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Short communication

Effect of maturity of scion and polythene bag cover on softwood grafting of *karonda* (*Carissa carandus* L.)

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Karonda (*Carissa carandus* L.) is one of the unique under-exploited fruit crops in India. It is evergreen and exceedingly hardy shrub, mostly having forked spines. Raw and ripe fruits of *karonda* are of economic importance, which possess enormous medicinal and processing properties. It is a good source of vitamin C, iron, phosphorous and calcium. Unavailability of vegetatively propagated planting material of good type is the greatest constraint in the expansion of this crop. The present plant propagation by seedlings results in a large variation in the progeny plants. Grafting can be a probable solution for mass multiplication, hence the experiment on propagation of *karonda* by softwood grafting was attempted using scions of different tissue maturity and polythene bag cover on graft.

The field investigation was conducted at the nursery of Department of Horticulture, College of Agriculture, Dapoli, for consecutive two years during 2008 and 2009. The experiment was conducted in factorial randomized block design with three treatments of scion, *viz*., A_1 = Hardwood scion (6-month-old), A_2 = Semi-hardwood scion (4-month-old) and A_3 = Softwood scion (2-month-old) with two treatments of cover namely P_1 = With polythene bag cover and P_2 = Without polythene bag cover. The number of replications was three with a unit of 20 grafts per treatment per replication.

The healthy, vigorous and disease free *karonda* seedlings of age 6 to 9 months with 10 to 15 cm height were selected as a rootstock. Mother plants of variety Konkan Bold were marked for collection of scion sticks. The selected rootstocks were headed back leaving about 6 to 7 cm softwood. This softwood was split vertically into cleft from the top to a length of about 4 cm below. The scion was prepared to wedge shape of 4 cm length at its lower end. Then by inserting the scion in the cleft of the rootstock the union was secured tightly with polythene strip of 1.5 cm width. In case of treatment P_1 a polythene bag was covered on the prepared graft and tied just below the graft union. With respect to treatment P_2 the grafts were not covered. The prepared grafts were transferred under shade and watered regularly. In treatment P_1, after sprouting, polythene bag over the scion stick was removed. The shoots appeared on the rootstock below the graft union were removed as and when appeared. Five surviving grafts were randomly selected per treatment per replication for recording the observations on vegetative parameters, *viz*., length of new shoot (cm), number of new leaves produced on graft and girth of new shoots. The statistical analysis was done according the method suggested by Panse and Sukhatme (6).

The sprouting of softwood grafts of *karonda* commenced from the first week of preparation during 2008. However, sprouting was restricted only with respect to A_3P_1. In the second week of grafting, the sprouting was recorded in all three scion treatments, which it was maximum in A_3 followed by A_2 and A_1. The grafts covered with polythene bags sprouted more in numbers than the grafts without polythene bag cover. The maximum, sprouting of grafts was completed in the third and fourth week from graft preparation. In the fifth week the sprouting was recorded only in A_2P_1. In 2009, the highest sprouting was observed in second and third week of graft preparation and completed in the fourth week. During both the years under study earlier sprouting was noticed in A_3P_1 as compared to other treatments. Use of younger scion and polythene bag cover on graft resulted in the early sprouting. In the young tissue of softwood scion higher meristimatic activities are observed which are responsible for higher rate of multiplication of tissues (Hartmann *et al*., 3). The polythene bag cover reduced the rate of transpiration and increased humidity around graft joint, which protected the tissues in graft joint from desiccation. Haldankar *et al*. (2) and Khandekar *et al*. (4) could obtain quicker sprouting in nutmeg grafts covered with polythene bags.

The mean sprouting found in *karonda* was 46.94 (2008) and 64.4 per cent (2009) (Table 1). It was the highest in treatment T_3 during both the years (64.83 and 86.67%, respectively) among the scion treatments. The sprouting percentage obtained in A_1 and A_2 was below the average. The polythene bag cover over graft resulted in the more sprouting than grafts without cover. Among the interactions A_3P_2 was the best. The variation found among various treatments of scion, polythene bag cover their interactions for sprouting (%) was statistically significant. Faster cambial activity in

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Table 1. Effect of maturity of scion and polythene bag cover on sprouting (%) of softwood grafts in *karonda*.

	2008			2009			Pooled		
	P1	P2	Mean	P1	P2	Mean	P1	P2	Mean
A1	40.00	28.33	34.17	85.0	16.7	50.83	62.50	22.50	42.50
A2	55.00	26.67	40.83	78.3	33.3	55.83	66.67	30.00	48.33
A3	91.67	40.00	65.83	91.7	81.7	86.67	91.67	60.83	76.25
Mean	62.2	31.7		85.0	43.9		73.61	37.78	
	Age	Polythene bag	Interaction	Age	Polythene bag	Interaction	Age	Polythene bag	Interaction
CD at 5%	18.10	14.78	25.60	19.00	15.51	26.86	13.46	10.99	19.04

A_1= Hardwood scion (6 month); A_2= Semi-hardwood scion (4 month); A_3= Softwood scion (2 month); P_1= Covered with polythene bag cover; P_2= Without polythene bag cover.

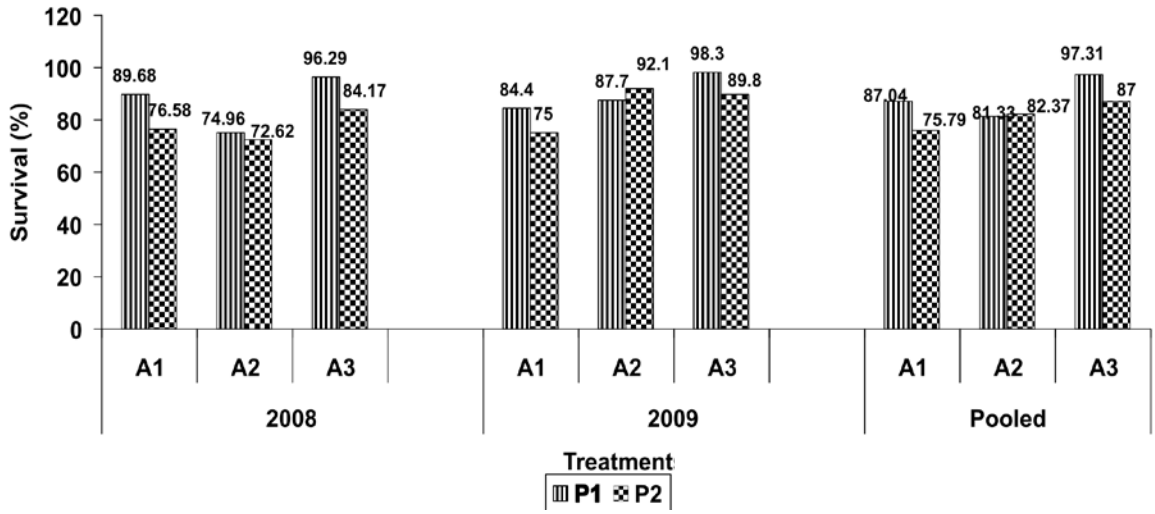

Fig. 1. Effect of maturity of scion and polythene bag cover on survival (%) in *karonda* softwood grafts.

Table 2. Effect of maturity of scion and polythene bag cover on number of leaves per softwood graft in *karonda*.

	2008			2009			Pooled		
	P1	P2	Mean	P1	P2	Mean	P1	P2	Mean
A1	6.08	4.67	5.38	10.5	15.4	12.94	8.29	10.03	9.16
A2	6.80	4.13	5.47	16.9	13.3	15.10	11.83	8.73	10.28
A3	11.00	5.13	8.07	17.5	16.7	17.13	14.27	10.93	12.60
Mean	8.0	4.6	6.30	15.0	15.2	15.1	11.46	9.90	10.68
	Age	Polythene bag	Interaction	Age	Polythene bag	Interaction	Age	Polythene bag	Interaction
CD at 5%	1.44	1.17	2.03	2.39	1.95	3.38	1.46	1.19	2.06

A1 = Hardwood scion (6 month); A2 = Semihardwood scion (4 month); A3 = Softwood scion (2 month); P1 = Covered with polythene bag cover; P2 = Without polythene bag cover.

young scion helps in successful graft union (Hartmann *et al*., 3). Reddy and Shukla (7) obtained higher sprouting in mango softwood grafts. In *Khasi* mandarin also softwood grafting has shown promise (Dubey *et al*., 1). The survival of sprouted grafts among various treatments was observed to be non significant (Fig. 1), which indicates that after sprouting the survival is not limitation in *karonda* with respect to maturity of scion or polythene bag cover over graft.

The leaves produced on softwood grafts of *karonda* differed significantly due to various treatments (Table 2). It was greatest in A_3 than A_2 and A_1. Similarly, the

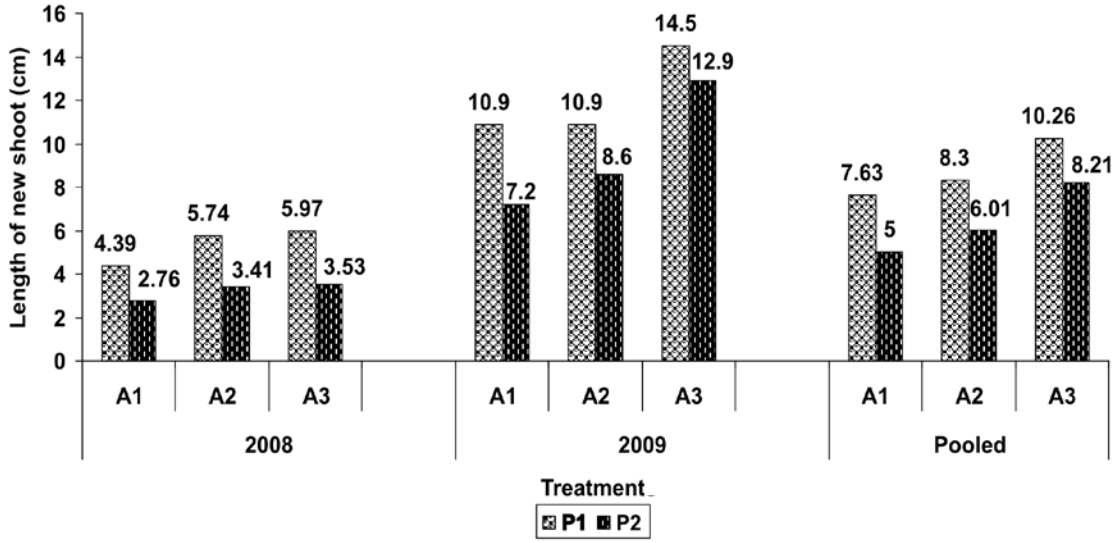

Fig. 2. Effect of maturity of scion and polythene bag cover on length of new shoot (cm) on *karonda* softwood graft.

Table 3. Effect of maturity of scion and polythene bag cover on girth of new shoot (cm) on softwood graft in *karonda*.

	2008			2009			Pooled		
	P1	P2	Mean	P1	P2	Mean	P1	P2	Mean
A1	0.15	0.13	0.14	0.63	0.72	0.67	0.39	0.42	0.41
A2	0.13	0.13	0.13	0.61	0.54	0.57	0.37	0.34	0.35
A3	0.11	0.12	0.12	0.72	0.63	0.68	0.42	0.38	0.40
Mean	0.1	0.1	0.13	0.65	0.63	0.6	0.39	0.38	0.39
	Age	Polythene bag	Interaction	Age	Polythene bag	Interaction	Age	Polythene bag	Interaction
CD at 5%	NS	NS	0.04	NS	NS	0.15	0.05	NS	0.07

A_1= Hardwood scion (6 month); A_2= Semihardwood scion (4 month); A_3= Softwood scion (2 month);P_1= Covered with polythene bag cover; P_2= Without polythene bag cover.

leaves emerged on grafts of P_1 were more than P_2. The interaction A_3P_2 was the best with for to production of new leaves on karonda grafts. Optimum maturity of scion with congenial environmental conditions promote the growth of grafts. Pampanna and Salikery (5) reported higher production of new leaves on Sapota grafts prepared by using young scion. Sulikeri *et al*. (8) reported better softwood grafts of Sapota under protected condition The length of new shoot showed similar pattern to that of leaves on graft (Fig. 2). The girth of new shoot observed in individual treatments of scions and polythene bags was non significant (Table 3). Though the interaction effect was significant no specific trend was observed.

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