

Study the Effect of Different Growing Conditions and Varieties on Graft-Take, Leaves and Scion Diameter in Guava (*Psidium guajava* L.)

G. C. Nanditha*, D. R. Patil, S. N. Patil, Venkateshalu and Kanthesh Gandolkar

Department of Fruit Science, Department of Entomology, Department of Agronomy, University of Horticultural Sciences, Bagalkot-587 104 (Karnataka)

*Corresponding Author E-mail: nandithagc@gmail.com

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ABSTRACT

An experiment was conducted at University of Horticultural Sciences, Bagalkot to investigate the study the effect of different growing conditions and varieties on graft-take, sprouts and leaves. The result revealed that among the different growing conditions, the minimum number of days for graft take (14.97) was recorded in mist house followed by open condition and was statistically on par with mist house followed by shade house (14.99). However, the maximum number of days required for graft take (16.72) was recorded in open condition followed by shade house (15.90). Among the varieties, the minimum number of days required for graft take (14.18) was noticed in Sardar. However, the maximum number of days required for graft take (17.11) was noticed in Lalit. The significantly highest number of leaves (6.63) was recorded in mist house followed by open condition at 30 DAG and mist house followed by shade house recorded highest number of leaves (10.00 and 16.91) at 60 and 90 DAG. However, lowest number of leaves was found in open condition (3.79, 5.45 and 12.01) at 30, 60 and 90 DAG respectively. Among the different varieties, highest number of leaves noticed in Sardar (7.65, 11.11 and 16.19) and lowest in Lalit (3.38, 5.13 and 13.07) at 30, 60 and 90 DAG respectively. The significantly highest scion diameter recorded in mist house followed by shade house (4.62, 5.85 and 6.36) and lowest in Open condition (2.75, 4.03 and 4.07) at 30, 60 and 90 DAG respectively. Among the varieties, highest scion diameter recorded in Sardar (5.43, 6.42 and 6.75) and lowest in Lalit (2.40, 3.62 and 3.73) at 30, 60 and 90 DAG respectively.

Key words: Graft- take, Growing condition, Guava varieties, Number of leaves.

INTRODUCTION

Guava (*Psidium guajava* L.) popularly known as apple of tropics and is native to the tropical America stretching from Mexico to Peru. Although, it is native to tropical America, it is widely distributed throughout the tropical and

subtropical regions of the world. At present, major guava producing countries are South Asian countries, the Hawaiian Islands, Cuba and India⁵. Guava is the fourth most important fruit in area and production after mango, banana and citrus in India.

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Guava ranked fifth in productivity among different fruit crops grown in India. Guava plants have been propagated through seeds since long time. Propagation from seeds results in considerable variation in the size, shape and quality of fruits. Vegetative propagation in guava results in true-to-type crop with short juvenile phase. Commercially, guava is propagated by air layering though considered to be most inexpensive method for vegetative propagation, the method did not prove very successful in case of guava due to production of poor quality roots and hence poor field survival¹². As a solution to these problems, softwood grafting is easy to handle and quite efficient as well as grafts can be prepared within a year, thus reducing cost of raising grafts considerably. Softwood grafting gives an excellent response by higher graft success and survival percentage of quality grafts with the least possibility of mortality which helps in better and uniform orchard establishment¹⁰. Provision of shade during and after grafting was found to have beneficial effect on success of grafting. Light is essential source for triggering photosynthetic activity and there by better nourishment of grafts. The rate of photosynthetic activity varies with the level of shade¹⁵. So, keeping these points in mind, the present investigation was carried out to assess Studies on the success and survivability of grafts in different varieties of guava by soft wood grafting under different growing conditions.

MATERIALS AND METHODS

An experiment was conducted at Division of Fruit Science, University of Horticultural Sciences, Bagalkot, Karnataka (India) during the year 2015-2016 in a Split plot design. Ten months Sardar (Lucknow-49) rootstocks were raised for soft wood grafting. A total of 480 healthy guava seedlings were used for this experiment. The softwood grafting of guava was done using Sardar, Allahabad safed, Lalit and Arka kiran were as scions at different growing conditions i.e. Open condition, Shade house, Mist house followed by shade house, Mist house followed by open condition.

Observations were recorded on ten grafts in each replication at 30, 60 and 90 days after grafting. The data were subjected to statistical analysis as per the procedure outlined by Panse and Sukhatme⁷ and the treatment means were compared by critical difference values computed at 5% level of significance.

RESULTS AND DISCUSSION

Number of days to graft-take:

There were significant differences among the different growing conditions, varieties and their interactions with respect to number of days taken for sprouting of grafts (**Table 1**). The significantly minimum number of days for graft take (14.97) was recorded in mist house followed by open condition and was statistically on par with mist house followed by shade house (14.99). However, the maximum number of days required for graft take (16.72) was recorded in open condition followed by shade house (15.90). The minimum number of days taken for graft take might be due to optimum temperature and relative humidity prevailing in mist house followed by open condition. The beneficial effects of mist house could be attributed to high humidity for longer period which prevents desiccation of the tissues at scion and stock interface and favours rapid callus tissue development and leading to better graft union which is in line with the results of Raghavendra *et al.*⁹ in wood apple. Similar results were reported by Sivudu *et al.*¹⁴ in mango, Gurjar and Singh² in aonla (*Emblia officinalis* L.) and Selvi *et al.*¹¹ in jack fruit.

Among the varieties, the minimum number of days required for graft take (14.18) was noticed in Sardar and it was significantly superior over other varieties. However, the maximum number of days required for graft take (17.11) was noticed in Lalit followed by Arka Kiran (16.21). The minimum number of days taken for graft take in Sardar may be due to early contact of cambium layers of stock and scion, early callus formation and initiation of subsequent growth. However, Syamal *et al.*¹⁶ reported 77.17% and 66.43% success under poly house and open condition,

respectively in guava when wedge grafting was done in the month of July.

Interaction effect between different growing conditions and varieties did not vary significantly with respect to number of days required for graft take.

Number of leaves:

The data on number of leaves per graft showed significant differences among the different growing conditions, varieties, and their interactions at 30, 60 and 90 days after grafting (**Table 2**). Among the different growing conditions, significantly maximum number of leaves (6.63) was recorded in mist house followed by open condition and it was on par with mist house followed by shade house (6.54) at 30 DAG and mist house followed by shade house recorded highest number of leaves (10.00 and 16.91) at 60 and 90 DAG. However, lowest number of leaves was found in open condition (3.79, 5.45 and 12.01) at 30, 60 and 90 DAG respectively. The increase in number of leaves might be due to the active growth of both stock and scion followed by favourable climatic conditions for the cambial activity and in turn favouring growth of grafts. Similar findings were obtained in other fruit crops by Harshavardhan³ in jack fruit, Shinde *et al.*¹³ in jamun and Kulwal *et al.*⁴ in sapota. The minimum number of leaves of 3.79, 5.45 and 12.01 recorded in open condition at 30, 60 and 90 days respectively after softwood grafting.

Among the varieties, the maximum number of leaves (7.65, 11.11 and 16.19) recorded in Sardar at 30, 60 and 90 days after softwood grafting whereas, the minimum number of leaves (3.38, 5.13 and 13.07) in Lalit at 30, 60 and 90 days respectively after softwood grafting. The increase in number of leaves in Sardar may be due to the genotypic character of the variety.

The interaction effect showed that the maximum number of leaves (9.43 and 13.19) recorded in Sardar in mist house followed by open condition, respectively. While, the minimum number of leaves (2.30 and 3.32)

recorded in Lalit under open condition at 30 and 60 days after softwood grafting, respectively and there was no significant difference between different growing condition and variety at 90 days after softwood grafting. Early sprouting followed by optimum temperature and relative humidity might be responsible for production of more number of leaves. This may be due to the synthesis of more photosynthates. The other reason might be due to the development of more sprouts, more meristematic activity and better healing of grafts. The present results are in accordance with the results of Pujari and Magdum⁸ in sapota.

Scion diameter (mm):

There were significant differences among the different growing conditions, varieties and their interactions with respect to scion diameter (mm) at 30, 60 and 90 days after grafting (**Table 3**).

The significantly highest scion diameter recorded in mist house followed by shade house (4.62 mm, 5.85 mm and 6.36 mm) at 30, 60 and 90 days after grafting, respectively. while, the lowest scion diameter was noticed in Open condition (2.75 mm, 4.03 mm and 4.07 mm) at 30, 60 and 90 days after grafting, respectively. The high relative humidity and slightly inclined temperature prevailing in mist house condition might have favoured the increase in scion diameter under mist house followed by shade house. Similar findings have also been reported by Dhanraj¹ in jackfruit and Mulla *et al.*⁶ in jamun.

Among the varieties, The highest scion diameter (5.43 mm, 6.42 mm and 6.69 mm) was registered in Sardar at 30, 60 and 90 days after soft wood grafting, respectively. Whereas, the lowest scion diameter (2.40 mm, 3.62 mm and 3.28 mm) was registered in variety Lalit at 30, 60 and 90 days after grafting. This might be due to the genotypic character of the variety.

In interaction, the highest scion diameter (6.12 mm and 8.15 mm) was recorded in Sardar under mist house followed

by shade house at 30 and 90 days after grafting, respectively. Whereas, lowest scion diameter (1.23 mm and 2.62 mm) was found in Lalit under open condition at 30 and 90 days

after grafting. At 60 days after grafting, the interaction effect between different growing conditions and varieties was found to be non-significant.

Table 1: Number of days taken to graft take as influenced by different growing conditions and varieties

Graft take (days)					
Treatments	V ₁	V ₂	V ₃	V ₄	Mean
M ₁	15.23	16.20	18.13	17.30	16.72
M ₂	14.47	15.08	17.61	16.43	15.90
M ₃	13.60	14.51	16.31	15.54	14.99
M ₄	13.43	14.50	16.40	15.57	14.97
Mean	14.18	15.07	17.11	16.21	
For comparing the means of	SEm±	C D at 5%			
M	0.20	0.69			
S	0.13	0.37			
M X S	0.25	NS			

M₁-Open condition M₂-Shade house M₃-Mist house followed by shade house M₄-Mist house followed by open condition

V₁- Sardar (Lucknow-49) V₂-Allahabad Safed V₃-Lalit V₄-Arka Kiran

M-Main treatments S-Sub treatments M x S-Interaction

NS-Non significant

Table 2: Number of leaves per graft as influenced by different growing conditions and varieties at 30, 60 and 90 days after soft wood grafting

Number of leaves per graft															
Treatments	30 days					60 days					90 days				
	V ₁	V ₂	V ₃	V ₄	Mean	V ₁	V ₂	V ₃	V ₄	Mean	V ₁	V ₂	V ₃	V ₄	Mean
M ₁	5.08	4.43	2.30	3.33	3.79	8.19	6.22	3.32	4.08	5.45	13.32	12.66	10.47	11.60	12.01
M ₂	7.15	6.07	3.57	5.07	5.46	9.98	7.41	4.29	6.15	6.96	15.69	14.69	12.30	13.47	14.04
M ₃	8.93	6.98	4.07	6.17	6.54	13.07	11.19	6.57	9.17	10.00	18.55	17.52	15.31	16.25	16.91
M ₄	9.43	7.17	3.60	6.32	6.63	13.19	11.20	6.35	9.17	9.98	17.18	16.72	14.21	15.37	15.87
Mean	7.65	6.16	3.38	5.22		11.11	9.01	5.13	7.14		16.19	15.40	13.07	14.17	
For comparing the means of	SEm±	C D at 5%				SEm±	C D at 5%				SE m±	C D at 5%			
M	0.12	0.40				0.09	0.30				0.04	0.15			
S	0.07	0.21				0.07	0.20				0.06	0.17			
M X S	0.14	0.42				0.14	0.41				0.12	NS			

M₁-Open condition M₂-Shade house M₃-Mist house followed by shade house M₄-Mist house followed by open condition

V₁- Sardar (Lucknow-49) V₂-Allahabad Safed V₃-Lalit V₄-ArkaKiran

M- Main treatments S-Sub treatments M x S-Interaction

NS-Non significant

Table 3: Scion diameter (mm) as influenced by different growing conditions and varieties at 30, 60 and 90 days after soft wood grafting

Scion diameter (mm)															
30 days						60 days					90 days				
Treatments	V ₁	V ₂	V ₃	V ₄	Mean	V ₁	V ₂	V ₃	V ₄	Mean	V ₁	V ₂	V ₃	V ₄	Mean
M ₁	4.47	3.14	1.23	2.14	2.75	5.23	4.58	2.58	3.71	4.03	5.33	4.62	2.62	3.74	4.07
M ₂	5.11	4.24	2.12	3.08	3.64	6.12	5.36	3.47	4.57	4.88	6.27	5.41	3.50	4.66	4.96
M ₃	6.12	5.11	3.15	4.10	4.62	7.18	6.35	4.34	5.51	5.85	8.15	7.20	4.54	5.56	6.36
M ₄	6.03	5.14	3.10	4.12	4.60	7.15	6.31	4.08	5.21	5.69	7.23	6.38	4.27	5.32	5.80
Mean	5.43	4.41	2.40	3.36		6.42	5.65	3.62	4.75		6.75	5.90	3.73	4.82	
For comparing the means of	SEm±	CD at 5%				SEm±	CD at 5%				SEm±	CD at 5%			
M	0.04	0.15				0.06	0.20				0.02	0.08			
S	0.03	0.09				0.05	0.13				0.03	0.09			
M X S	0.06	0.17				0.09	NS				0.06	0.17			

M₁-Open condition M₂-Shade house M₃-Mist house followed shade house M₄-Mist house followed by open condition

V₁- Sardar (Lucknow-49) V₂-Allahabad Safed V₃-Lalit V₄-Arka Kiran

M- Main treatments S-Sub treatments M x S-Interaction

NS- Non significant

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