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## DIFFERENCE IN ROOTING RESPONSE BETWEEN THE JUVENILE AND ADULT TISSUES OF CASUARINA EQUISETIFOLIA FORST.

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### ABSTRACT

Vegetative propagation is attaining considerable attention in *Casuarina equisetifolia* for obtaining genetically pure elite populations. However, there exits variability in rooting with respect to degree of juvenility of the material. An attempt was therefore made to elucidate the difference between the juvenile and adult tissues of Casuarina with respect to rooting. Cladode cuttings were collected from four different positions and kept for rooting in a polytunnel after giving a hormone treatment (2000 mg/l IBA). A decreasing trend in rooting ability was observed as cuttings are collected progressively from lower to upper parts of the tree. The juvenile material responded fully to rooting whereas in mature tissues, the rooting response is reduced but not completely suppressed.

Key words : Casuarina equisetifolia, Juvenility, Maturity, Rooting trials.

#### Introduction

Casuarina equisetifolia Forst., a fast growing tree is planted widely by small and medium level farmers. It finds many end uses like scaffoldings, charcoal making with trimmings providing fuel. Much of the biomass in Casuarina is apportioned in the stem with the result closer spacing is possible (Gurumurthi and Rawat, 1989). Casuarina can easily be propagated by seeds but the plantations raised from seeds show considerable variations resulting in unpredictable yield. Vegetative propagation can be practised with ease (Gurumurthi and Bhandari, 1988). A large clonal bank with over 100 clones has been established (Kumar and Gurumurthi, 1996). However, there exists variability in rooting with

respect to the degree of juvenility of the material. An attempt was therefore made to elucidate the difference between the juvenile and adult tissues of Casuarina with respect to rooting.

#### **Material and Methods**

Three trees, all two years old were selected for the study. They included a female, a male and a bisexual individual grown in the Forest Campus, Coimbatore. Four positions were marked on these tree viz.,

Position 1:

Upto 60 cm from ground level No flowering in any branch

#### Position 2 :

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Between 60-95 cm from ground level Occasional flowering in some branches

#### Position 3:

Between 95-145 cm from ground level Many branches showing flowering

#### Position 4:

Between 145-165 cm from ground level All branches showing flowering

Cladodes 5-7 cm in length, collected during the month of August, 1997 from these positions were used for the experiment. The cladodes (25 sprigs each from all the positions) were treated with 0.05 per cent mercuric chloride for 30 seconds to avoid fungal attack and dip smeared in rooting media (2000 mg/l Indole-3-Butyric Acid). Subsequently, the treated cladodes were planted in root trainers filled with pre-soaked composed coir pith and placed in the polytunnel. The polytunnel unit was approximately 180 cm long and 90 cm wide with sloping roof for draining the condensation water on the inner side. The roof and sides of the structure were covered with 400 gauge polythene sheet. The polytunnel was kept on a surface filled with sand to a depth of one foot. Cuttings could be placed in suitable containers and later they were placed in the tunnel with the sides of the tunnel tightly tucked in sand. Prior to placing the cuttings inside the tunnel, the sandy area was well watered without flooding. This provided a warmhumid (temperature varied approximately from 38°C-42°C with a high humidity range of 80-90 per cent) environment, very conducive for rooting process. Cladodes rooted in such polytunnels did not require watering. The tunnel was opened after 15 days when rooting had occurred in the cladodes.

Data were analysed by applying techniques for analysis of variance for Completely Randomized Design (Snedecor and Cochran, 1967). Arc sine transformed values were used for the analysis. Treatment means were compared using Duncan's Multiple Range Test at 5 per cent level of significance. The four positions on the trees were taken as the treatments where the female, male and the bisexual served as the three replications.

#### **Results and Discussion**

Table 1 shows the difference in rooting response with reference to the four different positions. Cladode cuttings collected from the bottom position (Position 1) registered the maximum response (80.74 per cent) for rooting whereas those collected from the top (Position 4) responded the lowest being 46.15 per cent. These values were found to be statistically significant at 5 per cent level. Rooting percentages were 80.68 and 68.16 when cuttings were collected from position 2 and position 3 respectively and these values were found statistically on par with the bottom position (Position 1).

#### Table 1

Difference in rooting response with reference to positions in Casuarina equisetifolia

Position	Rooting (%)*	Standard Deviation	Coeffi- cient Varia tion (%)
Position 1.	/ 80.75ª	16.03	19.85
Position 2.	80.68ª	8.44	10.46
Position 3.	68.16 <sup>a</sup>	9.22	13.53
Position 4.	46.15 <sup>b</sup>	6.10	13.23

\*Means with the same letter are not significantly different by Duncan's Multiple Range Test (P=0.05)

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However the data clearly show the decreasing trend in rooting ability as cuttings are collected progressively from lower to upper parts of the tree. This is because of the juvenility maturation phenomenon in trees (Bonga, 1982). It has long been known that juvenile explants show better response. The degree of juvenility is inversely proportional to the distance (along the trunk and branches) between the root junction and meristem (Razdan, 1993). Stem cuttings of mature Eucalyptus hybrid failed to root even with auxins (Nanda et al., 1968: Gurumurthi et al., 1988) and successful rooting was achieved by collecting shoots from coppiced adult trees. This is because the shoots that arise after coppicing are ontogenically

younger and have retained the juvenile characteristics (Bonga, 1982), In Casuarina equisetifolia, the rooting response of cladodes decreases when taken from mature tissues. This is unlike Eucalyptus whose mature stem cuttings (cuttings taken from upper portion of flowering/flowered trees) completely fail to respond to rooting. Thus, in Casuarina the juvenile material respond fully to rooting whereas in mature tissues. the rooting response is reduced but not completely suppressed. The present study has considerable practical significance in forestry, as promising mother plants can hedged and kept juvenile. The rooted ramets can be tested for their growth behaviour and the proven material can be mass propagated for clonal forestry.

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