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EFFECT OF INDOLE BUTYRIC ACID (GROWTH HORMONE) ON POSSIBILITY OF RAISING *Dalbergia sissoo* THROUGH BRANCH CUTTINGS

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ABSTRACT

An experimental study was conducted at Students Experimental and Research Nursery: Department of Forestry, Range Management & Wildlife, University of Agriculture Faisalabad through which effect of growth hormone (IBA) on vegetative propagation of shisham (Dalbergia sissoo) was determined. The branch cuttings were prepared from one-year-old branches of resistant plus trees of shisham at UAF, having 15-20 years age. The length of the cuttings was kept uniform as 6" with a thickness of 10mm. The cuttings were collected during first week of September which were then treated in bleach with 1: 4 ratio for 1/2 hour to disinfect them from any pest pathogen infestation. The study comprised two levels of growth regulator concentration as IBA 100mg/l & IBA 200mg/l. The cuttings were planted followed by four replications as R1, R2, R3 and R4 comprising 25 cuttings/replication, planted in same no. of polythene bags (23cm x 10cm) making a total number of 300 cuttings under low polythene tunnel. The results showed that true to type shisham tube plants can be produced vegetatively through branch cuttings with the application of rooting hormones. The cuttings in comparison to different concentration levels of IBA, responded well to a conc. of IBA 200mg/l. Many experiments done by various scientists have showed promising results in regard to growth of these tube plants with more than 80% survival when were planted in the field.

KEYWORDS

Indole Butyric Acid, Dalbergia sissoo

INTRODUCTION

Shisham (*Dalbergia sissoo*) is one of the most important timber species in Pakistan. It is a nitrogen-fixing and multipurpose tree species. In neighbouring countries it is found in India, Nepal, Bangladesh, Bhutan, Myanmar, Afghanistan and Malaysia. It is often encountered up to 900 m, occasionally ascending up to 1500 m. It is a large deciduous tree growing 2.4 m in girth and 30 m in height[10]. It is extensively planted in the irrigated plains of Pakistan. It is a preferred species for afforestation along road sides and canal banks. Farmers adopt it for plantations in their agricultural lands especially in the province of Punjab. It can be grown in combination with maize, mustard, rapeseed, gram, peas, wheat, sugarcane and cotton. It is an economically valued timber tree used for construction and ornamental woodwork, fuel and charcoal. It thrives well on sandy-loam soil with good drainage. The conventional method for propagation of shisham is through seeds but the problem of mortality in recent years necessitates that superior and resistant clonal material must be vegetatively multiplied for their healthier growth and higher productivity.

Vegetative propagation is not a breeding method but a way to rapidly multiply desired genetic/clonal material and capturing most of the genetic potential. When vegetative propagation is used, most of the genetic potential including the non-additive variance is transferred to the new plant [5],

[3]. Moreover, tree population is highly heterozygous and vegetative propagation helps to utilize maximum genetic gains in the shortest time. However, the success of vegetative propagation depends upon proper environment, genetic component and the physiological status of cuttings [2, 4, 7, 9]. For the production of fast growing high quality timber and resistant varieties, it is essential to start by superior clones from which the shoot and root cuttings are to be taken. The present study was initiated to determine the proper concentration of growth hormone for enhancing the rooting in cuttings of *Dalbergia sissoo* under low polythene tunnel.

Material and Methods

The experiment was carried out at Students Experimental and Research Nursery: Department of Forestry, Range Management & Wildlife, University of Agriculture Faisalabad during first week of September, 2007. The branch cuttings were prepared from one year old branches of resistant plus trees of shisham with 15-20 years age at UAF. The length of the cuttings was kept uniform as 6'' with a thickness of 10mm. The cuttings were treated in bleach with 1:4 ratio for 1/2 hour to disinfect them from any pest pathogen infestation. The auxin used was Indole Butyric Acid (IBA) as a rooting hormone. The cuttings were treated as given in **Table 1**.

Table 1. Different concentrations of IBA used for rooting in *Dalbergia sissoo*

Treatments	Auxin	Concentration	No. of cuttings
T1	Control	--	100
T2	IBA	100mg/L	100
T3	IBA	200mg/L	100

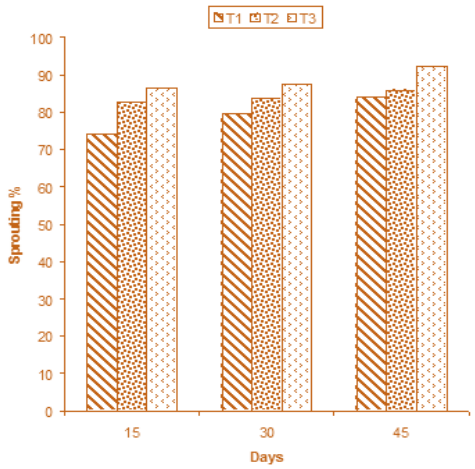
The cuttings were treated by dipping basal 1/3 portion in mentioned growth hormone for 5 minutes. Then these cuttings were planted in polythene bags (23cm x 10cm) filled with sand, silt & clay in proper proportions (54.07: 20.48: 25.45) as rooting medium. There were four replications comprising 25 cuttings per replication, making a total number of 300 cuttings. The controlled conditions of temperature (about 30-40˚C) and humidity (about 70-80 %) were maintained by provision of low polythene tunnel covering over all cuttings. Watering was carried out as and when required to avoid any fungal growth and weeding was also done regularly.

RESULTS AND DISCUSSION

The observations recorded after the period of four months are given in **Table 2**. The effect of growth hormone (IBA) is clear in the given table below which represents the response in comparison to different levels of concentration of Indole Butyric Acid on plants development and rooting behaviour of branch cuttings of *Dalbergia sissoo*. Variations were observed among different treatments for rooting percentage as IBA is a recommended rooting hormone by various scientists.

Table 2. Effect of different conc. levels of IBA on rooting behaviour in D*albergia sissoo*

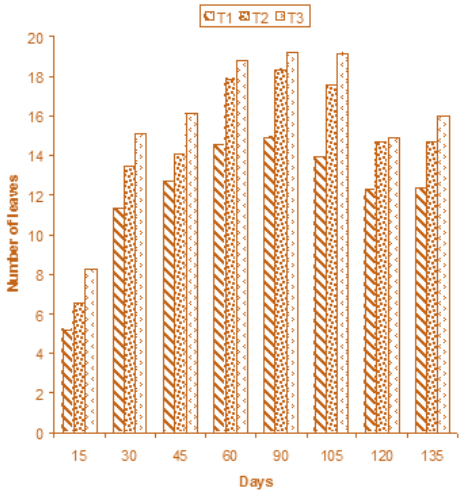
Treatments	Sprouting %age	No. of Leaves	Root length (cm)
T1	79.25	12.15	3.53
T2	84.08	14.64	5.65
T3	88.58	15.94	7.85



T1: Control
T2: IBA 100mg/l
T3: IBA 200mg/l

Figure 1. Effect of IBA on Sprouting %age of *Dalbergia sissoo* branch cuttings tunnel.

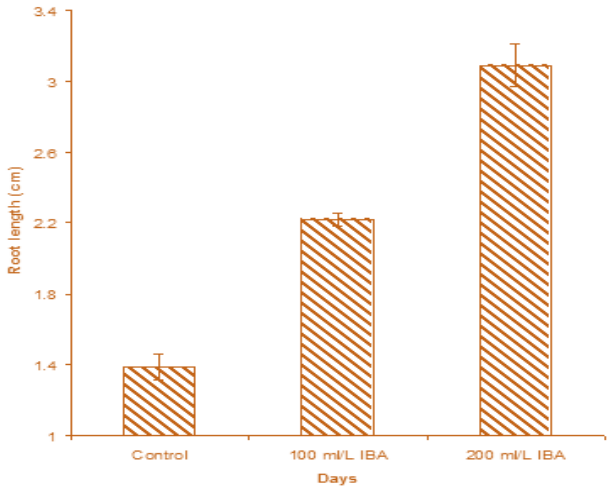
The results regarding sprouting percentage are depicted in **Fig-1**. According to these results maximum sprouting after 15 days was observed in T3 (IBA 200mg/l) which was 86.25%, followed by T2 (IBA 100mg/l) 82.75% and was lowest in T1 (control) 74.25%. The same pattern continued upto 45 days where it was 92.00% in T3, 86.75% in T2 and 84.00% in T1. Overall all the treatments showed good sprouting under low polythene tunnel but 84% sprouting in control (T1) is encouraging which indicates that *Dalbergia sissoo* can also successfully be propagated from branch cuttings without any growth hormone although growth hormones such as IBA have positive effect in plants growth.



T1: Control
T2: IBA 100mg/l
T3: IBA 200mg/l

Figure 2. Effect of IBA on number of leaves of *D. sissoo* cuttings under low polythene tunnel.

The results pertaining to mean value for number of leaves is given in **Fig-2**. According to the **Fig-2** maximum number of leaves after 15 days was seen in T3 (IBA 200mg/l) which was 8.29, followed by in T2 (IBA 100mg/l) which was 6.54 and lowest in T1 (control) which was 5.21. The mean number of leaves observed after 15 days were (6.68) which increased up to 105 days (16.88) under low polythene tunnel. Increase in number of leaves was observed up to 105 days in similar pattern such as T3 (19.15) followed by T2 (17.55) and T1 (13.94). This showed that the time is also an important factor in plants growth because with the passage of time number of leaves increased. Among all treatments, T3 (IBA 200mg/l) showed significantly better results in increase in number of leaves than T1 & T2 which also indicated that if proper concentration of growth hormone such as T3 is applied to branch cuttings of *Dalbergia sissoo*, it may prove beneficial to plants development.



T1: Control
T2: IBA 100mg/l
T3: IBA 200mg/l

Fig 5. Effect of IBA on Roots development in *Dalbergia sissoo* cuttings under low polythene tunnel.

The results regarding root length are depicted in Fig-3. The observations regarding development of roots was made after 135 days. Three plants per replication were selected from each treatment to examine rooting in branch cuttings of *Dalbergia sissoo*. It is clear from the results that root length was maximum 7.85 in T3 (IBA 200mg/l) followed by 5.65 in T2 (IBA 100mg/l) and only 3.53 in T1 (control). Although root length was significantly better in T3 (7.85) which showed that proper concentration of growth hormone (IBA) promotes rooting in *Dalbergia sissoo* plants. It is also clear from the **Fig-3** that T1 showed less rooting (3.53) which also proved that the effect of growth hormone IBA (T3) in the development of roots of *Dalbergia* plants from the branch cuttings is positive.

It was generally observed that the application of IBA triggered and enhanced rooting of shisham cuttings. However, a concentration of IBA 200mg/l promoted rooting of cuttings. A number of researchers have reported that auxins naturally or artificially applied triggered adventitious roots on stem cuttings [6, 8, 11]. Maximum rooting of 75% was observed in treatment (T3) that was IBA 200mg/l, followed by 65% rooting in treatment (T2) with IBA

100 mg/l and 23% rooting for treatment (T1) with control. Poor rooting was observed in (T1) control 23% respectively. The above discussion reveals that IBA with a conc. of 200mg/l enhanced rooting behaviuor of shisham cuttings and have positive results in propagation of *Dalbergia sissoo* plants through branch cuttings. The present study also indicated that if proper concentration of growth hormones is applied to the branch cuttings of *Dalbergia sissoo*, the resulted true to type tube plants produced successfully develop proper roots. Vegetative propagation of Shisham showed promising growth in the field with more than 80% survival [1]

CONCLUSION

From the above study it has been concluded that shisham (*Dalbergia sissoo*) can be raised vegetatively through the application of rooting hormones such as Indole Butyric Acid. Since the plants are genetically identical to parent plants, the clones offer the advantage of genetic uniformity and the plants produced have similar growth. Thus vegetative propagation provides an opportunity to exploit genetic variation directly. It also helps to utilize maximum genetic gain in a shortest time. However, these advantages cannot be attained through conventional method of producing stumps from seed in a yearlong. The covering of experiment with low polythene tunnel showed good sprouting and better development of these tube plants, produced under controlled atmospheric conditions provided by the tunnel. This also Proved that plant propagation in any season can be desirable. Therefore, it is suggested that IBA with a concentration of 200 mg/l may be used for rooting of shisham cuttings. The present study also widens the scope for further studies to be undertaken by scientists to make the applied techniques more economical for local farmers and to be applicable to other important economic species.

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