iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 11 **Issue:** IX **Month of publication:** September 2023

DOI: https://doi.org/10.22214/ijraset.2023.55582

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 11 Issue IX Sep 2023- Available at www.ijraset.com

Stionic and Environmental Influence on the Success and Survivability of Guava Grafts (*Psidium guajava* L.)

Venkata Rao
Department of Fruit Science, College of Horticulture, Bengaluru-560 065, Karnataka

Abstract: ***An experiment was conducted to "study the success and survivability of grafts in different scions of guava (Psidium guajava L.) by softwood grafting under different environmental conditions by using different aged rootstocks. The results revealed that, highest graft success (81.33 %) and survivability (62.66 %) was found in the shade net condition at 90 days after softwood grafting. Among the different scions, the highest graft success (84.44 %) and survivability (64.44 %) was registered in Sardar scion variety. However, interaction effect showed that, highest graft success (96.66 %) and survivability (76.66 %) was noticed in Sardar variety of scion under shadenet condition followed by polyhouse condition by using seven months old rootstock.***

Keywords: Scion, Environment, graft success, Survivability, Guava (Psidium guajava L.)

I. INTRODUCTION

One of the most familiar fruit in India is guava (*Psidium guajava* L.). It belongs to Myrtaceae family. It was originated in Tropical America, between Mexico and Peru. In India, it is commonly called as "poor man's apple", "apple of the tropics". During 17th century guava was introduced to India. It is grown fruitfully in a wide range of climatic and edaphic conditions. Its fruits are available throughout the year except during the summer season.

Guava is a delicious fruit, very nutritious and having several minerals useful for human health. Guava is a rich source of ascorbic acid (260 mg/100g of edible fruit) (Islam *et al.*, 2004). It has a good source of dietary fiber (5.4 g/100g) and pectin which has industrial use. Guava plants have been propagated by seeds for long periods. Seed propagated plants result in major variations in fruit quality, size and shape and do not allow superior important characteristics of a particular rootstock to be exploited (Soni *et al.*, 2016). Although guava is propagated through air-layering, budding, stooling and inarching are still not commercially feasible due to absence of tap root system, unreliable rate of success, long time interval to attain successful quality planting materials and cumbersome process. Therefore, a practice of quick multiplication (softwood grafting) has been developed.

Environmental conditions can affect the growing and rooting ability of plants. The most frequent external factors like temperature, light, seasons, moisture level and humidity are also important for growth and development of plants (Singh *et al*., 2019). All over the world, in many countries, different shade intensity technology has been practiced for nursery crop production. So these environment conditions smoothen the progress of better survival and performance of rooted plants. A polyhouse and shade net nursery condition is the substitute to an open nursery conditions (Rymbai *et al*., 2011).

Grafting success and survivability are reliant on numeral factors together with methods of grafting, scion variety, environmental conditions and age of rootstock material (Venkat Rao and Reddy., 2005).

II. MATERIAL AND METHODS

An experiment was conducted at PG Research block, College of Horticulture, Mysore, University of Horticultural Sciences, Bagalkot, Karnataka (India) during the year 2020 in a Factorial Completely Randomized Block Design (FCRD). There were 15 treatments which were replicated. Five, six and seven months old local cultivar rootstocks were raised for soft wood grafting.

The softwood grafting of guava was performed using scions of Sardar, Allahabad Safeda, Lalit, Arka Rashmi and Arka Kiran at different growing conditions *i.e.* polyhouse, shade net and open condition. The data were subjected to statistical analysis as per the procedure outlined by Panse and Sukhatme (1985) and the treatment means were compared by critical difference values computed at 5 per cent level of significance.

III. RESULT AND DISCUSSION

A. *Graft Success*

The data on graft success percentage presented in Table 1 showed that, there was significantly maximum (81.33 %) graft success recorded in shade net conditions followed by polyhouse (79.33 %) by using seven months old rootstock. Whereas the lowest (64.66 %) graft success was obtained in open conditions by the use of five months old rootstock and it was significantly lower over other environmental conditions. This is because of favorable temperature and humidity under shade net condition and polyhouse. The beneficial effects of shade house could be attributed to higher graft success, as it protects the grafts from high temperature and high light intensity and reduce the moisture stress and creates high humidity for longer period which prevents desiccation of the tissue and scions and stock interface and favors rapid callus tissue development and leading to better graft union. A related outcome has also been reported by Sharma and Srivastav, 2004 and Manga *et al.*, 2017 in guava. Among the different scions, significantly highest (84.44 %) graft success was noticed in Sardar by using seven months old rootstock followed by the plants grafted by using six and five months old rootstock with the same variety. However, the lowest (61.11 %) graft success was registered in Arka Kiran by using five months old rootstock at 30 days after grafting. It is due to the fact that, genotypic character of the Sardar variety leads to higher graft success. Interaction effect showed that highest (96.66 %) graft success observed in Sardar under the shade net by using seven months aged rootstock which was followed by six months old rootstock with the same variety and growing conditions (93.33 %). While, lowest (50.00 %) graft success was noticed in Arka Rashmi in open condition using five months aged rootstock which was inferior over other treatment combinations. The rootstock of seven months old showed higher graft success, similar findings have been reported by Aralikatti *et al.*, 2011 in jackfruit. This is because of physiological maturity of rootstock which plays a significant role in success and growth of grafts. The lower success of graft union could be attributed to lack of contact of cambium of both scion and stock and to interference of latex exudation (Hartmann and Kester, 1997).

Table 1. Effect of different environmental conditions, scions and age of rootstock on graft success (%) at 30 days after softwood grafting.

Treatments	5 months old rootstock	6 months old rootstock	7 months old rootstock
Factor-1 (Environmental conditions)			
S_1	71.33	75.33	79.33
S_2	78.00	78.00	81.33
S_3	64.66	68.66	70.66
S.Em±	3.03	2.24	2.55
CD at 5%	8.79	6.51	7.41
Factor-2 (Scions)			
V_1	75.55	70.00	82.22
V_2	73.33	76.66	66.66
V_3	77.77	83.33	84.44
V_4	68.88	73.33	73.33
V_5	61.11	66.66	78.88
S.Em±	3.91	2.89	3.29
CD at 5%	11.35	8.40	9.56
Interactions effect			
S_1V_1	53.33	53.33	70.00
S_1V_2	76.66	76.66	76.66
S_1V_3	73.33	86.66	83.33
S_1V_4	86.66	86.66	86.66
S_1V_5	66.66	73.33	80.00
S_2V_1	93.33	90.00	86.66
S_2V_2	80.00	80.00	66.66
S_2V_3	90.00	93.33	96.66
S_2V_4	70.00	70.00	73.33
S_2V_5	56.66	56.66	83.33
S_3V_1	80.00	66.66	90.00
S_3V_2	63.33	73.33	56.66
S_3V_3	70.00	70.00	73.33
S_3V_4	50.00	63.33	60.00
S_3V_5	60.00	70.00	73.33
S.Em±	6.77	5.01	5.70
CD at 5%	19.66	14.56	16.56

RS- Root stock; S_1- Polyhouse ; S_2- Shade net; S_3- Open conditions

V_1-Allahabadh Safeda; V_2- Lalith; V_3- Sardar; V_4 - Arka Rashmi; V_5-Arka Kiran

B. Graft Survivability Percentage

The graft survivability percentage (Table 2) at 90 days after grafting was noticed significant with regard to different environmental conditions. However, the highest (62.66 %) graft survival percentage was showed in the grafts inside the shade net conditions by the use of seven months aged rootstock. While the lowest (40.66 %) graft survival percentage was noticed under open conditions by using five months old rootstock at 90 days after grafting. The highest survivability under shade net might be because of the optimum temperature, which is suitable for the new parenchymatous callus proliferation between scion and rootstock also good callus formation due to higher humidity (Hartman *et al.*, 1997). The similar results were stated by Chander *et al.* (2016) in jamun and Sivudu *et al*. (2014) in mango.

The results noticed with respect to different scions, showed that percentage of graft survival was found to be highest (64.44 %) in the grafts of Sardar variety scions with the use of seven months old rootstock and followed by same variety (62.22 %) by using six months old rootstock. The lowest (36.66 %) survival percentage of grafts was recorded in the grafts of Arka Kiran scions by using five months old rootstock at 90 days after grafting. Singh *et al.*, 2007 also reported that significantly maximum graft success (84.44 %) inside the greenhouse as compared to open condition (61.11 %) in Sardar and Arka Kiran respectively.

The interaction effects involving the different growing conditions and scions at 90 days after softwood grafting were found significant. The maximum (76.66 %) graft survivability percentage was found in the grafts kept inside the shade net conditions with Sardar variety of scion using seven months old rootstock followed by the same conditions and variety (70.00 %) by using six months old rootstock. The minimum (30.00 %) survival percentage of grafts was noticed in the grafts kept in open conditions with Arka Rashmi scions by using five months old rootstock at 90 days after grafting. Similar results were noticed by Nanditha *et al*. (2017) in guava and Visin *et al*. (2010) in guava.

Table 2. Graft survivability (%) as influenced by different environmental conditions, scions and age of rootstock at 90 days after grafting.

Treatments	5 months old rootstock	6 months old rootstock	7 months old rootstock
Factor-1 (Environmental conditions)			
S_1	47.33	56.00	57.33
S_2	53.33	58.00	62.66
S_3	40.66	46.66	49.33
S.Em±	2.30	2.10	1.67
CD at 5%	6.70	6.11	4.86
Factor-2 (Scions)			
V_1	53.33	51.11	56.66
V_2	48.88	56.66	55.55
V_3	51.11	62.22	64.44
V_4	45.55	51.11	52.22
V_5	36.66	46.66	53.33
S.Em±	2.98	2.72	2.16
CD at 5%	8.65	7.89	6.28
Interactions effect			
S_1V_1	40.00	40.00	46.66
S_1V_2	46.66	53.33	60.00
S_1V_3	53.33	66.66	63.33
S_1V_4	56.66	63.33	60.00
S_1V_5	40.00	56.66	56.66
S_2V_1	63.33	66.66	66.66
S_2V_2	56.66	63.33	60.00
S_2V_3	60.00	70.00	76.66
S_2V_4	50.00	50.00	56.66
S_2V_5	36.66	46.66	53.33
S_3V_1	56.66	46.66	56.66
S_3V_2	43.33	53.33	46.66
S_3V_3	40.00	50.00	53.33
S_3V_4	30.00	40.00	40.00
S_3V_5	33.33	43.33	50.00
S.Em±	5.16	4.71	3.75
CD at 5%	14.98	13.68	10.88

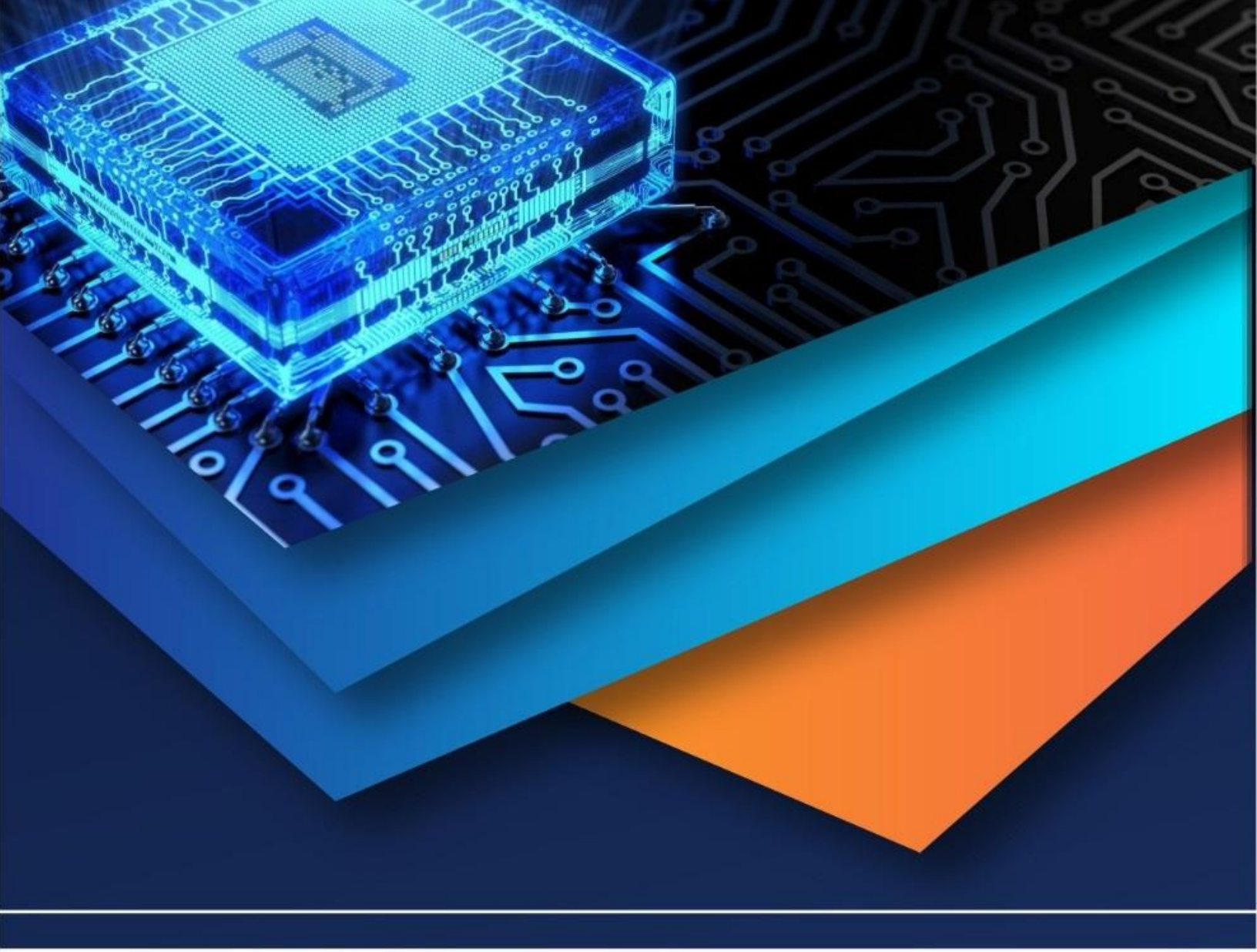
RS- Root stock; S_1- Polyhouse ; S_2- Shade net; S_3- Open condition

V_1-Allahabadh Safeda; V_2- Lalith; V_3- Sardar; V_4 - Arka Rashmi; V_5-Arka Kiran

Results obtained as influenced by different age of rootstocks on survival percentage of grafts. The highest percentage of success was recorded in seven months old rootstock. Similar results were obtained by Aralikatti *et al.* (2011) in jack, Barathkumar in 2017 in aonla and Venkat Rao and Reddy., (2005) in mango.

REFERENCES

[1] Aralikatti, G., Mokashia, A. N., Hegde, R. V., Patil R. V. and Angadi, S.G. (2011). Softwood grafting in jackfruit. Acta Hort., 101- 104.
[2] Barathkumar, T. R. (2017). Studies on effect of different age of rootstocks on softwood grafting in aonla (Phyllanthua embelica). J. Pharmacogn. and Phytochem., 1175-1177.
[3] Chander, S., Kumar., S. Kavino, M. and Bora, L. (2016). Effect of seasonal variation on softwood grafting under different environmental conditions in jamun (Syzygium cumini). Res. on Crops., 17(3): 524-528.
[4] Hartmann, H. P., Kester, D. E., Davies, F. T. and Genene, R. L. (1997). Plant propagation principal and practices 6th ed. Prentice Hall of India Pvt. Ltd., New Delhi, p. 25.
[5] Islam, M. N., Rahim, M. A. and Farooque, A. M. (2004). Standardization of time and grafting techniques in mango under Bangladesh condition. Asian J. of Plt. Sci., 3: 378-386.
[6] Manga, B., Jholgiker, P., Swamy, G. S. K., Prabhuling, G. and Sandhyarani, N. (2017). Studies on effect of propagation environment for softwood grafting in guava cv. Sardar (Psidium guajava). Int. J. Curr. Microbiol. App. Sci., 6(6):2779-2783.
[7] Panse, V. G. and Sukhatme, P. V. (1967). Statiscal methods for agricultural workers. ICAR, New Delhi, p: 152-161.
[8] Rymbai, H. R. and Reddy, G. S. N. (2011). Influence of open field and polyhouse nursery on survival characters of rooted layers in guava (Psidium guajava L.), Life sciences Leaflets, 21: 996-1002.
[9] Sharma, R. R. and Srivastav, M. (2004). Plant propagation and nursery management. First Edition, International book distributing co., Charbagh, Lucknow.
[10] Singh, G., Gupta, S., Mishra, R. and Singh, A. (2007). Technique for rapid multiplication of guava (Psidium guajava). Acta Hortic., 735.
[11] Singh, L., Awasthi, M., Negi, P. and Negi, M. (2019). Studies on success rate of grafting methods on walnut (Juglans regia L.) at different time under polyhouse condition. J. Pharmacogn. and phytochem. 8(4): 2657-2659.
[12] Sivudu, B. V., Reddy, M. L. N., Baburatan, P. and Dorajeerao, A. V. D. (2014). Effect of structural conditions on veneer grafting success and survival of mango grafts (Mangifera Indica cv. Banganpalli). Plant Arch., 14(1): 71-77.
[13] Soni, N., Pandey, S. K., Singh, S. S., Singh., S. R. K. Mishra., Baghe, S. S. and Kaurav, P. (2016). Propagation of guava through cuttage under net house condition at Jabalpur, Madhya Pradesh, India, Flora and Fauna, 22(1): 36-40.
[14] Venkat Rao and Reddy, Y.T.N (2005). Performance of polyembryonic rootstocks under nursery conditions. Ind. J. Hort., 62(3): 298-299.
[15] Visen, A., Singh, J. N. and Singh, S. P (2010). Standardization of wedge grafting in guava. Ind. J. Hort., 67(11): 111-114.



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY