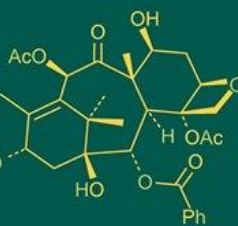
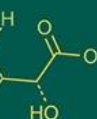
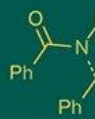


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Performance of different local rootstock genotypes on grafting success in guava

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Abstract

Guava (*Psidium guajava* Linn) is commercially propagated by air layering and poly-bag method of layering. However, multiplication rate through these methods is very low and hence availability of planting material of guava is very less which reflects on very limited area is under cultivation of guava. Guava is propagated by air layering or polybag method of layering and it has adventitious root system and do not get benefits of rootstocks. Guava wilt is a major problem in commercial cultivation and farmers are facing the same. Farmers are asking about the grafted planting material of guava with good rootstock but we cannot fulfill the demand of the growers and hence to cope up the demand of farmers, soft wood grafting might be the solution for commercial propagation of guava by using different seedling origin local genotypes with higher rate of multiplication. The experiment was conducted during the year 2012-13, 2013-14 and 2014-15 at Horticulture Section, College of Agriculture, Nagpur to find out the suitable rootstock for softwood grafting in guava. In the present investigation, soft wood grafting practice was carried out on 10 months old nine local rootstock seedlings of guava during February month. For better success of softwood grafting in guava, rootstock genotype NGR-04 (85.66%), Sardar (80.44%) and NGR-05 (80.13%) was found most suitable with highest grafting success.

Keywords: *Psidium guajava*, softwood grafting, rootstock genotype, grafting success

Introduction

Guava is commercially propagated by air layering and poly-bag method of layering. However, multiplication rate through these methods is very low and hence availability of planting material of guava is very less which reflects on very limited area is under cultivation of guava. Guava is propagated by air layering or polybag method of layering and it has adventitious root system and do not get benefits of rootstocks. Guava wilt is a major problem in commercial cultivation and farmers are facing the same. Farmers are asking about the grafted planting material of guava with good rootstock but we cannot fulfill the demand of the growers and hence to cope up the demand of farmers, soft wood grafting might be the solution for commercial propagation of guava by using different seedling origin local genotypes with higher rate of multiplication. Keeping with the view in mind the experiment was conducted with following objectives to find out the suitable local seedling origin different rootstock for commercial propagation of guava.

Materials and Methods

The investigation was carried out in Horticulture section, College of Agriculture, Nagpur for finding the suitable rootstock for soft wood grafting in guava. Local seedling origin guava rootstock genotypes seedlings raised in polythene bags. Seeds were extracted from selected well ripe fruits of local guava and allowed it to dry under shade. These seeds were sown in polythene bags of 25 cm x 20 cm and 200 gauge thickness filled with the mixture of soil, sand and Farm yard manure in a ratio of 2:1:1. Vigorously growing seedlings of different rootstock genotypes were used as root stocks, thirty seedlings each for every rootstock were selected and operation was carried out (Propagation) during February. The experiment was conducted for three years in Completely Randomized Design. There were nine local rootstock were tried for soft wood grafting and it was replicated thrice. In soft wood grafting, the shoots of the rootstock was decapitated at 20-25 cm height from the collar region.

A cut of 5 cm deep was made in the middle of the stock with sharp knife then prepared the detached scion of 8-10 cm length by giving two slanting cuts of about 4-5 cm long on both sides of the basal end. Scion was inserted and fixed in the straight cut portion of the stock and tied firmly with transparent polythene strip of 1.5 cm in width and 30 cm of length. The grafts were kept in shade net for further observation regarding final success.

Results

Height of plant (cm)

The data in respect of height of plant is presented in Table 1. It is revealed from the table that, the height of plant was significantly influenced by different genotypes. Significantly maximum plant height (pooled) was recorded in genotype NGR-03 (48.09 cm) followed by NGR-04 (45.00 cm) and Sardar (43.97 cm). However, minimum plant height was recorded in genotype NGR-07 (39.02 cm). Plant height was different in different genotypes might be due to that the genetic make-up of different genotypes which directly regulates the internal hormonal balance (specifically endogenous gibberellins responsible for cell elongation and internodal length), apical dominance, nutrient uptake efficiency, and overall photosynthetic capacity inherent to each cultivar. This variation is primarily governed by genotypic differences in expression levels of

growth-promoting hormones versus inhibitors, alongside variations in root system architecture which dictate structural vigor. Similar variations in vegetative growth parameters across diverse germplasm have been reported by Karna *et al.* (2017) ^[5, 6], Rathore *et al.* (2023) ^[16, 17], Nagesh *et al.* (2024) ^[12], and Patel *et al.* (2026) ^[14] in mango, who similarly attributed differential plant heights to cultivar-specific genetic configurations and physiological efficiencies.

Table 1: Plant height(Rootstock) as influenced by different rootstocks in guava (cm)

Rootstocks	Plant height (cm)			
	2012-13	2013-14	2014-15	Pooled
NGR-01	34.33	48.25	45.33	42.64
NGR-02	37.00	48.03	44.90	43.31
NGR-03	40.00	51.94	52.34	48.09
NGR-04	33.33	50.00	51.66	45.00
NGR-05	35.00	46.77	45.43	42.40
NGR-06	34.66	48.06	48.35	43.69
NGR-07	30.00	43.63	43.43	39.02
NGR-08	28.00	44.96	44.85	39.27
Sardar	38.66	46.00	47.25	43.97
'F' test	Sig.	Sig.	Sig.	Sig.
SE (m) ±	1.13	1.036	0.45	0.87
CD at 5%	3.40	3.109	1.33	2.60

Table 2: Stem diameters (rootstock) as influenced by different rootstocks in guava

Rootstocks	Stem diameter (cm)			
	2012-13	2013-14	2014-15	Pooled
NGR-01	0.39	0.42	0.43	0.41
NGR-02	0.44	0.46	0.46	0.45
NGR-03	0.50	0.52	0.53	0.52
NGR-04	0.44	0.48	0.47	0.46
NGR-05	0.51	0.53	0.52	0.52
NGR-06	0.31	0.37	0.36	0.35
NGR-07	0.35	0.40	0.41	0.38
NGR-08	0.28	0.33	0.36	0.32
Sardar	0.45	0.51	0.51	0.49
'F' test	Sig.	Sig.	Sig.	sig
SE (m) ±	0.03	0.016	0.04	0.05
CD at 5%	0.09	0.047	0.03	0.15

Stem diameter of plant (cm)

The data in respect of stem diameter of plant presented in Table 2 revealed that, the stem diameter of plant was significantly influenced by different genotypes. Significantly maximum stem diameter (pooled) was recorded in genotype NGR-05 and NGR-03 (0.52 cm) followed by Sardar (0.49 cm). However, minimum stem diameter was recorded in NGR-08 (0.32 cm). Stem diameter was different in different genotypes might be due to that the genetic make-up of different genotypes which directly regulates the internal hormonal balance (specifically endogenous auxins and cytokinins that drive radial cambial cell division, as well as gibberellins responsible for cell elongation), apical dominance, nutrient uptake efficiency, and overall photosynthetic capacity inherent to each cultivar. Variations in stem diameter reflect cultivar-specific capacities for secondary growth, which dictates the radial proliferation of vascular tissues (xylem and phloem) and influences structural translocation efficiency. Similar variations in secondary radial growth parameters have been reported by Gawankar *et al.* (2010) ^[2], Bhuiyan *et al.* (2010) ^[1], and Patel *et al.* (2026) ^[14] in mango, who likewise

attributed differences in stem girth to genotype-dependent cambial activity and carbohydrate allocation pathways.

Days to sprouting (days)

The data in respect of days to sprouting was recorded and presented in Table 3. It is revealed that, the days to sprouting were significantly influenced by different genotypes. Significantly minimum days to sprouting (pooled) were recorded in genotype NGR-05 (13.44 days) which was found to be at par with NGR-04 (13.70 days), and Sardar (14.14 days). However, maximum days to sprouting were recorded in genotype NGR-08 (18.44 days). Days to sprouting was different in different genotypes might be due to that the genetic make-up of different genotypes. This variation in sprouting timelines is deeply linked to cultivar-specific differences in bud dormancy mechanisms, local stored carbohydrate reserves (primarily starch), and the enzymatic mobilization rate of these reserves via amylase activity upon grafting or pruning. Genotypes that sprout faster typically display a more rapid shift in the internal hormonal balance—specifically an uptick in growth-promoting cytokinins relative to growth-inhibiting abscisic

acid (ABA) within the latent buds. Similar findings regarding differential budbreak and shoot emergence timelines among distinct cultivars were noted by Nikam *et al.* (2021)^[13] in mango.

Table 3: Days to sprouting as influenced by different rootstocks in guava

Rootstocks	Days to sprouting (Days)			
	2012-13	2013-14	2014-15	Pooled
NGR-01	18.66	17.00	17.22	17.63
NGR-02	16.33	15.66	15.55	15.85
NGR-03	15.33	15.66	15.55	15.51
NGR-04	13.66	13.66	13.78	13.70
NGR-05	13.00	13.33	14.00	13.44
NGR-06	14.33	15.33	15.33	15.00
NGR-07	15.00	14.33	14.55	14.63
NGR-08	20.00	17.66	17.66	18.44
Sardar	14.33	13.66	14.44	14.14
'F' test	Sig.	Sig.	sig	sig
SE (m) ±	0.59	0.556	0.39	0.37
CD at 5%	1.79	1.666	1.18	1.10

Grafting success (%)

The data in respect of grafting success presented in Table 4 revealed that, the grafting success was significantly influenced by different genotypes. Significantly maximum grafting success (pooled) was recorded in genotype NGR-04 (85.66%) followed by Sardar (80.44%) and genotype NGR-05 (80.13%). However, minimum grafting success was recorded in genotype NGR-03 (47.29%). Grafting success was different in different genotypes might be due to that the genetic make-up of different genotypes and availability of active phloem layer in different genotypes. Similar finding was noted by Manga *et al.* (2017)^[18], who observed that the scion genotype significantly impacts the degree of graft take and survival due to maternal food accumulation and structural compatibility. Variation in grafting success across different cultivars is heavily dictated by the precise alignment of the vascular cambium and the active phloem layers between the stock and scion; if the genetic makeup limits cell division or results in morphological discrepancies (such as variable bark-to-cambium thickness), it leads to poor vascular connectivity, mechanical failure, or scion desiccation (Meghana *et al.*, 2023; Standard & Singh, 2025)^[8, 18].

Table 4: Grafting success as influenced by different rootstocks in guava

Rootstocks	Grafting success (%)			
	2012-13	2013-14	2014-15	Pooled
NGR-01	52.22 (46.27)	56.00 (48.44)	52.91 (46.68)	53.71 (46.55)
NGR-02	55.55 (48.18)	53.00 (46.72)	55.89 (48.33)	57.80 (49.49)
NGR-03	46.66 (43.08)	48.66 (44.23)	46.55 (42.99)	47.29 (43.80)
NGR-04	84.44 (66.86)	86.00 (68.06)	86.55 (68.44)	85.66 (67.70)
NGR-05	83.33 (65.97)	80.66 (63.92)	80.41 (63.72)	80.13 (63.51)
NGR-06	61.10 (51.44)	64.66 (53.54)	64.40 (53.37)	63.39 (52.71)
NGR-07	65.55 (54.09)	68.66 (55.96)	67.40 (55.18)	65.87 (54.21)
NGR-08	61.10 (51.44)	66.00 (54.33)	66.11 (54.39)	66.07 (54.76)
Sardar	82.22 (65.08)	80.00 (63.45)	80.11 (63.51)	80.44 (63.72)
'F' test	Sig.	Sig.	sig	sig
SE (m) ±	1.37	0.56	0.45	0.88
CD at 5%	4.13	1.69	1.38	2.63

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