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Effect of defoliation and storage of scion stick on growth of softwood graft of mango var. Sonpari

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Abstract

The present study was carried out at Regional Horticultural Research Station, ASPEE College of Horticulture and Forestry, Navsari Agricultural University, Navsari, Gujarat, India during the year 2018-19. The experiment was laid out in Completely Randomized Design with Factorial concept and repeated thrice with twelve treatment combinations. The experiment comprising with two factors (1) effect of defoliation (6, 9 and 12 days before detachment from mother plant) and (2) effect of storage of scion stick (0,1, 2, and 3 days). The results of present investigation revealed that among different defoliation treatment and storage of scion stick, 12 days prior defoliated and fresh (without storage) scion stick of mango var. Sonpari, individually superior in softwood grafting for all the growth parameters like, incremental girth at union, incremental length of sprouted scion shoot, incremental height of graft and number of shoots. Hence, it can be concluded that 12 days prior defoliated and fresh (without storage) scion stick of mango var. Sonpari used to softwood grafting for better growth of graft.

Keywords: sonpari, scion stick, defoliation, storage and softwood grafting

Introduction

Mostly, mangoes are vegetatively propagated by inarching, veneer grafting, epicotyl grafting, softwood grafting, *etc.* In softwood grafting, it is easy to handle and quite efficient as well as grafts can normally raise within a year, thus reducing cost of raising grafts considerably. So in the present investigation, an attempt is made to test possibility of propagation of mango by softwood grafting. Softwood grafting gives an excellent response in initial success with least possibility of mortality, better and uniform orchard establishment (Ram and Pathak, 2006) [6]. Moreover, transportation of bud sticks from one place to another is an economic proposition as compared to whole plant is costly and liable to be damaged during transit. An alternate solution to this problem is to procure bud sticks. However, the vegetative propagation technique through softwood grafting is much influenced by the climatic condition of the region and is mostly carried out on the onset of monsoon, thereby restricting the availability of planting material for that particular season (Uchoi *et al.*, 2012) [10].

Method of storage and defoliation of scion sticks are to find out the best possible method for softwood grafting. Generally defoliation is done to minimize the transpiration of the scion sticks and prevent wilting of it. These defoliated scions sprout earlier than undefoliated ones that would help the grafted plants to complete their vegetative growth early than later ones and thus allowing earlier availability of grafts for planting. Hence to improve the efficacy of propagation methods with quick and better success in relation to defoliation there is need to optimize the storage period of scion sticks. Storage is another method to check the best period of days in which scion stick can conserve and use for making successful graft union. This method helps for transporting the scion stick to different areas. By these methods one can know the viability period of scion sticks of mango and can be send to distance place.

Material and Methods

The present study was carried out at Regional Horticultural Research Station, ASPEE College of Horticulture and Forestry, Navsari Agricultural University, Navsari, Gujarat, India during the year 2018-2019 to investigate the “Effect of defoliation and storage of scion stick on growth of softwood graft of mango var. Sonpari”. The experiment was laid out in Completely Randomized Design with Factorial concept and repeated thrice with twelve treatment combinations. The experiment comprising with two factors (1) effect of defoliation (6, 9 and 12 days before detachment from mother plant) and (2) effect of storage of scion stick

(0, 1, 2, and 3 days). The effect of this treatments on incremental girth at union (mm), incremental length of sprouted scion shoot (cm), incremental height of graft (cm) and number of shoots were studied.

Results and Discussion

Incremental girth at union (mm)

In present investigation significantly maximum incremental girth at union observed in 12 days prior defoliated and fresh scion stick (without storage) at 60, 120 and 180 DAG (Table 1). This might be due to presence of more nutrient that cause early bud sprouting and early leaf production causing accumulation of photosynthates in shoot which leads to increased girth of stem (Shama, 2013) [7].

Maximum girth obtained in fresh scion stick (without storage) while, minimum girth was noted in 3 day storage treatment. As storage period increased it was adversely effect on girth of scion stick, decreasing trend of girth might be due to rapid decaying tissue of scion at the cut end as storage period increased (Thakar and Shah, 2013) [9].

Incremental length of sprouted scion shoot (cm)

The data presented in Table 1 clearly revealed that incremental length of sprouted scion shoot was found significant effect due to defoliation and storage of scion stick at 60, 120 and 180 DAG. Significantly the maximum incremental length of sprouted scion shoot was observed in defoliated scion shoot. It might be due to defoliated scion shoot contained more carbohydrates and other food substances (Thakar and Shah, 2013) [9] which cause rapid increased in length of sprouted scion of mango var. Sonpari. Among the different storage period maximum length of sprouted scion shoot was observed in fresh scion stick (without storage) while, minimum length of sprouted scion shoot was obtained in 3 day stored scion stick. This might be due to early sprouting and better union which lead to higher length of scion where as longer storage period of scion resulted in late union and delayed sprouting which might here resulted in poor growth of graft (Pampana and Sulikeri, 2001) [5]. Also as storage period increased rapid decaying of tissue from cut end of scion stick causing less successful graft union leading to minimum length of scion (Thakar and Shah, 2013) [9]. Similar findings were obtained in the findings of Chavda *et al.* (2018) [2] in jamun.

Incremental height of graft (cm)

The observations on height of graft was found significant effect on defoliation and storage of scion stick at 60, 120 and 180 DAG (Table 1). Significantly the maximum height of graft was observed in 12 days prior defoliated scion shoot. It might be due to the storage of humidity and food material in the scion stick which reflects on growth stages (Mane and Nalage, 2017) [4]. Also might be due to defoliated scion shoot contained more carbohydrates and other food substances (Thakar and Shah, 2013) [9] which cause rapid increased in length of sprouted scion which ultimately increased the height of graft of mango var. Sonpari. Among the different storage period maximum height of graft was observed in fresh scion stick (without storage) while, minimum height of graft was obtained in 3 day stored scion stick. This might be due to early sprouting and better union which lead to higher length of scion where as longer storage period of scion resulted in late union and delayed sprouting which might here resulted in poor growth of graft (Pampana and Sulikeri, 2001) [5]. Also as storage period increased rapid decaying of tissue from cut end of scion stick causing less successful graft union leading to minimum length of scion ultimately minimum height of graft (Thakar and Shah, 2013) [9].

Number of shoots

It is evident from the Table 1 that number of shoots per graft was significantly affected by defoliation and storage of scion stick. Maximum number of shoots were obtained in 12 days prior defoliated scion stick which might be due to more number of active swallow bud which accumulate food material were present in defoliated scion shoot which cause more number of shoots (Adjei and Mante, 2007) [1]. In Jackfruit, it was found that more number of shoot is due to activate both the terminal and axillary dormant buds which swallowed through stimulation of parenchymatous cells (Swamy, 1993 and Gaoker, 1998) [8, 3]. Significant effect of storage of scion stick observed on number of shoots. Maximum number of shoots found in fresh scion stick (without storage) while, minimum number of shoots were observed in 3 day storage of scion stick. In present investigation early sprouting and number of leaves were noted in same treatment which leads to photosynthesis and produced more carbohydrates which ultimately increased number of shoots per graft.

Table 1: Effect of defoliation and storage of scion sticks on growth of softwood graft of mango var. Sonpari

Treatments	Incremental girth at union (mm)			Incremental length of sprouted scion shoot (cm)			Incremental height of graft (cm)			Number of shoots
	60 DAG	120 DAG	180 DAG	60 DAG	120 DAG	180 DAG	60 DAG	120 DAG	180 DAG	180 DAG
Defoliation (D)										
D ₁ : 6 days	2.59	3.01	3.22	2.37	4.82	8.96	2.87	5.22	9.36	1.77
D ₂ : 9 days	2.67	3.09	3.33	2.51	5.03	9.19	3.01	5.43	9.59	1.99
D ₃ : 12 days	2.75	3.17	3.46	2.70	5.34	9.47	3.20	5.74	9.86	2.13
S.Em.±	0.04	0.04	0.06	0.05	0.06	0.09	0.05	0.07	0.10	0.04
C.D. at 5%	0.12	0.12	0.18	0.15	0.19	0.28	0.15	0.18	0.27	0.13
Storage periods (S)										
S ₁ : 0 day	2.83	3.22	3.49	2.84	5.54	9.70	3.34	5.94	10.10	2.31
S ₂ : 1 day	2.77	3.20	3.48	2.75	5.39	9.55	3.25	5.80	9.95	2.20
S ₃ : 2 days	2.60	3.03	3.29	2.34	4.77	8.98	2.84	5.17	9.38	1.77
S ₄ : 3 days	2.48	2.91	3.09	2.18	4.55	8.58	2.68	4.95	8.98	1.57
S.Em.±	0.05	0.05	0.07	0.06	0.07	0.11	0.06	0.08	0.11	0.05
C.D. at 5%	0.14	0.14	0.20	0.17	0.22	0.32	0.17	0.21	0.32	0.15
Interaction effect (D X S)										
S.Em.±	0.09	0.08	0.12	0.10	0.13	0.19	0.11	0.13	0.19	0.08
C.D. at 5%	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
C.V. %	5.54	4.79	6.25	7.22	4.44	3.62	6.02	4.11	3.47	7.65

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