

## ***In-Vivo* Propagation of Rosewood (*Delbergia latifolia* roxb.) Through Stem Cuttings**

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### **Abstract**

*Dalbergia latifolia* is a premium-quality timber and medicinal plant species internationally known as "Indian Rosewood". This valuable plant species is native to India and all the natural strands are fast disappearing due to the higher exploitation. Conventional propagation by grafts and rooted cuttings is time consuming. Seed propagation is not successful due to low viability, not uniform maturity, and genetic variability. Therefore to overcome these problems, alternative propagation technique is essential for mass scale production of planting material of rosewood. This investigation was carried out with the objective of development of *in-vivo* propagation technique for *Delbergia latifolia* using stem cuttings. Semi hard wood cuttings were separated from the mother plant and all the cuttings were dipped in coconut water for two hours just after getting cuttings from the mother plants. Potting mixture was prepared by sieved coir dust:sand 1:1 ratio and moistened using fungicide (Topsin) solution. Potting mixture was filled in to 300 gauge and 18cm wide 45cm high transparent polythene bags. Cuttings were dipped in 3000ppm IBA, 4000ppm IBA, 3000ppm NAA, 4000ppm NAA, 3000ppm IBA+NAA (1:1 ratio), 4000ppm IBA+NAA (1:1 ratio) rooting hormone solutions for 2minutes before planting. After dipping rooting hormone solutions, Rooceta (commercially available rooting hormone) was applied into all the cuttings and carefully planted in single plant propagators. The lowest time taken to rooting showed in the treatment which applied 4000ppm IBA solution (33 days) followed by the treatment of 3000ppm NAA (35days) and the highest time taken for rooting was recorded from the treatment of 4000ppm NAA solution (61.333days). The highest number of shoots was recorded in the treatment of 3000ppm IBA (8.6667) followed by the treatment of 4000ppm IBA and the lowest number of shoots were observed in the cuttings treated with 4000ppm NAA (2.6667). The treatment with 4000ppm IBA+NAA showed the highest shoot length (0.7450) and treatment with 3000ppm IBA showed the lowest shoot length. Findings of the study implies that Rosewood can be best propagated by semi hardwood cuttings using 4000 ppm IBA treatment effectively by initiations the roots by lowest number of days with vigorous highest number of shoots.

**Keywords:** *Delbergia latifolia* Roxb, *In-vivo* propagation, Stem cuttings

### **INTRODUCTION**

Rosewood (*Dalbergia latifolia* Roxb.) is one of the most valuable timber trees and medicinal plant belonging to the family Fabaceae. Rosewood is native to India and is slow growing. Their export value is more than in the local market, and is already beyond the reach of the common man because of exorbitant prices. Rapid propagation of superior trees of good form, cylindrical bole, narrow crown and of disease free condition is of utmost importance. Tannins extracted from the bark of rosewood are used for a number of medicinal purposes such as stomachic stimulant, used in indigestion, diarrhea, leprosy, obesity and worms (Yusuf *et al.*, 2009).

Rose wood can be propagated through seeds and rooted cuttings. However few mother plants are available in Sri Lanka are not yet seed bearing and seed propagation is not successful due to low viability, not uniform maturity, and genetic variability. Propagation through rooted cuttings is also limited and time consuming. At the same time no any studies have been conducted in locally

on propagation through stem cuttings, may be due to the scarcity of mother plants. Therefore an effective method of propagation should be applied to mass scale propagation of rose wood due to huge demand in this valuable tree species for large scale plantation by tree plantation companies in Sri Lanka. In this regards, it was expected to develop a feasible protocol for production of planting materials for this valuable plant. This investigation was carried out with the objective of development of *in-vivo* propagation technique for *Delbergia latifolia* using stem cuttings.

## MATERIALS AND METHOD

Semi hard wood cuttings were collected from three years old mother plant, available at the Department of Crop Science, Faculty of Agriculture, University of Ruhuna. Cuttings were prepared consisting with 3-4 nodal segments with 2-3 leaves and all other leaves were removed. All the cuttings were dipped in coconut water for 2 hours just after removing the cuttings from the mother plant. Potting mixture was prepared by sieved coir dust:sand 1:1 ratio and moistened using fungicide (Topsin) solution at the rate of 10g per 10 L of water. Potting mixture was filled in to 300 gauge, 18cm wide and 45cm high transparent polythene bags. Moisture content of the media was adjusted to be able to prepare balls by squeezing hand and mixture was filled in to polythene bag in 12cm height. Prepared cuttings were taken out of the coconut water and dipped in to different concentrations of different rooting hormones as assigned in different treatments for 2 minutes (3000ppm IBA, 4000ppm IBA, 3000ppm NAA, 4000ppm NAA, 3000ppm IBA (50%)+NAA (50%), 4000ppm IBA(50%) + NAA(50%). Then Roocta (commercially available rooting hormone) was applied in to basal end of the cutting. Planting holes were prepared in the medium of the polythene bag and two cuttings were planted in one single polythene bag and tops of the polythene bags were tied using tread to ensure 100% Relative Humidity inside the polythene bag (single plant propagator). Propagators were kept inside the shade house carefully. The experiment was laid out according to a Factorial Completely Randomized Design with 4 replications. Observations were taken daily.

## RESULTS AND DISCUSSION

### Time taken for rooting

Different concentrations of IBA and NAA showed significant effect ( $p \leq 0.05$ ) on rooting of semi hard wood cuttings of Rosewood. The lowest time taken to rooting treatment showed on 4000ppm IBA solution (33 days) followed by the treatment of 3000ppm NAA (35days) and the highest time taken for rooting was observed in the treatment with 4000ppm NAA solution (61.333 days). Qaddoury (2004) reported that the effect of IBA for root formation on offshoots of *Phoenix dactylifera* L. showed moreover, roots appeared by the 6<sup>th</sup>-7<sup>th</sup> week in the presence of IBA and at 10<sup>th</sup> week in untreated offshoots.

### Number of shoots per cutting

Different concentrations of IBA and NAA have significant effect ( $p \leq 0.05$ ) on promoting shoot initiation of rosewood cuttings. The highest number of shoots were shown when cuttings treated with 3000ppm IBA (8.7) followed by the cuttings treated with 4000ppm IBA (5.3) and the lowest number of shoots per cuttings were shown when cuttings treated with 4000ppm NAA (2.7).

Attempt of root initiation from cuttings of *Ficus Hawaii* by Siddiqui and Hussain (2007) reported that the different concentrations of IBA have significant effect on number of shoots while there was no significant variation among different types of cuttings and no interaction between types of cutting and IBA concentrations. The maximum number of shoots per plant (13.2) was observed on cuttings of which were treated with 4000 ppm IBA followed by 9.0 and 5.7 in 3000 and 1000ppm IBA. The minimum shoots per plant (1.2) were recorded in control.

Highest number of shoots, better root and leaf development and survival of sprouted cuttings were obtained from stem cuttings of pepper fruit, guava, bush mango and cashew treated

with IBA and coconut water. These substances promoted sprouting (and rooting) and the development of cuttings more than IAA and NAA (Agele *et al.*, 2013).

### Shoot length

The highest shoot length (0.75cm) was recorded in the treatment of 4000ppm IBA:NAA (1:1) mixture with compared to all other treatments which were not significantly different from each others.

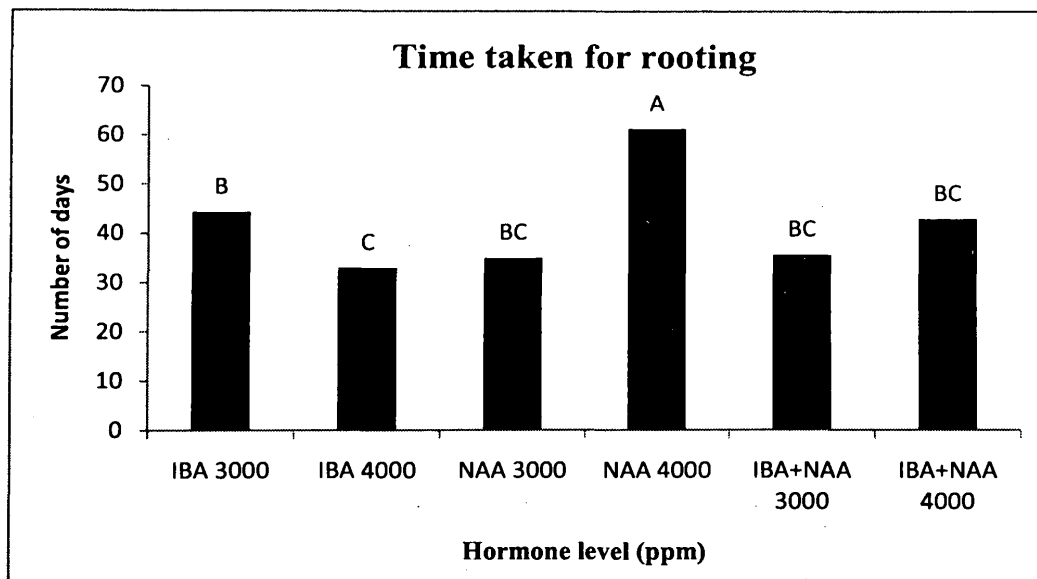
Edgar and Benabise (2012) recorded the shoot length of *Afzelia rhomboidea* was significantly affected by the location from which the cuttings were obtained. Comparison of treatment means showed that top cuttings had significantly longer shoots than the shoots emerged from the middle position and the bottom position of that crop.

### CONCLUSION

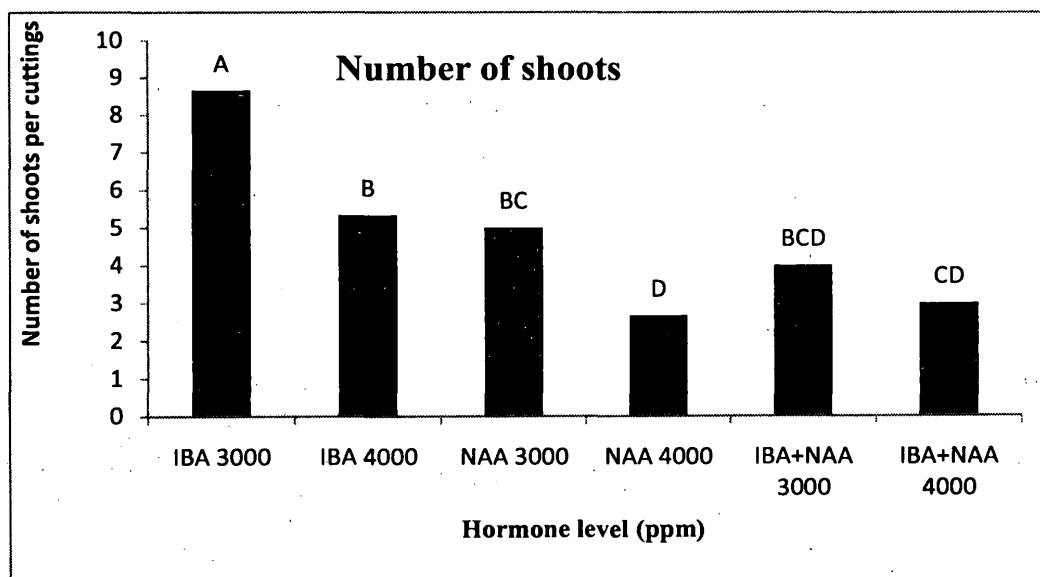
Rosewood can be best propagated by semi hard wood cuttings treated with 4000ppm IBA effectively by initiations the roots by lowest number of days with vigorous highest number of shoots.

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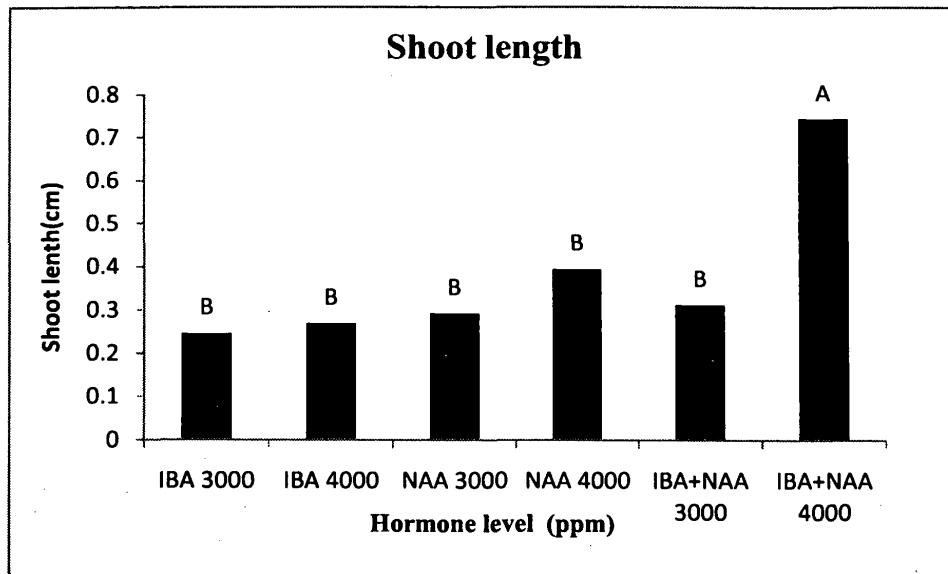
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**Figures**

**Figure 1:** Number of days taken for rooting in different hormone levels. Means on the bars followed by the same letter are not significantly different at  $P \leq 0.05$



**Figure 2:** Number of shoots per cutting. Means on the bars followed by the same letter are not significantly different at  $P \leq 0.05$



**Figure 3:** Shoot length of the cuttings in different auxin levels. Means on the bars followed by the same letter are not significantly different at  $P \leq 0.05$