*Current Horticulture* 13(3): 30–32, July–September 2025
DOI: 10.5958/2455-7560.2025.00036.4
Received: 26 November 2024; Accepted: 19 March 2025

# Response of guava (*Psidium guajava*) genotypes to air-layering under sub-humid southern Rajasthan

G. Chand, D.K.Sarolia*, V.Singh and D.K.Singh**

*Department of Horticulture, RCA, MPUAT, Udaipur (Rajasthan) India*

**Abstract**

The evaluation of the genotypes guava (*Psidium guajava* L.) for air layering under sub humid southern plains of Rajasthan conditions was done from 5 to 15 July 2015-16. The genotypes, L-49, Allahabad Safeda, Lalit, Red Fleshed, Pant Prabhat, Safed Jam, Arka Amulya, Arka Mridula, MPUAT S-1, MPUAT S-2, Shweta, Burfkhan, Sarbati, RCGH.-1 and One-Kg were used. Among the genotypes, early root initiation, percentage of rooted air layers, survival percentage and vigour index were maximum in Lalit, while and the number of secondary roots were highest in L- 49 and root: shoot ratio in Shweta. Poor response to rooting was observed in One-Kg.

**Key words:** Chinese layering performance, Sub-humid condition, Red and white fleshed genotypes. Air layering

Guava (*Psidium guajava* L.) is propagated by seeds and vegetative means. Seed propagated plants start bearing fruits in 6- 8 years with variation in fruit yield and quality, whereas vegetatively propagated ones are precocious in bearing (3- 4 years after planting) and produce in uniform fruits (Bose *et al.,* 1986). Vegetative propagation in guava is done by layering, grafting and budding in different parts of the India (Chadha, 2001). Under Rajasthan conditions true to type saplings are produced through air and mound layering as well as inarching methods of propagation. The success of air-layering depends on variety, types of plant material and time of operation (Sharma *et al*., 1975, Dod *et al*., 1998 and Tomar, 2016).

Since multiplication of desired genotype by air layering under sub-humid southern plains of Rajasthan, is not done to meet the demand, an experiment was done.

## MATERIALS AND METHODS

The experiment was conducted during 2015-16 at Rajasthan College of Agriculture, Udaipur, Rajasthan. The 15 genotypes, Allahabad Safeda, Arka Amulya, Arka Mridula, Burfkhan, L-49, Lalit, MPUAT S-1, MPUAT S-2, One-Kg, Pant Prabhat, RCGH-1, Red Fleshed, Safed Jam, Sarbati and Shweta were used.

During July 100 air-layering were performed on each genotype mother plant of 5-6 years old, with a total of 1500 layers. One year old healthy shoots were selected and on each selected shoot a ring of bark about 1.5- 2 cm width between two nodes was removed carefully by giving two circular cuts with a sharp knife at 50-60 cm above from the tip of the shoots. This portion covered with a handful of moistened sphagnum moss which had been previously soaked in water for 2-3 hours. It was then wrapped with a piece of polyethylene sheet (150 gauges) to hold the moss in position around the operated portion and tied firmly with plastic strips at both the ends.

The layers were separated from the plant when roots were visible through the polythene sheet. After detachment of layers from plant the wrapped polythene sheet was removed and layers were then treated with COC (copper oxychloride) @ 3 g per litre and planted in polythene bag (10 cm x 15 cm) after shoot pruning. Observations were recorded on days taken for root initiation, percentage of air layers rooted, root characters (number of secondary roots, length of longest root, diameter of longest root, fresh weight and dry weight of roots), root/ shoot ratio (root: shoot ratio = averaged root length (cm)/ averaged shoot length (cm), vigour index {vigour index= averaged root length (cm) + averaged shoot length (cm) X survival percentage}, survival percentage after shifting in poly bags at 15 days and one month after shifting were recorded after shifting in poly bag survival percentage again recorded according to which are remain 15 days after shifting.

## RESULTS AND DISCUSSION

The genotypes had a significant effect on days taken to rooting, per cent of rooting, root characters (number, length, diameter, fresh weight and dry weight of secondary roots), root: shoot ratio, survival percentage of rooted air layers and vigour index.

Minimum days taken for root initiation was observed in Lalit (39 days), followed by Red Fleshed (40.60 days) and maximum days taken for root initiation was in One-

* **Corresponding author :** singhdks1977@gmail.com (D.K.Singh)
* ICAR-Central Institute for Arid Horticulture, Bikaner (Rajasthan), India
**Kulbhaskar Ashram PG College, Prayagraj (Uttar Pradesh)

Kg (50 days). The probable reason might be due to genetic make-up of varieties (vigorous, dwarf and intermediate) and interaction with environmental factors. Manna *et al.* (2001) supported these findings.

Maximum percentage of air layers rooted was recorded in Lalit (74.76 %), followed by Allahabad Safeda (71.19 %) and One-Kg (50.19 %). Lalit responded higher to air layering due to genetic and physiological behaviour, better rooting occurs in layers when shoot is physiologically mature and is in active sap flow stage that varies with genotypes (Table 1). The results were found to be analogous with the findings reported by Sarkar and Ghosh (2006)

Maximum number of secondary roots was recorded in L-49 (11.20), length of longest root in Lalit (7.12 cm), diameter of longest root in Pant Prabhat (1.11 mm), fresh weight (1508 mg) and dry weight (395 mg) in Lalit and minimum number of secondary roots (4.20), fresh weight (914 mg), dry weight (196 mg) in One-Kg, length of longest root (3.50 cm) in Sarbati and diameter (0.54 mm) in RCGH-1 (Table 2, Figs. 1 and 2). The possible reason for better root characters is due to difference in genetic make-up of genotypes either alone or in combination with environmental factors, that might contributed to higher carbohydrate supply to root, resulting in better vegetative growth as evident from our study. Similar results were also reported by Ramteke *et al.* (1998) and Tripathi *et al.* (2018).

Root: shoot ratio was significantly different among varieties. The maximum root: shoot ratio was noticed in Shweta (1.24), followed by Lalit (1.19) and One-Kg (0.97). The greater root: shoot ratio might be due to that Shweta recorded higher root growth that indirectly improved the root: shoot ratio. The study was close to that of Vaghela and Sharma (2015).

**Table 1:** Root initiation (days), rooted layers (%), secondary roots numbers and root: shoot of air layers in genotypes.

| Treatment | Genotype | Days taken for root initiation | Air layers rooted (%) | Number of secondary roots | Root: shoot ratio |
|---|---|---|---|---|---|
| $T_1$ | L-49 | 42.40 | 67.20 | 11.20 | 1.12 |
| $T_2$ | Allahabad Safeda | 41.40 | 71.19 | 8.80 | 1.10 |
| $T_3$ | Lalit | 39.00 | 74.76 | 10.60 | 1.19 |
| $T_4$ | Red Fleshed | 40.60 | 64.05 | 7.60 | 1.07 |
| $T_5$ | Pant Prabhat | 42.20 | 64.05 | 7.20 | 1.13 |
| $T_6$ | Safed Jam | 49.80 | 52.50 | 7.00 | 1.00 |
| $T_7$ | Arka Amulya | 47.20 | 60.69 | 5.80 | 1.03 |
| $T_8$ | Arka mridula | 44.20 | 61.53 | 6.40 | 1.07 |
| $T_9$ | MPUAT S-1 | 42.20 | 63.00 | 7.00 | 1.06 |
| $T_{10}$ | MPUAT S-2 | 49.80 | 55.65 | 4.80 | 1.03 |
| $T_{11}$ | Shweta | 40.80 | 64.26 | 10.20 | 1.24 |
| $T_{12}$ | Burfkhan | 42.80 | 62.37 | 5.20 | 1.03 |
| $T_{13}$ | Sarbati | 43.80 | 61.95 | 6.60 | 1.02 |
| $T_{14}$ | RCGH-1 | 42.00 | 69.93 | 6.40 | 1.01 |
| $T_{15}$ | One Kg | 50.00 | 50.19 | 4.20 | 0.97 |
| SEm± | | 0.590 | 0.815 | 0.097 | 0.014 |
| CD at 5% | | 1.706 | 2.353 | 0.280 | 0.041 |

Each genotype 100 layers were attempted during 5-15 July and root: shoot was recorded after (15 days) shifting layers in poly bags.

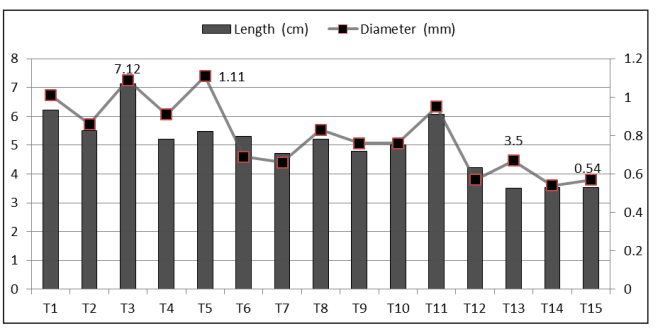


**Fig.1.** Air layer's secondary root length and diameter of different guava genotypes

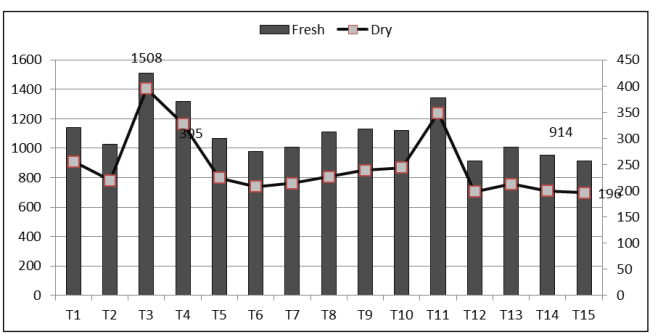


**Fig.2.** Air layer's root weight (mg) of different guava genotypes

The survival percentage of rooted air layers was maximum in Lalit (81.40 %), followed by Shweta (78.40 %) and One-Kg (47.80). Variety Lalit air layers had higher survivability which might be due to that healthy, stout and more number of secondary feeder roots production of layers not only support in uptake of water and nutrients from media but also more survival per cent (Table 2). Rehman *et al.* (2018) and Chand *et al.* (2018) also supported these findings.

Genotype Lalit recorded higher vigour index (838.42), followed closely by Red Fleshed (697.37). It might be due

to difference in nature of varieties with respect to growth, development, survivability, root: shoot ratio and uptake of moisture play key role in enhancement of vigour index of poly bag shifted layers. This is in line with those of Ram and Majumdar (2000) and Tripathi *et al.* (2018).

Maximum success was observed in Lalit (91.00 %), followed by Shweta (88.00 %) and One-Kg (58.00 %). Direct reference is not available to support the present result, but probably due to Lalit recorded early root initiation, higher percentage of rooted air layers, higher root: shoot ratio and vigour index provides higher survival percentage of rooted air layers after shifting. Chand *et al.* (2018) and Rehman *et al.* (2013) supported our findings.

**Table: 2** Survival of rooted air layers (%), vigour index and success of layers in poly bag (%) of air layers of guava genotypes

| Treatment | Genotyp | Survival of rooted air layers (%) | Vigour index | Success of layers in poly bag (at one month after shifting) (%) |
|---|---|---|---|---|
| $T_1$ | L-49 | 74.00 | 582.13 | 83.55 |
| $T_2$ | Allahabad Safeda | 71.20 | 581.47 | 82.46 |
| $T_3$ | Lalit | 81.40 | 838.42 | 91.00 |
| $T_4$ | Red Fleshed | 77.20 | 697.37 | 86.00 |
| $T_5$ | Pant Prabhat | 70.40 | 570.24 | 81.00 |
| $T_6$ | Safed Jam | 50.80 | 318.35 | 61.00 |
| $T_7$ | Arka Amulya | 53.80 | 394.53 | 64.00 |
| $T_8$ | Arka Mridula | 62.80 | 412.39 | 73.00 |
| $T_9$ | MPUAT S-1 | 66.20 | 494.29 | 76.00 |
| $T_{10}$ | MPUAT S-2 | 53.20 | 393.68 | 63.00 |
| $T_{11}$ | Shweta | 78.40 | 663.79 | 88.00 |
| $T_{12}$ | Burfkhan | 55.80 | 344.10 | 66.00 |
| $T_{13}$ | Sarbati | 57.80 | 321.75 | 67.00 |
| $T_{14}$ | RCGH-1 | 58.40 | 336.77 | 68.00 |
| $T_{15}$ | One-Kg | 47.80 | 262.90 | 58.00 |
| | SEm± | 0.881 | 9.347 | 0.933 |
| | CD at 5% | 2.547 | 26.998 | 2.695 |

Survivability was recorded after (15 days) shifting of layers in poly bags.

## CONCLUSION

The early root initiation, percentage of rooted air layers, survival percentage and vigour index were maximum in Lalit, number of secondary roots highest in L- 49, root: shoot ratio maximum in Shweta and poor response observed in One-Kg.

## REFERENCE


Bose T K, Mitra S K and Sadhu M K. 1986. Guava in propagation of tropical and sub-tropical horticultural crops. Naya Prakash, Calcutta, pp. 291-301.

Chadha K L. 2001. Guava: In Handbook of Horticulture. Directorate of Information and Publications of Agriculture, ICAR, New Delhi, pp.190-91.

Chand G, Sarolia D K and Yadav Suman K. 2018. Standardization of dates of guava (*Psidium guajava* L.) varieties to air layering under Southern Rajasthan Condition. *International Journal of Current Microbiology Applied Science.* **7**(04): 1164-68.

Dod V N, Bharad S G, Jadhao BT, Joshi P S and Kulkarni P M. 1998. Seasonal variation in rooting of air layers in guava. *Journal of Soils and Crops* **8**: 182-84.

Manna S, Mathew B and Ghosh S N. 2001. Air layering in guava cultivars. *Journal of Inter Academician* **5** (2): 278-81.

Ram M. and Majumdar P K. 2000. Propagating litchi through stooling. *Indian Horticulture* **25**: 20-21.

Ramteke NH, Verma R M, Damke MM, Pail VS and Panchbhai D M. 1998. Studies on propagation in guava under Akola conditions. *PKV Research Journal* **22**: 180-82.

Rehman MA, Ali A, Khan O and Haq I. 2013. Response of olive cultivars to air layering at various timings. *Pakistan Journal of Agricultural Sciences* **50** (4): 555-58.

Sarkar A. and Ghosh B. 2006. Air layering in guava *cv.* L-49 as affected by plant growth regulators, wrappers and time of operation. *Environment and Ecology* **24** (special 3A):820-23.

Sharma KK, Sandhu AS, Bajwa MS and Dhillon B S. 1975. Effect of IBA and NAA on the rooting of the air layers of guava. *Journal of Research P.A.U., Ludhiana* **1**: 23-25.

Tomar A. 2016. Impact of seasonal changes on air layering and rooting hormone in *Spondias pinnata* Kurz. *Tropical Plant Research* **3** (1): 131–35.

Tripathi S, Singh Rajesh, Singh J, Gurjar PS and Gautam U S. 2018. Standardizing time and methods of propagation in mango (*Mangifera indica* L.) for vindhya region of Madhya Pradesh. *Current Horticulture* **6**(1): 27–34.

Vaghela Deepak and Sharma D K. 2015.Effect of season and growing environment on success of soft wood grafting in cashew nut (*Anacardium occidentale* L.) under south Gujarat agroclimatic conditions. *Current Horticulture* **3**(2): 58–60.