Cultural Practices for the Production of Radiata Pine Cuttings in Australia

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Eighteen Australian nurseries produced over 34 million radiata pine seedlings and cuttings in 1992. Eleven of these nurseries produced cuttings and these nurseries were surveyed in this study to determine the cultural practices for the production of vegetatively propagated radiata pine. Nurseries reported that cuttings are grown on their best sites and soils in the nursery; usually these soils are lighter, better nutritionally, and with good drainage. All of the nurseries take cutting material from stool plants which are planted and maintained as hedges in the nurseries. Six of the eleven nurseries also collect shoot material from seedlings and cuttings growing in the nursery and also from recently planted seedlings and cuttings on reforestation sites. Stoolbeds are planted with 1, 2, or 3 rows of plants, plants are usually pruned once a year, and shoots are collected in winter. The collected shoots must be at least 4 mm in diameter and are most often about 10 cm long. Nursery beds are cultivated and formed into raised beds; shoots are set into the bed by pushing them 2 to 6 cm into the ground. Cuttings are grown at 100 to 150 cuttings per sq. m. with approximately 500,000 to 600,000 grown on one hectare. Most nurseries inoculate their cutting beds with mycorrhizal fungi (*Rhizopogon luteolus*) in the spring. The majority of the nurseries apply a base fertilizer before setting and then 5 of the 11 nurseries apply a complete foliar fertilizer every 2 to 4 weeks before rooting occurs. Nurseries vary greatly in the amount of time until cuttings root after setting with typical length of time being from 4 to 6 months. Root conditioning includes a combination of lateral pruning, undercutting and root wrenching. Nurseries begin watering immediately after setting followed by a typical regime of 3 minutes every 45 minutes for 8 hours each day to avoid stress and desiccation. After rooting, irrigation regimes are altered to improve and maintain soil moisture and, hence, are for longer periods at less frequent intervals. All nurseries except one top prune cuttings to control height and produce a more uniform crop. All nurseries use chemicals and handweeding for weed control and have a hardening program for cuttings which is initiated in the fall. Target heights for cuttings are between 30 to 35 cm for most nurseries; diameters vary greater and range between 5 and 12 mm. The cutting must also have a well-balanced root system. Between 50 and 85% of cuttings that are set in the nursery meet target specifications. The main reasons why nurseries grow cuttings is because they cannot obtain enough control pollinated seed and cuttings provide multiplication of the limited amount that they do have. Cuttings insure better genetic stock now. Cuttings, however, are 2.5 to 3.5 times as costly to produce as seedlings. The major challenges faced by nurseries growing cuttings are: (1) How to keep newly set shoots alive until they have enough roots to support themselves, (2) Managing irrigation to maintain stress at a minimum without overwatering and encountering drainage problems, and (3) Labor, health and safety concerns during shoot collection, setting and lifting. Other problems are aging of stoolbeds, growing an acceptable root system, weeds, fungal diseases, stoolbed management, and having enough suitable soil type and land available for production.