

***Chrysophyllum lanceolatum* — A new rootstock for sapota (*Achras zapota* L.)**

K.S. Kalesh, S.M. Shareef, Sam P. Mathew and Maya S. Chemburkar¹

Tropical Botanic Garden and Research Institute, Palode, Thiruvananthapuram-695 562, Kerala, India.

E-mail: kskalesh@rediffmail.com

¹Bhavans College, Andheri, University of Mumbai, Maharashtra, India

Abstract

Propagation experiments were carried out with *Chrysophyllum lanceolatum* (Bl.) DC. as a new rootstock for *Achras zapota* L. at Tropical Botanic Garden & Research Institute (TBGRI), Thiruvananthapuram, India. For four consecutive years, maximum percentage of grafting success was obtained during April to May. Grafted plants were grown in different agro-climatic conditions of the Kerala State and had good fruit quality and yield. *C. lanceolatum* proved one of the best rootstocks for Sapota. Taxonomically, C. L. Blume has earlier circumscribed *C. lanceolatum* (Bl.) DC. as *Nycterisition lanceolatum* Bl. from the Java Island. *C. roxburghii* G. Don. and *C. acuminatum* Roxb. are also other popular synonyms of the species.

Key words : *Achras zapota*, *Chrysophyllum lanceolatum*, rootstock, grafting.

Introduction

Sapota (*Achras zapota* L.), popularly known as 'Sapodilla' or 'Chicku', a native of Tropical America, has wide range of cultivation throughout the tropics for its delicious and pleasantly sweet fruits. It is an evergreen, handsome laticiferous tree of about 20m height with dense, spreading branches, flourishing well up to an altitude of 1200m (Bose, 1985). The coagulating resinous latex from the bark and tender fruits of this tree, commonly known as 'chicle gum', is a best natural raw material for chewing-gum production (Anonymous, 1948). The ellipsoid or rather ovoid fruits are rusty brown in colour on ripening. Tender fruits are astringent, while the ripe fruits are pleasantly sweet and widely consumed all over the world as desert fruit. The fruit pulp is also very useful for making foodstuffs like jam, jelly, squash etc. Usually 3 to 6 hard blackish and flatten seeds are found in each fruits. 'Sapota' cultivation in India dates back to 1898 in Maharashtra (Cheema *et al.*, 1954). Presently, there are several high yielding varieties like CO-1, CO-2, Cricket Ball, Oval, Badami, Baramasi, Calcutta round, Pala, P.K.N- 1, Bombay, Dwarapudi, Guruvayya, etc. which are under commercial cultivation in many states of India.

Achras zapota L. can flourish well on wide range of soils like alluvial, sandy loam, red laterite and medium black type with an average annual rainfall of 1250 mm and temperature ranging from 11°C to 34°C. Even though the tree occurs up to an altitude of 1200m, the plants occurring in higher elevations are rather poor in fruit quality and plant growth rate. Commercial cultivation of sapota for better yield and fruit quality is usually carried out through grafted saplings. Species like *Achras zapota* (sapota seedlings), *Mimusops hexandra* (khirni), *Mimusops kauki* (Adam's apple), *Madhuca latifolia* (mahua), *Bassia longifolia* (Mee tree), *Chrysophyllum cainito* (star apple) and *Sideroxylon dulcifolium* (Miracular fruit) have been reported as rootstocks for sapota (Bose, 1985).

C. lanceolatum is an indigenous tree species of the Western Ghats and the Northeast India (Hooker, 1882). *C. lanceolatum* belongs to the same family of *Achras zapota* L., rather frequently occurs in evergreen forests of the Western Ghats up to an altitude of 1200m. This wild species is also a laticiferous evergreen lofty tree similar to *Achras zapota* L., with a clean bole of 30m height and coriaceous shining closely nerved oblong-lanceolate or obovate leaves with an average size of 12 x 4 cm. Creamy white small flowers in axillary fascicles with 5 or rarely 6 imbricate calyx and corolla lobes. Stamens are usually 5 or rarely 6 with linear filaments and ovate anthers. Ovary 5 to 6 celled with cylindric style. Fruits are ellipsoid to globose orange-red berries with ellipsoid, hard-flattened, polished brown seeds. Usually fruits are 4 x 3 cm in size frequently single seeded. The tree fruits abundantly from September to November in their natural habitats with fertile seeds. This wild species, is rather sustainably disease resistant, abundantly fruiting with seed fertility over 95% and has well-established root system, as well as wide adaptability with different kinds of soils occurring in Kerala. Investigations were carried out to study the success of sapota graft on *C. lanceolatum* rootstock which is suitable for different soil types and climatic conditions of Kerala.

Materials and methods

Experiments were carried out using CO-2 as scion which is one of the improved varieties of sapota suitable for the various agro-climatic conditions of Kerala.

Shade dried, three days old seeds of *C. lanceolatum*, collected from mature fruits were sown in fine river sand which started germination within 20- 25 days. Thirty days old seedlings with at least three to five mature leaves were transplanted into polybags by using the combination of potting mixture of river sand, top soil and cow dung with 1: 1: 1 ratio. Ten-month-old seedlings were used as rootstock for grafting.



Fig. 1. A. Root stock, *Chrysophyllum lanceolatum* (Bl.) DC., B. One year old grafted plant, C. Established graft fruiting in the field

Approach grafting (inarching), a successful grafting method in sapota (Singh, 1980) was used for producing grafted plants. In this method, a slice of bark with 5 cm length of wood removed from both rootstock and scion branch and tied together with 100-gauge polythene strip. Both rootstock and mother plant were irrigated twice a day in summer. After 75 days, the successful grafts with enough union maturity were detached from the mother plant. Three-month-old successful grafts were planted in 60×60 × 60cm in pits. The field planting was performed during the onset of monsoon at recommend distance (7-8m). The flowers produced were pinched-off periodically for three consecutive years from the beginning, for accelerating the vegetative growth.

Results and discussion

The experiment carried out for a period of four consecutive years has proved maximum percentage of grafting success is obtained during the period of April to May (Fig. 2). Grafts planted in various agro-climatic zones of coastal regions of Thiruvananthapuram and Kollam districts and laterite hilly regions of Idukki and Kottayam districts selected for field introduction and further studies on new sapota and *C. lanceolatum* combination. Field trials at various places conducted through people's participation programme also got successful results in all the four districts. Root rotting or any other infections were not reported in newly identified rootstock from anywhere, besides the new rootstock could well withstand strong summer.

C. lanceolatum is an indigenous tree species of the Western Ghats and the Northeast India. This wild species, is rather sustainably disease resistant, abundantly fruiting with seed fertility over 95% and has well-established root system, as well as wide adaptability with different kinds of soils occurring in Kerala. Several grafts cultivated in different agro-climatic conditions and soil types in different regions of the state by local farmers successfully demonstrated good yield, fruit quality and growth of the grafts which highlighted that use of new rootstock for sapota grafts is highly rewarding.

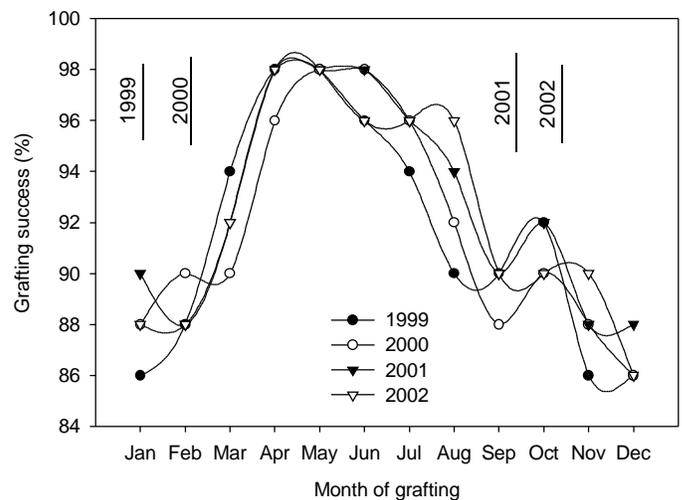


Fig. 2. Grafting success of sapota on *Chrysophyllum lanceolatum* rootstock in different months. Vertical bars show LSD ($P=0.05$) for different years

Acknowledgements

The authors are thankful to the Director, Tropical Botanic Garden and Research Institute, Palode for encouragement. The assistance of Mr. S. Baburaj and Mr. M. Varkey at various occasions of the experiments is also duly acknowledged.

References

- Anonymous, 1948. The Wealth of India. Vol. 1: 23-24. CSIR. New Delhi.
- Bose, T.K. 1985. *Fruits of India- Tropical and subtropical*. Naya Prokash, Calcutta, India.
- Cheema, G.S., S.S. Bhat and K.C. Naik, 1954. *Commercial fruits of India*. Macmillan & Co., Calcutta, India.
- Gopalswamiengar, K.S. 1970. *Complete gardening in India*. Kalyan Press, Bangalore, India.
- Hooker, J.D. 1882. *The Flora of British India* 3. Reeve & Co., London.
- Singh, A. 1980. *Fruit physiology and production*. Kalyani Publishers, New Delhi, India.