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ROOTING OF BRANCH CUTTING OF *LAGERSTROEMIA SPECIOSA* RETZ., *EUCALYPTUS CAMALDULENSIS*, DEHN. AND *ERYTHRINA INDICA*, LAM.

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Abstract: Rooting trials of branch cuttings of jarul (*Lagerstroemia speciosa* Retz.), eucalyptus(*Eucalyptus camaldulensis* Dehn.) and mandar (*Erythrina indica* Lam.) from 30,15 and 10 years old trees respectively were conducted treating them with Indole Butyric Acid (IBA) powder (0.4 or 0.8% IBA) and setting them under open mist. In Jarul, IBA had positive effect on rooting success and rooting time. Both root number and root length per cutting was also enhanced by IBA application. In the leafy cutting of eucalyptus, rooting success was significantly influenced by the IBA concentrations. The highest rooting percentage was found in cuttings treating with 0.8% IBA. For mean root number and root length, IBA did not show any positive effect. In mandar, IBA did not show any positive effect on rooting success, mean root length and root number.

Keywords: Rooting; Branch cutting; *Lagerstroemia speciosa*; *Eucalyptus camaldulensis*; *Erythrina indica*

Introduction

Propagation by stem cutting is one of the important methods for cloning of selected individuals. Selected trees are generally phenotypically superior plus trees and cloning is done for utilizing the best performer existing in tree population. In vegetative propagation, the inherent quality can be maintained for mass production of genetically identical propagules of selected individuals to establish clonal plantations, seed orchards, stock-plant orchards, clonal banks and/or clonal field trials.

In Bangladesh, seed orchards and clonal banks for several forest tree species has been established mainly by using grafting or budding methods of vegetative propagation since 1977 (Hoque and Alam, 1986). But canckar like formation on the ramet stems at the graft union site has been observed in some Teak (*Tectona grandis*) and Gamar (G*melina arborea*) seed orchards (Rashid *et al.*, 1986). To avoid danger of tissue in-compatibility and to make the unit cost of propagule production low, propagation by stem cutting is an important option.

Therefore, a study was taken to test the rooting ability of branch cutting of Jarul, eucalyptus and mandar. Jarul and eucalyptus are the most common plantation species and mandar is a common live-fence species in Bangladesh. Jarul wood is light wood, hard, durable, and used for general construction, boat building, carts, furniture and other purposes. Eucalyptus wood is useful in

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general construction, pulp and paper, fire wood, furniture, boxes, post and novelties. Mandar is a multipurpose tree species used to shade perennial crops, used as livestock forage; the roots are generally associated with the nitrogen fixing bacteria, *Rhizobium* sp. and they have the capability to fix atmospheric nitrogen through nodulation (Russo, 1991). Moreover, mandar tree supports betel vines and black pepper. Its light soft wood is used for seive-frame, scabbards, domestic utensils and other purposes.

Materials and Methods

Branch cuttings of jarul were harvested from Kaptai and eucalptus and mandar from Bangladesh Forest Research Institute (BFRI) campus, Chittagong. The ages of donar plants were 30, 15 and 10 years for jarul, eucalyptus and mandar respectively. The cuttings were 15-20 cm long. Mean diameter of the cuttings of jarul, eucalyptus and mandar were 1.0, 7 and 2.0 cm respectively. Number of nodes per cutting was 3 for each species. Cuttings of jarul and mandar were non-leafy and that of eucalyptus was leafy. Each leaf was trimmed to less than half retaining 50 cm^2 leaf area. The basal area of the cuttings of all the species were treated with 0.4 % or 0.8% IBA in talc powder. The cuttings serving as controls were not given any treatment. Rooting medium was a mixture of gravel, coarse, and fine sand. The gravel layer (7.5cm) was at the bottom. The coarse sand layer (15 cm) was in the middle and the fine sand layer (15 cm) was to the top. The rooting bed was made at the nursery under the open sun. Watering was made by automatic mist spray with regular interval. The mean temperature of the rooting medium was 31.2 ^oC and relative humidity in the air was 55% at the middle of the day. Randomized block design was followed for the experiment. There were 3 replications of 10 cuttings totaling 30 cuttings for each treatment. The experiment was conducted in April in Bangladesh.

Results and Discussion

Jarul: Formation of new buds and roots was found earlier in the treated cuttings than the control. Higher degree of correlation between the intensity of bud development and root formation was observed. The need for buds for rooting of cuttings was reported by Fadl and Hartman (1967). Treated cuttings rooted after 10 days whereas control cuttings after 14 days. The use of IBA enhanced rooting time was reported by Kumar *et al.* (1993). IBA had positive effect on rooting and the highest concentration (0.8%) showed highest (67%) rooting success (Table-1). Similar findings were also reported by Gupta *et al*. (1993) and Kamaluddin (1996). Average root number and root length per cutting were also found higher in the cuttings treated with 0.8% IBA (Table-1). Similar trend was also reported by Bhardwaj *et al.* (1993) and Kamaluddin (1996). Across the treatments, significant differences were found both in root number and root length. Significant difference was found in rooting success between 0.8% and 0.4% but no difference was found between 0.4% and control (Table-1).

Eucalyptus: First root appeared after 10 days in the IBA treated leafy (50m^2) cuttings and after 15 days in the leafy (50 m^2) control cuttings. Rooting time was significantly influenced by the IBA concentrations. It indicated that the applied auxin (IBA) enhanced rooting time, also reported by Kumar *et al.* (1993). Cuttings treated with IBA (0.8%) showed highest rooting success (67%) (Table- 1). Similar results were also reported for *Perilia prutesuns* (Badola *et al.,* 1993) and *Dalbergia sissoo* (Kamaluddin *et al.,* 1994). However, in an observation made by Kamaluddin (1996), the rooting success was found more in 0.4% than 0.8% IBA with the same species. Kamaluddin (1996) used cuttings taken from 3 months old stock plants whereas in the present study the cuttings were taken 15 years old plants. The juvenile cuttings might contain more root

forming endogenous auxin content than the mature materials and hence the branch cuttings collected from mature trees responded more to the highest concentration (0.8%) of IBA. In case of mean root number and root length, IBA did not show any positive effect as there were no significant differences among treatments (Table-1). Kamaluddin *et al.* (1994) recorded similar observations where IBA application did not significantly affect the maximum root length in leafy cuttings *of Dalbergia sissoo*.

Table- 1. Effect of IBA on jarul, eucalyptus and mandar branch cuttings in open mist condition.

Species	IBA conc.(%)	Average root no.	Average root length (cm)	Rooting success (%)
Jarul	0.8	a3.7±2.3	a5.5±2.7	67.0
	0.4	b2.9±1.9	c3.1±2.0	53.0
	0.0	c1.5±0.8	b4.3±2.6	50.0
Eucalyptus	0.8	a2.5±1.3	a1.6±0.6	67.0
	0.4	a2.3±1.0	a1.7±0.9	50.0
	0.0	a2.0±1.0	a1.4±0.7	43.0
Mandar	0.8	a14.7±7.4	a7.6±1.8	63.0
	0.4	a15.3±7.2	a7.7±4.3	50.0
	0.0	a14.5±5.2	a6.9±1.6	67.0

■ ± represents t.se (at p=0.05) and a, b and c signify the significant differences (p=0.05) as measured by DMR test.

Mandar: Buds sprouted after 10-15 days in treated and control cuttings. Roots appeared in both the treated and the control more or less at the same time, after third week of setting the experiment. Highest rooting success was found in the controls (67%) but among the IBA concentrations , 0.8% showed the highest success (63%). IBA did not show any positive effect on the mean root number and root length and no significant differences were found among the different concentrations of IBA and the controls (Table- 1). Similar results of IBA application with root length were reported by Kamaluddin *et al*. (1994). Moreover, reports were available for some tropical forest tree species where the overall percentage of rooting was found to be unaffected by IBA treatment (Lo, 1985). Russo (1991) reported 70-90% rooting success with *Erythrina poeppigiana* without the application of any growth hormone. However, Russo (1991) used large size cuttings: 2.5 m long and 8-12 cm diameter. Large size cuttings content more carbohydrates and there exits a good correlation between carbohydrate content and rooting ability in cuttings (Eliasson, 1978).

Conclusion

Though the rooting success for jarul (67%) and eucalyptus (67%) was not up to satisfaction to start clonal propagation, the results suggest that it would be possible to establish stock plant orchards of selected mature trees. Juvenile cutting from stock plants should be used for better rooting success. In mandar, large-scale propagation could be possible by using large size cuttings although the present rooting success was 67%. Use of IBA did not enhance percentage cuttings rooted over the control cuttings; rather the control cuttings registered highest rooting success. Using low-cost and non-mist propagator with the arrangement of high humidity control could be a better option over the high technology mist spraying used in the present experiment.

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