute, Lucknow - 226 001, India.

Key words: branches, correlation analysis, crop yield, cultivars, dry matter, genetic improvement, genetic variation, heritability, inflorescences, path analysis, plant breeding methods, plant height, sodic soils, soil types, stems, yield components, yield correlati

Journal of Applied Horticulture, 2003, volume 5, issue 1, pages 45-48.

Abstract: Eight exotic genotypes of *Chenopodium quinoa* were sown on normal and sodic soils in Lucknow, Uttar Pradesh, India, during 2000-01 to compare the grain yield potential, variability and genetic association among the different component traits (plant height, stem diameter, primary branches per plant, number of inflorescence per plant, inflorescence length and dry weight of plant) and their direct and indirect effects on yield. High heritability and moderate genetic advance was observed for inflorescence length and grain yield on sodic soil and for stem diameter, primary branches per plant, number of inflorescence per plant, dry weight of plant and inflorescence length on normal soil. Stem diameter and number of inflorescence per plant exhibited high direct path (0.837 and 0.761, respectively) and significant positive association (0.979 and 0.967, respectively) with grain yield on sodic soil, while dry weight of plant showed high correlation (0.889) and direct path (0.972) with grain yield on normal soil. The bre

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Decision process under greenhouse.

Singh, S K; Pitam Chandra; Singh, K P

PFDC, Division of Agricultural Engineering, IARI, New Delhi - 110 012, India.

Key words: automation, computer hardware, computer software, decision making, greenhouses, protected cultivation

Journal of Applied Horticulture, 2003, volume 5, issue 1, pages 49-51.

Abstract: This paper discusses the automation or support system for decision making in greenhouses. This automation is practised in the form of a computer program which are governed by setpoints. The choice of setpoints for environmental parameters must be done by a reasoning process integrating the situation outside the greenhouses, and inside situation that will be managed in an advantageous manner ensuring a profitable, though safe combination of growth and development factors while keeping the energy spending within acceptable bounds and as low as possible.

Volume 10(1), 2003

Effect of heavy manuring of phosphorous and its toxicity on growth, photosynthesis and photosynthetic pigments in Zn-efficient genotype of spearmint MSS-5

A. Misra and P. Singh

Central Institute of Medicinal and Aromatic Plants, Lucknow-226015, India.

Key words: Spearmint, *Mentha spicata*, Zn-efficient genotype MSS-5, protein, photosynthesis, photosynthetic pigments, Zn toxicity.

Journal of Applied Horticulture, 2003, volume 10, issue 1, pages 50-53.

Abstract: Changes in growth attributes, photosynthesis (Pn), photosynthetic pigments with γ -Glu.cys peptidase peptide and Zn accumulation in a Zn-efficient genotype of spearmint MSS-5 were investigated. Effect of phosphorus toxicity on MSS-5 were significantly different than the other genotypes; Arka, Neera and control (the local strain), in terms of phenotypic changes in height and a decrease in chlorophyll contents and CO₂ exchange rate. Heavy P manuring lead to the tolerance of Zn accumulation in MSS-5 with γ -Glu.cys peptidase peptide with high protein contents and Pn. Hence, the P toxicity induced a differential utilization of γ -Glu.cys peptidase peptide for higher accumulation of Zn in MSS-5 spearmint with higher photosynthetic rate for increasing the height and essential monoterpene oil(s). The study also indicated that accumulation of toxic heavy metal-Zn with γ -Glu.cys peptidase peptide made protein synthesis easier with antioxidants Zn cofactor enzymes.

Volume 5(1), 2003



Citrus canker - a review.

Das, A K

National Research Centre for Citrus, Amravati Road, PO Box 464, Nagpur - 440 010, Maharashtra, India.

Key words: epidemiology, molecular genetics, pathogenicity, plant disease control, plant diseases, plant pathogenic bacteria, plant pathogens, reviews, strains

Journal of Applied Horticulture, 2003, volume 5, issue 1, pages 52-60.

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Abstract: Of all the agricultural pests and diseases that threaten citrus crops, citrus canker is one of the most devastating. The disease, caused by the bacterium *Xanthomonas axonopodis* pv. *citri*, occurs in large areas of the world's citrus growing countries including India. At least 3 distinct forms or types of citrus canker are recognized. Among these, Asiatic form (Canker A) is the most destructive and affects most of the major citrus cultivars. Severe infection of the disease produces a variety of effects including defoliation, dieback, severely blemished fruit, reduced fruit quality and premature fruit drop. Warm, humid, cloudy climate, along with heavy rainfall and strong wind promotes the disease. Control of canker in countries or regions where the disease is not present include quarantine or regulatory programme to prohibit introduction of infected citrus plant material and fruit, as well as continuous and strict surveying in the field and the immediate destruction of infected trees. In countries where canker

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Evaluation of composted biosolid waste as an amendment to a standard horticultural nursery mix for container grown *Callicarpa* and *Ilex* production

Anthony W. Kahtz

University of Illinois Extension, Mt. Vernon, Illinois

Key words: Biosolids, sewage sludge, *Callicarpa*, *Ilex*, pH, electrical-conductivity, nitrate.

Journal of Applied Horticulture, 2003, volume 10, issue 1, pages 54-58.

Abstract: Growth of *Callicarpa dichotoma* (Lour.) 'Early Amethyst' and *Ilex glabra* (L.) 'Compacta' liners were evaluated in substrate containing 20, 40, 60,

80 and 100% composted biosolids as compared to a 3:2:1 (v:v:v) pine bark: peat:sand horticultural mix. Biosolid waste substrate amended with biosolids had higher pH, EC, nitrate, bulk density and container capacity compared to a standard horticultural nursery mix. Total porosity and air-filled capacity were greater for the control compared to substrate amended with biosolids. The effects of substrate amended with composted biosolids on growth varied for each species. *Callicarpa dichotoma* 'Early Amethyst' liners grown in substrate amended with 20, 40 and 60% biosolid waste had greater shoot and root dry weight and a better visual evaluation compared to the control. *Ilex glabra* 'Compacta' liners grown in the control (standard nursery mix) had greater shoot and root dry weight and a better visual evaluation compared to any biosolid amended substrate. It was concluded that substrate amended with biosolid waste can be utilized for the container production of plants, however, its usage may be species specific.

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Evaluation of seasonal nutrient status in the leaves of different olive varieties grown on calcareous soils

M.M. ElFouly, S.H.A. Shaaban and A.A. ElSayed

Department of Fertilization Technology, National Research Centre, Dokki, Egypt.

Key words: Olive, *Olea europaea* L., leaf nutrients, seasonal variations.

Journal of Applied Horticulture, 2003, volume 10, issue 1, pages 59-62.

Abstract: The study was conducted for two successive years at a private farm in El-Saf, Giza, Egypt on 19 years old trees of olive cultivars, Picual, Aggizi and Manzanillo, grown in calcareous soils. Leaf nutrients were measured bi-monthly during the 2001-2002 growing season. The study revealed that most of nutrients in the soil were at inadequate level. Nutrient concentrations in the leaves of the three cultivars were nearly the same. Results revealed that leaf N ranged between low to satisfactory. P contents were adequate in spring while inadequate in summer. K leaf contents were adequate. Peaks of Mg were found to be the highest during winter. Ca peaks were observed during March-June. Fe and Zn were inadequate while Mn was adequate. The concentrations of Fe, Mn and Zn peaked during June, which could be due the repeated foliar application of these nutrients during this period. The seasonal nutrient changes (N, P, K, Ca, Mg, Fe, Mn, Zn and Cu) of the olive leaves are supposed to be used as a guide for proper fertilization. Nutrients should be added as acidic fertilizer to the soil, which is useful in calcareous and high pH conditions.

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Evaluation of zinnia cultivars for field grown cut flower production

R. Crofton Sloan and Susan S. Harkness

North Mississippi Research and Extension Center, P.O. Box 1690, Verona, MS, 38879, USA.

Key words: *Zinnia elegans*, zinnia, cut flower, field production

Journal of Applied Horticulture, 2003, volume 10, issue 1, pages 63-66.

Abstract: The objective of the study was to evaluate the effects of cultivar and planting date on zinnia (*Zinnia elegans*) cut flower production. Parameters evaluated were the number of days to harvest, duration of harvest period for each planting date, number of stems per plant, stem length and diameter. Plants from the May planting date produced stems over a longer period of time compared to plants from the June and July plantings with the exception of 'Scarlet Splendor' from the July planting. Within each of the three planting dates, there were no statistically significant differences in the number of stems produced per plant due to the cultivar effect for 10 of the 13 cultivars evaluated. A trend of increasing stem and bloom size from the May planting date to the July planting was observed. The median number of stems produced by the zinnia cultivars in this study from the May, June, and July planting dates were respectively 21.6, 10.8 and 14.5 stems per plant for plants spaced one foot apart in the row. The potential stem yield for a single 100 ft row of the zinnia cultivars included in this trial was 2160, 1080 and 1450 stems for the production life of May, June, and July plantings, or 4690 stems for the three plantings combined. The cut flower zinnias evaluated in this study were very productive during the summer growing season.

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Growth and yield of grape as influenced by soil-site parameters in Nasik district of Maharashtra

H.S. Balpande, O. Challa and Jagdish Prasad

National Bureau of Soil Survey and Land Use Planning, Amravati Road, Nagpur-440 010, Maharashtra, India.

Key words: Grape, soil characteristics, growth, yield, drainage, depth, available water content

Journal of Applied Horticulture, 2003, volume 10, issue 1, pages 67-69.

Abstract: Six grape growing typical pedons in Nasik district, Maharashtra were characterised and soil-site parameters were correlated with yield and yield attributes of the crop. These soils were very shallow (Darana), moderately deep (Mahiravani, Kothure), shallow (Shivdi), deep (Talegaon) and very deep (Andersool) and characterised by well drained (Darana, Mahiravani, Shivdi) and moderately well drained (Talegaon, Kothure, Andersool). The height, stem girth, spread volume, bunch per plant, berries per bunch were very much related with soil depth, drainage, pH, available water content and DTPA extractable micronutrient cations.

Volume 5(1), 2003

Diagnosis of nutrient imbalances and derivation of new RPZI (Reference Population Zero Index) values using DRIS/MDRIS and CND approaches in the leaves of turmeric (*Curcuma longa*).

Kumar, P S S; Geetha, S A; Savithri, P; Jagadeeswaran, R; Mahendran, P P
Department of Soil Science and Agricultural Chemistry, Tamil Nadu Agricultural University, Coimbatore - 641 003, India.

Key words: boron, calcium, chemical composition, copper, crop yield, foliar diagnosis, iron, leaves, magnesium, manganese, methodology, mineral content, mineral deficiencies, nitrogen, nutrient content, nutrient deficiencies, phosphorus, plant composition, plant nut

Journal of Applied Horticulture, 2003, volume 5, issue 1, pages 7-10.

Abstract: The optimum levels for 12 nutrients (N, P, K, Ca, Mg, Na, S, B, Zn, Cu, Fe and Mn) in the leaves of turmeric were generated using Diagnosis and Recommendation Integrated System (DRIS)/Modified Diagnosis and Recommendation Integrated System (MDRIS) and Compositional Nutrient Diagnosis (CND) approaches. Approximately 500 soil and leaf samples were obtained from commercial fields in Coimbatore, Tamil Nadu, India, during July-September 2000. Using the new norms of DRIS/MDRIS, the extent of deficiency of none of the micronutrients (Zn, B and Fe) matched with the values assessed with the soil analysis. Approximately 9% of the turmeric growing area was severely limited by mineral nutrition. Approximately 20% was identified as having possible imbalances. Based on the order of requirement, predominance of Zn deficiency was well indicated by CND than DRIS. The order of nutrient imbalance was in the order S > B > Mg > Cu > P >

Na > Ca > K > Zn > N > Fe > Mn based on DRIS, S > B > Cu > Ca > Na > Zn > Mg > P > Fe > Mn > K

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***In vitro* propagation schedule of *Picrorhiza kurroa*: An endangered medicinal plant of Central Himalaya**

Ruchi Bist, H. Punetha, A.K. Gaur and L.D. Bist

Department of Biochemistry, Department of Horticulture, G.B. Pant University of Agriculture & Technology, Pantnagar-263 145, Uttarakhand, India.

Key words: *Picrorhiza kurroa*, axillary bud, *In vitro* multiplication, micropropagation

Journal of Applied Horticulture, 2003, volume 10, issue 1, pages 70-72.

Abstract: *Picrorhiza kurroa* Royle ex Benth (Kutki) has traditionally been used to treat disorders of the liver and upper respiratory tract, fever, and to treat dyspepsia, chronic diarrhoea and scorpion sting in Ayurveda medicine owing to the presence of active principles in root and rhizomes. The plant is self-regenerating but unregulated over-harvesting has caused it to be threatened to near extinction. The current research describes a protocol of micro propagation of this important medicinal plant from establishment to hardening in field conditions. Multiple shoots were induced in apical and axillary meristems derived from mature explants on Murashige and Skoogs (1962) medium supplemented with 0.25 mg L⁻¹ 6-benzylaminopurine (BA), 0.25 mg L⁻¹ kinetin (KN), 0.5 mg L⁻¹ ascorbic acid and 3% (w/v) sucrose. Optimal rooting (86.6%) and growth of microshoots were observed on a medium containing 0.25 mg L⁻¹ indole-3-butyric acid (IBA) with 2 % (w/v) sucrose. Micropropagated plantlets were acclimatized and successfully grown in soil.

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A comparison of three mathematical models of response to applied nitrogen using lettuce

Sadeghi Pour Marvi Mahdi

Department of Soil and Water Research, Varamin Agricultural Research Center, Ghodosi Blvd. Varamin, 3371616738, Iran.

Key words: *Lactuca sativa*, logistic equation, nitrogen

Journal of Applied Horticulture, 2003, volume 10, issue 1, pages 73-76.

Abstract: Modern fertilization recommendation must optimize crop yield and quality and minimize chances of negative environmental effects due to over fertilization. Data from fertilizer studies can be fitted to several mathematical models to determine optimum fertilizer rates, but resulting recommendations can vary depending on the model chosen. In this research, lettuce (*Lactuca sativa* L.) was used as a case study vegetable crop to compare models for estimating fertilizer N requirements. Field studies were conducted to measure yield response to applied N. The area was located at 25°21' E longitude and 51°38' N latitude in the North of Varamin city, (Tehran province, Iran) in the alluvial plain of Varamin. Soil family was fine, mixed, active, thermic, typic haplocambids based on Soil Taxonomic system (USDA, 1999). Plants were grown in Central Research Station of Varamin and received five rates of N (0, 150, 200, 250 and 300 kg ha⁻¹) as a urea in split applications. Data for plant fresh mass and N uptake were recorded. Logistic, linear-plateau and quadratic models were compared for the field data. The logistic model described the data for cultivar quite well, with correlation coefficients of 0.90 and above. Coefficients for the linear-plateau model were derived from the logistic model. All three models for lettuce production were compared graphically and analytically. The model coefficients were used to make improved estimates of fertilizer recommendations for field production of lettuce.

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Comparison of conventional fertilization and vermicompost use for basil cultivation

Liliana Marban, Lidia Giuffre, Marta Riat, Romina Romaniuk and Ernesto Giardina

Ingeis-Conicet Pabellon Ingeis. Ciudad Universitaria (1428), Buenos Aires, Argentina, Facultad de Agronomia, UBA, Av. San Martin 4453 (1417), Buenos Aires, Argentina.

Key words: Fertilization, vermicompost, *Ocimum basilicum* L., basil
Journal of Applied Horticulture, 2003, volume 10, issue 1, pages 77-80.

Abstract: The effect of conventional fertilization was compared with a vermicompost that was mixed with substrate for sweet basil (*Ocimum basilicum* L.) in a greenhouse experiment. The study was conducted in a completely randomized block design with 4 replications. Eight treatments were compared: a control treatment of a substrate mixture (T0: with no vermicompost added), five treatments with increasing percentages of

vermicompost added to the substrate mixture (H1 to H5), and two treatments using two application rates of a chemical fertilizer (F1 and F2). Both fertilizer and vermicompost presented very low levels of heavy metals, which assured agronomical suitability. Vermicompost from SS-MSW (Source-Separated Municipal Solid Waste) and slaughterhouse sludge, presented significant value as soil conditioner and biofertilizer and produced increased levels of C and N ($P < 0.05$). The phosphorus addition by vermicompost was high, with a decrease of zinc absorption by plants and potential contamination risk. Mixtures including more than 50% of the vermicompost and the highest rate of fertilizer showed statistically significant differences for dry weight, leaf length, plant survival and P-Zn antagonism ($P < 0.05$).

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Effects of high temperature on floral development and flowering in spray chrysanthemum

Kouju Nozaki and Seiichi Fukai

Horticultural Science, Faculty of Agriculture, Kagawa University, Miki, Kagawa 761-0795, Japan.

Key words: Chrysanthemum (*Dendranthema grandiflorum* (Ramat.) Kitam. syn. *Chrysanthemum morifolium*), floral development, high temperature.

Journal of Applied Horticulture, 2003, volume 10, issue 1, pages 8-14.

Abstract: Delayed flowering of chrysanthemum under high temperature conditions is a serious obstacle for all year round cut chrysanthemum flower production in southern temperate and subtropical zones. To clarify the causes of flowering delay in spray chrysanthemum, two different genotypes of spray chrysanthemum (*Dendranthema grandiflorum* (Ramat.) Kitam. syn. *Chrysanthemum morifolium*) were grown under high-temperature conditions: summer-to-autumn flowering type (SA type, high temperature tolerant) and autumn flowering type (A type, high temperature sensitive). Their flower-bud initiation and development were subsequently compared. Results clarify that two independent events caused by high temperatures occur in the shoot apex of spray chrysanthemum under short-day conditions. First, high temperatures slowed floral development in inflorescence, thereby increasing the number of florets in both SA and A chrysanthemum genotypes. Secondly, high temperatures slowed the developmental speed of inflorescence after the budding stage, and the time to reach the bud break stage was prolonged, thereby delaying flowering, especially in A chrysanthemum genotypes.

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Chilling requirement studies on flower buds in some male pistachio genotypes (*Pistacia vera* L.)

F. Nazoori, A. Talaie and A. Javanshah

Rafsanjan's Payam Nor University; Department of Horticultural Science, University of Tehran; Pistachio Research Institute, Rafsanjan-Iran.

Key words: Dormancy, bud break, cold storage, chilling requirement, bud development

Journal of Applied Horticulture, 2003, volume 10, issue 1, pages 81-84.

Abstract: Effects of different chilling periods were evaluated on growth and development of floral buds of male seedling trees (*Pistacia vera* L.) for chilling requirements of male genotypes helpful in predicting overlapping of flowering with female trees and escape from spring cold damage. The chilling requirement and responses of male genotypes to chilling treatment were determined by applying eight levels of chilling to shoots (*i.e.* 600-1300 h) at 3±1 °C. Based on the effect of chilling hours on bud break on four male pistachio genotypes were grouped to early (P₁ and P₆) and late flowering (P₇ and P₁₀) types. Percentage and rate of bud break, duration of flowering, growth and development of bud (length and width) were evaluated. The results indicated that genotypes had different chilling requirement. Among the male pistachio genotypes, the adequate chilling hours (bud break >80%) for P₁, P₆, P₇ and P₁₀ genotypes were 800, 700, 1100, and 1300 hours, respectively. P₁ and P₆ had low chilling requirement (700 hours) for 50% bud break compared to P₇ and P₁₀ (900 and 800 hours). Increased chilling led to decreased heat unit requirements for sprouting, resulting in greater overall growth and development. Chilling was a determining factor in floral bud break for all the genotypes, increasing chilling also produced greater bud break percentages. All genotypes required fewer heat units for bud break as chilling increased. Increasing the chilling hours also increased the length and width of flower buds and reduced duration of flowering.

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Volume 4(2), 2002

Performance of ber (*Ziziphus mauritiana* Lamk.) cultivars under Tarai conditions of Uttaranchal.

Omveer Singh; Misra, K K

Department of Horticulture, G.B. Pant University of Agriculture and Technology, Pantnagar - 263 145 (Uttaranchal), India.

Key words: crop yield, cultivars, girth, growth, leaf area, yield components

Journal of Applied Horticulture, 2002, volume 4, issue 2, pages 103-106.

Abstract: The performance of 24 ber (*Z. mauritiana*) in terms of growth, yield and yield components were studied under the tarai conditions of Uttaranchal, India during 1998-99. Sanaur 6 recorded the highest tree height (5.75 m) and spread (11.90 m), trunk girth (2.13 m), cross trunk sectional area (3616.08 cm²) and volume (1698.39 m³). Rohtak Gola, Seo, Nazuk, Narikeli and Sanaur 2 recorded the highest shoot length (248 cm), number of leaves per shoot (515.50), leaf length (10.68 cm), length: breadth ratio (2.32) and photosynthetic efficiency (0.182 mg/cm²/h), respectively. Sanaur 3 recorded the highest leaf breadth (7.71 cm) and area (43.19 cm²); ZG3 recorded the highest number of fruits per shoot (50.50) and per tree (11665.50), and yield (214.40 kg); and ZG 2 recorded the highest yield efficiency by weight (0.215 kg/cm²) and number of fruits per m³ volume of tree (59.05).

Volume 4(2), 2002

In vitro micropropagation of *Ananas comosus* L. (Merr.) var. Queen.

Mandal, A B; Aparna Maiti; Elanchezhian, R

Plant Genetics and Biotechnology Division, Central Agricultural Research Institute, Port Blair - 744 101, Andamans, India.

Key words: auxins, benzyladenine, culture media, cytokinins, fruits, IBA, in vitro culture, micropropagation, NAA, pineapples, plant growth regulators, rooting, shoots, suckers, tissue culture

Journal of Applied Horticulture, 2002, volume 4, issue 2, pages 107-112.

Abstract: Axillary buds from crown of mature fruits, slips and suckers of pineapple cv. Queen cultured in MS medium supplemented with high auxin: cytokin ratio and then transferred to MS medium with high cytokinin: auxin ratio showed high establishment percentage. Shoot multiplication increased upon subculture on freshly prepared MS medium supplemented with benzyladenine (BA). The best multiplication medium was an MS medium supplemented with 2.5 mg BA/litre, 2 mg NAA and IBA/litre and 10% coconut water. *In vitro* grown shootlets were successfully rooted in MS medium supplemented with 0.5 mg NAA and IBA/litre. The highest number of buds produced in 6 months was obtained from shaken liquid medium. Pulsing of explants enhanced the culture response as indicated by higher shoot multiplication rate in all types of explants.

Volume 4(2), 2002

Effects of stionic combinations on the growth and flowering of rose.

Santosh Kumar; Ranjan Srivastava

Department of Horticulture, G.B. Pant University of Agriculture and Technology, Pantnagar - 263 145, Uttaranchal, India.

Key words: budding, cultivars, flowering, flowers, growth, rootstock scion relationships, rootstocks, roses, scions, sprouting, vigour

Journal of Applied Horticulture, 2002, volume 4, issue 2, pages 113-115.

Abstract: Bud take, growth and flowering were evaluated in *Rosa indica* [*R. chinensis*] cultivars Odorata and Briar, *R. macrophylla* and *R. clinophylla* budded with cultivars Super Star, Happiness, Eiffel Tower and Kiss of Fire. Bud take at 2 weeks after budding was greatest for *R. indica* cv. Odorata budded with Super Star (80%). *R. macrophylla* budded with Eiffel Tower recorded the lowest number of days to sprouting (21.33 days). *R. indica* cv. Odorata budded with Super Star produced the tallest plants (37.67 cm) at 6 months after budding. However, at 15 months after budding, the tallest plants were obtained with *R. clinophylla* budded with Kiss of Fire (119.67 cm) and *R. indica* cv. Briar budded with Kiss of Fire (119.33 cm). At 6 months after budding, the greatest plant spread was recorded for *R. indica* cv. Odorata budded with Happiness (55.63 cm) and *R. indica* budded with Happiness (54.67 cm). Super Star budded on *R. indica* cv. Odorata produced vigorous plants. At 15 months after budding, *R. indica* cv. Briar budded with Ha

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Effect of hand thinning stage on fruit size, colour and yield of Flordaprince peaches (*Prunus persica* Batsch).

Arora, N K; Channana, Y R; Raghbir Singh; Kaundal, G S

Department of Horticulture, Punjab Agricultural University, Ludhiana - 141 004, India.

Key words: colour, crop quality, crop yield, fruits, thinning

Journal of Applied Horticulture, 2002, volume 4, issue 2, pages 116-117.

Abstract: The effects thinning at different crop growth stages (at pink bud stage, at full bloom, at fruit set, and after 7, 14, 21, 28, 35 and 42 days of fruit set) on the fruit size, colour and yield of peach cv. Flordaprince were determined in a field experiment conducted in Ludhiana, Punjab, India during 1998-99. The fruit length, breadth and yield of peach were highest when thinning was carried out during the pink bud stage. Data are presented on the effects of thinning on the colour of the fruits.

Volume 4(2), 2002

Genetic variability in early ripening grape genotypes.

Ram Kumar; Shailendra Rajan; Negi, S S; Yadava, L P

Central Institute for Subtropical Horticulture, PO Kakori, Rehmankhera, Lucknow - 227 107, India.

Key words: crop yield, fruits, genetic effects, genetic variation, genotypes, grapes, heritability, organic acids, phenotypic variation, reducing sugars, seed weight, yield components

Journal of Applied Horticulture, 2002, volume 4, issue 2, pages 118-120.

Abstract: The phenotypic and genotypic coefficients of variability, heritability along with genetic advance for yield and yield components of 14 early maturing grape genotypes were studied. The differences among the genotypes were highly significant ($p=0.05$) for all the characters (except bunch length) studied. A wide range of variation was recorded for bunch width, number of berry per bunch, 100-berry weight, 100-seed weight, juice content, total soluble solids, reducing sugar, organic acid content and berry yield. Based on the coefficient of variation, broad sense heritability and expected genetic advance, it can be concluded that berry yield, 100-berry weight, 100-seed weight and organic acid content provides a greater scope for selection of

superior genotypes. Among the 14 genotypes, Flame seedless produced the highest (17.6 t/h) berry yield; Cardinal registered highest (275.6 g) 100-berry weight with high (6.5 g) 100-seed weight; and Pusa Navrang showed highest organic acid content and 100-seed weight (6.7 g). The

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Yield and nitrogen recovery of lettuce under different irrigation regimes.

Karam, F; Mounzer, O; Sarkis, F; Lahoud, R

Lebanese Agricultural Research Institute, Department of Irrigation and Agro-Meteorology, Tal Amara, P.O. Box 287 Zahle, Lebanon.

Key words: ammonium nitrate, crop yield, dry matter accumulation, evapotranspiration, irrigation, leaf area index, lettuces, nitrogen, nitrogen fertilizers, use efficiency

Journal of Applied Horticulture, 2002, volume 4, issue 2, pages 70-76.

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Abstract: Studies were conducted to determine the effects of irrigation on the yield and nitrogen recovery of field grown lettuce in the Bekaa Valley of Lebanon under non-limiting soil N conditions. Within the experimental plots, irrigation differentiation was made upon crop evapotranspiration (ET_c) measured on a non-weighing lysimeter of 16 m². The treatments included a control, I-100, irrigated at 100% of ET_c, and two water deficit treatments, I-80 and I-60, irrigated at 80 and 60% of ET_c, respectively. Prior to planting, all plots received fertilizers broadcast at a rate of 250 kg/ha of NPK-fertilizer (17%). At 6- and 12-leaf stages, ammonium nitrate (34.5%) was applied with irrigation water in two applications of 125 kg/ha each. Local groundwater containing 10 mg N-NO₃/litre was used for irrigation. Yield was determined in a final destructive harvest. Crop evapotranspiration reached on the lysimeter a total of 433 mm for a total growing period of 70 days. Water stress caused by the deficit irrigations significantly

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Induction of caulogenesis and somatic embryogenesis in *Cucumis melo* (var. *flexuosus*).

Mohsen Hanana; Moncef Harrabi; Mohamed Boussaid

Laboratoire de Genetique et Amelioration des Plantes, Institut National Agronomique de Tunis (INAT), 43 Avenue Charles Nicolle, 1002 Tunis, Tunisia.

Key words: 2,4 D, auxins, benzyladenine, callus, cotyledons, cucumbers, culture media, cytokinins, embryogenesis, hypocotyls, in vitro culture, melons, methodology, plant growth regulators, tissue culture

Journal of Applied Horticulture, 2002, volume 4, issue 2, pages 77-82.

Abstract: Within the framework of genetic improvement of Tunisian Snake-melon (*Cucumis melo*) cultivar by biotechnological methods, we have developed a method to regenerate whole plants by *in vitro* culture using cotyledon and hypocotyl as explants on MS medium with different combinations and concentrations of auxin and cytokinin. Adventitious buds were initiated from hypocotyls grown on medium with 1.5 mg 2,4-D/litre and 0.5 mg benzyladenine/litre. A maximum percentage of embryogenesis (20%) was obtained for cotyledons grown in MS medium containing 0.5 mg 2,4-D/litre and 1 mg kinetin/litre. For stimulating the development of adventitious buds and the embryo's germination and their conversion into plants, MS medium diluted twenty times and supplemented with 1.5% sucrose was used. Histological studies showed that adventitious buds were initiated from the peripheral zones of the organogenic calluses by aggregation of meristematic cell masses which organized into a typical shoot meristem. Embryoids resulted from the divisio

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Effect of preharvest application of calcium nitrate, Topsin-M and Bayleton on postharvest life of aonla (*Emblica officinalis* Gaertn.) fruit.

Yadav, V K; Singh, H K

Department of Horticulture, N.D. University of Agriculture & Technology, Narendra Nagar (Kumarganj) - 224 229, Faizabad (UP), India.

Key words: acidity, ascorbic acid, calcium nitrate, crop quality, fruits, phenols, reducing sugars

Journal of Applied Horticulture, 2002, volume 4, issue 2, pages 83-86.

Abstract: The effects of preharvest spraying of 1% calcium nitrate, 0.1% Topsin-M and 0.1% Bayleton, alone or in combination on aonla (*Emblica officinalis* [*Phyllanthus emblica*]) cv. NA-6 were determined. The treatments

were sprayed 10 and 20 days before harvest. Treatment with 1% calcium + 0.1% Bayleton resulted in increased total soluble solids (8.4%), total sugars (6.93%) and total phenol (13.3%), and reduced levels of losses in acidity (8.8%), ascorbic acid (22.32%) and reducing sugars (12.8%). The treatment also prolonged the shelf-life of fruits up to 20 days compared to 10 days in control. Thus, this treatment doubled the shelf-life of aonla fruit in storage at ambient temperatures.

Volume 4(2), 2002

Effects of number of days between flowering and corm lifting on the performance of forthcoming summer season crop in gladiolus.

Singh, K P; Ramchandran

Indian Institute of Horticultural Research, Hesaraghatta Lake Post, Bangalore - 560 089, India.

Key words: corms, crop quality, crop yield, flowering, harvesting date, leaf area, leaves, plant height, postharvest decay, spikes, yield components

Journal of Applied Horticulture, 2002, volume 4, issue 2, pages 87-89.

Abstract: The effects of the number of days between flowering and corm harvesting on the performance of crops produced from harvested corms were studied in Hesaraghatta, Bangalore, Karnataka, India. Corms of gladiolus cv. Pink Friendship were harvested at 30, 45, 60, 75, 90, 105, 120 or 135 days after flowering (DAF). Plants grown from corms harvested at 45 and 60 DAF were the tallest (94.13 and 94.9 cm). Harvesting of corms at 45, 60, 75, 90 and 105 DAF resulted in the greatest number of leaves per plant (8.78, 8.83, 8.65, 8.29 and 8.46) and leaf breadth (3.40, 3.63, 3.43, 3.33 and 3.48 cm). Scape width was greatest in plants produced from corms harvested at 45 (2.99 cm), 60 (3.08 cm) and 75 DAF (2.85 cm). Harvesting of corms at 60 DAF resulted in the greatest floret diameter (12.92 cm), spike length (86.26 cm), rachis length (45.99 cm), and number of florets per spike (13.87), and in the lowest incidence of corm rot (23.78%). Corms harvested at 45 and 60 DAF were superior in terms vegetative growth, flower productio

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Performance of bitter gourd raised through transplanting of polyhouse-grown seedlings and direct seeding on different dates.

Joshi, N C; Srivastava, B K

Department of Vegetable Science, G.B. Pant University of Agriculture and Technology, Pantnagar - 263 145, Uttaranchal, India.

Key words: branches, crop yield, direct sowing, earliness, emergence, flowering, flowering date, flowers, fruits, harvesting date, internodes, planting date, seed germination, seeds, shoots, transplanting, yield components

Journal of Applied Horticulture, 2002, volume 4, issue 2, pages 90-92.

Abstract: The performance of bitter gourd (*Momordica charantia* cv. Jaunpuri Local) grown by direct sowing or transplanting at 15 January, 29 January, 12 February, 26 February or 12 March was evaluated in Pantnagar, Uttaranchal, India during the spring-summer season of 2000. Seeds sown directly in the open field on 15 and 29 January failed to germinate. For the other dates, seed germination was observed at 15.0 to 19.3 days after sowing. Main shoot length, number of branches arising from the main shoot, and internode length increased with the delay in transplanting. Greater shoot length was obtained under transplanting. The diameter of the main shoot decreased with the delay in direct sowing or transplanting. Flower emergence was earliest with transplanting on 26 February. In general, pistillate flowers emerged at 5-15 days after the emergence of staminate flowers. The formation of flowers on the lower nodes was more pronounced under transplanting. The lowest male flower position was obtained with transplanting on 12 Ma

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Strategy for crop regulation in guava (*Psidium guajava* L.) through foliar urea sprays and its effect on different N-forms in leaves.

Gorakh Singh; Singh, A K; Shailendra Rajan; Bhriguvanshi, S R

Central Institute for Subtropical Horticulture, Rehmankhera, P.O. Kakori, Lucknow - 227 107, India.

Key words: application rates, ascorbic acid, chemical composition, crop quality, crop yield, cultivars, foliar spraying, fruits, guavas, leaves, plant composition, reducing sugars, shoots, urea

Journal of Applied Horticulture, 2002, volume 4, issue 2, pages 93-98.

Abstract: The effects of foliar application of urea (10, 20, 25 and 30%) as the main source of N on the growth and leaf N composition of the guava cultivars

Sardar and Allahabad Safeda were determined in a field experiment conducted in Lucknow, Uttar Pradesh, India. Urea-N, ammonium-N and nitrate-N in the shoot and fruits were highest with the single application of 30% urea and double application of 20% urea in Allahabad Safeda and Sardar, respectively. Crop yield in both cultivars decreased with increasing urea concentration during the rainy season. Fruit weight, total soluble solids, and ascorbic acid and reducing sugar content were highest with foliar spraying of 25% urea on Allahabad Safeda and decreased with increasing urea concentration in Sardar.

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Effect of pulsing and wet cool storage on postharvest life and quality of rose cultivars.

Vinod Kumar; Bhattacharjee, S K; Suchitra

Division of Floriculture and Landscaping, Indian Agricultural Research Institute, New Delhi - 110 012, India.

Key words: crop quality, cultivars, cut flowers, dimethyl sulfoxide, flowers, roses, storage, vase life, water uptake

Journal of Applied Horticulture, 2002, volume 4, issue 2, pages 99-102.

Abstract: The effects of pulsing with 2% dimethyl sulfoxide and wet cool storage (4 degrees C) for 1-5 days on the postharvest life and quality of rose cultivars Noblesse and Mercedes were determined. The vase life of both rose cultivars subjected to pulsing and wet cool storage was higher compared to that of the control. In general, water uptake and flower diameter of the cut flowers subjected to pulsing and wet cool storage decreased with storage duration, but were higher compared to those of the control.

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Identification of genotypes using leaf isozymes: a study to assess biochemical gene markers in walnut.

Dhiraj Vyas; Sharma, A D; Sharma, S K; Sharma, D R

Department of Biotechnology, University of Horticulture & Forestry, Nauni-Solan - 173 230, H.P., India.

Key words: biochemical markers, cultivar identification, cultivars, enzymes, esterases, genetic diversity, isoenzymes, leaves, malate dehydrogenase, walnuts

Journal of Applied Horticulture, 2002, volume 4, issue 1, pages 10-13.

Abstract: Leaf isoenzyme patterns were studied in *Juglans nigra* and 8 cultivars of *J. regia* (ACO, Blackmore, Gobind, Hartley, KX Giant, Lake English, Payne and Tuttle) for their identification in the field. The results showed differences in specific relative mobility values for the various isoenzymes in walnut cultivars. Of the 6 enzyme systems that were localized on native gels, only esterase and malate dehydrogenase showed wide diversity in Rm values for the different isoenzymes. A total of 16 loci and 24 alleles were observed for 5 enzyme systems, out of which 10 loci were polymorphic. *J. nigra* was found to be more heterozygous and polymorphic than *J. regia*. PPO I, PRO I and EST III were found as reliable markers for distinguishing the two species of walnut. The values obtained for similarity coefficient were used to make the dendrogram. Among the cultivars of *J. regia*, the most diverse relationship was found between Tuttle and Blackmore, whereas Blackmore and Payne were the most genetically related.

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Inflorescence and nut characters of some coconut cultivars and hybrids grown in West Bengal.

Manna, S; Mathew, B; Hasan, M A; Chattopadhyay, P K

Faculty of Horticulture, Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, Nadia, West Bengal - 741 252, India.

Key words: chemical composition, coconuts, crop yield, cultivars, flowers, husks, hybrids, inflorescences, kernels, nuts, plant composition, seed weight, spikelets, varietal reactions, water content, yield components

Journal of Applied Horticulture, 2002, volume 4, issue 1, pages 14-16.

Abstract: The performance of 15-year-old palms of 7 cultivars (Local Tall, Laccadive Micro, West Coast Tall, Straight Settlement Green, Philippines Ordinary, Andaman Ordinary and Laccadive Ordinary) and 3 hybrids (Malayan Dwarf Yellow x West Coast Tall, Malayan Dwarf Orange x West Coast Tall, and West Coast Tall x Malayan Dwarf Orange) of coconut grown in West Bengal, India was evaluated. Malayan Dwarf Orange x West Coast Tall, West Coast Tall x Malayan Dwarf Orange, and West Coast Tall recorded high annual nut yields. Malayan Dwarf Orange x West Coast Tall had the highest number of spadix per plant (9.2), number of female flowers per spadix (102.0), and annual nut yield (161.9 nuts per plant). Principal component analysis revealed 3 sets of characters influencing yield: number of spikelets with female flowers, number

of spikelets per spadix, and number of nuts per spadix (for which Local Tall was superior); number of female flowers per spadix and number of female flowers per spikelet (Malayan Dwarf Orange x West Coast

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Manipulation of citrus trees for new higher-density orchards.

Joubert, F J; Plessis, M H du; Steenkamp, E D; Stassen, P J C

ARC-Institute for Tropical and Subtropical Crops, Private Bag X11208, Nelspruit, 1200, South Africa.

Key words: branches, canopy, crop density, grapefruits, high density planting, lemons, mandarins, oranges, plant training, pruning

Journal of Applied Horticulture, 2002, volume 4, issue 1, pages 17-20.

Abstract: Results of a study on the response of Valencia orange, mandarin, lemon and grapefruit cultivar/rootstock combinations to training systems (central leader system for high-density planting and multiple leader system for low-density planting), pruning methods (trees cut back to 50 cm height after planting and trained with new growth; trees shaped after planting without cutting back; trees shaped after 1 year of growth), and planting densities (3.0x1.0, 4.0x1.25, 4.0x1.5, 5.0x2.0 and 5.0x3.0 m, corresponding to 2222, 2000, 1667, 1000 or 667 trees/ha) are presented. The experiment was conducted in Nelspruit (Valencia orange and lemon), Lydenburg (mandarin) and Malelane (grapefruit), South Africa during 1996 and 1997. Pruning back a newly established tree to 50 cm height after planting had negative effects on tree volume and development compared to the other pruning methods. Lemon trees were trained more successfully under the central leader system. Higher levels of manipulation and pruning were necessary when lemo

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Effects of ultraviolet radiation, cytokinin and vapor gard on the shelf life of Kagzi lime (*Citrus aurantiifolia* Swingle).

Nagar, B L; Dashora, L K; Yadava, L P

Department of Horticulture, Rajasthan College of Agriculture, Udaipur, India.

Key words: antitranspirants, application rates, benzyladenine, chemical composition, crop quality, fruit juices, fruits, limes, plant composition, plant growth regulators, postharvest decay, postharvest treatment, storage, storage

decay, storage life, storage losses

Journal of Applied Horticulture, 2002, volume 4, issue 1, pages 21-24.

Abstract: The effects of ultraviolet radiation (for 0, 5 or 10 minutes), benzylaminopurine [benzyladenine] (BAP; 0, 50 or 100 ppm), and vapour gard (antitranspirant concentrate; 0 or 4%), singly or in combination, on the quality of *C. aurantiifolia* fruits stored at room temperature (20.0-28.5 degrees C) were studied. Fruit quality parameters were evaluated at 4, 8, 12, 16, 20 and 24 days after treatment. All the treatments resulted in lower physiological weight loss and decay, and greater diameter and juice content during storage compared with the control. The lowest reduction in physiological weight (5.32%) was obtained with ultraviolet radiation for 5 minutes + 100 ppm BAP + 4% vapour gard. Fruits treated with ultraviolet radiation for 5 or 10 minutes + 100 ppm BAP + 4% vapour gard did not exhibit rotting during storage. This treatment also recorded the lowest reduction in fruit diameter (4.67%). Treatment with ultraviolet radiation for 10 minutes + 100 ppm BAP + 4% vapour gard also gave the lowest reduction in juice

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Effects of light intensity and vermicompost on the yield of ginger (*Zingiber officinale* Rosc).

Vastrad, N V; Sulikeri, G S; Hegde, R V

Division of Horticulture, University of Agricultural Sciences, Dharwad - 580 005, India.

Key words: application rates, crop yield, curing, ginger, light intensity, light relations, nitrogen fertilizers, phosphorus fertilizers, potassium fertilizers, rhizomes, shading, yield components

Journal of Applied Horticulture, 2002, volume 4, issue 1, pages 25-26.

Abstract: The yield and yield components of ginger cv. Bidar local under normal (open) and reduced (shaded) light conditions, and 5 fertilizer treatments (recommended fertilizer rate (RFR) of 100:50:50 kg NPK/ha; 75% RFR + 25% vermicompost; 50% RFR + 50% vermicompost; 25% RFR + 75% vermicompost; and 100% vermicompost at 8 t/ha) were studied in Dharwad, Karnataka, India during 1998/99. Reduced light condition (by 40-50%) was obtained by growing dwarf castor bean cv. Aruna as an intercrop at a spacing of 90x30 cm. The average fresh rhizome yield (11.54 t/ha) and cured rhizome yield (3.64 t/ha) were higher under normal light conditions than under reduced light conditions (6.40 and 1.58 t/ha, respectively). Among the fertilizer

treatments, 100% RFR recorded the highest average fresh rhizome yield (10.21 t/ha). The application of 75% RFR + 25% vermicompost resulted in an average fresh rhizome yield (9.16 t/ha) which was almost as high. The effect of the interaction between light intensity and vermicompost on fresh rhizome y

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Studies on fruit-bud differentiation in mango (*Mangifera indica* L.) under South Indian conditions.

Humayun, M; Babu, R S

Department of Horticulture, S.V. Agricultural College, Tirupati - 517 502, Andhara Pradesh, India.

Key words: buds, carbohydrates, carbon nitrogen ratio, chemical composition, cultivars, fruiting, fruits, mangoes, nitrogen, nitrogen content, plant composition

Journal of Applied Horticulture, 2002, volume 4, issue 1, pages 27-29.

Abstract: The period of fruit bud differentiation (FBD) in mango cultivars AU-Rumani, Neeleshan, Neeluddin, Baneshan, Bangalora and Neelam grown in Tirupati, Andhra Pradesh, India was studied during 1998 and 1999. In general, FBD commenced on the 3rd week of September and was completed on the 3rd week of November. However, the onset of FBD and peaks of differentiation varied among the cultivars. The first sign of FBD (stage II) was observed in AU-Rumani on the 3rd week of September, and 100% differentiation was observed towards the end of October. In Neeleshan and Baneshan, stage II was observed on the 4th week of September, and 100% differentiation was evident towards the 2nd week of November. In Neeluddin, Bangalora and Neelum, stage II occurred during the 1st week of October, and 100% differentiation was evident on the 2nd and 3rd weeks of November. In general, the total carbohydrate fraction and C/N ratio were greatest at 100% FBD, whereas the total N fraction was lowest during FBD. At FBD, the total carbohydrate f

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A tool to predict fruiting in terms of number of days after anthesis based on fruit skin and pulp colour of pitaya (*Stenocereus thurberi* (Engelm.) Buxb.).

Tiznado Hernandez, M E; Ojeda Contreras, A J; Sanchez Estrada, A; Moreno Velazquez, D; Mercado Ruiz, J N

Centro de Investigacion en Alimentacion y Desarrollo, Departamento de Tecnologia de Alimentos de Origen Vegetal, Carretera a la Victoria km. 0.6, Apartado Postal 1735, Hermosillo, Sonora, Mexico.

Key words: colour, fruiting, fruits, linear models, mathematical models, maturity stage, peel, prediction

Journal of Applied Horticulture, 2002, volume 4, issue 1, pages 3-6.

Abstract: A model for the prediction of fruit development stage in *Stenocereus thurberi* [*Lemaireocereus thurberi*] was developed. Fruits were sampled from a field in Hermosillo, Sonora, Mexico, in June and July 1999 and 2000, at 5, 10, 15, 20, 25, 30, 37 and 40 days after anthesis (DAA). A Minolta chromameter CR-300 set was used to quantify fruit skin and pulp colour. A multiple linear model was developed using the stepwise procedure in forward selection. F statistics, mean square error, coefficient of determination, Mallows coefficient, and distribution of residuals around zero were used as indicators of the efficiency of model prediction. The results indicated the possibility of predicting the fruiting stage in *S. thurberi* in terms of DAA based on fruit pulp and skin characters.

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Effects of reduced humidity and antitranspirants in acclimatizing micropropagated Citrus plantlets.

Hazarika, B N; Parthasarathy, V A

Biotechnology Laboratory, ICAR Research Complex for NEH Region, Umiam - 793 103, Meghalaya, India.

Key words: 8 hydroxyquinoline, acclimatization, antitranspirants, chemical composition, daminozide, humidity, in vitro culture, in vitro regeneration, mandarins, micropropagation, plant composition, roots, shoots, silica gel, survival, tissue culture, water content

Journal of Applied Horticulture, 2002, volume 4, issue 1, pages 30-32.

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Abstract: Microshoots approximately 2.0-2.5 cm long obtained from *in vitro* cultures of *C. reticulata*, *C. nobilis* x *C. deliciosa*, *C. volkameriana* and *C. reshni* were subjected to reduced humidity treatment with silica gel (8 mg), alar [daminozide] (1 or 2 mg/litre) and 8-hydroxyquinoline (1 or 2 mg/litre). After

4 weeks, the plants were transferred to polyethylene bags containing soil and farmyard manure at 1:1. Plant survival was evaluated after 1 week. The application of silica gel adversely affected ex vitro survival. The values of shoot and root growth parameters were lowest under silica gel treatment and highest under the control. Alar and 8-hydroxyquinoline enhanced most of the root and shoot growth parameters. Plant weight was greatest in *C. nobilis* x *C. deliciosa* (293.53 mg) and lowest in *C. reshni* (280.45 mg). Shoot length ranged from 2.8 cm in *C. reshni* to 3.2 cm in *C. reticulata* and *C. volkameriana*. Leaf weight was greatest (30.46 mg) in *C. volkameriana*. The application of 2 mg 8-hydroxyquinoline/litre was eff

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Correlation and path analyses for oleoresin in chilli (*Capsicum* spp.).

Mini, C; Vahab, M A

College of Horticulture, Kerala Agricultural University, Vellanikkara, Trissure, Kerala - 680 654, India.

Key words: correlated traits, correlation analysis, crop yield, cultivars, earliness, flowering date, fruit set, fruits, genetic correlation, harvesting date, oleoresins, path analysis, yield components

Journal of Applied Horticulture, 2002, volume 4, issue 1, pages 33-34.

Abstract: Correlation and path analyses for oleoresin yield and yield components were conducted for *C. annum* (CA 653, Arka Lohit, Ujwala and KTPL-19), *C. chinense* (CA 640 and CA 645), *C. frutescens* (CA 671 and CA 648) and *C. baccatum* (CA 670) cultivars grown in Kerala, India during the summer (January-March), rainy (May-July) and winter (September-November) seasons [year not given]. Genetic correlation analysis revealed that oleoresin yield was positively correlated with number of fruits per plant, and negatively associated with number of days to fruit set, flowering and harvesting. The number of days to flowering was positively associated with number of days to first fruit set and first harvest, and fruit yield per plant. The number of days to fruit set had a significant and positive association with number of days to first harvest and negative association with number of fruits per plant. The number of days to harvesting was negatively associated with number of fruits and fruit yield per plant. Path analysis indicate

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Performance of papaya (*Carica papaya* L.) cultivars under Nagaland foot hill conditions.

Naresh Babu; Anamika Sharma

ICAR Research Complex for NEH Region, Nagaland Centre, Jharnapani - 797 106, India.

Key words: ascorbic acid, carotenoids, crop quality, crop yield, cultivars, fruit pulp, fruit set, fruits, length, nonreducing sugars, pawpaws, peel, plant height, reducing sugars, seeds, sugar content, titratable acidity, width, yield components

Journal of Applied Horticulture, 2002, volume 4, issue 1, pages 35-36.

Abstract: Plant height and fruit characteristics were evaluated during 1998/99 and 1999/2000 in 12 pawpaw cultivars (Co-1, Co-2, Co-3, Co-4, Co-5, Co-6, Pusa Dwarf, Pusa Delicious, Pusa Giant, Pusa Majesty, Coorg Honey Dew and Honey Dew) grown in Jharnapani, Nagaland, India. Plant height (243.300 cm), and fruit length (38.840 cm), width (43.800 cm) and weight (2445.780 g) were greatest in Pusa Giant. Pusa Delicious recorded the greatest fruit set (55.400%), number of fruits per plant (31.100), and fruit pulp/peel ratio (11.100) and total soluble solids content (14.08%). Peel percentage was lowest in Co-4 (6.560%). Pusa Majesty fruits had the highest seed percentage (0.970%). Fruit yield was highest in Coorg Honey Dew (41.070 kg per plant). Fruit total carotenoids content was highest in Pusa Dwarf (7.730 mg/100 g). Honey Dew fruits were characterized by the greatest total sugar (12.450%), reducing sugar (11.570%) and nonreducing sugar (0.880%) contents, acidity (0.100%), and sugar/acid ratio (124.500). Co-5 fruits had t

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Effects of pruning severity and growth retardants on the vegetative growth, flower yield and oil content of damask rose (*Rosa damascena* Mill.).

Porwal, R; Nagda, C L; Pundir, J P S

Datepalm Research Centre, Rajasthan Agricultural University, Bikaner - 334 006, Rajasthan, India.

Key words: application rates, chemical composition, chlormequat, crop yield, essential oil plants, essential oils, flowering, flowers, growth, growth retardants, maleic hydrazide, plant composition, plant height, pruning, shoots, yield components

Journal of Applied Horticulture, 2002, volume 4, issue 1, pages 37-40.

Abstract: The effects of pruning height (10, 20 or 30 cm) and growth retardants (cycocel [chlormequat] and maleic hydrazide at 2000, 4000 or 8000 ppm) on the performance of *R. damascena* were studied in Udaipur, Rajasthan, India during 1993/94. The growth retardants were sprayed after sprouting (when 4-5 leaves were fully developed on shoots) and at 15 days thereafter. Plant height, plant spread, and number of shoots per plant decreased with the increase in growth retardant concentration and decrease in pruning height (i.e. increase in pruning intensity). The effect of the interaction between pruning and growth retardant on vegetative parameters was not significant except on plant spread, which was greatest (1.15 m²) with a pruning height of 30 cm and 2000 ppm cycocel. Flower yield per plant and per hectare, and oil content were also significantly affected by pruning and growth retardant. The interaction between pruning and growth retardant was also significant except on oil content. The greatest flower yield per plant

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Evaluation of chilli (*Capsicum* spp.) germplasm for fruit yield and component characters.

Dipendra Gogoi; Gautam, B P

Department of Horticulture, Assam Agricultural University, Jorhat - 785 013, Assam, India.

Key words: branches, crop yield, cultivars, flowering date, flowers, fruit drop, fruiting, fruits, germplasm, inbred lines, leaves, plant height, seed weight, yield components

Journal of Applied Horticulture, 2002, volume 4, issue 1, pages 41-44.

Abstract: Fifty-two chilli (*C. annuum* and *C. frutescens*) genotypes (cultivars and advanced breeding lines) grown in Jorhat, Assam, India were evaluated for fruit yield and component characters from February to October 1999. The genotypes significantly varied for all the parameters evaluated. Plant height was greatest in Asamia Jalakia (71.21 cm). The number of primary branches was highest in Nadharia (7.83) and Kala J. Long (7.83). Balijuri (190.67), Nadharia (202.83) and Kala J. Long (198.50) had the highest number of leaves per plant. Specific leaf weight was highest in Balijuri (6.62 mg/cm²). The number of days to first flowering was lowest in Soalkuchi (51.83). Khoti Jalakia had the highest number of flowers (662.67) and fruits (278.17) per plant, and fruiting percentage (42.00%). Fruit drop incidence was lowest in Singhasan

(0.90%). Jayanti recorded the greatest fruit length (9.71 cm). Fruit diameter was greatest in Tupura Jalakia (1.83 cm), Thupuka Jalakia (1.81 cm) and Bogori Jalakia (1.64 cm). The greatest fres

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Comparative performance of budding methods in pecan nut propagation.

Chandel, J S; Ananda, S A

Department of Pomology, Dr Y S Parmar University of Horticulture and Forestry, Nauni, Solan - 173 230, HP, India.

Key words: budding, buds, growth, pecans, unions

Journal of Applied Horticulture, 2002, volume 4, issue 1, pages 45-46.

Abstract: The effects of budding method (annular, chip, Forkert or patch budding) and date (15th or 30th day of May, June, July or August) on bud take success in pecan cv. Mahan were studied in Nauni, Solan, Himachal Pradesh, India during 1995/96. Bud take success was evaluated at 3 months after budding, whereas linear and radial growth were evaluated during the dormant season (at 1 1/2 years after budding). The highest mean percentage of bud take was obtained with annular budding (47.39%) and 30 June (55.92%), and their interaction (82.54%). Patch budding performed on 30 June (73.78%) and 15 July (70.61%) also resulted in high bud take success. The greatest mean linear and radial growth were obtained with annular (124.6 and 7.88 cm) and patch (121.1 7.74 cm) budding, and budding on 15 May (135.3 and 8.47 cm), 30 May (131.3 and 8.16 cm) and 30 June (131.5 and 8.18 cm). In terms of interaction effect, annular budding on 30 June recorded the greatest linear (145.8 cm) and radial (9.04 cm) growth.

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Developmental pattern and maturity standards for litchi (*Litchi chinensis* Sonn.) cv. Calcuttia.

Mahajan, B V C; Dhillon, B S

Punjab Agricultural University Regional Research Station, Gurdaspur - 143 521, Punjab, India.

Key words: chemical composition, fruit pulp, fruit set, fruiting, fruits, maturity, plant composition, seed weight, seeds, titratable acidity

Journal of Applied Horticulture, 2002, volume 4, issue 1, pages 47-48.

Abstract: Fruit development was studied in 25-year-old litchi (*Litchi chinensis* cv. Calcuttia) trees grown in Gurdaspur, Punjab, India. Observations on the physicochemical characteristics of the fruits were recorded from 20 to 60 days after fruit set (DAFS). Fruit size (length and diameter) increased until harvesting. The greatest fruit length (3.9 cm) and diameter (2.9 cm) were recorded at 55 DAFS. Fruit weight rapidly increased up to 40 DAFS, after which fruit weight gradually increased until harvesting. Pulp and seed weight significantly increased up to 55 DAFS. Pulp weight increased slowly up to 30 DAFS, increased at a faster pace at the second phase, then increased very slowly towards the end of sampling. On the other hand, seed weight increased dramatically at the first phase (35 DAFS), then gradually increased thereafter. The content of total soluble solids (TSS) increased until harvest, with the increase being much faster up to 40 DAFS. TSS ranged from 9.0 to 18.3 degrees Brix. A gradual decline in titratable a

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Performance of nine ber (*Ziziphus mauritiana* Lamk) cultivars on topworking in the semi-arid region of West Bengal.

Ghosh, S N; Mathew, B

Department of Fruits and Orchard Management, Faculty of Horticulture, Bidhan Chandra Krishi Viswavidyalaya, Mohanpur - 741 252, Nadia, West Bengal, India.

Key words: ascorbic acid, budding, chemical composition, crop quality, crop yield, cultivars, fruit pulp, fruits, girth, leaves, plant composition, plant height, ripening, ripening stage, scions, seed weight, sugar content, titratable acidity, topworking, unions, va

Journal of Applied Horticulture, 2002, volume 4, issue 1, pages 49-51.

Abstract: The response of *Z. mauritiana* cultivars Baranasi Karaka, Chuhara, Dandan, Gola, Ilayachi, Jogia, Kaithali, Katha Phal and Umran to topworking was studied. Scion buds collected from Jhargram, West Bengal, India were topworked on 5-year-old trees of *Z. rotundifolia*. At 2 months after budding, budding success was 100% in Baranasi Karaka and Kaithali, and 80% in Dandan, Jogia, Katha Phal and Umran. Gola had the highest number of leaves (116). Scion height (155 cm) and girth (10.0 cm) were greatest in Umran. Jogia recorded the highest fruit yield per plant at 7 months after budding (62.1

kg), as well as the highest number of fruits per plant (1600). Fruit weight was highest in Umran (39.2 g). Fruit length and weight were more pronounced in Baranasi Karaka (5.4 and 3.4 cm), Dandan (5.1 and 3.0 cm), Jogia (4.9 and 3.8 cm) and Umran (4.8 and 3.8 cm). Seed weight was lowest (0.6 g) in Ilayachi and highest (1.9 g) in Jogia. Ilayachi fruits registered the greatest total soluble solids (21.8 degrees Brix), total sugar (

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Effects of antimicrobial compounds on the postharvest life of rose.

Tiwari, A K; Ranvir Singh

Department of Horticulture, G.B. Pant University of Agriculture & Technology, Pantnagar - 263 145, Udham Singh Nagar, Uttaranchal, India.

Key words: 8 hydroxyquinoline, 8 hydroxyquinoline citrate, aluminium sulfate, copper sulfate, cut flower preservatives, cut flowers, postharvest losses, roses, senescence, uptake, vase life, weight losses

Journal of Applied Horticulture, 2002, volume 4, issue 1, pages 52-53.

Abstract: The effects of 8-hydroxyquinoline citrate (HQC), 8-hydroxyquinoline (HQ), CoSO_4 and $\text{Al}_2(\text{SO}_4)_3$ at 200 ppm each, incorporated into the vase solution containing 4% sugar and 200 ppm citric acid, on the vase life of rose cv. Superstar were studied. Weight gain was greatest on the 3rd day in HQC (3.75 g) and CoSO_4 (3.70 g) solutions, and lowest in distilled water (2.00 g). Weight loss at senescence was greatest in flowers kept in distilled water (1.99 g), HQ (1.85 g) and HQC (1.75 g) solutions, and lowest in flowers maintained in $\text{Al}_2(\text{SO}_4)_3$ solution (1.50 g). The antimicrobial agents were equally effective in enhancing flower diameter. The greatest uptake of solution was observed in flowers kept in HQC (24.0 ml) and CoSO_4 (23.0 ml) solutions, whereas the lowest was observed in flowers maintained in distilled water (14.00 ml). Flowers in HQC and CoSO_4 solutions had the longest vase lives (15.20 and 14.56 days, respectively). Flowers kept in distilled water had the shortest vase life (10.00 days). HQ and $\text{Al}_2(\text{SO}_4)_3$ ha

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Effects of grafting method and height on the growth of grafted plants and production of feathers in spur-type apple cultivars at nursery stage.

Rajesh Kumar; Ananda, S A

Department of Pomology, Dr. Y.S. Parmar University of Horticulture and Forestry, Solan (H.P.), India.

Key words: apples, budding, cultivars, grafting, growth, rootstocks, scions, unions, varietal reactions

Journal of Applied Horticulture, 2002, volume 4, issue 1, pages 54-55.

Abstract: The effects of propagation method (tongue grafting, chip budding, shield budding and annular budding) and grafting height (15, 20 or 25 cm from the collar region) on the performance of apple cultivars Wellspur and Redspur as scions and crab apple as rootstock were studied. Tongue grafting and chip budding were conducted in March, whereas shield and annular budding were conducted in summer. Tongue grafting resulted in the greatest linear and radial growth of scion and rootstock. The linear growth of scion was significantly affected by the grafting height in Redspur, while the radial growth of scion and rootstock was significantly affected by grafting height in both cultivars. In Redspur, the linear and radial growth of the scion was greatest with 15 and 25 cm grafting height, respectively. In Wellspur, the linear and radial growth of the scion and rootstock was greatest with a grafting height of 15 cm. The method of propagation significantly affected the number of feathers in both cultivars. The distance betwe

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Performance of gerbera (*Gerbera jamesonii*) cultivars under fan and pad cooled greenhouse environments.

Singh, K P; Mandhar, S C

Indian Institute of Horticultural Research, Bangalore, Karnataka - 560 089, India.

Key words: air temperature, cooling systems, crop quality, cultivars, cut flowers, flowering, flowering date, flowers, greenhouse crops, leaves, ornamental herbaceous plants, ornamental plants, plant height, protected cultivation, relative humidity, stems, suckers,

Journal of Applied Horticulture, 2002, volume 4, issue 1, pages 56-59.

Abstract: The performance of 9 exotic cultivars of gerbera (*G. jamesonii*) (Diablo, Lyonella, Ornella, Sunset, Tara, Thalassa and Tiramisu, Twiggy and Whitsun) was studied under fan and pad cooled greenhouse environments at the Indian Institute of Horticulture Research, Bangalore, Karnataka, India from

July 1998 to June 1999. The greatest plant height (48.83 cm), and number of suckers (5.16) and leaves (46.27) per plant were obtained with Tiramisu, Lyonella and Ornella, respectively, while the lowest values of the aforementioned parameters were recorded for Whitsun (47.88 cm), Sunset (3.82) and Tiramisu (26.74), respectively. Flowering was earliest (47.88 and 57.47 days for 50 and 100% flowering, respectively) in Whitsun and latest (83.10 and 88.30 days) in Tiramisu. The greatest diameter of flower (10.70 cm) and length of flower stalk (58.27 cm) were recorded for Tiramisu and Lyonella, respectively. The thickest (0.70 cm diameter) and heaviest (22.20 g) flower stalks were observed in Twiggy, whereas the thinnest (0.60

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Evaluation of early-ripening grape genotypes under subtropical North Indian conditions.

Ram Kumar; Shailendra Rajan; Negi, S S

Central Institute for Subtropical Horticulture, P.O. Kakori, Rehmankhera, Lucknow - 227 107, India.

Key words: buds, chemical composition, crop quality, crop yield, cultivars, earliness, fruiting, fruits, grapes, harvesting date, plant composition, ripening, ripening stage, sprouting, stability, titratable acidity, varietal reactions, yield components

Journal of Applied Horticulture, 2002, volume 4, issue 1, pages 60-62.

Abstract: The yield and quality of 14 early-ripening grape cultivars, planted during 1995 in Rehmankhera, Lucknow, Uttar Pradesh, India, were evaluated during 1997-2000 to identify the most suitable cultivars for North Indian plains, where pre-monsoon showers is a limiting factor for grape cultivation. The period of bud sprouting and ripening varied with the year and cultivar. Bud sprouting (20 February-5 March) and fruit ripening (16 May-5 June) were earliest in Beauty Seedless. BA x Per-75-32, Gold, Delight and Kishmish Beli exhibited late fruit ripening. Flame Seedless and Pusa Navrang were high-yielding, and the mean annual yield of these cultivars was approximately 20 kg per vine. Both cultivars, which were resilient to damage by heavy rains, exhibited phenotypic yield stability even under unfavourable conditions. Cardinal (5.40-8.61 kg per vine), Kishmish Charani (4.69-12.66 kg per vine), Beauty Seedless (1.13-22.63 kg per vine), Pusa Seedless (5.02-7.13 kg per vine), Gold (1.36-8.88 kg per vine) and New Perlette

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Determination of the cost and profitability of dried fig production: a case study for Turkey.

Yercan, M; Engindeniz, S

Department of Agricultural Economics, Faculty of Agriculture, The University of Ege, 35100 Bornova-Izmir, Turkey.

Key words: crop yield, dried fruit, figs, fruit growing, production costs, production economics, profitability, profits

Journal of Applied Horticulture, 2002, volume 4, issue 1, pages 7-9.

Abstract: The economics of dried fig production in selected villages of Izmir province, Turkey, was analysed based on data from 52 producers. Dried fig yield was calculated at 186 kg per decar (1 decar=1000m²). Production cost was found to be 80.3 million TL/decar, while the net profit was 36.9 million TL/decar.

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Influence of pruning date on fruit quality of guava (*Psidium guajava* L.).

Singh, A K; Gorakh Singh

Central Institute for Subtropical Horticulture, Rehmankhera, P.O. Kakori, Lucknow - 227 107, India.

Key words: ascorbic acid, crop quality, cultivars, fruits, guavas, pruning, titratable acidity

Journal of Applied Horticulture, 2001, volume 3, issue 2, pages 100-102.

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Abstract: The effects of pruning date on the fruit quality of 16-year-old trees of guava cultivars Sardar and Allahabad Safeda were studied in Lucknow, Uttar Pradesh, India. In 1991-93, pruning was conducted on the first week of February, March, April, May, or June. Sardar and Allahabad Safeda recorded the highest fruit weight (266.66 and 201.10 g), fruit length (7.81 and 6.89 cm), and fruit diameter (7.40 and 7.17 cm) when pruning was conducted in May. The highest total soluble solid (TSS) content was observed when Sardar trees were pruned in June (11.73 degrees Brix), and when Allahabad Safeda trees were pruned in May and June (12.16 and 12.43 degrees Brix, respectively). Pruning in May and June gave the highest ascorbic acid content in Sardar (334.54 and 354.79 mg/100 g, respectively) and Allahabad Safeda (237.28 and 258.98 mg/100 g, respectively). In 1994-95, pruning on the 15th and 30th of April, May, or June were evaluated. The highest ascorbic acid content was recorded for Sardar pruned on 30 May (308.64 mg/100

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Effect of nodal position and season on *in vitro* shoot proliferation in aonla (*Emblica officinalis* Gaertn.).

Maneesh Mishra; Pathak, R K

N.D. University of Agriculture and Technology, Kumarganj, Faizabad (UP) - 224

221, India.

Key words: callus, explants, in vitro culture, in vitro regeneration, micropropagation, shoots, tissue culture

Journal of Applied Horticulture, 2001, volume 3, issue 2, pages 103-104.

Abstract: *Emblica officinalis* [*Phyllanthus emblica*] nodal shoots excised from the top or middle portion of the canopy (1st to 10th, 10th to 15th, 15th to 20th, 20th to 25th, or 25th to 30th node) from April to July, August or November, or December to March were cultured in Murashige and Skoog's medium containing 0.8% agar, 3% sucrose, 0.4 mg kinetin/litre, and 0.4 mg gibberellic acid/litre at 25±2 degrees C and 50-55% relative humidity. Nodal shoots excised from the 10th to the 15th node exhibited the greatest bud induction and produced the longest indeterminate shoots (0.83 cm). The shoots excised from the 1st to the 10th node did not survive due to the inability of the shoots to withstand the toxic effect of sterilants and antioxidants. The shoots collected from the 20th to the 30th node showed low bud induction, probably due to tissue maturity. Bud induction and growth of indeterminate shoots were most pronounced in explants collected during August-November. Bud break was not observed in explants collected during

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Effect of Dormex, CPPU and GA3 on berry growth and ripening of Pusa Seedless cultivar of grape.

Bikash Das; Pandey, S N; Jindal, P C; Sureja, A K

Division of Fruits and Horticultural Technology, Indian Agricultural Research Institute, New Delhi, India.

Key words: crop quality, cyanamide, dormancy breaking, earliness, flowering, flowering date, forchlorfenuron, fruits, gibberellic acid, grapes, growth, plant growth regulators, ripening, ripening stage

Journal of Applied Horticulture, 2001, volume 3, issue 2, pages 105-107.

Abstract: The effects of Dormex (40% aqueous hydrogen cyanamide), CPPU [forchlorfenuron], and gibberellic acid (GA3) on the fruit growth and ripening of grape cv. Pusa Seedless were studied in New Delhi, India, in 1998. The treatments consisted of spraying plants with 1.5% Dormex solution immediately after pruning (T1); T1 + dipping of bunches in 0.15% CPPU solution after fruit set (T2); and T2 + dipping of bunches in 45 ppm GA3 at the full bloom stage. Fruits were sampled at weekly intervals from two weeks after

flowering until harvest. Plants treated with Dormex exhibited earlier bud break (by 30 days), flowering (by 12 days), and ripening (by 7 days) than the control. Unlike in the control and Dormex-treated plants, fruit fresh weight in plants under T2 and T3 increased continuously until harvest. Ripening date did not significantly vary between the control plants and plants under T2 and T3; however, fruit growth period was longer in plants under T2 and T3 than in the control. Treated plants had higher fruit fresh w

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Determination of fruit maturity indices in apricot (*Prunus armeniaca* L.) cv. New Castle.

Singh, M P; Dimri, D C; Nautiyal, M C

Department of Horticulture, College of Forestry & Hill Agriculture, G.B. Pant University of Agriculture & Technology, Hill Campus, Ranichauri - 249 199, Distt. Tehri Garhwal, Uttaranchal, India.

Key words: apricots, ascorbic acid, chemical composition, crop quality, firmness, fruits, malic acid, maturity stage, nonreducing sugars, plant composition, specific gravity, starch, sugar content, titratable acidity

Journal of Applied Horticulture, 2001, volume 3, issue 2, pages 108-110.

Abstract: The fruit quality of apricot cv. New Castle at 45, 50, 55, 60, 65, 68, , and 73 days after full bloom (DAFB) was studied in Ranichauri, Uttaranchal, India, from February to June 1999. Fruit length and weight significantly increased whereas chlorophyll content substantially decreased up to 60 DAFB, then remained stable until the harvesting period (73 DAFB). Fruit weight, volume, and specific gravity; pulp weight; and total soluble solid, total sugar, and nonreducing sugar contents increased until harvest. The opposite trend was recorded for stone weight, firmness, titratable acidity (in terms of malic acid content), and starch and ascorbic acid contents. Fruits most appropriate for transport were harvested at 71 DAFB, whereas those intended for local consumption were harvested at 73 DAFB.

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Effect of harvesting date, storage environment and postharvest treatment on shelf life of litchi (*Litchi chinensis* Sonn.) fruits.

Nigam, J K; Ganesh Kumar

Department of Horticulture, G.B.P.U.A.&T., Pantnagar - 263 145, Uttarakhand, India.

Key words: chemical composition, cold storage, crop quality, fruits, gibberellic acid, harvesting date, plant composition, plant growth regulators, postharvest decay, postharvest treatment, storage, storage decay, storage life, storage losses, titratable acidity, wa

Journal of Applied Horticulture, 2001, volume 3, issue 2, pages 111-112.

Abstract: *L. chinensis* (cv. Rose Scented) fruits harvested from 16-year-old trees grown in Pantnagar, Uttar Pradesh, India, on 3 and 6 June [year not given] were subjected to various postharvest treatments (dipping of fruits in 200 ppm gibberellic acid or in 16.6, 20.0, and 25.0% wax emulsion for 2 minutes) and stored under ambient (21.8-29.0 degrees C and 41.0-98.0% relative humidity) or cold (5 degrees C and 85% relative humidity) storage conditions for 8 days. Physiological weight loss (PLW) and spoilage increased, whereas titratable acidity decreased with the increase in storage duration. Total soluble solid content increased up to 5 days of storage, then decreased thereafter. Fruits harvested on 3 and 6 June had lower PLW when treated with 25% wax emulsion (3.94 and 4.76%, respectively) and stored under cold conditions (4.32 and 4.43%, respectively). Fruits harvested on 3 June exhibited lower spoilage incidence when stored under ambient temperature (25.64%) than under cold conditions (26.33%). For fruits harvested

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Standardization of kiwifruit (*Actinidia chinensis* var. *delicosa*) propagation through hardwood cuttings.

Kishore, D K; Pramanick, K K; Sharma, Y P

IARI Regional Station (Horticulture), Amartara Cottage, Cart Road, Shimla - 171 004 (H.P.), India.

Key words: application rates, cultivars, growing media, hardwood cuttings, IBA, kiwifruits, plant growth regulators, rooting, roots, sand, sawdust, shoots, varietal reactions, vegetative propagation

Journal of Applied Horticulture, 2001, volume 3, issue 2, pages 113-114.

Abstract: Hardwood cuttings (20-30 cm long) from kiwifruit (*Actinidia chinensis* var. *delicosa* [*A. deliciosa*]) cultivars Hayward, Monty, Toumuri, Abbot, Bruno, and Allison were immersed in IBA at 0, 2500, 3000, 3500, and 4000 ppm for 15 seconds and transferred to rooting beds containing either

sand or sawdust. Significant variations were recorded among IBA treatments and cultivars, and between rooting media. Among the cultivars, Abbot recorded the highest rooting percentage (59.38%). Among the IBA rates, 3000 ppm resulted in the highest rooting percentage with both sand (59.55%) and sawdust (77.53%) rooting media. Higher rooting percentage was obtained with sawdust (45.64%) than with sand (37.09%) as the rooting medium. Cuttings rooted on sand exhibited greater number of fibrous (19.75) and secondary (18.48) roots, as well as new shoot growth (12.47 cm), than the cuttings rooted on sawdust (4.27, 3.20, and 4.73 cm, respectively). The results indicate that sawdust is more suitable for root initiation, whereas sand is mo

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Influence of rate and method of phosphorus placement to garlic (*Allium sativum* L.) in a Mediterranean environment.

Turk, M A; Tawaha, A M

Department of Plant Production, Faculty of Agriculture, Jordan University of Science and Technology (JUST), P.O. Box 3030, Irbid, Jordan.

Key words: application methods, application rates, band placement, broadcasting, bulbs, crop quality, crop yield, garlic, phosphorus fertilizers, plant height, superphosphates, yield components

Journal of Applied Horticulture, 2001, volume 3, issue 2, pages 115-116.

Abstract: The effects of P rate (0, 25, 50, and 75 kg/ha as superphosphates) and application method (band and broadcast) on the yield and quality of garlic were studied in Jordan during 1999/2000 and 2000/2001. P at 75 kg/ha resulted in the greatest plant height at 120 days after planting (66.0 cm), bulb length (3.45 cm), bulb diameter (3.55 cm), clove breadth (3.30 cm), clove length (3.55 cm), number of cloves per bulb (13.5), and dry weight (740.5 g/m²). Plants treated with 0 and 25 kg P/ha exhibited P deficiency symptoms such as dwarfing and purpling of leaves. Broadcasting gave greater plant height (61.3 cm), bulb length (3.42 cm), bulb diameter (3.35 cm), clove breadth (3.15 cm), number of cloves per bulb (13.25), and dry weight (661.3 g/m²) than band placement.

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Screening of tomato germplasm for some physiological disorders.

Srinivas, T R

National Bureau of Plant Genetic Resources, Regional Station, Hyderabad - 500 030, India.

Key words: fruit cracking, fruit puffing, germplasm, plant disorders, tomatoes
Journal of Applied Horticulture, 2001, volume 3, issue 2, pages 117-118.

Abstract: Some 180 tomato accessions grown in Rajendranagar, Hyderabad, Andhra Pradesh, India, during 1997/98 were evaluated for various fruit physiological disorders. Approximately 34.4 and 25.56% of the accessions exhibited radial (cracks across the stem scar) and concentric (cracks around the stem scar) cracks, respectively. Both radial and concentric cracks were recorded for 13.33% of the accessions. Approximately 3.33% of the accessions had green back (presence of green parts in mature and ripening fruits), whereas 6.66% of the accessions showed fruit fasciation (adherence of two fruits to each other). Puffiness (partially filled fruits) was observed only in EC 163594 (0.56%).

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Evaluation of spent biogas silage as casing soil in mushroom cultivation.

Gupta, V P; Vishnu Kumar

Department of Botany, C.C.S. University, Meerut - 250 004, India.

Key words: biogas, composts, crop yield, diammonium phosphate, edible fungi, farmyard manure, mushrooms, silage, superphosphate

Journal of Applied Horticulture, 2001, volume 3, issue 2, pages 119-121.

Abstract: The effects of casing soil composition on mushroom productivity were studied. The casing soil consisted of: 50% garden loam soil + two-year-old farmyard manure or FYM (control, set 1); spent biogas plant silage + 0.5% diammonium phosphate (DAP) + 0.5% superphosphate (set 2); 50% spent biogas plant silage + 50% FYM (set 3); 50% spent biogas plant silage + 25% FYM + 25% two-year-old spent compost + 1% DAP + 1% superphosphate (set 4); 50% spent biogas plant silage + 50% spent compost + 0.5% DAP + 0.5% superphosphate (set 5); and 50% spent biogas plant silage + 25% FYM + 25% garden loam soil (set 6). Bags containing the casing soil and a straw-based compost with 1.5-inch thick spawn layer were transferred to growth chambers at 24±1 degrees C. The mycelium impregnated the casing soil in 8-10 days. When the casing soil was fully impregnated with mycelia, the temperature of

the chamber was lowered to 18+or- degrees C. The mushrooms were harvested after 11-12 days. Except for set 2, which recorded 21% lower crop yi

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Effect of paclobutrazol and ethephon on growth and productivity of cape gooseberry (*Physalis peruviana* L.).

Yadava, L P

Allahabad Agricultural Institute, Allahabad, U.P. - 211 007, India.

Key words: crop yield, ethephon, fruit set, fruits, growth, growth retardants, leaf area, leaves, paclobutrazol, plant height

Journal of Applied Horticulture, 2001, volume 3, issue 2, pages 122-124.

Abstract: The effects of paclobutrazol (12.5, 25.0, 50.0, and 100.0 ppm) and ethephon (100, 200, 400, and 800 ppm) on the growth and yield of *P. peruviana* were studied in Allahabad, Uttar Pradesh, India. The growth retardants were sprayed to seedlings at 21 days after transplanting. Paclobutrazol at 50 ppm and ethephon at 400 ppm increased plant height, number of leaves, number of branches, fruit set, fruit size, fruit weight, number of fruits per plant, and yield per hectare, but reduced leaf area. Both chemicals at higher rates reduced yield and plant height.

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Use of photoselective plastic films to control growth of three perennial salvias.

Wilson, S B; Rajapakse, N C

Indian River Research and Education Center, Institute of Food and Agricultural Sciences, University of Florida, 2199 South Rock Road, Fort Pierce, FL 34945, USA.

Key words: far red light, flowers, growth, internodes, leaf area, leaves, light relations, plant height, plastic film, red light, solar radiation, stems

Journal of Applied Horticulture, 2001, volume 3, issue 2, pages 71-74.

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Abstract: Plant response to a photosensitive plastic film with a red (R)- or far-red- (FR)-absorbing property was tested using the three perennial salvias: Indigo Spires sage (*Salvia longispicata* x *Salvia farinacea*), wine sage (*Salvia splendens* 'Van Houttei'), and Mexican sage (*Salvia leucantha*). Films were designated AFR (FR-light-absorbing film), AR (R-light-absorbing film), and control (clear plastic film). Solar light transmitted through the AFR film reduced plant height by 17-36%, depending on the species. This correlated with a reduction in internode length and stem dry weight. Light transmitted through the AR film did not significantly affect plant height, regardless of species. Leaf area was not significantly affected by the AFR or AR film compared to the control film, regardless of species. Leaf dry weight under AFR was reduced in Indigo Spires sage and Mexican sage, but not in wine sage. Flower development (days to flower and flower number) was not significantly affected by the AFR or AR film compared to the

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Irrigation scheduling of onion in Tekirdag province of Turkey.

Orta, A H; Ener, M

Department of Farm Structure and Irrigation, Faculty of Tekirdag Agriculture, University of Trakya, 59030 Tekirdag, Turkey.

Key words: bulbs, crop yield, evapotranspiration, irrigation, irrigation scheduling, onions, plant water relations, yield components

Journal of Applied Horticulture, 2001, volume 3, issue 2, pages 75-77.

Abstract: The response of onion (*Allium cepa*) to different irrigation schedules was studied in Trakya, Turkey, during 1997 and 1998. Onion crop was subjected to four irrigation treatments according to available soil water depletion fractions (0.30, 0.50, 0.70, and no irrigation). Irrigation thresholds (amount of soil water at 0.40 m depth) were used as criteria to initiate drip irrigations. For each differential water treatment, the parameters of bulb morphology (diameter and height), solids soluble in bulbs, bulb weight, and total yield were analysed. Yield and yield components except solids soluble in bulbs were affected by irrigation and soil water depletion fractions. The highest yield was obtained from the plots to which irrigation water was applied at a soil water fraction level of 0.30. The maintenance of soil moisture depletion level at 0.30 required 339.4 mm (in 14 applications) and 227.2 mm (in 13 applications) of irrigation water in 1997 and 1998, respectively. The seasonal evapotranspiration of onion was 42

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Leaf and soil nutrient status of mango (*Mangifera indica* L.) grown in peninsular India and their relationship with yield.

Reddy, Y T N; Kurian, R M; Sujatha, N T; Srinivas, M

Indian Institute of Horticultural Research, Hessaraghatta, Bangalore - 560 089, India.

Key words: chemical composition, correlated traits, crop growth stage, crop yield, cultivars, leaves, mangoes, mineral content, nitrogen, nitrogen content, nutrient availability, nutrient content, phosphorus, plant composition, plant nutrition, potassium

Journal of Applied Horticulture, 2001, volume 3, issue 2, pages 78-81.

Abstract: Twenty-five mango orchards in Nuzvid (Andhra Pradesh), Srinivaspur (Karnataka), and Krishnagiri (Tamil Nadu), India, were evaluated for leaf and soil nutrient status from 1994 to 1997. Banganapally was grown in 5 orchards, Alphonso in 5 orchards, and Totapuri in 15 orchards. The trees in Karnataka and Andhra Pradesh were 30- to 40-year-old, whereas those in Tamil Nadu were 20-year-old. The high-yielding trees had higher leaf N content than the low-yielding trees. The orchards in Andhra Pradesh had the highest leaf and soil nutrient (N, P, and K) levels. The available soil N significantly varied between high-yielding and low-yielding trees only before the flowering stage. The available soil P and K did not significantly vary with the growth stage. The high-yielding orchards recorded higher soil N and P, and lower soil K than the low-yielding orchards. Fruit yield was positively correlated with leaf N before and during flowering, with leaf P after harvest, and with leaf K before flowering. Fruit yield was posi

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Micropropagation studies in "single" vs. "double" types of tuberose (*Polianthes tuberosa* L.).

Krishnamurthy, K B; Mythili, J B; Meenakshi Srinivas

Division of Horticulture, University of Agricultural Sciences, Bangalore - 560 065, India.

Key words: benzyladenine, carbendazim, chlorothalonil, cultivars, disinfectants, explants, IAA, in vitro culture, in vitro regeneration,

micropropagation, ornamental plants, plant growth regulators, rooting, roots, shoots, tissue culture, tissue cultures, varietal r

Journal of Applied Horticulture, 2001, volume 3, issue 2, pages 82-84.

Abstract: Terminal or axillary stem scale sections from *P. tuberosa* cultivars Shringar (single type) and Suvasini (double type) were disinfected with 1000 ppm Bavistin [carbendazim], 1000 ppm Kavach [chlorothalonil], and 500 ppm Cetrimide, singly or in combination, before sterilization with 0.1% HgCl₂ for 10-15 minutes. The explants were cultured in Murashige and Skoog's (MS) medium containing 3% sucrose and 0.25% phytigel, and autoclaved at 121 degrees C for 15 minutes. The shoot tips from sprouted explants were transferred into a medium containing 2 or 4 mg BAP [benzyladenine]/litre singly or in combination with 0.1 mg IAA/litre. The regenerated shoots were transferred into 1/2 MS medium containing 0.5 or 1.0 mg IBA, 0.5 mg IAA, or 0.25 mg IAA + 0.25 mg IBA/litre. Treatment with Bavistin + Kavach + Cetrimide overnight followed by treatment with HgCl₂ for 15 minutes resulted in the highest percentage of axenic cultures using axillary (23.3-26.6%) and terminal (30.0%) scale sections. Cytokinin induced multiple shoot fo

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Response of mentha (*Mentha spicata* L.) cultivars to low iron nutrition.

Preety Singh; Misra, A; Srivastava, N K; Sharma, S

Central Institute of Medicinal and Aromatic Plants, PO: CIMAP, Lucknow - 226 015, India.

Key words: application rates, branches, chlorophyll, correlated traits, cultivars, dry matter, growth, iron, nutrient deficiencies, plant height, plant nutrition, plant oils, varietal reactions

Journal of Applied Horticulture, 2001, volume 3, issue 2, pages 85-87.

Abstract: Suckers from *M. spicata* cultivars MSS 5, Arka, and Neera were grown in Hoagland's solution supplemented with 0.00, 0.056, 2.80, and 5.60 mg Fe/litre. Plants grown at 0.00 and 0.056 mg Fe/litre did not survive after 10 days of treatment. Fe deficiency symptoms, such as chlorosis and necrosis particularly in young leaves, were more pronounced in Arka and Neera than in MSS 5. The latter cultivar also recorded the greatest plant height, number of branches, dry weight, fresh weight, chlorophyll content, oil content, and carvone content under Fe deficiency. These parameters decreased with the reduction in Fe supply. The positive correlation between fresh weight and dry

matter, dry matter yield and oil content, and oil percentage and carvone content was observed in all cultivars. Fresh herb yield and dry matter was positively correlated with oil percentage and carvone content in MSS 5 only.

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Effect of paclobutrazol on source-sink relationship in mango (*Mangifera indica* L.).

Kurian, R M; Reddy, Y T N; Sonkar, R K; Reddy, V V P

Division of Fruit Crops, Indian Institute of Horticultural Research, Hesaraghatta Lake Post, Bangalore - 560 089, India.

Key words: cultivars, fruits, leaf area, leaves, mangoes, paclobutrazol, photosynthates, plant growth regulators, ringing, source sink relations, translocation

Journal of Applied Horticulture, 2001, volume 3, issue 2, pages 88-90.

Abstract: The effects of paclobutrazol on the fruit-leaf ratio of twelve-year-old trees of mango cultivars Alphonso and Dashehari were studied in Bangalore, Karnataka, India. The soil was drenched with paclobutrazol at 0.0, 2.5, or 7.5 g a.i. per tree. In each paclobutrazol-treated tree, photosynthate and metabolite translocation to 30 leaves with a single fruit was inhibited by girdling the branch (1 cm wide ring of bark) at a uniform distance from the fruit. Girdling was conducted when Dashehari fruits were 4.9+or-0.7 cm long and weighed 27.9+or-8.5 g, and when Alphonso fruits were 4.0+or-1.0 cm long and weighed 32.9+or-7.5 g. Twenty-eight fruits on ungirdled shoots of trees not treated with paclobutrazol served as the control. In the two cultivars, thirty leaves were not sufficient to promote the growth of a single fruit, especially when the tree was not treated with paclobutrazol. In untreated trees, the weight of fruits from girdled trees of Alphonso and Dashehari was only 60.2 and 64.9%, respectively, of the cont

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Changes in the activity of nitrogen utilizing enzymes during development of malformed and normal panicles of mango (*Mangifera indica* L.).

Singh, V K; Saini, J P; Misra, A K

Central Institute for Subtropical Horticulture, Rehmankhera, PO. Kakori, Lucknow - 227 107, India.

Key words: chemical composition, crop growth stage, cultivars, enzyme activity, enzymes, glutamate dehydrogenase, glutamate synthase, glutamate ammonia ligase, mangoes, nitrate, nitrate reductase, nitrogen content, panicles, plant composition, plant disorders, prote

Journal of Applied Horticulture, 2001, volume 3, issue 2, pages 91-94.

Abstract: The activity of nitrogen-utilizing enzymes, i.e. nitrate reductase (NR), glutamine synthetase [glutamate-ammonia ligase] (GS), glutamate synthase (GOGAT), and glutamate dehydrogenase (GDH), during the development of healthy and malformed panicles of mango cultivars Amrapali and Dashehari was studied in Lucknow, Uttar Pradesh, India, during 1995-97. Healthy and malformed panicles were evaluated at stages I (fully developed apical bud), II (flower bud at inception), III (fully grown panicles prior to full bloom), and IV (fully developed panicle at the full bloom stage). NR activity was significantly reduced in normal panicles from stage I to IV in both cultivars. Non-significant changes were observed in the malformed panicles of Amrapali. In general, the activity of GS and GOGAT followed the same trend. Contrary to the activity of NR, GS, and GOGAT, a sharp increase in GDH activity was observed in malformed panicles at the early stage of panicle development. GDH activity, which was highest at stage II in both c

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Variation in canopy characteristics of mango (*Mangifera indica* L.) cultivars from diverse eco-geographical regions.

Shailendra Rajan; Ram Kumar; Negi, S S

Central Institute for Subtropical Horticulture, Rehmankhera, P.O. Kakori, Lucknow - 227 107, India.

Key words: canopy, colour, crop quality, foliage, foliage area, fruits, genetic variation, leaf area index, mangoes

Journal of Applied Horticulture, 2001, volume 3, issue 2, pages 95-97.

[Full text PDF |](#)

Abstract: A study was conducted Lucknow, Uttar Pradesh, India, to study foliage density and canopy diffuse non-interceptance in 26 Indian mango cultivars. The indirect measurement of leaf area index (LAI) and diffuse non-interceptance (DNI) was conducted using output of concentric silicon detectors

placed at five zenith angles on the sensing head of LAI-2000, which recorded significant variability in foliage density (LAI=1.18-4.48). DNI values also exhibited large variation, which ranged from 0.02 to 0.36. UPGMA cluster analysis of the data revealed that Bangalora, Fazri, Neelum, Vanraj, Dashehari, Alphonso, Lucknow Safeda, and Banganapalli had similarity in tree leaf component. Nisar Pasand, Kishan Bhog, and Bombay Green had compact and dense canopy with more foliage component. Papatio and Fernandin exhibited comparatively less foliage under Lucknow conditions. Prabhashankar and Chausa showed similarity and were closer to compact canopy group. In general, east and north Indian cultivars recorded more foliage component

Volume 3(2), 2001

Effect of plant density on growth, flowering and yield of *Stalice (Limonium sinuatum)*.

Deshpande, G M; Sonawane, P C; Manjul Dutt

College of Agriculture, Pune, India.

Key words: crop density, crop quality, crop yield, cut flowers, earliness, flowering, flowering date, growth, plant height

Journal of Applied Horticulture, 2001, volume 3, issue 2, pages 98-99.

Abstract: The effects of spacing between plants (15, 30, and 45 cm) and rows (30, 45, and 60 cm) on 30-day-old *L. sinuatum* seedlings were studied in Pune, Maharashtra, India. At 60 and 90 days after sowing, plant height increased, whereas plant spread decreased as the spacing between plants and rows decreased. A spacing of 45 between plants and 60 cm between rows resulted in the earliest flowering (47.43 days) and highest yield in terms of the weight of flower stalks per plant (871.36 g). Flower stalk length (82.55) and flower weight per hectare (47.27 t/ha) were highest when the spacing between plants and rows was maintained at 15 and 30 cm, respectively. In general, a plant spacing of 45 cm with a row spacing of 60 cm resulted in superior growth and flower quality, but inferior yields. On the other hand, a plant spacing of 15 cm and a row spacing of 45 cm resulted in high yields but inferior flower quality. Satisfactory flower yield and quality was obtained with a plant spacing of 30 cm and a row spacing of 45 cm.

Volume 3(1), 2001

Interactions among rooting substrate, phenological stage of cuttings and auxin concentration on the rooting of *Cotinus*

obovatus.

Denny, G C; Arnold, M A

Department of Horticultural Sciences, Texas A&M University, Mail Stop 2133, College Station, TX 77843-2133, USA.

Key words: application rates, auxins, hardwood cuttings, IBA, ornamental plants, ornamental woody plants, peat, perlite, phenology, plant growth regulators, rooting, semihardwood cuttings, softwood cuttings, substrates, woody plants

Journal of Applied Horticulture, 2001, volume 3, issue 1, pages 13-16.

Abstract: A study was conducted to determine the effects of substrate, phenological stage of cutting, and auxin concentration on the rooting of the ornamental Texas smoke tree (*C. obovatus*). Cuttings from new lush growing tips (softwood), partially matured tissues (semi-mature wood) and mature woody fully lignified cuttings from the previous season's growth (mature wood) were treated with either 0, 5000, 10 000 or 15 000 mg potassium salt of indole-butyric acid (K-IBA)/litre and placed in either 50% peat:50% perlite or 100% perlite rooting substrates. Cuttings were placed under an intermittent mist system in a greenhouse for 8 weeks. Softwood cuttings rooted in both substrates, but the 50% peat:50% perlite substrate produced better quality rooted cuttings. Softwood cuttings peaked at 8000 to 10 000 mg K-IBA/litre. Semi-mature wood and previous season's growth cuttings rooted only in the 100% perlite substrate. In 100% perlite substrate, the optimum concentration for semi-mature wood cuttings was ~12 000 mg K-IBA/litre,

Volume 3(1), 2001



Plant regeneration from zygotic embryo hypocotyls of Tunisian chili (*Capsicum annuum* L.).

Arous, S; Boussaid, M; Marrakchi, M

Faculte des Sciences de Tunis, Campus Universitaire, Tunis, Tunisia.

Key words: adventitious shoots, benzyladenine, buds, chillies, crop quality, culture media, flowers, fruits, gibberellic acid, hypocotyls, in vitro culture, in vitro regeneration, leaves, NAA, plant development, plant embryos, plant growth regulators, progeny, seeds

Journal of Applied Horticulture, 2001, volume 3, issue 1, pages 17-22.

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Abstract: This paper reports the regeneration of Tunisian pepper cultivar from zygotic embryos cultured *in vitro*. Zygotic embryos of the Tunisian cultivar D'hirat cultured *in vitro* developed adventitious buds. The best results for bud induction were obtained in the Murashige and Skoog medium, supplemented with 5 mg benzylaminopurine (BA)/litre and 1 mg NAA/litre. The important effect of BA in adventitious bud formation was demonstrated. Shoot bud development was enhanced by the addition of gibberellic acid to the medium. Plants were rooted in half-strength Murashige and Skoog medium and transferred into pots, containing loam. To test the stability of the regenerants, characters related to the fertility, fruit quality, leaf and flower were measured. Regenerants and their progeny were compared to the control plants derived from seeds. Variance analysis and CANDISC were used. No significant differences were detected between the regenerants and the control plants for the characters tested.

Volume 3(1), 2001



Effect of low-tunnel, mulch and pruning on the yield and earliness of tomato in unheated glasshouse.

Arin, L; Ankara, S

T. U. Agricultural Faculty, Department of Horticulture, 59030 Tekirdag, Turkey.

Key words: crop yield, earliness, fruits, harvesting date, mulches, mulching, plant height, polyethylene film, protected cultivation, pruning, stems, straw mulches, tomatoes, tunnels

Journal of Applied Horticulture, 2001, volume 3, issue 1, pages 23-27.

[Full text PDF](#) |

Abstract: A study was conducted to determine the effect of low-tunnel, mulching (black and transparent polyethylene or straw) and pruning treatments on yield and earliness of tomato cv. Fuji F1 in unheated glasshouse. A 643.72% increase in height (relative to height at the planting time) was observed in plants grown under low-tunnel (tunnelled) than those grown without tunnel (602.87%). Among the mulches, plant height increase was highest with the straw mulch (679.13%). Stem diameter increase was higher

in plants tunnelled (265.36%) than plants grown without tunnel (233.83%). Straw and transparent polyethylene mulches recorded higher stem diameter than other mulches. The number of days to first harvest was 117.97 for plants tunnelled and that for plants grown without tunnel was 119.88. The shortest time to harvest was recorded in transparent polyethylene (117.90 days), which was at par with black polyethylene (118.17 days). Early fruit yield was higher in tunnelled and mulched treatments than in other treatments. The c

Volume 3(1), 2001

Environmental conditions and gerbera production under different types of greenhouses.

Mandhar, S C; Singh, K P; Kumari, C R

Indian Institute of Horticultural Research, Hesaraghatta Lake, Karnataka, Bangalore - 560 089, India.

Key words: artificial ventilation, crop production, crop quality, crop yield, flowers, greenhouses, natural ventilation, relative humidity, seasonal variation, temperature

Journal of Applied Horticulture, 2001, volume 3, issue 1, pages 28-31.

Abstract: The naturally ventilated greenhouse (NVGH) and fan- and pad-cooled greenhouse (FPGH) were designed and constructed for conditions in Bangalore, Karnataka, India. Gerbera crop was cultivated in both greenhouses and temperature and relative humidity (RH) were recorded at 10.00, 13.00 and 16.00 h. The temperature in NVGH could be brought down very near to ambient temperature during hot and dry months by proper irrigation. The maximum temperature during the year in NVGH was 36.6 degrees C when the ambient temperature was 35.4 degrees C and RH 28.4% at 13.00 h in April. The maximum build up of temperature of 2.5 degrees C was recorded during rainy and cloudy days when the ambient temperature was low and RH was high. The average build up of humidity on a yearly basis in NVGH was 1.5% above the ambient RH. The drop in temperature up to 8.2 degrees C was observed in FPGH in April when the ambient temperature was very high (35.4 degrees C) and ambient RH was very low (28.4%). The maximum temperature of 30.1 degrees C

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The impact of carbenicillin, cefotaxime and vancomycin on chrysanthemum and tobacco TCL morphogenesis and *Agrobacterium* growth.

Silva, J A T da; Fukai, S

Faculty of Agriculture, Kagawa University, Miki-cho, Kagawa, 761-0795, Japan.

Key words: cefotaxime, culture media, genetic transformation, growth, light, morphogenesis, phytotoxicity, tobacco, transgenic plants, vancomycin

Journal of Applied Horticulture, 2001, volume 3, issue 1, pages 3-12.

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Abstract: *Agrobacterium*-mediated plant genetic transformation requires a two-step process for its success: selection and regeneration of transformed tissues, and the elimination of the transformation vector, *Agrobacterium*. This study uses carbenicillin (CA), cefotaxime (CF) and vancomycin (VA) singly, or in combination, to eliminate *Agrobacterium tumefaciens* LBA4404 and AGLO growing on *Agrobacterium*-favouring (LB) and plant-favouring (MS) media, at transgenic plant selection levels (10 or 25 micro g/ml kanamycin for chrysanthemum and tobacco, respectively). The three antibiotics differed in their capacities to eliminate *Agrobacterium* i.e., bacterial threshold survival levels (TSLs), depending on the strain, medium and light conditions. Plant TSLs differed from those for *Agrobacterium*, and were cultivar-, species- and light-dependent, with CA > VA > CF in terms of phytotoxicity. Since over 90% of plant transformation experiments use *Agrobacterium* as the transformation vector, with most of these containing an aminoglycos

Volume 3(1), 2001

Heterosis studies in bottlegourd [*Lagenaria siceraria* (Mol.) Standl.].

Samadia, D K; Khandelwal, R C

NRC for Arid Horticulture, Bikaner, India.

Key words: crop yield, cultivars, genetic variation, heterosis, hybrids, yield components

Journal of Applied Horticulture, 2001, volume 3, issue 1, pages 32-36.

Abstract: Heterosis studies on 9 bottlegourd (*Lagenaria siceraria*) cultivars (Banswara Local-1 (BL-1), Long White Prolific, Pusa Naveen, Raichur Local-1, Udaipur Local-1, IC 92352A, IC 92374, IC 42361 and PSPL), including their 36

F1 hybrids and cv. Varad as the control cultivar, were carried out under 4 environments created by sowing on two dates and at two locations in a field experiment conducted in Rajasthan, India. The analysis of variance indicated the presence of significant genetic variability among the experimental materials. The hybrids BL-1 x IC 92374, BL-1 x Pusa Naveen, and IC 92374 x PSPL were superior and exhibited significant economic heterosis for fruit yield per plant and yield components such as number of fruits and female flowers per plant. Most of the heterotic crosses were also heterobeltiotic.

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Influence of pruning date on fruit yield of guava (*Psidium guajava* L.) under subtropics.

Gorakh Singh; Singh, A K; Shailendra Rajan

Central Institute for Subtropical Horticulture, Rehmankhera, P. O. Kakori, Lucknow - 227 107, India.

Key words: application date, crop yield, cultivars, flowering, fruits, growth, guavas, photosynthesis, pruning, shoots

Journal of Applied Horticulture, 2001, volume 3, issue 1, pages 37-40.

Abstract: A trial was conducted in Uttar Pradesh, India, to determine the effect of pruning dates on guava fruit yield. During 1991-93, fifteen trees, each of cultivars Sardar and Allahabad Safeda were pruned in the first week of February, March, April, May and June. During 1994-95, nine trees each of Allahabad Safeda and Sardar were pruned on 15 and 30 April, May and June. Six trees, each of Allahabad Safeda and Sardar were pruned on 15 and 30 May and June during 1995-96. Six trees each of Allahabad Safeda and Sardar were pruned during 1996-98. Compared to pruning in February and March, pruning from April through June, enhanced the number of shoots and flowering percentage. Shoot growth was reduced in May- and June-pruned trees. The total yield during winter increased significantly ($P < 0.05$) in May- and June-pruned trees than the unpruned trees of both cultivars. May pruning significantly increased the harvest in the winter season. Pruning from February to March did not respond well for winter fruiting. Penet

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Evaluation of *Psidium guajava* accessions and some other *Psidium* species for fruit characters.

Dinesh, M R; Reddy, B M C

Division of Fruit Crops, Indian Institute of Horticultural Research, Bangalore - 560 089, India.

Key words: colour, crop quality, cultivars, epidermis, fruits, guavas, hybridization, seeds, titratable acidity

Journal of Applied Horticulture, 2001, volume 3, issue 1, pages 41-43.

Abstract: Thirty-seven accessions of *P. guajava* and 6 *Psidium* species (*P. chinensis*, *P. quadrangularis*, *P. molle*, *P. cattleianum*, *P. guineense* and *P. friedrichsthalianum*) were studied for fruit weight, volume, length, breadth, total soluble solids (TSS), titratable acidity, skin colour and pulp colour. Cultivar Kamsari had the highest fruit weight. The TSS was highest in the cultivar Bangalore Local (12.70 degrees Brix), however, this cultivar has hard seeds. In most of the cultivars, the skin colour was yellow and cultivars such as Apple Colour and Chittidar had red spots on the skin. The cultivars Beaumont, EC- 147039, 147037, 162904, 147036, 147034, G-6, Kamsari, Pati, Portugal, Red Flesh had pink to red flesh colour. *P. quadrangularis* and *P. guinees* produced large fruits. The TSS was highest in *P. friedrichsthalianum*. The hybridization programme carried out has resulted in the isolation of one superior red-fleshed cultivar H-21.

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Ripening pattern of commercial jujube (*Ziziphus mauritiana* Lamk.) cultivars in Indian arid ecosystem.

Vishal Nath; Bhargava, R

National Research Centre for Arid Horticulture, Bikaner - 334 006 (Rajasthan), India.

Key words: climate, cultivars, ecosystems, geography, relative humidity, ripening, temperature, varietal reactions

Journal of Applied Horticulture, 2001, volume 3, issue 1, pages 44-47.

Abstract: The variations in the ripening time of jujube (*Z. mauritiana*) cultivars Gola, Kaithali, Banarsi Kadaka, Umran, Mundia and Seb under the arid regions of Anantapur, Andhra Pradesh; Sardarkrushinagar, Gujarat; Jobner, Jodhpur and Bikaner, Rajasthan; and Hisar, Haryana, India were determined. Meteorological data, including the minimum and maximum temperature, and morning and evening relative humidity were recorded during 1986-90 in all locations except for Bikaner for which meteorological data were recorded

during 1994-98. Irrespective of cultivars, the peak ripening of jujube was between the last week of November and the first week of January in the southern region of India and between the 10th of January and 30th of March in the northern regions of India. The prevailing maximum (23.3-34.4 degrees C) and minimum (6.2-19.1 degrees C) temperatures, the temperature difference of 11.9-18.3 degrees C and the morning relative humidity of 49.6-87.7% that lasts for at least a month induced the peak ripening in jujube. T

Volume 3(1), 2001

Effect of spacing and nitrogen on flowering, flower quality and post harvest life of gladiolus.

Bijimol, G; Singh, A K

Department of Horticulture, Nagaland University, Medziphema - 797 106, Nagaland, India.

Key words: application rates, corms, crop quality, flowering, flowers, nitrogen fertilizers, row spacing, spikes, vase life, water uptake, yield components

Journal of Applied Horticulture, 2001, volume 3, issue 1, pages 48-50.

Abstract: An experiment was conducted to assess the effect of spacing and nitrogen levels on flowering, flower quality and vase life of gladiolus cv. Red Beauty. Four spacings (15x30, 20x30, 25x30 and 30x30 cm) and four nitrogen rates (0, 100, 200 and 00 kg/ha) were taken. Corms planted at 25x30 cm and 200 kg N/ha significantly increased the diameter of spike, number of florets per spike, number of spikes per plant and number of spikes per ha and early emergence of spike under field conditions (Nagaland, India). Application of 200 kg N/ha also resulted in maximum length of spike and diameter of floret. However, early opening of flower was recorded with lower N rate (100 kg/ha), while length of floret with 300 kg N/ha. Spacing and N levels had significant effect on postharvest life of cut gladioli. Spacing 25x30 cm had striking effect on percent opening of florets per spike, number of open florets with drooping of minimum florets. N at 200 kg/ha had significant effect on percent opening of florets per spike, number of o

Volume 3(1), 2001

Effect of self and cross pollination on the fruit set behaviour of some promising apple genotypes.

Jana, B R

Department of Fruit Breeding and Genetic Resources, Dr. Y. S. Parmar University of Horticulture and Forestry, Solan 173 230, HP, India.

Key words: apples, cross pollination, cultivars, fruit set, self incompatibility, self pollination

Journal of Applied Horticulture, 2001, volume 3, issue 1, pages 51-52.

Abstract: Self incompatibility, one of the main problems causing low productivity of apple, was studied to determine the suitable pollenizer cultivar. The experimental materials used included 8- to 9-year-old apple trees of cultivars Anna, Aziza, Red Baron, Spur Red Delicious, EC161286, EC161287 and unknown (standard tree having greenish yellow fruit) as the pollenizers and four cultivars Red Baron, Spur Red Delicious, EC161286 and EC161287 as the female parents. Data on self pollination were recorded in first year to facilitate cross pollination in the following year. Controlled pollination was done following the standard method of emasculation and pollination on selected flower clusters. Fruit set was calculated 45 days after pollination. In terms of self pollination, Red Baron recorded the highest fruit set (5.76%) while EC161286 recorded the lowest fruit set (2.09%). EC161287 and Spur Red Delicious recorded 2.80 and 3.24% fruit set, respectively. In cross combinations, the highest fruit set (76.17%) was observed in

Volume 3(1), 2001

Floral descriptors of field evaluated tomato germplasm.

Srinivas, T R

National Bureau of Plant Genetic Resources, Regional Station, Hyderabad - 500 030, India.

Key words: calyx, corolla, crop yield, flowering date, flowers, fruit set, fruits, germplasm, inflorescences, morphometrics, plant hairs, plant morphology, stamens, styles, tomatoes

Journal of Applied Horticulture, 2001, volume 3, issue 1, pages 53-55.

Abstract: The flowers of 188 exotic tomato germplasms were characterized and evaluated in Andhra Pradesh, India, during 1997-98. Of the accessions, most were of the same level as stamen type of flowers (SLASF; 40.34%), followed by the inserted (INSF; 24.36%), the slightly exerted (SEF; 22.69%) and the highly exerted type of flowers (HEF; 12.61%). Majority of the accessions (96.64%) had simple style shape and style hairiness. Among the flower types, the average corolla and stamen length were highest in HEF (9.96 and 7.59 mm, respectively). Calyx length was highest and lowest in the INSF

(7.80 mm) and HEF (5.69 mm), respectively. The variability in corolla length was highest in INSF, while variability in calyx and stamen lengths was highest in HEF. The average number of days to flower was highest in SEF (64.6), followed by INSF (64.4), HEF (63.2) and SLASF (61.8). The variability for days to 50% flowering was highest in SLASF. The average flower number per inflorescence and the average fruit number per cluster was highes

Volume 3(1), 2001

Effect of growth regulators on water relations and fruit yield of rain-fed sapota (*Achras sapota*).

Reddy, Y T N; Khan, M M

Division of Horticulture, University of Agricultural Sciences, GKVK, Bangalore - 560 065, India.

Key words: application rates, chlormequat, crop yield, fruits, mepiquat, paclobutrazol, plant growth regulators, plant water relations, sapodillas, stomatal resistance, transpiration, water content

Journal of Applied Horticulture, 2001, volume 3, issue 1, pages 56-57.

Abstract: A study was conducted to determine the effect of paclobutrazol, Cycocel [chlormequat] and Chamatkar [mepiquat chloride] on the water relations and fruit yield of sapota (*A. sapota* [*Manilkara zapota*]) cv. Kalipatti at the Horticultural Research Station of the University of Bangalore, Karnataka, India. Treatments comprised 250, 500 and 750 ppm Cycocel; 1000, 2000 and 3000 ppm Chamatkar; 1.25, 2.50 and 5.00 g paclobutrazol; and control (water spray or no spray). Paclobutrazol, Cycocel and Chamatkar were effective in improving water relations and fruit yield of sapota. Paclobutrazol at 5 g was the most effective. All growth regulators increased the relative water content and decreased the transpiration, but the most pronounced effect was with 5 g paclobutrazol. None of the growth regulators affected the stomatal resistance. The growth regulator treatments affected the second year fruit yield, unlike the first year fruit yield. The highest fruit yield on the second year (56.3 kg/plant) was obtained with 5 g paclob

Volume 3(1), 2001

Phenotypic stability in late season garden pea.

Pan, R S; Prasad, V S R K; Mathura Rai

ICAR Research Complex for Northern Region, HAFRP, Ranchi - 834 010, India.

Key words: crop yield, cultivars, flowering, genetic stability, maturity, peas, pods, varietal reactions

Journal of Applied Horticulture, 2001, volume 3, issue 1, pages 58-59.

Abstract: The phenotypic stability of pea cultivars DRP-3, VL-3, JP-83, KS-226, KS-225, Bonneville and HC-30+36 was evaluated in a field experiment conducted in Ranchi, Bihar, India during 1994-98 to identify stable and high-yielding cultivars suitable for late sowing. Significant differences among the cultivars tested in terms of crop yield, number of days to flowering, pod length and breadth, seed number per pod, 100-green seed weight and shelling percentage were observed. KS-225 was stable for green pod yield under late-sown, favourable conditions, and for pod length and breadth under unfavourable environments. DRP-3 was stable for early flowering under favourable environments. KS-226 was stable for pod breadth and number of seeds per pod under unfavourable environments. VL-3 and JP-83 were stable for number of seeds per pod under unfavourable environments.

Volume 3(1), 2001

Nutrient composition of some wild edible fruits of Andaman and Nicobar Islands.

Singh, D B; Attri, B L; Sharma, T V R S; Sreekumar, P V

Central Agricultural Research Institute, Port Blair - 744 101 (Andamans), India.

Key words: acidity, ascorbic acid, carotenoids, fruits, jackfruits, nutritive value, sugars, wild relatives

Journal of Applied Horticulture, 2001, volume 3, issue 1, pages 60-62.

Abstract: Pulps of 28 wild fruits from Andaman and Nicobar Islands, India, were analysed for their total soluble solids (TSS), acidity, ascorbic acid and carotenoid content. The data showed that *Diospyros pyrrocarpa* (22.0%), *Artocarpus integrifolia* (21.0%) and *Annona reticulata* (21.0%) had high TSS. The fruits showed a wide range of acidity and a low value (0.06%) was recorded in *Gnetum gnemon* and *Muntingia calabura* (0.16%). The highest total sugars were recorded in *Annona reticulata* (18.18%), *D. pyrrocarpa* (18.18%) and *M. calabura* (14.28%). Majority of these fruits were rich in ascorbic acid and the highest value was recorded in *Artocarpus integrifolia* (176.00 mg/100 g). Among the fruits studied, quite a good number were found exceptionally rich in carotenoids and the highest value (1485.00 mg/100 g) was observed in *Artocarpus integrifolia*, followed by *Artocarpus lakoocha* [*Artocarpus lacucha*] (501.41 mg/100 g). The study revealed that these wild

fruits are rich in vitamins and essential nutrients and thus, their pro

Volume 3(1), 2001

Powdery mildew - a serious disease of mango.

Misra, A K

Central Institute for Subtropical Horticulture, Rehmankhera, PO. Kakori, Lucknow - 227 107, India.

Key words: application date, chemical control, cultural control, fungal diseases, fungicides, integrated control, mangoes, plant disease control, plant diseases, plant pathogenic fungi, plant pathogens, symptoms

Journal of Applied Horticulture, 2001, volume 3, issue 1, pages 63-68.

Abstract: Powdery mildew caused by *Oidium mangiferae*, is the most important disease of mango. It is reported from 35 countries in the world and reported to cause up to 90% loss in India. Besides inflorescence infection, it causes different types of symptoms on leaves and fruits. Based on epidemiological studies and control measures conducted for the last 15 years at CISH, Lucknow (Uttar Pradesh, India), a disease cycle and an integrated disease management practice is proposed. Disease can easily be controlled by adopting suitable cultural practices and timely application of spray schedule. As the disease is weather-sensitive, need-based control measures are suggested based on the prevailing environmental conditions.

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Volume 2(2), 2000

Regulation of flowering time for longan (*Dimorcarpus longan*) production in Thailand.

Subhadrabandhu, S; Yapwattanaphun, C

Department of Horticulture, Faculty of Agriculture, Kasetsart University, Bangkok 10900, Thailand.

Key words: chlorates, crop husbandry, crop production, cultivars, flower induction, flowering, flowering date, irregular bearing, longans, plant growth regulators, sodium chlorate

Journal of Applied Horticulture, 2000, volume 2, issue 2, pages 102-105.

Abstract: The methods of off-season longan production in Thailand are presented: (1) application of potassium chlorate (as soil drench, foliar spray, and trunk or stem injection) and sodium chlorate to regulate flowering, and (2) cultivation of non-seasonal flowering cultivars. The physiological responses of longan to potassium chlorate and orchard management practices are briefly discussed.

Volume 2(2), 2000

Leaf nutrient status of polyembryonic mango varieties and that of cv. Alphonso grafted on to some of these rootstocks.

Reddy, Y T N; Kurian, R M

Division of Fruit Crops, Indian Institute of Horticultural Research, Hessaraghatta Lake, Bangalore 560 089, India.

Key words: calcium, chemical composition, copper, cultivars, iron, leaves, magnesium, manganese, mangoes, mineral content, nitrogen, nutrient content, phosphorus, plant composition, plant nutrition, potassium, rootstock scion relationships, rootstocks, scions, zinc

Journal of Applied Horticulture, 2000, volume 2, issue 2, pages 106-107.

Abstract: The leaf nutrient status of twelve ungrafted polyembryonic mango cultivars (Bappakai, Chandrakaran, Kensington, Muvandan, Mylepelian,

Nekkare, EC 95862, Olour, Kitchner, Kurukan, Vellaikulumban, and Starch), and that of cv. 'Alphonso' grafted onto seven of the aforementioned cultivars, was determined to generate preliminary information on the role of rootstocks in mango nutrition. All seedlings and grafted plants were thirteen years old, growing in a compact block with uniform cultural practices. Differences among polyembryonic seedlings were highly significant for N, P, K, Ca, and Mn, and significant for Mg, Cu, Zn, and Fe. 'Alphonso' scion growing on the polyembryonic rootstocks revealed highly significant differences for N, significant differences for Ca and Fe, and non-significant differences for P, K, Mg, Mn, Cu, and Zn contents in leaves. Vigorous rootstocks, viz., Muvandan, Bappakai, and Olour, resulted in higher leaf nitrogen concentration of 'Alphonso' scion while the least vigorous rootstock viz., V

Volume 2(2), 2000

Effects of different irrigation methods and moisture regimes on vegetative growth parameters of Starking Delicious apple trees.

Orta, A H; Akcay, M E; Erdem, T

Department of Farm Structure and Structure and Irrigation, Faculty of Tekirda Agriculture, University of Trakya, 59030 - Tekirda, Turkey.

Key words: apples, evapotranspiration, growth, irrigation requirements, irrigation water, plant water relations, soil water, surface irrigation, trickle irrigation

Journal of Applied Horticulture, 2000, volume 2, issue 2, pages 108-110.

Abstract: This study was conducted in Turkey in 1997 and 1999 to investigate the effects of different irrigation methods and regimes on the vegetative growth of "Starking Delicious" apple trees under Thrace conditions. Drip and surface (ponding) irrigation methods were the basic treatments while the allowable depletion levels of soil moisture (40% and 70% of available water holding capacity) in 120 cm soil depth were sub treatments. Seasonal evapotranspiration and total amount of irrigation water in drip irrigation plots were lower than those of surface irrigation plots (62.7% and 72.5%, respectively). However, the effect of irrigation regimes on vegetative growth parameters was nonsignificant. Drip irrigation gave better results than surface irrigation when irrigation water requirements, evapotranspiration, and vegetative growth parameters were evaluated together. In conclusion, it can be suggested that drip irrigation should be preferred for apple trees under Thrace conditions and irrigation water should be applied w

Volume 2(2), 2000

Control of aonla (*Emblca officinalis* Gaertn.) rust through fungicides.

Pradeep Kumar; Singh, H K

Department of Horticulture, Narendra Deva University of Agriculture & Technology, Kumarganj, Faizabad - 224 229 (U.P.), India.

Key words: bitertanol, chemical control, copper oxychloride, crop quality, crop yield, cultivars, fruit drop, fruits, fungal diseases, fungicides, mancozeb, phytotoxicity, plant disease control, plant diseases, plant pathogenic fungi, plant pathogens, tridemorph

Journal of Applied Horticulture, 2000, volume 2, issue 2, pages 111-112.

Abstract: Field experiments were conducted in 1995-96, 1996-97, and 1997-98 at Faizabad, Uttar Pradesh, India, with aonla (*Emblca officinalis* [*Phyllanthus emblica*]) cultivars NA-7 and Kanchan to determine the effective fungicides against aonla rust (caused by *Ravenelia emblicae*). Pooled data revealed that all tested fungicides, except tridemorph, reduced the rust percent disease index (PDI; 0.69-16.83 and 1.17-14.04) over the control (25.45 and 17.65) in NA-7 and Kanchan, respectively. Indofil M-45 (mancozeb; 0.3%) applied thrice during September-October was most effective (0.69 and 1.17 PDI; 97.37 and 93.22 percent disease control or PDC), followed by Baycor (bitertanol; 3.22 and 6.34 PDI; 84.79 and 67.46 PDC) and Blitox-50 (copper oxychloride; 3.55 and 7.13 PDI; 84.69 and 62.22 PDC). Improvement in fruit size was also recorded for these fungicides. Tridemorph showed toxic effects by causing heavy premature fruit drop. NA-7 was most sensitive as there were less healthy fruits left for recording the yield.

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Economic feasibility of organic greenhouse cucumber production: the case of Menderes.

Engyndenyz, S

Department of Agricultural Economics, Faculty of Agriculture, The University of Ege, 35100 Bornova, Izmir, Turkey.

Key words: cost benefit analysis, crop production, cucumbers, economic viability, organic farming, production costs, production economics, protected cultivation, returns

Journal of Applied Horticulture, 2000, volume 2, issue 2, pages 113-116.

Abstract: The costs and returns of organic cucumber production in a 12x32 m greenhouse in Menderes, Turkey were determined, and a production budget was developed for growers. Total costs of organic, greenhouse cucumber production were determined to be 1334 dollars. Net return per square metre was 0.98 dollar and net return per kilogram was 0.07 dollar.

Volume 2(2), 2000

Inheritance of yield and its attributing characters in pumpkin (*Cucurbita moschata* Duch ex. Poir).

Sirohi, P S; Behera, T K

Division of Vegetable Crops, Indian Agricultural Research Institute, New Delhi - 110 012, India.

Key words: crop yield, dominance, fruits, genetic effects, heritability, heterosis, hybrids, inheritance, yield components

Journal of Applied Horticulture, 2000, volume 2, issue 2, pages 117-118.

Abstract: Twenty-eight *C. moschata* F1 hybrids involving 8 genotypes as parents (Pusa Vishwas, S-107-B, S-124-10, NDPK-24, S-15, S-12, S-20, and S-17) in half diallel fashion were evaluated to study the gene action of yield and its contributing characters. Dominant gene action was observed for all the characters, viz. vine length, fruit maturity, fruits per plant, fruit weight, and yield per plant. In all these characters, dominance component of variance was greater than the additive component of variance. The heritability in narrow sense was found to be less than 0.50 for the majority of characters. Low narrow sense of heritability coupled with higher degree of non-additive gene action (dominance variance) in yield and its components suggested that heterosis breeding might be advantageous for obtaining higher gains in pumpkin.

Volume 2(2), 2000

Maturity standards for date palm (*Phoenix dactylifera*).

Fageria, M S; Dhaka, R S; Mahesh Agrawal

Department of Horticulture, S.K.N. College of Agriculture, Jobner - 303 329 (Rajasthan), India.

Key words: acidity, crop quality, cultivars, dates, fruits, harvesting date, keeping quality, maturity, organoleptic traits, ripening stage, spoilage

Journal of Applied Horticulture, 2000, volume 2, issue 2, pages 119-120.

Abstract: The effects of harvesting date (Gandora [green stage], Doka [early stage of fruit development], and Dang [late stage of fruit development]) on 8 *P. dactylifera* cultivars (Jagool, Khadrawi, Medjool, Shamran, Halawy, Barhee, Khunezi, and Khalsa) were investigated. The harvesting stage influenced fruit weight, acidity, total soluble solids (TSS), organoleptic rating, and spoilage percentage. The weight of fruits in all eight cultivars increased up to Doka stage and then slightly decreased at Dang stage. The TSS in all cultivars increased from Gandora to Dang stage whereas acidity decreased. This study revealed that for raw consumption of dates as well as for its better keeping quality, fruits should be harvested at the Doka stage. As positive correlation was observed between TSS and organoleptic rating. It is suggested that TSS may be considered as an index of maturity of dates.

Volume 2(2), 2000

Varietal improvement of papaya (*Carica papaya* L.).

Dinesh, M R; Reddy, B M C; Reena, N A

Division of Fruit Crops, Indian Institute of Horticultural Research, Bangalore - 89, India.

Key words: brix, carotenoids, chemical composition, colour, crop quality, cultivars, fruit pulp, fruits, hybridization, hybrids, leaves, pawpaws, plant height, sugar content, sweetness, titratable acidity

Journal of Applied Horticulture, 2000, volume 2, issue 2, pages 121-123.

Abstract: Nineteen pawpaw cultivars were evaluated at Bangalore, Karnataka, India, for fruit quality. Pusa Nanha, a dwarf mutant, flowered at the 19th node; Thailand, Pusa Dwarf, and Tainung also bore fruits at a lower height. Fruit weight (2140 g), volume (1940 ml), and breadth (16 cm) were greatest in Pant Papaya 2. Red Indian (25.3 cm) and Thailand (24.2 cm) had the longest fruits. Tainung 1 and Red Indian produced sweet fruits with total soluble sugar (TSS) of 13.2 and 13.0 degrees Brix, respectively. The total carotenoids content was highest in Sunrise Solo (5031 I.U.%). Nigeria and Papaya Pant 2 had the thickest fruit pulp (3.0 cm). Fruit cavity index was lowest in Tainung 1 (13%). Mauritius, Pink Flesh Sweet, Red Indian, Sunrise Solo, Tainung 1, Tainung 2, and Thailand had pink pulp. Surya, produced from crossing Sunrise Solo with Pink Flesh Sweet, was evaluated, along with the parental cultivars, for plant and fruit quality. Surya had the lowest plant height at first flowering

as well as the greatest girth and

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Effect of fungicidal seed treatment and foliar sprays on early blight incidence, fruit characters and yield of tomato cv. Pusa Ruby.

Singh, N K; Saxena, R P; Jaiswal, R C; Pradeep Kumar

Department of Vegetable Science, N.D. University of Agriculture & Technology, Kumarganj, Faizabad - 224 229, India.

Key words: bitertanol, boric acid, carbendazim, carboxin, chemical control, crop yield, foliar spraying, fruits, fungal diseases, fungicides, mancozeb, plant disease control, plant diseases, plant pathogenic fungi, plant pathogens, seed treatment, seeds, thiram, tom

Journal of Applied Horticulture, 2000, volume 2, issue 2, pages 124-126.

Abstract: The efficacy of fungicidal seed treatments (soaking seeds for 12 h in aqueous solution of 0.1% Bavistin [carbendazim], 0.2% Vitavax [carboxin], 0.2% Baycor [bitertanol], 0.2% thiram, 0.2% Dithane M-45 [mancozeb], and 0.1% Bavistin+0.2% Vitavax) and foliar sprays (0.2% Dithane M-45, 0.2% Baycor, 0.3% Blitox-50, and 0.5% boric acid) on early blight (caused by *Alternaria solani*) incidence and tomato cv. Pusa Ruby yield was investigated in Faizabad, Uttar Pradesh, India. Seeds treated with fungicides were sown in the nursery. Fungicide spraying was conducted thrice (i.e. at the time of disease appearance and twice thereafter at 15-day interval) under field conditions. The initial disease appearance in seed-treated plants was observed at 60-69 days after sowing (DAS). The lowest percent disease index and highest percent disease control (PDC) at 177 DAS were recorded for 0.1% Bavistin, 0.1% Bavistin+0.2% Vitavax, 0.2% thiram, and 0.2% Vitavax. The highest average fruit yield (357.46 q/ha) was obtained with 0.2% Bay

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Growth, flowering and multiplication in gladiolus cultivar 'Aarti' as affected by grades of mother corm and cormel.

Singh, K P

Floriculture Laboratory, Indian Institute of Horticultural Research, Hesaraghatta Lake, PO, Bangalore - 560 089, India.

Key words: corms, diameter, flowering, flowers, growth, leaves, plant height, propagation materials, size, spikes, vegetative propagation

Journal of Applied Horticulture, 2000, volume 2, issue 2, pages 127-129.

Abstract: The influence of 9 grades of mother planting material on the vegetative growth, flowering, and multiplication of gladiolus (*Gladiolus* sp.) cv. 'Aarti' was studied. The largest size grade (>6.00 to <6.50 cm diameter) produced significantly higher number of leaves per plant, girth of scape, number of florets per spike, and weight and diameter of corm. The greater height of plant, length of spike and rachis, and number of flower spike per plant were produced by corm size of (>5.10 to <6.00 cm diameter). Number 1 (>3.80 to <5.10 cm diameter) corm grade produced maximum diameter of second floret and number of cormels per plant. Number 2 corm grade (>3.20 to <3.80 cm diameter) produced higher number of cormels per plant and their corresponding weight. One hundred percent of corms flowered up to No.3 grade; flowering percentage was reduced as corm size decreased. The highest percentage of propagation coefficient was obtained with No. 6 grade corm.

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Effect of polyethylene on the behaviour and yield of strawberry (*Fragaria x ananassa*).

Pramanick, K K; Kishore, D K; Sharma, Y P

IARI Regional Station (Horticulture), Amartara Cottage, Shimla - 171 004, India.

Key words: crop quality, crop yield, cultivars, flowering, flowering date, fruits, polyethylene film, strawberries, tunnels, varietal reactions

Journal of Applied Horticulture, 2000, volume 2, issue 2, pages 130-131.

Abstract: The effects of low black polyethylene tunnels on the performance of 35 strawberry cultivars were investigated at Shimla, India, during 1996-98. Covering beds with black polyethylene hastened flowering by approximately 1 month, prevented soil erosion, reduced weed growth and winter injury, and increased total yields by 20%. Weeding was not required in mulched beds. During summers, the replacement of plastic sheets with anti-hail or anti-bird nets increased the yields and improved fruit quality. Variation in cultivar performance was also observed. Under uncovered conditions, Shimla Delicious gave the highest number of fruits per plant (30) while Etna and Belrubi the highest yield per plant (243.80 and 213.20 q/ha).

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Effect of micronutrients on leaf composition, fruit yield and quality of Kinnow mandarin.

Monga, P K; Josan, J S

Punjab Agricultural University, Regional Fruit Research Station, Abohar - 152 116, India.

Key words: acidity, chemical composition, crop quality, crop yield, ferrous sulfate, fruits, iron, iron fertilizers, leaves, mandarins, manganese, manganese fertilizers, manganous sulfate, nitrogen, nutrient content, phosphorus, plant composition, plant nutrition, p

Journal of Applied Horticulture, 2000, volume 2, issue 2, pages 132-133.

Abstract: The effect of the foliar application of zinc, alone and in combination with Fe and Mn (as zinc sulfate, manganous sulfate, and ferrous sulfate, respectively) on leaf composition, fruit yield, and quality of Kinnow mandarin was studied at Regional Fruit Research Station, Abohar, Punjab, India. Micronutrient sprays increased the concentration of respective micronutrient without affecting the level of N, P, and K in the leaves. However, the increase in Zn content was more when spraying of Zn was conducted alone rather than in combination with Fe and Mn. Fruit yield, juice content, and total soluble solids were maximum under zinc sulfate (0.3%) treatment. Acidity decreased in all treatments compared to the control.

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Effect of IBA on rooting in West Indian cherry (*Malpighia galbra* L.) cuttings.

Singh, D B; Attri, B L

Central Agricultural Research Institute, Port Blair - 744 101, India.

Key words: application rates, branches, cuttings, IBA, leaves, plant growth regulators, rooting, roots, survival, vegetative propagation

Journal of Applied Horticulture, 2000, volume 2, issue 2, pages 134-135.

Abstract: West Indian cherry (*Malpighia galbra* [M. glabra]), a rich source of vitamin C [ascorbic acid], has a problem in propagation through seeds. Indole butyric acid (IBA) at 500, 1000, and 1500 ppm was tried in hard and semi-hard wood cuttings for vegetative propagation. After 90 days, maximum survival (90%), number of leaves (25.0), number of primary branches (6.60),

and number of secondary branches (6.60) were recorded in hard wood cuttings treated with IBA at 1500 ppm. Similarly, the maximum number of primary roots (9.37), number of secondary roots (16.37), length of primary roots (22.04 cm), and length of secondary roots (15.10 cm) were observed in hard wood cuttings treated with IBA at 1500 ppm. The hard wood cuttings treated with 1500 ppm IBA were most successful for the vegetative propagation of West Indian cherry.

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Postharvest disinfestation of mango (*Mangifera indica* cv. Manila) with controlled atmospheres.

Leon, D M; Ortega, D A; Cabrera, H; Cruz, J de la; Parkin, K L; Garcia, H S
UNIDA, Instituto Tecnológico de Veracruz, Apdo. Postal 1420, Veracruz, Ver.
91860, Mexico.

Key words: carbon dioxide, chemical composition, colour, controlled atmosphere storage, crop quality, disinfestation, fruits, insect pests, larvae, mangoes, oxides, pest control, pH, postharvest treatment, reducing sugars, sensory evaluation, spongy tissue, storage

Journal of Applied Horticulture, 2000, volume 2, issue 2, pages 71-75.

Abstract: Manila mangoes were infested in the tree by allowing fertile *Anastrepha obliqua* female flies to oviposit on fruits contained inside cages. Infested mangoes were exposed to nine different controlled atmospheres (CA) containing combinations of 1, 3, or 5% O₂ and 30, 50, or 70% CO₂. Surviving larvae were enumerated after subjecting the mangoes to CA for 1 to 5 days. Selected compositional and physical parameters (weight loss, pH, titratable acidity, colour, soluble solids, reducing sugars, and texture) were analysed during post-treatment ripening. Fully ripened fruits were also subject to sensory evaluation using a non-structured hedonic scale and a trained panel. CA containing 1% O₂ and either 30 or 50% CO₂ effectively killed all larvae present in treated fruits. These treatments did not alter the composition or sensory characteristics of fully ripened mangoes. However, losses of 20 to 25% of fruits on the basis of sensory acceptability were attributed to the development of "spongy" tissue. CAs containing 70% C

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Ripening effects on the chilling sensitivity of processing and non-processing tomato cultivars.

Mohammed, M; Brathwaite, R A I

Department of Food Production, Faculty of Agriculture and Natural Sciences, The University of the West Indies, St. Augustine, Trinidad and Tobago.

Key words: chilling injury, cold resistance, cultivars, fruits, postharvest decay, ripening, storage decay, storage disorders, susceptibility, tomatoes, varietal reactions

Journal of Applied Horticulture, 2000, volume 2, issue 2, pages 76-78.

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Abstract: Studies on the sensitivity to chilling injury (CI) of 8 processing and 8 non-processing tomato cultivars stored at the table-ripe stage were examined. Fruits were stored for 21 days at 7 degrees C and upon transfer to 20 degrees C for 1 or 3 days, respectively. The low correlation coefficient between pitting and decay suggested that these two early manifestations of CI are not significantly related. The least sensitive tomato cultivars to CI were Advantage, Dorado, and Rio Grande among the processing types and Star Pak and Walters of the non-processing types. The least tolerant to CI were processing cultivars Caraibe and Cascade and non-processing cultivars Early Set, Carnival, and Capitan. The observed tolerance of table-ripe tomatoes after 21 days at 7 degrees C plus 3 days at 20 degrees C compared to control fruit stored continuously at 20 degrees C for only 8-11 days indicates that a longer marketing period could be obtained at temperatures lower than those currently recommended.

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Effect of CaCl₂ sprays, heat, and combined CaCl₂-heat treatments on the quality of apples (*Malus domestica* Borkh.).

Dris, R; Niskanen, R; El Assi, N

Department of Applied Biology, Horticulture, University of Helsinki, P.O. Box 27, FIN-00014, Finland.

Key words: apples, calcium, calcium chloride, cold storage, crop quality, dry matter, endogenous growth regulators, ethylene production, firmness, fruits, heat treatment, magnesium, nitrogen, nutrient content, pH, phosphorus, plant growth regulators, postharvest dec

Journal of Applied Horticulture, 2000, volume 2, issue 2, pages 79-83.

Abstract: 'Lobo' apple fruits were subjected to preharvest CaCl₂ spraying treatment, pre-storage heat treatment, and CaCl₂+heat treatment and were held at 2 degrees C and 90-95% RH for six months. Respiration and ethylene production rates were monitored and soluble solids, juice pH, firmness, total dry matter and macronutrient (P, K, Ca, Mg, and N) contents were determined. Additionally, the incidence of physiological disorder and pathological disease were recorded. Respiration and ethylene production rates slightly decreased in heat-treated apples and increased in CaCl₂-treated apples. CaCl₂ treatment did not increase fruit firmness or Ca concentration. Combined CaCl₂+heat treatment and heat treatment increased pH. At the beginning of storage, the firmness of heat- and CaCl₂+heat-treated fruits was lower but greater than that of the control fruits at the end of the storage period. After 6 months of storage, the lowest incidence of disorder and disease symptoms was observed in the CaCl₂+heat treatment.

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2,4,5-T induced somatic embryogenesis in papaya (*Carica papaya* L.).

Bhattacharya, J; Khuspe, S S

Plant Tissue Culture Division, National Chemical Laboratory, Pune - 411 008, India.

Key words: 2,4,5 T, abscisic acid, in vitro culture, in vitro regeneration, pawpaws, somatic embryogenesis, somatic embryos, tissue culture

Journal of Applied Horticulture, 2000, volume 2, issue 2, pages 84-87.

Abstract: A protocol for high frequency somatic embryogenesis in *C. papaya* was developed using immature zygotic embryo explant of cultivars Honey Dew and CO 2. Somatic embryos were induced in immature embryos, cultured on Murashige and Skoog's (MS) basal medium supplemented with 3 mg/litre of 2,4,5-T, and incubated in the dark for a period of 3-6 weeks. Loosely attached globular somatic embryos appeared from apical domes within 3-6 weeks of incubation. The development of somatic embryos was asynchronous, which passed through globular, heart, and torpedo shape stages. Embryos continued to proliferate with regular subculture and remained morphologically competent for up to one year. Maturation of the embryos was achieved in medium supplemented with ABA [abscisic acid] (0.1 mg/litre). The cotyledonary stage embryos germinated (71.33% in Honey Dew and 59.33% in CO 2) on

phytohormone free MS basal medium. Regenerated plantlets were established in the greenhouse and hardened plants were transferred in soil.

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Shelf life extension of tomato fruits by postharvest antioxidant application.

Arava Bhagwan; Reddy, Y N; Rao, P V; Mohankumar, K C

Department of Horticulture, College of Agriculture, Acharya N G Ranga Agricultural University, Rajendranagar, Hyderabad - 500 003, India.

Key words: acidity, ascorbic acid, benzyladenine, chemical composition, ethylene production, fruits, plant growth regulators, postharvest physiology, postharvest treatment, reducing sugars, sodium benzoate, storage life, sugar content, tomatoes, weight losses

Journal of Applied Horticulture, 2000, volume 2, issue 2, pages 88-91.

Abstract: The effect of postharvest application of ascorbic acid, sodium benzoate, and benzyladenine at two levels of concentration on the days to ripening, shelf life, and various physicochemical properties was studied. Benzyladenine at 50 ppm improved the shelf life to 42 days, followed by benzyladenine at 25 ppm (37 days) and sodium benzoate at 1000 ppm (35 days), compared to the control (26 days). Physiological weight loss increased throughout the storage period while sugars, total soluble solids (TSS), and acidity increased up to the 14th day and then declined in the control and treated fruits. Treatments that improved the shelf life maintained better fruit quality in terms of higher reducing sugars, TSS, and acidity. Peak ethylene production reached the 14th (7.43 nl g⁻¹ h⁻¹) day in benzyladenine at 50 ppm and on the 11th day (6.75 nl g⁻¹ h⁻¹) in sodium benzoate at 1000 ppm when compared to the 11th day (8.15 nl g⁻¹ h⁻¹) in the control. The reduced and delayed peak ethylene production in benzyladenine- and sodium

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Enhancing micropropagation efficiency of strawberry using bandage in liquid media.

Neeru Sood; Ranjan Srivastava; Singh, O S; Gosal, S S

Biotechnology Center, Punjab Agricultural University, Ludhiana - 141 004, India.

Key words: bandages, benzyladenine, in vitro culture, in vitro regeneration, kinetin, leaves, micropropagation, plant growth regulators, shoots, strawberries, survival, tissue culture

Journal of Applied Horticulture, 2000, volume 2, issue 2, pages 92-93.

Abstract: The rate of strawberry propagation through conventional technique is quite low and it is difficult to maintain plant material during the summer months. In the present investigation, the protocol for tissue culture propagation has been further improved by using liquid medium with four layers of surgical bandage. Fifteen milliliters of liquid Murashige and Skoog's (MS) medium enriched with BAP [benzyladenine] and Kinetin was used for the study. The proliferating shoots were longer, thicker, and borne with broader leaves in liquid medium. Studies on the survival of such plants were also conducted. The survival rate on various substrates varied from 66.67% in soil to 76.67% in soilrite mix. Seventy percent of plantlets transferred on sand survived well.

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Effect of surface sterilizing agents on *in vitro* culture establishment of guava (*Psidium guajava* L.).

Meghwal, P R; Sharma, H C; Singh, S K

Division of Fruits and Horticultural Technology, IARI, New Delhi - 110 012, India.

Key words: browning, disinfectants, guavas, hydrogen peroxide, in vitro culture, in vitro regeneration, mercuric chloride, micropropagation, phenolic compounds, shoots, silver nitrate, tissue culture

Journal of Applied Horticulture, 2000, volume 2, issue 2, pages 94-95.

Abstract: A method was standardized for the quick establishment of aseptic cultures in guava from mature field-grown stock plants for micropropagation through enhanced axillary branching technique. The maximum number of aseptic explants with shoot proliferation was obtained by a combination of surface sterilizing agents involving hydrogen peroxide (10%), silver nitrate (0.25%), and mercuric chloride (0.05%) treatment of explants one by one for five, six, and three minutes, respectively. The problem of phenolic browning was also minimized to a great extent by leaching of phenolic compounds due to agitation in antioxidant solution as well as by proper drying of explant prior to inoculation.

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Effect of pulsing with paclobutrazol on microshoots of citrus species *in vitro*.

Singh, I P; Parthasarathy, V A; Handique, P J

Biotechnology Laboratory, Division of Horticulture, ICAR Res. Complex for NEH Region, Umiam, Meghalaya - 793 103, India.

Key words: application rates, *in vitro* culture, *in vitro* regeneration, internodes, leaves, lemons, paclobutrazol, plant growth regulators, roots, shoots, survival, tissue culture

Journal of Applied Horticulture, 2000, volume 2, issue 2, pages 96-97.

Abstract: *In vitro*-grown microshoots of Assam lemon (*C. limon*) and Sweet lime "sour mutant" (*C. limettioides*) were pulsed for one minute with paclobutrazol solutions at 5 levels (0, 1000, 2500, 5000, and 7500 ppm) under laminar flow followed by inoculation in Murashige and Skoog's (MS) Medium. Observations on shoot length, root length, number of leaves, length of internode, root diameter, shoot weight, root weight, and plant weight were recorded after five weeks of culture initiation. Increased concentration of paclobutrazol suppressed the root length and increased the root diameter of both species. However, there was no response on shoot growth. Paclobutrazol-treated plants showed better survival at the nursery stage than control.

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Flowering scenario in commercial cultivars of jujube (*Ziziphus mauritiana* Lamk.) under Indian arid ecosystem.

Vishal Nath; Bhargava, R

National Research Centre for Arid Horticulture, Bikaner 334 006 (Rajasthan), India.

Key words: air temperature, cultivars, flowering, phenology, relative humidity, varietal reactions

Journal of Applied Horticulture, 2000, volume 2, issue 2, pages 98-101.

Abstract: The flowering of *Z. mauritiana* cultivars (Gola, Kaithali, Banarsi Kadaka, Umran, Mundia, and Seb) at six locations in India (Anantapur, Andhra Pradesh; Sardarkrushinagar, Gujarat; and Jobner, Jodhpur, Bikaner, and Hisar, Rajasthan) was studied. Irrespective of cultivar, flowering was completed by 5 September at Anantapur, while it continued up to 29 November at Hisar. In

Rajasthan, flowering duration was, approximately, from 24 July to 10 November. The peak of flowering was observed between 17 June and 30 August in southern India and from 27 August to 22 October in northern India. Flowering was generally dependent on temperature and relative humidity, particularly on the variation between maximum and minimum temperature. A maximum temperature of 32.4-36.9 degrees C and a minimum temperature of 20.7-25.3 degrees C, along with a temperature difference of 8.6-13.3 degrees C and morning relative humidity of 70.6-82.5%, prevailing continuously for a minimum of 1 month induced profuse flowering in all cultivars across

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Pruning strategies to alleviate overcrowding in higher density citrus orchards.

Joubert, F J; Plessis, M H du; Stassen, P J C

ARC, Institute for Tropical and Subtropical Crops, Private Bag X11208, Nelspruit, 1200, South Africa.

Key words: crop quality, crop yield, fruits, grapefruits, light penetration, oranges, overcrowding, pruning, regrowth

Journal of Applied Horticulture, 2000, volume 2, issue 1, pages 1-5.

Abstract: In this study different pruning methods were applied to higher density orange (cv. Navel), grapefruit (cv. Star Ruby) and orange (cv. Valencia) orchards (in South Africa, in 1996-99), which had become overcrowded five to six years after planting. A progressive decline in yield and fruit size was experienced with these orchards. Response to the different pruning actions, as well as yield variation and fruit size was assessed over three successive seasons. Corrective (severe) pruning and hedging resulted in a significant reduction in yield in the 1st year after pruning, but with an increase in fruit size. However, yield and fruit size improved substantially in the 2nd and 3rd year after the severe pruning. Light hedging as a maintenance pruning action was effective in restricting tree size without adversely affecting yield. Alternate bearing was substantially reduced by annual pruning. By creating a slanted, 20 degrees angle canopy with mechanical hedging and selective pruning, a greater portion of fruit is borne

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Some compositional changes in Kent mango (*Mangifera indica*) slices during storage.

Tovar, B; Ibarra, L I; Garcia, H S; Mata, M

Instituto Tecnológico de Tepic, Apdo. Postal 634, Tepic, Nay. 63000, Mexico.

Key words: browning, chemical composition, colour, cutting, fruits, mangoes, pH, plant composition, plant pigments, ripening, storage, storage decay, titratable acidity

Journal of Applied Horticulture, 2000, volume 2, issue 1, pages 10-14.

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Abstract: Kent mango slices at two different stages of ripening: 4 days (S1) and 6 days (S2) after harvest were kept under aseptic conditions at 13 and 23 degrees C to determine if normal ripening could proceed after slicing. Whole mangoes stored at 23 degrees C and 65% RH were used as control. Soluble solids of slices from all treatments did not show the same trend as whole fruits and remained unchanged at their initial values. Titratable acidity increased and pH decreased in all the slices and were in turn, different from the control fruit. Colour parameters indicated loss of yellow pigments and browning. Decay occurred between days 5 and 7 of storage in slices that were stored at 23 degrees C. Slices from S1 mangoes kept at 13 degrees C suffered minimal changes due to cutting; however, the slices did not show the same compositional changes as the naturally-ripened whole fruit.

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Effect of cultivar, hot water treatment and storage conditions on quality of fresh-cut papaya (*Carica papaya* L.).

Allong, R; Wickham, L D; Majeed Mohammed

Department of Food Production, Faculty of Agriculture and Natural Sciences, University of the West Indies, St. Augustine, Trinidad and Tobago.

Key words: ascorbic acid, brix, carbon dioxide, crop quality, cultivars, ethylene, fruits, growth, hot water treatment, pawpaws, sensory evaluation, storage, storage decay, tastes, temperature

Journal of Applied Horticulture, 2000, volume 2, issue 1, pages 15-18.

Abstract: The effects of hot water treatments and storage conditions on quality of fresh-cut papaya were investigated. A hot water treatment of 48-50 degrees C for 20 minutes was found to delay fungal storage rots in fruits of

Tainung #2 and Red Lady cultivars without negatively affecting sensory quality. Fresh-cut slices from fruit of Tainung #2 and Red Lady cultivars were stored at 5 degrees C and 10 degrees C and evaluated for changes in physical, chemical and microbial quality over eight days. There was a decline in sensory quality and acceptability of Red Lady papaya slices after four days at both temperatures, while fresh-cut Tainung #2 fruit held at 5 degrees C and 10 degrees C was found to have high sensory quality and acceptability up to six days of storage. A storage temperature of 5 degrees C was more effective than 10 degrees C in reducing CO₂ and ethylene accumulation, as well as suppressing microbial growth, while maintaining high sensory quality in fresh-cut papaya slices. Unacceptable microbial counts w

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Fruit evaluation studies in sapota (*Achras zapota* L.).

Dinesh, M R; Reddy, B M C

Division of Fruit Crops, Indian Institute of Horticultural Research, Hesaraghatta Lake Post, Bangalore 560 089, India.

Key words: crop quality, cultivars, fruits, length, sapodillas, weight

Journal of Applied Horticulture, 2000, volume 2, issue 1, pages 19-20.

Abstract: An attempt was made to evaluate sapota (*Achras zapota* [*Manilkara zapota*]) cultivars based on their fruit characteristics. Twenty-two cultivars, viz. Badam, Badami, Bombay, Calcutta Round, CO1, CO2, Cricket Ball, Dwarapudi, Guruvayya, Gavaraiah, Pilipatti, Gutti, Hybrid, Jhumakiya, Kirtibarti (big), Kirtibarti (long), Krishna Rao, Mohangooti, Oval, Pakala Oval, Seedless and Vavilvalasa, were studied under Bangalore (Karnataka, India) conditions. Fruit weight was maximum in Krishna Rao and least in Pilipatti. The length of the fruit was maximum in CO1. Fruit breadth was maximum in Cricket Ball. Total soluble solid was highest in Kirtibarti (big) and Pakala Oval. The average number of seeds per fruit was least in Guruvayya, Gavaraiah and Pakala Oval. The study indicates that considerable variability exists in the cultivars and there is good scope for breeding varieties for dwarfness or reduced vigour.

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Peach based agroforestry systems in degraded foothills of north-western Himalayan region.

Saroj, P L; Tomar, D S; Arora, Y K

Central Soil and Water Conservation Research and Training Institute, Dehradun (UP) - 248 195, India.

Key words: agroforestry systems, crop yield, income, juvenility, multipurpose trees, peaches, soil depth, survival, toria, trees, trickle irrigation, vigour

Journal of Applied Horticulture, 2000, volume 2, issue 1, pages 21-24.

Abstract: The investigation revealed that peach orchard can be raised successfully even on degraded land by adopting site specific agrotechnique. The porous profile with only 60 cm top soil depth (T3) favoured better vegetative vigour of peach plants as compared to those sites having soil only throughout the profile (T4 and T5). The drip system of irrigation had good response on plant survival but overall plant vigour was not influenced much in juvenile peach plants compared to rain fed control under humid subtropical climate. Introduction of urd (*Phaseolus vulgaris* cv. T-9) in kharif and toria (*Brassica campestris* [*B. campestris* var. toria] cv. Pant-303) in rabi season was a compatible combination with peach plantation but growing of annual crops particularly rabi season crop was uneconomical on highly gravelly sites (80% gravels distributed throughout profiles-T2). The yield of groundstorey crops were affected by rainfall distribution pattern during crop growing period coupled with canopy cover of the overstorey compo

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Induction of callus and plant regeneration in *Coleus forskohlii* Briq.

Asamenew, M T; Narayanaswamy, P

Ethiopian Agricultural Research Organisation, P.O. Box 2003, Addis Ababa, Ethiopia.

Key words: adventitious shoots, benzyladenine, callus, culture media, IAA, in vitro culture, in vitro regeneration, kinetin, micropropagation, plant growth regulators, shoot tip culture, tissue culture

Journal of Applied Horticulture, 2000, volume 2, issue 1, pages 25-27.

Abstract: Callus cultures were initiated from the shoot tip explants of aseptically grown *C. forskohlii*. A rapid initiation and proliferation of callus was obtained in MS basal medium containing 1.0 mg IAA/l and 1.5 BAP [benzyladenine] mg/l. Adventitious shoots (17.33) were obtained from compact greenish callus on passage to MS basal medium containing various concentrations and combination of IAA and kinetin. But, the best response was

in the medium containing 1.0 mg IAA/l and 2.0 mg kinetin/l. On further subculturing of individual shoots onto hormone-free MS medium, shoots developed into normal plantlets.

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***In vitro* plant regeneration of *Citrus aurantifolia* through callus culture.**

Srivastava, R K; Sandhu, A S; Neeru Sood

Department of Horticulture, Punjab Agricultural University, Ludhiana - 141 004, India.

Key words: benzyladenine, callus, culture media, cytokinins, epicotyls, explants, hypocotyls, *in vitro* culture, *in vitro* regeneration, limes, micropropagation, plant growth regulators, shoot tip culture, tissue culture

Journal of Applied Horticulture, 2000, volume 2, issue 1, pages 28-30.

Abstract: Callus was induced from different explants of *in vitro* raised seedlings of *C. aurantifolia* to study the response of explants and medium composition on frequency of callusing and to develop reliable protocol for high frequency of plant regeneration from callus cultures. Shoot tip, epicotyl and hypocotyl were found superior explants for callusing in terms of amount of callusing, days to callus and callus induction frequency. Addition of cytokinin was found indispensable for regeneration and MS medium enriched with BAP [benzyladenine] (5 mg/l) resulted in highest per cent of callus regeneration. Regenerants were rooted *in vitro* and hardened in plastic pots containing autoclaved soil.

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Studies on postharvest changes in sapota (*Achras sapota* L.) at ambient storage conditions.

Singh, D B; Suryanarayana, M A; Attri, B L

Central Agricultural Research Institute, Port Blair - 744 101, India.

Key words: ascorbic acid, chemical composition, cultivars, plant composition, postharvest physiology, reducing sugars, ripening, sapodillas, storage, storage life

Journal of Applied Horticulture, 2000, volume 2, issue 1, pages 31-33.

Abstract: Various chemical changes were studied during ripening of four sapota (*Achras zapota* [*Manilkara zapota*]) cultivars, viz. Cricket Ball, Ever Bearer, Bangalore Giant and Calcutta Round, at ambient temperature (25-30 degrees C) and relative humidity of 70-90%. Significant changes during storage were recorded in physico-chemical constituents of all the cultivars studied. The ripening process started first in Ever Bearer and its total soluble solid contents, total sugars, reducing sugars and ascorbic acid accumulation declined after 4 days. All the cultivars had a storage life of 6 days whereas Ever Bearer could only be stored for 2 days at ambient temperature.

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Blossom biology of hog-plum (*Spondais pinnata* Kurz).

Darshana Nand

C-67, Guru Tegh Bahadur Nagar, Allahabad - 211 016, India.

Key words: anthers, dehiscence, flowering, flowers, fruit set, fruiting, fruits, hermaphroditism, inflorescences, panicles, pollen

Journal of Applied Horticulture, 2000, volume 2, issue 1, pages 34-36.

Abstract: Studies were undertaken on the flowering biology and bearing behaviour of hog-plum (*Spondais pinnata* [*Spondias pinnata*]). Well-established trees of hog-plum varieties 'oval' and 'round', growing within the premises of Government Gardens, Varanasi, Uttar Pradesh, India, were used. The studies were conducted with special reference to the variety 'oval'. The trees bore pure panicles at the terminal end of last years growth. The flowering took place on naked shoots with the advent of the spring season. Flowers opened during odd hours and anthers dehisced with the opening of flowers. The structure and shape of the inflorescence were similar to mango. Flowers were observed as hermaphrodites numbering 1829.4 per panicle. Pollen grains were dusty. The initial percentage set under natural open pollination was very good (71.29%) compared to very nominal set in mango. Thirty-five fruits per panicle reached final maturity.

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Influence of irrigation and mulching on plant growth and leaf nutrient status of aonla (*Emblca officinalis* G.) under sodic soil.

Shukla, A K; Pathak, R K; Tiwari, R P; Vishal Nath

N.D. University of Agriculture and Technology, Kumarganj, Faizabad (U.P.) 224 229, India.

Key words: calcium, canopy, chemical composition, farmyard manure, growth, leaves, magnesium, mineral content, mulches, mulching, nitrogen, nutrient content, phosphorus, plant composition, plant height, polyethylene, potassium, rice, rice straw, straw, trickle irrig

Journal of Applied Horticulture, 2000, volume 2, issue 1, pages 37-38.

Abstract: In a field experiment conducted in Faizabad, Uttar Pradesh, India, during 1995-96, the effect of irrigation and mulching on growth of aonla (*Emblica officinalis* [*Phyllanthus emblica*]) cv. NA 7 was investigated. The treatment comprised 3 irrigations (daily drip irrigation, alternate day drip irrigation and conventional surface irrigation by basin method) and different types of mulching materials, i.e. 200 gauge black polyethylene, 8-cm thick farmyard manure (FYM), paddy straw, grass, and unmulched control. Plant height, canopy spread and stock girth were significantly better under alternate day drip irrigation over conventional method. Among mulching treatments, black polyethylene was the most effective mulch material however, among organic mulches paddy straw was the best for the same parameters. Leaf nutrient content (N, P, K, Ca and Mg) was maximum in alternate day drip irrigation and minimum under conventional method. Among mulching treatments, the maximum P, K, Ca and Mg values were found in FYM whereas,

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Mango pollinators in Israel.

Dag, A; Gazit, S

The Kennedy-Leigh Centre for Horticultural Research, The Hebrew University of Jerusalem, Rehovot 76100, Israel.

Key words: crop yield, honey bees, mangoes, open pollination, pollination, pollinators

Journal of Applied Horticulture, 2000, volume 2, issue 1, pages 39-43.

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Abstract: Effective insect pollination is essential for good fruit set and yield in mango (*Mangifera indica*). Insects visiting mango bloom were collected for 3 years (1994-96) in 10 commercial orchards located in all major mango-

growing areas in Israel. Forty-six distinct species or types (not identified to the species level) were found; most belonged to the orders Diptera (26), Hymenoptera (12) and Coleoptera (6). The following species played a significant role in mango pollination in most orchards: two blow flies (*Chrysomya albiceps* and *Lucilia sericata*); the honeybee (*Apis mellifera*) and the housefly (*Musca domestica*). Found in only one or two orchards, in medium to large numbers, were: the hover fly *Episyrphus balfeatus*, the wasp *Bembecinus tridens*, and two beetles, *Cantharis atropoveolatus* and *Omophlus syriacus*. The effectiveness of 12 pollinators was assessed in one orchard. Blow flies were found to be as effective as the honeybee, whereas the housefly was less so. Yield of small caged 'Keitt' mango trees was min

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Detection of variability in *Xanthomonas campestris* pv. *mangiferaeindicae* strains.

Kishun, R; Rajan, S

Central Institute for Subtropical Horticulture, Rehmankhera, P.O. Kakori, Lucknow - 227 107, India.

Key words: antibiotics, cluster analysis, detection, genotypes, geographical distribution, growth, mangoes, pathogenicity, plant pathogenic bacteria, plant pathogens, strains

Journal of Applied Horticulture, 2000, volume 2, issue 1, pages 44-46.

Abstract: Nineteen *X. campestris* pv. *mangiferaeindicae* strains collected from different ecogeographical areas/mango genotypes of India were studied to confirm the existence of variability in the strains on the basis of their pathogenicity on genotypes (9), reaction towards antibiotics (9) and growth on culture media (5). Study revealed the existence of variability in Xcmi strains as exhibited by their differential reaction. The similarity in Xcmi strains was observed by hierarchical cluster analysis. Clustering pattern on these three detection methods indicated that the grouping of strains is not entirely based on their geographical distribution as the strains from northern and southern parts of India falls in a single cluster. However, the strains collected from Bihar exhibited more similarity with each other and clustered in one or nearby cluster in all the detection methods used.

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Population fluctuations of fruit flies, *Bactrocera* spp. in

submountainous mango and guava orchards.

Divender Gupta; Ranjeet Bhatia

Regional Horticultural Research Station, Jachh (Nurpur) - 176 201, India.

Key words: fluctuations, guavas, insect pests, mangoes, monitoring, plant pests, ripening, temperature, traps

Journal of Applied Horticulture, 2000, volume 2, issue 1, pages 47-49.

Abstract: The fruit fly (*Bactrocera dorsalis* and *B. zonata*) population was monitored with the help of bottle traps containing 100 ml aqueous solution of 0.1% methyl eugenol and 0.25% malathion per trap, in mango and guava orchards of submountainous region of Himachal Pradesh, India. The maximum catch of 98.6 and 62.6 males/trap for mixed population was recorded during 30th and 27th standard weeks in 1992 and 1993, respectively, in mango orchard. The corresponding catch in guava orchard was 427.2 and 517.0 during the 37th and 39th standard weeks. There was a significant positive correlation between the trap catch and maximum and minimum temperatures during both the years for both the hosts. The maximum catch coincided with the ripening period of fruits.

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Field evaluation of citrus germplasm for resistance against leafminer, *Phyllocnistis citrella* Stainton.

Arora, P K; Sharma, J N; Thind, S K; Monga, P K

Regional Fruit Research Station, Punjab Agricultural University, Abohar - 152 116, India.

Key words: cultivars, germplasm, grapefruits, insect pests, lemons, limes, mandarins, oranges, pest resistance, plant pests, tangelos, varietal resistance

Journal of Applied Horticulture, 2000, volume 2, issue 1, pages 50-51.

Abstract: Some 8, 18, 3, 9, 5, 7, 3 and 7 cultivars of sweet oranges, mandarins, limes, lemons, grapefruits, trifoliates [*Poncirus trifoliata*], tangelos and other related species (such as *C. taiwanica*) were evaluated for resistance to citrus leafminer (*P. citrella*) under field conditions at Abohar, Punjab, India, during 1995-97. None of the citrus species was found to be free from leafminer infestation. Two cultivars of sweet orange (Campbell Valencia and Heavy Sweet), 1 of mandarin (Kara), 1 of lime (Sweet lime), 1 of lemon (Galgal), 4 of grapefruits (Davis, Marsh Prolific, Redblush and Star Ruby), 6 of trifoliates

(Carrizo, Citrumelo, Pomeroy, Rubidoux, Sacaton Citrumelo and Savage) and 1 of related species (Sadaphal) were found to be least susceptible to leafminer, while 3 cultivars of mandarin (Italian mandarin, Kondanarum and Willow Leaf), 1 of lime (Kagzi lime), 1 of lemon (*Jullundhiri Khatti*) and 2 of related species (Box orange and Karna Khatta) were found highly susceptible.

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Response of planting methods on plant survival and yield of early cauliflower (*Brassica oleracea* var. *botrytis*) under Tarai conditions.

Pankaj Srivastava; Srivastava, B K; Singh, M P

Department of Vegetable Science, G. B. Pant University of Agriculture and Technology, Pantnagar, Udham Singh Nagar, India.

Key words: cauliflowers, crop yield, earliness, growth, maturity, planting, ridges, seedlings, survival

Journal of Applied Horticulture, 2000, volume 2, issue 1, pages 52-53.

Abstract: Four planting methods, i.e. flat planting, flat planting-earthing up, ridge planting and raised bed double row planting, were tested to study the performance of early cauliflower cv. Pant Gobhi-2 grown during rainy season under Tarai conditions of Pantnagar, Uttar Pradesh, India. The cauliflower seedling of 40 days age were planted at 60x45 cm spacing. Earthing up operation was done after one month of transplanting (27 July 1995). The results indicated that the mortality of seedling was significantly lesser in ridge planting compared to flat planting at all the stages of plant growth. The ridge planting resulted in healthy and early plant growth compared to other methods and also showed earliness in curd maturity besides giving higher net curd yield.

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Effect of planting densities on growth, flowering and postharvest quality of cut spike in tuberose (*Polianthes tuberosa*) cv. 'Single'.

Singh, K P; Sangama

Floriculture Laboratory, Indian Institute of Horticultural Research, Hesaraghatta, Lake, PO, Bangalore - 560 089, India.

Key words: crop density, crop quality, crop yield, cut flowers, flowering, growth, plant height, spacing, spikes

Journal of Applied Horticulture, 2000, volume 2, issue 1, pages 54-55.

Abstract: The effect of seven plant spacing, viz. 30x30, 30x20, 30x10, 20x20, 20x12.5, 20x10 and 20x8.5 cm, on vegetative growth, flowering and postharvest quality of cut spikes in tuberose cv. 'Single' was investigated at Bangalore, Karnataka, India, during 1997-98. Wider spacing resulted in longer rachis and heavier individual florets. Closer spacing produced higher yield of cut flower and loose flower per plot basis. Wider and closer spacing have vice versa effect on above floral parameters. Rest of the studied parameters namely, plant height, number of leaves per clump, spike length, diameter of second floret, flowering duration under field condition and number of florets per spike and their corresponding weight and postharvest quality of cut flower were not influenced significantly by the plant densities.

Volume 2(1), 2000

Plant growth and dry matter accumulation in African and French marigold varieties.

Janakiram, T; Rao, T M; Bhatt, R M

Division of Ornamental Crops, Indian Institute of Horticultural Research, Hesaraghatta Lake, Bangalore - 560 089, India.

Key words: crop yield, cultivars, dry matter accumulation, growth, yield components

Journal of Applied Horticulture, 2000, volume 2, issue 1, pages 56-57.

Abstract: Plant growth, dry matter accumulation and its partitioning to different plant parts were studied in two cultivars of African marigold (*Tagetes erecta*) and three cultivars of French marigold (*Tagetes patula*). The cultivars of both African and French types differed significantly in dry matter production. In the African type, Golden Age recorded higher dry matter, while in the French type the maximum dry matter was accumulated by the Harvest Moon cultivar. The difference in the total yield is attributed to the variation in the growth components.

Volume 2(1), 2000

Marketing of apples in Himachal Pradesh - price spreads, problems and strategies.

Dahiya, P S; Saraswat, S P

Central Potato Research Institute, Shimla - 171 001, H.P., India.

Key words: apples, constraints, marketing, marketing margins, price support, prices

Journal of Applied Horticulture, 2000, volume 2, issue 1, pages 58-61.

Abstract: Analysis of the marketing of apples in Himachal Pradesh, India, shows that despite the price support for apples announced since 1981, the marketing system is riddled with myriad problems. Farmers had marketing margins of 41% in 1984-85 and 42% in 1995-96. It is suggested that multipronged strategies should be explored for the future development of horticultural crops in the state in order to achieve better returns for the growers.

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Endogenous hormones and phenols of seedling trees of polyembryonic mango cultivars and their role as rootstocks in scion vigour of cv. Alphonso.

Murti, G S R; Upreti, K K; Kurien, R M; Reddy, Y T N

Plant Hormones Laboratory, Indian Institute of Horticultural Research, Hessaraghatta Lake Post, Bangalore 560 089, India.

Key words: abscisic acid, auxins, chemical composition, cultivars, cytokinins, endogenous growth regulators, growth, IAA, leaves, mangoes, phenols, phloem, plant composition, plant growth regulators, rootstock scion relationships, rootstocks, sap, scions, seedlings,

Journal of Applied Horticulture, 2000, volume 2, issue 1, pages 6-9.

Abstract: Changes in the levels of endogenous hormones, abscisic acid (ABA), cytokinins (t-zeatin riboside (t-ZR) and dihydrozeatin riboside (DHZR)) in xylem sap and leaves and indole acetic acid (IAA) and total phenols in the leaves were determined in seven polyembryonic mango cultivars (Bappakai, Chandrakaran, Furukan, Muvandan, Mylepelian, Olour and Vellaikolamban), which are commonly used as rootstocks. Simultaneously morphological characters were recorded on mango cv. Alphonso of similar age raised on these cultivars as rootstocks to examine whether the hormones and phenols produced by these bear any relationship to the growth and development of scion. Also the stem anatomical features of the shoots of current and previous

year growth were studied in Alphonso grafted on two rootstocks imparting contrasting effects on shoot vigour. The morphological attributes such as tree girth and tree volume of Alphonso were generally higher on rootstocks Muvandan, Bappakai and Olour and least on Vellaikolamban followed by Kuruk

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Use of Logistic, Gompertz and Richards functions for fitting normal and malformed mango panicle growth data.

Shailendra Rajan

Central Institute for Subtropical Horticulture, PO Kakori, Rehmankhera, Lucknow - 227 107, India.

Key words: growth, malformations, mangoes, mathematical models, panicles
Journal of Applied Horticulture, 2000, volume 2, issue 1, pages 62-64.

Abstract: Logistic, Gompertz and Richards functions were used for examining their suitability in fitting growth data of malformed and normal mango panicles. The functional analysis of data indicated that Richards function was a suitable model for summarizing panicle growth data. The model was found to be superior to logistic and Gompertz because of its greater flexibility. The study revealed that Richards function can be successfully used for simulating panicle growth under different treatments and conditions.

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Flower induction for producing off-season mango in Thailand.

Junthasri, R; Nartvaranant, P; Subhadrabandhu, S; Tongumpai, P

Department of Horticulture, Kasetsart University, Bangkok 10900, Thailand.

Key words: application methods, application rates, buds, canopy, climatic factors, cultivars, flowering, foliar spraying, fruit drop, fruit set, inflorescences, mangoes, orchards, paclobutrazol, thiourea

Journal of Applied Horticulture, 2000, volume 2, issue 1, pages 65-70.

Abstract: The technique in producing off-season mango has been adopted in Thailand since 1986. Paclobutrazol, a plant growth retardant, was used in combination with thiourea for producing as well as breaking of flower buds. The studies on application methods showed that soil drenching of paclobutrazol is

more effective for the induction of flowering in mango as compared to foliar spray. The rate of paclobutrazol application depended on the size of tree canopy as well as on mango cultivars. For most cultivars, the rate of paclobutrazol applied is generally determined by multiplying the diameter of tree canopy (expressed in meter) with 1.0-1.5 g of active ingredients of paclobutrazol. At 120 days after the application of paclobutrazol, 0.5% thiourea is usually sprayed to some cultivars for breaking of buds. Using this method, inflorescences are visible within 2.5 to 4 months after the paclobutrazol application depending on cultivar. However, the success in producing off-season mango is also dependent on other factors suc

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Volume 1(2), 1999

Physico-chemical characteristics of some ber varieties in relation to fruit fly incidence.

Arora, P K; Nirmal Kaur; Batra, R C; Mehrotra, N K

Regional Fruit Research Station, Abohar 152116, India.

Key words: varieties, cultivars, fruits, phenols, sugars, quality, insect pests, pest resistance, ascorbic acid, fruit crops, control, agricultural entomology

Journal of Applied Horticulture, 1999, volume 1, issue 2, pages 101-102.

Abstract: Physicochemical characteristics of fruits of eight ber (*Ziziphus mauritiana*) varieties, Chuhara, Gola, Elaichi, Kaithli, Nazuk, Sanaur 2, Umran and ZG-2 in relation to fruit fly infestation were studied at Abohar. Fruit fly (*Carpomya vesuviana*) infestation was positively correlated with fruit weight, pulp-stone ratio, total soluble solids (TSS) and total sugars, whereas, it was negatively correlated to acidity, vitamin C [ascorbic acid] and total phenols. The varieties high in pulp content, TSS, total sugars, low acidity, vitamin C and total phenols were highly susceptible to fruit fly attack. The most resistance varieties were Umran (49% incidence), Gola (40%) and ZG-2 (33%).

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Evaluation of mango cultivars for arid-irrigated region of Punjab.

Sharma, J N; Josan, J S; Thind, S K; Arora, P K

Regional Fruit Research Station, Punjab Agricultural University, Abohar 152116, India.

Key words: cultivars, mangoes, evaluation, fruits, quality, yields, yield components, variety trials, fruit crops

Journal of Applied Horticulture, 1999, volume 1, issue 2, pages 103-104.

Abstract: Four mango cultivars, Dashehari, Langra, Mallika and Amrapali, were introduced from different sources and grown at the Regional Fruit Research Station, Abohar (Punjab), during 1982-83 to allow evaluation under

arid-irrigated conditions. Langra was most vigorous followed by Mallika, Dashehari and Amrapali. Dashehari fruits had the highest total soluble solids content (TSS; 20.04%), reducing sugar content (3.87%), TSS/acid ratio (75.42) and sugar/acid ratio (14.33) with an average fruit yield of 60.22 kg/tree. Fruits of Dashehari and Langra matured during the second week of July whereas those of Mallika and Amrapali matured in the third week of July. On the basis of yield and quality observed under Abohar conditions, cultivation of Dashehari, Langra, Mallika and Amrapali cultivars are recommended for cultivation in the arid-irrigated region of Punjab.

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Effect of modified atmosphere packaging and ethanol on the deastringency process in jamun (*Syzygium cuminii*) fruit.

Mohammed, M; Wickham, L

Department of Food Production, Faculty of Agriculture and Natural Sciences, University of the West Indies, St. Augustine, Trinidad and Tobago.

Key words: modified atmosphere storage, ethanol, packing, fruits, storage, ethephon, ripening, quality, plant growth regulators, responses, keeping quality, storage life, fruit crops, ethylene

Journal of Applied Horticulture, 1999, volume 1, issue 2, pages 105-107.

Abstract: *S. cuminii* [*S. cumini*] fruits were dipped in Ethrel [ethephon] or ethanol and stored at 10 or 30 degrees C for up to 12 days in either sealed low density (LDPE) or high density polyethylene bags (HDPE) or paper bags (PB). Fruits were evaluated for degrees of deastringency and other quality related changes. Ethanol-treated fruits stored in polyethylene bags at 10 degrees C were completely deastringent after 9 days compared with Ethrel-treated fruits over the same period which remained astringent throughout. Untreated control fruits stored at 10 degrees C in paper bags or polyethylene bags showed no changes in astringency and senesced rapidly after 3 and 6 days, respectively. Fruits stored at 30 degrees C, regardless of the packaging or dip treatments, succumbed to 100% decay after 3 days. Despite having the same astringency ratings, ethanol-treated fruits stored in LDPE bags at 10 degrees C were preferred to those stored in HDPE bags based on the lower incidence of decay in the former compared with the latter.

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Influence of postharvest treatment with vapour heat and

hydrogen peroxide based chemical on the quality of mango cv. Baneshan.

Pal, R K; Thomas, R J; Sangeeta Gupta; Lal, B; Singh, N M

Division of Fruits and Horticultural Technology, Indian Agricultural Research Institute, New Delhi 110012, India.

Key words: hydrogen peroxide, mangoes, carotenoids, fruits, heat treatment, quarantine, reducing sugars, ripening, sugars, toxicity, quality, plant physiology, colour, treatment, organoleptic traits, plant composition, chemical composition, fruit crops

Journal of Applied Horticulture, 1999, volume 1, issue 2, pages 108-111.

Abstract: Physiological and physico-chemical changes in mango cv. Baneshan fruits in response to vapour heat treatment (VHT) were compared to those observed after treatment with a hydrogen peroxide based chemical (Virosil-Agro; VS). VHT is the accepted quarantine treatment for export of mangoes. VS is an eco-friendly and biodegradable chemical having little residual toxicity containing H₂O₂ and Ag²⁺. VST had antisenescence effects. VHT enhanced ripening during 14 days of storage compared with the control. VHT resulted in better marketability of fruits due to uniform peel colour development.

Volume 1(2), 1999

Rheological properties of 'Dashehari' mango.

Verma, A K; Singh, M D

Central Institute for Subtropical Horticulture, Rehmankhera, P.O. Kakori, Lucknow 227107, India.

Key words: mangoes, mechanical properties, deformation, fruits, quality, ripening, plant development, fruit crops

Journal of Applied Horticulture, 1999, volume 1, issue 2, pages 112-114.

Abstract: An experiment on force deformation was conducted on mature fruits of mango cv. Dashehari (collected from India). The first yield point in a sample was observed at 0.30 kN with a rupture point at 0.48 kN. Results indicated elastic behaviour up to 0.30 kN force, plastic beyond 0.48 kN and elastoplastic in between 0.30 and 0.48 kN. Strain energy required for first yield point was calculated using $E = F \cdot D / 2$, where E = strain energy, F = force applied and D = deformation. The energy required for the first yield point was calculated as 0.084 Nm and second rupture point was at 0.25 Nm strain energy.

Volume 1(2), 1999

Studies on the preharvest application of chemicals on shelf-life of aonla (*Emblca officinalis* Gaertn.) fruits at ambient temperature.

Yadav, V K; Singh, H K

Department of Horticulture, N.D. University of Agriculture and Technology, Kumarganj 224229, U.P., India.

Key words: fruits, triadimefon, fungicides, disease control, storage decay, thiophanate methyl, quality, storage life, keeping quality, calcium nitrate, calcium, nitrogen, plant composition, chemical composition, plant diseases, plant pathogens, plant pathogenic fun

Journal of Applied Horticulture, 1999, volume 1, issue 2, pages 118-121.

Abstract: The effects of preharvest sprays of 1% calcium nitrate, 0.1% Topsin-M [thiophanate-methyl], 0.1% Bayleton [triadimefon] and their combinations on the storage quality of fruits of *E. officinalis* [*Phyllanthus emblica*] cv. NA-6 were investigated. Treatment with 1% calcium nitrate + 0.1% Topsin-M was the best followed by 1% calcium nitrate + 0.1% Bayleton and 1% calcium nitrate. The lowest weight loss (11.09%) and decay loss (14.43%) were observed in fruits given 2 pre-harvest sprays of 1% calcium nitrate + 0.1% Topsin-M; this treatment prolonged shelf-life to up to 20 days compared with 10 days in the control at ambient temperature. Calcium nitrate-treated fruits had higher concentrations of Ca than control fruits. Treatment with Topsin-M and Bayleton controlled *Penicillium oxalicum* for 10 days and *Aspergillus niger* for 20 days and extended shelf life.

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Response of "Cavendish" banana to different nitrogen levels and their split applications.

Singh, D B; Suryanaryana, M A

Central Agricultural Research Institute, Port Blair 744101, Andaman and Nicobar Islands, India.

Key words: bananas, cultural methods, nitrogen fertilizers, crop yield, pseudostems, growth, plant development, fruit crops, fruits, small fruits

Journal of Applied Horticulture, 1999, volume 1, issue 2, pages 122-124.

Abstract: The effect of N (50, 100, 150, 200 or 250 g/plant), applied all at once or in split doses (2-4 splits), on growth and yield of banana cv. Dwarf Cavendish was investigated during 1994-97 at Port Blair, Andaman and Nicobar Islands. The best growth (height, girth of pseudostem and number of leaves) and bunch yield were observed following application of 200 g N/plant in 4 split doses (2, 4, 6 and 8 months after planting). Increasing N rate from 200 to 250 g/plant delayed flowering/fruiting and was not effective at further increasing bunch size.

Volume 1(2), 1999

Effect of black polythene and rice husk mulch on chemical composition of pineapple.

Prasanta Das; Binita Hazarika

Department of Horticulture, Assam Agricultural University, Jorhat 785013, Assam, India.

Key words: chemical composition, mulches, mulching, plant residues, plastic film, quality, pineapples, polyethylene, rice, ascorbic acid, flowering, fruits, reducing sugars, sugars, fruit crops, small fruits

Journal of Applied Horticulture, 1999, volume 1, issue 2, pages 125-127.

Abstract: Mulching promoted the quality of pineapples cv. Kew, grown in India. Good quality fruits were observed in the black polythene mulch and rice husk (2.5 and 5 cm thick) treatments. The best quality fruits were obtained in the black polythene (50\micro) mulch treatment where plants were mulched throughout the cropping period.

Volume 1(2), 1999



Forecasting model for veneer grafting success in mango.

Rajan, S; Sinha, G C; Lal, B

Central Institute for Subtropical Horticulture, Rehmankhera, P.O. Kakori, Lucknow 227107, India.

Key words: grafting, mangoes, forecasting, mathematical models, relative humidity, temperature, fruit crops, fruits

Journal of Applied Horticulture, 1999, volume 1, issue 2, pages 128-130.

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Abstract: Various models were developed to account for the effect of weather variables on the success of veneer grafting in mango under Lucknow conditions. The influence of weather parameters was described by the model: $GS = 290.946 - 0.239 MA^2 - 20.322 MI - 0.305 MI^2 - 3.58 RH$, where GS = veneer grafting success, MA = maximum temperature, MI = minimum temperature, RH = relative humidity, and RF = rainfall. The use of this model to forecast grafting success based on environmental conditions is discussed.

Volume 1(2), 1999

Studies on the propagation of bael (*Aegle marmelos* Correa) by different grafting methods in West Bengal.

Maiti, C S; Nath, A; Sen, S K

Faculty of Horticulture, Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, Nadia, West Bengal, India.

Key words: medicinal plants, grafting, propagation, shoots, growth, plant development

Journal of Applied Horticulture, 1999, volume 1, issue 2, pages 131-132.

Abstract: The effect of grafting method (whip, splice or cleft grafting) on survival and growth was investigated for *A. marmelos* grown under West Bengal conditions, India, during the monsoon. The best method was whip grafting (70% success and the best shoot growth).

Volume 1(2), 1999

Influence of rootstocks on fruit drop in Kinnow mandarin under dense planting.

Sharma, R R; Goswami, A M; Saxena, S K; Anil Shukla

Division of Fruits and Horticultural Technology, Indian Agricultural Research Institute, New Delhi 110012, India.

Key words: mandarins, rootstocks, citranges, high density planting, fruit drop, fruits, seasonal variation, rootstock scion relationships, thinning, fruit crops, subtropical fruits, citrus fruits

Journal of Applied Horticulture, 1999, volume 1, issue 2, pages 133-134.

Abstract: The effect of rootstock (Troyer citrange, Karna Khatta [*Citrus karna*] and Sohsarkar) on fruit drop was investigated for mandarins grown in high density plantings in India. Plants on all 3 rootstocks showed 2 distinct waves of drop (a very heavy drop in April-May and severe preharvest drop in September-October). Plants on Troyer citrange showed the lowest fruit drop in April-May and the highest pre-harvest fruit drop compared with the other rootstocks. Overall fruit drop was highest in Sohsarkar (86.41%) and lowest in Troyer citrange (69.79%).

Volume 1(2), 1999

Effect of mode of irrigation on the growth of cabbage (*Brassica oleracea* var. capitata).

Prabhat Srivastava; Chauhan, H S

Department of Irrigation and Drainage Engineering, College of Technology, Pantnagar 263145, U.P., India.

Key words: cultural methods, cabbages, irrigation, growth, canopy, climate, growth studies, leaf area, spacing, subsurface irrigation, subtropics, plant development, trickle irrigation, surface irrigation, crop yield, vegetables

Journal of Applied Horticulture, 1999, volume 1, issue 2, pages 135-136.

Abstract: The effects of different methods of irrigation (microsprinkler, drip [trickle] (emitter), drip (microtube) and surface irrigation) on growth of cabbages in India were investigated. Plants were grown at a spacing of 0.5 x 0.6 m. The largest plants with the highest number of leaves and greatest crop canopy were produced in the microsprinkler treatment.

Volume 1(2), 1999

Comparative performance of cabbage (*Brassica oleracea* var. capitata) under different irrigation methods.

Prabhat Srivastava; Chauhan, H S

Department of Irrigation and Drainage Engineering, College of Technology, Pantnagar 263145, U.P., India.

Key words: cultural methods, trickle irrigation, surface irrigation, crop yield, cabbages, irrigation, methodology, spacing, use efficiency, water use, water

use efficiency, plant water relations, vegetables

Journal of Applied Horticulture, 1999, volume 1, issue 2, pages 137-138.

Abstract: The water use efficiencies of cabbages (cv. Golden Acre) irrigated via microsprinkler, drip [trickle], microtube or surface irrigation methods were determined in India. Cabbages were planted at a spacing of 0.5 x 0.6 m. The highest yield was obtained in the microsprinkler irrigation treatment (40.23 t/ha), followed by drip irrigation (38.97 t/ha), surface irrigation (33.76 t/ha) and microtube irrigation (32.54 t/ha). Water use efficiency was highest for drip irrigation, followed by microtube irrigation, microsprinkler irrigation and surface irrigation. Compared with surface irrigation, percentage water savings were 61.44, 59.28 and 36.82% for microtube, drip and microsprinkler methods, respectively.

Volume 1(2), 1999

Combining ability and stability analysis in bittergourd (*Momordica charantia* L.).

Matoria, G R; Khandelwal, R C

Department of Horticulture, Rajasthan College of Agriculture, Udaipur 313001, India.

Key words: fruits, heterosis, hybrids, quantitative traits, yield components, diallel analysis, specific combining ability, stability, general combining ability, cucurbit vegetables, vegetables

Journal of Applied Horticulture, 1999, volume 1, issue 2, pages 139-141.

Abstract: Combining ability and stability analysis for six traits was performed in 45 bitter gourd hybrids derived from a 10 x 10 diallel analysis. The analysis revealed that both additive as well as non-additive gene action were important for all the characters. However, non-additive gene action was predominant for all the traits, except for girth of fruits and number of seeds/fruits. BG-14 was observed to be the best general combiner for yield/vine and most of the other quantitative traits. Among the crosses, Udaipur Local x BG-14 and NBPGR/TCR-727 x Jaunpuri Long showed the highest SCA effects as well as stability in their performance making them suitable for a heterosis breeding programme.

Volume 1(2), 1999

Growth, yield and quality performance of turmeric (*Curcuma longa* L.) genotypes in mid altitudes of Meghalaya.

Chandra, R; Sheo Govind; Desai, A R

ICAR Research Complex for NEH Region, Barapani, Meghalaya 793 103, India.

Key words: genotypes, turmeric, quality, yields, yield components, plant height, rhizomes, yield correlations, spice plants

Journal of Applied Horticulture, 1999, volume 1, issue 2, pages 142-144.

Abstract: Performance of twenty-five genotypes was studied at Barapani for three consecutive years. Among the 19 characters studied, weight of primary finger rhizome recorded the highest level of variability (38.94%) followed by number of primary and secondary finger rhizomes per clump. Plant height, length of leaf, and length, diameter and weight of primary finger rhizome, internodal distance of primary finger rhizome, and rhizome yield per hectare were significantly and positively associated with fresh rhizome yield per clump. A negative correlation between dry rhizome recovery and fresh rhizome yield per clump was observed. PCT 13, PCT 11, GL Puram and PCT 15 showed no significant differences and had higher yields, indicating their suitability for cultivation under mid hill conditions of Meghalaya. Lakadong had poor yields but had the highest curcumin (7.33%) content.

Volume 1(2), 1999

Effect of planting time on plant growth, flower and spike production of tuberose (*Polianthes tuberosa* L.).

Mishra, H P

Department of Floriculture & Landscaping, Rajendra Agricultural University, Pusa, Samastipur, Bihar 848125, India.

Key words: flowers, ornamental bulbs, plant development, planting, bulbs, planting date, flowering, ornamental plants

Journal of Applied Horticulture, 1999, volume 1, issue 2, pages 145-148.

Abstract: The effect of planting date (February-May) on growth and flowering of *P. tuberosa* was investigated during 1995-97 in Bihar, India. Early and late planting produced plants with poor flower and spike yields. Planting bulbs on 7 March followed by 22 March produced plants with a high number of long leaves/clump, thick and big spikes, and a high number of florets and spikes/unit area.

Volume 1(2), 1999

Wilt disease of guava: a national problem.

Dwivedi, S K; Padmanabh Dwivedi

School of Environmental Sciences, B.B. Ambedkar University, Lucknow-226 025, India.

Key words: guavas, reviews, soil solarization, symptoms, plant disease control, plant pathogens, plant pathogenic fungi, plant diseases, chemical control, fungal diseases, biological control, environmental factors, fruit crops, fruits, control, plant pathology

Journal of Applied Horticulture, 1999, volume 1, issue 2, pages 151-154.

Abstract: A review of guava wilt (caused by *Fusarium solani*, *F. longipes*, *F. moniliforme* [*Gibberella fujikuroi*], *F. oxysporum* f.sp. *psidii*, *Macrophomina phaseolina* and *Rhizoctonia* sp.) in India is given. A brief account of the economic importance of guava is followed by the occurrence and symptoms of the disease. The modes of infection, causal organisms, and environmental and chemical factors that guide the development of the disease have also been emphasised. The recent findings made to control the disease severity, including those by chemical and biological methods and soil solarization, are also reviewed.

Volume 1(2), 1999



Effect of temperature on the flowering biology and fertilization of mangoes (*Mangifera indica* L.).

Shu, Z H

Fengshan Tropical Horticultural Experiment Station, TARI, Fengshan, Kaohsiung 830, Taiwan.

Key words: pollination, flowers, plant development, flowering, mangoes, anthers, dehiscence, sex ratio, temperature, cultivars, fruit crops, fruits

Journal of Applied Horticulture, 1999, volume 1, issue 2, pages 79-83.

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Abstract: The effect of 3 temperature regimes (31/25 (warm), 25/19 (moderate) and 19/13 degrees C (cool), day/night) on flowering and pollination in 4 mango cultivars (Haden, Irwin, Keitt and Local) was

investigated in Taiwan. Compared with the moderate treatment, warm temperatures hastened growth rates of panicles and flowers, shortened flowering duration and life span of individual flowers, and decreased the number of hermaphrodite and male flowers. Warm temperatures increased the rates and percentages of anther dehiscence and pollination. In contrast, cool temperatures retarded the growth of panicles and flowers, extended flowering duration and life span of flowers, and increased the number of hermaphrodite and male flowers. Sex ratio was statistically not different among the 3 temperature treatments. The highest number of hermaphrodite flowers occurred during the first third of the flowering period. The highest number of male flowers occurred halfway through the flowering period.

Volume 1(2), 1999

Hormonal physiology of flowering in 'Dashehari' mango.

Sant Ram

G.B. Pant University of Agriculture and Technology, Pantnagar-263 145, U.P., India.

Key words: flowering, mangoes, abscisic acid, auxins, cytokinins, differentiation, flowers, fruiting, plant development, plant growth regulators, cultural methods, gibberellins, inhibitors, paclobutrazol, productivity, pruning, steroids, urea, growth, endogenous gro

Journal of Applied Horticulture, 1999, volume 1, issue 2, pages 84-88.

Abstract: Studies were conducted on alternate bearer mango cv. Dashehari. Dashehari produced a major vegetative flush in March-April followed by 2 minor flushes in June-July and September-October. The major vegetative flush fruited, whereas the other 2 minor flushes did not. Shoots which fruited rarely produced a new vegetative flush soon after crop harvest and also did not flower and fruit in the following season. To promote vigour and productivity, such shoots were forced to produce vegetative growth soon after crop harvest by pruning and application of 1-2% urea. Such treatments failed to induce flowering and fruiting. The concentrations of endogenous growth regulators were determined in shoots. Shoot-tips contained 3 auxins, 8 gibberellins, 11 cytokinins, 11 steroids and an ABA-like inhibitor. High concentrations of auxins, inhibitors, cytokinins and steroids were observed in shoot-tips just prior to or during the period of flower bud differentiation, whereas low concentrations of gibberellins were observed. Gibber

Volume 1(2), 1999

Influence of coloured poly-covers on flowering of mango.

Baghel, B S; Pandey, S K; Nema, B K

Department of Pomology and Fruit Preservation, Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur 482004, India.

Key words: flowering, mangoes, flowers, light, cultural methods, sex, plastic film, covers, plant development, abnormal development, fruit crops, fruits

Journal of Applied Horticulture, 1999, volume 1, issue 2, pages 89-90.

Abstract: The effect of coloured poly-covers (control, white, red, green, blue and yellow) on flowering of mango (cv. Sunderja) was studied during October 1996 to February 1997. Covering twigs with coloured poly-covers influenced flowering. The highest rates of flowering shoots, healthy panicles and hermaphrodite flowers, the longest panicles, and the highest numbers of branchlets/panicle and flowers/panicle were recorded in the red poly-cover treatment. This treatment was better than the control, white and yellow poly-cover treatments, but was at par with the other treatments. The lowest rate of floral malformation, the lowest incidence of male flowers and the lowest ratio of hermaphrodite to male flowers (1:3.05) were also observed in the red poly-cover treatment.

Volume 1(2), 1999

Critical studies on the effect of growth regulators on *in vitro* shoot proliferation in *Rosa x hybrida* L. cv. Sonia for micropropagation.

Singh, S K; Syamal, M M

Department of Horticulture, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi 221005, India.

Key words: plant growth regulators, *in vitro* culture, *in vitro* regeneration, roses, micropropagation, gibberellic acid, IBA, NAA, rooting, acclimatization, roots, ornamental woody plants, shoots, gibberellins, tissue culture, ornamental plants, auxins, cytokinins

Journal of Applied Horticulture, 1999, volume 1, issue 2, pages 91-93.

Abstract: A micropropagation method for roses cv. Sonia is presented. Shoot proliferation was best (70.3%) on MS [Murashige and Skoog] medium supplemented with BAP [benzyladenine] at 2 mg/litre + NAA at 0.1 mg/litre + GA3 at 0.01 mg/litre, with a proliferation of >5 microshoots per subculture.

Efficient rooting was achieved on half-strength MS medium supplemented with IBA at 0.2 mg/litre + NAA at 0.1 mg/litre. Rooted plantlets were acclimatized for 3 weeks and planted out under field conditions with a survival of over 70%.

Volume 1(2), 1999

Kanamycin sensitivity in cultured tissues of cauliflower.

Sonali Dixit; Srivastava, D K

Department of Biotechnology, Dr. Y.S. Parmar University of Horticulture and Forestry, Solan, HP, India.

Key words: cauliflowers, callus, cotyledons, explants, in vitro regeneration, kanamycin, in vitro selection, vegetables, biotechnology

Journal of Applied Horticulture, 1999, volume 1, issue 2, pages 94-96.

Abstract: Kanamycin sensitivity studies were conducted to study the resistance level of kanamycin in cauliflower (*Brassica oleracea* var. botrytis, cv. Pusa Snow Ball). Increasing doses of kanamycin (10, 20, 30, 40, 50 mg/litre) were given to hypocotyl and cotyledon explants to determine a minimum concentration of kanamycin required for selection of putative transformed cells during transformation. Decreases in fresh weight in both cotyledon and hypocotyl tissues were observed with increasing in kanamycin concentration. Even 50 mg/litre kanamycin did not completely inhibit the growth but callus formation and shoot regeneration was affected. It is suggested that at least 20-30 mg/litre kanamycin would be necessary to select resistant transformants in callus and shoot cultures.

Volume 1(2), 1999

Effect of defoliation, decapitation and deblossoming on fruit bud differentiation in guava (*Psidium guajava* L.).

Gorakh Singh; Singh, A K; Rajan, S

Central Institute for Subtropical Horticulture, Rehmankhera, P.O. Kakori, Lucknow 227107, India.

Key words: deblossoming, defoliation, differentiation, guavas, emergence, flowers, buds, plant development, cultural methods, ringing, pruning, seasonal variation, cultivars, fruit crops, fruits

Journal of Applied Horticulture, 1999, volume 1, issue 2, pages 97-100.

Abstract: Complete removal of leaves, along with decapitation of shoots, promoted flower bud differentiation (FBD), while ringing with partial or complete defoliation along with decapitation of shoots did not promote FBD. Decapitation of leafy shoots also promoted FBD, increasing from 44 to 63% and 37 to 54% in Sardar and Allahabad Safeda, respectively. Defoliation of same age shoots (1-3 months old) at different times of the year influenced FBD. In many cases, defoliation did not promote flowering compared with controls. Principal component analysis revealed that the time of shoot emergence was the decisive factor for FBD in 1-, 2- and 3-month-old shoots. Defoliated shoots put forth terminal extension or axillary growth, while in undefoliated ones only terminal growth took place. There is a strong indication that in guava, leaves play a favourable role in flower bud formation.

Volume 1(1), 1999

Breeding for dwarf genotypes in mango.

Yadav, I S; Dinesh, M R

Division of Fruit Crops, Indian Institute of Horticultural Research, Hessarghatta, Bangalore, Karnataka, India.

Key words: mangoes, evaluation, dwarfing, plant height, fruits, plant morphology, plant breeding, fruit crops

Journal of Applied Horticulture, 1999, volume 1, issue 1, pages 24-26.

Abstract: Nine mango [*Mangifera indica*] genotypes having dwarf stature were compared to the control Alphonso for morphological and fruit characteristics, in order to identify those with potential for use in breeding programmes. Varieties Kerala Dwarf and Janardhan Pasand were the most suitable for usage as donor parents.

Volume 1(1), 1999

Improvement of some under-utilised fruits through selection.

Singh, I S; Srivastava, A K; Singh, V

N.D. University of Agriculture and Technology, Kumarganj, Faizabad, U.P., India.

Key words: fruits, germplasm, tropical tree fruits, chemical composition, quality, genetic improvement, fruit crops, plant genetic resources

Journal of Applied Horticulture, 1999, volume 1, issue 1, pages 34-37.

Abstract: A survey of bael (*Aegle marmelos*), jamun (*Syzygium cumini*), mahua (*Bassia latifolia* [*Madhuca longifolia*]), lasora (*Cordia myxa*), wood apple (*Feronia limonia* [*Limonia acidissima*]), monkey jack (*Artocarpus lakoocha* [*A. lakucha*]) and karonda (*Carissa carandas*) growing regions, particularly in eastern Uttar Pradesh, was conducted to examine the variability in existing germplasm for selection of desirable genotypes. Information was recorded on fruit physical and chemical characteristics, and much variability was observed. Some desirable traits were identified.

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Volume 15(1), 2013



Post-tsunami collection of polyembryonic mango diversity from Andaman islands and their *ex situ* reaction to high sodium in sodic soil

T. Damodaran, Shailendra Rajan, Ram Kumar, D.K. Sharma, V.K. Misra, S.K. Jha and R.B. Rai

Central Soil Salinity Research Institute, RRS, Lucknow, India

Key words: Polyembryony, mango, natural selection, tsunami, Andaman Islands, sodium toxicity, tolerance, sodic soils, mortality

Journal of Applied Horticulture, 2013, volume 15, issue 1, pages 21-25.

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Abstract: The study includes collection of polyembryonic mango types from tsunami affected areas of the South Andaman district where trees are under natural selection pressure for salt tolerance and screening of collections against high sodium in sodic soils *ex situ*. Forty two accessions were located and collected on the basis of phenotypic expression and indentation level in tsunami. Out of which 15 diverse polyembryony types from different locations were evaluated for survival and growth in sodic soils of pHe 9.51 and sodium (Na⁺) 21.20 meq/L at Lucknow. The mortality percentage and relationship between the salt tolerance potential of the selections and Na⁺ / K⁺ ratio, root length and shoot length were investigated. Based on mortality in *ex situ* screening, collected types were classified into different groups. An increase in pH and Na⁺ concentrations led to higher mortality (96.67 -100.00 %) in polyembryonic seedlings when compared to salt tolerant types (3.33-16.678 %). Six accessions GPL-1, GPL-3, ML-3, ML-4, ML-2 and GPL-4 exhibited tolerance to high soil sodium content and pH. Accessions GPL-1 and ML-2 collected from sites affected by inundation of sea water during tsunami under acid saline soil conditions were found to have the highest tolerance level. These accessions accumulated comparatively higher amounts of K⁺ ions in leaves than other accessions. They also had lower Na⁺ / K⁺ ratio which was even lower than the other tolerant collections. The collections demonstrated an increase in the root and shoot length and significant negative correlation with

mortality of the seedlings ($r = 0.97$ and 0.98 , respectively). The study revealed the importance of natural selection of mango polyembryony seedlings for salt tolerance and scope of its utilization.

Volume 14(2), 2012

Postharvest microbial diversity on major cultivars of Indian mangoes

S.N. Jha, Pranita Jaiswal, K. Narsaiah, Rishi Bhardwaj, Poonam Preet Kaur, Ashish Kumar Singh, Rajiv Sharma and R. Kumar

Agricultural Structures and Environmental Control Division, Central Institute of Postharvest Engineering & Technology, Ludhiana 141004, India.

Key words: Bacteria, biochemical, diversity, filamentous fungi, mango, relative abundance

Journal of Applied Horticulture, 2012, volume 14, issue 2, pages 102-109.

Abstract: Microbial diversity on fruit surface of nine mango cultivars (Alphonso, Banganapalli, Chausa, Dashehri, Kesar, Langra, Mallika, Maldah and Neelam) harvested from orchards of nine Indian states (Andhra Pradesh, Bihar, Gujarat, Karnataka, Maharashtra, Orissa, Punjab, Tamil Nadu and Uttar Pradesh) were studied using standard methods. A total of 47 fungal and 123 bacterial isolates were purified from 761 mango samples, which included 63 Gram positive and 60 Gram negative bacterial isolates. The relative abundance of Gram positive, Gram negative bacteria and different filamentous fungi varied among cultivars. Gram positive bacteria dominated on Langra of Uttar Pradesh, while Dashehri from Punjab showed dominance of Gram negative bacteria. Among total fungal isolates, the common genera were *Aspergillus* and *Fusarium*, while among bacterial isolates, the most common genera were *Bacillus*, *Aeromonas*, *Pseudomonas*, *Lactobacillus*, *Citrobacter*, *Mycobacterium* and *Serratia*. Alphonso and Kesar variety from Maharashtra showed maximum and minimum fungal diversity, respectively. Genera and species identified include members known for spoilage of fruits; having all types of pectinase and cellulase activities and those used in biocontrol of plant pathogens.

Volume 14(1), 2012

Allelopathic effect of orchard soils on seedling growth of rough lemon (*Citrus jambhiri* Lush.)

R.P.S. Dalal, Navjot, A. Thakur, A.S. Sidhu and J.S. Brar

Punjab Agricultural University, Regional Station, Bathinda 151001, India.

Key words: Allelopathy, *Citrus jambhiri*, old orchard soils, seedling growth, nutrients.

Journal of Applied Horticulture, 2012, volume 14, issue 1, pages 77-80.

Abstract: An experiment was conducted to study the allelopathic potential of old orchard soils on the seedling growth of rough lemon. Soils from the root zone spheres of eight orchards of mango, aonla, peach, pomegranate, citrus, pear, ber, guava and virgin soil as a control was used for raising the seedlings. The rough lemon *Jatti khatti* seedlings of one and a half year old raised in aonla, ber and peach orchard soil as growing media showed the reduction in shoot length (40-50%), leaf number (46-63%), leaf area/ plant (62-69%) and shoot dry weight (79-83%). The root length was most inhibited by ber, aonla and peach orchard soils. The percent reduction in root dry weight (11.23-34.48%) of the seedling was not in equal proportion to reduction in root volume (42.55- 55.86%). Root dry weight density varied between 0.55-0.96 g mL⁻¹ and root: shoot ratio between 1.42-1.82. Whereas, in citrus, mango, pomegranate, ber and guava orchard soils, the percent reduction in root dry weight was in equal proportion to root volume and root dry weight density varied between 0.41-0.49 g mL⁻¹ and root: shoot ratio between 0.44-0.72. The shoot and root growth of the seedlings was at par when raised in citrus and pomegranate orchard soil as growing media. Leaf N and P contents increased, whereas, Ca and Mg decreased in all the orchard soils except citrus and pomegranate orchard soils as growing media. Leaf Fe, Cu and Mn contents in all the orchard soils as growing media were in toxic range except citrus and pomegranate orchard soils. Overall, the orchard soils of deciduous fruit plants showed more allelopathic effect than the soils growing evergreen fruit plants in citrus cultivation.

Volume 13(2), 2011



Intraspecific somatic hybridization of mango (*Mangifera indica* L.) through protoplast fusion

Ramezan Rezazadeh, Dion K. Harrison and Richard R. Williams

The University of Queensland Gatton, School of Agriculture and Food Sciences, Gatton Qld 4343, Australia.

Key words: Flow cytometry, Haden, Keitt, Tommy Atkins, Kensington Pride,

Mangifera indica L., PEG, PEMs, RAF, somatic embryo.

Journal of Applied Horticulture, 2011, volume 13, issue 2, pages 101-107.

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Abstract: Somatic hybridization of mango via protoplast fusion was attempted at cultivar level. Enzymatically isolated protoplasts from leaves of greenhouse-grown seedlings of cvs. 'Tommy Atkins', 'Keitt' and 'Haden' and from proembryonic masses (PEMs) of cv. 'Kensington Pride' were used. Protoplasts were fused by polyethylene glycol (PEG), embedded in Ca-alginate beads and cultured in shallow liquid culture on shaker (30 rpm). After 4 weeks, Ca-alginate beads were depolymerized and released microcolonies of PEMs were plated onto the solid culture media. After two consecutive subcultures, fast growing large clumps of PEMs were picked up and cultured as PEMs line for analyses. Flow cytometry analysis of 242 PEMs lines revealed 41 tetraploid lines. DNA fingerprinting of the regenerated embryos from the tetraploid lines showed that only four lines were somatic hybrids, all resulting from 'Haden' + 'Kensington Pride' protoplast fusions. By contrast, the tetraploid lines from 'Keitt' + 'Kensington Pride' and 'Tommy Atkins' + 'Kensington Pride' were autotetraploids. Root-tip chromosome counts on resulting germinated cotyledonary embryos confirmed that somatic hybrid embryo lines had a chromosome number of $2n=4x=80$ compared to diploid parents ($2n=2x=40$). Of 50 deflasked somatic-hybrid, *in vitro* plantlets with true leaves only 3 plantlets formed the healthy apical bud (meristem) in the soil and grew normally.

Volume 13(2), 2011



Application of extended BBCH Scale for phenological studies in mango (*Mangifera indica* L.)

Shailendra Rajan, Divya Tiwari, V.K. Singh, Pooja Saxena, Shilpi Singh, Y.T.N. Reddy, K.K. Upreti, M.M. Burondkar, A. Bhagwan and Richards Kennedy
Central Institute for Subtropical Horticulture, Rehmankhera, Lucknow. Indian Institute of Horticultural Research, Bangalore.

Key words: BBCH scale, Biologische Bundesanstalt, Bundessortenamt and Chemische Industrie, mango, phenology, phenophase, flowering, growth

Journal of Applied Horticulture, 2011, volume 13, issue 2, pages 108-114.

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Abstract: Phenological studies are important for understanding the influence of weather dynamics on vegetative growth, flowering and fruiting on mango. BBCH (Biologische Bundesantalt, Bundessortenamt and Chemische Industrie) scale was used for data recording and to assess utility of the scale in mango phenological studies. Phenological stages of the mango were recorded at weekly intervals on 60 shoots of cultivar Totapuri at five diverse locations for testing usefulness of scale under different diverse ecologies and data from one location, *i.e.*, Lucknow (26° 54' N and 80° 48' E) was used for analysis. Existing BBCH scale was modified on the basis of data recorded for mango in which seven out of 10 principal stages were used, starting with bud development (stage 0) and ending with maturity of fruit (stage 8). Three digit scale was used for inclusion of the mesostages between the principal and secondary growth stages. Highly recurring flowering phenophases were 511 (18 %), 513 (20 %) recorded in standard week 9 and 517 (45 %) in standard week 11 (March). Other important phenophases, 619 (38 %) and 709 (10 %) occurred during standard weeks 13 and 22 to 23, respectively. A high degree of variation in shoots representing principal growth stages *viz.*, vegetative bud, leaf and shoot development was observed due to simultaneous transition of the stages during standard week 33 to 42 and 4 to 24. Limitations of existing BBCH scale and comprehended modifications have been proposed and discussed. The study revealed that the extended BBCH-scale for mango can be widely used because of its utility in describing all phenophases pertaining to bud, shoot, leaf, panicle and fruit development and indicated the incisive growth pattern of the shoots and seasonal variation. This is the first report on quantitative analysis of mango phenological data using BBCH scale.

Volume 12(2), 2010

Vapour heat quarantine treatment for Taiwan native mango variety fruits infested with fruit fly

ThiNghiem Le, ChingChang Shiesh, HueyLing Lin and Elsa Lee

Graduate School of Horticultural Department, Chung Hsing University, 250 Kuo Kang Road, Taichung, Taiwan. Horticultural Department, Chung Hsing University. 250 Kuo Kang Road, Taichung, Taiwan.

Key words: Vapour heat, oriental fruit fly, quarantine pests, 'Tuu Shien' mango
Journal of Applied Horticulture, 2010, volume 12, issue 2, pages 107-112.

Abstract: The objective of the research was to evaluate the efficacy of Vapour heat treatments (VHT) to disinfest the Taiwan native mango variety fruits (Tuu

Shien) from the oriental fruit fly (*Dacus dorsalis* Hendel) and the effect of the treatments on the quality of mango fruits. The three stage treatment of forced air at 30°C for 30 minutes, 30 to 48°C for 60 minutes, and then 48°C forced hot air with saturated humidity over the mango fruit surface until the fruit centre temperature reached 46.5°C and fruit was held for 40 minutes. Survival tests showed that both second and third generation instars were more susceptible to the VHT than eggs and there were no surviving oriental fruit fly after 46.5°C for 40 min. The quality of local mango fruits treated with VHT and stored at ambient temperature (28 ± 3°C) for 6 days was not significantly different from the control.

Volume 10(2), 2003

Relationship of arbuscular mycorrhizal fungi and *Azotobacter* with plant growth, fruit yield, soil and leaf nutrient status of mango orchards in north-western Himalayan region of India

Som Dev Sharma and Pramod Kumar

Scientist, Department of Pomology, Dr. Y S Parmar University of Horticulture and Forestry, Solan, HP-173 230 India; Research Officer(R & D Agriculture), Rashtriya Chemicals & Fertilizers Limited (GOI), Chembur, Mumbai-74, India.

Key words: AM fungi, *Azotobacter*, root colonization, correlation, mango
Journal of Applied Horticulture, 2003, volume 10, issue 2, pages 158-163.

Abstract: The present investigation was undertaken with the objective to find out the nutritional status of mango orchards cv. Dashehari located in north-western Himalayan region of India and to establish the relationship of soil microflora especially, arbuscular mycorrhizal (AM) fungi and *Azotobacter* with growth, fruit yield, and soil and leaf nutrient contents. The study revealed that the correlation between AM spore population and shoot extension growth, leaf area, fruit yield, available Cu and Zn content and leaf N, P, Cu, Zn and Mn contents was found to be positive and significant, whereas, the relationship with soil as well as leaf K content was negative but significant. *Azotobacter* count was positively and significantly correlated with fruit yield, soil organic carbon (OC) and leaf Fe content, while, it was negative and significant with leaf K content. The relationship of per cent root colonization with soil OC and available N content of orchard soil was found to be positive and significant, and with shoot extension growth, leaf area, fruit yield, electrical conductivity, available P, K, Cu, Zn and Mn content and P, K and Cu contents of leaf, it was negative but non-significant.

Volume 5(2), 2003



The impact of panicle and shoot pruning on inflorescence and yield related developments in some mango cultivars.

Yeshitela, T; Robbertse, P J; Stassen, P J C

Department of Plant Sciences, Alemaya University, P.O. Box 165 Dire Dawa, Ethiopia.

Key words: crop yield, cultivars, flowering, fruiting, fruits, growth, mangoes, pruning

Journal of Applied Horticulture, 2003, volume 5, issue 2, pages 69-75.

[Full text PDF |](#)

Abstract: In a study conducted at Bavaria Estate, Hoedspruit, the northern province of South Africa, the mango cultivars Keitt and Tommy Atkins were subjected to the following treatments over 2 seasons: (1) inflorescence removal at the point of apical bud attachment during full bloom; (2) inflorescence removal together with apical whorl of leaves subtending the inflorescence (about 5 cm from the tip) during full bloom; (3) removal of 50% of the total inflorescences (every alternate shoot of the tagged branches) together with apical whorl of leaves subtending the inflorescence during full bloom; (4) renewal pruning where 20-30% of termination shoots with weak, misshaped and small fruits were cut back to a suitable node in October; (5) postharvest pruning where termination shoots that had been bearing fruits the previous season were cut back to a suitable node; (6) removal of terminal buds just before bud break; and (7) no pruning treatments (control). Pruning at the point of apical bud attachment induced re-flowering, m

Volume 5(1), 2003

Genetic studies in mango (*Mangifera indica* L.).

Dinesh, M R

Division of Fruit Crops, Indian Institute of Horticultural Research, Hessaraghatta, Bangalore - 560 089, India.

Key words: crop quality, crosses, cultivars, fruits, genetic variance, genetic

variation, heritability, heterosis, mangoes, phenotypic variation, reciprocal effects

Journal of Applied Horticulture, 2003, volume 5, issue 1, pages 27-28.

Abstract: A study was conducted in Bangalore, Karnataka, India to determine the presence of reciprocal effects and to assess the parents best suited for the transfer of desirable characters in commercial cultivars of mango. The cultivars Alphonso, Banganapalli, Neelum, Kalapadi and Janardhan Pasand were utilized for crossing, including reciprocals. The F1 intervarietal progenies of the combinations Alphonso x Banganapalli, Alphonso x Neelum, Alphonso x Kalapadi and Alphonso x Janardhan Pasand were evaluated for different characters, i.e. fruit weight, fruit volume, total soluble solids (TSS), skin weight, stone weight and pulp percentage. The study showed that non-additive variance controls the characters. Heritability was low and the chances of hybrid vigour manifesting for the characters in the F1 generation were high. Selection of progenies can be made based on fruit size, i.e. medium-sized fruits will have good TSS and big-sized fruits will decrease this character. For the characters studied, the phenotypic coefficient

Volume 4(1), 2002

Studies on fruit-bud differentiation in mango (*Mangifera indica* L.) under South Indian conditions.

Humayun, M; Babu, R S

Department of Horticulture, S.V. Agricultural College, Tirupati - 517 502, Andhra Pradesh, India.

Key words: buds, carbohydrates, carbon nitrogen ratio, chemical composition, cultivars, fruiting, fruits, mangoes, nitrogen, nitrogen content, plant composition

Journal of Applied Horticulture, 2002, volume 4, issue 1, pages 27-29.

Abstract: The period of fruit bud differentiation (FBD) in mango cultivars AU-Rumani, Neeleshan, Neeluddin, Baneshan, Bangalora and Neelam grown in Tirupati, Andhra Pradesh, India was studied during 1998 and 1999. In general, FBD commenced on the 3rd week of September and was completed on the 3rd week of November. However, the onset of FBD and peaks of differentiation varied among the cultivars. The first sign of FBD (stage II) was observed in AU-Rumani on the 3rd week of September, and 100% differentiation was observed towards the end of October. In Neeleshan and Baneshan, stage II was observed on the 4th week of September, and 100% differentiation was evident

towards the 2nd week of November. In Neeluddin, Bangalora and Neelum, stage II occurred during the 1st week of October, and 100% differentiation was evident on the 2nd and 3rd weeks of November. In general, the total carbohydrate fraction and C/N ratio were greatest at 100% FBD, whereas the total N fraction was lowest during FBD. At FBD, the total carbohydrate f

Volume 3(2), 2001



Variation in canopy characteristics of mango (*Mangifera indica* L.) cultivars from diverse eco-geographical regions.

Shailendra Rajan; Ram Kumar; Negi, S S

Central Institute for Subtropical Horticulture, Rehmankhera, P.O. Kakori, Lucknow - 227 107, India.

Key words: canopy, colour, crop quality, foliage, foliage area, fruits, genetic variation, leaf area index, mangoes

Journal of Applied Horticulture, 2001, volume 3, issue 2, pages 95-97.

[Full text PDF |](#)

Abstract: A study was conducted Lucknow, Uttar Pradesh, India, to study foliage density and canopy diffuse non-interceptance in 26 Indian mango cultivars. The indirect measurement of leaf area index (LAI) and diffuse non-interceptance (DNI) was conducted using output of concentric silicon detectors placed at five zenith angles on the sensing head of LAI-2000, which recorded significant variability in foliage density (LAI=1.18-4.48). DNI values also exhibited large variation, which ranged from 0.02 to 0.36. UPGMA cluster analysis of the data revealed that Bangalora, Fazri, Neelum, Vanraj, Dashehari, Alphonso, Lucknow Safeda, and Banganapalli had similarity in tree leaf component. Nisar Pasand, Kishan Bhog, and Bombay Green had compact and dense canopy with more foliage component. Papatio and Fernandin exhibited comparatively less foliage under Lucknow conditions. Prabhashankar and Chausa showed similarity and were closer to compact canopy group. In general, east and north Indian cultivars recorded more foliage component

Volume 3(2), 2001

Changes in the activity of nitrogen utilizing enzymes during development of malformed and normal panicles of mango

(*Mangifera indica* L.).

Singh, V K; Saini, J P; Misra, A K

Central Institute for Subtropical Horticulture, Rehmankhera, PO. Kakori, Lucknow - 227 107, India.

Key words: chemical composition, crop growth stage, cultivars, enzyme activity, enzymes, glutamate dehydrogenase, glutamate synthase, glutamate ammonia ligase, mangoes, nitrate, nitrate reductase, nitrogen content, panicles, plant composition, plant disorders, prote

Journal of Applied Horticulture, 2001, volume 3, issue 2, pages 91-94.

Abstract: The activity of nitrogen-utilizing enzymes, i.e. nitrate reductase (NR), glutamine synthetase [glutamate-ammonia ligase] (GS), glutamate synthase (GOGAT), and glutamate dehydrogenase (GDH), during the development of healthy and malformed panicles of mango cultivars Amrapali and Dashehari was studied in Lucknow, Uttar Pradesh, India, during 1995-97. Healthy and malformed panicles were evaluated at stages I (fully developed apical bud), II (flower bud at inception), III (fully grown panicles prior to full bloom), and IV (fully developed panicle at the full bloom stage). NR activity was significantly reduced in normal panicles from stage I to IV in both cultivars. Non-significant changes were observed in the malformed panicles of Amrapali. In general, the activity of GS and GOGAT followed the same trend. Contrary to the activity of NR, GS, and GOGAT, a sharp increase in GDH activity was observed in malformed panicles at the early stage of panicle development. GDH activity, which was highest at stage II in both c

Volume 3(2), 2001

Effect of paclobutrazol on source-sink relationship in mango (*Mangifera indica* L.).

Kurian, R M; Reddy, Y T N; Sonkar, R K; Reddy, V V P

Division of Fruit Crops, Indian Institute of Horticultural Research, Hesaraghatta Lake Post, Bangalore - 560 089, India.

Key words: cultivars, fruits, leaf area, leaves, mangoes, paclobutrazol, photosynthates, plant growth regulators, ringing, source sink relations, translocation

Journal of Applied Horticulture, 2001, volume 3, issue 2, pages 88-90.

Abstract: The effects of paclobutrazol on the fruit-leaf ratio of twelve-year-old

trees of mango cultivars Alphonso and Dashehari were studied in Bangalore, Karnataka, India. The soil was drenched with paclobutrazol at 0.0, 2.5, or 7.5 g a.i. per tree. In each paclobutrazol-treated tree, photosynthate and metabolite translocation to 30 leaves with a single fruit was inhibited by girdling the branch (1 cm wide ring of bark) at a uniform distance from the fruit. Girdling was conducted when Dashehari fruits were 4.9+or-0.7 cm long and weighed 27.9+or-8.5 g, and when Alphonso fruits were 4.0+or-1.0 cm long and weighed 32.9+or-7.5 g. Twenty-eight fruits on ungirdled shoots of trees not treated with paclobutrazol served as the control. In the two cultivars, thirty leaves were not sufficient to promote the growth of a single fruit, especially when the tree was not treated with paclobutrazol. In untreated trees, the weight of fruits from girdled trees of Alphonso and Dashehari was only 60.2 and 64.9%, respectively, of the cont

Volume 3(2), 2001

Leaf and soil nutrient status of mango (*Mangifera indica* L.) grown in peninsular India and their relationship with yield.

Reddy, Y T N; Kurian, R M; Sujatha, N T; Srinivas, M

Indian Institute of Horticultural Research, Hessaraghatta, Bangalore - 560 089, India.

Key words: chemical composition, correlated traits, crop growth stage, crop yield, cultivars, leaves, mangoes, mineral content, nitrogen, nitrogen content, nutrient availability, nutrient content, phosphorus, plant composition, plant nutrition, potassium

Journal of Applied Horticulture, 2001, volume 3, issue 2, pages 78-81.

Abstract: Twenty-five mango orchards in Nuzvid (Andhra Pradesh), Srinivaspur (Karnataka), and Krishnagiri (Tamil Nadu), India, were evaluated for leaf and soil nutrient status from 1994 to 1997. Banganapally was grown in 5 orchards, Alphonso in 5 orchards, and Totapuri in 15 orchards. The trees in Karnataka and Andhra Pradesh were 30- to 40-year-old, whereas those in Tamil Nadu were 20-year-old. The high-yielding trees had higher leaf N content than the low-yielding trees. The orchards in Andhra Pradesh had the highest leaf and soil nutrient (N, P, and K) levels. The available soil N significantly varied between high-yielding and low-yielding trees only before the flowering stage. The available soil P and K did not significantly vary with the growth stage. The high-yielding orchards recorded higher soil N and P, and lower soil K than the low-yielding orchards. Fruit yield was positively correlated with leaf N before and during flowering, with leaf P after harvest, and with leaf K before

flowering. Fruit yield was posi

Volume 3(1), 2001

Powdery mildew - a serious disease of mango.

Misra, A K

Central Institute for Subtropical Horticulture, Rehmankhera, PO. Kakori, Lucknow - 227 107, India.

Key words: application date, chemical control, cultural control, fungal diseases, fungicides, integrated control, mangoes, plant disease control, plant diseases, plant pathogenic fungi, plant pathogens, symptoms

Journal of Applied Horticulture, 2001, volume 3, issue 1, pages 63-68.

Abstract: Powdery mildew caused by *Oidium mangiferae*, is the most important disease of mango. It is reported from 35 countries in the world and reported to cause up to 90% loss in India. Besides inflorescence infection, it causes different types of symptoms on leaves and fruits. Based on epidemiological studies and control measures conducted for the last 15 years at CISH, Lucknow (Uttar Pradesh, India), a disease cycle and an integrated disease management practice is proposed. Disease can easily be controlled by adopting suitable cultural practices and timely application of spray schedule. As the disease is weather-sensitive, need-based control measures are suggested based on the prevailing environmental conditions.

Volume 2(2), 2000

Leaf nutrient status of polyembryonic mango varieties and that of cv. Alphonso grafted on to some of these rootstocks.

Reddy, Y T N; Kurian, R M

Division of Fruit Crops, Indian Institute of Horticultural Research, Hessaraghatta Lake, Bangalore 560 089, India.

Key words: calcium, chemical composition, copper, cultivars, iron, leaves, magnesium, manganese, mangoes, mineral content, nitrogen, nutrient content, phosphorus, plant composition, plant nutrition, potassium, rootstock scion relationships, rootstocks, scions, zinc

Journal of Applied Horticulture, 2000, volume 2, issue 2, pages 106-107.

Abstract: The leaf nutrient status of twelve ungrafted polyembryonic mango

cultivars (Bappakai, Chandrakaran, Kensington, Muvandan, Mylepelian, Nekkare, EC 95862, Olour, Kitchner, Kurukan, Vellaikulumban, and Starch), and that of cv. 'Alphonso' grafted onto seven of the aforementioned cultivars, was determined to generate preliminary information on the role of rootstocks in mango nutrition. All seedlings and grafted plants were thirteen years old, growing in a compact block with uniform cultural practices. Differences among polyembryonic seedlings were highly significant for N, P, K, Ca, and Mn, and significant for Mg, Cu, Zn, and Fe. 'Alphonso' scion growing on the polyembryonic rootstocks revealed highly significant differences for N, significant differences for Ca and Fe, and non-significant differences for P, K, Mg, Mn, Cu, and Zn contents in leaves. Vigorous rootstocks, viz., Muvandan, Bappakai, and Olour, resulted in higher leaf nitrogen concentration of 'Alphonso' scion while the least vigorous rootstock viz., V

Volume 2(2), 2000

Postharvest disinfestation of mango (*Mangifera indica* cv. Manila) with controlled atmospheres.

Leon, D M; Ortega, D A; Cabrera, H; Cruz, J de la; Parkin, K L; Garcia, H S
UNIDA, Instituto Tecnológico de Veracruz, Apdo. Postal 1420, Veracruz, Ver.
91860, Mexico.

Key words: carbon dioxide, chemical composition, colour, controlled atmosphere storage, crop quality, disinfestation, fruits, insect pests, larvae, mangoes, oxides, pest control, pH, postharvest treatment, reducing sugars, sensory evaluation, spongy tissue, storage

Journal of Applied Horticulture, 2000, volume 2, issue 2, pages 71-75.

Abstract: Manila mangoes were infested in the tree by allowing fertile *Anastrepha obliqua* female flies to oviposit on fruits contained inside cages. Infested mangoes were exposed to nine different controlled atmospheres (CA) containing combinations of 1, 3, or 5% O₂ and 30, 50, or 70% CO₂. Surviving larvae were enumerated after subjecting the mangoes to CA for 1 to 5 days. Selected compositional and physical parameters (weight loss, pH, titratable acidity, colour, soluble solids, reducing sugars, and texture) were analysed during post-treatment ripening. Fully ripened fruits were also subject to sensory evaluation using a non-structured hedonic scale and a trained panel. CA containing 1% O₂ and either 30 or 50% CO₂ effectively killed all larvae present in treated fruits. These treatments did not alter the composition or sensory characteristics of fully ripened mangoes. However, losses of 20 to 25% of fruits on the basis of sensory acceptability were attributed to the

development of "spongy" tissue. CAs containing 70% C

Volume 2(1), 2000

Flower induction for producing off-season mango in Thailand.

Junthasri, R; Nartvaranant, P; Subhadrabandhu, S; Tongumpai, P

Department of Horticulture, Kasetsart University, Bangkok 10900, Thailand.

Key words: application methods, application rates, buds, canopy, climatic factors, cultivars, flowering, foliar spraying, fruit drop, fruit set, inflorescences, mangoes, orchards, paclobutrazol, thiourea

Journal of Applied Horticulture, 2000, volume 2, issue 1, pages 65-70.

Abstract: The technique in producing off-season mango has been adopted in Thailand since 1986. Paclobutrazol, a plant growth retardant, was used in combination with thiourea for producing as well as breaking of flower buds. The studies on application methods showed that soil drenching of paclobutrazol is more effective for the induction of flowering in mango as compared to foliar spray. The rate of paclobutrazol application depended on the size of tree canopy as well as on mango cultivars. For most cultivars, the rate of paclobutrazol applied is generally determined by multiplying the diameter of tree canopy (expressed in meter) with 1.0-1.5 g of active ingredients of paclobutrazol. At 120 days after the application of paclobutrazol, 0.5% thiourea is usually sprayed to some cultivars for breaking of buds. Using this method, inflorescences are visible within 2.5 to 4 months after the paclobutrazol application depending on cultivar. However, the success in producing off-season mango is also dependent on other factors suc

Volume 2(1), 2000

Use of Logistic, Gompertz and Richards functions for fitting normal and malformed mango panicle growth data.

Shailendra Rajan

Central Institute for Subtropical Horticulture, PO Kakori, Rehmankhera, Lucknow - 227 107, India.

Key words: growth, malformations, mangoes, mathematical models, panicles

Journal of Applied Horticulture, 2000, volume 2, issue 1, pages 62-64.

Abstract: Logistic, Gompertz and Richards functions were used for examining their suitability in fitting growth data of malformed and normal mango panicles. The functional analysis of data indicated that Richards function was a suitable model for summarizing panicle growth data. The model was found to be superior to logistic and Gompertz because of its greater flexibility. The study revealed that Richards function can be successfully used for simulating panicle growth under different treatments and conditions.

Volume 2(1), 2000

Population fluctuations of fruit flies, *Bactrocera* spp. in submountainous mango and guava orchards.

Divender Gupta; Ranjeet Bhatia

Regional Horticultural Research Station, Jachh (Nurpur) - 176 201, India.

Key words: fluctuations, guavas, insect pests, mangoes, monitoring, plant pests, ripening, temperature, traps

Journal of Applied Horticulture, 2000, volume 2, issue 1, pages 47-49.

Abstract: The fruit fly (*Bactrocera dorsalis* and *B. zonata*) population was monitored with the help of bottle traps containing 100 ml aqueous solution of 0.1% methyl eugenol and 0.25% malathion per trap, in mango and guava orchards of submountainous region of Himachal Pradesh, India. The maximum catch of 98.6 and 62.6 males/trap for mixed population was recorded during 30th and 27th standard weeks in 1992 and 1993, respectively, in mango orchard. The corresponding catch in guava orchard was 427.2 and 517.0 during the 37th and 39th standard weeks. There was a significant positive correlation between the trap catch and maximum and minimum temperatures during both the years for both the hosts. The maximum catch coincided with the ripening period of fruits.

Volume 2(1), 2000

Detection of variability in *Xanthomonas campestris* pv. *mangiferaeindicae* strains.

Kishun, R; Rajan, S

Central Institute for Subtropical Horticulture, Rehmankhara, P.O. Kakori, Lucknow - 227 107, India.

Key words: antibiotics, cluster analysis, detection, genotypes, geographical

distribution, growth, mangoes, pathogenicity, plant pathogenic bacteria, plant pathogens, strains

Journal of Applied Horticulture, 2000, volume 2, issue 1, pages 44-46.

Abstract: Nineteen *X. campestris* pv. *mangiferaeindicae* strains collected from different ecogeographical areas/mango genotypes of India were studied to confirm the existence of variability in the strains on the basis of their pathogenicity on genotypes (9), reaction towards antibiotics (9) and growth on culture media (5). Study revealed the existence of variability in Xcmi strains as exhibited by their differential reaction. The similarity in Xcmi strains was observed by hierarchical cluster analysis. Clustering pattern on these three detection methods indicated that the grouping of strains is not entirely based on their geographical distribution as the strains from northern and southern parts of India falls in a single cluster. However, the strains collected from Bihar exhibited more similarity with each other and clustered in one or nearby cluster in all the detection methods used.

Volume 2(1), 2000



Mango pollinators in Israel.

Dag, A; Gazit, S

The Kennedy-Leigh Centre for Horticultural Research, The Hebrew University of Jerusalem, Rehovot 76100, Israel.

Key words: crop yield, honey bees, mangoes, open pollination, pollination, pollinators

Journal of Applied Horticulture, 2000, volume 2, issue 1, pages 39-43.

[Full text PDF |](#)

Abstract: Effective insect pollination is essential for good fruit set and yield in mango (*Mangifera indica*). Insects visiting mango bloom were collected for 3 years (1994-96) in 10 commercial orchards located in all major mango-growing areas in Israel. Forty-six distinct species or types (not identified to the species level) were found; most belonged to the orders Diptera (26), Hymenoptera (12) and Coleoptera (6). The following species played a significant role in mango pollination in most orchards: two blow flies (*Chrysomya albiceps* and *Lucilia sericata*); the honeybee (*Apis mellifera*) and the housefly (*Musca domestica*). Found in only one or two orchards, in medium to large numbers, were: the hover fly *Episyrphus balfeatus*, the wasp

Bembecinus tridens, and two beetles, *Cantharis atropoveolatus* and *Omophilus syriacus*. The effectiveness of 12 pollinators was assessed in one orchard. Blow flies were found to be as effective as the honeybee, whereas the housefly was less so. Yield of small caged 'Keitt' mango trees was min

Volume 2(1), 2000

Blossom biology of hog-plum (*Spondais pinnata* Kurz).

Darshana Nand

C-67, Guru Tegh Bahadur Nagar, Allahabad - 211 016, India.

Key words: anthers, dehiscence, flowering, flowers, fruit set, fruiting, fruits, hermaphroditism, inflorescences, panicles, pollen

Journal of Applied Horticulture, 2000, volume 2, issue 1, pages 34-36.

Abstract: Studies were undertaken on the flowering biology and bearing behaviour of hog-plum (*Spondais pinnata* [*Spondias pinnata*]). Well-established trees of hog-plum varieties 'oval' and 'round', growing within the premises of Government Gardens, Varanasi, Uttar Pradesh, India, were used. The studies were conducted with special reference to the variety 'oval'. The trees bore pure panicles at the terminal end of last years growth. The flowering took place on naked shoots with the advent of the spring season. Flowers opened during odd hours and anthers dehisced with the opening of flowers. The structure and shape of the inflorescence were similar to mango. Flowers were observed as hermaphrodites numbering 1829.4 per panicle. Pollen grains were dusty. The initial percentage set under natural open pollination was very good (71.29%) compared to very nominal set in mango. Thirty-five fruits per panicle reached final maturity.

Volume 2(1), 2000



Some compositional changes in Kent mango (*Mangifera indica*) slices during storage.

Tovar, B; Ibarra, L I; Garcia, H S; Mata, M

Instituto Tecnológico de Tepic, Apdo. Postal 634, Tepic, Nay. 63000, Mexico.

Key words: browning, chemical composition, colour, cutting, fruits, mangoes,

pH, plant composition, plant pigments, ripening, storage, storage decay, titratable acidity

Journal of Applied Horticulture, 2000, volume 2, issue 1, pages 10-14.

[Full text PDF](#) |

Abstract: Kent mango slices at two different stages of ripening: 4 days (S1) and 6 days (S2) after harvest were kept under aseptic conditions at 13 and 23 degrees C to determine if normal ripening could proceed after slicing. Whole mangoes stored at 23 degrees C and 65% RH were used as control. Soluble solids of slices from all treatments did not show the same trend as whole fruits and remained unchanged at their initial values. Titratable acidity increased and pH decreased in all the slices and were in turn, different from the control fruit. Colour parameters indicated loss of yellow pigments and browning. Decay occurred between days 5 and 7 of storage in slices that were stored at 23 degrees C. Slices from S1 mangoes kept at 13 degrees C suffered minimal changes due to cutting; however, the slices did not show the same compositional changes as the naturally-ripened whole fruit.

Volume 2(1), 2000

Endogenous hormones and phenols of seedling trees of polyembryonic mango cultivars and their role as rootstocks in scion vigour of cv. Alphonso.

Murti, G S R; Upreti, K K; Kurien, R M; Reddy, Y T N

Plant Hormones Laboratory, Indian Institute of Horticultural Research, Hessaraghatta Lake Post, Bangalore 560 089, India.

Key words: abscisic acid, auxins, chemical composition, cultivars, cytokinins, endogenous growth regulators, growth, IAA, leaves, mangoes, phenols, phloem, plant composition, plant growth regulators, rootstock scion relationships, rootstocks, sap, scions, seedlings,

Journal of Applied Horticulture, 2000, volume 2, issue 1, pages 6-9.

Abstract: Changes in the levels of endogenous hormones, abscisic acid (ABA), cytokinins (t-zeatin riboside (t-ZR) and dihydrozeatin riboside (DHZR)) in xylem sap and leaves and indole acetic acid (IAA) and total phenols in the leaves were determined in seven polyembryonic mango cultivars (Bappakai, Chandrakaran, Furukan, Muvandan, Mylepelian, Olour and Vellaikolamban), which are commonly used as rootstocks. Simultaneously morphological characters were recorded on mango cv. Alphonso of similar age raised on these cultivars as rootstocks to examine whether the hormones and phenols

produced by these bear any relationship to the growth and development of scion. Also the stem anatomical features of the shoots of current and previous year growth were studied in Alphonso grafted on two rootstocks imparting contrasting effects on shoot vigour. The morphological attributes such as tree girth and tree volume of Alphonso were generally higher on rootstocks Muvandan, Bappakai and Olour and least on Vellaikolamban followed by Kuruk

Volume 1(2), 1999

Evaluation of mango cultivars for arid-irrigated region of Punjab.

Sharma, J N; Josan, J S; Thind, S K; Arora, P K

Regional Fruit Research Station, Punjab Agricultural University, Abohar 152116, India.

Key words: cultivars, mangoes, evaluation, fruits, quality, yields, yield components, variety trials, fruit crops

Journal of Applied Horticulture, 1999, volume 1, issue 2, pages 103-104.

Abstract: Four mango cultivars, Dashehari, Langra, Mallika and Amrapali, were introduced from different sources and grown at the Regional Fruit Research Station, Abohar (Punjab), during 1982-83 to allow evaluation under arid-irrigated conditions. Langra was most vigorous followed by Mallika, Dashehari and Amrapali. Dashehari fruits had the highest total soluble solids content (TSS; 20.04%), reducing sugar content (3.87%), TSS/acid ratio (75.42) and sugar/acid ratio (14.33) with an average fruit yield of 60.22 kg/tree. Fruits of Dashehari and Langra matured during the second week of July whereas those of Mallika and Amrapali matured in the third week of July. On the basis of yield and quality observed under Abohar conditions, cultivation of Dashehari, Langra, Mallika and Amrapali cultivars are recommended for cultivation in the arid-irrigated region of Punjab.

Volume 1(1), 1999

Breeding for dwarf genotypes in mango.

Yadav, I S; Dinesh, M R

Division of Fruit Crops, Indian Institute of Horticultural Research, Hessarghatta, Bangalore, Karnataka, India.

Key words: mangoes, evaluation, dwarfing, plant height, fruits, plant

morphology, plant breeding, fruit crops

Journal of Applied Horticulture, 1999, volume 1, issue 1, pages 24-26.

Abstract: Nine mango [*Mangifera indica*] genotypes having dwarf stature were compared to the control Alphonso for morphological and fruit characteristics, in order to identify those with potential for use in breeding programmes. Varieties Kerala Dwarf and Janardhan Pasand were the most suitable for usage as donor parents.

Volume 1(2), 1999



Forecasting model for veneer grafting success in mango.

Rajan, S; Sinha, G C; Lal, B

Central Institute for Subtropical Horticulture, Rehmankhera, P.O. Kakori, Lucknow 227107, India.

Key words: grafting, mangoes, forecasting, mathematical models, relative humidity, temperature, fruit crops, fruits

Journal of Applied Horticulture, 1999, volume 1, issue 2, pages 128-130.

[Full text PDF |](#)

Abstract: Various models were developed to account for the effect of weather variables on the success of veneer grafting in mango under Lucknow conditions. The influence of weather parameters was described by the model: $GS = 290.946 - 0.239 MA^2 - 20.322 MI - 0.305 MI^2 - 3.58 RH$, where GS = veneer grafting success, MA = maximum temperature, MI = minimum temperature, RH = relative humidity, and RF = rainfall. The use of this model to forecast grafting success based on environmental conditions is discussed.

Volume 1(2), 1999

Rheological properties of 'Dashehari' mango.

Verma, A K; Singh, M D

Central Institute for Subtropical Horticulture, Rehmankhera, P.O. Kakori, Lucknow 227107, India.

Key words: mangoes, mechanical properties, deformation, fruits, quality,

ripening, plant development, fruit crops

Journal of Applied Horticulture, 1999, volume 1, issue 2, pages 112-114.

Abstract: An experiment on force deformation was conducted on mature fruits of mango cv. Dashehari (collected from India). The first yield point in a sample was observed at 0.30 kN with a rupture point at 0.48 kN. Results indicated elastic behaviour up to 0.30 kN force, plastic beyond 0.48 kN and elastoplastic in between 0.30 and 0.48 kN. Strain energy required for first yield point was calculated using $E = F \cdot D / 2$, where E = strain energy, F = force applied and D = deformation. The energy required for the first yield point was calculated as 0.084 Nm and second rupture point was at 0.25 Nm strain energy.

Volume 1(2), 1999

Influence of postharvest treatment with vapour heat and hydrogen peroxide based chemical on the quality of mango cv. Baneshan.

Pal, R K; Thomas, R J; Sangeeta Gupta; Lal, B; Singh, N M

Division of Fruits and Horticultural Technology, Indian Agricultural Research Institute, New Delhi 110012, India.

Key words: hydrogen peroxide, mangoes, carotenoids, fruits, heat treatment, quarantine, reducing sugars, ripening, sugars, toxicity, quality, plant physiology, colour, treatment, organoleptic traits, plant composition, chemical composition, fruit crops

Journal of Applied Horticulture, 1999, volume 1, issue 2, pages 108-111.

Abstract: Physiological and physico-chemical changes in mango cv. Baneshan fruits in response to vapour heat treatment (VHT) were compared to those observed after treatment with a hydrogen peroxide based chemical (Virosil-Agro; VS). VHT is the accepted quarantine treatment for export of mangoes. VS is an eco-friendly and biodegradable chemical having little residual toxicity containing H₂O₂ and Ag²⁺. VST had antisenesescence effects. VHT enhanced ripening during 14 days of storage compared with the control. VHT resulted in better marketability of fruits due to uniform peel colour development.

Volume 1(2), 1999

Influence of coloured poly-covers on flowering of mango.

Baghel, B S; Pandey, S K; Nema, B K

Department of Pomology and Fruit Preservation, Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur 482004, India.

Key words: flowering, mangoes, flowers, light, cultural methods, sex, plastic film, covers, plant development, abnormal development, fruit crops, fruits

Journal of Applied Horticulture, 1999, volume 1, issue 2, pages 89-90.

Abstract: The effect of coloured poly-covers (control, white, red, green, blue and yellow) on flowering of mango (cv. Sunderja) was studied during October 1996 to February 1997. Covering twigs with coloured poly-covers influenced flowering. The highest rates of flowering shoots, healthy panicles and hermaphrodite flowers, the longest panicles, and the highest numbers of branchlets/panicle and flowers/panicle were recorded in the red poly-cover treatment. This treatment was better than the control, white and yellow poly-cover treatments, but was at par with the other treatments. The lowest rate of floral malformation, the lowest incidence of male flowers and the lowest ratio of hermaphrodite to male flowers (1:3.05) were also observed in the red poly-cover treatment.

Volume 1(2), 1999

Hormonal physiology of flowering in 'Dashehari' mango.

Sant Ram

G.B. Pant University of Agriculture and Technology, Pantnagar-263 145, U.P., India.

Key words: flowering, mangoes, abscisic acid, auxins, cytokinins, differentiation, flowers, fruiting, plant development, plant growth regulators, cultural methods, gibberellins, inhibitors, paclobutrazol, productivity, pruning, steroids, urea, growth, endogenous gro

Journal of Applied Horticulture, 1999, volume 1, issue 2, pages 84-88.

Abstract: Studies were conducted on alternate bearer mango cv. Dashehari. Dashehari produced a major vegetative flush in March-April followed by 2 minor flushes in June-July and September-October. The major vegetative flush fruited, whereas the other 2 minor flushes did not. Shoots which fruited rarely produced a new vegetative flush soon after crop harvest and also did not flower and fruit in the following season. To promote vigour and productivity, such shoots were forced to produce vegetative growth soon after crop harvest by pruning and application of 1-2% urea. Such treatments failed to induce flowering and fruiting. The concentrations of endogenous growth regulators were determined in shoots. Shoot-tips contained 3 auxins, 8 gibberellins, 11

cytokinins, 11 steroids and an ABA-like inhibitor. High concentrations of auxins, inhibitors, cytokinins and steroids were observed in shoot-tips just prior to or during the period of flower bud differentiation, whereas low concentrations of gibberellins were observed. Gibber

Volume 1(2), 1999



Effect of temperature on the flowering biology and fertilization of mangoes (*Mangifera indica* L.).

Shu, Z H

Fengshan Tropical Horticultural Experiment Station, TARI, Fengshan, Kaohsiung 830, Taiwan.

Key words: pollination, flowers, plant development, flowering, mangoes, anthers, dehiscence, sex ratio, temperature, cultivars, fruit crops, fruits

Journal of Applied Horticulture, 1999, volume 1, issue 2, pages 79-83.

[Full text PDF |](#)

Abstract: The effect of 3 temperature regimes (31/25 (warm), 25/19 (moderate) and 19/13 degrees C (cool), day/night) on flowering and pollination in 4 mango cultivars (Haden, Irwin, Keitt and Local) was investigated in Taiwan. Compared with the moderate treatment, warm temperatures hastened growth rates of panicles and flowers, shortened flowering duration and life span of individual flowers, and decreased the number of hermaphrodite and male flowers. Warm temperatures increased the rates and percentages of anther dehiscence and pollination. In contrast, cool temperatures retarded the growth of panicles and flowers, extended flowering duration and life span of flowers, and increased the number of hermaphrodite and male flowers. Sex ratio was statistically not different among the 3 temperature treatments. The highest number of hermaphrodite flowers occurred during the first third of the flowering period. The highest number of male flowers occurred halfway through the flowering period.

Volume 15(3), 2013



Advancing Alphonso mango harvest season in lateritic

rocky soils of Konkan region through manipulation in time of paclobutrazol application

M.M. Burondkar, Shailendra Rajan, K.K. Upreti, Y.T.N. Reddy, V.K. Singh, S.N. Sabale, M.M. Naik, P.M. Nigade and Pooja Saxena

Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, Maharashtra. Central Institute of Subtropical Horticulture, Rehmankhara, Lucknow. Indian Institute of Horticultural Research, Bangalore, India.

Key words: Early season, Alphonso, mango, lateritic rocky area, Konkan, paclobutrazol, flowering, harvesting season

Journal of Applied Horticulture, 2013, volume 15, issue 3, pages 178-182.

[Full text PDF |](#)

Abstract: The present study, aimed at advancing Alphonso mango harvest season through manipulation in time of soil application of paclobutrazol (PBZ) [soil application on 15th of May, June, July, and August]; foliar spray of KNO₃ (3%) [August and September], was conducted during 2010 to 2012 cropping seasons in red lateritic rocky soil of Konkan (Maharashtra, India). Results of individual years and mean for three years revealed that significant earliness in flowering (85.4 day) and advancement in harvesting (82 day) was achieved with the application of PBZ on 15th May. PBZ application on 15th June was relatively less effective in inducing early flowering (56 day) and harvesting (69 days). However, the greater extent of flowering (72.23 %) and fruit yield per tree (40.72 kg/tree) were recorded with PBZ applied at recommended time *i. e.*, on 15th August. Individual fruit weight was higher in KNO₃ sprayed tree in the months of August (268g) and September (265.5 g), whereas fruit T.S.S. was higher (19.37 °Brix.) in trees receiving PBZ on 15th August. The findings of study indicated huge potential for realizing about 5-6 times higher returns from Alphonso produced in February-March months as compared to May harvest.

Volume 16(1), 2014

Canopy management in mango (*Mangifera indica* L.) cv. Alphonso with reference to flowering, yield and quality characters under ultra high density planting

B. Gopu, T.N. Balamohan¹, P. Soman² and P. Jeyakumar³

Department of Fruit Crops, Horticultural College and Research Institute, Tamil

Nadu Agricultural University, Coimbatore (TN), India. ¹Horticultural College and Research Institute for Women, Trichy, Tamil Nadu Agricultural University, Coimbatore

Key words: Mango pruning, flowering, fruit set, fruit yield and quality.
Journal of Applied Horticulture, 2014, volume 16, issue 1, pages 50-53.

Abstract: An experiment was conducted to study the effect of different pruning levels on flowering, yield and quality characters in Alphonso mango under Ultra High Density Planting from 2010-2011 at Jain Irrigation Systems Pvt. Limited (JISL) Farms, Udumalpet, Tripur District, Tamil Nadu. The treatments included control, light pruning, moderate pruning, heavy pruning, 50 per cent removal of past season growth and total removal of past season growth and imposed on five-year-old uniform sized Alphonso trees grown under a close spacing of 3 x 2 m. The minimum number of days taken for first flowering and 50 per cent flowering were recorded by the control. The highest number of panicles per tree and the maximum number of panicles produced per sq.m canopy area were recorded in the control. However, highest percentage of hermaphrodite flower per panicle and per cent fruit set were found in the treatment T₅ (50 per cent removal of past season's growth and tipping). Fruit and yield characters were influenced by different pruning levels. Treatment T₂ (light pruning) recorded the highest mean fruit weight, fruit length, fruit volume, fruit pulp weight and stone weight. However, treatment T₃ (moderate pruning) registered highest fruit circumference. Highest pulp to stone ratio was observed in T₄ (Heavy pruning) followed by T₂ (light pruning). Highest number of fruits per tree and yield per tree were observed in control. Highest total soluble solids, total sugars and non reducing sugars of the fruit were observed in T₆ (total removal of past season's growth). The maximum acidity and ascorbic acid content were observed in control. Maximum total carotenoid content was recorded in T₃ (moderate pruning) and reducing sugars in T₄ (heavy pruning).

Volume 17(3), 2015



Evaluation of colour behavior during ripening of Banganapalli mango using CIE-Lab and RGB colour coordinates

V. Eyarkai Nambi, K. Thangavel, S. Shahir and V. Geetha

Department of Food and Agricultural Process Engineering, Tamil Nadu Agricultural University, Coimbatore, India.

Key words: Banganapalli, ripening, RGB, Lab colour values, colour coordinates, ripening prediction, colour changes, total colour difference

Journal of Applied Horticulture, 2015, volume 17, issue 3, pages 205-209.

[Full text PDF |](#)

Abstract: Machine dependent (RGB) and machine independent (CIE-Lab) colours were measured during ripening of Banganapalli mangoes, at 24 h interval and evaluated throughout the ripening period. The machine dependent colour coordinates red (R), green (G) and blue (B) were extracted from the digital images of mangoes taken every day. All the colour coordinates were increasing significantly during the ripening of mango. In total colour difference, major change was observed during 10th day. A steep rise was found in hue angle between 10-11th day of ripening. Chroma was increasing up to 20th day and started decreasing. It was found that, the R and G would be more suitable to predict the ripening colour change rather than B value. In case of ratios, the red ratio (R/B), the green ratio (G/B) and both blue ratios would be suitable to predict the ripening of mangoes. These observations could be used as one of the nondestructive tools for mango quality evaluation, mango ripening and optimization studies.

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