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ROOTING OF LIGNOTUBERS OF SOME EUCALYPTS WITH INDOLE – 3 BUTYRIC ACID

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Abstract

Lignotubers, obtained from three year old seedlings of *Eucalyptus cloeziana*, *E. tereticronis* and *E. grandis* growing in the nursery, were soaked in 25, 50, 75 and 100ppm concentrations of Indole – 3 Butyric Acid (IBA) and in distilled water for 3, 6, 12 and 24 hours and left in petridishes, in order to asses their rooting abilities. After four weeks, when most of the unrooted lignotubers had started drying up, the lignotubers were assessed for differences in root number and length. The lower the concentration if IBA, and the fewer the number of hours soaked, the higher the number of adventitions roots formed. However, in higher concentrations of IBA, rooting was achieved in longer hours of soaking only. Root length increased with the concentration of IBA, but no roots were formed in 75ppm concentration. There is the potential for raising planting stocks of *E. cloeziana* and the other eucalypts from lignotubers.

Introduction

Lignotubers are stem structures that commence as swellings in the axils of the cotyledons or of the first few pairs of leaves produced on a seedling (Kerr, 1925). As the seedlings age, the swellings in the individual leaf axils fuse and increase in size, forming a bulbous mass that is known as lignotubers (Kerr, *loc. cit.*).

Most eucalypts develop lignotubers. Lignotubers contain food reserves and they are of high significance in determining the persistence of eucalypts (Jacobs and Arthur, 1955). They may be partially burried and therefore may not be easily destroyed by fires, and by supplying the main shoot with food, they can assist the shoot in establishing itself in difficult situations (Jacobs and Arthur, *loc. cit.*).

Buds from lignotubers are usually dormant instead of adventious and if activated, can produce new shoots (Romberger, 1963).

In the savanna areas of Nigeria, several eucalypts are grown for reafforestation and as shelterbelts. Although these eucalypts flower and fruit precociously, most fruits of *E. cloeziana* are not viable. The reason for this behaviour and possible ways of improving the seed quality of *E. cloeziana* are under investigation. Additionally, a research project was initiated to find ways of raising planting stocks of *E. cloeziana* vegetatively to augment those from seeds. In this light, this study examined the possibility of raising *E. cloeziana* vegetatively by rooting its lignotubers treated with IBA. Lignotubers from *E. grandis* and *E. tereticorinis* were also included inorder to have a wider idea of how eucalypts would respond to the IBA treatment.

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Materials and Methods

Lignotubers were obtained from three year old seedlings of *E. tereticornis*, *E. grandis* and *E. cloeziana*, growing in polypots in the Savanna Forestry Research Station's nursery at Samaru, Zaria, Nigeria. The lingotubers were sliced off the seedlings, using a sharp chisel and a mallet, after serving the shoot from the roots with a sicateur. Lignotubers of similar sizes were used, while damaged and undersized ones were discarded.

Twenty five, 50, 75 and 100ppm concentrations of IBA were prepared, while distilled water was used as the control. Twelve lignotubers were soaked in each of the IBA concentrations and in distilled water for 3, 6, 12 and 24 hours, after which they were sown out into four replicates of petridishes, containing three layers of Whatman No. 1 filter papers saturated with distilled water. Moisture in the dishes was maintained by addition of about 1 ml of distilled water every other day. After four weeks, when shrivelling had advanced in most of the unrooted lignotubers, number of adventitious roots formed per lignotuber and percentage rooting per treatment and root lengths were determined. Mean percentage rooting and root length were compared between treatments, using students "t" test (Zar, 1974). Since the controls did not root, the percentage rooting was based on the number of lignotubers per treatment and not on the controls.

Results and Discussion

Table 1 shows the variations in percentage rooting and root length per treatment in each species. No rooting was obtained with distilled water under the present experimental conditions. The highest rooting percentage was achieved with 25ppm concentration of IBA, followed by 50ppm. However, in the three species, in all hours of soaking, no rooting was obtained with 75ppm treatment. In the 25ppm treatment, rooting percentage generally increased with the decrease in number of hours the lignotubers were soaked in IBA. Conversely, in higher concentrations of IBA, longer hours of soaking generally tended to favour rooting than shorter hours. The reason for this is unknown. Although 50ppm treatment did not favour rooting in *E. tereticornis*' lignotubers, they rooted in 100ppm treatment where those of the two other species failed to root. The highest rooting percentage was obtained with twelve hours of soaking in the 100ppm treatment in *E. tereticornis*, with no rooting observed in the three hours of soaking.

Generally, the higher the concentration, the longer the roots formed. The above findings have shown that there is the potential for raising *E. cloeziana*, *E. tereticornis* and *E. grandis* vegetatively using lignotubers treated with low concentration of IBA and that at higher concentrations, of IBA, responses can vary with species. Since lignotubers contain food reserves (Jacobs and Arthur, 1955), given the right environmental conditions, it may be possible to root them even without the use of growth substances. This possibility would be fully investigated in growth chambers, under varying temperature, light intensities and relative humidities.

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Table 1

Mean rooting percentage and root length of lignotubers of eucalypts treated with different concentrations of Indole – 3 Butyric Acid (± S.E. 0.05xt)

Species	concentration of IBA (ppm)	number of soaked	percentage rooting	root length (cm)
E. tereticornis	25	3	40.8* ±4.1	3.2*c±0.32
		6	22;3*a±3.7	3.4*c±0.29
		12	20.0 a±3.2	3.5*c±0.31
		24	–	–
	50	3	–	–
		6	–	–
		12	–	–
		24	–	–
	75	3	–	–
		6	–	–
		12	–	–
		24	–	–
	100	3	–	–
		6	12.5*b±2.2	4.6*d±0.51
		12	30.6*b±4.7	4.3*d±0.47
		24	9.3*b±3.6	4.7*d±0.39

Table — I (*Contd.*)

Species	concentration of IBA (ppm)	number of soaked	percentage rooting	root length (cm)
E. grandis	25	3	66.8* ±5.4	2.8*f±0.38
		6	32.5*e±3.3	3.2*f±0.24
		12	—	—
		24	—	—
	50	3	—	—
		6	—	—
		12	—	—
		24	30.7*e±4.1	3.9* ±0.21
	75	3	—	—
		6	—	—
		12	—	—
		24	—	—
	100	3	—	—
		6	—	—
		12	—	—
		24	—	—
E. cloeziana	25	3	52.2* ±6.3	2.8*h±0.22
		6	34.3*g±4.6	3.5*i±0.25
		12	—	—
		24	—	—
	50	3	—	—
		6	—	—
		12	38.5*g±2.8	3.2hi±0.29
		24	14.7* ±3.1	3.7*i±0.21
	75	3	—	—
		6	—	—
		12	—	—
		24	—	—
	100	3	—	—
		6	—	—
		12	—	—
		24	—	—

In each species, between different IBA concentrations and hours of soaking, means followed by the same letter are not significantly different at 5% level.