VEGETATIVE PROPAGATION OF *HYMENAEA COURBARIL* BY AIR LAYERING

Thirunavoukkarasu*, M. Brahmam & N. K. Dhal

Aromatic and Medicinal Plants Department, Regional Research Laboratory (Council of Scientific and Industrial Research), Bhubaneswar - 751 013, Orissa, India

Vegetative propagation through cutting, grafting, budding and air layering has been a vital tool in tree improvement programmes and is used for multiplying desirable trees without genetic segregation. It also enables a tree breeder to multiply seedlings quickly for further planting of desired tree species besides making it possible for them to maintain the desired parental genotypes. However, the success of propagation using root cuttings is marginal for some species. In this case air layering can be used as an intermediate method to obtain roots for these species (Zobel & Talbert 1984).

Hymenaea courbaril (Caesalpinoideae) is a promising tropical tree species suitable for the Orissa agroclimatic condition due to its fast growth and nitrogen fixing ability. Its biomass is generally utilised in the pharmaceutical, wood and resin industries (Caseres *et al.* 1991). However, propagation of this species by cuttings and seeds exhibits very low rate of regeneration (Thirunavoukkarasu & Brahmam 1997). Hence, air layering method was tried to mass multiply this valued species.

The study was conducted at the experimental garden of the Regional Research Laboratory (20° 17' N latitude and 85° 49' E longitude), Bhubaneswar, Orissa, India. A few phenotypically superior trees having good growth form, superior height and bole diameter were selected by ocular judgement (Kedarnath 1982) for the present study. Using a scraping knife, healthy limbs of the trees were girdled at a width of 2.5 cm, about 25 cm away from the tip of the limbs. The girth of the limbs varied from 1.75 to 3.5 cm. There were 20 limbs per treatment with a total of 140 air layers per replication.

Indole-3-butyric acid and indole-3-acetic acid solutions in the concentrations of 1000, 2000 and 3000 ppm were prepared by dilute solution method (Hartman & Kester 1972). Dried sphagnum moss was soaked in the prepared auxin solutions and kept for 24 hours. Water-soaked sphagnum moss served as control. A handful of soaked sphagnum moss, from which excess hormonal solution was squeezed out, was used to cover the ringed area. The area was then wrapped tightly with a polypropylene film and tied above and below the ball of moss with a thread. Two to three holes were made on the polypropylene film for aeration and the moss was kept moist by spraying water at least once a week. Weekly observation for root formation was carried out for 60 days, after which limbs were severed from the mother plant. The number of roots per rooted limbs and root length were recorded and statistically analysed. Severed rooted layers were then planted in pots containing soil, sand and farm yard manure at 1:2:1 ratio.

Results showed that rooting response varied with auxin treatment of the limbs. Earlier rooting response in layers was noticed with IBA treatment compared with IAA. Air layers started to bulge after three weeks but roots were only visible after 35 to 40 days. After 60 days, all layers showed good rooting within the ball of moss. All layers rooted in IBA 1000 and 2000 ppm concentrations (Table 1). In IAA treatment, maximum rooting response

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**E-mail: arasu@rrlbhu.res.in*

Table 1 Rooting response on air layered limbs of *Hymenaea courbaril*

Treatment	Rooting response (%)	Mean no. of roots/ rooted cutting	Mean root length (cm)
Control	20	2.1 ± 1.22	1.0 ± 0.48
IAA			
1000 ppm	40	3.1 ± 1.20	2.2 ± 0.28
2000 ppm	40	3.0 ± 2.58	3.2 ± 1.50
3000 ppm	60	3.3 ± 1.21	3.8 ± 1.80
IBA			
1000 ppm	100	12.6 ± 8.43	2.7 ± 1.87
2000 ppm	100	7.8 ± 4.81	2.4 ± 1.70
3000 ppm	–	–	–

was recorded with 3000 ppm concentration, which showed rooting in 60% of the limbs. The number of roots per rooted cuttings and root length were highest in IBA 1000 ppm and IAA 3000 ppm. IBA at 3000 ppm showed inhibitory effects and limbs dried after 40 days of air layering. Maximum number of roots per rooted cutting was observed in limbs with girth of 2.0 to 2.5 cm. Rooted layers that were planted in the pots showed 90% survival.

The present study revealed that IBA at low concentrations had a pronounced effect on root formation of the limbs of *H. courbaril*. It has been reported that root induction in air layered limbs of *Cassia fistula* was successful with the application of IBA at 2500 ppm but a further increase in concentration reduced the rooting potential (Misra & Jaiswal 1994). IBA performed better that IAA and this conforms with results of other studies (Puri & Nagpal 1988, Gupta *et al.* 1993, Thirunavoukkarasu & Brahmam 1999). Pre-treatment with IBA will supplement the endogenous level of auxin and increase its availability in the surface area of cut end, which in turn assists on rhizogenesis (Audus 1953).

In air layer experiments, auxins are usually applied directly to the cut surface either in powder or solution form. However, this may sometimes result in poor adsorption or excess absorption of auxin. In the present investigation, the sphagnum moss was soaked overnight in auxin concentrations and applied to the cut surface, thereby, the limb gets uniform auxin treatment. From this study, we conclude that sphagnum moss soaked with IBA was an appropriate method for the production of clones of *H. courbaril* for large-scale planting.

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