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Short communication

Standardization of softwood grafting in *chironji* (*Buchanania lanzan* Spreng.) under semi-arid environment of western India

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ABSTRACT

The experiment was conducted for two consecutive years at CHES, Vejalpur (Godhra), Gujarat to standardize time of softwood grafting in *chironji* (*Buchanania lanzan* Spreng.). Softwood grafting was carried out at monthly interval commencing July to June. Bud sprout (68.00%) and graft success (66.66%), were noted highest in July. Length of sprout and number of leaves were recorded highest in March. Irrespective of scion and rootstock, maximum accumulation of nitrogen and carbohydrate contents were recorded in March. Softwood grafting in July may be adopted for multiplication of elite *chironji* genotypes.

Key words: Buchanania, deft grafting, softwood grafting.

Chironji (*Buchanania lanzan* Spreng.) of family Anacardiaceae assumes great significance due to rich source of protein. The kernel is highly nutritious and rich in protein and yields sweet oil, which can be used to substitute olive and almond oil (Singh *et al*., 6). A wide range of variability occurs with regard to fruit size and quality owing to seed propagation (Singh *et al*., 6; Singh and Singh, 3). Of various methods of propagation, grafting is of paramount importance in fruit trees as it results in high success and better field establishment in *jamun*, tamarind and guava (Chovatia and Singh, 2; Singh and Singh, 4; Syamal *et al*., 7). The time is considered to be the most vital factor that determines the success and establishment of the grafts hence, the present investigation was undertaken to standardize the suitable time for softwood grafting under semi-arid environment of western India.

The investigation was carried out at CHES, Vejalpur (Godhra), Panchmahal, Gujarat for two consecutive years. The locally available seeds of *chironji* were shown in the polythene bags filled with soil and farmyard manure (2:1) for raising rootstocks. About 9-12 month-old seedlings of uniform size having stem of pencil thickness were used as rootstock. Softwood grafting (Through cleft method) was carried out at monthly interval commencing from July to June and the two years data were pooled. Scion shoots of promising genotype having desirable horticultural traits were used to perform grafting. The experiment was laid out in completely randomized block design with three replications and 20 plants in each replication as unit. Data on bud sprouting was recorded soon after bud burst, while success percent was recorded three months after grafting. Length and diameter of sprout, number of leaves and sprouts per plant were recorded at the interval of 90,120 and 150 days after grafting. Total nitrogen, protein and carbohydrates were determined by the methods suggested by AOAC (1).

It was observed from the data in Table 1 that scion bud sprouted earliest when grafting was done in the month of July (24.66 days), closely followed by April and August. Maximum time for bud sprouting was taken when grafting was done in October (31.67 days). The delayed bud sprouting in the month of October probably was caused due to fall in temperature and inadequate flow of cell sap. Higher temperature and humidity during July-August helped in early sprouting because of fast establishment of vascular connection amongst rootstock and scion as has been reported by Singh and Singh (4), and Singh and Singh (3) in *jamun*. The highest bud sprouting (68.00%) was recorded when grafting was done in July, followed by August, September, March and April. Plants recorded least bud sprouting in February (4.00%). Two years pooled data exhibited maximum graft success in the month of July (66.66%), closely followed by August and September. This finding is in agreement with the findings of Chovatia and Singh (2) and Singh *et al.* (5) on *jamun*. Wide variation in temperature and relative humidity influence the sprouting and graft success (Singh *et al*., 5). The optimum temperature and relative humidity prevailing during the period of grafting might have played an important role in early contact of cambium layers of stock and scion resulting in early callus formation and initiation of subsequent growth. Singh and Singh (3) also recorded that total nitrogen and carbohydrate contents showed increasing trend during March-April and that must have equally contributed in healing of the grafts. The data on growth parameters

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Table 1. Effect of time of propagation on bud sprouting, time taken for bud sprout and success percent in buchanania.

Treatment	Time taken for bud sprout (days)	Bud sprout (%)	Success (%)
July	24.66	68.00 (55.55)	66.66 (54.70)
August	25.57	67.00 (54.94)	62.10 (52.00)
September	29.33	58.10 (49.66)	56.00 (48.45)
October	31.67	34.00 (35.67)	32.50 (34.76)
November	0.00	0.00 (0.17)	0.00 (0.17)
December	0.00	0.00 (0.17)	0.00 (0.17)
January	0.00	0.00 (0.17)	0.00 (0.17)
February	30.00	4.00 (11.54)	3.33 (10.47)
March	26.50	45.20 (42.25)	42.00 (40.40)
April	25.00	40.00 (39.23)	38.10 (38.12)
May	27.33	34.00 (35.67)	32.20 (34.57)
June	26.67	47.50 (43.57)	45.10 (42.19)
$CD_{0.05}$	2.39	3.25	2.58

Figures in parentheses are transformed values

like sprout length, sprout diameter, number of leaves and sprout per plant were recorded and at 150 days after grafting, maximum mean sprout length (27.00 cm) and sprout diameter (0.72 cm) were recorded when grafting was done in March, closely followed by April. At 150 days after grafting, the maximum number of sprout per plant, *i.e*. 3.00 was recorded in the month of March and April. The number of leaves also increased with increasing days after grafting and the maximum number of leaves per plant (11.00) was recorded in March after 150 days of grafting. The quick and strong union formation, better nutrient uptake and ample growing period might have caused for higher plant growth and more number of leaves per plant in the month of March, April, June, July and August. Earlier, Singh and Singh (3, 4) recorded similar findings in *jamun* and tamarind, respectively under different agro-climatic conditions. The rootstock had significantly higher content of total nitrogen than that of scion (Table 3). Maximum accumulation of nitrogen content

Table 3. Biochemical constituents of scion and rootstock at the time of grafting in buchanania.

Treatment	Total N (%)		Total carbohydrates (%)		C : N ratio		Protein (%)	
	Rootstock	Scion	Rootstock	Scion	Rootstock	Scion	Rootstock	Scion
July	0.37	0.33	12.10	11.00	32.70	33.33	2.31	2.06
August	0.38	0.35	12.00	11.10	31.57	31.71	2.37	2.18
September	0.32	0.24	12.40	11.10	38.75	46.25	2.00	1.50
October	0.29	0.23	12.10	11.00	41.72	47.82	1.81	1.43
November	0.28	0.22	12.00	11.00	42.85	50.00	1.75	1.37
December	0.27	0.21	11.30	10.30	41.85	39.04	1.68	1.31
January	0.30	0.25	11.10	10.00	37.00	40.00	1.87	1.56
February	0.37	0.24	11.50	11.20	41.08	46.66	2.31	1.50
March	0.46	0.39	13.00	12.00	28.26	30.56	2.87	2.43
April	0.38	0.28	12.00	12.00	31.57	42.85	2.37	1.75
May	0.37	0.33	12.00	10.80	32.43	32.72	2.31	2.06
June	0.33	0.27	12.10	10.90	36.66	40.37	2.06	1.66
$CD_{0.05}$	0.04	0.05	0.60	0.51	2.52	2.83	0.18	0.16

was recorded in March in both rootstock (0.46%) and scion (0.39%), while it was found in lower concentration during the month of September, October, November, December and January. Similarly, carbohydrates content was recorded higher in the month of March and April, closely followed by July and August. Higher protein content was estimated in the rootstock than scion, and was found to be maximum in the month of March, while the lowest protein accumulation was recorded in the month of December. Chovatia and Singh (2) and Singh and Singh (3) recorded similar findings in *jamun*. It is concluded that softwood grafting in July may be followed for efficient multiplication of elite *chironji* genotypes under semi-arid environment of western India.

Table 2. Effect of time and method of propagation on length and diameter of sprout (cm), number of sprouts and number of leaves (150 days after grafting) in buchanania.

Treatment	L.S. (cm)	D.S. (cm)	N.S. (cm)	NL (cm)
July	22.50	0.69	2.66	9.00
August	22.00	0.69	2.66	9.00
September	21.20	0.69	2.66	8.33
October	20.13	0.67	2.33	7.66
November	0.00	0.00	0.00	0.00
December	0.00	0.00	0.00	0.00
January	0.00	0.00	0.00	0.00
February	22.13	0.71	2.00	9.00
March	27.00	0.72	3.00	11.00
April	26.20	0.70	3.00	10.00
May	25.13	0.69	2.66	9.00
June	24.50	0.68	2.66	9.00
$CD_{0.05}$	1.77	0.02	0.12	1.12

LS = Length of sprout, DS = Diameter of sprout, NS = No. of sprouts, NL = No. of leaves

REFERENCES

1. A.O.A.C. 1990. *Official Methods of Analysis*, Association of Official Agricultural Chemists (13th Edn.), Benjamin Franklin Station, Washington, DC.
2. Chovatia, R.S. and Singh, S.P. 2000. Effect of time on budding and grafting success in *jamun* (*Syzygium cuminii* Skeels). *Indian J. Hort.* **57**: 255-58.
3. Singh, Sanjay and Singh, A.K. 2006. Standardization of method and time of propagation in jamun (*Syzygium cuminii* Skeels) under semi-arid environment of western India. *Indian J. Agric. Sci.* **76**: 142-45.
4. Singh, Sanjay and Singh, A.K. 2007. Standardization of method and time of propagation in tamarind (*Tamarindus indica* L.) under semi-arid environment of western India. *Indian J. Hort.* **64**: 45-49.
5. Singh, Sanjay, Singh, A.K. and Bagle, B.G. 2007. Propagating *jamun* successfully. *Indian Hort.* Nov-Dec, pp. 31-33.
6. Singh, Sanjay**,** Singh, A.K., Joshi, H.K., Lata, K., Sisodia, P.S. and Bagle, B.G. 2010. Floral biology studies in *Buchanania* under semi-arid ecosystem of western India. *Indian J. Hort.* **67**: 161-68.
7. Syamal, M.M., Katiyar, R. and Joshi, M. 2012. Performance of wedge grafting in guava under different growing conditions. *Indian J. Hort.* **57**: 255-58.

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