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Standardization of wedge grafting in guava under North Indian plains

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ABSTRACT

Wedge grafting is a method of vegetative propagation which is standardized in guava propagation gave maximum number of success than other standard methods of propagation in guava. Present study revealed that wedge method of grafting was tried in guava (*Psidium guajava*) cultivars Allahabad Safeda Lucknow 49 and Lalit under greenhouse (GH) as well as in open field conditions with and without polycap. The grafting operation performed in greenhouse with polycap gave significantly higher success of grafts compared with other conditions of wedge grafting in all taken cultivars. However, maximum success of grafts was obtained in greenhouse (81.71%) and minimum in open field conditions (when grafting was carried out during September to December in all three cultivars. Grafting under greenhouse significantly reduced the time taken (12-13 days) for sprouting than those grafted in open field conditions. The temperature range of 24 to 26^0 C and 70 to 80 per cent RH were found most conductive for achieving maximum success.

Key words: *Psidium guajava* L., wedge grafting, propagation, polyhouse.

INTRODUCTION

The greatest handicap in guava plantation is discriminate multiplication of plant from unreliable sources by nurserymen (Singh *et al*., 11). Non availability of quality planting material and consequent substitution of poor quality seedling have adversely affected the guava production and productivity. The initial planting material is the basic requirement on which the final crop depends both in quality and quantity (Singh *et al.,* 11). In view of the high return and the potential for processing, there is a tremendous scope for bringing substantial additional area under guava crop in India. So a rapid and successful propagation technique is required as the area under crop is expanding and there is great demand to prepare the guava sampling throughout the year. Though guava is propagated through budding (Gupta and Mehrotra, 1; Kaundal *et al*., 4), air-layering Sharma *et al*. (10) and Manna *et al*. (5), stooling Rathore (8), and inarching (Mukherjee and Majumder, 6) these are still not commercially viable due to varying rates of success, absence of tap root system and cumbersome process. Preliminary trails carried out by the authors have indicated that the rapid and successful propagation through wedge grafting technique has been found possible throughout the year even in extreme climatic conditions such as severe cold and heat (Singh *et al*., 11). Therefore, it has become imperative to standardize the method of wedge grafting for guava throughout the year vegetative multiplication under greenhouse as well as in open conditions.

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MATERIALS AND METHODS

The present experiment was carried out at the Horticultural Research Garden of the Institute of Agricultural Sciences, BHU, Varanasi, to find out suitable propagation techniques in guava. This experiment was conducted during September, 2008 to December, 2008. Three cultivars namely Allahabad Safeda , Lucknow 49 and Lalit were selected for the present study and Four months viz. September, October, November and December were selected for wedge grafting. There were two conditions for wedge grafting namely open and polyhouse conditions. There were two other conditions of wedge grafting in open and polyhouse with and without polycap. Polycap of 100 gauge thickness in 3 cm x 15 cm size were used in wedge grafting to cover the graft-scions.

The technique envisaged growing of seedling in polyethylene bag, grafting and hardening (Singh *et al*., 11). Raising rootstock in polyethylene bags is recommended by Singh *et al*. (11) as it gives better establishment of plants in the field on account of undisturbed tap root system. Fresh seeds of guava cvs. Allahabad Safeda and L-49 were extracted from ripe fruits and washed thoroughly to remove the pulp and other

material clinging to the seeds. After extraction, seeds of both varieties were sown in polyethylene bags filled with soil, sand and FYM in 3:1:1 ratio. Further, all the polyethylene bags were covered with 100 micron (400 gauge) white polyethylene sheet soon after sowing. Seedlings were raised for rootstocks in the nursery and when it was approximately 6 to 8 months old and had attained a stem diameter of 0.5 to 1.0 cm, were picked up for wedge grafting. Shoot with apical portion which is 3 to 4-month-old, 15 to 18 cm long of pencil thickness (0.5-1.0 cm) with 3 to 4 healthy buds were used for grafting. Selected scion shoots were defoliated on the mother plant, about one week prior to detachment. At the same time, the apical growing portion of selected shoots was also beheaded, which helped in forcing the dormant buds to swell. In this way, the buds on the scion were made ready to start sprouting at the time of grafting. This treatment is essential for high success of grafts.

After selection of the scion material, rootstock (seedling) was headed back, leaving 15 to 18 cm long stem above the polythene bag. The beheaded rootstock was split open about 4.0 to 4.5 cm deep through the centre from cut end of the rootstock with grafting knife. A grafting shaped cut, slanting from both the sides (4.0-4.5 cm long) was made on the lower portion of the scion shoot. The scion stick was then inserted into the wedge of the stock and pressed properly so that cambium tissues of rootstock and scion could come in contact with each other. The stock and scion point was then tied with the help of 150 gauge, 2 cm wide polyethylene strip. Sprouting of graft-scions were observed everyday and number of days taken for sprouting was counted back to date of grafting. Success percentage of sprouted grafts was calculated for each replication of all the treatments on the basis of total number of grafts sprouted out of total number of grafts prepared. Statistical analysis of the data was carried out as per .the CRD method outlined by Panse and Sukhatme (7).

RESULTS AND DISCUSSION

Data on number of days taken for graft sprouting revealed that it was significantly influenced by scion cultivar, month of grafting, conditions of grafting, use of polycap and interaction of scion cultivars with of grafting (Fig. 1a-c). Significantly earlier sprouting of graft was recorded with Allahabad Safeda followed by Lalit and L-49. Number of days taken for graft sprouting was significantly less due to grafting in the month of September. Furthermore, use of polycap significantly reduced the number of days taken for graft sprouting than without polycap. Significantly earlier sprouting was observed by use of polycap irrespective of scion cultivars and month of grafting due to creation of high humidity

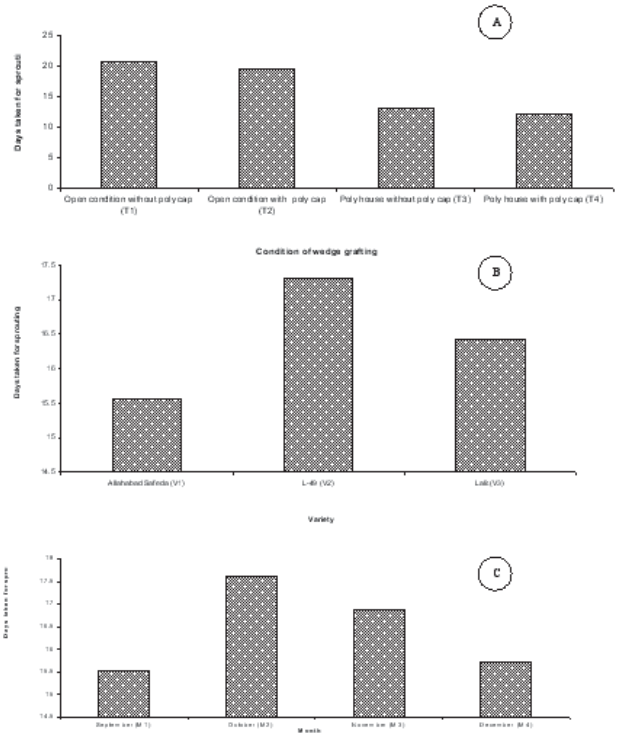

Fig. 1. Effect of different factor on No. of days taken for scion bud sprouting in guava.

around graft-scions which reduced the desiccation of active tissue of scion bud as compared to open condition. Beneficial effect of polycap/increase in relative humidity on number of days taken to sprouting of graft-scion buds has been reported earlier also by Rajan *et al*. (9), Jinturkar and Narwadkar (2), and Kashyap *et al*. (3).

Minimum number of days taken for graft sprouting was recorded in the month of September which was at par with December and significantly lower than October and November. It may be attributed due to higher relative humidity in the month of September and December. Minimum number for days was taken for graft sprouting was associated with polyhouse with polycap, which was significantly lower than other conditions of wedge grafting. This was perhaps due to higher relative humidity in polyhouse and also inside the polycap. High humidity greatly influences bud sprouting. It might be due to creation of high humidity around the graft-scions which reduced the desiccation of active tissue of scion bud as compare to open conditions. The next grafting condition in order of minimum number of days taken for graft sprouting was polyhouse without polycap. It might be due to high relative humidity in the polyhouse. Relative humidity play vital role in sprouting of graft-scions as higher humidity enhances early sprouting. Maximum number of days taken to graft sprouting was recorded

under open condition without polycap. It might be due to high temperature and low relative humidity.

The success of wedge grafting was significantly influenced by scion-cultivar, month of grafting, growing conditions of wedge grafting (open condition and polyhuose) and use of polycap. Significantly more success percentage was recorded in the month of December followed by November (Table 1). It might be due to low temperature, high relative humidity, short sun-shine period and low evaporation rate. However, minimum success was noted during September. It might be due to high temperature, low relative humidity, long sun-shine period and high evaporation rate. All three varieties differed significantly to each other in respect of success percentage. This difference might be due to genotype of the varieties. Among the varieties, Allahabad Safeda showed the maximum percentage followed by Lalit and L-49 (Table 2). Irrespective of the varieties, growing the grafts in polyhouse along with polycap gave the maximum success which was significantly higher than other conditions of wedge grafting (Table 3). It might be attributed to the environmental condition around the graft-scion which was suitable for graft sprouting and hence the success of grafting was higher in polyhouse alongwith polycap than other conditions of grafting. In polyhouse, temperature and relative humidity were slightly higher than open conditions. Treatment polyhouse conditions without polycap gave good success, which might be due to low temperature and high humidity which enhances early sprouting. However,

Table 1. Effect of different months on success of wedge grafting in guava.

Month	Success percentage
September (M_1)	64.70
October (M_2)	68.19
November (M_3)	74.60
December (M_4)	79.60
CD at 5%	1.20

Table 2. Effect of different Guava genotypes on success of wedge grafting in guava.

Variety	Success percentage
Allahabad Safeda (V_1)	75.00
L-49 (V_2)	68.25
Lalit(V_3)	72.06
CD at 5%	1.04

Table 3. Effect of different growing conditions on success of wedge grafting in guava.

Condition of wedge grafting	Success percentage
Open condition without poly cap (T_1)	62.75
Open condition with poly cap (T_2)	68.59
Poly house without poly cap (T_3)	74.04
Poly house with poly cap (T_4)	81.71
CD at 5%	1.20

minimum success percentage was observed under open condition without polycap. It might be due to high temperature, low relative humidity, long sun-shine period and high evaporation rate. The next minimum success percentage was recorded under open conditions with polycap, which was more than open condition without polycap. It could be due to low temperature and high relative humidity inside the polycap which enhances early sprouting of graft-scion.

The study revealed that wedge grafting has a tremendous potential for multiplying guava plants rapidly either in greenhouse or open conditions. Grafting done with polycap gave high success graft take percentage under polyhouse conditions (Fig. 2). In dry seasons and under low humidity condition, polycap can be utilized for covering graft-scions in order to obtain more success in grafting.

Fig. 2. Scion bud sprouting after wedge grafting in guava cvs.Lalit and Allahabad Safeda.

REFERENCES

1. Gupta, M.R. and Mehrotra, N.K. 1985. Propagation studies in guava (*Psidium guajava* L.) cv. Allahabad Safeda. *J. Res. PAU*, *Ludhiana*, **22**: 267-69.

2. Jinturkar, S.P. and Narwadhar, P.R. 1989. Effect of environmental condition on the success of epicotyls grafting in mango. *Acta Hort*. **231**: 252-55.

3. Kashyap, J.S., Srivastava, S.S. and Sharma, A.B. 1989. Studies on vegetative propagation of mango. *Acta Hort*. **231**: 263-65.

4. Kundan, G.S., Gill, S.S. and Minhas, P.P. 1987. Budding techniques in clonal propagation of guava. *Punjab Hort. J*. **27**: 208-11.

5. Manna, A., Mathew, B. and Ghosh, S.N. 2004. Air-layering in guava cultivars. *J. Interacad. Nadia,* **2**: 278-81.

6. Mukherjee, S.K. and Majumder, P.K. 1983. *Vegetative Propagation of Tropical and Subtropical Fruit Crops*, ICAR, New Delhi.

7. Panse, V.C. and Sukhatme, P.V. 1987. *Statistical Methods for Agricultural Workers*. Indian Council of Agricultural, New Delhi.

8. Rathore, D.S. 1984. Studies on the propagation of guava by stooling. *Punjab Hort. J*. **24**: 75-78.

9. Rajan, J., Arvindakshan, M. and Kumar, G. 1981. Studies on stone grafting in mango. *South Indian Hort*. **35**: 192-99.

10. Sharma, K.K., Jawanda, J.S. and Gill, S.S. 1978. Propagation of guava by mould layering. *Punjab Hort. J*. **18**: 65-67.

11. Singh, G., Gupta, S., Mishra, R. and Singh, G.P. 2005. *Wedge Grafting in Guava- A Novel Vegetative Propagation Technique.* Central Instt. for Sub-tropical Horticulture Publications, Lucknow.

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