

Original Research Article

Impact of Season on Softwood Grafting in Champaca (*Michelia champaca* Linn.) cv. Soundarya under Konkan Agroclimatic Conditions

H. M. Mane*, N. V. Dalvi, R. G. Khandekar, V. G. Salvi, B. R. Salvi,
R. T. Bhingarde and S. R. Bhagwat

Department of Horticulture, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, India

*Corresponding author

ABSTRACT

The present investigation entitled “Studies on softwood grafting in champaca (*Michelia champaca* Linn.) cv. Soundarya” was conducted at nursery No. 4, Department of Horticulture, College of Agriculture Dr. B.S.K.K.V. Dapoli, Dist. Ratnagiri during the year 2017-18. The experiment was executed in randomized block design with twelve treatment of grafting, the period of grafting was January, 2018 to December, 2018. Propagation was done by softwood grafting. The grafts were tied in different season at every second fortnight such as T₁: Grafting during second fortnight of January to T₁₂: Grafting during second fortnight of December, 2018. The sprouting parameters like days required for sprouting, sprouting percentage, survival percentage and the growth parameters such as number of leaves, length of new sprout, length of leaf, leaf area, girth of plant were recorded. During the investigation period grafting during second fortnight of May (T₅) has shown significant result's like minimum days required for sprouting (13.20 days), sprouting percentage (98.67%), survival percentage (86.67%), number of leaves (10.00), length of new sprout (7.49 cm), girth of plant(9.00 mm). While significantly maximum length of leaf (19.92 cm), leaf area (77.62cm²) was observed in treatment T₄(Grafting during second fortnight of April). All observations were recorded at the end of 90 days after grafting except days required for sprouting and percent sprouting. It was concluded that propagation through softwood grafting in the treatment T₄ and T₅.i.e. Grafting during second fortnight of April and May months had proved to be the best months for propagation under konkan region of Maharashtra.

Keywords

Champaca,
Softwood grafting,
Season

Introduction

Michelia is a historical genus of flowering plants belonging to the magnolia family i.e. Magnoliaceae having chromosome number 2n=38. The genus included about 50 species native to tropical and subtropical regions while *Michelia Champaca* is a large evergreen or semi – deciduous tree and shrub. *Michelia champaca* has several ornamental,

commercial and medicinal uses for gardeners, it is an excellent choice as a houseplant or companion plant in landscape. A few species have been introduced to garden or as street trees outside of the Indomalaya region, including *Michelia figo*, *Michelia doltsopa*, and *Michelia champaca*. Commercially the timber of *Michelia* is used for almost anything from cabinet – making to firewood and flowers are grown to sell at cut flower

shop. *Michelia* has strongly fragrant flowers in varying shades usually golden – yellow, golden – orange and creamy - white.

Commonly, champaca is propagated by means of seed and vegetative pathways via layering (Channaveerappa, G. S. and Gowda, 1984). When 8 to 10 month old seedlings were decapitated 25 to 30 cm from the ground and previously defoliated scions were grafted in early august, 40 percent success was obtained (Nalawadi *et al.*, 1988). In-vitro propagation either through organogenesis or somatic embryogenesis has become an important and popular method to reproduce crops. At present no research work has been carried for fast multiplication of grafts as well as the best season for grafting. Therefore the present study was undertaken to standardize the season for grafting in champaca (*Michelia champaca* L inn.) cv. Soundarya under Konkanagro-climatic conditions.

Materials and Methods

The experiment was conducted at Nursery No. 4, of department of Horticulture, college of Agriculture Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, Dist. Ratnagiri (M. S.) India, 415712. With following details mentioned below.

Experimental details

Crop: Champaca (*Michelia champaca* Linn.) cv. Soundarya

Design: - Randomized Block Design (R.B.D)

No. of Treatments:12

Replications: 04

No. of grafts per treatment per replication: - 25

Treatment details

T₁:Grafting during second fortnight of January

T₂:Grafting during second fortnight of February

T₃:Grafting during second fortnight of March

T₄:Grafting during second fortnight of April

T₅:Grafting during second fortnight of May

T₆:Grafting during second fortnight of June

T₇:Grafting during second fortnight of July

T₈: Grafting during second fortnight of August

T₉: Grafting during second fortnight of September

T₁₀: Grafting during second fortnight of October

T₁₁: Grafting during second fortnight of November

T₁₂: Grafting during second fortnight of December

The healthy vigorous seedling having 30 cm to 60 cm height with 0.30 to 0.35 cm thickness of 4 month age old having newly emerged vegetation with apical growth were used for softwood grafting. The selection of scion sticks was terminal, one season old matured shoots were selected as a scion material. Scion shoot which are round in shape having plumpy active buds, mostly brown in colour with 10–12 cm in length were preferred for grafting. Selected scion shoots were defoliated up to 15 cm length. Defoliated scion sticks of 8 day's were

utilized for grafting (Amin, 1974). Apical new vegetative growth appeared on rootstock. Then vertical cut of about 5-6 cm length was given with sharp knife on remaining apical softwood to split it in two equal parts. The cut portion appears a fork or 'V' shape. The scion stick of about equal thickness as that of rootstock was selected for grafting.

There after wedge shape is given to lower end of scion by giving two slanting cuts of about 5-6 cm length opposite to each other. Then this wedge shape end of scion was inserted into vertical slit taken on rootstock. The joint was tied firmly by using polythene strip of 1.5 cm width, 45 cm length and 200 gauge thickness. The newly prepared grafts were kept under shade and watered regularly at 4 to 5 days interval. The sprouts arising on rootstocks below graft joint were removed as and when they appear. The prepared grafts were covered from top by polythene bags 25 cm × 7.5 cm size keeping its knot below the graft joint. The bag was retained on the graft for one month or till sprouting was observed in the graft.

Results and Discussion

Days required for sprouting

The earliest sprouting was (13.20 days) recorded in T₅ (Grafting during second fortnight of May) which was at which was at par with T₄ (13.67 days). It was observed that softwood grafting had significant effect on days required for sprouting over all rest of the treatment. The congenial weather condition especially temperature and humidity prevailing during grafting period must be triggering cell activity in scion. The higher cell activity result in early sprouting of scion. Similar result were reported by Shinde *et al.*, (2011) in Jamun and Sonawane *et al.*, (2012) obtained minimum number of days

required for completion of sprouting in month of May in softwood grafting of Carmbola (Table 1).

Sprouting percentage (%)

The maximum sprouting percentage (98.67%) was recorded in treatment T₅ (Grafting during second fortnight of May) which was at par with T₁₀ (93.33%), T₁₂ (93.33%), T₄ (93.33%), T₁₁(89.33%). The temperature and humidity play very important role in the healing of grafts union (Hartmann and Kester, 1968). The higher success of grafting during May and April months may be attributed to the congenial weather conditions (maximum and minimum temperature and optimum humidity) prevailed during these months, resulting in increased cell activity leading to better union of stock (Pampanna and Sulikeri, 2000).

Survival percentage (%)

The maximum survival percentage (86.67%) was recorded in treatment T₅(Grafting during second fortnight of May) which was at par with T₄ (80.00%), T₁₀ (78.67%) and T₁₂ (76.00%). The covering of polythene cap over the scion protect the vital buds and increase humidity and temperature around the buds and thus reduces the mortality percentage (Joshi *et al.*,2016).The higher success of grafting during April and June months may be attributed to the congenial weather conditions.

Number of leaves (no.)

At 45 DAG, the maximum number of leaves (7.87) was observed in treatment T₅(Grafting during second fortnight of May) and T₄ (Grafting during second fortnight of April) and also maximum number of leaves (10.00) was observed in treatment T₅ (Grafting during second fortnight of May) at 90 DAG.

The congenial weather conditions during grafting period resulted in higher cell activity and early sprouting which are responsible for more number of leaves. Similar result was obtained by Panikar (1986) in Alphonso mango where highest number of leaves was produced in the month of May in softwood grafting. Shinde *et al.*, (2011) observed maximum number of leaves in the month of May in softwood grafting of Jamun. Waghmare (1990) reported maximum number of leaves per graft in the month of September and which was at par with May, April and August in softwood grafting in Sapota var. Kalipatti.

Length of leaf (cm)

At 45 DAG, the maximum length of leaf (14.85) was recorded in treatment T₄ (Grafting during second fortnight of April) which was at par with T₁₀ (13.87 cm), T₁₁ (13.06 cm) and T₅ (12.81cm) and also maximum length of leaf was recorded in treatment T₄(Grafting during second fortnight of April) (19.92 cm) at 90 DAG.

The optimum temperature is effective for maximum cell division and early sprouting of grafts, probably due to early sprouting, grafts took maximum duration for growth as compared to other treatments (Khatun *et al.*, 2008). The early sprouting is responsible for more number of leaves, in turn gave rise to more photosynthesis which might have increased length of leaf at greater extent (Sridhar, 2014). Similar trend of increase in length of leaf was reported by Tasnim (2013) recorded maximum length of leaf with cleft grafting in Amra when grafting was done in May.

Leaf area (cm²)

At 45 DAG, highest leaf area (44.87cm²) was noticed in treatment T₄ (Grafting during

second fortnight of April) which was at par with T₅ (44.56 cm²), T₁₁ (44.55 cm²), T₁₂ (44.23 cm²) and T₃ (41.84 cm²) found significantly superior over all rest of the treatment. Also the maximum leaf area (77.62 cm²) was observed in treatment T₄ (Grafting during second fortnight of April) which was at par with T₅(75.86 cm²), T₁₂(75.62 cm²), T₃ (75.44 cm²), T₁₀(75.30 cm²), T₈ (74.98cm²), T₁₁(74.90 cm²) and T₉ (73.83 cm²). The congenial weather conditions available during grafting and growth period leads to early sprouting. As the number of leaves increases the metabolic activity of cell is doubled which results in healthy and vigorous growth of grafts. The early sprouting is photosynthesis for more number of leaves, in turn gave rise to more photosynthesis which might have increased the leaf area at greater extent (Sridhar, 2014).

Length of new sprout (cm)

At 45 DAG, longest length of new sprout (4.05cm) was noticed in treatment T₅ (Grafting during second fortnight of May) and also the maximum length of new sprout (7.49cm) was noticed in treatment T₅ (Grafting during second fortnight of May) at 90 DAG.

The successful grafting correlated to the higher cell activity and early sprouting which was responsible for more number of leaves, in turn gave rise to more photosynthesis which might have increased growth of scion shoot to greater extent and produced more number of branches (Sridhar, 2014).The warmer and humid air inside the grafting shed induces the soil to warm up which helps to increase the length of sprout (Joshi *et al.*, 2016). These results are in association with the result of Mulla *et al.*, (2007) who recorded maximum length of sprout in the month of May with softwood grafting in jamun (Table 2).

Table.1 Days required for sprouting, sprouting percentage, survival percentage, number of leaves and length of leaf of champaca grafts

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
T₁	14.80	84.00	53.33	4.87	6.60	10.22	16.43
T₂	14.13	76.00	41.33	5.26	7.13	10.91	15.93
T₃	16.20	88.00	48.00	7.13	9.60	11.98	17.70
T₄	13.67	93.33	80.00	7.87	9.27	14.85	19.92
T₅	13.20	98.67	86.67	7.87	10.00	12.81	18.81
T₆	15.07	49.33	32.00	4.20	6.27	8.28	11.13
T₇	14.60	52.00	40.00	4.07	5.73	8.30	11.15
T₈	14.93	76.00	46.67	3.67	5.93	10.88	18.01
T₉	16.33	57.33	37.33	3.80	6.20	11.64	18.59
T₁₀	17.73	93.33	78.67	5.33	6.67	13.87	19.03
T₁₁	17.60	89.33	65.33	5.87	7.33	13.06	19.54
T₁₂	17.47	93.33	76.00	6.80	7.93	11.74	16.89
Range	13.20-17.73	49.33-98.67	32.00-86.67	3.67-7.87	5.73-10.00	8.28-14.85	11.13-19.92
Mean	15.47	79.22	56.11	5.56	7.39	11.54	16.93
S.E.±	0.27	3.46	6.03	0.47	0.46	0.82	1.16
C.D. at 5%	0.80	10.17	17.70	1.39	1.36	2.41	3.41
Result	SIG	SIG	SIG	SIG	SIG	SIG	SIG

Table.2 Leaf area, length of new sprout and girth of plant of champaca grafts

Treatments	Leaf area (cm ²)		Length of new sprout (cm)		Girth of plant (mm)	
	45 DAG	90 DAG	45 DAG	90 DAG	45 DAG	90 DAG
T ₁	34.68	72.46	3.47	6.49	4.82	6.21
T ₂	36.16	71.11	3.71	6.90	5.50	6.25
T ₃	41.84	75.44	3.27	5.93	5.13	6.39
T ₄	44.87	77.62	3.98	5.81	7.45	8.43
T ₅	44.56	75.86	4.05	7.49	8.29	9.00
T ₆	25.60	45.76	2.57	4.16	6.33	7.68
T ₇	27.81	48.45	2.94	4.63	5.56	7.31
T ₈	37.97	74.98	3.59	4.57	5.41	7.35
T ₉	36.33	73.83	3.34	4.08	6.33	7.53
T ₁₀	36.93	75.30	3.52	4.77	6.67	7.63
T ₁₁	44.55	74.90	3.79	4.77	6.46	7.41
T ₁₂	44.23	75.62	3.83	5.79	6.86	8.31
Range	25.60-44.87	45.76-77.62	2.57-4.05	4.08-7.49	4.82-8.29	6.21-9.00
Mean	37.96	70.11	3.50	5.45	6.23	7.45
S.E.±	2.14	1.63	0.26	0.62	0.10	0.11
C.D. at 5%	6.27	4.79	0.77	1.85	0.30	0.33
Result	SIG	SIG	SIG	SIG	SIG	SIG

Girth of plant (mm)

At 45 DAG, maximum girth of plant (8.29 mm) was noticed in treatment T₅ (Grafting during second fortnight of May) which was found significantly superior over all rest of the treatment and also the maximum girth of new sprout (9.00) was observed in treatment T₅ (Grafting during second fortnight of May) which was found significantly superior at 90 DAG. Grafts containing media mixture with proper aerations moisture and substantial amount of nutrients. It helped in cell division, cell elongation and adequate water supply resulted in increase in percent of girth of grafted plants. Similar trend of increase in girth of plant was recorded by Mukherjee and

Mujumdar (1964) reported that maximum growth of scion in Mango grafts prepared during March to April.

From the present investigation it is observed that period during April to May was found to be best for maximum survival of grafts. Further grafting during second fortnight of May was found to be promising with respect to the growth parameters and grafting during second fortnight of April was found to be significant in growth parameters as well as survival percentage as compared to other treatments in the experiment. From the present research undertaken it is concluded that April to May is the ideal period for getting maximum survival of champaca grafts

cv. Soundarya through softwood grafting under shade net condition in Konkan region of Maharashtra.

References

- Amin, R. S. (1974). A study on the establishment of mango orchard with wedge graft on in- situ grown Mango seedling in dry region of Gujarat. *Haryana J. Hort. Sci.*, 3: 160-167.
- Channaveerappa, G.S. and J. V.N. Gowada (1984). Studies on vegetative propagation of *Michelia champaca* L. by air layering *Agri Sci. Journal of Progressive Horticulture* 1984 vol.16 No.112 pp97.100 ref.
- Joshi, M., Syamal, M. M. and S. P. Singh (2016). Propagation techniques of Guava (*Psidium guajava*) under different growing conditions. *Bangladesh J. Bot.*, 45(2): 313-320.
- Khatun, M. J. M., Islam, M. S., Haque, T. and Khan N. (2008). Propagation of Jackfruit (*Artocarpus heterophyllus* L.) by modified cleft grafting as influenced by time of operation. *Progressive Agric.*, 19(2): 67-74.
- Mukherjee, S. K. and P. K. Majumdar (1964) Effect of different factors on the success of veneer grafting in Mango (*Mangifera indica* L). *Indian J. Hort.*, 21: 4650.
- Mulla, B. R., Angadi, S. G., Mathad, J. C., Patil, V. S. and Mummigatti, U. V. (2007). Studies on softwood grafting in Jamun (*Syzygium cumini* Skeels.). *Karnataka J. Agric. Sci.*, 24(3): 366-368.
- Nalwadi, U. G., A. A. Patil and P. Narayanaswamy, (1988). Softwood wedge grafting – a successful method of grafting for *Champaca* (*Michelia champaca* L inn.) *Curr. Res.* 17:53-54. 6
- Pampanna, Y. and G. S. Sulikeri (2000). Effect of procuring and storage of scion sticks on the success and growth of softwood grafts in Sapota (*Achras zapota* L.) cv. Kalipatti. *Karnataka J. of Agriculture Science*, 14 (4): 1025-1029
- Panicker, P. (1986). Studies on softwood grafting in Mango (*Mangifera indica* L.) var. Alphonso. M.Sc. (Agri.) thesis submitted to D.B.S.K.K.V., Dapoli.
- Shinde, S. B., Saiyad, M. Y., Jadhav, R. G. and J. C. Chavda (2011). Effect of time on softwood grafting success and survival of Jamun (*Syzygium cumini* Skeels) grafts. *International J. of Agril. Sci.*, 7(1): 83-85.
- Sonawane, G. R., Khadekar, R. G., Kolekar, G. N., Haldankar, P. M. and P. C. Mali (2011). Studies on softwood grafting in Carambola (*Averrhoa carambola* L inn). M.Sc. (Hort.) thesis submitted to D.B.S.K.K.V., Dapoli.
- Sridhar, R. (2014). Effect of season on the success and growth of mango (*Mangifera indica* L.) softwood grafts under southern transitional zone of Karnataka. *Environment and Ecology*, 32(4B): 1717-1719.
- Tasnim, N. (2013). Effect of germplasm and time of cleft grafting on the success, survivability and growth in Arma (*Spondias spp.* L). A M.Sc. thesis submitted to the Bangladesh Agricultural University, Mymensingh.
- Waghmare, G. M. (1990). Studies on standardization of softwood grafting in Sapota (*Achras zapota* L.) var. Kalipatti. M.Sc. (Ag.) thesis submitted to D.B.S.K.K.V., Dapoli.