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Effect of season on grafting success in different cultivars of sapota (*Manilkara achras* (Mill.) Fosberg) under tropical humid conditions of Andhra Pradesh.

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ABSTRACT

Two sets of experiments were carried out during 2012-2013 to assess incompatibility of sapota cultivars to softwood grafting, and to find out the best time for softwood grafting, at Horticultural Research Station, Venkataramannagudem. Considerable variation in success of softwood grafting among sapota cultivars was observed. Among ten cultivars studied, Pala showed highest compatibility with Khirnee rootstock to softwood grafting, followed by Cricket Ball and DSH-2. There was a total failure in graft-take in cultivars CO-1, DSH-1 and Gutti. Softwood grafting success was highest in sapota when carried out on 1st July (72%) followed by 15th August (70%), 5th June (62%) and 15th June (56%).

Key words : Cultivars, Incompatibility, Khirnee, Sapota, Season, Softwood Grafting.

Sapota (*Manilkara achras* (Mill.) Fosberg) is one of the delicious fruit of humid tropical and subtropical regions, belonging to the family Sapotaceae. It is a native of Tropical America and has now spread to almost all tropical countries of the world. It is also called by other names, such as chikku, sapota plum and sapodilla. The pulp of sapota when ripe is soft, granular and very sweet. Sapota fruits may be eaten fresh or used as an ingredient in various milk products. Sapota is an energy rich fruit with high total soluble solids (20-22%) and good source of digestible sugar (14-18%) and has an appreciable amount of protein, fat, fiber and minerals like calcium, phosphorous, iron (Shanmugavelu and Srinivasan, 1973). In fruits, peel can also be eaten along with pulp since it is rich in nutritive value than the pulp alone (Gupta *et al.,* 1981). Latex from sapota tree is used in the manufacture of chewing gum in Tropical America. The gum processed from sapota also finds use in dental surgery. The bark of tree contains extractable quantities of tannins which have many industrial uses. It is a hardy tree that can be cultivated in saline soils too and fairly less susceptible to pest and disease which may be due to the presence of endogenous phenolics substances (Lakshminarayana and Subramanyam, 1966). Sapota is cultivated mainly in the southern states of India, with maximum area under it in Karnataka. India is a leading producer of sapota with an area and production of 1,58,000 ha and 13,46,000 metric tonnes respectively (Anonymous, 2010). It is commercially grown in the Maharashtra, Gujarat, Karnataka, Andra Pradesh, Tamil Nadu and West Bengal states. In Andhra Pradesh, it occupies an area of 12,208 ha in Guntur, Prakasam, West Godavari, Kurnool and Medak districts with an annual production of 1.22 lakh tonnes (NHB Database, 2013).There is a good demand for planting material of this crop not only in Andhra Pradesh, but also in the states of Tamilnadu, Maharastra, Karnataka, Jharkhand, Bihar and Orissa. The crop is mainly propagated by grafting on to Khirnee (*Manilkara hexandra* L.) rootstock. Although inarch grafting or approach grafting is universally practised, the method is laborious, time-consuming and also expensive. Currently, an alternative to approach grafting, softwood method of grafting in polythene bags, is becoming very popular. However, its success depends mainly on season of operation and varietal reaction to this method, which need to be standardized for coastal conditions of Andhra Pradesh.

MATERIAL AND METHODS

The present investigation was carried out at Horticulture College and Research Institute, Dr.Y.S.R.Horticultural University, Venkataramanna gudem, Tadepalligudem, West Godavari District. The site is located at an altitude of 34 m (112 feet) above mean sea level. The geographical situation is 16.8°N latitude and 81.5°E longitude. The location falls under Agro-climatic zone-10, humid, East Coast Plain and Hills (Krishna-Godavari zone) with an average rainfall of 900 mm. It experiences hot humid summer and mild winters. The experiment was conducted in 2012 and 2013 following Randomized Block Design using different cultivars of sapota as the scion. To identify the best time of operation for large-scale production of sapota grafts, grafting was made on 1-year old Khirnee rootstock seedlings, during June to October. Fifty grafts with three replications were made each time. To study varietal response to softwood grafting, scions of ten cultivars, *viz.,* Cricket Ball, CO-1, CO-2, CO3, DSH-1, DSH-2, Kalipatti, Gutti, Pala and PKM-2 were grafted on Khirnee rootstock on 1st July of 2012 and 2013. Fifty grafts with three replications in each combination were made. The terminal portion of sapota shoot having grayish coloured wood (6-8 mm thick and 6-8 cm in length) was used as scion. Each graft was tied and covered with white polythene (Pepsicap) for creating higher humidity around the scion. Grafted plants were kept under partial shade for better success. Plant growth was recorded 90 days after grafting.

RESULTS AND DISCUSSION

Data presented in Table 1 reveal that sapota cultivars responded significantly to softwood grafting, with different degree of success. The highest successful grafts were obtained in Pala (85%) variety, followed by 'Cricket Ball' and 'DSH-2' (65%). But, there was total failure of graft in CO-1, DSH-1 and Gutti varieties. Other cultivars like CO-3, CO-2, Kalipatti and PKM-2 also showed poor response to softwood grafting. The results clearly indicates that graft-incompatibility phenomenon exists between stock and scion of sapota cultivars, which may be attributed to varied woody nature of tissues, differential active-movement of sap, presence of growth promoting/ inhibiting factors at the site of graft union hampering cambial activity between stock and scion. Differential response of sapota cultivars to softwood grafting has also been reported by Kulwal *et al* (1988) and Shirol *et al* (2005). Incompatibility in softwood grafting in cultivars was also reported in fruit crops like cashew (Ghosh, 1995) and custard apple (Ghosh and Tarai, 2005). Another interesting

Table 1. Response of sapota cultivars to softwood grafting after three months.

Response of sapota cultivars to softwood grafting after six months

S.No.	Cultivar	Success (%)	Plant height (Extended new growth (cm)	Number of leaves per graft
1	Cricket Ball	65.46 (53.73)	2.84	15.55
2	CO-1	0.00 (0.00)	0.00	0.00
3	CO-2	30.00 (33.21)	6.51	8.21
4	CO-3	25.06(30.00)	1.44	10.53
5	DHS-1	0.00(0.00)	0.00	0.00
6	DHS-2	65.91 (53.73)	3.26	17.34
7	Gutti	0.00 (0.00)	0.00	0.00
8	Kalipatti	25.00 (31.45)	2.95	8.88
9	Pala	85.23 (67.21)	1.1	19.65
10	PKM-2	20.76 (26.57)	2.63	8.00
	Sem	1.51	0.33	0.74
	CD (P=0.05)	4.42	0.81	2.26

Figures in parantheses indicate angular transformed values.

Table 2. Effect of season on success of softwood grafting in sapota after three months.

Date of operation	Success (%)	Number of leaves/graft
1th June	62.00 (51.94)	13.87
15th June	56.00(48.45)	14.01
1st July	72.00(58.05)	12.08
15th July	45.00 (42.13)	14.83
1st August	15.00 (22.79)	8.00
15th August	70.00 (56.79)	9.65
1st September	20.00 (26.57)	7.00
15th September	10.00 (18.43)	6.04
1st October	0.00 (0.00)	0.00
SEm ±	1.61	0.64
CD *(P=0.05)*	4.84	1.65

Figures in parantheses indicate angular transformed values.

observation in this experiment was that cultivars, CO-2, Cricket Ball and DSH-2 [that gave the highest percentage of success (85 to 65%) under Paschim Midnapore, West Bengal Condition], showed less success in softwood grafting under Dharward conditions of Karnataka (Shirol *et al*., 2005). This finding indicates that propagation technique needs to be standardized in each variety for each locality. Growth of the grafted plants in respect of height and leaf production was better in cultivars with higher grafting success compared to that cultivars those performed poorly in softwood grafting.

It is clear from data in Table 2 that success in softwood grafting is significantly influenced by time of grafting. Highest success (70 to 72%) was recorded when grafting was carried out on 1st July and 15th August, followed by 5th and 15th June. Higher grafting success during the early part of monsoon (5th June to 1st July) was mainly due to favourable weather conditions (high humidity and atmospheric temperature) which could have resulted in maximum cambial activity in both stock and scion. Besides, the scion seemed to be in a physiologically active condition for better sap flow at that time. Although early and middle part of the rainy season (15th August) was found to be better under coastal condition of Andhra Pradesh (venkataramannagudem), in Dharwad (Karnataka), the months of April and May were the best suited for softwood grafting in sapota with graft success of 47 to 62% (Sulikeri *et al*, 1997). In Navsari (Gujarat) January and February were congenial for approach-grafting (Bhuva *et al*, 1990) in sapota. Growth of grafts in terms of leaf production was higher in grafts prepared during the early part of rainy season (5th June to 15th July) and leaf number progressively decreased in grafts prepared after 15th July.

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