

Root Growth of Phalsa (*Grewia asiatica* L.) as Affected by Type of cutting and Rooting Media

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Abstract

The aim of this study was to determine the effects of different rooting media and Type of cutting on rooting of Phalsa (*Grewia asiatica* L.) stem cuttings. This research was conducted to Root Growth of Phalsa as Affected by Type of cutting and Rooting Media Under Garhwal Himalayas during the Rainy season 2013-14 at Horticultural Research Centre, Chauras Campus. H.N.B. Garhwal University Srinagar, Garhwal Uttarakhand, India. The experiment was laid out in Factorial Randomized Block Design (FRBD) with three main factor (Semi hardwood, hardwood and softwood cuttings) and three sub factors (Soil+Sand+FYM, Vermicompost and Soil+FYM). Results of the investigation showed that survival percentage of cutting (57.77), percentage of rooted cutting (56.66), number of primary root (14.48) and length of longest root (8.79cm) was recorded under H₂ (Hardwood cutting) with M2 (Vermicompost) rooting media.

Keywords: *Phalsa, rooting media, cutting type and rooting percentage.*

1. Introduction

Phalsa belongs to family Tiliaceae and genus *Grewia*, it is native to the Indian and South-East Asia. The edible part of fruit varies from 69 to 93%. The ripened phalsa fruits are good source of vitamin A and C. The fruits are eaten fresh as dessert, are made into sirup, and extensively employed in the manufacture of soft drinks. It can be grown successfully on the slop of hills. It is also preferred for dry land horticulture.

Hardwood cutting and planting date influence rooting of Phalsa. Some success has been achieved in rooting of stem cuttings in phalsa with the use of synthetic auxins, especially Indole-3-butyric acid (IBA). The treatment of hard wood cutting of Phalsa with IBA (2000 and 3000ppm) significantly increased the root length, number of roots per cutting and percentage survival (Srivastava, 1996).

Hardwood cuttings is one of the least expensive and easiest method of vegetative propagation. Hardwood cuttings are easy to prepare, are not readily perishable, may be shipped safely over long distance if necessary, and require little or no special equipment during rooting. Kathrotia and Singh (1995) observed that the maximum number of primary roots (12.70) in hardwood cuttings of phalsa (*Grewia asiatica* L.) when compared to semi hardwood cuttings. Sharma *et al.* (2009) recorded 100% survival of the hardwood and semi-hardwood rooted cuttings of pomegranate cv. Ganesh. Rooting media should be considered an integral part of the propagation system. percentage rooting and the quality of the roots produced are directly influenced by the medium. Ansari, (2013) reported that the maximum rooting percentage and root numbers was obtained on 5 Jan and 4 Feb in vermiculite and 19 Feb in vermiculite + sand respectively. Surekha, (2014) observed that the maximum fresh and dry weight of roots, fresh weight of shoots and dry weight was recorded under sand + FYM (2:1) and minimum days required to rooting and days to sprouting is in Sand + Silt + FYM (1:1:1).

2. Materials and Methods

The experiments were conducted under mist chamber at HRC (Horticultural Research Centre), Chauras Campus. H.N.B. Garhwal University Srinagar, Garhwal Uttarakhand. The experiment was laid out in Factorial Randomized Block Design (FRBD) with three main factor (Semi hardwood, hardwood and softwood cuttings) and three sub factors (Soil+Sand+FYM, Vermicompost and Soil+FYM). The lower portion of the cuttings were dipped in dilute solutions of IBA 1000ppm by quick dip method for 10 seconds before planting in the rooting medium. After the treatment, the cuttings were immediately planted in root trainers and inserted 6.5 cm deep in the rooting media. The experiment was replicated thrice with 30 cuttings in each treatment and a total of 270 cuttings were

tested. The number of sprouted cutting, survival percentage of cutting, percentage of rooted cutting, number of primary root, length of longest root, number of leaves, length of longest sprout and diameter of sprouts were recorded after three

3. Results and Discussion

The results of the rooting and survival parameters of phalsa cuttings are showed in the Table 1 and 2. Significantly the maximum number of sprouted cutting (5.77), survival percentage of cutting (57.77), percentage of rooted cutting (56.66), number of primary root (14.48), length of longest root (8.79cm), number of leaves (7.44), length of longest sprout (8.31cm) and diameter of sprouts (2.29mm) was recorded under H₂ (Hardwood cutting) treatment while the minimum number of sprouted cutting (2.44), survival percentage of cutting (24.44), percentage of rooted cutting (23.33), number of primary root (7.33), length of longest root (4.37cm), number of leaves (2.83), length of longest sprout (4.10cm) and diameter of sprouts (1.11mm) was observed under H₃ (Softwood cutting). Basal cuttings from the branch were the best in rooting and gave the highest percentage of rooting and survival compared to medium and terminal. The basal stem cuttings of pomegranate produced maximum fresh weight of 36.43 g and dry weight of 14.57 g per cutting compared to apical and sub-apical stem cuttings as reported by Purohit and Sekharappa (1985). Reddy et al. (2008) investigated that the hardwood cuttings recorded highest survival percentage of 88.33 and highest root length of 19.05 cm compared to semi-hardwood cuttings which recorded 68.88 percentage of survival and a root length of 13.58 cm in fig. The highest root length in hardwood cutting was due to more starch and early sprouting on shoot which in turn brings about favourable condition for root initiation as well as increased root length. The hardwood cuttings, generally, might have assumed juvenile characteristics through the formation of adventitious shoots from the base of the mature plants (Jules et al.,1981). The best rooting was usually found in cuttings taken from the basal portion of the shoots. This was referred to the possibility of higher accumulation of carbohydrates and concentration of endogenous roots promoting substances that were produced in buds and leaves.

months. Data recorded during the course of investigations were subjected to statistical analysis under Factorial Randomized Block Design as described by Cochran and Cox (1992).

The similar results were also reported by Sharma *et al.* (2009) in pomegranate cv. Ganesh and Kathrotia and Singh (1995) in phalsa Singh (2017) in phalsa (Table 1 and 2).

The maximum number of sprouted cutting (5.11), survival percentage of cutting (51.11), percentage of rooted cutting (51.11), number of primary root (12.88), length of longest root (7.13cm), number of leaves (5.22), length of longest sprout (6.69cm) and diameter of sprouts (1.88mm) was recorded under M₂ (Vermicopost) treatment while the minimum number of sprouted cutting (3.66), survival percentage of cutting (36.66), percentage of rooted cutting (35.55), number of primary root (10.32), length of longest root (5.81cm), length of longest sprout (5.94cm) and diameter of sprouts (1.59mm) was observed under M₁ ((Soil+Sand+FYM)) rooting media and number of leaves (4.16) was recorded under M₃ ((Soil+FYM)) rooting media. Torkashv and Shadparvar (2012) observed that the highest root diameter, number of root but the highest buds numbers obtain in sand-perlit substrate. The lowest root beginning (45 days) and the lowest callus induction (28 days) were recorded in peat-perlit substrate. Rooting media Soil + Sand + Cocopeat improved rooting percentage, number of primary and secondary roots, average length of root, length of sprout while survival percentage was observed under Soil+Sand+FYM (Singh *et al.*, 2015). The present findings are very well supported by the similar observations of Singh *et al.* (2011) in *Thuja compecta*. Environmental conditions can influence the ability of stem cuttings to grow and root. The most common external factors are temperature, light, humidity. seasons, moisture level of cutting and rooting medium (Hartman *et al.* 1997). Bowman, (1950) reported that with optimum moisture supply, successful rooting could be achieved in a wide range of media. Application of synthetic auxin to stem cuttings at high concentrations can inhibit bud development and sometimes to the point at which no shoot growth will take place even though root formation has been adequate (Sun and Bassuk, 1993).

Table 1. Effect of type of cutting and rooting media on survival and rooting performance of Phalsa (*Grewia asiatica* L.)

Rooting Media	Number of sprouted cutting				Survival percentage of cutting				Percentage of rooted cutting				Number of primary root			
	H1 (Semi Hard wood)	H2 (Hard wood)	H3(Soft wood)	Mean	H1 (Semi Hard wood)	H2 (Hard wood)	H3 (Soft wood)	Mean	H1 (Semi Hard wood)	H2 (Hardwood)	H3(Softwood)	Mean	H1 (Semi Hardwood)	H2 (Hardwood)	H3(Softwood)	Mean
M1 (Soil+Sand+FYM)	3.66	4.33	3.00	3.66	36.66	43.33	30.00	36.66	33.33	43.33	30.00	35.55	10.33	12.98	7.66	10.32
M2 (Vermicompost)	6.00	7.00	2.33	5.11	60.00	70.00	23.33	51.11	60.00	70.00	23.33	51.11	14.44	16.88	7.33	12.88
M3 (Soil+FYM)	4.00	6.00	2.00	4.00	40.00	60.00	20.00	40.00	40.00	56.66	16.66	37.77	11.00	13.59	7.00	10.53
Mean	4.55	5.77	2.44		45.55	57.77	24.44		44.44	56.66	23.33		11.92	14.48	7.33	
	M	C	MxC		M	C	MxC		M	C	MxC		M	C	MxC	
Sem	0.145	0.145	0.251		1.452	1.452	2.515		1.870	1.870	3.239		0.891	0.891	1.543	
CD at 0.5%	0.425*	0.425*	0.737ns		4.259*	4.259*	7.377*		5.485*	5.485*	9.501*		2.613ns	2.613*	4.527ns	

Table 2. Effect of type of cutting and rooting media on survival and rooting performance of Phalsa (*Grewia asiatica* L.)

Rooting Media	Length of longest root (cm)				Number of leaves				Length of longest sprout (cm)				Diameter of sprouts (mm)			
	H1 (Semi Hardwood)	H2 (Hardwood)	H3(Softwood)	Mean	H1 (Semi Hardwood)	H2 (Hardwood)	H3 (Softwood)	Mean	H1 (Semi Hardwood)	H2 (Hardwood)	H3(Softwood)	Mean	H1 (Semi Hardwood)	H2 (Hardwood)	H3(Softwood)	Mean
M1 (Soil+FYM)	6.06	7.37	4.00	5.81	5.00	7.66	3.50	5.38	6.00	7.18	4.66	5.94	1.77	2.00	1.00	1.59
M2 (Vermico)	7.06	10.00	4.33	7.13	4.66	8.00	3.00	5.22	6.30	9.77	4.00	6.69	1.66	2.77	1.22	1.88
M3 (Cocopeat)	6.47	9.00	4.78	6.75	3.83	6.66	2.00	4.16	7.88	8.00	3.66	6.51	1.83	2.11	1.11	1.68
Mean	6.53	8.79	4.37		4.49	7.44	2.83		6.72	8.31	4.10		1.75	2.29	1.11	
	M	C	MxC		M	C	MxC		M	C	MxC		M	C	MxC	
Sem	0.396	0.386	0.669		0.260	0.260	0.450		0.265	0.265	0.459		0.089	0.089	0.155	
CD at 0.5%	1.133*	1.133*	1.963ns		0.763*	0.763*	1.322ns		0.777ns	0.778*	1.347*		0.263ns	0.263*	0.456*	

4. CONCLUSION

Hardwood cutting showed the best performance in terms of maximum number of sprouted cutting, survival percentage of cutting, percentage of rooted cutting, number of primary root, length of root, number of leaves and diameter of sprouts. Among the different rooting media, Vermicompost rooting media has shown best result in present study. It may also be successfully used for clonal propagation. It is suggested that H₂ (Hardwood cutting) with M2 (Vermicompost) rooting media gives the best performance under mist condition to produce tallest plant of Phalsa (*Grewia asiatica*).

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