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Original Research Article

Effect of Age of Rootstock on Softwood Grafting in Champaca (*Michelia champaca* Linn.) cv. Soundarya

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A B S T R A C T

Champaca (*Michelia champaca* Linn.) is a famous fragrant flowering plant. Now days there is peak demand for planting material in nursery hence it is necessary to standardize softwood grafting technique for maximum survival of champaca grafts. In this view the present investigation entitled "Effect of age of rootstock on softwood grafting in champaca (*Michelia champaca* Linn.) cv. Soundarya was conducted at the Department of Horticulture, College of Agriculture, Dapoli, Dist. Ratnagiri during the year 2017-2018. The experiment was conducted in Randomized Block Design (RBD). Experiment consisted age of rootstock with five treatments and four replications. The sprouting parameters like days required for sprouting, sprouting percentage, survival percentage and the growth parameters such as number of leaves, length of leaf, leaf area, length of new sprout and girth of new sprout was significantly influenced by age of rootstock. the result indicated that highest sprouting percentage (98.00 %), number of leaves (12.50), length of leaf (17.07 cm), leaf area (88.06 cm^2), length of new sprout (9.44 cm) and girth of new sprout (2.68 mm) was observed in treatment T_1 i.e. grafting on 4 month old rootstock. While minimum days required for sprouting (13.05 days) were seen in treatment T_3 i.e. grafting on 8 month old rootstock and maximum survival percentage (70.50 %) were found in treatment T_2 i.e. grafting on 6 month old rootstock. All observations were recorded at the end of 90 days after grafting except days required for sprouting and percent sprouting. From the present investigation it can be concluded that, age of rootstock had significant effect on softwood grafting in champaca. Rootstock of four to six months age old has shown promising results for maximum survival of champaca grafts through softwood grafting method under konkan agroclimatic conditions of Maharashtra.

Keywords

Champaca, Softwood grafting, Age of rootstock

Introduction

Champaca (*Michelia champaca* Linn.) is one of the fragrant flower crop belonging family Magnoliaceae having chromosome no. 2n=38. Softwood grafting is very convenient method of vegetative propagation, perpetuating some plants that cannot be conveniently multiply by other vegetative means. Grafted plants induces early flowering within few years of planting. Now a days, nursery practices involved much risks and cost with respect to raising of seedling rootstocks and their maintenance till they attain graftable size. Vigorous and healthy growth of the rootstocks and perfect grafting techniques will help to attain higher rate of success. As there is healthy demand from the

farmers for planting material in nursery but studies on propagation in champaca are to the limited extent.

Hence, standardization of method of grafting and month of grafting for softwood was carried out using defoliated scion sticks. In this view the investigation on effect of age of rootstock on softwood grafting in champaca (*Michelia champaca* Linn.) cv. Soundarya was undertaken under konkan agroclimatic condition.

Materials and Methods

The experiment was carried out at the Department of Horticulture, College of Agriculture, Dapoli, Dr. BSKKV, Dapoli, Dist. Ratnagiri, Maharashtra during the year 2017-2018.The experiment was conducted in Randomized Block Design (RBD). Experiment consisted age of rootstock with five treatments and four replications. Softwood grafts were tied on champaca seedlings as per the following treatments. T_1 – 4 month old rootstock; T_2 – 6 month old rootstock; T_3 – 8 month old rootstock; T_4 – 10 month old rootstock and T_5 – 12 month old rootstock.

Raising and selection of rootstock

After harvest, medium size, good shape seeds were selected and immersed in 0.1% carbendazim solution. To prevent the loss of viability of seeds immediately the seed were sown in cocopeat. Seeds were sown at a depth of 1.5-2 cm.

The seeds germinated within 25-30 days and watered regularly as per requirement. After germination of seeds at a two leaves stage seedlings were transplanted in polythene bags of 15 cm × 20 cm size containing potting mixture of soil and F.Y.M. in the ratio of 3:1. Uniform seedlings of 4, 6, 8, 10 and 12 months old were used for experiment. The softwood grafting operation was followed as per the method described by Amin (1974).

Results and Discussion

Days required for sprouting (no.)

The earliest sprouting was recorded in 8 month old rootstock treatment T_3 (13.05 days)which was at par with treatment T_4 (13.30 days) followed by T_5 (15.45 days), T_2 (16.20 days) and T_1 (16.95 days). The maximum days required for sprouting was observed in 4 month old rootstock treatment T_1 (16.95 days).

The age of rootstock has relationship with regenerating ability of a plant part which is found to be higher in younger rootstocks and this is because of higher activity of meristematic cells resulting in early sprouting. The congenial weather conditions especially temperature and humidity prevailing during grafting period must be triggering cell activity in scion sticks. The higher cell activity results in early sprouting of scion. Similar results were reported by Priyanka *et al.,* (2017) in jackfruit, Barathkumar (2017) in Aonla.

Sprouting percentage (%)

The highest sprouting percentage was found in 4 month old rootstock treatment T_1 (98.00 %). The lowest sprouting percentage was recorded in 12 month old rootstock treatment T_5 (89.00 %). age of rootstock had significant effect on sprouting in champaca. Younger rootstocks stimulates higher activity of meristematic cells resulting in faster formation of callus and quick healing of graft union. Similar results were reported by Raju B. S. (2000) in champaca, Aralikatti *et al.,* (2011) in jackfruit and Barathkumar (2017) in Aonla.

Survival percentage (%)

The highest survival percentage was found in 6 month old rootstock treatment T_2 (70.50 %). The lowest survival percentage was recorded in 6 month old rootstock treatment T_5 (50.50 %). Muniswami (1979) opined that younger rootstocks are better amenable than older for soft wood grafting. The congenial weather conditions (maximum and minimum temperature and optimum humidity) which resulted in increased cell activity leading to better union of rootstock and scion (Pampanna and Sulikeri, 2000). Similar results were reported by Raju B. S. (2000) in champaca and Dambal (1999) in Sapota.

Number of leaves (No.)

At 45 days after grafting, maximum number of leaves were recorded in 4 month old rootstock treatment T_1 (7.30) and also maximum number of leaves were recorded in 4 month old rootstock treatment T_1 (12.50) at 90 DAG. The age of rootstock had significant effect on number of leaves. Better growth of grafts in the present study with young rootstock may be attributed to the higher meristematic activity and juvenility of younger scion, which in turn helped for early sprouting. Perhaps early sprouting followed by optimum temperature and humidity might be responsible for production of more number of leaves. This may be due to more photosynthesis. Similar results were reported by Raju B. S. (2000) in champaca, Aralikatti *et al.*, (2011) and Priyanka *et al.*, (2017) in Jackfruit.

Length of leaf (cm)

At 45 days after grafting, the maximum length of leaf was observed in 4 month old rootstock treatment T_1 (10.34 cm) and also the maximum length of leaf was observed in 4 month old rootstock treatment T_1 (17.07 cm) at 90 DAG. The length of leaf was significantly affected by age of rootstock. The optimum temperature might be effective for maximum cell division. More number of leaves leads to more photosynthesis which may be responsible for increased length of leaf at greater extent (Sridhar, 2014). The findings are in line with that of Alam *et al.*, (2006) in mango.

Leaf area (cm^2)

At 45 days after grafting, the maximum leaf area was observed in 4 month old rootstock treatment T_1 (37.98 cm^2) and also the maximum leaf area was observed in 4 month old rootstock treatment T_1 (88.06 cm^2) at 90 DAG. Younger age old rootstock grafts had more number of leaves which increases the metabolic activity of cell which results in healthy and vigorous growth of grafts. More number of leaves turn give to more photosynthesis which might have increased the leaf area at greater extent (Sridhar, 2014). Similar results were obtained by Maheswari T. U. and Nivetha(2015) in jackfruit, Alam *et al.*, (2006) in mango.

Length of new sprout (cm)

At 45 days after grafting, the maximum length of new sprout was observed in 4 month old rootstock treatment T_1 (7.22 cm) and also the maximum length of new sprout was observed in 4 month old rootstock treatment T_1 (9.44 cm) at 90 DAG. Better growth of grafts in the present study with young rootstock may be attributed to the higher meristematic activity and juvenility of younger scion, which in turn helped for early sprout initiation due to more photosynthesis. Perhaps early sprouting followed by optimum temperature and humidity might be responsible for encouraging maximum length of sprout. Similar results were obtained by Singh and Srivastava (1982) in softwood grafting in mango, Priyanka *et al.*, (2017) in jackfruit.

Table.1

Treatments	Days required for sprouting (no.)	Sprouting Percentage (%)	Survival Percentage (%)	Number of leaves (no.)		Length of Leaf (cm)	
				45 DAG	90 DAG	45 DAG	90 DAG
T_1	16.95	98.00	68.00	7.30	12.50	10.34	17.07
T_2	16.20	97.00	70.50	7.00	11.40	8.70	15.77
T_3	13.05	91.00	68.00	5.85	8.90	7.06	14.43
T_4	13.30	91.00	62.00	5.05	7.70	5.92	13.96
T_5	15.45	89.00	50.50	5.70	8.50	5.77	14.06
Range	**13.05-16.95**	**89.00-98.00**	**50.50-70.50**	**5.05-7.30**	**7.70-12.50**	**5.77-10.34**	**13.96-17.07**
Mean	14.99	93.20	63.80	6.18	9.80	7.56	15.06
S.E.±	0.55	1.13	1.96	0.38	0.65	0.49	0.73
C.D. at 5%	1.69	3.47	6.04	1.18	2.00	1.52	2.26
Result	**SIG**	**SIG**	**SIG**	**SIG**	**SIG**	**SIG**	**SIG**

Table.2

Treatments	Leaf area (cm2)		Length of new sprout (cm)		Girth of new sprout (mm)	
	45 DAG	90 DAG	45 DAG	90 DAG	45 DAG	90 DAG
T_1	37.98	88.06	7.22	9.44	2.04	2.68
T_2	30.86	76.68	6.26	8.49	1.92	2.49
T_3	19.01	61.73	5.58	7.66	1.78	2.20
T_4	16.37	57.16	4.76	6.97	1.50	1.80
T_5	12.92	50.29	5.55	7.62	1.55	1.67
Range	**12.92-37.98**	**50.29-88.06**	**4.76-7.22**	**6.97-9.44**	**1.50-2.04**	**1.67-2.68**
Mean	23.43	66.79	5.87	8.03	1.76	2.17
S.E.±	1.75	2.50	0.47	0.45	0.12	0.19
C.D. at 5%	5.41	7.71	1.45	1.39	0.38	0.59
Result	SIG	SIG	SIG	SIG	SIG	SIG

Girth of new sprout (mm)

At 45 days after grafting, the maximum girth of new sprout was observed in 4 month old rootstock treatment T_1 (2.04 mm) and also the maximum girth of new sprout was observed in 4 month old rootstock treatment T_1 (2.68 mm) at 90 DAG which was at par with treatments T_2 (2.49 mm) and T_3 (2.20 mm). Higher cell activity and early sprouting responsible for more number of leaves, in turn give rise to more photosynthesis which

might have increased growth of scion shoot to greater extent (Sridhar, 2014). The maximum number of leaves and girth of new sprout of grafts might be due to stored carbohydrates and other food substances available in scion sticks (Zimmerman, 1958). Similar results were obtained by Singh and Srivastava (1980) in softwood grafting in mango, Aralikatti *et al.,* (2011) in jackfruit and Barathkumar (2017) in aonla.

From the present investigation it can be concluded that, age of rootstock had significant effect on softwood grafting in champaca. The rootstock of four to six month's age old has shown significant effect for number of leaves, length of leaf, leaf area, length and girth of new sprout, and maximum survival percentage of grafts. Hence, rootstock of four to six months age old has shown promising results for maximum survival of champaca grafts through softwood grafting method under konkan agroclimatic conditions of Maharashtra.

References

Alam, M. A., Mortuza, M. G., Uddin, M. Z., Sarkar, D. and Barman, J. C. (2006). Effect of length and variety of scion in stone grafting of Mango, *International J. Sustainable Crop Production*, 1(2): 07-11.

Amin, R. S. (1974). A study on the establishment of mango orchard with wedge graft on in- situgrown Mango seedling in dry region of Gujarat. *Haryana J. Hort. Sci.*, 3: 160-167.

Aralikatti, G., Mokashi, A. N., Hegde, R. V., Patil, R. V. and Angadi, S. G. (2011). Softwood grafting in jackfruit. *Acta Hort*. 890:101-106.

Barathkumar, T. R. (2017). Studies on effect of different age of rootstocks on softwood grafting in Aonla (*Phyllanthus emblica* L.), *J. Pharmacognosy and Phytochemistry*, E-ISSN: 22784136.

Dambal, R. (1999). Studies on softwood grafting in mist house conditions. M.Sc. (Agri.) Thesis, University of Agricultural Science, Dharward.

Maheshwari, T. and Nivetha, K. (2015). Effect of age of the rootstock on the success of epicotyl grafting of Jackfruit (*Artocarpus heterophyllus* L), *Plant Archives*, 15(2): 823-825.

Muniswami, K. P. (1979). Cashew Grafts under mist conditions. Cashew Causerie: 1(2): 16- 20.

Pampanna, Y. and Sulikeri, G. S. (2000). Effect of procuring and storage of scion sticks on the success and growth of softwood grafts in Sapota cv. Kalipatti. *Karnataka J. Agri. Sci*., 14 (4): 1025-1029.

Priyanka, H. L., Vinay G. M., Hipparagi Kulapati, Deepak G. Nayan and Mamatha N. P. (2017). Effect of rootstocks age on softwood grafting in jackfruit (*Artocarpus heterophyllus* lam.) *International J. Agri. Sci.*,9(12): 0975-9107.

Raju, B. S. (2000). Studies on standardization of softwood grafting techniques in champaca *(Michelia champaca* L.) M.Sc. (Hort.) thesis submitted to university of Agriculture Science Bangalore.

Singh, N. P. and Srivastava, R. P. (1982). Studies on various factors involved in softwood grafting in Mango. *Progr. Hort.*, 14(2-3): 117-120.

Sridhar, R. (2014). Effect of season on the success and growth of mango (*Mangifera indica* L.) softwood grafts under southern traditional zone of Karnataka. *Envi. And eco.*,32 (4): 17171719.

Zimmerman, M. M. (1958). Translocation of organic substances in the phloem of trees. *The Physiology of forest trees*. New York Ronald press. pp. 213-217.