International Journal of Chemical Studies

P-ISSN: 2349–8528
E-ISSN: 2321–4902
www.chemijournal.com
IJCS 2020; 8(2): 901-903
© 2020 IJCS
Received: 10-01-2020
Accepted: 12-02-2020

Jinalben J Tandel
Department of Fruit Science
ASPEE College of Horticulture and Forestry Navsari Agricultural University, Navsari, Gujarat India

Patil SJ
Department of Fruit Science
ASPEE College of Horticulture and Forestry Navsari Agricultural University, Navsari, Gujarat India

Gaikwad SS
Department of Fruit Science
ASPEE College of Horticulture and Forestry Navsari Agricultural University, Navsari, Gujarat India

Tandel BM
Department of Fruit Science
ASPEE College of Horticulture and Forestry Navsari Agricultural University, Navsari, Gujarat India

Corresponding Author:
Jinalben J Tandel
Department of Fruit Science
ASPEE College of Horticulture and Forestry Navsari Agricultural University, Navsari, Gujarat India

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

Jinalben J Tandel, Patil SJ, Gaikwad SS and Tandel BM

DOI: https://doi.org/10.22271/chemi.2020.v8.i2n.8882

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 minimum days to sprouting, maximum number of leaves, leaf area, sprouting percentage and graft survival percentage.
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 sprouting and survival.

Keywords: Sonpari, scion stick, defoliation, sprouting and survival

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). 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) [12].
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 days to sprouting, number of leaves, leaf area, sprouting percentage and graft survival percentage were studied.

Results and Discussion

Days required to sprouting

The date presented in Table 1 clearly revealed that the time taken for sprouting decreased significantly with increased in time gap between defoliation and grafting. It may be due to longer period between defoliation and grafting which might have help in activating the buds which was apparent from their swelling. Minimum days required to sprouting were found in defoliated scion stick. It might be due to accumulation of stored carbohydrate material in defoliated scion sticks which helps in early emergence of leaf from bud (Mane and Nalage, 2017) [5]. Also this might be due to defoliation activates buds in the axil of leaves (Jha and Brahmachari, 2002) [1]. Patil *et al.* (1984) concluded that early sprouting may be due to higher meristamatic activity presence in swallowed buds which was present in defoliated scion stick that leads to early sprouting and leaf emergence. While, Zimmermann (1958) found that bud in a defoliated shoot are in a position to sprout smoothly due to the fact that when photosynthetic organ of shoot are removed, a sink is created in a defoliated shoot and reserved food materials from the adjoining shoots get mobilized to the defoliated shoots through mass flow. Similar results were noted by Chavda *et al.* (2018) in jamun.

The minimum days required to sprouting was recorded when mango var. Sonpari fresh scion sticks (without storage) used for softwood grafting. While, the increased storage period gradually delayed the days required to sprouting of mango softwood grafts. The least time taken to sprouting might be due to abundant accumulation of carbohydrates and other food material in fresh scion stick, which initiates bud activation and they are in position to sprout early. As the storage period increased it takes more time to sprouting (Thakar and Shah, 2013). In the present investigation as storage period increased days required to sprouting increased it might be possible that with increasing time of storage, physiological activity of scion stick decreases (Pampana and Sulikeri, 2001).

Minimum days required to sprouting was observed in mango var. Sonpari when 12 days prior defoliated scion stick without storage used for softwood grafting. This might be due to 12 days prior defoliated scion stick have more stored carbohydrates and fresh scion stick was more turgid as compared to 1, 2 and 3 days storage which ultimately sprout early.

Number of leaves

It is clear from result presented in Table 2 that number of leaves significantly influenced by defoliation and storage of scion stick of mango var. Sonpari at 180 DAG. Maximum number of leaves were observed in 12 days prior defoliated scion sticks used for grafting. This might be due to early sprouting of buds (Sharda *et al.*, 1991) resulting in early and better union of stock and scion there by making the nutritional supply in required quantity easily (Patil *et al.*, 1984). Also it might be due to defoliated scion containing more carbohydrate in bud and there were presence of more active and vigorous buds in it (Thakar and Shah, 2013) which ultimately gave more number of leaves after bud sprouting.

Storage condition affected significantly on total number of leaves. Maximum number of leaves were observed when fresh scion stick (without storage) was used for grafting. While, minimum number of leaves were obtained in three day storage of scion stick. This might be due to rapid decaying of cut ends of scion sticks as the storage period increased which gave less number of leaves in more day stored scion stick (Thakar and Shah, 2013). Also due to early sprouting and more physiological activity of scion stick during early storage days causing proper graft union leading to more success (Pampana and Sulikeri, 2001) in fresh scion stick (without storage).

Leaf area (cm^2)

Data showed that (Table 2) defoliation and storage of scion stick affect significantly with relation to leaf area at 180 DAG. With respect to defoliation maximum leaf area was observed in 12 days prior defoliated scion stick. This might be due to more accumulation of stored carbohydrates by long precured scion shoots causing area expansion of leaf.

While, in case of storage period maximum leaf area was noted in fresh scion stick (without storage). This might be due to when fresh scion stick used for softwood grafting produced more number of leaves and shoots in present investigation which ultimately produced more carbohydrates by photosynthesis and increased leaf area.

Sprouting percentage

From the result obtained in the sprouting percentage of graft was affected significantly by defoliation (Table 2). The maximum sprouting percentage was observed in 12 days prior defoliated scion shoots might be due to the fact that defoliation causes an immediate rise in sucrose content of phloem sap of shoot. This helps in movement of solutes toward the apex of the shoots and thereby resulting in initiation of higher meristamatic activity at the bud level. This condition helps in better sap flow and good callus formation due to stimulation of cambium division favouring better graft union (Maiti and Biswas, 1980). Maximum sprouting percentage was noted in fresh scion stick (without storage) while, minimum sprouting percentage was found in 3 day storage of scion stick. Among different storage period when the period of storage increased sprouting percentage was significantly decreased. In fresh scion stick, scion cells turgid and highly turgid cell are likely to give rapid proliferation of callus and speedy healing of graft success.

Graft survival percentage

From the data (Table 2), it is evident that final graft survival percent at 180 DAG significantly increased due to defoliated scion stick. It might be due to defoliated scion had more stored food material which is visible as bud swelling which cause rapid formation of callus tissue that allow translocation of vital chemical compounds between stock and scion leading to more chance of graft success and survivability. It also influenced growth parameters attributed to initiation of cambium activity which might have resulted from defoliation causing early and strong graft union (Nahar *et al.*, 2015).

Significant difference was observed regarding of final graft survival percentage due to storage of scion stick. Maximum graft survival percentage was observed in fresh scion stick.

This may possible due to graft in this treatment had maximum number of leaves and exhibited excellent vegetative growth thus higher photosynthesis rate result in luxuriant vegetative growth and causing maximum survivability (Kumar and Jain, 1998).

Table 1: Effect of defoliation and storage of scion sticks on days required to sprouting in softwood grafting of mango var. Sonpari

Defoliation Storage period	6 days (D_1)	9 days (D_2)	12 days (D_3)	Mean
S_1 – 0 day	8.73	7.20	4.53	6.82
S_2 – 1 day	9.20	8.07	6.53	7.93
S_3 – 2 days	12.07	11.27	10.53	11.29
S_4 – 3 days	13.73	12.33	11.73	12.60
Mean	10.93	9.72	8.33	
	S.Em.±	C.D. at 5%		C.V. %
D	0.06	0.17		2.18
S	0.07	0.20		
D * S	0.12	0.35		

Table 2: Effect of defoliation and storage of scion sticks on leaves, sprouting (%) and survival (%) of softwood graft of mango var. Sonpari

Treatments	Number of leaves at 180 DAG	Leaf area (cm^2) at 180 DAG	Sprouting percentage	Graft survival percentage at 180 DAG
Defoliation (D)				
D_1 : 6 days	20.22	50.93	57.08 (70.00)	53.71 (64.92)
D_2 : 9 days	20.95	51.86	60.47 (75.00)	55.82 (68.28)
D_3 : 12 days	21.68	52.97	64.56 (80.41)	58.43 (72.04)
S.Em.±	0.39	0.34	0.89	0.96
C.D. at 5%	1.14	0.99	2.61	2.80
Storage periods (S)				
S_1 : 0 day	22.26	53.85	68.47 (86.11)	60.93 (75.96)
S_2 : 1 day	22.09	52.56	65.71 (82.79)	57.91 (71.63)
S_3 : 2 days	20.38	51.04	56.52 (69.44)	53.14 (64.03)
S_4 : 3 days	19.06	50.12	52.11 (62.22)	51.97 (62.02)
S.Em.±	0.45	0.39	1.03	1.10
C.D. at 5%	1.32	1.14	3.01	3.23
Interaction effect (D X S)				
S.Em.±	0.78	0.68	1.79	1.92
C.D. at 5%	NS	NS	NS	NS
C.V. %	6.45	2.28	5.10	5.94

(Data outside the parenthesis are arcsin transformed values)

References

1. Brahmachari BS, Singh MP, Vishwas RC. Effect of period of defoliation of scion and age of rootstock on success of epicotyl grafting in mango (*Mangifera indica* L.) cv. Amrapali. Orissa J Hort. 1999; 27(2):104-105.
2. Chavda JK, Patil SJ, Rajni R, Tandel BM, Gaikwad SS. Effect of defoliation and storage of scion stick on survival and scion growth of softwood graft of jamun var. Goma Priyanka. Int. J Chem. Studies. 2018; 6 (3):1535-1537.
3. Kumar R, Jain BB. Effect of bud wood defoliation and storage on success of soft wood grafting in mango (*Mangifera indica* L.) cv. Dashehari. Hort. J. 1998; 11(1):49-54.
4. Maiti SC, Biswas P. Effect of scion variety and type of scion shoot on success of epicotyl grafting of mango. Punjab Hort. J. 1980; 20(3-4):152-155.
5. Mane MD, Nalage NA. Studies on period of defoliation and storage condition of scion sticks for soft wood grafting in tamarind (*Tamarindus indica* L.). J Pharma. and Phytochem. 2017; 6(5):2690-2695.
6. Nahar A, Choudhury SH, Rahim MA, Susmita Ray, Islam S. Effect of scion defoliation and stock leaf retention on the grafting success and survivability of lime. Europian Academic Res. 2015; 3(9):9721-9728.
7. Pampanaa Y, Sulikeri GS. Effect of pre curing and storage of scion stick on the success and growth of softwood grafts in sapota cv. Kalipatti. Karnataka J Agric. Sci. 2001; 14(4):1025-1029.
8. Patil JD, Warke DC, Patil VK, Gunjkar SN. Studies on epicotyl grafting in mango. Indian J Hort. 1984; 41:69-72.
9. Ram RA, Pathak RK. Softwood grafting opens new avenues in cultivation of fruit crops. Indian J Hort. 2006; 63(4):10-11.
10. Sharda C, Rao VP, Ravisankar C, Rao SN. Studies on softwood grafting cashew. South Indian Hort. 1991; 39(3):199-123.
11. Thakar PD, Shah NI. Effect of scion stick storage methods on growth and success softwood grafts of mango (*Mangifera indica* L.) cv. Kesar. Asian J Hort. 2013; 8(2):498-501.
12. Uchoi J, Raju B, Debnath A, Shira V. Study on the performance of softwood grafting in jamun. Asian J Hort. 2012; 7(2):340-342.
13. Zimmerman. Translocation of organic substance in phloem of trees. The Physio. Forest Trees, (Ed. K. V. Thimaned) New York Ronald Press, 1958.