Reprinted from : Indian Journal of Horticulture
Vol., 35 No. 2, June 1978

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SOFT WOOD GRAFTING OF MANGO *IN SITU*

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INTRODUCTION

The propagation of mango by cuttage and layerage has been tried by many workers with mixed results (Garg, 7; Madhava Rao, 9; Singh, 13; Thakurta and Dutt, 14). Different methods of budding and grafting have been reported to give high percentage of success (Bajwa and Ram, 3; Bhan *et al.*, 4; Gandhi, 6; Garg, 7; Madhava Rao, 9; Majumder and Rathore, 10; Singh and Kahn, 12; Ulvi, 15) but have been confined to the nursery only. Simple approach grafting has still remained the most popular method. Transplanting of such vegetatively propagated nursery plants in the field has been attended with a relatively low percentage of success except under most favourable agroclimatic conditions having good irrigation facilities.

Budding and grafting *in situ* have also given appreciable success in very favourable agroclimatic conditions (Ahmad, 1; Bhat, 5; Lynch and Mustard, 8; Mukherjee and Majumdar, 11). However, in vast areas of less favourable conditions under which mango is grown, the etsablishment of grafts in the field is very meagre even when a method may give a high take in the nursery.

In order to solve these problems of low establishment of grafts in areas of relatively less favourable agroclimatic condition, a technique of soft wood grafting on mango stock plants raised *in situ* was tried at Anand in 1972 and 1973. In this technique, all the leaves on the stock plant were removed immediately after grafting (Amin, 2). Though the method gave a near 100 per cent success, the survival through summer, 9 months later, of these grafts was poor. The technique was therefore modified as reported below.

MATERIALS AND METHODS

Mango stones were sown in the field in 1974. In 1975 there was a population of 450 seedlings in the plot. The plot was divided into 3 blocks. In all 414 stock plants which developed properly were soft wood grafted between July and August 1975 imparting the following 3 treatments.

(A) Soft wood grafting followed by immediate removal of all the leaves on the stock.

(B) Soft wood grafting followed by the immediate removal of leaves from the lower half of the stock.

(C) Soft wood grafting retaining all the leaves on the stock.

The number of grafts that came under each of the above treatments A, B, and C were 136, 125 and 153 respectively which were treated as replicates and data analysed as completely randomised design model.

Treatment of Scion Wood

The scions used were all of the Rajapuri variety, selected from healthy trees. One or two weeks prior to the date of grafting, terminal shoots, 3 to 6 months old, with a thickness of about 0.5 cm having well developed terminal bud were selected. Upto 25 cm these were defoliated keeping about 6 mm petioles attached to the stem. On the day of grafting these pretreated scion twigs were collected, wrapped in moist cloth and kept in polythene bags till required.

Preparation of graft

Stock plants with new terminal growth with bronze coloured leaves and stems were selected for grafting. They were decapitated leaving 7 to 10 cm of the soft stem. These stems were split from the top to a length of 3 to 3.5 cm with a sharp knife into a cleft. Defoliated scion shoots of the same thickness as the stock shoots were cut back to 10 to 13 cm length and the lower end made into a wedge of 2.5 to 3.0 cm. The scion wedge was then inserted into the cleft on the stock and secured firmly with transparent polythene strip 1.2 cm wide and 45 cm long and of 200 gauge thickness.

In treatments A and B all or half the number of leaves remaining on the stock were removed immediately after grafting.

In cases of failures, which were very few, the stock was regrafted on the fresh growth obtained after about a month.

Results and Discussion

The soft wood grafting on all the plants was completed during the period of July-August 1975. Periodical observations were made on the plants and the survival of grafts on 31-11-76 i.e. about 15 months after grafting is presented in Table 1.

Table 1

Survival of soft wood grafted mango plants 15 months after grafting

Treatment	No. of plants under the treatment	Number of deaths of grafted plants in											Number Survived	% Survival
		Oct. 75	Nov. 75	Dec. 75	Jan. 76	Feb. 76	March 76	April 76	May 76	June 76	July 76	August 76		
A	136	5	6	5	1	—	6	5	13	2	—	1	92	67.65
B	125	—	—	—	—	—	—	—	—	—	—	—	125	100
C	153	—	—	—	—	—	—	—	—	—	—	—	153	100

It is seen from the table that in treatments B and C in which leaves were retained in the upper half and all along the root stock stem respectively, the survival was 100 per cent, whereas in treatment A where all the leaves were removed, the survival was only 67.65 per cent. This indicates that the photosynthates from the flush leaves of the scion were inadequtae for the survival of the grafts.

It was also noted as early as October, 1975 that the stock plants in treatments B and C had put up better growth with thicker stock stems. In order to study the

vigour of the plants under the different treatments the girth of the plants at a height of 15 cm from ground level was recorded in October 1975, April 1976 and October 1976. The recorded average girths and increments of girth are presented in Table 2.

TABLE 2

Average increase in circumference of survived grafts in cm

Treatment	Grafts survived after 12 months	Average circumference of survived grafts in cm			Average increase in circumference in cm	
		October 1975	April 1976	October 1976	April 1976	October 1976
A	92	4.28	5.61	9.52	1.33	5.24
B	125	5.28	7.24	11.57	1.96	6.29
C	153	5.78	7.80	11.99	2.02	6.21
			CD at 5%		0.19	0.40
			CD at 1%		0.25	0.53

The data clearly show that the grafts under treatments B and C put up highly significant secondary growth compared to those in treatment A. Treatments B and C were on par with each other in respect of stock girth.

The observations reported above prove that *in situ* mango grafts could be made with 100 per cent survival by the soft wood grafting where in all the leaves on the stock are retained.

Grafting on 2 weeks old seedlings under controlled conditions, gives good union. But the grafts later fail to establish in the field. This method can be adopted for older stocks of 2 to 5 years *in situ* having more branches, by removing all but two vertically growing branches and grafting on new flush (soft wood) of these brances. The same method can also be successfully used for top working older trees by periodically dehorning, in 2-3 years the main branches, allowing new flush to develop and using the tender soft shoots for grafting.

Detached scion methods of grafting viz., splice, whip and tongue, wedge, veneer, side grafting etc. have been tried by many workers in the past on mature wood which appears to be the reason for the low success. In the present technique, the grafting was done at the site of terminal fresh growth having bronze coloured leaves and stems i.e. on the soft wood. The method of grafting employed was wedge grafting but the same success was observed with other methods of detached grafting like splice, whip and tongue, saddle etc.

While the high take is attributable to the grafting on soft wood, the survival depended on the nourishment provided by the leaves on the stock.

This method offers scope for grafting on seedlings established *in situ* as also for quick top working of undesirable varieties. One reason why the impact of the new hybrids is not felt in the orchards is the slow rate of replacement of old orchards. A reliable and quick method of top working like this should be of great promise to spread new varieties more rapidly.

SUMMARY

One year old *in situ* grown mango stocks were soft wood grafted by wedge method having imposed three treatments viz. (A) immediate removal of all the leaves from the stock (B) immediate removal of leaves from the lower half of the stock and (C) retaining all the leaves on the stock, in the year 1975. Periodical records were maintained for the failures of thc successful grafts and also for the girth of grafts at 15 cm height at every six months.

The results indicated that 67.65 per cent grafted plants survived in treatment A, while 100 per cent survival was found in the treatments B and C. The secondary growth as measured in terms of an increase in circumference of the survived grafts revealed significant superiority of the treatments B and C as compared to A.

ACKNOWLEDGEMENT

The author is thankful to Mr. B. M. Patel, Asst. Professor of Horticulture, Gujarat Agricultural University, Anand Campus for his valuable help during the course of this experiment.

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