

Effect of Time and Source of Scion on Softwood Grafting Success in Guava (*Psidium guajava* L.)

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Abstract The present experiment was carried out to find the effect of time and source of scion on softwood grafting success in guava (*Psidium guajava* L.) during the year 2013-2014. Three different source of scion from varieties; L-49, Lalit, Shweta were grafted at fourth night interval from January to February. Grafting performed during 2nd fourth night of February recorded maximum leaf area (43 cm²) and final survival of grafts (93.89%). Among varieties maximum final survival obtained from scion of Shweta (93.34%).

Keywords Guava, L-49, Lalit, Shweta, Scion.

Introduction

Guava (*Psidium guajava* L.) is an important fruit crop

of tropical and subtropical region of India belongs to family Myrtaceae. It is one of the most promising fruit crop and considered to be exquisite, nutritionally valuable and remunerative crop [1]. The greatest obstacle in plantation of guava is discriminate multiplication of planting material from unreliable sources. The initial planting material is the basic requirement on which final crop depends both in quality and quantity [2]. Presently high density planting (HDP) system in guava gained popularity amongst the farmers across the country. HDP require more number of planting material. One of the basic principal of HDP is to use of dwarfing rootstock. Employing such type of rootstock is only possible through the mean of grafting instead of other methods of guava propagation viz. Stooling, air layering. Through grafting it is also possible that the resistant rootstock can be utilized against guava wilt and other maladies. For example; Pusa Srijan was identified as a potential dwarfing rootstock for HDP in guava and show tolerance to guava wilt [3]. Besides these softwood grafting is very much effective in dry, hot weather or in areas of low precipitation which is the prevailed under Akola condition. Therefore, present investigation was done to know the effect of varieties and time of grafting on softwood grafting success in guava.

Materials and Methods

The experiment was conducted at Propagation Unit, Department of Horticulture, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola (Maha) during 2014-15. The

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Table 1. Effect of time of grafting and source of scion on different growth parameters and final survival of guava graft.

Treatments	Number of leaves per graft	Leaf area (cm ²)	Root density (ml)	Stonic ratio	Final survival of graft (%)
Time of grafting					
T ₁ : (1 st forth night of January)	18.65	35.73	12.51	0.99	71.67 (61.89)
T ₂ : (2 nd forth night of January)	18.53	41.27	11.67	0.97	75.00 (60.85)
T ₃ : (1 st forth night of February)	18.11	33.74	15.36	0.98	85.00 (69.44)
T ₄ : (2 nd forth night of February)	17.76	43.00	12.31	0.89	93.89 (78.33)
SE (m) ±	0.67	2.22	0.35	0.022	2.02
CD at 5%	–	6.50	1.03	0.065	5.93
Source of scion					
S ₁ : L-49	17.22	36.67	13.98	0.96	79.58 (63.84)
S ₂ : Lalit	18.98	39.64	13.50	0.97	71.25 (60.48)
S ₃ : Shweta	18.59	38.99	11.40	0.95	93.34 (78.57)
SE (m) ±	0.58	1.92	0.30	0.019	1.75
CD at 5%	–	–	0.89	–	5.14

experiment was laid out in factorial randomized block design (FRBD) with 12 treatment combination comprising of four different times of grafting and three different varieties. The details of experimental treatment were as below: Time of grafting; 1st forth night of January, 2nd forth night of January, 1st forth night of February, 2nd forth night of February. Varieties (Source of scion); L-49, Lalit, Shweta and there combination were T₁S₁ (1st forth night of January + L-49), T₁S₂ (1st forth night of January + Lalit), T₁S₃ (1st forth night of January + Shweta), T₂S₁ (2nd forth night of January + L-49), T₂S₂ (2nd forth night of January + Lalit), T₂S₃ (1st forth night of January + Shweta), T₃S₁ (1st forth night of February + L-49), T₃S₂ (1st forth night of February + Lalit), T₃S₃ (1st forth night of February + Shweta), T₄S₁ (2nd forth night of February + L-49), T₄S₂ (2nd forth night of February + Lalit), T₄S₃ (2nd forth night of February + Shweta). The grafting operation performed on uniform and healthy guava seedlings of about eight month old were selected for rootstock. The scion material was collected from the identified guava varieties viz. L-49, Lalit and Shweta. For collection of scion material the past season growth of respective cultivar were tagged and defoliated 7 days prior to grafting operation. Twenty centimeter in length with 4 to 5 activated but unspouted buds scion wood were selected for grafting operation. During investigation the observation were recorded regarding different growth

parameter (number of leaves per graft, leaf area, root density) and final survival of grafts.

Results and Discussion

Number of leaves per plant

The data presented in Tables 1 and 2 indicate that, an effect of time of grafting, source of scion and there interaction effect on number of leaves per plant was found to be the non-significant. However the maximum number of leaves was obtained from the plants grafted during 1st forth night of January (18.65 leaves per graft) and the minimum number of leaves (17.76 leaves per graft) was obtained from the plants grafted during 2nd forth night of February. Among the scion maximum numbers of leaves were counted from the scion of the variety Shweta (18.98 leaves per graft). Whereas, the scion of variety L-49 showed minimum number of leaves per graft. In interaction effect maximum number of leaves obtained when the grafting operation performed during 1st forth night of January with scion of variety Lalit (20 leaves per graft). While the minimum number of leaves noticed from the plants in which grafting operation performed during 2nd forth night of February scion of variety Shweta (16.27 leaves per graft).

Table 2. Interaction effect of time and source of scion on different growth parameters and final survival of guava graft.

Treat-ments	Number of leaves per graft	Leaf area (cm ²)	Root density (ml)	Stonic ratio	Final survival of graft (%)
T ₁ S ₁	16.47	35.42	13.00	1.02	78.33 (62.79)
T ₁ S ₂	20.00	33.84	15.00	0.95	40.00 (39.03)
T ₁ S ₃	19.47	37.94	9.53	0.99	96.67 (83.86)
T ₂ S ₁	19.73	38.11	9.00	0.98	78.33 (62.91)
T ₂ S ₂	17.80	48.60	11.00	1.01	60.00 (50.79)
T ₂ S ₃	18.07	37.09	15.00	0.91	86.67 (68.86)
T ₃ S ₁	16.27	34.58	20.00	0.92	71.67 (58.07)
T ₃ S ₂	19.33	34.65	16.00	1.02	90.00 (72.53)
T ₃ S ₃	18.73	32.00	10.07	1.00	93.33 (77.71)
T ₄ S ₁	16.40	38.58	13.93	0.90	90.00 (71.57)
T ₄ S ₂	18.80	41.47	12.00	0.89	95.00 (79.55)
T ₄ S ₃	18.07	48.94	11.00	0.89	96.67 (83.86)
SE(m)±	1.17	3.84	0.61	0.038	3.50
CD at 5%	–	–	1.79	–	10.28

Leaf area

Data presented in Table 1 clearly shows that, an effect of time of grafting on leaf area was found to be significant. The maximum leaf area was obtained from the plants grafted during 2nd forth night of February (43 cm²) which was found to be as par with grafting operation performed during 2nd forth night of January (41.27 cm²). However minimum leaf area noticed from the plants grafted during 1st forth night of February (33.74 cm²). This could be attributed to the fact that, grafting operation performed during spring period got the favorable soil moisture, atmospheric humidity and optimum temperature which should have the favorable effect on leaf area. Similar significant effect of time on grafting has also been reported in jamun [4, 5]. The non significant variation was observed due to source of scion on leaf area of grafts. The maximum leaf area was obtained from the scion of variety Shweta (38.99 cm²). However the minimum leaf area was obtained from the scion of variety Lalit (39.64 cm²). In interaction effect (Table 2) the maximum leaf area (48.99 cm²) obtained from the plants grafted during 2nd forth night of February with scion of variety Shweta. However minimum leaf area obtained from the plants grafted during 1st forth night of February with scion of variety Shweta (32 cm²).

Root density

From the data presented in Table 1 it is revealed that, an effect of time of grafting, source of scion and there interaction effect on root density was also found to be significant. The highest root density obtained from the plant grafted during 1st forth night of February (15.36 ml), which was found to be significantly superior over all the treatment. However the lowest root density was obtained from the plants grafted during 2nd forth night of January (11.67 ml). This might be also due to air temperature and edaphic factor like soil moisture, soil temperature which favors the root growth. From the different variety scion highest root density was observed from scion of variety L-49 (13.98 ml). Whereas the scion of variety Shweta showed lowest root density (11.40 ml). It might be also attributed due to the genetical characteristic of the variety.

From interaction effect presented in Table 2 the highest root density was observed from the grafts prepared during 1st forth night of February with the scion of variety L-49 (20 ml) over all the treatment combination followed by T₃S₂ (16 ml), T₁S₂ and T₂S₃ (15 ml). The lowest root density was noted from the grafts prepared during 2nd forth night of January with scion of variety L-49 (9 ml).

Stonic ratio

An effect of time of grafting on stonic ratio was found to be significant (Table 1). The desirable maximum stonic ratio (closer to one) was obtained from the plant grafted during 1st forth night of January (0.99). Whereas the minimum stonic ratio (0.89) obtained from the plant grafted during 2nd forth night of January. Softwood grafting during January and February showed the compatible union which might be the results of cambium continuity. Similar results also noticed in jamun by Gadekar et al. [4] the favorable stonic ratio (close to 1) was obtained when softwood grafting performed on 1st march and 15th march.

The effect of different sources of scion on stonic ratio were found to be non significant. The maximum stonic ratio (0.97) obtained from the scion of variety Lalit, closely followed by L-49 (0.96) and Shweta (0.95). Also an interaction effect of time of grafting and source

of scion stonic ratio was found to be non significant (Table 2). However the desirable stonic ratio (1) obtained from the plant grafted on 1st forth night of February with scion of variety Shweta closely followed by treatment combination T₁S₃ (0.99) and T₂S₂ (1.01) and the minimum stonic ratio obtained from the plant grafted during 2nd forth night of January with scion of variety Lalit and Shweta (0.89).

Final survival of grafts

It is clearly indicated from Table 1 that maximum final survival of grafts (93.89%) were obtained when grafting done during 2nd forth night of February which is significantly superior over all the treatment. However minimum survival of graft was obtained when grafting operation performed during 1st forth night of January (71.67%). This might be due to congenial climatic conditions and there by encourage early contact of cambium layers of stock and scion resulting in early callus formation, initiation of subsequent growth and ultimately results in better survival of grafts [6]. Similar kind of finding also obtained by different scientist in fruit crops like mango [7], aonla [8], jamun [9], carambola [10] and guava [11] which was in agreement with present study. The grafts prepared with the scion of variety Shweta (93.34%) shows maximum final survival over all the varieties. However the minimum final survival was observed from the scion of variety Lalit (71.25%). It might due to the genetic makeup of Shweta variety having the more of live paranchymatous cells, less of vessels and higher meristematic activity at the bud level, which turn helps in better sap flow and good callus [12]. Results obtained are in accordance with the results in mango [12] and guava [13]. An interaction effect (Table 2) due to the time of grafting and source of scion on final survival of graft was also found to be the significant. Treatment combination T₁S₃ (1st forth night of January + Shweta) and T₄S₃ (2nd forth night of February + Shweta) shows maximum (96.77%) final survival of grafts were also fund to be at par with T₁S₁ (93.33%) followed by T₄S₂ (95%) and T₃S₃ (93.33%). Whereas the minimum survival was obtained from the plants

grafted during 1st forth night of January with the scion of variety L-49 (40%). The better final survival of graft attributed to the genetical performance of the source of scion under suitable climatological environment which encourage the early callus formation and establishment of scion and stock union [6]. Similar kind of results were also observed in guava [13].

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