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Effect of different months on air layering in Karvanda

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Abstract
The experiment entitled with "Effect of different months on air layering in Karvanda". With the objectives to study the effect of different months on rooting and survival of air layers in Karvanda and to find out the retention of appropriate month for higher success in Karvanda The data obtained were analyzed using FRBD design with four treatment i.e. time of air layering operation *viz*., M_1 July, M_2 August, M_3 September and M_4 October months which were replicated four times.
The Karvanda propagation significantly influenced by different time i.e. months of layering operation in treatment M_1 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^3) and height of rooted air layered(27.43cm) is maximum in treatment M_2 i.e. August month in Karvanda. Whereas, the results regarding fresh weight of shoot and dry weight of shoot were found to be non- significant.

Keywords: FRBD design, air layering, Karvanda

1. Introduction
Karonda (*Carissa carandas L.*) comes under the family *Apocynaceae*, chromosome no. 22; it is native to India, commonly called as Karonda, karaunda and Karanda. Popularly known as 'Christ's thorn. It is widely cultivated in the home gardens, farmer's fields and orchards as hedge plant and occasionally few plants for commercial purpose. Raw fruit is green while the ripe one is purple to shining black, depending on the state of ripening. These are full of sweet, though slightly acidic, juicy when fully ripe. Fruit of Karonda is commonly used as a condiment or additive to Indian pickles and spices. In these species some of the plants can be propagated without any difficulties while others having poor cambium and co factors necessary for rooting and more endogenous inhibitors, show difficulties to root initiation. Therefore, kinds of chemical such as IBA have been used with the aim to induce root formation in species difficult to propagation or to increase the number and extent of roots in others that develop slowly. In horticulture the propagation of desirable plants for establishing orchards through clonal means is of great importance as it ensures the presence of desirable characters in the new stock obtained (Noor Elahi Jan *et al*, 2002) [9]. 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 Karvanda and to find out the retention of appropriate time or month for higher success in Karvanda.

2. Material and Methods
The present investigation was carried out during the year 2017-18 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 5-6 year old trees of *Karvanda* 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 Karvanda 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 sharked 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.

3. 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.

3.1. 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_1 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_4 i.e. October month. It indicated that the M_1 i.e. July month showing the favourable 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) [4] in guava respectively.

3.2. 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_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 is indicated that superior percentage of rooted air layer was observed in M1 (July). This may be due to suitable climatic and environmental factors along with hormonal balance as reported by Chandrappa and Gowda (1998) [7] in guava. This results is in conformity with the findings of Ahamed (1964) [1] and Rymbai and Reddy (2010) who advocated that rainy season is good for air layering.

3.3. 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_1 I.e. July month (14.24) which was at par with treatment M_2 i.e. August (13.40), However, minimum number of primary roots per layer was observed in treatment M_4 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.) [6] These result are in agreement of Bhosale *et al.* (2009) [5] in pomegranate.

3.4. 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_2 i.e. August month (32.28) which was at par with M_1 i.e. July month (30.90), However, minimum number of secondary roots per layer was observed in M_4 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 results are in agreement of Owais (2010) [10] in pomegranate and Tyagi and Patel (2004) [16] in guava.

3.5. 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_1 i.e. July month (11.91 cm) which is at par with M_2 i.e. August month (11.12cm), However, minimum length of primary roots per layer was observed in treatment M_4 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) [5] and Tomar (2011) [14] in relations to pomegranate.

3.6. 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_1 i.e. July month (2.37 cm), which was at par with M_2 and M_3 (2.12 and 2.08 cm respectively), However, minimum length of secondary roots per layer was observed in treatment M_4 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) [15], Tomar (2011) [14] in pomegranate and Baghel (2015) [4] in guava.

3.7. 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_1 i.e. July month had recorded significantly maximum fresh weight of root (1.91 g) followed by M_2 (1.64 g), However, minimum fresh weight of root had recorded in treatment M_4 (1.54 g), It indicates that the month M_1 i.e. July month showing the favourable effect on fresh weight of root. These results are in conformity with Singh (2009) in air layers of Litchi.

3.8. 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_1 i.e. July month had recorded significantly maximum dry weight of the root (0.54 g) followed by M_2 and M_3 (0.36 and 0.35 g respectively), However, minimum dry weight of root had recorded in treatment M_4 i.e. October (0.30 g). It might be due to favourable weather conditions i.e. high relative humidity and well distributed rainfall and optimum temperature regime. These results are line with the results in reported by Mishra and Singh (1988) [8] in karonda.

Table 1: Effect of different months on air layering in Karvanda

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_1 – July month	21.85	71.50 (57.13)	20.81	36.81	11.91	2.37	1.91	0.54
M_2 August month	24.06	67.09 (55.00)	21.88	37.96	11.12	2.12	1.64	0.36
M_3-September month	25.38	62.94 (52.50)	19.88	34.13	10.19	2.08	1.63	0.35
M_4 – 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.

3.9. Root volume (cm^3)

Data presented in Table 2 indicated that maximum root volume influence different months of layering operation was observed in treatment M_2 i.e. August had recorded significantly higher root volume (3.81cm^3) and it was found to be at par with M_2 and M_3 (3.80 and 3.06 cm^3 respectively), However, minimum root volume was recorded in treatment M_4 i.e. October (2.85 cm^3), It indicates that the month M_1 i.e. July month showing the favourable effect on root volume. These results are in conformity with the results reported by Ahamed (1964) [1] in guava, Trymbake and Patil (2002) [15] in pomegranate and Deshmukh (2014) in karonda respectively.

3.10. 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_2 i.e. August month (29.87cm) which was at par with M_1 i.e. July month (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 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) [9] in litchi and Bhosale *et al.* (2009) [5] in pomegranate.

3.11. 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_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 i.e. August month (39.44), However, minimum number of leaves at final survival was recorded in treatment M_4 i.e. October month (37.63), It indicates that the treatment M_1 i.e. July month showing the favourable 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) [11], Bhosale *et al*. (2009) [5] in pomegranate.

3.12. 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.

3.13. Survival percentage (%)

Data presented in Table 2 indicated that maximum survival percentage influence different months of layering operation was observed in 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 treatment M_4 i.e. October month (56.83), It indicated that M_1 i.e. July month showing the favourable 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) [5] 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) [14] in pomegranate and Baghel (2015) [4] in guava.

Table 2: Effect of different months on air layering in Karvanda

Treatment	Root volume (cm^3) 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_1 – July month	3.80	25.94	42.63	10.54	4.23	75.06 (60.4)
M_2 August month	3.81	27.43	39.44	10.73	4.23	73.63 (59.10)
M_3 – September month	3.06	24.28	38.81	9.12	4.06	71.69 (57.85)
M_4 – 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.

4. Conclusions

The Karvanda propagation was 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 Karvanda.

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