

Original Research Article

Effect of Defoliation on Scion Sticks for Softwood Grafting in Champaca (*Michelia champaca* Linn.) cv. Soundarya

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ABSTRACT

Champaca (*Michelia champaca* Linn.) is one of the fragrant commercial flower crop which is one of the fragrant commercial flower which is spread by humans since ancient times. Because of its greater economic value, multiplication of plants at higher rate of success is an important aspect, therefore for nurseryman present investigation entitled “Effect of defoliation on scion sticks for 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 defoliation of scion sticks with six 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 were significantly influenced by defoliation of scion sticks. The result revealed that maximum number of leaves S_1 (12.35), length of leaf (16.40 cm), leaf area (90.45 cm²), length of new sprout (8.08 cm) and girth of new sprout (2.72 mm) were recorded in treatment S_1 i.e. grafting with 4 days defoliated scion sticks. While minimum days required for sprouting (8.15 days), maximum sprouting percentage (98.00 %) were found in treatment S_5 i.e. grafting with 12 days defoliated scion sticks and maximum survival percentage (71.00 %) were recorded in S_2 i.e. grafting with 6 days defoliated scion sticks. All observations were recorded at the end of 90 days after grafting except days required for sprouting and percent sprouting. It can be concluded that, days of defoliation had significant effect on softwood grafting in champaca. Defoliated scion sticks of 4-6 days has shown promising results for maximum survival of champaca grafts through softwood grafting method under konkan agroclimatic conditions of Maharashtra.

Keywords

Champaca,
Softwood grafting,
Scion sticks,
Defoliation

Introduction

Champaca (*Michelia champaca* Linn.) belongs to family Magnoliaceae having chromosome no. $2n=38$. Although softwood grafting is very convenient method of vegetative propagation, perpetuating some plants that cannot be conveniently multiply

by other vegetative means. Grafted plants commence flowering within few years of planting. It has gained commercial importance due to its fragrant, medicinal value, improve soil status and used by gardeners as ornamental plants. At present, age of defoliated scion sticks has not been standardized which will attain maximum

survival after grafting. Therefore, it is necessary to study the techniques to obtain maximum planting material at higher success rate. Hence, standardization of method of grafting for softwood was carried out using defoliated scion sticks. In this view the investigation was carried on “Effect of defoliation on scion stick for 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 with following layout mentioned below. The experiment was conducted in randomized block design consisted six treatments with four replications. i.e. S₁ – 4 Days after defoliation; S₂ – 6 Days after defoliation; S₃ – 8 Days after defoliation; S₄ – 10 Days after defoliation; S₅ – 12 Days after defoliation and S₆ – 0 Days after defoliation.

The selection of scion sticks was done as per the method described by Raju B.S. (2000). Terminal, one season old matured shoots were selected as a scion material. Scion shoots which are round in shape having plumpy active buds, mostly brown in colour with 10-12 cm in length were preferred at the time of selection. Such selected scion shoots defoliated upto 15 cm length from the tip, scions of 4, 6, 8, 10, 12 and 0 days old prior to grafting and 6 months old rootstock were utilized for experiment. While defoliating the scion shoots, one cm petiole stubs were retained intact. After collection of adequate scion sticks for experiment to be grafted in a day, they were dipped in 0.1% carbendazim solution. It helped to get rid of the fungal infection and also increased the cell turgidity. The softwood grafting operation was

followed as per the method described by Amin (1974) (Table 1 and 2).

Results and Discussion

Days required for sprouting

The earliest sprouting was recorded in 12 days after defoliation treatment S₅ (8.15 days) which was significantly superior over all rest of the treatments. Prior defoliation might be stimulating meristematic activity and increases auxin concentration in the scion before formation of union. The congenial weather conditions especially temperature and humidity prevailing during grafting period must be triggering cell activity in scion. The higher cell activity results in early sprouting. Similar results were reported by Desai (1989) in jackfruit and Shinde *et al.*, (2011) in jamun.

Sprouting percentage (%)

The maximum sprouting percentage was recorded in 12 days after defoliation treatment S₅ (98.00 %) which was at par with treatment S₄ (97.00 %) followed by S₂ and S₃ (91.00 %). Temperature and humidity play important role in the healing of graft union (Hartmann and Kester, 1968). The higher success of grafting may be attributed to the congenial weather conditions (maximum and minimum temperature and optimum humidity) which resulted increased cell activity leading to better union of rootstock and scion (Pampanna and Sulikeri, 2000). Similar results were recorded by Sonawane *et al.*, (2012) in carambola and Bhilare (2017) in lemon.

Survival percentage (%)

The highest survival percentage was found in 6 days after defoliation treatment S₂ (71.00 %) which was at par with treatments S₁

(70.00 %) and S₃ (67.00 %) followed by S₆ (62.00 %) and S₄ (49.00 %). Thus, Prior defoliation helps in increasing the meristematic activity at bud level which results in their swelling of buds, helps in early sprouting of graft and early healing of graft union and results in maximum survival of grafts. Similar results were recorded by Sonawane *et al.*, (2012) in carambola, Das (2013) in jackfruit, Sridhar (2014) in mango and Patil (2018) in bullock's heart.

Number of leaves (no.)

At 45 days after grafting, maximum number of leaves were recorded in 4 days after defoliation treatment S₁ (5.35) and also maximum number of leaves were recorded in 4 days after defoliation S₁ (12.35) at 90 DAG. The season and defoliation had significant effect on number of leaves.

The congenial weather condition in shade net house during grafting period results in higher cell activity which are responsible for more number of leaves. The driving forces for cell elongation and multiplication favours soil moisture, humidity and temperature which produce favourable effect on number of leaves on scion sticks (Bodkhe and Rajput, 2010). Similar results were reported by Raju B.S. (2000) in champaca, Bhilare (2017) in lemon and Sridhar (2014) in mango.

Length of leaf (cm)

At 45 days after grafting, the maximum length of leaf was observed in 4 days after defoliation treatment S₁ (10.91 cm) which was at par with treatment S₂ (9.65 cm) and also the maximum length of leaf was observed in 4 days after defoliation treatment S₁ (16.40 cm at 90 DAG. The minimum length of leaf was observed in 12 days after defoliation treatment S₅ (8.01 cm). The length of leaf was significantly affected by

defoliation of scion sticks for softwood grafting. The optimum temperature might be effective for maximum cell division and more number of leaves, in turn give rise to more photosynthesis which might have increase the length of leaf at greater extent (Sridhar, 2014). Similar results were reported by Khatun *et al.*, (2008) in cleft grafting in jackfruit. Hasna (2011) in cleft grafting of pummelo. Singh *et al.*, (2014) in cleft grafting of mango cv. Amrapali. Bhilare (2017) in lemon.

Leaf area (cm²)

At 45 days after grafting, the maximum leaf area was observed in 4 days after defoliation treatment S₁ (46.29 cm²) and also the maximum leaf area was observed in 4 days after defoliation treatment S₁ (90.45 cm²) at 90 DAG. As the number of leaves increases the metabolic activity of cell is doubled which results in healthy and vigorous growth of grafts, in turn give rise to more photosynthesis which might have increased the leaf area at greater extent (Sridhar, 2014). These results are in association with the results of Thakur and Shah (2013) in mango and Bhilare (2017) in lemon.

Length of new sprout (cm)

At 45 days after grafting, the maximum length of new sprout was observed in 4 days after defoliation treatment S₁ (5.46 cm) and also the maximum length of new sprout was observed in 4 days after defoliation treatment S₁ (8.08 cm) at 90 DAG.

Thus defoliation had significant effect on length of new sprout. The successful grafting correlated to the higher cell activity which was responsible for more number of leaves, it give rise to more photosynthesis which might have increased growth of scion shoot to greater extent (Sridhar, 2014).

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
S ₁	17.20	89.00	70.00	5.35	12.35	10.91	16.40
S ₂	16.20	91.00	71.00	5.10	10.50	9.65	14.97
S ₃	12.55	91.00	67.00	4.35	8.90	8.99	12.14
S ₄	10.00	97.00	49.00	4.25	8.00	8.63	11.78
S ₅	8.15	98.00	48.00	3.55	7.90	8.01	11.51
S ₆	22.75	89.00	62.00	4.65	8.85	8.61	12.83
Range	8.15-22.75	89.00-98.00	48.00-71.00	3.55-5.35	7.90-12.35	8.01-10.91	11.51-16.40
Mean	14.48	92.50	61.17	4.54	9.42	9.13	13.27
S.E.±	0.44	1.07	1.85	0.36	0.66	0.53	0.63
C.D. at 5%	1.33	3.22	5.57	1.09	1.98	1.61	1.90
Result	SIG	SIG	SIG	SIG	SIG	SIG	SIG

S₁ – 4 Days after defoliation; S₂ – 6 Days after defoliation; S₃ – 8 Days after defoliation; S₄ – 10 Days after defoliation; S₅ – 12 Days after defoliation and S₆ – 0 Days after defoliation.
DAG- Days after grafting.

Table.2

Treatments	Leaf area (cm ²)		Length of new sprout (cm)		Girth of new sprout (mm)	
	45 DAG	90 DAG	45 DAG	90 DAG	45 DAG	90 DAG
S ₁	46.29	90.45	5.46	8.08	2.04	2.72
S ₂	40.00	70.81	5.17	7.03	1.78	2.54
S ₃	33.47	41.68	4.59	6.19	1.50	2.13
S ₄	32.83	41.30	4.33	5.88	1.47	1.72
S ₅	28.63	37.03	4.21	4.96	1.31	1.57
S ₆	33.75	60.67	4.59	6.54	1.61	2.38
Range	28.63-46.29	37.03-90.45	4.2-5.5	4.96-8.08	1.31-2.04	1.57-2.72
Mean	35.83	56.99	4.73	6.45	1.62	2.18
S.E.±	1.42	2.07	0.26	0.27	0.15	0.23
C.D. at 5%	4.29	6.24	0.78	0.82	0.45	0.70
Result	SIG	SIG	SIG	SIG	SIG	SIG

These results are in association with the results of Sonawane *et al.*, (2012) in carambola, Thakar and Shah (2013) in mango and Sridhar (2014) in mango.

Girth of new sprout (mm)

At 45 days after grafting, the maximum girth of new sprout was observed in 4 days after defoliation treatment S₁ (2.04 mm) and also the maximum girth of new sprout was observed in 4 days after defoliation treatment S₁ (2.72 mm) at 90 DAG. The maximum number of leaves and girth of sprouted shoots of grafts might be due to stored carbohydrates and other food substances available in the scion sticks after defoliation of scion (Zimmerman, 1958). These results are in association with the results of Thakar and Shah (2013) in mango, Majeed *et al.*, (2015) in mango and Bhilare (2017) in lemon.

From the present investigation it can be concluded that, days of defoliation had significant effect on softwood grafting in champaca. Four to six days defoliated scion sticks was proved to be the best for number of leaves, length and breadth of leaf, leaf area, length and girth of new sprout, and maximum survival percentage of grafts. Hence, defoliated scion sticks of 4-6 days has shown promising results for maximum survival of champaca grafts through softwood grafting method under konkan agroclimatic conditions of Maharashtra.

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