

Effects of herbaceous and woody vegetation control on early boreal mixedwood stand development

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Abstract: On upland mesic sites in Canada's boreal forest region, there is increasing demand for practical regeneration strategies that will reproduce the temporal, spatial, compositional, and structural diversity of mixed stands of white spruce (*Picea glauca* [Moench] Voss) and trembling aspen (*Populus tremuloides* Michx.). We initiated a study to test the hypothesis that such a mixedwood may be established on clear-felled sites by planting spruce at 5-m spacing, tending them individually with 2-m radial treatments, and leaving aspen to regenerate naturally in the intervening area between the spruce. The resulting stand may provide a commercial thinning opportunity at about age 35, when the aspen would be removed as a fibre crop and the spruce left to produce a long-term sawlog crop. Herein we present spruce and aspen growth response data through 5 years post mixedwood establishment on two identical installations in the western (Alberta) and eastern (Ontario) boreal. The best growth of spruce and aspen was observed following radial treatments consisting of 2 to 4 years of herbaceous and woody competition control. In these situations, spruce growth was equivalent to the same stock grown at 2.5-m spacing and provided with complete, continuous relief from competition. Removing only the woody vegetation stimulated the growth of herbaceous competition, dominated by *Calamagrostis canadensis* (Michx) in the west and a variety of low-shrub and forb species in the east. This competition reduced the survival and growth of spruce and did not promote aspen growth in radial treatments. In contrast, control of herbaceous vegetation alone resulted in increased

spruce and aspen growth over woody-only competition control, suggesting that early herbaceous vegetation control should be an operational priority. Untended plots contained the smallest spruce and aspen in the study. Long-term monitoring is needed to document the dynamic interactions between these two species, as established, and formulate practical regeneration strategies and crop plans for spruce-aspen mixedwoods.

Key Words: white spruce, aspen, bluejoint grass, herbs, competition, competitive effects, growth response