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Studies of Grafting Height on Success of Softwood Grafting in Mango (*Mangifera indica* L.)

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ABSTRACT

A research was carried out during 2015-16 in Department of Horticulture, College of Agriculture, Junagadh Agricultural University, Junagadh to find out the effect of grafting height on success of softwood grafting in mango. Variation due to different grafting height was found significant and among different grafting height significantly, highest graft success percentage (59.44 %), survival percentage (49.44 %) maximum shoot length of scion (13.61 cm), total number of leaves (12.77), plant height (75.23 cm) and stock girth (9.33 mm) were recorded at 60 cm (H_3) followed by H_2. However, maximum scion girth (8.58 mm) was recorded at 40 cm (H_2). Likewise, lowest shoot length (11.91 cm), total number of leaves (10.84), plant height (33.07 cm), scion girth (7.42 mm) and stock girth (8.55 mm) were noted in 20 cm (H_1).

Key words: *Mango, Height, Success percentage, Growth parameter.*

INTRODUCTION

Mango (*Mangifera indica* L.) is an important fruit crop belonging to family anacardiaceae is very popular among all parts of India. It is also called the king of fruits and known as national fruit of India. The agro climactic conditions prevailing in Gujarat is very congenial for mango cultivation and provides splendid scope for mango cultivation. Among the various constraints for expanding the mango cultivation, lack of availability of suitable planting material is one of the important drawbacks to increase the area of mango cultivation. Though, seed propagation is the most common method of propagation, which is not produce true to plants which have long gestation period and produce irregular fruit size with inferior quality. So propagation by asexual method is generally followed for successful cultivation. Mostly, mangoes are vegetative propagated by inarching, veneer grafting, epicotyl grafting, softwood grafting etc. Among those softwood grafting is generally followed which is easy to handle and quite efficient as well as grafts can normally raised within a year, thus reducing cost of raising grafts considerably. Though other method such as veneer grafting and air layering is followed and it is time consuming and low multiplication rate of grafts. Hence, the present investigations were under taken to standardize the height of seedling rootstock in mango on success of softwood grafting in mango.

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MATERIAL AND METHODS

The present investigation was carried out at Fruit Research Station, Sakkarbaug, Department of Horticulture, College of Agriculture, Junagadh Agricultural University, Junagadh during 2015-16 to study the effect of grafting height on success of softwood grafting in mango. The experiment was laid out in completely randomized design with factorial concept with three repetitions. For rootstock purpose, sowing mango stones of local variety in black polyethylene bag and the mango stone are sown in 1st June 2015 and seedling are ready for grafting on particular date as per programme from 15th August 2015 to 30th October 2015 with different grafting height 20cm (H_1), 40 cm (H_2) and 60 cm (H_3) on rootstock. For scion mature and healthy terminal shoots of more than 3 month of age were selected from Kesar cultivar of mango. It should be 10-15 cm long. Procuring was done 7-10 days before grafting. Then softwood grafting is followed as per the standard procedure described by R. S. Amin. Five representative plants from each treatment were selected and observed with regard to the days to shoot emergence, success and survival percentage, shoot length of scion, number of leaves, plant height, scion girth and stock girth. The observations were recorded two month after grafting operation at 30 days interval until 120 days after grafting.

RESULT AND DISCUSSION

The data revealed that the variation due to treatment like different grafting height was found unable to create significant influence on days to shoot emergence. However, minimum days taken least time for sprout initiation when grafting was done at 40 cm. It might be due to well established, vigorous shoot and root, more food reserved in rootstock seedlings. Furthermore, too young and old tissues are not fit for complete union. This view was supported by Jagidar *et al.*[3] and Mandal *et al.*[6] in mango.

Result was also found significant and maximum success percentage (59.44 %) was recorded in 60 cm (H_3). lower success percentage (49.44 %) was observed in 20 cm (H_1). Similarly, survival percentage was also found significant when grafting was done at higher grafting height *i.e.* 60 cm on rootstock (H_3). The highest survival percentage (49.44 %) was noted in 60 cm grafting height and was at par with H_2 (43.88 %) at 40 cm and lower survival percentage (42.22 %) was recorded in 20 cm grafting height (H_1) during 120 days after grafting. It may be due to higher cambial activity of softwood in the rootstock. The results are also confirmed with Gandhoke[2], Kumar *et al.*[5] and Kumar *et al.*[5] in mango; Pathak and Srivastava[8] in apple and Sharma and Chauhan[9] in walnut.

Variation in different grafting height was found significant and maximum shoot lengths (11.91, 12.67 and 13.61 cm) were observed in 60 cm grafting height (H_3) during 60, 90 and 120 DAG, respectively. Likewise, minimum shoot lengths (10.01, 10.81 and 11.91 cm) were recorded in 20 cm grafting height (H_1) at 60, 90 and 120 days after grafting. It might be optimum numbers of leaves are retained on rootstock which causes more production of synthesized food material by the leaves. These photosynthates must have helped in the cambial activity for healing of the graft union. The roots also nourish properly and the strong root system might have absorbed more nutrients from the soils thereby increasing the shoot length of scion on the grafted plants. Incase of number of leaves, it was also found significant and maximum number of leaves (9.06, 10.92 and 10.84) were recorded at 60 cm height (H_3) while, minimum number of leaves (7.22, 9.06 and 10.84) were noted with 20 cm grafting (H_1) during 60, 90 and 120 Days after grafting, respectively. The highest number of leaves might be due to photosynthetic accumulation in newly grafted plants which in turns increased the number of nodes and absorption of nodes and absorption of nutrients by leaf primordial. The result was supported by Mandal *et al.*[6] in mango and Synman and Fraser[10] in passion fruit.

Ample differences were found in plant height of the graft due to assortment of different grafting height. The maximum plant

heights (72.22, 73.89 & 75.23 cm) were observed at 60 cm (H_3) during 60, 90 & 120 DAG. Whereas, lowest plants height (30.60, 31.78 and 33.07 cm) were noted in 20 cm grafting height (H_1) during all periodicals.

Result was also found significant and maximum scion girths (6.79, 7.51 & 8.58 mm) were recorded in 40 cm (H_2) at 60, 90 and 120 DAG, respectively as compared to other grafting height. The above findings may happened due to the longer time available for growth in meristamatic cells coupled with better physiological processes along with better graft union due to better contact of cambium layers of the stock and scion causes increase in scion growth. This result are in accordance with Bajpai *et al.*[1], Kelaskar *et al.*[4], Kumar *et al.*[5] and Mandal *et al.*[6] in mango.

Significantly highest stock girths of grafts were recorded when grafted on 60 cm height on rootstock (H_3) and the minimum girth of rootstock was recorded at 20 cm height on rootstock. The increase in stock girth at higher grafting height may be due to the increase in leaf number and leaf area resulting into more synthesis of photosynthates. It is in conformity with the observations of Nalage *et al.*[7] in mango.

Table 1: Effect of grafting height on days to shoot emergence, success percentage of grafts and survival percentage of grafts after 120 days after grafting

Treatment	Days to shoot emergence	Success percentage of graft (%)	Survival percentage of graft (%)
20 cm (H_1)	13.46	49.44	42.22
40 cm (H_2)	13.32	51.11	43.88
60 cm (H_3)	13.64	59.44	49.44
S.Em.±	0.025	1.851	2.34
C.D. at 5 %	NS	5.34	6.77
C.V. %	5.05	10.82	14.63

Table 2: Effect of grafting height on shoot length, number of leaves and plant height at 60, 90 and 120 days after grafting (DAG)

Treatment	60 DAG			90 DAG			120 DAG		
	Shoot length (cm)	Number of leaves	Plant height (cm)	Shoot length (cm)	Number of leaves	Plant height (cm)	Shoot length (cm)	Number of leaves	Plant height (cm)
20 cm (H_1)	10.01	7.22	30.60	10.81	9.26	31.78	11.91	10.84	33.07
40 cm (H_2)	10.74	7.86	51.00	11.75	9.87	52.37	12.76	11.79	53.66
60 cm (H_3)	11.91	9.06	72.22	12.67	10.92	73.89	13.61	12.77	75.23
S.Em.±	0.018	0.013	0.045	0.013	0.011	0.064	0.007	0.013	0.072
C.D. at 5 %	0.05	0.04	0.13	0.04	0.03	0.18	0.02	0.03	0.21
C.V. %	5.30	6.22	1.76	4.19	4.60	2.04	2.58	3.44	2.12

Table 3: Effect of grafting height on scion and stock girth at 60, 90 and 120 days after grafting (DAG)

Treatment	60 DAG		90 DAG		120 DAG	
	Scion girth (mm)	Stock girth (mm)	Scion girth (mm)	Stock girth (mm)	Scion girth (mm)	Stock girth (mm)
20 cm (H_1)	5.67	7.13	6.61	7.83	7.42	8.55
40 cm (H_2)	6.79	8.03	7.51	8.03	8.58	8.82
60 cm (H_3)	6.17	8.50	7.11	8.50	7.86	9.33
S.Em.±	0.006	0.002	0.005	0.003	0.004	0.002
C.D. (P= 0.05)	0.02	0.007	0.01	0.01	0.01	0.007
C.V. (%)	5.15	3.17	3.83	3.16	3.17	2.40

CONCLUSION

Based on the present investigation on, "Effect of grafting height on success of softwood grafting in mango (*Mangifera indica* L.)", it can be concluded that softwood grafting at a height of 60 cm recorded maximum shoot length of scion, success percentage, leaves per graft, plant height, stock girth and maximum survival percentage. Whereas, lowest days to shoot emergence and maximum scion girth of grafts were recorded when grafting were done at 40 cm height on rootstock.

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