



## Multiplication of mulberry varieties through semi hard wood cuttings in arid region

D. K. Sarolia\*, R. K. Meena and U. V. Singh

ICAR-Central Institute for Arid Horticulture, Bikaner 334 006, Rajasthan

\*Corresponding author's email: deephorti@gmail.com

(Received: 08.02.2020; Accepted: 19.04.2020)

Mulberry (*Morus sp.*) is an underutilized fruit plant of tropical to subtropical province and native to south west Asia to China. Genus *Morus* comprises about sixteen species of deciduous nature. This fruit plant is fast-growing when young, but soon become slow-growing. The leaves are alternately arranged, simple and often lobed and serrated on the margin. Inflorescence catkin and fruit type is a multiple, immature fruits are green or pale yellow. The fruits of the species *alba* are greenish yellow when ripe and *nigra/rubra*, turn dark purple or black and have a sweet flavour when fully ripe.

Mostly this crop is being cultivated for rearing of silkworm and wind break rather than fruit crop. This crop not specific with climatic requirement so can be grown in arid, marginal soil, barren land without much care. Fruits use as fresh desert and in processing for making of different products like jam, beverages *etc.* Root has high medicinal properties and wood for sports article preparation and twigs for making baskets of packaging. In order to meet out planting material requirement, development of an easier, quicker and economic method of propagation is required. The raising of mulberry plants by cuttings has been found to best as it is quick, less expensive and requires less space and skill. The higher rooting potential of semi hardwood cuttings has been attributed to endogenous auxin in tender vegetative growth of such cuttings (Hartmann and Kester, 1983). It is a well known fact that physiological status of the plant exerts a strong influence on the root initiation. The involvement of root metabolites and rooting promoters/ inhibitors has been reported to play a significant role. ICAR-Central Institute for Arid Horticulture has identified two varieties of mulberry namely Thar Harit (a short stature and spreading growth habit, green white colour, pendulous shape fruits, fruits ripens in 38-42 days from set and suited for table & processing purposes) from *Morus alba* group and Thar Lohit (Spreading growth habit skin colour red fruit ripens 32-36 days from fruit set, TSS 20.8° B and acidity 1.6 % with ascorbic acid 11.2 mg 100g<sup>-1</sup> edible pulp) from *Morus rubra* group (Anon., 2017) used as experimental material with the aim to produce true to type planting material of these varieties through cuttings.

The experiment was conducted during 2017-18 at nursery unit, ICAR-Central Institute for Arid Horticulture,

Bikaner is located on 28° N latitude, 73° 18' E longitude and at altitude of 234.84 m above sea level. The semi hard wood cuttings of mulberry varieties Thar Harit and Thar Lohit were planted on protrays and polybags conditions (Fig 1a & 1b). Stem cuttings were prepared during late January month about 20-25 cm long, 1.5-2.5 cm diameter and containing 3-4 nodes per cutting (Pathak, 1996). After IBA (1000 ppm) treatment planted in slanting position in protrays containing media mixture of vermiculite, perlite and cocopeat in the ratio of 1:1:2, respectively. Further successful cuttings were shifted in polybags containing mixture of pond silt, FYM and soil (1:1:2). From each variety prepared 100 cuttings and two sets of the experiment kept in green agro-shed net of 50 % light intensity conditions. Uniform nursery practices were followed during the experimentation. Observations on cuttings survivability shoot growth, root: shoot, success per cent *etc.* were recorded up to 6 month after planting as per standard methodology. Further, vigour index was calculated by the formula proposed by Abdul and Anderson (1973) *i.e.* averaged root length (cm) + averaged shoot length (cm) x survival percentage in polybags conditions. Data were analysed with t-test and two factors (varieties and months) analysis using statistical online OPSTAT software developed by Sheoran *et al.* (1998)

Results revealed that both the varieties were showed initiation of sprouts about a month after planting; however Thar Harit took six days more compared to Thar Lohit. Initial sprout and survivability observed higher in Thar Lohit and maximum survivability (85 %) in protray condition. After sprout maximum drying of shoot was observed in Thar Harit and because of that received only 35 per cent survivability. The possible reason for the better survivability was due to difference in genetic makeup of the both the varieties either alone or in combination with environmental factors, that might contributed to the higher carbohydrate supply to root resulting in better sprout growth and initial survivability as evident in the present study. These results are in accordance with the findings of Davis and Hartmann (1984) and Hartmann *et al.* (2002)

Further in polybag (containing mixture of pond silt, FYM and soil) conditions at 4 month after shifting maximum shoot length (22.4 cm) and inter nodal length (3.8 cm) in Thar

Harit and other parameters namely, nodes number (10.2), root length (15.6 cm), root: shoot (0.82), vigour index (2760) and success per cent (80 %) were higher in Thar Lohit. It might be due to difference in nature of varieties with respect to growth, development, survivability, root/shoot ratio and uptake of moisture play key role in enhancement of vigour index of poly bag shifted plants. These results are in accordance with the results of Maynard and Bassuk (1988). The variety Thar Lohit recorded early root initiation, higher root/ shoot ratio and vigour index provides higher survival percentage of rooted air layers after shifting. Thus, Mulberry variety Thar Lohit was found to be easy-to-root and registered higher success rate compared to the variety Thar Harit in irrigated hot arid

conditions.

Results revealed that both the varieties have showed initiation of sprouts about a month after planting and maximum survivability (85%) was recorded in variety Thar Lohit in protray condition. Further in polybags condition maximum shoot length and inter nodal length was observed at 4 month after shifting in Thar Harit and other parameters namely, nodes number, root length, root: shoot, vigour index and success per cent (80%) were higher in Thar Lohit. Thus, mulberry variety Thar Lohit was found to be easy-to-root and registered 31.25% higher success rate compared to the variety Thar Harit

Table 1. Performance of stem cuttings in pro tray conditions

S. No.	Particulars	Mulberry varieties		SEm±	T cal
		Thar Harit	Thar Lohit		
1	Days to sprout	36	29	1.15	31.18
2	Sprout (%)	69	90	1.37	50.50
3	Survivability (2MAP)	30	85	0.58	51.96

MAP=months after planting and t tab value=2.57 at 5 % level

Table 2. Performance of mulberry varieties in polybags conditions at 2 and 4 month after shifting

S.No.	Parameters	Thar Harit		Thar Lohit		SEm±	CD (5%)
		2 month	4 month	2 month	4 month		
1	Shoot length (cm)	10.63	22.4	12.6	18.92	0.24	0.71
2	Number of leaves	5.46	8.53	7.16	10.20	0.12	NS
3	Internodal length (cm)	2.52	3.84	2.20	3.11	0.04	0.13
4	Root length (cm)	5.66	10.2	8.19	15.59	0.15	0.45
5	Root: shoot	0.53	0.46	0.65	0.82	0.01	0.03
6	Shoot: root	1.88	2.19	1.54	1.21	0.02	0.07
7	Success (%)	30.0	24.6	85.0	80.0	0.89	NS
8	Vigour index	486	815	1768	2760	24.61	72.25



Cuttings in protray



Thar Harit



Polybags shifting

Saplings

Fig. 1a. Mulberry propagation through semi hard wood cuttings



Thar Lohit

Fig. 1b. Mulberry propagation through semi hard wood cuttings

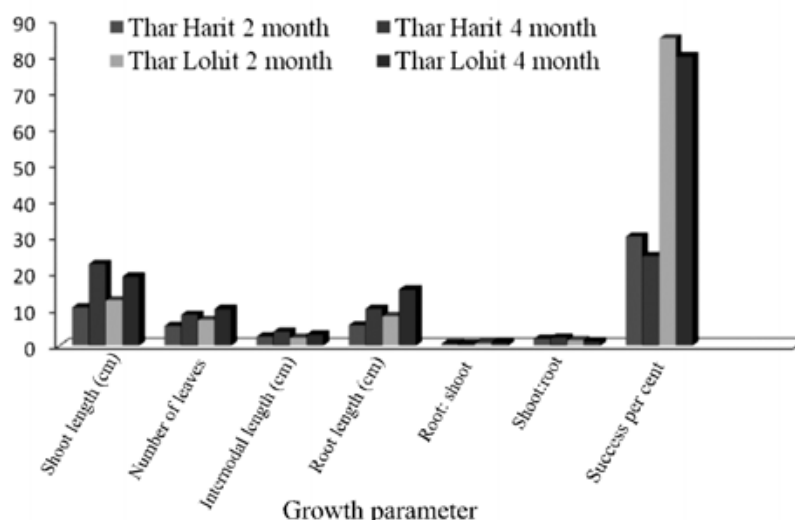


Fig. 2. Performance of semi hard wood cuttings of mulberry in polybags

## References

- Abdul Baki, A. and Anderson, J.D. 1973. Vigour determination in soybean seed by multiple criteria. *Crop Science*, 13:630-633.
- Davis, F.T. and Hartmann, H.T. 1984. Physiological basis of adventitious root formation. *Acta Hort.*, 227:113-20.
- Hartmann, H.T. and Kester, D.E. 1983. Plant Propagation: Principles and Practices. (4<sup>th</sup> Edn.), Prentice hall, Delhi, pp.349-50.
- Hartmann, H.T., Kester, D.E., Davies, F.T. and Geneva, R.L. 2002. Plant propagation: Principles and Practices Hall, Delhi, pp.349-350.
- Anonymous, 2017. An overview. CIAH/Tech/Pub./ No.60:10p
- Maynard, B.K. and Bassuk, N.L. 1988. Etiolation and banding effects on adventitious root formation. In: Adventitious Root Formation in Cuttings; Davis, T.D. Haissing, B.E. and Sankhla, N. (Eds.). Portland Oregon: Dioscorides Press, pp.29-47.
- Pathak, R.K. 1996. Phal Vriksh Pravardhan, ICAR, New Delhi, pp.95.
- Sheoran, O.P., Tonk, D.S, Kaushik, L.S., Hasija, R.C and Pannu, R.S. 1998. Statistical Software Package for Agricultural Research Workers. Recent Advances in information theory, Statistics and Computer Applications by D.S. Hooda and R.C. Hasija Department of Mathematics Statistics, CCS HAU, Hisar, pp.139-143.p