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Effect of Scion Cultivar and Grafting Season on Success of Wedge Grafting in Guava (*Psidium guajava* L.)

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A B S T R A C T

Effect of scion cultivar and grafting season on success of wedge grafting in guava (*Psidium guajava* L.) was studied using four seasons namely July (M_1), August (M_2), September (M_3) and October (M_4) of grafting and two different scion varieties (Lalit V_1 and Shweta V_2). Wedge grafting performed during the month of August with scion var. Lalit gave maximum success (70.17 %) followed by var. Shweta (66.83 %). Var. Lalit gave best response with respect to number of days taken to sprouting, graft-take per cent, sprouting per cent, number of leaves per new shoot, height of graft, girth of graft, Leaf area and finally graft survival percentage as compared to var. Shweta.

Introduction

Guava (*Psidum guajava* L.) popularly known as "Apple of tropic" and "Poor man's apple" belonging to the family Myrtaceae and native to Peru, is one of the most important, nutritionally valuable and remunerative fruit crop of India. In recent years, guava is getting popularity in the international trade due to its nutritional value and processed products (Singh *et al.,* 2005). However, major handicap in guava plantation is indiscriminate multiplication of plants from unreliable sources by nurserymen (Singh *et al.,* 2005). Proper care is not taken in the selection of scion material from outstanding and disease-free mother plant. The result is that large number of low grade guava plants are distributed and planted in the field every year. These trees become a permanent liability to the growers as no amount of fertilization and care can change their genetic qualities. Un-availability of quality planting materials and consequent substandard of poor quality seedlings adversely affected the guava production and productivity. Although, a large number of nurseries have been established but still, there is an acute shortage of quality planting material. The scenario is changing from traditional propagation with

incorporation of science and technology innovation in nursery management and trade (Singh and Bajpai, 2003). There is tremendous scope for bringing substantial additional area under guava crop in India. So rapid and successful propagation technique is required as the area under crop is expanding and there is a much demand to prepare guava seedlings year round by involving rapid multiplication technique. Therefore a technique of rapid multiplication (wedge grafting) of guava has been developed at Central Institute of Sub-tropical Horticulture (CISH), Lucknow (UP).So, wedge grafting in guava was tried using two scion verities in different seasons to know there performance.

Materials and Methods

The present experiment entitled "Effect of scion cultivar and grafting season on success of wedge grafting in guava (*Psidium guajava* L.)" was conducted at Agriculture Experimental Station (AES), Paria. Navsari Agricultural University, Gujarat, from July 2016 to January 2017. Wedge grafting in guava was carried out in four season *viz*., July (S_1), August (S_2), September (S_3) and October (S_4) by using two different varieties namely Lalit (V_1) and Shweta (V_2). The grafting was done on 6-8 month-old, healthy and good quality guava seedlings.

Terminal one season old scion shoots, having 15 to 18 cm length and of pencil thickness (0.5 to 1.0 cm) with 4 to 5 healthy buds and free from pest and disease were selected for grafting. Selected scions were defoliated on the mother plant, about one week prior to detachment. For grafting lower end of the selected and detached scion stick was prepared in the form of wedge of about 2-3 cm. The top portion of the root stock was decapitated at 15-20 cm height and then top portion of the stem was split vertically about 3-4 cm in length forming "V" shape. The wedge shaped scion was inserted into the "V" shaped slit and tied with polythene strip. The experiment was laid out in Completely Randomized Design (CRD) with factorial concept and three repetitions and eight treatment combinations. The observations were recorded regularly on success of grafting such as graft-take per cent, days taken to sprout, graft sprouting per cent and vegetative parameter like height of graft (cm), number of leaves per new shoot, girth of graft and leaf area (cm^2) and finally graft survival percentage were recorded at 120 DAG, and were analyzed statistically for interpretation of results.

Results and Discussion

The data (Table 1) revealed that number of days taken to sprout, graft-take, sprouting per cent, vegetative parameter and survival percentage of grafts were significantly influenced by grafting seasons and varieties. The grafting done during the month of August recorded minimum days (11.10) to sprouting of graft, highest graft-take (71.43%) and sprouting (69.63%), whereas maximum days (20.74) taken to sprouting, lowest graft-take (60.60) per cent and sprouting (54.34) per cent were found in October month of grafting.

The maximum grafting success observed in month of August might be due to optimum temperature and high humidity prevailed during this period which had resulted in successful union of cambium layers of stock and scion, early callus formation and initiation of subsequent growth. South Gujarat condition belongs to high rain fall zone, which receive maximum rainfall along, higher humidity and optimum temperature might have developed conducive environment for graft success. Hartman and Kester (1979) reported that temperature and relative humidity activates the cambial cells during monsoon. The callus tissue arising out of the

cambial region is composed of thin walled turgid cells which can easily desiccated and die off and relative humidity can protect such cells in the cambial region of the graft union. Least success of grafting were recorded in October month, which might be due to higher day temperature and lower humidity as well as low night temperature due to winter, resulted in reduced rate of graft success.

The present results are also in accordance with result of Dhunaga *et al.,* (1988) who recorded minimum days to sprouting of in guava graft during August month. Similar results were also observed by Sonawane *et al.,* (2012) in carambola. Syamal *et al.,* (2012) observed faster sprouting in guava grafts during August month. Singh *et al.,* (2007) also reported that wedge grafting performed well during August and gave good success in guava. Saroj *et al.,* (2000) in anola. Tewari and Bajpai (2002) reported that highest success of graft of aonla is possible in August.

Whereas Grafts prepared by using var. Lalit took minimum days (15.57) to sprout, highest graft-take (65.78 %) and sprouting (64.99 %) over a var. Shweta (Table 1). Pprobable reason for variation of success in grafting may be genotype of particular variety, suitable period of grafting and favourable environmental conditions, compatibility of scion and rootstock. The results are in closed conformity with the findings of Syamal *et al.,* (2012) in guava. Visen *et al.,* (2010) also obtained significant variation in relation to sprouting of grafts in guava variety Allahabad Safeda, Lalit and L-49. Shankar *et al.,* (1991) and Patil *et al.,* (1991) also recorded varietal differences in mango

With respect to vegetative growth parameters of grafts like height of graft (cm), number of leaves per new shoot, leaf area (cm^2) and girth of graft (cm) was significantly influenced by different season of grating as well as different varieties and their interaction, the maximum height (27.27 cm) of graft, highest number of leaves per new shoot (13.81), maximum leaf area (24.80 cm^2) and girth of graft (1.43 cm) was recorded during August month of grafting. Whereas minimum height of graft (17.60 cm), lowest number of leaves per new shoot (9.59), minimum leaf area (21.03 cm^2) and girth (1.07 cm) of graft were recorded during October grafting (Table 1). Possible reason for maximum vegetative growth recoded in the month of August was due to optimum temperature, sufficient sunlight, and high relative humidity ensured water availability which had increased the rate of photosynthesis lead to the formation of more food materials which facilitated and improved the growth and development of the sprouts. It may also due to prevailing ideal temperature and relative humidity congenial for plant activity which had resulted in increased number of leaves with more meristematic activity during August and early healing of graft union during this month. The reason for poor vegetative growth in the month of October was mainly because the plants were less exposed to sun light due to cloudy weather and winter observed during this month which had adversely affected the photosynthesis in plants by stomata closing in mesophyll cells there by resulting in less vegetative growth under this region. Alternatively less growth in September grafted plants may be due to excessive weed growth and increase in temperature which might have suppressed the vegetative growth of the grafted plants.

Present findings are duly supported by Singh *et al.,* (2003) in lasoda, Dhakad and Honda (1986) in mango. Sarada *et al.,* (1991) observed better vegetative growth when softwood grafting done in cashew during month of August. Gadekar *et al.,* (2010) also observed the same results in cashew, Angadi and Karadi (2012) in Jamun.

Table.1 Effect of scion cultivar and grafting season on guava grafts

	Days taken to sprouting	Graft-take %	Sprouting %	Height of graft (cm)	Number of leaves per new shoot	Leaf area (cm^2)	Girth of graft (cm)	Survival % at 120 DAG
Season of grafting (S)								
S_1	15.57	65.06	63.21	21.44	11.83	23.02	1.34	55.34
S_2	11.10	71.43	69.63	27.27	13.81	24.80	1.43	68.50
S_3	17.47	61.81	60.23	20.65	11.20	22.08	1.14	52.24
S_4	20.74	60.60	54.34	17.60	9.59	21.03	1.07	49.04
Cd at. 5%	**0.86**	**2.71**	**2.51**	**1.23**	**0.66**	**0.96**	**0.06**	**1.64**
Varieties (V) (V_1-Lalit, V_2- Shweta)								
V_1	15.57	65.78	62.82	22.33	12.35	22.51	1.25	57.11
V_2	16.87	63.67	60.89	21.14	10.87	22.95	1.23	55.45
C.D. at5%	**0.61**	**1.91**	**1.78**	**0.87**	**0.47**	**NS**	**NS**	**1.16**
C V %	**6.39**	**5.03**	**4.88**	**6.82**	**6.86**	**5.06**	**5.92**	**3.50**

Table.2 Interaction effect of scion cultivar and grafting season on guava grafts

Season of grafting (S) Varieties (V)	**S_1**		**S_2**		**S_3**		**S_4**		**CD at.5%**	**CV %**
	V_1	**V_2**	**V_1**	**V_2**	**V_1**	**V_2**	**V_1**	**V_2**		
Days taken to sprouting	14.82	16.33	10.39	11.81	16.95	18.00	20.12	21.35	**NS**	**6.39**
Graft-take %	66.00	64.12	71.33	71.52	63.79	59.84	62.01	59.19	**NS**	**5.03**
Sprouting %	63.98	62.44	69.67	69.59	60.61	59.86	57.00	51.68	**NS**	**4.88**
Height of graft (cm)	20.83	22.06	28.98	25.56	21.40	19.89	18.12	17.07	**1.74**	**6.82**
Number of leaves per new shoot	11.67	12.00	14.72	12.90	13.10	9.30	9.89	9.29	**0.94**	**6.86**
Leaf area (cm^2)	22.56	23.48	24.24	25.36	21.99	22.18	21.27	20.79	**NS**	**5.06**
Girth of graft (cm) at 120 DAG	1.35	1.32	1.45	1.42	1.13	1.15	1.09	1.05	**NS**	**5.92**
Survival % at 120 DAG	55.89	54.79	70.17	66.83	53.13	51.35	49.24	48.84	**NS**	**3.50**

Under different varieties the var. Lalit significantly varied from var. Shweta with respect to height of graft (cm) and number of leaves per new shoot. Whereas Leaf area (cm^2) and girth of graft (cm) were reported to be non-significant. Maximum height (22.33 cm) of graft and number of leaves (12.35) per shoot was recorded in var. Lalit, however lowest height (21.14 cm) of graft and number of leaves (10.87) per shoot was reported in var. Shweta (Table 1). In case of interaction effect of season and variety of grafting on

height of graft and number of leaves per new shoot were significantly influence. Highest height (28.98 cm) and leaves (14.72) per shoot was recorded with respect to grafting done during August month by using var. Lalit, meanwhile lowest height (17.07 cm) of graft and leaves (9.29) per shoot were reported in grafting done in month of October by use of var. Shweta (data presented in Table 2) whereas leaf area and girth of graft was not affected significantly.

Finally highest graft survival was found in S_2V_1 treatment combination *i.e.* grafting done during August by using var. Lalit while the minimum (48.84) survival percentage was observed when grafting done in month October by use of var. Shweta (S_4V_2) (Table 2).

This might be due to adequate supply of desired healthy and matured scion sticks coupled with warm humid climate attributed to favourable environmental conditions for successful bud union and better establishment of grafts during the month of August.

Similar results were also obtained by Syamal *et al.,* (2012) in guava by wedge grafting. Singh and Singh (2007) in tamarind, Pathak *et al.,* (1991) in guava and Sarada *et al.,* (1991) in the month of August in cashew.

Based on the results of present investigation, it can be concluded that treatment combination S_2V_1 *i.e.* grafting in month of August by use of var.

Lalit in South Gujarat conditions was found to be the best treatment among all treatments studied as it required minimum days for sprouting along with maximum graft-take per cent, sprouting percentage, number of leaves per new shoot, height of graft, leaf area, girth of graft and survival percentage of graft after 120 days of grafting.

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