

Anatomical Variation in Tissue Characteristics between Juvenile and Adult Materials as well as Male, Female and Monoecious Trees of *Casuarina equisetifolia*

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Abstract

The transition from juvenile to adult phase has been explained as a change in the reproductive competence but it is also marked by species-specific changes in a variety of vegetative traits including leaf shape, leaf anatomy, adventitious root production, disease resistance and a number of secondary compounds. Early studies on attempts to identify sex of the plants based on morphological and physiological parameters have not been consistent. In recent years, there have been serious studies on the genetic basis of sex determination and early sex identification using molecular / biochemical markers. In the present study Phylloclad cuttings from four positions viz. lower (juvenile) to upper (mature) parts of nine year old male, female and monoecious trees were investigated for nine anatomical characters (pith diameter, thickness of the phloem tissue, number of xylem vessels per unit area, diameter and area of the xylem vessels, roundness, aspect ratio and fullness ratio of the xylem vessels) using an image analyser. Significant differences were observed between the juvenile and adult tissues. Pith diameter and thickness of phloem tissue varied among the stem cuttings obtained from the four positions. A decreasing trend was observed from position 1 to position 4 for pith diameter and a reverse trend was observed for the thickness of phloem tissue. Similar was the trend for diameter of the remaining area (excluding pith and phloem), which was observed to decrease from position 4 to position 1. None of the other parameters examined in this study could be used to distinguish juvenile and adult materials at the anatomical level. Pith diameter, diameter of the area excluding pith and phloem, diameter, area, roundness and aspect ratio of the xylem vessels varied significantly among the male, female and monoecious trees. Pith diameter was found to be maximum for monoecious trees followed by female and male trees. A reverse trend was noticed for diameter of the remaining area. Average diameter and area of the xylem vessels were higher for the male trees than the female and monoecious individuals. With reference to the shape of the xylem vessels, male trees exhibited better roundness than the female and monoecious trees.