

Original Research Article

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Standardization of Optimum Season for Softwood Grafting in Guava (*Psidium guajava* L.) cv. Sardar

B. Manga*, P. Jholgiker, G.S.K. Swamy, G. Prabhuling and N. Sandhyarani

Department of Fruit Science, KRCCH, Arabhvi, University of Horticultural Sciences,
Bagalkot, India

*Corresponding author:

ABSTRACT

Keywords

Guava, Softwood grafting, Season, Graft success

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An experiment was conducted to standardization the optimum season for softwood grafting in guava (*Psidium guajava* L.) cv. Sardar at the Department of Fruit Science, Kittur Rani Channamma College of Horticulture, Arabhavi, University of Horticultural Sciences, Bagalkot, during the period of 2012 - 2013. Softwood grafting was performed at monthly interval from July to December months under shadehouse ecosystem significantly highest percentage of graft success was recorded in grafting performed during December (69.00 %) and July months (65.50 %) with maximum survival percentage noted in July month (94.88 %). Growth attributes like, number of sprouts, length of sprout, percent sprouting and number of leaves also registered maximum values in graft prepared in the month of December.

Introduction

Guava (*Psidium guajava* L.) is one of the most promising fruit crops of India and is considered as one of the nutritionally valuable and remunerative crops (Singh *et al.*, 2007). Guava fruits are used for both, fresh consumption and processing. In the recent years, guava is gaining popularity in the international trade due to its nutritional value and processed products (Singh *et al.*, 2005). Non-availability of quality of planting materials and consequent substitution of poor quality seedling has adversely affected the guava production and productivity (Singh *et al.*, 2005). In view of the high return and the potential for processing, there is tremendous scope for bringing substantial additional area

under guava crop in India. Hence there is a need to standardize rapid and successful propagation technique to meet the demand of genuine planting material of elite varieties through-out the year. Softwood grafting is one of commercial method of propagation followed in different fruit crops like mango (Amin, 1974), sapota (Pampanna and Sulkieri, 2000), custard apple (Chovatia and Singh, 1999) *etc.* Softwood grafting method becomes important when planting materials mother plants are limited as this method has tremendous potential for rapid multiplication. Guava also responds well for softwood grafting with varying degree of success from place to place (Shashikumar, 2010),

indicating the influence of environment of success rate of softwood grafting in guava. One of the pre-requisite to realize high grafting success is identification and performance of grafting in correct season (Shashikumar, 2010). Keeping the above facts in view an experiment was carried out to identify suitable period for softwood grafting in guava.

Materials and Methods

An experiment, on standardization of optimum season for softwood grafting in guava (*Psidium guajava* L.) cv. Sardar was carried out during the period of 2012 to 2013, at the Department of Fruit Science, Kittur Rani Channamma College of Horticulture, Arabhavi, University of Horticultural Sciences, Bagalkot, Karnataka state. The experiment was laid out in Completely Randomized Design with 6 treatments and 4 replications. Hundred plants in each treatment formed a unit. The softwood grafting was done at monthly interval from July 2012 to December 2012.

Root stocks were raised in poly bags from fresh seeds of guava cv. 'Sardar' extracted from ripe fruits for approximately 6 to 8 months till they attained a stem diameter of 0.5 to 1.0 cm. staggered sowing was done to get same age uniform rootstocks for softwood grafting during different months of grafting. The scion shoots (15 to 18 cm long) of pencil size thickness with 3 to 4 healthy buds were used for grafting. Selected scion shoots were pre-cured ten days prior to detachment. Softwood wedge grafting was performed at monthly interval as per procedure suggested by Amin (1974). The prepared grafts were covered from top by polythene cap. This cap was retained on the graft for one month or till sprouting was observed on the graft. The observation were recorded on graft-take *i.e.* per cent graft success and survival percentage.

The growth parameters such as number of sprouts, per cent sprouting, average length of sprout and average number of leaves were recorded at 30, 60 and 90 days after grafting. Total nitrogen and carbohydrates content of scion shoots collected during different months were determined by the standard methods (Sadasivam and Manickam, 2005). The data was statistical analysed by following procedure as suggested by Panse and Sukhatme (1978).

Results and Discussion

The details of the observation pertaining to effect of time of softwood grafting are presented in Table 1. The outcome of the present experiment highlighted that softwood grafting in guava can be successfully carried out from June to December with varying degree of success under shade house ecosystem. The interpretation of data revealed that graft success (69.00 and 65.50 %) was high in grafting performed during December and July months. However, they were found statistically on par with one another. The graft success (34.00 %) was least in grafting performed during September. High graft success obtained during December month for softwood grafting may be attributed to the availability of naturally cured scion shoots on the mother plants during that period as it precedes with initiation of winter resulting in partial defoliation of plants and accumulation of food reserves in the scion shoots. This is confirmed by the observation of presence of high levels of carbohydrates with higher C: N ratio in shoots of December month (Table 2), their by making it available for new callus tissues developing at graft interface. This finding is corroborated with opinion of Chovatia and Singh (1999) in custard apple and Singh and Singh (2006) in jamun.

Similarly grafting performed in July recorded high graft take. This might be attributed to the

reason that July month grafting coincided with the inception of monsoon with prevalence of high humidity and slightly elevated temperatures. These findings are in line with Mukherjee and Majumdar (1964) who clearly indicated the relation between time of grafting with graft success and growth

of grafts with moderate temperature and moderate to high rainfall promoting callus development and rapid graft union formation. Similar findings were suggested by Sanjay *et al.*, (1996) in mango, Madalageri *et al.*, (1990) in sapota and Chovatia and Singh (2000) in jamun.

Table.1 Effect of season on graft-take and its growth t 90 DAG in softwood grafting of guava cv. Sardar

Treatments	Per cent graft success	Number of sprouts	Per cent sprouting	Average length of sprout (cm)	Average number of leaves	Survival percentage
T ₁ (July – 2012)	65.50 (54.03)*	1.88	42.53 (40.72)	8.12	11.98	94.88 (76.90)
T ₂ (August- 2012)	46.50 (42.99)	2.96	31.14 (33.87)	2.71	6.21	83.75 (66.24)
T ₃ (September- 2012)	34.00 (35.67)	2.27	35.70 (36.69)	3.97	8.45	67.60 (55.30)
T ₄ (October- 2012)	48.00 (43.85)	2.31	34.65 (36.08)	5.23	9.41	81.50 (64.52)
T ₅ (November- 2012)	61.00 (51.35)	3.63	67.25 (55.11)	4.63	15.17	89.82 (71.39)
T ₆ (December – 2012)	69.00 (56.17)	4.27	70.37 (57.05)	5.85	15.90	90.77 (72.31)
SEm ±	3.32	0.20	3.34	0.46	0.96	3.30
CD @ 5%	9.89	0.60	9.93	1.37	2.87	9.82
CV (%)	18.49	4.93	19.92	8.40	11.82	14.6

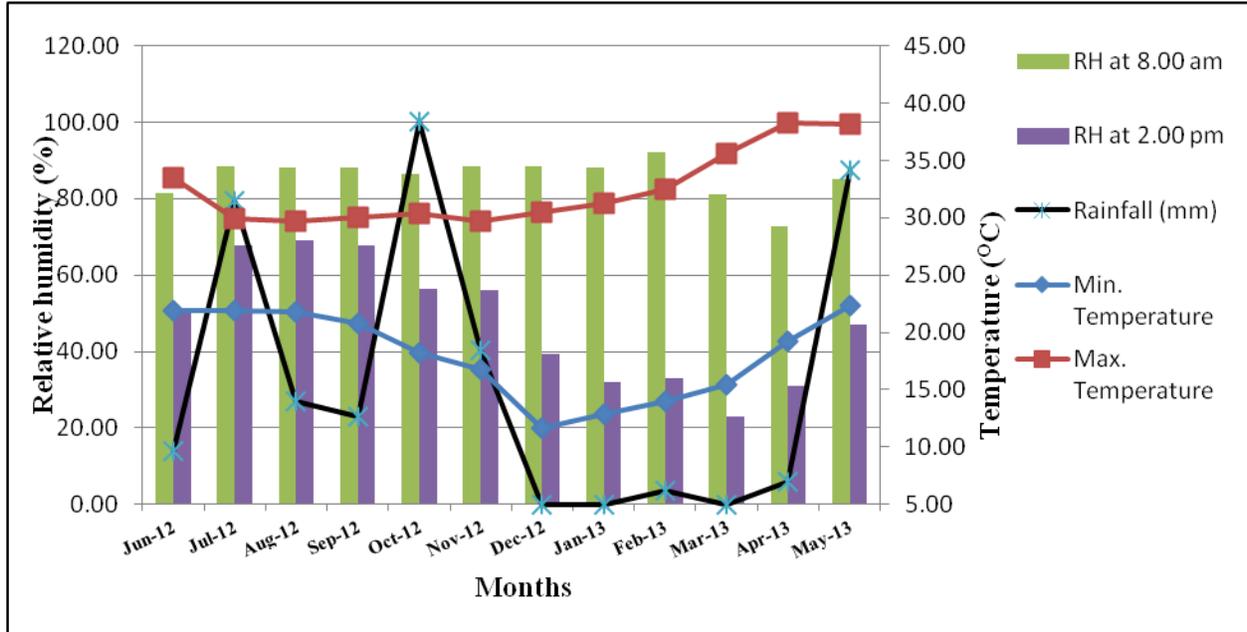
DAG – Days after grafting

* Values in parenthesis are angular transformation data

Table.2 Effect of season on Carbohydrates: Nitrogen ratio in the scions used for softwood grafting in guava cv. Sardar

Month	Total Carbohydrates (%)	Total Nitrogen (%)	C:N ratio
T ₁ (July – 2012)	12.07	0.96	12.65
T ₂ (August- 2012)	9.60	0.97	9.91
T ₃ (September- 2012)	9.33	0.96	9.69
T ₄ (October- 2012)	9.18	0.89	10.32
T ₅ (November- 2012)	12.60	0.91	13.82
T ₆ (December – 2012)	12.80	0.86	14.88
SEm±	0.15	0.01	0.23
CD @ 5%	0.46	0.02	0.69
CV (%)	2.76	1.65	3.74

Fig.1 Monthly weather data recorded during the period of investigation



Grafts prepared in December and July months also recorded good growth during hardening. Grafts of December noted high values for number of sprouts (4.27), percent sprouting (70.37 %) and average number of leaves (15.90) at 90 days after grafting (Table 1). The post grafting growth behavior of grafts prepared during December may be attributed to the physico- chemical condition of the scion shoots which are available for developing tissues for new growth. This might have also helped in quick and strong graft union formation and better nutrient uptake. Similar findings were reported by Wazarkar *et al.*, (2010) in sapota, Chovatia and Singh (2000) in jamun and Jacob *et al.*, (2001) in mango.

In the present study significantly reduced graft success was noted during the September and August months in spite of prevalence of favourable climatic conditions (Fig 1). This might be attributed to the complex relation between the physico- chemical status of scion shoots and their interaction with environmental condition. During these

months the plants are in reproductive phase (mrig bahar) with profuse flowering and initiation of fruit set. Therefore the scion shoots collected during these months were depleted with food reserves as depicted by lower C: N ratio status of scion shoots collected during these months (Table 2). This was also aggravated due to inadequate rainfall received during the month of August and September (Fig 1). Similar findings have been documented in other crops like sapota (Pampanna and Sulikeri, 2000) and cashewnut (Swami *et al.*, 1990).

The graft survival percentage after 90 DAG showed significant differences among the months of grafting. Significantly high survival percentage was registered in grafts prepared during July (94.88 %) and December (90.77 %) respectively. Good growth with higher survivability may be attributed to congenial environmental condition prevailing during post grafting hardening period which coincided with monsoon rains under Arabhavi conditions.

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