

Title and description:

Rooting Patterns Of Boreal Mixedwood Species In Saskatchewan; Ken Van Rees/Doug Jackson; 1994; Soil Science Department; University of Saskatchewan; 36 pages

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Introduction

Concern has been raised as to the impacts of harvesting and site preparation methods and in some cases fire events on the nutrient status of forest soils. Some forestry practices can be detrimental to nutrient levels in the soil by either removing surface mineral soil and litter layers such as in landings or through increased nutrient leaching following harvesting; hence reducing the productivity of a site for future tree rotations. The role of tree roots in capturing nutrients that may be potentially lost to nutrient leaching is not understood and Gale and Grigal (1987) suggested that early successional species (i.e., aspen) may be beneficial in minimizing nutrient loss due to their extensive root systems whereas late successional species (i.e., spruce) are better suited for sites where nutrient resources are concentrated near the soil surface. In the Boreal Mixedwood forests, however, little is known about the distribution and extent of aspen and spruce roots and where roots of each species exploit the soil profile for water and nutrients.

Root length measurements are necessary in order to understand the role of roots in the absorption of water and nutrients, especially from the standpoint of investigating nutrient competition between species. Roots that are actively involved in uptake are generally less than 3 mm in diameter. There are no studies, however, that have quantified root length densities for aspen and spruce in Boreal Mixedwood stands. Strong and La Roi (1983a) did quantify the number of roots on soil pit faces for various boreal species, but did not separate out species or determine root length densities. There has been some work done in Minnesota on root distributions of aspen in pure aspen stands (Ruark and Bockheim, 1987), but not a mixedwood stand.

The objective of this project (1993-1994) is to investigate the rooting distribution of mature aspen and spruce trees in a Boreal Mixedwood forest located in Prince Albert National Park. Future work will determine the activity of these root systems in different parts of the soil profile using a stable tracer.

Material and Methods

The site was located in the Prince Albert National Park (UTM coordinates: 13U 425840 5968800 SW corner) which is a part of the Prince Albert Model Forest (PAMF) (Fig. 1). This area is associated with the Waskesiu Hills Upland (rolling topography) and is a part of the *Populus-Aralia/Linnaea* ecosystem in the Mixedwood ecodistrict (Kabzems *et al.*, 1986).

The general landscape is classified as a Loon River-Bittern Lake with a slope class of 35 %. The research plot is dominated by Loon River (orthic Gray Luvisolic) soils over 70 % of the landscape with significant inclusions of Bittern Lake (Brunisolic Gray Luvisols, Eutric Brunisolic soils, and gleyed variants of the Luvisolic and Brunisolic orders in lower landscape positions) (Fig. 2). An elevational map for the area (produced by Dr. D. Pennock) and the location of the sampling sites is presented in Figure 3.

The vegetation on the site consists predominantly of mature trembling aspen (*Populus tremuloides* Michx.; tA) and white spruce (*Picea glauca* (Moench) Voss; wS) with some balsam poplar (*Populus balsamifera* L.; bPo) growing on the Gleysols. Understory vegetation consisted of prickly rose (*Rosa acicularis*), dry-spike sedge (*Carex siccata* Dewey), and bearberry (*Arctostaphylos uva-ursi* (L.) Spreng) (Fig. 4). Stocking of the stand was ≈ 2000 stems ha⁻¹. Another site down the haul road with jack pine (*Pinus banksiana* Lamb; jP) was also selected to take two cores for jack pine root length.