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Standardization of suitable time and method of grafting for raising *Sohiong* (*Prunus nepalensis* L.) under mid-hill conditions of Meghalaya

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Abstract

The present investigation on “Standardization of suitable time and method of grafting for raising *Sohiong* (*Prunus nepalensis* L.) under mid-hill conditions of Meghalaya” was carried out in the experimental field and laboratory of the Division of Horticulture, ICAR, (RC) for NEH region, Barapani (Umiam), Meghalaya during the year 2009-2010. Two grafting methods viz., tongue grafting and wedge grafting were tried at 30th September and 15th October to identify the suitable method and time of grafting for raising *Sohiong* plants. Method, time of grafting and its interaction had significant effect on days to first sprouting, sprouting duration and graft success. Tongue grafting performed on 15th October recorded the highest graft success (98%) followed by wedge grafting (96%) done on the same date. Similarly, subsequent plant growth characteristics and highest survival percentage (85.78%) was recorded under tongue grafting especially when done on 15th October. However, wedge grafting done on 30th September recorded the lowest graft success (58%) and minimum survival percentage (69.56%).

Keywords: *Prunus nepalensis*, time of grafting, method of grafting

Introduction

Prunus nepalensis L. which is locally known as *Sohiong* in *Khasi* is one of the most important indigenous underutilized fruit crops of sub-temperate areas and it belongs to the family Rosaceae. It covers about 51.29 ha area with an average fruit yield of 25-35 kg/tree in the age group of 10-80 years in the East Khasi hill district of Meghalaya (Patel *et al.*, 2008) ^[11]. The crop is known for its richness in vitamins, minerals and anti-oxidants properties. The analysis of *Sohiong* fruit revealed that the TSS ranged from 16 to 23.20%, acidity from 0.13 to 0.77%, ascorbic acid from 8.81 to 12.34 mg/100 g pulp weight and sugar from 3.53 to 10.37% (Patel *et al.*, 2008) ^[11]. Besides being consumed fresh, fruit juice and pulp are used for making jam, jelly, squash, RTS, preserves and wine. It holds good potential for extraction of natural colour and its colour last for one year in squash.

Seed propagated plant has long juvenile phase (about 7-8 years) and it is difficult to maintain its genetic purity. Therefore, vegetative means of propagation provides the best alternative to overcome such problems. Moreover, Patel *et al.* (2008) ^[11] cited the importance of vegetative propagation to standardize its multiplication technique. Hence, present study was conducted to standardize the method and time of grafting.

Material and Methods

The experiment was conducted at experimental field and laboratory, Division of Horticulture, ICAR Research Complex for NEH Region, Barapani (Umiam), Meghalaya during 2009-2010. 1 year old pencil thickness, uniform-sized seedlings of *Sohiong* were selected for grafting and dormant shoot of pencil size thickness with apical growing portion of previous season growth having 4-5 healthy buds of 15 to 20 cm long were used as scion which was collected from the selected *Sohiong* tree (20 to 25 years old) of Mawklot area of Upper Shillong, Meghalaya located at 25°33.111' North latitude and 91°49.864' East longitude having an elevation of 1714 metre above the mean sea level. Grafting operations were done at 15 days intervals on 30th September and 15th October by adopting tongue and wedge method of grafting. The experiment was laid out in two factors in randomized Block Design with 5 replications having 10 plants in each replication. Data on sprouting was recorded after bud burst.

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Results and Discussion

Effect of time and method of grafting on days to first sprouting and sprouting duration of *Sohiong* (*Prunus nepalensis* L.) grafts

The data (Table 1) showed a significant variation on days to first sprouting and sprouting duration as influenced by different methods and time of grafting (Table 1). Tongue grafted plants took less number of days (19.30 days) for first bud sprouting and sprouting duration (32.3 days) which might be due to earlier callus proliferation in tongue grafted plants compared to wedge grafted plants. These findings are in agreement with the findings of Chauhan and Mehta (2007)^[6] in apricot and Dimri *et al.* (2009)^[7] in apple. Grafting performed on 15th October took less number of days (15.80 days) for first sprouting and sprouting duration (31.10 days) which was perhaps due to appropriate physiological state of

stock and scion for the bud to burst and the favourable environmental conditions which ultimately reduced the time of bud sprouting when performed on 15th October (15 days). However, a wide variation (31.10 to 38.10 days) in sprouting duration in 15th October and 30th September grafting might be possibly due to wide variation in temperature and relative humidity during the grafting periods for earlier callus proliferation and sprouting in tongue grafting which ultimately reduced the duration of sprouting. Delay in sprouting and maximum days required to complete sprouting in wedge grafting done on 30th September might be due to the unavailability of scion with active buds, the improper physiological condition of the rootstock and decreased sap flow which resulted in late callus proliferation, ultimately interfering the sprouting process.

Table 1: Effect of time and method of grafting on days to first sprouting and sprouting duration of *Sohiong* (*Prunus nepalensis* L.) grafts

Treatments	Days to sprouting (days)	Sprouting duration (days)
Method of grafting		
Tongue grafting (M1)	19.30 ^b	32.30 ^b
Wedge grafting (M2)	23.20 ^a	36.90 ^a
SE(m)±	0.56	0.72
CD _(0.05)	1.74	2.23
Time of grafting		
30 th September (T1)	27.70 ^a	38.10 ^a
15 th October (T2)	15.80 ^b	31.10 ^b
SE(m)±	0.56	0.72
CD _(0.05)	1.74	2.23
Method × Time		
MIT1	23.60 ^b	36.20 ^b
MIT2	15.00 ^c	28.40 ^c
M2T1	29.80 ^a	40.00 ^a
M2T2	16.60 ^c	33.80 ^b
SE(m)±	0.80	1.02
CD _(0.05)	2.46	3.16

2. Effect of time and method of grafting on days to graft success and survival percentage of *Sohiong* (*Prunus nepalensis* L.) grafts

2.1 Graft success

Higher success in tongue grafted plants (87%) was obtained under tongue grafting (Table 2). This might be due to more cambial contact, earlier callus proliferation and quick healing of callus in tongue grafting than wedge grafting. These findings are in agreement with the findings of Bhardwaj and Awasthi (1993)^[3] in pecan, Gill and Sharma (1996)^[9] in Flordasun peach, Ananda *et al.* (1999)^[11] in apple, Dwivedi *et al.* (2000)^[8] in apricot and Chauhan *et al.* (2004)^[5] in apricot. 15th October grafting also proved to be the best time for grafting to obtain high graft success (97%). This which might be attributed to availability of scions with active buds, the proper physiological condition of the rootstock, increased sap flow, congenial environmental conditions owing to rapid callusing and early contact of cambial layers, thus enabling the grafts to heal quickly and make a strong union. This was in agreement with the findings of Bhardwaj and Awasthi (1993)^[3] by tongue grafting on pecan nut, Rana *et al.* (2004)^[12] in kiwifruit and Upadhyay and Badyal (2005)^[13] in kiwi. In the present case, the less success of graft during September might be due to the improper physiological conditions of stock and scion and unfavourable environmental condition which may have ultimately interfered with the graft union healing process. This result is in agreement with the findings of Patel *et al.* (2007)^[10] in mandarin. Higher graft success was registered in tongue grafting done on 15th October (98%)

among the treatments which might be due to congenial environmental conditions and more cambial contact thus enabling the grafts to heal quickly and make a strong union (Chandel *et al.*, 1998)^[4]. This result is in agreement with the findings of Anon (2007-08) in *Sohiong* where tongue and wedge grafting performed on one year old seedling rootstock of *Sohiong* during October resulted in 70% and 60% graft success, respectively. However, poor success was recorded in wedge grafting performed on 30th September.

2.2 Survival percentage

Tongue grafting done on 15th October also registered the highest survival percentage (85.78%) while wedge grafting done on 30th September registered the minimum survival percentage (69.56%). This was perhaps due to better cambial contact, maximum callus proliferation and quick healing of the callus at the graft interface in the favourable environment in tongue grafting done on 15th October as compared to the other treatments, thereby, resulting in more translocation of nutrients for plant growth. The present findings are in corroboration with the findings of Hoque and Hussian (1974) and Chakrabarty and Sadhu (1989) who reported that vascular continuity between rootstock and scion in mango took minimum time of 60-120 days. In case of sprouted grafts, increase in respiration and transpiration by actively proliferating new shoots coupled with insufficient ascent of sap and/or restricted translocation of solutes from the stock to the scion and vice-versa had probably created a stress condition for scion shoots for the availability of food which

ultimately caused death of the newly emerged scion shoots.

Table 2: Effect of time and method of grafting on days to graft success and survival percentage of *Sohiong* (*Prunus nepalensis* L.) grafts

Treatments	Graft success (%)	Survival percentage (%)
Method of grafting		
Tongue grafting (M1)	87.00 ^a	82.04 ^a
Wedge grafting (M2)	77.00 ^b	76.02 ^a
SE(m)±	2.47	2.22
CD (0.05)	7.60	NS
Time of grafting		
30 th September (T1)	67.00 ^b	73.93 ^b
15 th October (T2)	97.00 ^a	84.13 ^a
SE(m)±	2.47	2.22
CD (0.05)	7.60	6.85
Method × Time		
M1T1	76.00 ^b	78.30 ^{ab}
M1T2	98.00 ^a	85.78 ^a
M2T1	58.00 ^c	69.56 ^b
M2T2	96.00 ^a	82.47 ^a
SE(m)±	3.49	3.14
CD (0.05)	10.75	9.69

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