CENTRE FOR ENHANCED FOREST MANAGEMENT

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Gradients in microclimate and spruce growth adjacent to young aspen stands

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Treating small patches or clusters of spruce while leaving a portion of the stand untreated, is a potentially useful option for enhancing spruce growth and increasing spruce yield in regenerating mixedwood stands. However, there is concern that the taller surrounding aspen may influence growth of the white spruce. Information on the nature and extent of these edge effects is of potential value in identifying optimal sizes for the spruce patches.

Data were collected during the growing seasons of 2002 and 2003 within three 12-year-old WESBOGY installations located near Grande Prairie and Peace River, Alberta. At these sites we examined how light, soil moisture, and air temperature change across the boundary between young aspen and young spruce patches. We also examined how these factors influence white spruce growth adjacent to aspen patches.

Findings:

1. Light levels increase with distance from the aspen stands;

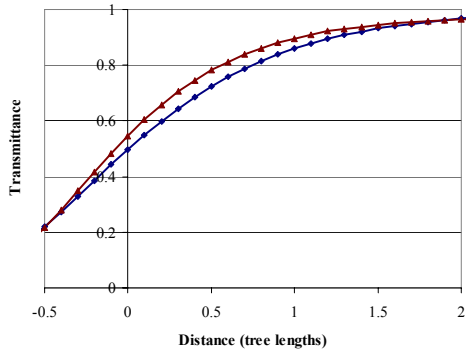

Figure 1. This graph shows the relationship between light (transmittance) at 1 m height and distance from the edge of 12-year-old aspen stands for North (N, blue diamonds) and South (S, red triangles) facing edges. The lines are described by the equations:

a) **North:** $DIFN = 0.9987e^{-e^{-\left(\frac{PD+0.2334}{0.6488}\right)}}$

b) **South:** $DIFN = 0.9768e^{-e^{-\left(\frac{PD+0.2848}{0.5226}\right)}}$

2. The negative effects of aspen on spruce growth in adjacent gaps are greatest within about 1/3 of the height of the aspen;

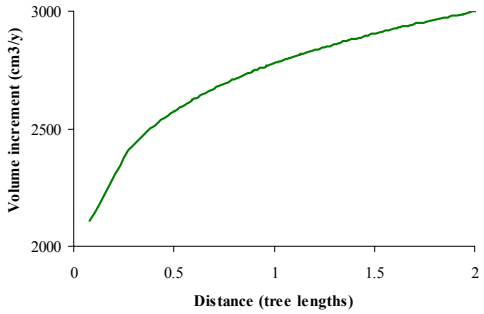

Figure 2. This graph shows the relationship between spruce growth and distance from the edge of 12-year-old aspen stands at the Manning and Hines Creek Sites.

3. Soil moisture availability is highest in the conifer patch right at the edge of a north facing aspen stand due to suppression of herbs and grasses and improved snow retention;

4. Young aspen patches provide spruce with some protection from growing season frost within one tree length from the edge of the patch on some sites.

Implications:

When spruce patches are at least one aspen tree length wide the adjacent aspen will have only limited influence on spruce growth. It may be desirable to keep spruce patches smaller than two aspen tree lengths in width to provide for frost protection and suppression of understory vegetation.

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Further Information:

Voicu, M.F. and Comeau, P.G. 2006. Microclimatic and spruce growth gradients adjacent to young aspen stands. For. Ecol. Manage. 221: 13-26.

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