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Short Communication

Effect of grafting on success and survivability of jamun (*Syzygium cumini* Skeels.) varieties

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ABSTRACT

Jamun (*Syzygium cumini* Skeels) is a vital fruit crop for arid regions. An investigation was conducted to assess the propagation success of four jamun varieties (CISH-42, CISH-37, Konkan Bahadoli and Goma Priyanka) in the south-western region of Punjab. Data were collected on grafting success, graft survival, sprout initiation, number of sprouts and leaves per graft, graft height, and chlorophyll index. The results revealed that the variety Konkan Bahadoli recorded highest graft success (83.7%, 82.8%) and survival rates (76.6%, 73.9%) during both the years, followed by Goma Priyanka. The var. Konkan Bahadoli recorded earliest sprouting (16.6 days, 15.3 days, respectively in both years) and superior growth parameters, including the number of sprouts and leaves, graft height, and chlorophyll index. Overall, the var. Konkan Bahadoli responded best to grafting performed in March under south-western region of Punjab.

Keywords: Chlorophyll index, graft success, graft survival, grafting, jamun

INTRODUCTION

Jamun (*Syzygium cumini* Skeels.) is one of the important minor indigenous fruit crops of India, belongs to the family Myrtaceae. The tree bears dark purple date like fruits of 2-4 cm long with prominent elongated seeds. The fruit is usually astringent, sometimes unpalatable and the taste varies from acid to fairly sweet. In recent years, this crop has attained importance as an arid zone fruit crop because of its hardy nature, high yielding potential besides its nutritious fruits. Jamun seed powder has antidiabetic properties and also cures ringworm. It is found in wild throughout India *i.e.*, from Indo-gangetic plains in the north to Tamil Nadu in the south. In Punjab, jamun is cultivated in an area of about 80 ha which is mainly confined to arid irrigated zone. Considering the commercial and medicinal importance of this unexploited crop and the potentiality of cultivation of this fruit crop especially in the arid zone, there is a great demand of improved varieties with good quality fruits, early bearing and dwarf stature, and high yield potential. Despite its benefits, the cultivation of jamun faces challenges, particularly in terms of propagation and ensuring high survival rates of plants. As this crop has gained importance the growers are demanding genuine true-to-type planting materials.

Jamun is propagated both sexually and asexually. But poor germination, slow growth of rootstock seedlings, lack of information on season and suitable method of propagation has rendered the clonal multiplication process more difficult to produce large scale planting material to meet the growing demand (Chander et al., 2016a). Grafting technique is being practiced commercially at almost all the commercial nurseries of the country (Chander et al., 2016b). The technique gives an excellent result in initial success with minimum mortality, better and uniform crop establishment (Ram & Pathak, 2006). Prevailing weather conditions plays a prominent role on grafting success and growth parameters of grafts. The ideal month of grafting and further the response of different varieties to weather conditions vary in different regions. Various factors influence the success and survivability of grafts *viz.*, varieties, grafting method, defoliation period of scion, time of grafting operation, age of the scion, leaf and node retention on rootstock (Khushi et al., 2019). The vegetative methods of propagation like patch budding and grafting are performed in jamun (Giri & Lenka, 2007; Shinde et al., 2010; Chander et al., 2016b; Ruchita et al., 2022). Also, the grafting success and survivability of the jamun varies with the genotypes (Ruchita et al., 2022). The south-western region of Punjab, characterized by its semi-arid climate, presents a

unique set of challenges for jamun cultivation. Understanding the specific responses of jamun varieties to grafting under these conditions is crucial for optimizing cultivation practices and improving yield. The study seeks to identify which jamun variety exhibits the best overall performance when subjected to grafting in the specific climatic conditions of south-western Punjab.

An experiment on the success of grafting in jamun was performed at fruit nursery, Regional Research Station, Abohar, Punjab Agricultural University, Punjab, during two consecutive years *i.e.* 2021 and 2022. Wedge grafting was performed for four jamun varieties namely CISH-42, CISH-37, Konkan Bahadoli and Goma Priyanka. Pre-raised jamun seedlings of 8-9 months old having pencil size thickness, vigorous growth and uniform size were selected as rootstock (Local cultivar) for grafting. Eighty plants of each variety were grafted during 1st week of March in both the years. For the scion bud-sticks collection, the past season shoot having pencil thickness were defoliated 1 week prior to the grafting operation to make the buds activated. The scion sticks were collected from mother trees of all the four varieties in the morning hours on the day of grafting. Immediately after separation of the scions from the mother tree, they were wrapped in moist cloth and carried in polythene covers to the site of grafting. The grafting was carried out on the same day of separation. Then the scions were covered with 100 micron polytubes to avoid desiccation of the scion by creating humidity near and above the graft union. The observation on graft success and number of sprouts was recorded at 30 days after grafting. Graft survivability was recorded after 90 days of grafting. Growth parameters including total number of leaves per graft, graft height were recorded after 60, 120, and 180 days after grafting. Chlorophyll index was measured after 180 days of grafting by using chlorophyll content meter (CCM-200 plus). Prevailing weather data was recorded during the experimentation period (Fig. 1). The experiment was laid out in a completely randomized design with four treatments and four replications. All the data were analysed using OPSTAT (Sheoran et al., 1998). Bartlett's Chi-square test was performed to test of homogeneity of variances. Pooled analysis of two years were analysed and discussed at $P < 0.05$ for the significance of the difference between their mean values.

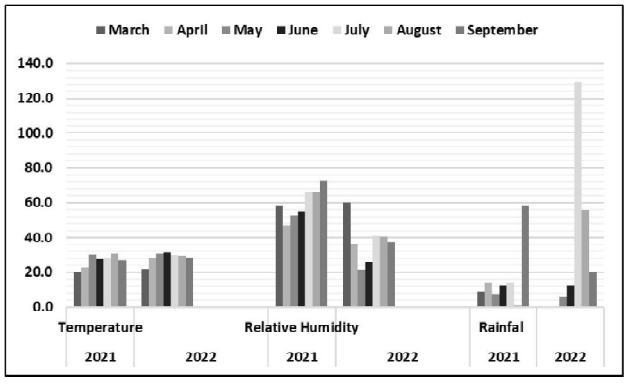

Fig. 1: Weather data recorded during the period of study

The pooled data results indicated no significant differences in graft success among the four varieties. However, variety Konkan Bahadoli achieved a comparatively higher graft success rate (83.7%) in both years (Fig. 2). There was a significant impact of varieties on graft survival in both years. Specifically, varieties Konkan Bahadoli and Goma Priyanka showed the highest graft survival rates (76.6% and 73.9%), respectively. The variety Konkan Bahadoli demonstrated better scion and stock union formation, as evidenced by a higher number of leaves and chlorophyll index. Initially, most grafts sprouted but later dried up. This initial sprouting likely occurred due to stored food reserves, as the unsuccessful union between stock and scion prevented water and nutrient supply to the scion (Chander et al., 2016a).

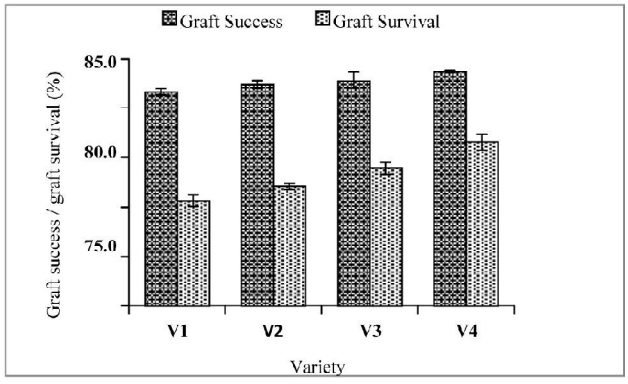

Fig. 2: Effect of grafting on graft success and survival in different varieties of jamun

Variations in graft survivability among different jamun varieties may be attributed to varietal characteristics. Similar findings were also reported by Ruchita et al. (2022) in jamun and Khushi et al. (2019) in mango. Significant varietal differences in the days to sprouting were observed. Grafts of the var. Goma Priyanka

Table 1: Effect of grafting on days taken for sprouting, number of sprouts, number of leaves, graft height and chlorophyll index in different varieties of jamun

Treatment	Days taken for sprouting	No. of sprouts/ graft	Number of leaves/graft			Graft height (cm)			Chlorophyll index
			60 DAG	120 DAG	180 DAG	60 DAG	120 DAG	180 DAG	
CISH-42	17.4[a]	2.1[b]	10.7[b]	16.4[b]	19.3[b]	11.0[b]	15.0[b]	20.8[b]	77.2[b]
CISH-37	16.7[b]	1.8[c]	9.9[c]	14.3[c]	16.7[c]	9.9[c]	14.6[c]	20.1[c]	71.5[c]
Goma Priyanka	16.4[b]	1.7[d]	9.5[d]	13.9[c]	13.9[d]	8.3[d]	13.5[d]	18.5[d]	68.8[d]
Konkan Bahadoli	16.6[b]	2.2[a]	13.4[a]	17.5[a]	20.1[a]	12.9[a]	17.3[a]	21.2[a]	79.6[a]
C.D. (*P=0.05*)	0.61	0.06	0.29	0.51	0.36	0.20	0.33	0.44	1.65
C.V.	2.26	1.81	1.70	2.09	1.31	1.22	1.39	1.41	1.42

*DAG: days after grafting;

sprouted earliest (16.4 days), while, CISH-42 took 17.4 days. The number of sprouts per graft also varied significantly among varieties, with Konkan Bahadoli recorded highest number of sprouts per graft (2.2) whereas, var. Goma Priyanka recorded lowest (1.7). Growth parameters such as the number of leaves and graft height, recorded at two-month intervals up to six months, showed significant differences among the four varieties. The var. Konkan Bahadoli grafts recorded highest number of leaves at 60, 120, and 180 days post-grafting (13.4, 17.5, and 20.1) in both years (Table 1). This higher leaf count in var. Konkan Bahadoli is likely due to the greater number of sprouts, indicating a successful union and active growth between stock and scion.

This growth can also be influenced by climatic conditions affecting cambial activity. Similar results were also observed by Chander et al. (2016a) in jamun. Grafts of Konkan Bahadoli also recorded the greatest heights at different intervals (12.9 cm, 17.3 cm, and 21.2 cm), likely due to the higher number of leaves per graft (Table 1). The var. Goma Priyanka grafts recorded minimum height, potentially due to its genetic characteristics as a semi-dwarf. The higher number of leaves per graft led to increased photosynthate production, resulting in better growth of these grafted plants. The greater height of var. Konkan Bahadoli grafts might be due to the early healing of graft unions, leading to early sprouting and faster growth. Photosynthates produced by the leaves enhance cambial activity, aiding in graft union healing. Well-nourished roots develop a strong root system, absorbing more nutrients from the soil, thus increasing the graft's height and girth. Similar results have been reported by Shinde et al. (2011), Chander et al. (2016a), Kaur & Kaur (2018), and Ruchita et al. (2022). There was a significant effect of varieties on the chlorophyll index. The var. Konkan Bahadoli grafts recorded higher chlorophyll index (79.6), indicating better physiological condition compared to the other varieties. These findings highlight the critical role of varietal characteristics in graft success and growth performance.

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