COMMENTS ON EFFECTS OF WRENCHING ON DROUGHT AVOIDANCE OF DOUGLAS FIR SEEDLINGS

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May I refer to Tree Planters' Notes Vo. 28(2) of Spring 1977. Therein is an article by Kenneth B. Koon and Tharon O'Dell entitled "Effects of Wrenching on drought avoidance of Douglas-fir seedlings", which quotes two New Zealand papers.

I should like to bring to your attention the matter of seedbed density. Since the quoted papers were published we have done a great deal of work at the N.Z. Forest Research Institute on this question, and our well-confirmed findings are that the important point is not average bed density, but the growing space occupied by the individual seedling. We therefore now talk of seedling spacing rather than seedling density. The effect of even (and adequate) spacing on 1/0 radiata pine seedlings can be observed in N.Z. F.R.I. Annual Report for the year ended 31 December 1974, page 17. Regular spacing at 7 cm between individual seedlings, compared with normal irregular spacing, reduced the cull rate from 28 percent to 4 percent, improved survival from 85 percent to 96 percent, and led to an increase in height increment in the first year from 4 to 16 cm.

The optimum spacing is found to be related to species, age class and size of seedlings, climate and soil of the nursery. We have not worked out the proper spacing for Douglas fir seedlings, but our *minimum* specifications for high quality 2/0 seedlings of that species are a root collar diameter of 7 mm and a height: diameter ratio of 50-60 for warmer nurseries and 30-40 for cooler localities. I would hazard a guess that the spacing should be at least 10 cm between seedlings. Information is given in the New Zealand Forestry Handbook (1977) published by the N.Z. Institute of Foresters.

Another point which may be significant for Douglas fir, and which we have confirmed in several trials for radiata pine, is that root damage during lifting can cause a reduction in survival and initial growth. For this reason our "conditioning regime" normally consists of an initial undercut, followed by several wrenchings, and usually two lateral root prunings. (These terms are defined in the Forestry Handbook). The lateral pruning tends to improve seedling performance and makes the trees easier to lift, handle, pack and plant. Undercutting, wrenching and lateral pruning are all mechanized.

More recently we have been looking at an alternative regime. One problem with wrenching is that it tends to inhibit the development of a taproot after outplanting, while lateral pruning on two sides leads to heavy growth of lateral roots along the drill, which tend to get "screwed" into the planting hole. This lack of taproot, and distorted side roots, often lead to instability in windy areas.

We are now working on the following regime:

- — a deepish undercut
- — lateral root pruning on four sides, carried out twice.
- — a shallower undercut. (no wrenching).

This method gives a "container-grown" root configuration without the disadvantages of containers. The second clean cut of the taproot a few weeks before lifting leads to strong development of a new taproot (or more usually several strong sinkers). The four-sided pruning makes lifting easy without root damage, and also makes planting much easier, while avoiding any serious root distortion.

Finally, I was surprised at the very low survival percentages you appear to tolerate. In the trial reported, the lowest mortality was 44 percent which we would regard as disastrous. It therefore surprises me that rigorous grass control was not undertaken on these dry sites. While fencing, fungicides, deer repellent and rodenticides were used, no herbicides were applied.

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We have found that in our dry climates (down to a mean annual rainfall of 12 inches in the central South Island) planting trees in grass, however high their quality, is always a partial or complete failure. With control of grass by herbicides over the first one (sometimes two) years, a high degree of success can be achieved.