



EFFECT OF DIFFERENT GROWING MEDIA ON VEGETATIVE GROWTH AND ROOTING IN POMEGRANATE (*PUNICA GRANATUM* L.) CV. “KANDHARI” HARDWOOD STEM CUTTING UNDER MIST

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Abstract

An experiment was conducted at Horticultural Research Centre and Department of Horticulture, Chauras Campus, H.N.B. Garhwal University, Srinagar (Garhwal), Uttarakhand, India, during the year 2016. The aim of this work was to determine the most successful media among those traditionally used and to identify promising alternatives. Cuttings were planted in 9 different media under mist house condition. Substrates such as T_1 = sand, T_2 = FYM, T_3 = sand + FYM (1:1), T_4 = perlite, T_5 = vermiculite, T_6 = perlite + vermiculite (1:1), T_7 = sand + perlite (1:1), T_8 = sand + vermiculite (1:1) and T_0 = soil (control) were used pure or in mixtures. Experimental results have shown that high rooting percentage was achieved by hardwood cuttings in vermiculite (76.67%), while the lowest percentage was obtained under soil (26.67%). The maximum number of primary roots was noticed in vermiculite (36.33%) and the lowest in soil (16.67%), which showed significant difference. The highest number of secondary roots (67.67), length of longest root (17.50cm), diameter of thickest root (1.80mm) and fresh weight (0.20gm) was recorded in vermiculite.

Key words : Cuttings, media, propagation, vegetative growth, *Punica granatum*.

Introduction

Pomegranate (*Punica granatum* L.) is a favourite table fruit in tropical and sub tropical regions of the world belonging to family Punicaceae. A native to Iran (Persia), it is found from Kanyakumari to Kashmir, but it is cultivated commercially only in Maharashtra. Small-scale plantations are also seen in Gujarat, Rajasthan, Karnataka, Tamil Nadu, Andhra Pradesh, Uttar Pradesh, Punjab and Haryana. In India, it is considered as a crop of arid and semi-arid regions because it withstands different soil and climatic stresses. It occupies a cultivated area of 180.64 thousand hectares with 1789.31 thousand MT of production (NHB, 2015). Recently, Pomegranate is described as nature's power fruit, is a plant used in folklore medicine for the treatment of various diseases (Moneim and Abdel, 2012; Ajaikumar *et al.*, 2005) widely growing in the Mediterranean region. *Punica granatum* L. can be propagated by seed, sucker, cuttings, grafting and layering. Rooting of pomegranate can be enhanced by the use of various suitable growing media, which

directly affects the development and later maintenance of the extensive functional rooting system. Suitable medium for cutting establishment should have moisture and good aeration (Hartman *et al.*, 2000). Use of suitable growing media or substrates is essential for the production of quality horticultural crops. Some of the soilless media used are vermiculite, perlite, cocopeat, peat, sand, etc. A good growing medium would provide sufficient encourage or support to the plant, serves as reservoir for nutrients and water, allow oxygen diffusion to the roots and permit gaseous exchange between the roots and atmosphere outside the root substrate. It is, therefore, necessary to find out the standard rooting media for better survival and maximum rooting of cuttings in any horticultural crop. The present study aims, to find out the effect of different media on root-initiation of pomegranate cuttings.

Materials and Methods

The research studies were carried out at Horticultural Research Centre and Department of Horticulture, Chauras Campus, H.N.B. Garhwal University, Srinagar (Garhwal), Uttarakhand, India, during the year 2016. For

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planting cuttings of *Punica granatum* L., nine rooting media were selected viz., T_1 = sand, T_2 = FYM, T_3 = sand + FYM (1:1), T_4 = perlite, T_5 = vermiculite, T_6 = perlite + vermiculite (1:1), T_7 = sand+ perlite (1:1), T_8 = sand + vermiculite (1:1) and T_0 = soil (control) were used pure or in mixtures and replicate thrice. All the media were filled in root trainers. The plants selected for preparing cutting were vigorous, healthy and free from insects, pests and diseases. The length of cuttings was made between 12-15 cm (6-8 inches). Cuttings were made up of pencil size diameter with the help of sharp secateurs. All the leaves are removed from shoots during preparation of cutting. The basal portion was made just below the node without any injury to the bud and the proximal end, a slanting cut was made about 1.3cm above the node. After the cuttings were prepared, they planted immediately in 10×5 cm size of root trainer. At the time of planting, 7.5 cm basal portion of cuttings was inserted in the rooting media followed by light watering. Statistical analysis was performed under Completely Randomized Design (Snedecor and Cochran, 1968). Valid conciliations were drawn after the determination of significance of difference between the treatments, at 5% level of probability. Critical difference was calculated in order to compare the treatment means.

Results and Discussion

Effect on vegetative growth

The shooting response of pomegranate (*Punica granatum*) cv. “Kandhari” stem cuttings planted with different growing media is showed in table 1. The maximum percentage of sprouted cuttings (76.67%) were recorded under T_5 (vermiculite) treatment. The minimum percentage of sprouted cuttings (26.67%) was recorded under control. This result agreed with the study of Ratna Kumari (2014), who observed that the cuttings of pomegranate (*Punica granatum* L.) cv. “Bhagwa” grown with medium vermiculite performed the best in terms of sprouting.

Data of present study revealed that in respect of un-sprouted cuttings treatment T_5 (vermiculite) showed the lowest percentage of (23.33%) un-sprouted cuttings, while, the maximum percentage of un-sprouted cuttings (73.33%) was recorded under control. Finding of present investigations matched with the result of Ozekar (2009), who observed the less percentage of un-sprouted cuttings under (vermiculite) treatment under mist condition in ‘Ayvalik’ Olive cuttings.

The maximum number of sprouts per cutting (2.33) were recorded under the treatment, T_3 (sand+FYM), T_5 (vermiculite) and T_8 (Sand+Vermiculite), while, the

minimum number of sprouts per cuttings (1.33) were recorded under control. This observation matched with the result obtained by Sarrou *et al.* (2014) in (*Punica granatum*) cv. “Wonderful” under mist condition.

The maximum average length of sprouts per cutting (12.80 cm) was recorded under T_4 (perlite) treatment. The minimum average length of sprout per cutting (3.30 cm) was recorded under control. This observation also matched with the result obtained by Sarrou *et al.* (2014) in (*Punica granatum*) cv. “Wonderful” under mist condition in respect of perlite + vermiculite treatment.

All the growing media affect the diameter of sprouts/cutting significantly (table 1). It is studied that treatment T_5 (Vermiculite) obtained first rank in diameter of sprouts per cuttings with an average diameter (1.97 mm) while, the minimum average diameter of sprouts per cutting (0.50 mm) was recorded under control during present investigation. The result of these findings is related with the result of Kacar *et al.* (2009) and Ozekar (2009).

The data of table 1 shows that the numbers of leaves on new shoots were found non-significant in respect of Growing Medium. It is evident from the data that the maximum number of leaves per cutting (19.50) was recorded under the treatment T_5 (vermiculite), while, the minimum number of leaves per cutting (8.67) was recorded under control. This observation agreed with the study of Ratna Kumari (2014).

Effect on rooting

The rooting response of pomegranate (*Punica granatum*) cv. “Kandhari” stem cuttings treated with different growing media is showed in table 2. Among all the treatments, T_5 (vermiculite) treatment showed the highest percentage of rooted cuttings (76.67). The minimum percentage of rooted cutting (26.67%) was recorded under control. This observation have been found similar with the research of Khalil ansari (2013), who observed that the cuttings of pomegranate “Malas torch cv.” grown with medium (sand + vermiculite) treatment performed the best in term of rooted cuttings followed by vermiculite.

It is revealed that the numbers of primary roots/cutting were found significant in respect of growing medium. The highest number of primary roots per cutting (36.33) were recorded under the treatment T_5 (vermiculite), While, the minimum number of primary roots per cutting (16.67) were recorded under control. These finding are found similar with the result of Khalil (2013) in cuttings of pomegranate “Malas torch cv.” with respect of medium (vermiculite) treatment.

Table 1 : Effect of different growing media on vegetative characters in Pomegranate (*Punica granatum*) cv. “Kandhari” stem cutting under mist.

Treatments	Percentage of sprouted cuttings (%)	Percentage of sprouted cuttings (%)	Number of sprouts per cutting	Average length of sprout per cutting (cm)	Average diameter of sprout per cutting (mm)	Number of leaves on new shoots
Sand	30.00	70.00	1.67	4.50	1.10	11.67
Fym	36.67	63.33	2.00	7.90	1.20	15.33
Sand + Fym	46.67	53.33	2.33	6.32	1.27	18.17
Perlite	60.00	40.00	2.00	12.80	1.40	16.67
vermiculite	76.67	23.33	2.33	9.50	1.97	19.50
Perlite+vermiculite	60.00	40.00	1.67	11.48	1.57	15.00
Sand+perlite	63.33	36.67	2.00	6.83	1.33	18.00
Sand+vermiculite	66.67	33.33	2.33	6.10	1.30	14.33
Soil (control)	26.67	73.33	1.33	3.30	0.50	8.67
S.Em±	9.8131	9.8131	0.8165	2.6354	0.09	6.10
C.D.at 5%	20.6168	20.6168	1.7154	5.5369	0.19	12.82

Table 2 : Effect of different growing media on root characters in Pomegranate (*Punica granatum*) cv. “Kandhari” stem cutting under mist.

Treatments	Rooting percentage	Number of primary roots per cutting	Number of secondary roots per cutting	Length of longest root per cutting (cm)	Diameter of thickest root per cutting (mm)	Fresh weight of roots per cutting (gm)	Dry weight of roots per cutting (gm)
Sand	30.00	23.00	38.33	9.20	0.90	0.13	0.06
Fym	36.67	24.33	42.00	10.73	1.17	0.12	0.06
Sand + Fym	46.67	19.00	33.33	7.57	1.23	0.13	0.07
Perlite	60.00	28.33	54.33	12.30	1.33	0.13	0.06
Vermiculite	76.67	36.33	67.67	17.50	1.80	0.20	0.08
Perlite+vermiculite	60.00	28.00	60.33	15.57	1.73	0.16	0.06
Sand+perlite	63.33	23.00	42.33	11.47	1.57	0.15	0.05
Sand+vermiculite	66.67	26.33	52.33	10.43	1.40	0.14	0.08
Soil (control)	26.67	16.67	28.67	6.10	0.60	0.05	0.02
S.Em±	9.8131	4.8509	6.6258	3.0258	0.0703	0.02	0.02
C.D.at 5%	20.6168	10.1914	13.9205	6.357	0.1476	0.04	0.04

The maximum number of secondary roots per cutting (67.67) was recorded under the treatment T_5 (vermiculite). The minimum number of secondary roots per cutting (28.67) was recorded under control. These findings are also found similar with the result of **Khalil (2013)** in cuttings of pomegranate “Malas torch cv.” with respect of medium vermiculite.

The data on average length of roots per cutting have been presented in table 2 reveals that the length of longest root was found significant in respect of growing medium. The T_5 (vermiculite) treatment was found to give longest root with an average length of (17.50 cm), while, the minimum length of roots per cutting (6.10 cm) was

recorded under control during the present investigations. This study agreed with the result of Khalil (2013), who found out the length of longest root in (vermiculite) treatment with the length 19.71 cm.

All the treatments of growing medium were found significant to increase the diameter of roots. With an average diameter of thickest root (1.80 mm) to obtained highest rank under the treatment T_5 (vermiculite), While, the minimum value (0.60 mm) was obtained under control. The result of this research have been found little bit similar with the result of Khalil (2013).

The data presented in table 2 revealed that the entire growing medium significantly increases average fresh

weight of roots per cutting against the control. Among all treatments fresh weight of roots per cutting was recorded maximum (0.20 gm) under the treatment T_5 (vermiculite). The minimum fresh weight of roots per cutting (0.05 gm) was recorded under control. This observation matched with the study of Khalil (2013), who observed these same findings in pomegranate cutting with respect to vermiculite medium followed by sand + vermiculite medium.

The data obtained during the course of present study showed that all the treatments of growing medium gave non-significantly higher dry weight against the T_0 (control). Maximum dry weight of roots per cutting (0.08 gm) was recorded under the treatment T_5 (Vermiculite) and T_8 (Sand+Vermiculite), while, the minimum dry weight of roots per cutting (0.02 gm) was observed under control. This result agreed with the observation of Kacar et al. (2009) in *Salvia officinalis* L.

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