

Summary of:

Rooting Patterns of Boreal Tree Species.

Researcher:

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Tree harvesting and site preparation have raised concerns regarding their impacts on soil processes and the successful reestablishment of new forests. These concerns have resulted in a need to understand the role root systems play in capturing leached nutrients.

The objectives of this study were:

1. to investigate the root distribution of aspen and white spruce.
2. to monitor root activity of aspen and spruce.

Methods:

Four study sites were selected. Site 1 was a 10 year old plantation of white spruce. This site was lightly shearbladed before planting, and regenerating aspen was brushsawn. Site 2 was a 20 year old plantation of white spruce with no site preparation. Site 3 was a mature stand of aspen and 110 year old spruce. Site 4 was a 6 year old plantation of white spruce that was prepared with a bracke moulder before planting. Foliage samples were taken from spruce and aspen in sites 1-3. These samples were analyzed for strontium (Sr) levels to determine root activity. 8 cm diameter soil cores were used to take root samples from site 4. These samples were analyzed to determine root distribution. Samples were taken from the litter and FH horizons of all sites in May to determine the input of strontium to the litter layer. Soil samples were also taken to a depth of 100 cm to determine natural strontium levels.

Results:

Root biomass and root length increased with stand age. Roots were found to a depth of 120 cm, but most roots (58-74%) were found within 15 cm of the soil surface. The high percentage of roots at shallow depths is a reflection of higher soil temperatures near the soil surface, favourable spring-time moisture conditions, and genetic influences on root development. Reduced root densities at greater depths may be due to the cool soil temperatures, which were generally less than 6 degrees Celsius (the temperature at which roots initiate growth). Cool soil temperatures in Luvisolic forest soils may restrict deep root penetration.

Accumulation of strontium in foliage indicates that roots are very active in the forest floor, and less active deeper within the soil. Deciduous trees showed greater strontium accumulation than coniferous trees showed. Natural strontium levels were highest at the soil surface. The lowest strontium concentrations occurred between 0-30 cm depth. Experimental surface application of strontium indicated very little translocation of strontium to the soil surface from greater depths (90 cm) within the soil.