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Effect of time and air layer per shoot on rooting and survival of air layers in pomegranate cv.Bhagwa

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ABSTRACT

The experiment was carried out at Akola with the objectives to study the effect of time and air layer per shoot on rooting and survival of air layers in pomegranate and to find out the retention of appropriate time or month for higher success in pomegranate. The pomegranate propagation significantly influenced by different time i.e. months layering in M_1 i.e. July month was found significantly superior over all the other treatments for root initiation, rooting percentage, length of root, fresh and dry weight of root and number of leaves, However, number of root, root volume, height of rooted air layered and survival percentage is maximum in M_2 i.e. August month in pomegranate.

Key words : Pomegranate, IBA, Air layering.

INTRODUCTION

The pomegranate (*Punica granatum* L.) is one of the ancient and highly praised favorite fruit. It is commercially grown, apart from India, in a number of countries for its sweet acidic fruits, which provide cool refreshing juice, and is valued from its medicinal properties its popularity is also due to the ornamental nature of the plant which bears bright red, very attractive flowers. The area under pomegranate is increasing day by day due to its export potential as well as demand in domestic market. The pomegranate is propagated through cutting and layering on commercial scale but the rooting and survival success is very less. In the recent years the area under pomegranate is increasing day by day in state of Maharashtra state especially in western Maharashtra and Vidarbha region. Present area 90,000 ha, production 9,45,000 MT and productivity 10.5 MT/Ha. There is a heavy demand for planting materials so there is need to produce large planting material in shortest possible time. The different season and month of layering operation, also affect rooting and survival percentage of pomegranate air layers 68 per cent of the layers done during rainy season showed callus development and root initiation within a month compared to 30 to 40 per cent in spring (Ahamed, 1964). At present there is no standard period available with pomegranate growers to perform air layering in pomegranate. Therefore present investigation will be undertaken to study the effect of time and air layer per shoot on rooting and survival of air layers in pomegranate and to find out the retention of appropriate time or month for higher success in pomegranate. For correct and precise advice to pomegranate growers of Maharashtra state.

MATERIALS AND METHODS

The present investigation was carried out during the year 2015-16 at the Commercial Fruit Nursery unit, College of Horticulture, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola, Maharashtra. The materials used and methodologies adopted in the investigation given below:

The experiment was laid out in Randomized Block Design (RBD) with four treatments, *i.e* layering operation is done on different times i.e.M_1 July, M_2 August, M_3 September and M_4 October months were used for to study the effect of time and air layer per shoot on rooting and survival of air layers in pomegranate cv. Bhagwa.

Selection of plants and branches

The uniformed sized, healthy and vigorous growth of 8 year old trees of *Punica granatum* cv. Bhagwa grown at Commercial Fruit Nursery Unit, were selected. On these plants, well-matured and healthy branches of pencil thickness were selected

for air layering. The average length of branches was 60 cm for each replication and each treatment, total 20 plants were selected and 20 air layers were taken on each plant's branch for each treatment.

Preparation of plant growth regulators (IBA)

For preparation of 5000 ppm lanolin paste of IBA 500 mg of IBA was weighed on a chemical balance and was transferred in a beaker. Thereafter, 5 ml of ethyl alcohol (95 %) was added to it and shake thoroughly to dissolve properly. Then 100 g lanolin was taken in petri dish and heated. The dissolved growth regulator was transferred into the melted lanolin paste and stirred firmly with clean glass rod until evaporation alcohol. In this way, harmonious mixture of growth regulator and lanolin paste was prepared.

RESULTS AND DISCUSSION

Days required for root initiation

The result obtained in respect of Minimum number of days (21.85) required for root initiation was recorded in treatment M_1 i.e. July month which were significantly superior and maximum days (26.70) observed under treatment M_4 i.e. October month. It indicated that the M_1 i.e. July month showing the favorable effect on days required for rooting. It might be due to slower down of the photosynthesis during later months resulting in late rooting. Similar result was reported by Deshmukh (2014) in karonda and Baghel (2015) in guava air layers.

Rooted air layers (%)

The result obtained in respect highest percentage of rooted air layers was observed in treatment M_1 i.e. July month (71.50%) followed by M_2 i.e. August month (67.09%) whereas, treatment M_4 i.e. October month (59.75%) recorded minimum percentage of rooted air layers. It indicated that superior percentage of rooted air layer was observed in M_1 (July). This may be due to suitable climatic and environmental factors along with hormonal balance as reported by Chandrappa and Gowda (1998) in guava. This results is in conformity with the findings of Ahamed (1964) and Rymbai and Reddy (2010) who advocated that rainy season is good for air layering.

Number of primary and secondary roots

Observation in respect of, the maximum number of primary roots (21.88) and secondary roots (37.96) was observed in M_2 i.e. August month. However, minimum number of primary roots (18.56) and secondary roots (34.13) was observed in M_4 i.e. October month. It indicates that August months showing the favorable effect on number of primary and secondary roots per layer. Similar results were reported by Tryambake and Patil (2002) in pomegranate, Ghosh and Rajan (2005) in guava and and Tomar (2011) in pomegranate.

Length of primary and secondary roots (cm)

Observation in respect of the maximum length of primary roots (11.91) and secondary roots (2.36) was observed in M_1 i.e. July month However, minimum length of primary roots(9.56) and secondary roots (1.86) was observed in M_4 i.e. October month. This might be due to the favorable effect may due to establishing vascular connections with the conducting tissue of the layer and emergence through the cortex and epidermis as a result of root development (Hartman *et al.,* 1989.) These results are in conformity with Ulemale and Shelke (1987) in guava, Tryambake and Patil (2002) in pomegranate.

Fresh and Dry weight of roots (g)

Observations in respect of maximum weight of fresh roots (1.91g) and dry weight (0.54g) was found to be maximum in treatment M_1 *i.e* July month. However, minimum fresh weight of roots (1.54g) and dry weight of roots (0.30) was recorded in treatment M_4 *i.e* October month). It indicates that the month M_1 i.e. July month showing the favorable effect on fresh and dry weight of root. These results are in conformity with Bhosale (2009) in pomegranate and Singh *et al*. (2009) in air layers of Litchi.

Root volume

Observation in respect of maximum root volume was found in treatment M_2 *i.e* August month (3.81 cm^3). and it was found to be at par with M_1 and M_3 (3.80 and 3.06 cm^3 respectively), However, minimum root volume was recorded in treatment M_4 *i.e* October month (2.83 cm^3).), It indicates that the month M_2 i.e. August month showing the

Table : 1. Effect of time and air layer per shoot on rooting and survival of air layers in Pomegranate cv. Bhagwa.

Treatment	Days required for root initiation	Rooted air layer (%)	Number of primary roots after 90 DAL	Number of secondary roots after 90 DAL	Length of primary roots (cm) after 90 DAL	Length of secondary roots (cm) after 90 DAL	Fresh weight of roots (g) after 90 DAL	Dry weight of roots (g) after 90 DAL	Root volume (cm^3) after 90 DAL	Height of rooted air layered (cm) after 60 DAT	Number of leaves per layer after 60 DAT	Fresh weight of shoot (g) after 60 DAT	Dry weight of shoot (g) after 60 DAT	Survival percentage (%)
M_1 – July month	21.85	71.50 (57.13)	20.81	36.81	11.91	2.37	1.91	0.54	3.80	25.94	42.63	10.54	4.23	75.06 (60.4)
M_2 August month	24.06	67.09 (55.00)	21.88	37.96	11.12	2.12	1.64	0.36	3.81	27.43	39.44	10.73	4.23	73.63 (59.10)
M_3 – September month	25.38	62.94 (52.50)	19.88	34.13	10.19	2.08	1.63	0.35	3.06	24.28	38.81	9.12	4.06	71.69 (57.85)
M_4 – October month	26.70	59.75 (50.62)	18.56	35.31	9.56	1.86	1.54	0.30	2.85	24.56	37.63	9.09	3.64	70.06 (56.83)
F Test	Sig	Sig	Sig	Sig	Sig	Sig	Sig	Sig	Sig	Sig	Sig	NS	NS	Sig
SE (m)±	0.54	1.31	0.95	0.88	0.48	0.14	0.10	0.6	0.34	0.84	1.34	0.63	0.42	1.20
CD at 5%	1.33	3.23	2.34	2.17	1.19	0.34	0.23	0.15	0.84	2.06	3.30	-	-	2.94

Note – Figures in parenthesis denote the arc sign transformation value

DAL- Days after layering

DAT- Days after transplanting

favorable effect on root volume. These results are in conformity with the results reported by Ahamed (1964) in guava, Trymbake and Patil (2002) in pomegranate and Deshmukh (2014) in karonda.

Heights of rooted air layer (cm)

Observation in respect of heights of rooted air layer at the stage of 60 DAT, significantly maximum height of rooted layer was observed in M_2 *i.e* August month (29.87).) which was at par with M_1 i.e. July (29.64 cm), Whereas, minimum height of rooted layer was observed in M_4 *i.e* October month (26.09 cm). This might be due to maximum rainfall and increased humidity in atmosphere which was best for layering Singh (2009). This also might be due to reduced transpiration rate which in turn increases the cell turgidity and enhances the cell division. These results are in conformity with Nagone (1989), Tomar (2011) in pomegranate and Desale (2011) in karonda.

Number of leaves per layers at final survival

Observation in respect of Number of leaves per layers at final survival M_1 *i.e* July month (42.63) had recorded significantly higher number of leaves at final survival which was at par with treatment M_2 (39.44), However, minimum number of leaves at final survival was recorded in treatment M_4 (37.63), It indicates that the treatment M_1 i.e. July month showing the favorable effect on number of leaves at final survival.

Fresh and Dry weight of shoot (g)

Observation in respect different time of layering operation treatment were found to be non significant for the fresh and dry weight of shoot at final survival.

Survival percentage

Observation in respect of final survival percentage treatment M_1 *i.e* July month had recorded significantly higher survival percentage (60.04), which was at par with treatment M_2 i.e. August month (59.10) and minimum survival percentage was recorded in M_4 (56.83), It indicated that M_1 i.e. July month showing the favorable effect on survival percentage. Better survival of rooted layers is obviously due to profuse rooting with longer roots having increased accumulation of dry matter Singh *et al.* (2009). These results are in conformed by Bhosale *et al*. (2009) in pomegranate air layers.

CONCLUSIONS

The present investigation of pomegranate propagation on effect of time and air layer per shoot on success of air layers of pomegranate significantly influenced by different months M_1 i.e. July month was found significantly superior over all other treatments for root initiation, rooting percentage, length of root, fresh and dry weight of root, number of leaves. while number of roots, root volume, height of rooted air layered and survival percentage is maximum in M_2 i.e. August month in pomegranate.

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