Journal of Applied Horticulture, 24(1): 84-88, 2022
DOI: https://doi.org/10.37855/jah.2022.v24i01.16
Journal of Applied Horticulture
ISSN: 0972-1045

Evaluation of postharvest shelf life of south Indian culinary melon (*Cucumis melo* var. acidulus) accessions

Ratnakar M. Shet[1]*, T. Shantappa[2], Ashok[1], Shivanand Hongal[1], Raghavendra Gunnaiah[3] and R.C. Jagadeesha[4]

*[1]College of Horticulture Sirsi, University of Horticultural Sciences, Bagalkot, Karnataka, India.-581401. [2]Regional Horticultural Research & Extension Centre, Dharwad, Karnataka,India-580005. [3]College of Horticulture, Bagalkot, University of Horticultural Sciences, Bagalkot, Karnataka, India-587104. [4] College of Horticulture, Bangalore, University of Horticultural Sciences, Bagalkot, Karnataka, India- 560065. *E-mail: ratnakar.shet@uhsbagalkot.edu.in*

Abstract

Culinary melon (*Cucumis melo* var. *acidulus*) also known as Mangalore melon is reported with extended shelf life of more than six months. A study was conducted to assess the variability in the fruit traits with shelf life for selected 52 accessions of culinary melon at room temperature. Fruits were hanged in the air tied with smooth plastic fiber and psuedostem banana fiber, hanged to the roof of a laboratory and observations were recorded on fruit weight loss, change in the color of rind and fruit decay. Significant variation in shelf life and rind color change was observed among the accessions during storage period. The correlation analysis revealed that shelf life had significant positive high association with weight loss during storage (0.602) followed by fruit weight (0.544), flesh thickness (0.401), fruit length (0.359), days to harvest (0.346), peduncle length (0.332) and fruit width (0.322). Twenty-six accessions exhibited shelf life of more than 150 days. Green rind fruits were less vulnerable for discoloration and decay. Among the accessions MS30, MS28, MS79, MS74, MS78, MS39, MS74 and MS6 were identified as promising accessions for shelf life with marginal weight loss, rind color change and fruit traits. Understanding of physiological and biochemical changes in fruits during storage period and identification of candidate genes for shelf life will help in exploitation of this trait to improve the muskmelon.

Key words: Shelf life, culinary melon, rind color, storage, fruit weight loss, Mangalore melon.

Introduction

The gourd family, Cucurbitaceae, is one of the economically important plant groups and includes numerous widely cultivated crops such as squash and pumpkin (*Cucurbita* spp.), watermelon [*Citrullus lanatus* (Thunb.) Matsum. & Nakai], cucumber (*Cucumis sativus* L.) and melon (*Cucumis melo* L.). The squash and pumpkin are having long shelf life due to tough thick rind. However, non-dessert vegetable, culinary melon (*Cucumis melo* var *acidulus*) is cultivated in south Indian states namely Karnataka, Kerala, Andhra Pradesh, Telangana and part of Tamil Nadu and locally referred as Mangalore melon or sambhar southe, vellari, dosakaya, Madras cucumber, Malabar cucumber etc, that possess off white crisp flesh, hard rind and smooth thin skin having 8-10 months of shelf-life.(Manohar and Murthy, 2012; Swamy, 2017).

Rapid deterioration by physical, physiological and microbiological processes takes place when fruits are detached from their parent plant (Perera and Smith, 2007). It is estimated that more than 20-22% of the total production of fruits and vegetable is lost due to spoilage at various post-harvest handling stages (Sandhya, 2010). Postharvest treatments are being used to minimize the loss of fresh produce as well as to maintain the quality, thereby increase the shelf life (Artes *et al.*, 2009). Post-harvest treatments will slow down the physiological processes such as respiration, senescence and ripening in fresh fruits and vegetables. Apart from that these treatments also reduces the incidence of pathogen attack and microbial contamination, which inturn enhance the shelf life of fresh commodities (Sandarani *et al.*, 2018). However, any of these treatments will not be able to enhance the shelf life not more than one month without losing freshness. Culinary melon/Mangalore melon is an underexploited traditional vegetable crop mainly used for culinary preparations and it has 8-10 month shelf life without losing freshness (Swamy, 2017, Raghavendra *et al.*, 2021). The shelf life is potential trait in culinary melon /Mangalore melon and it can be exploited for improvement of cantaloupe crop to enhance the post harvest shelf life (Manohar and Murthy, 2012). Identification of desirable fruit type with long shelf life is essential for trait introgression breeding in improvement of cantaloupe crop of melon. The cross pollination nature of the crop generates lot of variations for fruit color, shape, size and shelf- life. The desirable fruit type with long shelf- life is one of the important breeding objectives of culinary melon. The promising accessions can be exploited for enhancing the shelf life of cantaloupe crop through introgression breeding. Even though many scientist thought about culinary melon has high shelf life (Swamy, 2017; Manohar and Murthy, 2012) but none of them evaluated 52 accessions of culinary melon collected from six different south Indian states namely Karnataka, Kerala, Andhra Pradesh, Tamil Nadu, Telangana and Goa for the trait systematically.

Hence, study was conducted to assess the variability for shelf-life among the selected South Indian culinary melon accessions and their association with fruit traits.

Materials and methods

The field evaluation of diverse 80 accessions collected from south Indian states namely Kerala (15), Karnataka (40), Andhra Pradesh (17), Tamil Nadu (5), Telangana (1) and Goa (2) conducted at College of Horticulture, Sirsi farm during summer 2019 for productivity traits in augmented design along with Mudicode and Soubhagya as checks following recommended package of practice of University of Horticultural Sciences, Bagalkot. The storage study was conducted from May 2019 after the harvest of crop. Three fruits each of 52 selected accessions based on field performance were suspended in air with the help of plastic and psuedostem banana fiber hanged to the roof (Fig 1). This practice is commonly followed by the farmers in their houses for their household culinary uses of Mangalore melon and they store the fruits till they harvest next year fruits. The shelf life study was conducted at the laboratory of Department of Biotechnology and crop Improvement, College of Horticulture Sirsi, Karnataka. The Details of 52 accessions are furnished in Table 1.The initial and final fruit weight (weight taken during initiation of fruits decay) and changes in rind color were recorded during storage period. The fruit weight loss was measured and converted into % weight loss. The correlation among traits namely days to harvest, peduncle length (cm), fruit weight (g), fruit length (cm), fruit width (cm), fruit shape index, flesh thickness (cm), TSS (^{o}brix) and weight loss during storage (g) and shelf life (days) was calculated by adopting formulae of Pearson using Sheoran *et al.* (1998) online software.

Results and discussion

Shelf life of culinary melons: Culinary melons/ Mangalore melons are known for longer shelf life of up to 8-10 months (Swamy, 2017). In our study, significant variability for shelf life and rind color of fruits was observed among the selected

Fig.1. Above: Storage study of culinary /Mangalore melons by hanging to roof at room temperature. Below: Storage study at laboratory with the help of banana pseudostem fiber as practiced by farmers

Table 1: Culinary melon/Mangalore melon accessions used for shelf-life study

Accession No	Botanical Name	State	Features	
			Fruit color	Fruit shape
MS 2	*C. melo* var *acidulus*	KER	Yellow	Elongated
MS 3	*C. melo* var *acidulus*	KER	Green	Elongated
MS 4	*C. melo* var *acidulus*	KER	Orange	Elongated
MS 5	*C. melo* Subsp *Agrestis*	KER	Striped	Elongated
MS 6	*C. melo* Subsp *Agrestis*	KER	Striped	Pyriform
MS 9	*C. melo* var. *acidulus*	KER	Striped	Oblate
MS 10	*C. melo* var. *acidulus*	KER	Orange	Oblate
MS 11	*C. melo* var. *acidulus*	KER	Striped	Ovate
MS 12	*C. melo* var. *acidulus*	KER	Striped	Ovate
MS 15	*C. melo* var. *acidulus*	KER	Yellow	Globular
MS 16	*C. melo* var. *acidulus*	KAR	Striped	Oblate
MS 18	*C. melo* var. *acidulus*	KAR	Striped	Oblate
MS 19	*C. melo* var. *acidulus*	KAR	Striped	Ovate
MS 20	*C. melo* var. *acidulus*	KAR	Dark-Green	Oblate
MS 21	*C. melo* var. *acidulus*	KAR	Dark-Green	Oblate
MS 27	*C. melo* var. *acidulus*	KAR	Green	Oblate
MS 28	*C. melo* var. *acidulus*	KAR	Dark-green	Oblate
MS 30	*C. melo* var. *acidulus*	KAR	Striped	Oblate
MS 31	*C. melo* var. *acidulus*	KAR	Striped	Oblate
MS 32	*C. melo* var. *acidulus*	KAR	Striped	Oblate
MS 34	*C. melo* var. *acidulus*	KAR	Striped	Oblate
MS 35	*C. melo* var. *acidulus*	KAR	Striped	Oblate
MS 36	*C. melo* var. *acidulus*	KAR	Striped	Oblate
MS 37	*C. melo* var. *acidulus*	KAR	Striped	Elliptic
MS 38	*C. melo* var. *acidulus*	KAR	Striped	Oblate
MS 39	*C. melo* var. *acidulus*	KAR	Striped	Oblate
MS 41	*C. melo* var. *acidulus*	KAR	Orange	Oblate
MS 42	*C. melo* var. *acidulus*	KAR	Green	Oblate
MS 44	*C. melo* var. *acidulus*	KAR	Striped	Oblate
MS 45	*C. melo* var. *acidulus*	KAR	Striped	Oblate
MS 46	*C. melo* var. *acidulus*	KAR	Striped	Pyriform
MS 48	*C. melo* var. *acidulus*	TEL	Orange	Globular
MS 50	*C. melo* var. *acidulus*	AP	Golden yellow	Globular
MS 52	*C. melo* var. *acidulus*	AP	Golden Yellow	Globular
MS 53	*C. melo* var. *acidulus*	AP	Yellow	Globular
MS 56	*C. melo* var. *acidulus*	AP	Orange	Globular
MS 59	*C. melo* var. *acidulus*	AP	Golden yellow	Globular
MS 60	*C. melo* var. *acidulus*	AP	Orange	Globular
SS 14	*C. melo* var. *acidulus*	KAR	Striped	Ovate
MS 63	*C. melo* var. *acidulus*	AP	Orange	Oblate
MS 65	*C. melo* var. *acidulus*	AP	Orange	Globular
MS 66	*C. melo* var. *acidulus*	AP	Yellow	Globular
MS 69	*C. melo* var. *acidulus*	AP	Striped	Globular
MS 70	*C. melo* var. *acidulus*	AP	Yellow	Globular
MS 71	*C. melo* var. *acidulus*	TN	Orange	Globular
MS 72	*C. melo* var. *acidulus*	TN	Yellow	Globular
MS 74	*C. melo* var. *acidulus*	TN	Striped	Elliptic
MS 78	*C. melo* var. *acidulus*	Goa	Striped	Oblate
MS 79	*C. melo* var. *acidulus*	KAR	Dark-green	Ovate
MS 80	*C. melo* var. *acidulus*	KAR	Green	Oblate
Mudicode	*C. melo* var. *acidulus*	KER	Yellow	Ovate
Soubhagya	*C. melo* var. *acidulus*	KER	Striped	Oblate

KER: Kerla, KAR: Karnatka, TN: Tamil Nadu, AP: Andhra Pradesh TEL: Telangana

accessions of culinary melon. The observations on shelf life, fruit weight loss and rind color change during storage is presented in Table 2. The shelf life ranged from 65-300days with average of 155.81 days. The highest shelf life was observed in accession MS -30 (300 days) followed by MS 6,MS 39 (290 days) MS 42 (288 days) and MS 38 (280 days) whereas the lowest shelf life was observed for accessions namely MS 16 (65 days) followed by MS31 (70days). The average shelf life of about five months (155.81days) indicated that culinary melon is potential source for enhancing the shelf life of desert type melons (Manohar and Murthy, 2012; Raghavendra, *et al.,* 2021) due to their cross compatibility.

Table 2. Weight loss, shelf life and rind color change of fruits during storage study

Accessions	Weight loss(g)	Weight loss (%)	Shelf life (days)	Rind color change
MS 2	96.88	12.08	130.00	Y-GY
MS 3	191.76	16.39	75.00	G-Y
MS 4	76.32	12.80	134.00	O- DO
MS 5	21.92	24.88	90.00	GS-YS
MS 6	80.00	14.34	290.00	GS-YS
MS 9	100.29	10.28	195.00	GS-YS
MS 10	44.38	4.78	135.00	O-DO
MS 11	136.23	13.14	170.00	GS-YS
MS 12	140.00	17.63	281.00	GS -YS
MS 15	42.67	6.16	150.00	Y-GY
MS 16	14.13	1.91	65.00	GS -YS
MS 18	87.41	14.88	65.00	GS -YS
MS 19	80.83	15.98	95.00	GS -YS
MS 20	45.42	8.18	190.00	DG-Br
MS 21	184.29	12.62	210.00	DG-LG
MS 27	159.07	10.07	205.00	G-LG
MS 28	120.78	5.75	195.00	DG-Br
MS 30	164.63	8.38	300.00	GS -OS
MS 31	116.46	17.09	70.00	GWS -OYS
MS 32	150.00	13.15	185.00	GWS -OYS
MS 34	100.83	8.75	82.00	GS -OS
MS 35	100.30	12.45	169.00	YS- GoYS
MS 36	42.96	7.25	80.00	GWS -YS
MS 37	124.57	26.70	174.00	GWS -YS
MS 38	122.23	14.87	280.00	GWS -YS
MS 39	161.89	12.53	290.00	GS-YS
MS 41	183.57	17.26	181.00	O- DO
MS 42	197.33	8.93	288.00	G-Br
MS 44	128.67	11.20	144.00	GWS-GoYS
MS 45	65.92	14.15	95.00	YS-GoYS
MS 46	109.97	15.25	117.00	YS -OYS
MS 48	17.87	8.20	73.00	O-DO
MS 50	64.50	21.18	137.00	GY-O
MS 52	39.41	8.97	75.00	GY-O
MS 53	90.57	29.16	199.00	Y-O
MS 56	48.85	15.92	127.00	O-DO
MS 59	85.10	29.61	174.00	GY-O
MS 60	26.23	11.59	78.00	O- DO
SS 14	70.54	8.53	129.00	GS-YS
MS 63	70.60	12.14	156.00	O-DO
MS 65	29.83	9.04	102.00	O-DO
MS 66	66.57	20.70	165.00	Y-O
MS 69	54.47	10.55	127.00	YS -OS
MS 70	25.75	7.90	76.00	Y- O
MS 71	52.79	13.44	153.00	O-DO
MS 72	43.13	10.34	101.00	Y-O
MS 74	170.29	16.05	226.00	GS-YS
MS 78	61.00	6.42	201.00	GS-YS
MS 79	185.47	11.26	210.00	DG-G
MS 80	170.00	13.88	271.00	G- LG
Mudicode	114.89	10.11	106.00	Y-O
Soubhagya	87.83	15.69	86.00	YS-OS
Minimum	14.13	1.91	65.00	
Maximum	197.33	29.61	300.00	
Mean	95.53	13.09	155.81	
SEM	2.31	0.69	2.88	
CV (%)	9.05	2.07	1.97	
CD @5 %	6.56	1.96	8.17	

Y-Yellow, GY-Golden Yellow, G-Green, O-Orange, DO- Dark Orange, GS- Green Stripe, YS- Yellow Stripe, DG-Dark Green, Br- Brown, LG- Light Green, OS- Orange Stripe, GWS- Green White Stripe, OYS-Orange Yellow Stripe, GoYS-Golden Yellow Stripe

Fruit weight loss during storage: Concomitant with increased shelf life, significant fruit weight loss was also observed with increase in shelf life duration. Percentage of weight loss ranged from 1.91 % to 29.61 % with an average loss of 13.09 %. Lesser weight loss was observed in the accession with low shelf life (1.91% in MS16 with 65 days shelf life). But no such association was seen in the accessions with high shelf life. For example, accession MS30 with 300 days of shelf life showed mere 8.28 % weight loss, which is desirable for both the farmers and consumers. However the correlation study indicated the highly significant association of weight loss with shelf life (Table 3). The weight loss is mainly due to reduction in water content of fruit (Nunes and Emond, 2007). The water content determines the freshness of fruits**.** Every 100 g edible portion of culinary melon fruit contains 96.5 g water (Jompitak, 2002). Gradual loss of water content over storage period resulted in deterioration of crunchy nature of fruit flesh and is less preferred for preparation of delicious dishes like dosa and sambar. Since the maximum storage period come across *Kharif* and winter season (June-February) and laboratory temperature ranged from 18- 24 °c which may be resulted in marginal weight loss in stored fruits (Nunes *et al.,* 2003). The fruits physiological and biochemical changes also cause weight loss during storage (Ron Porat, 2008).

Change in fruit rind color: Rind color is one of the main attributes that characterizes the freshness of most fresh vegetables, as consumers take product appearance as a primary criterion in choice and acceptability, and may even influence taste thresholds and pleasantness (Clydesdale, 1993). The significant variation had been observed for change in rind color during storage period. All the green striped fruits turned yellow to orange stripes; yellow fruits tuned to golden yellow and orange; orange fruits turned to dark orange in color. However, green color fruits

Table 3. Correlation coefficients, mean and range for shelf life related fruit traits in 52 culinary melon accessions

Traits	Days for first harvest	Peduncle length (cm)	Fruit wt (g)	Fruit length (cm)	Fruit width (cm)	Fruit shape index	Flesh Thickness (cm)	TSS (°brix)	Weight loss (g)	Shelf life (days)
Days for first harvest	**1**	-0.019^{NS}	0.035^{NS}	-0.206^{NS}	0.118^{NS}	-0.388**	-0.111^{NS}	0.012^{NS}	-0.021^{NS}	0.346*
Peduncle length (cm)		1	0.662**	0.573**	0.394**	0.251^{NS}	0.610**	0.100^{NS}	0.570**	0.332*
Fruit wt (g)			1	0.831**	0.747**	0.236^{NS}	0.781**	0.102^{NS}	0.771**	0.544**
Fruit length(cm)				1	0.493**	0.679**	0.731**	0.136^{NS}	0.718**	0.359**
Fruit width (cm)					1	-0.254^{NS}	0.593**	0.048^{NS}	0.425**	0.322*
Fruit shape index						1	0.271^{NS}	0.206^{NS}	0.375**	0.067^{NS}
Flesh Thickness (cm)							1	0.260^{NS}	0.675**	0.401**
TSS (°brix)								1	0.177^{NS}	0.227^{NS}
Weight loss(g)									1	0.602**
Mean	54.25	3.14	809.29	15.11	9.88	1.57	2.52	2.66	95.53	155.81
SEm±	0.89	0.52	17.16	1.19	1.11	0.32	0.52	0.29	2.31	2.88
Minimum	43.00	1.44	88.12	7.00	4.75	0.77	0.50	0.60	14.13	65.00
Maximum	62.00	5.60	2209.83	24.08	27.71	2.48	4.20	5.30	197.33	300.00
CV (%)	12.14	29.50	60.32	30.71	35.61	25.73	6.60	6.21	9.05	1.97
CD at 5 %	2.39	1.40	49.50	3.19	2.80	0.86	1.55	0.84	6.56	8.17

*, ** indicates significant at 5% and 1 % probability levels, respectively. NS- Non-significant

turned light green (for the accessions MS 21, MS 27, MS 79, MS 80) and few turned brown color (MS 20, MS 28, MS 39 and MS 42), whereas the accession MS 3 green fruits turned to yellow. The color change is a complex process and it may be due to the destruction of green chlorophyll pigments and accumulation of yellow/ orange carotenoid pigments (Burger *et al.,* 2006). It depends on various endogenous and exogenous factors such as fruit maturity at harvest and sensitivity of fruit to ethylene synthesis (Kitamura *et al.,* 1975; Ayub *et al.,* 1996; Raghavendra *et.al.,* 2021), the temperature and relative humidity, efficacy of air circulation and ventilation of storage condition (Ron Porat 2008). The accessions namely MS 28, MS 21, MS 39,MS 42, MS 79 having green color fruits found to be less vulnerable to discoloration process and had relatively higher shelf life compared to yellow and orange color fruits bearing accessions (Shet *et al.,* 2021). Apart from green color fruits, few green and white stripe fruits accessions MS 6,MS 30, MS 38, MS 74, MS 78 showed promising for shelf life and other quality traits. These accessions can be used as parents for the improvement of musk melon and other melon vegetables shelf life.

Relationship of shelf life with fruit traits: Shelf life is an important parameter for long distance transport and usage of many vegetable and fruits. The present study focused on evaluation of different south Indian culinary melon accessions for shelf life and promoting these accessions for cantaloupe introgression breeding programme. The understanding of relationship between shelf life and different fruit traits will provides the basis for selection of desirable fruit type with enhanced shelf life (Raghavendra *et.al.,* 2021). The fruit traits namely days to harvest, peduncle length, fruit weight, fruit length, width, flesh thickness, TSS content weight loss and shelf life had significant variability among the accessions (Table 3). The correlation analysis revealed that shelf life had significant positive high association with weight loss during storage period (0.602) followed by fruit weight (0.544), flesh thickness (0.401) and fruit length (0.359) whereas it had significant positive association with days to harvest (0.346) followed by peduncle length (0.332) and fruit width (0.322). However, it had nonsignificant association with fruit shape index and TSS content (Table 3). It indicated that fruit traits had significant positive relationship with shelf life. Among the traits, weight loss during storage had highly positive significant association with fruit weight (0.771) followed by fruit length (0.718), flesh thickness (0.675), peduncle length (0.570), fruit width (0.425) and fruit shape index (0.375). However, it had no significant association with days to harvest and TSS content of fruit. It indicates that weight loss during storage had significant relationship with fruit traits especially with fruit weight, length, width and flesh thickness and not with days to harvest and TSS content of the fruit, which results in highly significant association with shelf life. The weight loss is mainly depends on evapotranspiration of water from the fruit ((Nunes and Emond, 2007) and fruit contains more than 95 percent water, as the fruit size increases, the fruit water content also increases and vice versa. The peduncle is important part of the fruit which helps in transport of nutrients for the growth of fruits. The peduncle length determines the size of the fruit and it had positive highly significant association with fruit weight (0.662), flesh thickness (0.61), fruit length (0.573) and fruit width (0.394). Apart from weight loss, drying of peduncle also the indication of deterioration of fruit freshness and shelf life (Liu, *et al.,* 2004). Correlation analysis revealed that to identify enhanced shelf life accessions, consideration of fruit traits are essential for further breeding programme.

The shelf-life is an important quality trait of culinary melon.

The significant variability observed for shelf-life and fruit traits in selected accessions of culinary melon can be exploited for the improvement of perishable melon vegetables including musk melon. The accessions namely MS30, MS28, MS79, MS74, MS78, MS39, MS74 and MS6 were identified as promising accessions for shelf life based on evaluation and can be promoted for introgression breeding to transfer shelf life gene to cantaloupe crop. Further, physiological and biochemical changes incurred in fruit rind color during storage need to be investigated for better understanding of discoloration process. The complete profiling of chemical and nutrients composition of rind and flesh will generate more information on high shelf-life of fruits. Identification of candidate genes governing shelf life and further introgression into musk melon will minimize the post harvest losses in greater extent.

Acknowledgement

The author expresses sincere thanks to Dr. Prem Nath Agriculture Science Foundation, Bangalore (Project No. 132/ PNASF-UHSB/2018-19) for encouragement and financial assistance.

References

Artes, F., P. Gomez, E. Aguayo, V. Escalona and F. Artes-Hernandez. 2009. Sustainable sanitation techniques for keeping quality and safety of freshcut plant commodities. *Postharvest Biology and Technol.,* 51: 287-296.

Ayub, R., M. Guis, M. Ben Amor, L. Gillot, J.P. Roustan, A. Latche, M. Bouzayen and J.P. Pech, 1996. Expression of ACC oxidase antisense gene inhibits ripening of cantaloupe melon fruits. *Nature Biotechnol*., 14: 862-866

Burger, Y., U. Saar, H. S. Paris, E. Lewinsohn, N. Katzir, Y. Tadmor and A. Schaffer, 2006. Genetic variability for valuable fruit quality traits in *Cucumis melo*. *Isr. J. Plant Sci.,* 54: 233-242.

Clydesdale, F.M. 1993. Color as a factor in food choice. *Critical Reviews in Food Science and Nutrition*, 33: 83-101.

Jompitak, Y. 2002. *Nature Food; Native Vegetable*. Odient Store Press, Bangkok, p. 132.

Kitamura, T., T. Umemoto, Iwata and T. Akazawa. 1975. Studies on the storage of melon fruits. II. Changes of respiration and ethylene production during ripening with reference to cultivars. *J. Japan Soc Hort Sci.,* 44: 197-203.

Liu, L., F. Kakihara, and M. Kato. 2004. Characterization of six varieties of *Cucumis melo* L. based on morphological and physiological characters, including shelf-life of fruit. *Euphytica.,* 135(3): 305-313. doi:10.1023/b:euph.0000013330.66819.6f

Manohar, S. and H. Murthy, 2012. Estimation of phenotypic divergence in a collection of Cucumis melo, including shelf-life of fruit. *Scientia horticulturae.,* 148: 74-82.

Nunes, M.C.N. and J.P. Emond. 2007. Relationship between weight loss and visual quality of fruits and vegetables. *Proc. Fla. State Hort. Soc.,* 120: 235-245.

Nunes, M.C.N., E. Proulx, J.P. Emond, and J. K. Brecht. 2003. Quality characteristic of 'Horn of Plenty' and 'Medallion' yellow summer squash as a function of the storage temperature. *Acta Horticulturae*, 628: 607-614.

Perera, C. O. and Smith, B. 2007. Technology of processing of horticultural crops. *Handbook of Farm, Diary, and Food Machinery,* William Andrew Inc. Myer Kutz (ed.) pp. 251-302.

Raghavendra, G., M. S. Ratnakar, L. Ashwini, D. H. Radhika, and R C. Jagadeesha. 2021. Genetic diversity assessment and gene expression analysis of prolonged shelf-life genes in Mangalore melon (*Cucumis melo* ssp. *agrestis* var. *acidulus*). *Euphytica*, 217:158. https://doi.org/10.1007/s10681-021-02887-9

Ron Porat, 2008. Degreening of citrus fruits. *Tree and forestry Science and biotechnol.* 2(Special issue 1): 71-76.

Sandarani, M.D.J.C., D.C.M.C.K. Dasanayaka and C.V. L. Jayasinghe, 2018. Strategies Used to Prolong the Shelf Life of Fresh Commodities. *J. Agri Sci Food Res.,* 9: 206.

Sandhya, S., 2010. Modified Atmosphere packaging of fresh produce: current status and future needs. *Food Science and Technol*., 43: 381-392.

Sheoran, O.P., D.S. Tonk, L. S. Kaushik, R.C. Hasija, and R.S. Pannu, 1998. Statistical software package for agricultural research workers. recent advances in information theory, statistics & computer applications by D.S. Hooda & R.C. Hasija Department of Mathematics Statistics, CCS HAU, Hisar (139-143)

Shet, R.M., S. Hongal and R. Gunnaiah, 2021. Performance of mangalore melon selections in farmer's field. *International J. Economic Plants*, 8(1): 001-005. Doi: HTTPS://DOI.ORG/10.23910/2/2020.0400

Swamy, K.R.M. 2017. Origin, distribution and systematics of culinary melon (*Cucumis melo* subsp. *agrestis* var. *conomon*). *J. Hort. Sci.,* 12(1): 1-22.

Received: July, 2021; Revised: October, 2021; Accepted: October, 2021