

# Keeping mixedwood forests *mixed*: An experiment addressing the feasibility of regenerating aspen and white spruce.

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## Abstract – Oral and poster

In March 2002, a study was initiated to increase understanding of the vegetation management regimes necessary to establish a mixture of white spruce (*Picea glauca* [Moench] Voss) and trembling aspen (*Populus tremuloides* Michx.) following clear felling on upland boreal sites. The hypothesis being tested is that a relatively low density of white spruce (e.g., 400 stems/ha) can be planted and managed on an individual-tree basis, while aspen are grown to an early technical rotation in the intervening areas between the spruce. The aspen will, potentially, enhance spruce stem quality and provide a cash crop midway through the spruce sawlog rotation. A key objective of the study is to explore the relationship between early competition control around the planted spruce and aspen stem density, so that mixed yields of the two species might be optimized. The research sites, situated near Whitecourt Alberta and Timmins Ontario, employ a response-surface design that combines the effects of early, radial vegetation control (0, 2, and 4 years duration) with aspen stem density (400, 800, 1200, 2000 and natural (i.e., unthinned)). Five reference treatments are also established to represent selected alternative practices: a) untended mixedwood plantation; b) mixedwood plantation with control of grass and herbaceous vegetation only; c) pure spruce plantation with control of all competition; d) pure spruce plantation with control of woody competition only, and e) pure aspen. Individual and combined growth responses of the aspen and spruce are being compared among treatments and the treatment impacts on environmental factors and plant growth resources measured (e.g., air temperature, soil temperature, soil moisture, and light).

Following two growing seasons, planted white spruce receiving both woody and herbaceous competition control, either as a broadcast or radial treatment, exhibited 50 to 60% gains in stem diameter over untended trees, resulting in 2.5- to 2.8-fold gains in stem volume index ( $p < 0.01$ ). Spruce receiving control of only woody or herbaceous competition exhibited 15 to 58% gains in stem volume index over untreated trees ( $p < 0.01$ ). Aspen crop trees in plots receiving either broadcast or radial herbaceous vegetation control exhibited 37 to 43% gains in stem volume index over aspen in untreated or radial woody control plots ( $p \leq 0.02$ ). Growth of the spruce was related to light levels or cover of neighbouring vegetation. Due to substantial and frequent rainfall during the summer of 2004, competition for water appears to have had little impact on spruce growth.

In the short term, this study will improve our understanding of how controlling competition from grasses, herbs and shrubs influences resource availability and the establishment and growth of white spruce and aspen. Long-term results from this research will provide an improved understanding of the dynamics of mixedwood stands that will be useful in the development of better strategies for their management.

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