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Propagation studies in karonda (*Carissa carandas*) under Paschim Midnapore condition of West Bengal

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Karonda (*Carissa carandas* Linn.), a xerophytic plant can be grown commercially in red laterite Zone of West Bengal as protective hedge and for home scale preparation of pickles, chutneys, jelly etc. It is mainly propagated by seeds resulting a different degree of variation among the population. Due to continuous efforts, a number of elite clones have been identified at different places (Athani *et al.*, 2005; Mishra, 2007) which have to be multiplied vegetatively. Among the various vegetative propagation methods, air layering, budding and grafting are recommended. However, its method and time of operation should be standardized for a particular locality for maximum plant stands. As little report has been available in this aspect and no information particularly related to red laterite zone of West Bengal, a potential area for karonda cultivation, an investigation was therefore made in this regard.

The investigation was conducted in a private orchard at Jhargram, Paschim Midnapore. Different propagation methods are followed during June to October on 15th and 30th of each month of 2006 and 2007. Five year old karonda plants were taken for the study. To know the best time of air layering, thirty layers were prepared with three replications in a randomized block design on 8 to 12 months old shoot having pencil thickness. A ring of bark of 2.5 to 3.0 cm was removed and covered with rooting media having equal proportion of moist soil and well decomposed cowdung. The rooting media was wrapped with 100 gage white polythene strip. The layers were detached from the plant when roots were clearly visible. Five rooted layers from each replication were selected randomly for rooting study. The remaining successful layers were planted in the nursery in polybags for field establishment study which was noted 90 days after plating. The data on rooting success, time taken for separation of layers, root growth and field establishment of layers were collected and statistically analyzed.

For budding, chip method while in grafting, soft wood grafting with wedge method was followed on one year old rootstock seedlings. The budding and grafting operation was carried out under propagation shed from June to August at 15 days interval following randomized design having three replications. In each replication thirty budding or grafting was made. The roof of propagation shed was transparent poly-sheet and four sides of the shed were opened. In grafting, the scions were covered with white poly-caps (Pepsi-cap) and poly-caps were removed 15-20 days after grafting when new buds were sprouted.

Air layering

The data presented in table-1 indicated that rooting success in air layering of karonda was significantly influenced by time of operation. Highest rooting success (90%) with maximum field establishment (82 %) was noted when layering was done on 15th June followed by 30th June. Under Pantnagar condition, layering during July-August was reported to be the best (Mishra, 2007).Rooting success and field establishment of layers were progressively decreased, after 30th June and it was zero on 15th October, when rainy season was just ceased. It was interesting to note that rooting success in karonda was maximum when rainy season was just started The meteorological data during the period of investigation (Table 2) indicated that maximum temperature 37.7°C and minimum of 27.5°C with the relative humidity of 87% at 7.00 am and 58% at 2.00 pm were the congenial for higher rooting in air layers of karonda in the red laterite Zone of West Bengal. Time taken for separation of rooted layers from the mother plant was 90 days irrespective of time of operation.

Field establishment of rooted layers is considered to be the important observation in any layering experiment as the ultimate aim to get maximum number of plant stands. Results from the table-1 revealed that the field establishment of rooted layers was highest (82%) when operation was made on 15th June followed by 30th June (80%) and it drastically reduced thereafter. It is also evident from the table that number of roots played a significant role in field establishment of layers as compared to root growth at the time of planting. Maximum number of roots was counted from the 15th June prepared layers (19.5) which gave highest field establishment of 82 percent.

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Table 1: Effect of season on success of air layering in karonda

Time of layering	Rooting success (%)	Time taken for rooting (days)	No.of roots layer^{-1}	*Length of longest root (cm)	*Field establishment of rooted layer (%)
15th June	90 (71.57)	90	19.5	6.5	82 (62.90)
30th June	75 (60.00)	90	14.0	5.0	80 (63.43)
15th July	50 (45.00)	90	10.0	4.0	40 (39.23)
30 July	30 (33.12)	90	2.5	3.0	30 (33.21)
15th August	40 (39.23)	90	2.6	3.2	30 (33.21)
30th August	30 (33.21)	90	2.0	2.6	30 (33.21)
15thSeptember	20 (26.57)	90	1.5	2.0	20 (26.57)
30th September	35 (36.27)	90	4.2	3.0	20 (26.57)
15th October	0 (0.00)	-	-	-	- -
SEm (±)	**2.1**	**-**	**0.3**	**0.1**	**1.1**
LSD(0.05)	**6.2**	**-**	**0.8**	**0.4**	**3.2**

Note: Average of 2005 and 2006, Figures in the parentheses are angular transformed value

Table 2: Effect of season on success of budding and grafting in koronda atJhargram

Date of propagation	Chip budding			Wedge grafting		
	Success (%)	Shoot length (cm)	Leaf No.	Success (%)	Shoot length (cm)	Leaf No.
15th June	60 (50.77)	22	30	70 (56.79)	15	78
30th June	20 (26.57)	13	26	55 (47.57)	13	49
15th July	25 (30.00)	9	19	80 (63.43)	15	70
30th July	40 (39.23)	16	29	95 (77.08)	13	71
15th August	50 (45.00)	20	28	90 (71.57)	19	33
30th August	30 (33.21)	10	15	90 (71.57)	20	30
15th September	25 (30.00)	12	24	80 (63.43)	17	58
30th September	15 (22.79)	13	25	65 (53.73)	21	61
15th October	10 (18.43)	1	4	45 (42.13)	14	44
SEm (±)	**1.9**	**1.2**	**1.8**	**1.4**	**1.2**	**2.3**
LSD(0.05)	**5.8**	**3.5**	**5.4**	**4.2**	**3.7**	**6.8**

Budding and grafting

The data in table-2 indicated that the highest budding success (60%) was observed when it was done on 15th June with maximum shoot length (22cm) and leaf number (30) followed by 15th August (50%). The grafting in different months clearly indicated that the method not only gave the highest percentage of success (80 to 95) but also longer period of success ness (15th July to 15th September) as compare to other two methods. Due to spiny nature of karonda twigs, grafting was experienced to be easier and convenient for handling as compare to budding and layering. Due to convenience of handling, more number of grafts was made in a given time as compare to other two methods .The growth of the grafts in terms of leaf production was higher as compared to budding in any corresponding time of operation. The better scion growth indicated that compatibility between scion and rootstock was higher in grafting as compared to budding. However on scion-shortage situation, budding is advocated during middle of June and August under red and laterite zone of agro-climatic condition. The grafting success was sharply declined from 2nd fortnight of September due to cessation of monsoon.

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