

ROOT FORM OF JACK PINE PAPERPOT SEEDLINGS

EIGHT YEARS AFTER OUTPLANTING

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More than 50 eight-year-old jack pine (*Pinus banksiana* Lamb.) trees, originally grown in FH 308 Japanese paperpots and planted near Thessalon in the Algoma District of Ontario, were excavated to investigate the effects of root deformation on seedling performance after outplanting.

The trees had been planted as part of a time study of an operational container planting operation (Scarratt and Ketcheson 1974). The planting site was characterized by weakly broken topography with deep, deltaic deposits of stone-free, medium sands, and offered easy planting conditions. Average seedling dimensions at time of planting were: shoot height - 11.8 cm; oven-dry weight - 520 mg; root: shoot ratio - 2:1. By present standards, the 16-week-old seedlings had been held too long in the FH 308 paperpots before planting, and difficulties were experienced in separating individual seedlings at the planting site because of heavy root intergrowth between the pots. Although the most severely damaged seedlings were culled before planting, all seedlings planted undoubtedly suffered some degree of root breakage during separation. Furthermore, because of the excessive root development, many of the longer seedling roots were bent or otherwise deformed during the planting operation, especially during heeling-in. Similar planting quality would not be acceptable today. The relatively severe root deformities observed were considered to be a direct result of the planting problems described.

Eight years after planting, of the 51 tree roots excavated, 88% had good vertical root development, and 67% of these also had a well developed tap root. In the horizontal plane, 14% of the trees had a multi-tiered

lateral root system, whereas 53% had only a single tier of lateral roots. In both cases, roots radiated outwards from the main axis in all directions. However, the lateral roots of the remaining 33% of planted trees grew out from the main axis in a single direction only or, at best, into a narrow segment of the available rooting space as viewed from above. All seven natural trees of similar size sampled on the same site had well developed tap roots with well distributed horizontal roots.

Cross sections of the roots revealed that most of the roots originally within the confines of the paperpot had fused together, with the cambial sheath completely enveloping the formerly deformed roots. Bark and soil inclusions were present in the root ball of most trees.

There were no significant differences in height growth between the natural (225.3 cm) and containerized trees (220.5 cm) at time of sampling. Furthermore, there were no correlations between root distribution indices or root deformation indices and tree growth.

No recent mortality from any cause was evident in the plantation. Data on past mortality are lacking, and we cannot discount the possibility that seedlings with severely deformed root systems may have died in the interim as an indirect result of such deformities. However, the absence of reduced height growth or evident pathological condition in those trees sampled which exhibited root deformities leads us to conclude that the root deformations imposed during planting have had no significant effect on the growth of surviving paperpot seedlings eight years after planting.

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