

ROOT PRUNING OF CONTAINER SEEDLINGS PRIOR TO PLANTING

Root pruning is common practice with bareroot seedlings, both in the field (undercutting & lateral root pruning), and in the sorting shed prior to packaging. Root pruning after harvest is done to facilitate packing and planting. If not too severe, root pruning is usually not detrimental to field performance. Up to 25% of the initial root mass was pruned from 2+0 bareroot jack pine without reducing seedling growth after planting. In another study, four root pruning treatments of varying severity were carried out on 3+0 bareroot white spruce (*Picea glauca*) and Norway spruce (*P. abies*) after lifting. First and second year height increments were not affected by the root pruning treatments, although survival was low in the most severe treatment. In the second year, the percentage increase in root length of root pruned seedlings was twice that of controls. As active root development was observed taking place from the pruned ends of secondary roots, it was hypothesized that the root pruning was responsible for the increased growth of the root system.

There has been some interest in pruning the bottom portion of the plug of container grown seedlings in an effort to stimulate root egress. Results from limited trials so far, show for the most part little difference in root egress or shoot growth between root pruned and unpruned seedlings. Examples include BC Ministry of Forest (BCMOF) Silviculture Branch Trial (SX Trial) SX 84199 G established in Vanderhoof and Mackenzie forest districts on two seedlots of PSB 313B 2+0 white spruce planted in May/June of 1985, and in the spring of 1987 with white spruce and PSB 313B 2+0 lodgepole pine (*Pinus contorta*) in Mackenzie. After four and two seasons for the 1985 and 1987 trials respectively, there were no important differences in survival, height, and leader growth of the pruned and unpruned stock. It was noted that root pruning did not change the amount or location of root egress from the plug. Similarly, BCMOF SX Trial 86127 Q established in Vanderhoof and Fort St. John forest districts, found that PSB 313 white spruce plugs pruned to 3 and 5 cm and planted on mounds had lower survival, height increment, and volume than 1 cm pruned or control seedlings. Although it did not appear to inhibit root egress, root pruning 1, 3 or 5 cm from the base of the plug did not promote root egress compared to the unpruned seedlings on both mounded or unprepared spots. As well, BCMOF SX Trial 84102 Q reported no significant differences in growth after one growing season between root pruned and unpruned lodgepole pine seedlings.

However, results promising enough to suggest further work be conducted were reported in BCMOF SX Trial 86125 Q on lodgepole pine PSB 211 at 2 sites in both the Prince George and Kamloops forest regions. Three lengths, either 1, 3 or 5 cm were pruned off the base of the plug, as part of a larger trial which included a copper root pruning treatment. After 3 seasons, the 3 cm root pruned seedlings had significantly greater height and root collar diameter (RCD) than the 5 cm pruned seedlings. Although not significantly different, the 3 cm pruned seedlings had better root growth than the other manual pruning treatments and the control. Seedlings which were copper pruned had the best root development.

One reason for the lack of positive response following root pruning may be due to the removal of carbohydrate stored in the root. However, as there is a greater amount of mass in the shoot compared to the root, and therefore potentially more carbohydrates, removing a small

amount of the plug should not significantly reduce the seedlings' total carbohydrate reserves. As well, new root growth after planting has been shown to rely heavily on current photosynthate under favourable site conditions.

Another explanation for the lack of root egress stimulation may be due to the seasonal nature of root growth. In general, root growth resumes in the spring as the soil warms, declines during shoot growth, and peaks again in the late summer/fall. Seedlings root pruned prior to spring planting may not have enough time to regenerate new roots from the pruned area prior to budflush, after which time the roots must compete with the new shoot for current photosynthate and stored carbohydrates. This is because although root pruning may stimulate the production of more roots, it causes initial physical damage. Therefore, root pruning of summer or fall plant seedlings may prove more beneficial as increased reserves required for the repair of old roots and production of new roots will be available.

