NOTE

LIFTING AND HANDLING PROCEDURES AT EDENDALE NURSERY — EFFECTS ON SURVIVAL AND GROWTH OF 1/0 PINUS RADIATA SEEDLINGS

J. BALNEAVES
Ministry of Forestry, Forest Research Institute,
P.O. Box 31–011, Christchurch, New Zealand

and M. MENZIES
Ministry of Forestry, Forest Research Institute,
Private Bag, Rotorua, New Zealand

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ABSTRACT

Holding stocks of 1/0 **Pinus radiata** D. Don overnight in the nursery packing shed caused a significant decrease in seedling water potential from –0.23 to –0.58 MPa. Although watering restored water potentials, growth after planting out was lower than in seedlings planted straight after lifting.

Keywords: seedling survival; seedling growth; water potential; **Pinus radiata**.

INTRODUCTION

A trial at Edendale Nursery, Southland, in 1982 evaluated the effects of the handling methods being used. The stages of the handling process assessed were:

(i) On the nursery bed 5 minutes after lifting (Day 1);
(ii) On the trailer before going to the packing shed (30 min. after lifting);
(iii) On the trailer after overnight storage in the packing shed (Day 2);
(iv) On the sorting table before culling and root trimming (30 min. after (iii));
(v) After culling, root trimming, and packing into polythene bags and cartons, and 15 min. after water was added for root wetting;
(vi) In the storage shed just before despatch to the forest on the second day after lifting – or 24 hours after water was added to the seedling package (Day 3);
(vii) At the forest planting site on arrival from the nursery (Day 3);
(viii) At the planting site immediately before planting (Day 5), (storage in a concrete block shed at the headquarters).

A trailer-load of 40 000 seedlings (Amberley Seed Orchard 6/3/81/002) was followed through from lifting to planting in two series, one in June and one in August 1982. Samples of 90 seedlings were collected from each of the stages listed and im-

mediately planted out in a randomised block design of six blocks with 15 seedlings/row. The planting site, at Edendale Nursery, was grubbed and disced, then kept weed-free during the experiment.

Height, diameter, and seedling health were recorded within 1 week of planting, and were remeasured 1 and 2 years after planting. Analysis of variance for treatments and planting time was used to test differences in height and diameter growth.

In August, another 10 seedlings per handling stage were measured for water potential. These seedlings were stored in a polythene bag for a maximum of 20 min. before water potential was measured with a pressure chamber (Cleary & Zaerr 1980).

RESULTS AND DISCUSSION

Seedling survival exceeded 98% in all treatments.

Height and Diameter Growth

Height or height increment showed no significant effect of lifting time after 1 year. However, over-all height increment over 2 years, and height after 2 years were significantly different ($p \leq 0.01$) for seedlings planted in August. For these seedlings overnight storage on trailers in the packing shed (Stage iii) had a deleterious effect which was increased by handling during culling and root trimming (Stage iv). Tree growth improved after watering (Stage v) but did not reach the same levels achieved by seedlings planted out immediately after lifting.

There was no significant difference in diameter growth over the 2 years after planting.

Seedling Water Potential (August series only)

Seedling water potential decreased after overnight storage (Stage ii) to below –0.5 MPa, the level where dessication may cause death of fine roots (Menzies *et al.* 1985). Levels remained low until after Stage v when water was added to the seedling package. Seedling water potential then increased, reaching normal levels by Stage vi (Fig. 1). Although seedling water potentials recovered completely, growth after planting did not. Minimum growth occurred in seedlings planted at Stage v (Fig. 1). Possibly the seedlings had not absorbed sufficient water at this stage to prevent further deterioration. Growth had improved in seedlings planted at Stage vi, 24 hours after water was added. However, growth did not attain the levels reached by seedlings planted straight after lifting (Fig. 1). Most deterioration occurred in the first 2 days after lifting, while the seedlings were being handled and packed (Stages ii to v).

The trial was spread over 5 days (from moment of lifting to moment of planting). Poor weather can delay planting for up to 21 days after lifting.

CONCLUSIONS AND RECOMMENDATIONS

To minimise seedling deterioration, a handling and packing system should include:

(1) Keeping the time between lifting and packing as short as possible;

(2) Keeping the exposure of seedlings to drying conditions to a minimum;

(3) Keeping seedling root systems moist during and after packing.

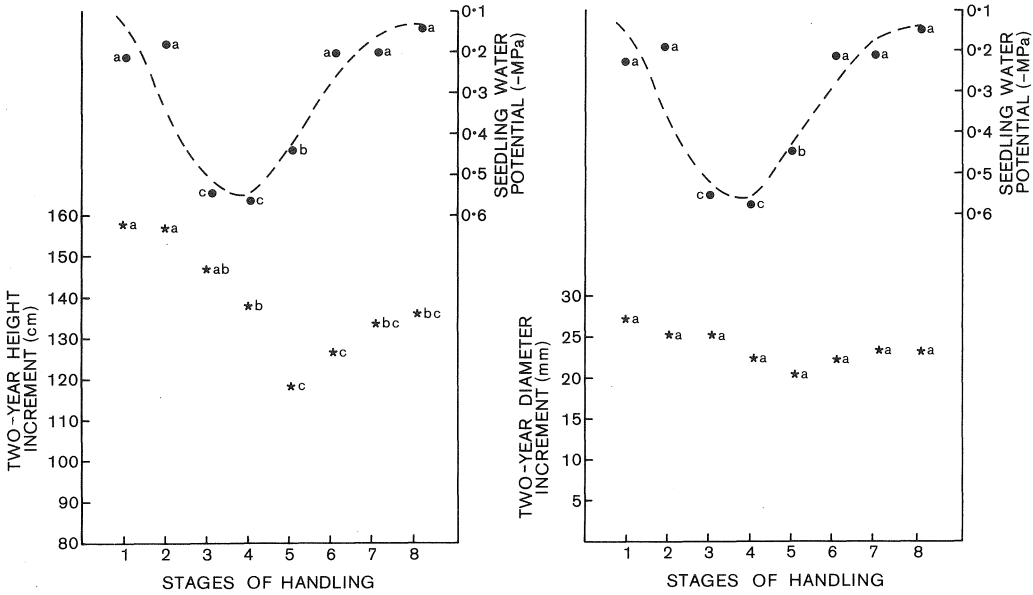

FIG. 1—Relationship between seedling water potential before planting, and average height and diameter increment over a 2-year period (August only). Treatment means followed by the same letter are not significantly different (LSD test, p = 0.05).

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