

## STUDIES ON DIFFERENT SOFTWOOD GRAFTING TECHNIQUES IN JAMUN, *EUGINEA JAMBOLANA*

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### ABSTRACT

Jamun (*Eugenia jambolana*) is mostly propagated through seeds, which exhibit a great variation due to inevitable heterozygosity. For producing pedigree plants of a variety, the presence of any asexual propagational technique is prerequisite. For this purpose, nursery experiments were conducted at Horticultural Research Institute, AARI, Faisalabad during the year 2009-10 and 2010-11 for standardization of asexual propagational technique in jamun. Three grafting techniques i.e. T-budding, T-grafting and cleft grafting were studied. On the basis of two years means, maximum success percentage (65.25%) was measured in the plants budded by T-grafting. The plants sprouted in 30.50 days and produced 13.5 number of leaves on 27 cm long twig. Minimum success (10.75%) was measured in cleft grafting. The results provided useful information on clonal multiplication of elite germplasm of jamun *in vitro* for developing commercial nurseries.

**Keywords:** *Eugenia jambolana*; T-budding; T-grafting; cleft grafting; pedigree plants; Pakistan.

### INTRODUCTION

Jamun (*Eugenia jambolana*) is an evergreen tropical to sub-tropical tree native to Bangladesh, India, Nepal, Pakistan, Trinidad and Indonesia. Jamun is an important minor indigenous fruit tree of Pakistan (Indo-Pak) which belongs to the family Myrtaceae. It has recently attained importance as its fruit is appraised by the diabetic patients. Jamun has also anti-cancer and anti-viral properties. It is a good source of iron, apart from the usual content like minerals, sugar, proteins, pigments, etc. (11). This fruit is reported to be quite useful for heart and liver dysfunction. Its seed powder has anti-diabetic properties and cures ringworm (3). The vinegar prepared from juice extracted from slightly unripe fruits is carminative, diuretic and cures stomach pain apart from having cooling and digestive properties. Jamun fruit syrup is a remedy for diarrhoea (14).

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In Punjab, Pakistan there are two types of varieties i.e. large sized jamun locally called "Ra Jaman" and small sized jamun which is called as "Desi Jaman". Fruits of Ra Jaman are oblong in shape, deep purple or bluish black in colour at fully ripe stage. The pulp colour of ripe fruit is purple pink and the fruit is juicy and sweet. The stone is small in size. It ripens in the month of July-August. These types of strains are very common among the people. Desi jaman is of small sized and is late maturing variety. It ripens in the month of August. Its fruit is slightly round in shape, deep purple or blackish in colour at full ripe stage. The colour of pulp is purple, less in juice, weight and sweetness of pulp with large stone size in comparison of that of 'Ra Jamun'.

Usually the plant propagation is carried out through seeds. Jaman, if propagated through seed exhibits a great variation due to inevitable heterozygosity. Moreover, seed propagated plants come into bearing much later than vegetatively propagated plants. Due to cross pollination the variations exist in leaves, plant height and spread, bearing, fruit size, colour, shape, taste and texture.

Asexual techniques are easy way to preserve the certain characters of variety. Environmental conditions like mild temperature and mild humidity; and suitable grafting technique must be met for development of callus tissue and to form a graft union. In outdoor grafting operation it is difficult to provide all favourable environmental conditions but these could be easily achieved in controlled conditions (1).

Madalageri *et al.* (8) reported that propagation of jamun by softwood grafting gave 97.5 percent success during month of June and 50.00 percent during August. Chovatia and Singh (2) reported that propagation of jamun by softwood grafting gave 68.8 percent success during June and 64.15 percent success during July. Bandenawaj (1) reported that in open condition May and November months recorded the highest (90%) graft success, whereas in case of controlled condition months of October, November and December showed maximum (86%) graft success. The main advantage of controlled condition over open condition is to get maximum graft success in the months of October, November and December. The best age of rootstock for grafting under open condition was 7 and 13 months, whereas under controlled condition the highest graft success was obtained in 6, 7 and 8 month old rootstock.

Considering the commercial and medicinal importance of this unexploited crop, there is a great need to develop and standardize technology for vegetative propagation in jamun so that true-to-type plants may be produced and better characters of variety may be preserved or multiplied.

## MATERIALS AND METHODS

This study was conducted at Horticultural Research Institute, AARI, Faisalabad during the year 2009-2011. Land was well cultivated and leveled and flat beds were prepared. To enhance fertility, texture and drainage, farm yard manure (FYM) @ 60-80 kg/marla (272.25 sq.feet) was applied and uniformly mixed in the soil one month prior to sowing of seeds. The seeds free from the diseases, insect and pest's attacks were collected, thoroughly washed to free pulpy material and then treated with a fungicide to prevent fungal diseases. The seeds were sown in the furrows 2-3 cm apart during month of October in both years as the temperature becomes mild and RH remains in the range of 70-80 percent. The seeds were lightly covered with soil 0.5 to 1.0 cm deep and watered. After attaining the size of 4-6 cm, the seedlings were shifted to nursery beds for easy handling in rows 9 to 12 inches apart. After four lines, distance of 2.5 feet was left for budding operations. To protect the seedlings against insect pests and diseases judicious spray of insecticides and/or fungicides was carried out. The plants became ready for grafting after 6 to 9 months. On attaining the girth equal to girth of pencil the seedlings were grafted with three methods i.e. T-budding, T-grafting and cleft grafting.



Fig.1. Different grafting techniques

Experiment was laid out in randomized complete block design replicated four times. Data were collected on success percentage, days taken to sprout, shoot length after 30 days and number of leaves after 30 days and means of both years were calculated. Data were analyzed statistically by using Fishers analysis of variance and treatments were compared by using least significant difference test at 5% probability level (13).

## RESULTS AND DISCUSSION

### Success percentage

The data (Table 1) revealed that T-grafting in jamun gave maximum success (65.25%) followed by T-budding (24.75%) against minimum success

(10.75%) in plants budded via cleft grafting. The results are in line with the findings of earlier workers (2, 8). Desai (4) also observed that softwood grafting in Jack showed the highest success (69.33%) in April followed by May (56.0%). Jose and Valasalakumari (6) noted high percentage of sprouting and survival during the month of June compared to May, July and August following epicotyl grafting. They further observed that the grafts kept under mist showed sign of better success and survival. Chovatia and Singh (2) reported that success was poor from February to May whereas budding in May resulted in significantly higher shoot length, shoot diameter and number of functional leaves.

**Table 1. Performance of different grafting techniques in jamun.**

Technique	Success (%)	Days taken to sprout	Shoot length after 30 days	No. of leaves after 30 days
T-budding	24.75b	27.00b	12.25b	07.5b
T-grafting	65.25a	30.50b	27.00a	13.5a
Cleft grafting	10.75c	44.25a	09.50b	04.50c
LSD value	9.9394	9.5163	6.6576	2.3070

### Shoot length

Maximum shoot length (27.00 cm) was noted in plants grafted by T-grafting followed by T-budding (12.25 cm) (Table 1). Minimum shoot length (9.50 cm) was measured in cleft grafting. Ghojage *et al.* (5) also narrated that maximum graft height (20.66 cm) was recorded in October which was at par with February (18.66 cm) and August (17.66 cm). On the other hand, December recorded the lowest height (12 cm). Khattak *et al.* (7) reported that maximum shoot length of 18.66 cm and 17.22 cm, was noted on 15<sup>th</sup> April and 15<sup>th</sup> May, respectively.

### Days taken to sprout

Significantly maximum days (44.25) were observed for sprouting in the plants grafted by cleft grafting followed by T-grafting (30.50). Minimum number of days (27.00) for sprouting were noted in T-budding. These results are supported by Bandenawaj (1), who stated that days taken for sprout initiation differed significantly among treatments (months). He noted significantly less number of days to sprout in the month of June.

### Number of leaves after 30 days

The data (Table 1) revealed that maximum number of leaves (13.5) were observed in the plants grafted by T-grafting. T-budding showed 7.5 number

of leaves against minimum 4.5 cleft grafting. Bandenawaj (1) also reported similar results where success on 15<sup>th</sup> days after graft was significantly higher (11.00%) with more number of leaves in June over rest of the treatments. Ghojage *et al.* (5) stated that number of leaves was maximum in February (9.33) which were at par with March, September (9.00) and July (7.33), against minimum in December (3.00). These results are also supported by Raghavendra (12) who reported that maximum number of leaves (3.4), leaf area (5.9cm<sup>2</sup>) and sprout length (2.7 cm) were recorded in eight months old rootstock (A4) on 30th day after bud take in grafting method. Bandenawaj (1) reported that on 15<sup>th</sup> and 30<sup>th</sup> day after graft success highest number of leaves i.e. 9.33 and 12.48 were recorded in June, respectively under open condition. He observed minimum number of leaves i.e. 3.19 and 3.15 in August and November, respectively.



Fig. 2. Series wise technology of T-grafting.

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