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### Effect of different months on air layering in pomegranate cv. Bhagwa

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#### Abstract

The experiment entitled with "Effect of different months on air layering in pomegranate cv. Bhagwa". With the objectives to study the effect of different months on rooting and survival of air layers in pomegranate and to find out the retention of appropriate month for higher success in pomegranate. The data obtained were analyzed using FRBD model with four treatment i.e. time of air layering operation viz., M<sub>1</sub> July, M<sub>2</sub> August, M<sub>3</sub> September and M<sub>4</sub> October months which were replicated four times. The pomegranate propagation significantly influenced by different time i.e. months of layering operation in treatment M<sub>1</sub> i.e. July month was found significantly superior over all the other treatments for early root initiation (21.85 days), rooting percentage (71.50 %), length of primary root (11.91cm), length of secondary root (2.37cm), fresh weight of root (1.91gm), dry weight of root (0.54gm), number of leaves (42.63) and survival percentage is (75.06 %). However, number of primary root (21.88), number of secondary root (37.96) root volume (3.81cm<sup>3</sup>) and height of rooted air layered (27.43cm) is maximum in treatment M<sub>2</sub> i.e. August month in pomegranate. Whereas, the results regarding fresh weight of shoot and dry weight of shoot were found to be non- significant.

**Keywords:** Sphagnum moss, air layering, IBA, pomegranate

#### Introduction

Pomegranate (*Punica granatum* L) is an ancient favourite table fruit of tropical regions of the world and it belongs to the family Punicaceae having chromosome no. 2n=18. Plant is deciduous in desert regions, but in coastal areas may lose only a portion of its leaves in winter. Pomegranate comes under the fruit type „Balusta“ and its edible part is juicy seed coat i.e. Arils. Pomegranate is a non climacteric fruit and it prefers well drained sandy loam to deep loamy soil types with hot and dry climatic condition during flowering and fruit development. It has been spread to other countries from Iran, its main producer and exporter in the world (Alikhani et. al., 2011). India ranks first in pomegranate production in the world but it has only 7 % share of total world exports. The total area under cultivation of pomegranate in India is 131 thousand ha and production is around 1346 thousand MT with productivity 10.3 MT ha-1 and in Maharashtra the cultivated area under this crop is 90.00 thousand ha and production is 945.00 thousand MT (Anon., 2014) [3]. Hence, Maharashtra is the leading producer of pomegranate followed by Karnataka, Andhra Pradesh, Gujarat and Tamil Nadu. The area under pomegranate is increasing day by day due to its export potential in international market as well as demand in domestic market. Propagation of pomegranate by seed is easy but it takes more time for flowering and fruiting and it brings genetic variability and leads to low yield and poor quality fruits. Propagation through hard wood cuttings is also the best and less expensive method (Upadhyay and Badyal, 2007) [19] but commercially air-layering is one of the most successful method in pomegranate propagation and has the advantage of being able to reproduce plants with better rooting than cuttings. Air layering can be advantageously useful in pomegranate propagation to minimize the time for fruiting earlier than cutting planting to increase the success percentage (Tomar, 2011) [15]. 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. Sixty eight 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) [1]. 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.

### Material and Methods

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

#### A. Selection of Plants and Branches

The uniformed sized, healthy and vigorous growth of 5 year old trees of *Punica granatum* cv. Bhagwa grown at CFN Unit, were selected. On these plants, well-matured and healthy branches of pencil size shoot thick were selected from one year old mature shoots of pomegranate for air layering.

#### B. Preparation of Plant Growth Regulators (IBA) in Lanolin Paste

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 shaken 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.

#### C. Preparation of Layers

A strip of bark of 4.0 cm width was completely removed around the stem. The exposed surface was scraped to ensure complete removal of cambium layer to retard healing. Then cut portion was treated with growth regulator paste by brush. Later on slightly moistened sphagnum moss was placed to enclose the cut surfaces. A piece of polythene film was wrapped and tied with string.

### Results and Discussion

The result obtained from the present investigation as well as relevant discussion have been summarized under following sub heads and given in Table. 1 and 2

#### 1. Days required for root initiation

Data presented in Table 1 indicated that minimum days required for root initiation influence different months of layering operation was observed in treatment M<sub>1</sub> i.e. July month (21.85 days) required for root initiation which were significantly superior and maximum days required for root initiation (26.70 days) observed under treatment in M<sub>4</sub> i.e. October month. It indicated that the M<sub>1</sub> i.e. July month showing the favorable effect on days required for rooting. This is might be due to the rainy (July) season was more favourable for rooting of air layers in *Spondias pinnata* due to the fact that constant moisture is one of the essential conditions for successful air layering (Nautiyal 2002). Similar result was reported by Deshmukh (2014) in karonda and Baghel (2015)<sup>[4]</sup> in guava.

#### 2. Rooted air layers (%)

Data presented in Table 1 indicated that maximum percentage of rooted air layers influence different months of layering operation was observed in treatment M<sub>1</sub> i.e. July month (71.50%) followed by M<sub>2</sub> i.e. August month (67.09%) whereas, treatment M<sub>4</sub> i.e. October month (59.75%) recorded minimum percentage of rooted air layers. It is indicated that superior percentage of rooted air layer was observed in M<sub>1</sub> (July). This may be due to suitable climatic and environmental factors along with hormonal balance as reported by Chandrappa and Gowda (1998)<sup>[8]</sup> in guava. This results is in conformity with the findings of Ahamed (1964)<sup>[11]</sup> and Rymbai and Reddy (2010) who advocated that rainy season is good for air layering.

#### 3. Number of primary roots

Data presented in Table 1 indicated that maximum number of primary roots influence different months of layering operation was observed in treatment M<sub>1</sub> i.e. July month (14.24) which was at par with treatment M<sub>2</sub> i.e. August (13.40), However, minimum number of primary roots per layer was observed in treatment M<sub>4</sub> i.e. October month (10.96). This might be due to accelerated rooting in the layering with the increased IBA concentration increases cell wall elasticity which further may have accelerated cell division and in turn increased number of roots up to a certain level. (Bora *et al.* 2006.)<sup>[7]</sup> These result are in agreement of Bhosale *et al.* (2009)<sup>[5]</sup> in pomegranate.

#### 4. Number of secondary roots

Data presented in Table 1 indicated that maximum number of secondary roots influence different months of layering operation was observed in treatment M<sub>2</sub> i.e. August month (32.28) which was at par with M<sub>1</sub> i.e. July month (30.90), However, minimum number of secondary roots per layer was observed in M<sub>4</sub> i.e. October month (28.94). Use of sphagnum moss and adequate level of IBA would have be advantageous for emergence of more number of secondary roots. These result are in agreement of Owais (2010)<sup>[11]</sup> in pomegranate and Tyagi and Patel (2004)<sup>[17]</sup> in guava.

#### 5. Length of primary roots (cm)

Data presented in Table 1 indicated that maximum length of primary roots influence different months of layering operation was observed in treatment in M<sub>1</sub> i.e. July month (11.91 cm) which is at par with M<sub>2</sub> i.e. August month (11.12cm), However, minimum length of primary roots per layer was observed in treatment M<sub>4</sub> i.e. October month (9.56cm). This must have resulted due to congenial weather conditions prevailing during these months. These results are in conformity with Bhosale *et al.* (2009)<sup>[5]</sup> and Tomar (2011)<sup>[15]</sup> in relations to pomegranate.

#### 6. Length of secondary roots (cm)

Data presented in Table 1 indicated that maximum length of secondary roots influence different months of layering operation was observed in treatment in M<sub>1</sub> i.e. July month (2.37 cm), which was at par with M<sub>2</sub> and M<sub>3</sub> (2.12 and 2.08 cm respectively), However, minimum length of secondary roots per layer was observed in treatment M<sub>4</sub> i.e. October month (1.86cm). This might be due to maximum rainfall and increased humidity in atmosphere which was best for layering. These results are in conformity with Tryambake and Patil (2002)<sup>[16]</sup>, Tomar (2011)<sup>[15]</sup> in pomegranate and Baghel (2015)<sup>[4]</sup> in guava.

### 7. Fresh weight of roots (g)

Data presented in Table 1 indicated that maximum fresh weight of roots influence different months of layering operation was observed in treatment M<sub>1</sub> i.e. July month had recorded significantly maximum fresh weight of root (1.91 g) followed by M<sub>2</sub> (1.64 g), However, minimum fresh weight of root had recorded in treatment M<sub>4</sub> (1.54 g), It indicates that the month M<sub>1</sub> i.e. July month showing the favorable effect on fresh weight of root. These results are in conformity with Singh (2009) in air layers of Litchi

### 8. Dry weight of roots (g)

Data presented in Table 1 indicated that maximum dry weight of roots influence different months of layering operation was observed in treatment M<sub>1</sub> i.e. July month had recorded significantly maximum dry weight of the root (0.54 g) followed by M<sub>2</sub> and M<sub>3</sub> (0.36 and 0.35 g respectively), However, minimum dry weight of root had recorded in treatment M<sub>4</sub> i.e. October (0.30 g). It might be due to favorable weather conditions i.e. high relative humidity and well distributed rainfall and optimum temperature regime. These result are line with the results in reported by Mishra and Singh (1988)<sup>[9]</sup> in karonda.

**Table 1:** Effect of different months on air layering in pomegranate cv.bhagwa.

Treatment	Days required for root initiation	Percentage of rooted air layer (%)	No of primary roots 90 DAL	No of secondary roots 90 DAL	Length of primary roots (cm) 90 DAL	Length of secondary roots (cm) 90 DAL	Fresh weight of roots (g) 90 DAL	Dry weight of roots (g) 90 DAL
M <sub>1</sub> – July month	21.85	71.50 (57.13)	20.81	36.81	11.91	2.37	1.91	0.54
M <sub>2</sub> August month	24.06	67.09 (55.00)	21.88	37.96	11.12	2.12	1.64	0.36
M <sub>3</sub> -September month	25.38	62.94 (52.50)	19.88	34.13	10.19	2.08	1.63	0.35
M <sub>4</sub> – October month	26.70	59.75 (50.62)	18.56	35.31	9.56	1.86	1.54	0.30
F Test	Sig	Sig	Sig	Sig	Sig	Sig	Sig	Sig
SE (m)±	0.54	1.31	0.95	0.88	0.48	0.14	0.10	0.6
CD at 5%	1.33	3.23	2.34	2.17	1.19	0.34	0.23	0.15

Note-Figures in parenthesis denote the arc sign transformations value.

DAL- Days after layering.

DAT- Days after transplanting.

### 9. Root volume (cm<sup>3</sup>)

Data presented in Table 2 indicated that maximum root volume influence different months of layering operation was observed in treatment M<sub>2</sub> i.e. August had recorded significantly higher root volume (3.81cm<sup>3</sup>) and it was found to be at par with M<sub>2</sub> and M<sub>3</sub> (3.80 and 3.06 cm<sup>3</sup> respectively), However, minimum root volume was recorded in treatment M<sub>4</sub> i.e. October (2.85 cm<sup>3</sup>), It indicates that the month M<sub>1</sub> i.e. July month showing the favorable effect on root volume. These results are in conformity with the results reported by Ahamed (1964)<sup>[1]</sup> in guava, Trymbake and Patil (2002)<sup>[16]</sup> in pomegranate and Deshmukh (2014) in karonda.

### 10. Heights of rooted air layer (cm)

Data presented in Table 2 indicated that maximum heights of rooted air layer influence different months of layering operation was observed in treatment M<sub>2</sub> i.e. August month (29.87cm) which was at par with M<sub>1</sub> i.e. July month (29.64 cm), Whereas, minimum height of rooted layer was observed in M<sub>4</sub> i.e. October month (26.09 cm). This might be due to reduced transpiration rate which in turn increases the cell turgidity and enhances the cell division. Thus the greater portion of available photosynthesis used in root growth resulted in maximum height of rooted air layered. These results are in conformity with Noor Elahi Jan *et al.* (2002)<sup>[10]</sup> in litchi and Bhosale *et al.* (2009)<sup>[5]</sup> in pomegranate.

### 11. Number of leaves per layer at final survival

Data presented in Table 2 indicated that maximum number of leaves at final survival influence different months of layering operation was observed in treatment M<sub>1</sub> i.e. July month (42.63) had recorded significantly higher number of leaves at

final survival which was at par with treatment M<sub>2</sub> i.e. August month (39.44), However, minimum number of leaves at final survival was recorded in treatment M<sub>4</sub> i.e. October month (37.63), It indicates that the treatment M<sub>1</sub> i.e. July month showing the favorable effect on number of leaves at final survival. This might be due to the absorption of more nutrients along with moisture as compared to all other treatments which in turn increase the initiation of more number of leaves. These results are in conformity with Patel *et al.* (2012)<sup>[12]</sup>, Bhosale *et al.* (2009)<sup>[5]</sup> in pomegranate.

### 12. Fresh and Dry weight of shoot (g)

Data presented in Table 2 indicated that fresh and dry weight of shoot influence different months of layering operation were found to be non significant for the fresh and dry weight of shoot at final survival.

### 13. Survival Percentage (%)

Data presented in Table 2 indicated that maximum survival percentage influence different months of layering operation was observed in treatment M<sub>1</sub> i.e. July month had recorded significantly higher survival percentage (60.04), which was at par with treatment M<sub>2</sub> i.e. August month (59.10) and minimum survival percentage was recorded in treatment M<sub>4</sub> i.e. October month (56.83), It indicated that M<sub>1</sub> 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 (2009). These results are in conformed by Bhosale *et al.* (2009)<sup>[5]</sup> in pomegranate air layers. This might be due to better survival of rooted layers is obviously due to profuse rooting with longer roots having increased accumulation of

dry matter. These results are in conformity with Tomar (2011) <sup>[15]</sup> in pomegranate and Baghel (2015) <sup>[4]</sup> in guava.

**Table 2:** Effect of different months on air layering in pomegranate cv.bhagwa.

Treatment	Root volume (cm <sup>3</sup> ) 90 DAL	Height of rooted air layered (cm) 60 DAT	No of leaves per layer 60 DAT	Fresh weight of shoot (g) 60 DAT	Dry weight of shoot (g) 60 DAT	Survival percentage (%)
M <sub>1</sub> – July month	3.80	25.94	42.63	10.54	4.23	75.06 (60.4)
M <sub>2</sub> August month	3.81	27.43	39.44	10.73	4.23	73.63 (59.10)
M <sub>3</sub> – September month	3.06	24.28	38.81	9.12	4.06	71.69 (57.85)
M <sub>4</sub> – October month	2.85	24.56	37.63	9.09	3.64	70.06 (56.83)
F Test	Sig	Sig	Sig	NS	NS	Sig
SE (m)±	0.34	0.84	1.34	0.63	0.42	1.20
CD at 5%	0.84	2.06	3.30	-	-	2.94

Note-Figures in parenthesis denote the arc sign transformations value.

DAL- Days after layering.

DAT- Days after transplanting.

### Conclusions

The pomegranate propagation was significantly influenced by different months M<sub>1</sub> 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<sub>2</sub> i.e. August month in pomegranate.

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