

IN VIVO PROPAGATION OF GUAVA (*PSIDIUM GUAJAVA* L.) THROUGH T-GRAFTING

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The *in vivo* propagation of guava (*Psidium guajava* L.) cv. Sufeda by T-grafting was investigated at 6 times from April, 15, at monthly interval up to September, 15. Three different scionwoods of cv. Sufeda were grafted onto landrace guava rootstocks. Better sprouting of 83.33% resulted on July, 15 followed by August, 15 (77.77%). Maximum shoot length was produced on April, 15 (18.66 cm) and minimum was noted on September, 15 (11.00 cm). The highest success rate of 76.00% was obtained on July, 15. August, 15 also produced a good success of 70.00%. The interaction between months of operation \times type of scionwood was found non-significant for the traits. The apex excision scionwood exhibited better sprouting (78.88%), maximum shoot length (17.94 cm) and good survival percentage (74.44%) than leaf defoliation and hormone treatment.

INTRODUCTION

Guava (*Psidium guajava* L.) is usually propagated from seed and the species is highly cross pollinated (35.6%) in nature (Soubihe and Gurgel, 1962). The traditional methods of vegetative propagation, such as inarching, aerial layering, budding are practiced in this species in various countries but in Pakistan, none of the above methods are used in commercial nurseries. The propagation of the species is mainly confined to sexual method.

Guava is difficult to root even if the cuttings are taken from strong succulent green woods (Chandler, 1958; Maqbool and Khan, 1973; Ahmad, 1966; Khattak *et al.*, 1983). T-grafting (Ali, 1972), inarching and air layering (Samson, 1986) were practiced by various investigators. The inarching gave better results than any other method (Ahmad, 1966) but this technique is costly, time consuming and cumbersome. T-grafting practiced by Ali (1972) as mentioned

earlier presented only sprouting percentage and no success percentage were recorded in trial. Therefore, investigations were conducted to use different scionwoods for better survival percentage and make it convenient to be practiced in the field.

MATERIALS AND METHODS

The experiment was conducted at the Experimental Area, Department of Horticulture, University of Agriculture, Faisalabad during 1986-988. The seeds of guava landrace were sown during 1986 and 1987 to prepare as rootstocks (Giani, 1968). One year old seedlings were used for grafting. The technique of T-grafting was followed after Ali (1972). Three types of scionwoods were prepared as T₁ (defoliation of leaves from scionwoods 20 days before operation), T₂ (clipping 10-15 cm terminal growth from scionwoods 20 days before operation) and T₃ (dipping current season shoots for 20 minutes at 1 ppm solution of indole butyric

Table 1. Percentage sprouting of T-grafted plants in guava (*Psidium guajava* L.) during 1987 and 1988 (means of two years)

	April	May	June	July	August	September	Mean
T ₁	66.66	66.66	73.33	90.00	80.00	70.00	74.44 a
T ₂	73.33	66.66	76.66	93.33	86.66	76.66	78.88 a
T ₃	63.33	53.33	66.66	70.00	66.66	53.33	62.22 b
Months means	67.77 ab	62.22 b	72.22 ab	83.33 a	77.77 ab	66.66 b	

Means of months and treatments followed by different letters are significant at 1% level of probability.

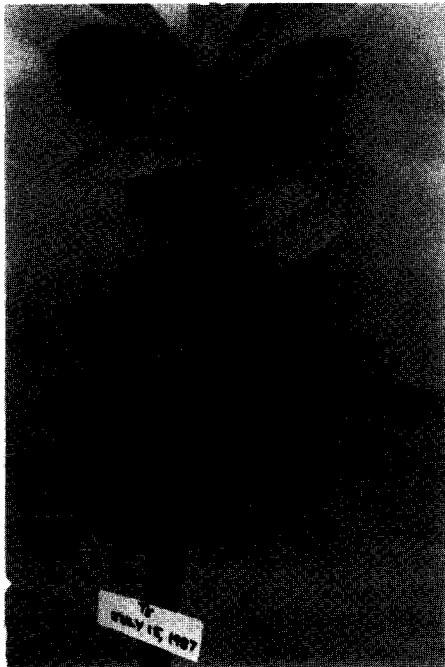


Fig. 1. Three months old plant produced by T-grafting + apex excision scionwood.

acid before practice). The scions for grafting purpose were removed from sub-terminal portions (15 cm) beyond the brown portion of the previous year's growth. The grafting operation was started on April, 15 and continued at monthly intervals up to September, 15 and the same experiment was repeated during the second season in 1988. Each year, 540 plants were grafted and 3 types of scionwoods were used. The experiment was laid out in randomised complete block design with factorial arrangement in 3 replications. The data regarding percentage sprouting, shoot length and percentage survival were compiled and means were separated by New Duncan's Multiple Range test (Steel and Torrie, 1980).

RESULTS AND DISCUSSION

Percentage sprouting of grafted plants: Data regarding percentage sprouting of grafted plants during various months of operation showed that maximum sprouting of 83.33% was observed on July, 15 followed by August, 15, June, 15 and September, 5 (Table 1). Very low sprouting of grafts (56.66%) was noted on May, 15. The results

Table 2. Shoot length (cm) produced by grafted plants in guava (*Psidium guajava* L.) during 1987 and 1988 (mean of two years).

	April	May	June	July	August	September	Mean
T ₁	19.66	17.00	15.33	15.33	14.00	11.66	15.50 b
T ₂	21.33	20.00	19.00	18.00	16.00	13.33	17.94 a
T ₃	15.00	14.66	11.66	13.00	13.33	8.00	12.61 c
Months means	18.66 a	17.22 ab	15.33 b	15.44 b	14.44 b	11.00 c	

Means of months and treatments followed by different letters are significant at 1% level of probability.

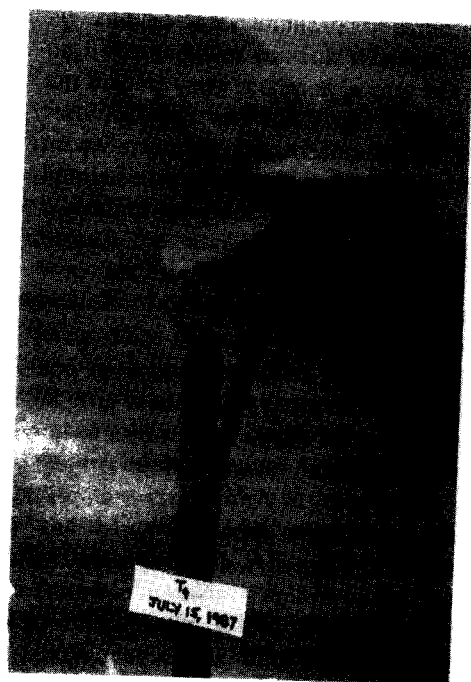


Fig. 2. Three months old plant produced by T-grafting + leaf defoliation scionwood.

of May, 15 are statistically identical to April, 15. August, 15, June, 15 and September, 15 presented an intermediate position with regards to percentage sprouting of grafted plants. Maximum sprouting of graft on July, 15 and August, 15 may be on account of maximum humidity (75%) and favourable temperature (39°C) prevailing during these months. Ali (1972) reported similar results during these months.

In case of type of scionwoods, T₂ (apex excision) significantly increased the sprouting percentage (78.88%). T₁ (leaf defoliation) scionshoots also resulted good sprouting of 74.44%. These treatments are statistically at par with each other (Table 1). Very low sprouting was noted under T₃ (hormone treatment). The apex excision gave good sprouting may be due to elimination of apical dominance.

Shoot length: Mean values of the months regarding shoot length of the grafted plants indicated that on April, 15 and May, 15 assumed a maximum shoot length of 18.66 cm and 17.22 cm, respectively (Table 2). The shoot length produced on July, 15, June, 15 and August, 15 were next to the above months. Very shorter length of 11.00 cm was

Table 3. Analysis of variance for percentage survival of T-grafting in guava (*Psidium guajava* L.) during 1987 and 1988 (mean of two years)

Source of variance	DF	Sum of squares	Mean squares	F. ratio
Replications	2	70.38	35.19	-
Months (M)	5	2298.15	459.63	3.45*
Treatments	2	4070.38	2035.19	15.27**
Months x	10	351.85	35.18	0.26 ^{NS}
Treatments (M x T)				
Error	34	4529.62	133.22	-

*, ** = Significant at 5% and 1% level of probability, respectively.
NS = Non-significant.

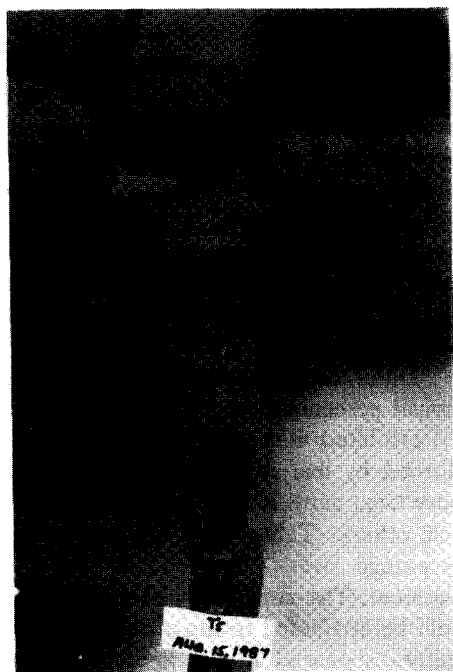


Fig. 3. Two months old plant produced by T-grafting + Apex excision scionwood.

observed on September, 15. The data exhibited more or less persistently rhythmical manner for growth of shoot. It is quite understandable because the time given for the shoot to grow was absorbitantly greater than the time given to other shoots.

Apex excision (T_2) significantly increased the shoot length to 17.94 cm (Table 2) than leaf defoliation (T_1) and T_3 (hormone treatment). In this case, removal of growing tips could be useful for earlier protuberance of buds which could otherwise have remained dominant because of some of the inhibitors produced in the apex (Leopold, 1963).

Percentage survival: Data on percentage survival of grafted plants are presented as an analysis of variance in Table 3. It reveals significant differences for months (M) and type of scionwoods (T) among primary effects and interaction between months (M) x type of scionwoods (T) was non-significant.

Survival percentage in case of various months of operation shows that July, 15 got the maximum success of 76.66%. The sec-

ond best month was August, 15 where a 70% success was noted (Table 4). Very low survival was observed on May, 15 (56.66%).

The superiority of July, 15 and August, 15 with regards to survival percentage is mainly because of the onset of monsoon

Table 4. Percentage survival of T-grafts in guava (*Psidium guajava* L.) during 1987 and 1988 (mean of two years)

	April	May	June	July	August	September	Mean
T ₁	63.33	60.00	66.66	80.00	76.66	66.66	68.88 a
T ₂	66.66	63.33	73.33	86.66	80.00	76.66	74.44 a
T ₃	50.00	46.6	60.00	63.33	53.33	50.00	53.88 b
Months means	60.00 b	56.66 b	66.66 ab	76.66 a	70.00 ab	64.44 ab	

Means of months and treatments followed by different letters are significant at 1% level of probability.



Fig. 4. Two months old plant produced by T-grafting + leaf defoliation scionwood.

rains and favourable temperature for callus growth as reported earlier. It can be assumed from the above discussion that the above two months are the better time for guava propagation. The present findings are similar to Mukherjee and Singh (1965), Bhandary and Mukherjee (1970) and Ahmad (1966). They recommended that June, July and August are the best months for guava propagation.

Different scionwoods also reflected the survival percentage in guava. Apex excision (T₂) exhibited maximum survival of 74.44% followed by leaf defoliation (68.88%). The above treatments are statistically at par with each others (Table 4). Very low survival percentage was observed in hormonal treatment. The superiority of apex excision could be attributed to the elimination of inhibitors appeared in the apex. This treatment also showed dominancy for overall parameters in the present study. The photographs of the successful graft plants produced by the best scionwoods are shown in Figures 1, 2, 3 and 4.

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