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Effect of months and varieties on success percentages and growth parameters of wedge grafted guava plants under Raipur region of Chhattisgarh plain

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Abstract
The present experiment entitled "Effect of months and varieties on success percentages and growth parameters of wedge grafted guava plants under Raipur region of Chhattisgarh Plain" was conducted at research farm of Precision Farming Development Centre (PFDC), Department of Fruit Science, College of Agriculture, I.G.K.V., Raipur (C.G.) during the year of 2021-22. The maximum success percent of wedge grafting was recorded 71.91 percent in treatment T_8 (GM_2V_3) when, wedge grafting was done during the month of August with Allahabad Sadeda variety of guava while, the minimum success percent of wedge grafting was observed 43.15 percent in treatment T_6 (GM_3V_2) during month of September. The minimum days taken to first bud sprouting was reported 11.06 days in treatment T_8 (GM_2V_3) while, the maximum days was recorded under 28.75 days in treatment T_{15} (GM_3V_5). The maximum bud sprouting percent (86.38 percent), the length of shoots (32.46 cm) and diameter of shoots (3.95 mm) were recorded under treatment T_8 (GM_2V_3) and the minimum diameter of shoots was recorded 2.74 mm under treatment T_{15}. The minimum number of days taken to first leaf opening was observed 23.25 days under treatment T_8 (GM_2V_3) while, maximum days taken 41.77 days observed treatment T_{15} (GM_3V_5).

Keywords: Guava, months, roots, success percentage, wedge grafting and varieties

Introduction
Guava is scientifically known as *Psidium guajava* L. and also referred as "Apple of Tropics" and "Poor Man's Apple." In India it is locally known as Bihi, Jaam and Amrud etc. It is one of the most promising, popular and commercial fruit crop of tropical and subtropical regions of India and the ideal fruit crop for nutritional security in our country. It is the fourth largest economical fruit after mango, banana, and citrus so far as area and production of major fruits are considered. Guava is a prolific bearer with highly remunerative even without much care.

It originated in Tropical America and grew from Mexico to Peru and belongs to the *Psidium* genus of the Myrtaceae family which comprises 3000 species under 80 genera (Singh *et al*., 2019) [12]. The commercially cultivated cultivars are diploid *i.e.* the number of the chromosome is 2n=22 while, seedless cultivars are found triploid and shy bearers in nature. Guava is hardy, drought tolerant, has high yield potential, regular bearer crop.

The major producing districts in Chhattisgarh are Korba (22.898), Mahasamund (17.375), Kabirdham (15.714), Janjir Champa (12.215), Surguja (9.545), Korea (9.464), Raigarh (9.220), Bilaspur (8.976) Kanker (7.619), and Narayanpur (7.500) thousand metric tons during 2020-21 respectively (Anon. 2021) [1] The minimum number of days taken for 50% of graft sprouting (29.80 days), the maximum percentage of graft sprouting (18.57%), number of flushes per sprout (2.10) were recorded in plants grafted under shade net condition when compared to the plants grafted under poly house condition and also the maximum percentage of graft sprouting (39.35%), less number of days taken for 50% of graft sprouting (20.67 days) and number of flushes per sprout (2.17) were also recorded in the plants grafted during January month followed by December month (Vanaja *et al*., 2017) [13]. Softwood grafting was performed at the monthly interval from July to December months under shade house and the highest percentage of graft success was observed in grafting during December (69.00%) and July months (65.50%) with maximum survival percentage recorded 94.88 per cent in July month (Manga and Jholgiker., 2017) [10].

Materials and Methods

The present experiment entitled "Effect of months and varieties on success percentages and growth parameters of wedge grafted guava plants under Raipur region of Chhattisgarh Plain" was conducted at research farm of Precision Farming Development Centre (PFDC), Department of Fruit Science, College of Agriculture, I.G.K.V., Raipur (C.G.) during the year of 2021-22.

The experiment was consisted of fifteenth treatments with three replications under factorial completely randomized design (FCRD) with two factorial arrangements. The first factor of propagation months with three levels like July (M_1), August (M_2) and September (M_3) while second factor of varieties with five levels like Shweta (V_1), Lalit (V_2), Allahabad Safeda (V_3), Lucknow-49 (V_4) and VNR bihi (V_5). The treatment combinations of present investigation are T_1 - GM_1V_1, T_2-GM_2V_1, T_3-GM_3V_1, T_4-GM_1V_2, T_5-GM_2V_2, T_6-GM_3V_2, T_7-GM_1V_3, T_8-GM_2V_3, T_9-GM_3V_3, T_{10}-GM_1V_4, T_{11}-GM_2V_4, T_{12}-GM_3V_4, T_{13}-GM_1V_5, T_{14}-GM_2V_5, and T_{15}-GM_3V_5. The following observations were recorded during research *i.e.* success percentage of wedge grafting, number of days taken to first bud sprouting, bud sprouting percentage (%), length of shoots (cm), diameter of shoots (mm) and number of days taken to first leaf opening.

Result and Discussion

Success percentage of wedge grafting

The results revealed that the data on success percentage of wedge grafting significantly influenced by different months and varieties of guava is presented in table 1 for the year 2021-2022. It was shown significantly effect on success percentage of various treatments with interaction of both factors *i.e.* propagation months (M) and varieties (V). Out of whole treatments, August month (M_2) was significantly showed the success percentage of wedge grafting.

As per the data concerned, the maximum success percent was observed 57.72 percent under the month of August followed by month of July was recorded 53.87 percent while the minimum success percent of wedge grafting was recorded 49.14 percent under the month of September. Among the different varieties, the maximum success percent of wedge grafting was observed 66.40 percent under the variety of Allahabad Safeda followed by variety of Lucknow-49 (57.76 per cent) during the year of 2021-22. The minimum success percent of wedge grafting was recorded 45.66 percent noticed in Shweta variety of guava.

An interaction effect between different months (July, August, and September) and varieties (Shweta, Lalit, Allahabad Safeda, Lucknow-49 and VNR Bihi) on success percent of wedge grafting was significantly influenced. The maximum success percent of wedge grafting was observed 71.91 percent in the treatment T_8 (GM_2V_3) followed by treatment T_7 (GM_1V_3) while, the minimum success percent of wedge grafting was observed 43.15 percent under treatment T_6 (GM_3V_2) when wedge grafting was done during the month of September.

The maximum success percentage (33.33%) was recorded when wedge grafting was done in the July followed by wedge grafting done in August (30.00) in Lucknow-49 reported by Kumar *et al.* (2017) [9]. These results were in agreement with findings of Kukshal *et al.,* (2017) [8], Kholia *et al.,* (2017) [7] and Reshma *et al.,* (2016) [11].

The minimum number of days taken to first bud sprouting

The minimum number of days taken to first bud sprouting was observed 17.09 days under August month followed by July month 19.73 days was recorded while, the maximum number of days taken to first bud sprouting 24.78 days was recorded in September month during the year of 2021-22. Among the different varieties, the minimum number of days taken to first bud sprouting was observed 15.54 days under the variety of Allahabad Safeda followed by variety of Lucknow-49 (18.06 days). The minimum number of days taken to first bud sprouting was observed 11.60 days in the treatment T_8 (GM_2V_3) followed by treatment T_{11} (GM_2V_4) while, the maximum number of days taken to first bud sprouting was recorded 28.75 days in treatment T_{15} (GM_3V_5). These results were in agreement with findings of Visen *et al.* (2010) [14] and Beer *et al.* (2013) [2].

Bud sprouting percentage (%)

The data on bud sprouting percentage in wedge grafting as influenced by different months and varieties of guava is presented for the year 2021-2022. It was shown significantly effect on bud sprouting percentage of various treatments with interaction of both factors *i.e.* propagation months (M) and varieties (V). As per the data concerned, the maximum bud sprouting percentage was observed 73.69 percent under August month followed by July month (67.77 per cent) was recorded while, the minimum bud sprouting percentage was recorded 64.77 in September month.

Among the different varieties, the maximum bud sprouting percent was observed 80.29 percent under the variety of Allahabad Safeda followed by variety of Lucknow-49 (76.17 percent) was observed while, the minimum bud sprouting percent was recorded 55.88 percent under Shweta variety of guava during the year of 2021-22, 2022-23 and pooled mean data respectively. These results were in agreement with findings of Vanaja *et al.,* (2017) [13] and Gotur *et al.* (2017) [4].

An interaction effect between different months (July, August, and September) and varieties (Shweta, Lalit, Allahabad Safeda, Lucknow-49 and VNR Bihi) on bud sprouting percent was significantly influenced. The maximum bud sprouting percent was observed 86.38 percent in the treatment T_8 (GM_2V_3) followed by treatment T_{11} (GM_2V_4) while, the minimum bud sprouting percent was recorded 50.78 percent in treatment T_3 (GM_3V_1). These results were in agreement with findings of Kholia *et al.* (2017) [7], Dixit *et al.,* (2019) [3] and Guleria (2022) [5].

Length of shoots

It was shown significantly effect on length of shoots of various treatments of both factors *i.e.* propagation months (M) and varieties (V). Out of whole treatments, August month was significantly showed the maximum length of shoots. The maximum length of shoots was observed 29.25 cm under the month of August followed by month of July 27.10 cm was recorded while, the minimum length of shoots was recorded 24.69 cm when, wedge grafting was done in the month of September.

Out of whole varieties, Allahabad Safeda was significantly showed the maximum length of shoots. The maximum length of shoots was observed 29.62 cm under the variety of Allahabad Safeda followed by Lalit (27.63 cm) while, the minimum length of shoots was observed in VNR Bihi (24.01

cm) during the years of 2021-22.
An interaction effect between different months (July, August, and September) and varieties (Shweta, Lalit, Allahabad Safeda, Lucknow-49 and VNR Bihi) on length of shoots was significantly influenced. The maximum length of shoots was observed 32.46 cm under the treatment T_8 (GM_2V_3) followed by treatment T_7 (GM_1V_3) while, the minimum length of shoots was observed 21.94 cm under treatment T_{15} (GM_3V_5). The sprout length was observed in different months like mid-July (15.14 cm), mid-August (17.08 cm) and mid-September (18.03 cm) in wedge grafted plants at 90 days after grafting in guava reported by Guleria (2022) [5].

Diameter of shoots
The maximum diameter of shoots was observed 3.54 mm under the month of August followed by month of July 3.35 mm was recorded while, the minimum diameter of shoots was recorded 3.20 mm when, wedge grafting was done in the month of September. The maximum diameter of shoots was observed 3.73 mm under the variety of Allahabad Safeda followed by Lucknow-49 (3.59 mm) while, the minimum diameter of shoots was observed in VNR Bihi (2.84 mm).
An interaction effect between different months (July, August, and September) and varieties (Shweta, Lalit, Allahabad Safeda, Lucknow-49 and VNR Bihi) on diameter of shoots was significantly influenced. The maximum diameter of shoots was observed 3.95 mm under the treatment T_8 (GM_2V_3) followed by treatment T_{11} (GM_2V_4) while, the minimum diameter of shoots was observed 2.74 mm under treatment T_{15} (GM_3V_5) during the years of 2021-22. The maximum diameter of sprout (0.87cm) was recorded when wedge grafting was done in the July followed by wedge grafting done in August (0.84 cm) in guava reported by Kumar *et al.* (2017) [9].

Number of days taken to first leaf opening
As per the data concerned, the minimum number of days taken to first leaf opening was observed 28.96 days under August month followed by July month 33.08 days was recorded while, the maximum number of days taken to first leaf opening 36.22 days was recorded in September month. Among the different varieties, the minimum number of days taken to first leaf opening was observed 27.81 days under the variety of Allahabad Safeda followed by variety of Lucknow-49 was observed 28.98 days while, the maximum number of days taken to first leaf opening was recorded 37.59 days.
An interaction effect between different months (July, August, and September) and varieties (Shweta, Lalit, Allahabad Safeda, Lucknow-49 and VNR Bihi) on number of days taken to first leaf opening was significantly influenced. The minimum number of days taken to first leaf opening was observed 23.25 days in the treatment T_8 (GM_2V_3) followed by treatment T_7 (GM_1V_3) while, the maximum number of days taken to first leaf opening was recorded 41.77 days in treatment T_{15} (GM_3V_5) during the year 2021-22. These results were in agreement with findings of Joshi (2016) [6], Kukshal *et al.* (2017) [8] and Guleria (2022) [5].

Table 1: Effect of months and varieties on success percentages and growth parameters of wedge grafted guava plants under Raipur Region of Chhattisgarh Plain

Treatments		Success percentage	Number of days taken to first bud sprouting	Bud sprouting percentage (%)	Length of shoots (cm)	Diameter of shoots (mm)	Number of days taken to first leaf opening
Propagation Months (M)							
M_1	July	53.87	19.73	67.77	27.10	3.35	33.08
M_2	August	57.72	17.09	73.69	29.25	3.54	28.96
M_3	September	49.14	24.78	64.77	24.69	3.20	36.22
SE(m)±		0.231	0.174	0.349	0.143	0.017	0.290
C.D. at 5%		0.668	0.501	1.007	0.414	0.050	0.838
Varieties (V)							
V_1	Shweta	45.66	21.82	55.88	26.62	3.19	34.25
V_2	Lalit	47.66	23.31	67.08	27.63	3.47	35.13
V_3	Allahabad Safeda	66.40	15.54	80.29	29.62	3.73	27.81
V_4	Lucknow -49	57.76	18.06	76.17	27.18	3.59	28.98
V_5	VNR Bihi	50.40	23.93	64.31	24.01	2.84	37.59
SE(m)±		0.299	0.224	0.450	0.185	0.023	0.375
C.D. at 5%		0.863	0.647	1.300	0.535	0.113	1.082
Interaction effect (MxV)							
T_1	GM_1V_1	44.75	21.54	56.02	26.48	3.12	34.89
T_2	GM_2V_1	49.62	18.48	60.86	28.17	3.35	31.58
T_3	GM_3V_1	42.62	25.44	50.78	25.21	3.08	36.27
T_4	GM_1V_2	47.68	22.72	65.85	27.24	3.48	35.34
T_5	GM_2V_2	52.15	20.12	71.44	29.92	3.65	30.61
T_6	GM_3V_2	43.15	27.08	63.95	25.72	3.29	39.45
T_7	GM_1V_3	66.98	15.62	78.52	30.25	3.72	29.52
T_8	GM_2V_3	71.91	11.60	86.38	32.46	3.95	23.25
T_9	GM_3V_3	60.31	19.41	75.97	26.17	3.53	30.67
T_{10}	GM_1V_4	58.37	16.48	73.85	27.70	3.59	28.55
T_{11}	GM_2V_4	61.11	14.49	83.68	29.44	3.83	25.47
T_{12}	GM_3V_4	53.78	23.22	70.96	24.39	3.34	32.92
T_{13}	GM_1V_5	51.55	22.29	64.63	23.84	2.85	37.11
T_{14}	GM_2V_5	53.82	20.75	66.09	26.26	2.92	33.89
T_{15}	GM_3V_5	45.83	28.75	62.22	21.94	2.74	41.77
SE(m)±		0.518	0.388	0.779	0.321	0.039	0.649
C.D. at 5%		1.495	1.121	2.251	0.926	0.113	1.874

Conclusion

The success percent of wedge grafting was recorded in treatment T_8 (GM_2V_3) when, wedge grafting was done during the month of August with Allahabad Safeda variety of guava while, the minimum success percent of wedge grafting was observed in treatment T_6 (GM_3V_2) during month of September. The minimum days taken to first bud sprouting was recorded in August month with Allahabad Safeda variety. The maximum bud sprouting percent, the length of shoots, and diameter of shoots were recorded under Allahabad Safeda, when air layering was done during August month. The minimum number of days taken to first leaf opening was observed in Allahabad Safeda during August month. Hence, Allhabad Safeda was gave the best performance in wedge grafting during August month.

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