

Original Research Article

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Effect of Time and Environment on Wedge Grafting of Guava (*Psidium guajava* L.) cv. Sardar

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ABSTRACT

An experiment was conducted at the farm of Krishi Bhawan, Jaunpur during 2018-19 to study the “Effect of time and environment on wedge grafting of guava (*Psidium guajava* L.) cv. Lucknow – 49 (Sardar)”. The result indicated that minimum number of days (25) required for sprouting of bud was significant in the month of July. Highest bud sprouting percentage (36.77%), maximum number of leaves (47.06), maximum width of leaves (6.22 cm), maximum scion shoot diameter (0.87 cm), maximum length of rootstock (16.97 cm) and highest success percentage (34.82%) also recorded in July. Whereas the maximum plant height (64.95 cm) and maximum length of scion shoots (39.05 cm) was performed in March. Significantly maximum rootstock diameter (1.47 cm) and maximum leaf length (13.29 cm) was recorded in October. Maximum number of primary branches (6.37) performed in November and highest mortality percentage (88.96%) was noticed in April.

Keywords

Psidium guajava,
mango, banana and
citrus

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Introduction

Guava (*Psidium guajava* L.) popularly known as ‘apple of tropics’ is native to the tropical America region stretching from Mexico to Peru. It is widely distributed throughout the tropical and subtropical regions of the world. At present, major guava producing countries are south Asian countries Hawaiian Islands,

Cuba and India (Kumar *et al.*, 2011). Guava belongs to the family Myrtaceae and the recognition of being the most widely cultivated species of this family. Guava was introduced to India during 17th century. It is a popular fruit crop due to its prolific bearing and good remuneration. Guava is the fourth most important fruit crop in area and production after mango, banana and citrus. It

occupies 4.07 % of total fruit crop area in the country with 4.16 % production share. The area under guava during 2017-18 was about 265 m-ha with production 4054 mt and productivity 15.3 T/ha. In India it is grown in almost all states; however, Uttar Pradesh, Madhya Pradesh, Bihar, Chhatisgharh, West Bengal, Odisha, Gujarat, Haryana, Maharashtra, Punjab, Karnataka and Andhra Pradesh are the leading guava growing states. The state of Uttar Pradesh has highest 49.53 m ha area with highest 928.44 M.T production and leading state in productivity is Andhra Pradesh with 24.12 T/ha (Ministry of Agriculture and Farmer's Welfare, Govt. of India).

Guava can be propagated by vegetative methods as it gave advantages over seed propagation as it reduces juvenility and maintain uniformity in the planting material. Success rate of propagation techniques varies with climatic factors and season of grafting. Vegetative methods of propagation have employed in guava in different part of the country. However, season of propagation techniques varies from region to region due to the variation in agro-climatic condition.

Wedge grafting has a tremendous potential for multiplying guava plants rapidly throughout the year either in greenhouse as well as in open conditions. But studies related to the suitable time of grafting are not sufficient to standardize this technique over a large geographical area. Therefore, the present study was planned to standardize the time of wedge grafting for achieving higher success percent.

Materials and Methods

The present investigation entitled "Effect of time and environment on wedge grafting of guava (*Psidium guajava* L.) cv. Lucknow – 49 (Sardar)" was carried out during the 2018-19.

The experiment was conducted at the farm of Krishi Bhawan, Jaunpur, Uttar Pradesh. Geographically Jaunpur is situated between 25°44'0" latitude in the north and 82°41'0" longitude in the east at an elevation of 83.230 meter above mean sea level. The total geographical area of Jaunpur division comes under Eastern zone of Uttar Pradesh. The climatic condition of Jaunpur is sub-tropical with three distinct seasons i.e., winter, summer and rainy. During the winter season (December to January) temperature fall 5°C or even low, while in summer season (May to June) it reaches as high as 45°C. Occasional spell of frost and precipitation may occur during winter. Most of the rainfall is received in the middle of July to end of September after which the intensity of rainfall decreases. The mean annual rainfall is about 850 to 1100 mm.

The treatments were viz. T₁ - (15th march), T₂ - (14th April), T₃ - (14th May), T₄ - (13th June), T₅ - (13th July), T₆ - (12th August), T₇ - (11th September) T₈ - (11th October) and T₉ - (10th November) evaluated in factorial randomized block design with three replications.

One year old healthy and uniform seedlings of guava having a diameter of 0.75 to 1.0 cm and height of 50 to 60 cm were used as rootstock for the entire study. The seedlings were maintained healthy by using appropriate cultural practices during the course of investigation. Proper selection and preparation of scion sticks are very important for obtaining higher success in wedge grafting. Therefore, 3 to 4 months old 16 cm long scion shoots of pencil thickness (0.75 to 1.0 cm) having 3 to 4 healthy buds were used for wedge grafting. These selected shoots were then defoliated on the mother plant leaving the petiole attached, about 5 to 7 days prior to its detachment from mother trees. At the same time, the apical growing portion of selected shoot was also beheaded. This helped in forcing the dormant buds to swell. After

selecting the scion, the root stock was headed back at the height of 15 cm. The beheaded root stock was then split open 4 cm deep through the centre from the cut end of the stock with the help of grafting knife. A wedge shaped slanting cut from both the sides (4 cm long) was made at the proximal end of the scion shoot. The scion stick was then inserted into the split portion of the stock and pressed properly so that the cambium tissues of root stock and scion stick overlap each other. The stock and scion combination was then tied with the help of 2 cm wide and 25 cm long polyethylene (strip 150 gauges). The polyethylene strip was removed as soon as the buds started to sprout.

For testing the hypothesis the following ANOVA table was used. The significance and non-significance treatment effect was judged with the help of 'F' variance ratio test. Calculated 'F' value was compared with the table value of 'F' at 5% levels of significance. If calculated value exceeds the table value, the effect was considered to be significant. The significant difference between the means was tested critical difference at 5% level of significance.

Results and Discussion

The data (Table 1 & Table 2) revealed that there was a steady rise in days taken to sprouting, sprouting percentage (%), diameter of scion shoot (cm), length of rootstock (cm), number of leaves per budded/grafted plants, leaf width (cm) and success percentage (%) (25.13 days, 36.77%, 0.87 cm, 16.97 cm, 47.06, 6.22 cm and 34.82%) respectively were encountered in July. The findings are in conformity with the findings of Rao *et al.*, (1984) who had observed early bud sprouting when grafting was done during July. Likewise, the studies of other researchers working on different crops supported these findings. For

example, Kumar and Mitra (1994) had observed early bud sprouting in mango when grafting was done during July and August.

Studies in guava observed early bud sprouting in plants budded in the month of May and June (Rao *et al.*, 1977).

In this study, highest bud and graft success were recorded during the month of July. Also the grafts made during July exhibited more sprouting closely followed by the grafts prepared in August and September. Rao *et al.*, (1984) also obtained maximum graft success per cent in the month of July. The higher success in July and August in the present study might be because of congenial environmental conditions prevailing during the period following grafting and rapid sap flow in stock and scion which might have favoured the healing process and as a result established the continuity of cambial and vascular tissues for sprouting and ultimately higher plant survival (Chandel *et al.*, 1998; Pathak and Srivastava, 1973).

Maximum plant height (cm) and length of scion shoot (cm) (64.95 and 39.05) respectively performed in March. Singh and Sengupta (1996) also recorded maximum sprout length in the plants grafted during March. The higher plant and scion length recorded in plants grafted in March and April in the present study may be because of the fact that grafted plant faced long periods of rainy season. Maximum diameter of rootstock (1.53 cm) and maximum leaf length (13.29 cm) were found in the month of October. Whereas maximum numbers of primary branches per budded/grafted plants (6.37) were performed in November and maximum mortality percentage (88.96 %) was noticed in April. Similar observations were recorded by Upadhyay and Prasad, (1988) while working on mango.

Table 1

Months	Treatments	Day taken to sprouting	Sprouting percentage	Diameter of scion shoot (cm)	Length of rootstock (cm)	Number of leaves	Leaf width(cm)	Success percentage (%)
15 march	T ₁	26.06	26.74	0.64	16.06	45.63	5.20	21.48
14 April	T ₂	29.04	13.61	0.16	16.00	40.69	6.04	11.9
14 May	T ₃	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13 June	T ₄	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13 July	T ₅	25.13	36.77	0.87	16.97	47.06	6.22	34.82
12 August	T ₆	27.52	33.51	0.84	15.81	35.85	5.85	30.82
11 September	T ₇	29.24	30.69	0.69	16.12	30.03	5.84	27.09
11 October	T ₈	32.34	26.84	0.77	16.10	32.83	5.51	21.74
10 November	T ₉	34.94	20.92	0.73	16.19	35.03	5.43	16.89
Mean		22.65	21.01	0.57	12.58	29.74	4.45	18.34

Table 2

Month	treatments	Plant height (cm)	Length of scion shoot (cm)	Diameter of scion shoot (cm)	Leaf length (cm)	Number of primary branches	Mortality percentage (%)
15 march	T ₁	64.95	39.05	1.13	11.91	5.54	77.89
14 April	T ₂	58.92	33.84	1.18	12.88	4.90	88.96
14 May	T ₃	0.00	0.00	0.00	0.00	0.00	0.00
13 June	T ₄	0.00	0.00	0.00	0.00	0.00	0.00
13 July	T ₅	59.00	34.28	1.14	12.99	6.22	65.17
12 August	T ₆	54.48	30.49	1.29	12.47	5.97	69.17
11 September	T ₇	52.73	29.36	1.19	12.75	5.25	72.90
11 October	T ₈	54.89	31.56	1.53	13.29	5.45	77.99
10 November	T ₉	44.90	21.07	1.25	12.03	6.37	83.10
Mean		43.32	24.45	0.97	9.81	4.41	59.37

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