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Are the Alberta Free-to-Grow standards a good measure of future competition?

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Free-to-Grow standards (FTG) are distant-dependent competition indices that have been used to regulate an acceptable level of competition from hardwoods and brush on a focal conifer tree. FTG standards have been applied to conifer plantations in British Columbia and Ontario for at least 20 years. In Alberta, once these standards are fully enacted they will have enormous impact on the composition and structure of the future forests and on the profitability of forestry operations. The standards now in policy, however, have never been tested for their ability to actually measure the competition from hardwoods on growth of conifer species.

Recent research (Lieffers et al. 2002) in the Centre for EFM at the U of A shows that light transmission through an aspen canopy reaches its minimum level about 15 to 25 years after establishment. Minimums are reached when aspen are 10 to 12 m in height. Light transmission increase in taller and older stands. In some juvenile stands, transmission was less than 5% of above canopy light, which will severely suppress or kill spruce seedlings. The MIXLIGHT forest light simulator (Stadt and Lieffers 2000) was used to estimate light transmission in aspen stands of different densities and spatial configurations. Positions in the understory were marked and categorized as FTG or failing FTG under several different FTG criteria (plots were 1 to 2 m in radius and the mixedwood FTG rule using the 1.5 m radius 270° arc was also considered).

Light transmission to positions in canopy gaps (up to 4 m across) or at the northern sides of canopy gaps was slightly higher than positions under hardwood trees, especially on their north side. In general, however, there was little difference in available light between positions that met or failed FTG criteria. With 2500 stems/ha of 11m tall aspen trees light levels were extremely low at most positions. At 1100 stems/ha of 11m tall aspen, there is sufficient light for good height growth of spruce.



This spruce tree is not considered to be FTG by some definitions.

In summary, none of the FTG definitions, based upon small plots (up to 2 m in radius), were able to predict the competitive impacts of aspen for light as the aspen becomes taller. Plots 10 m in radius would be needed to assess light regime at specific points in the understory for aspen stands 10 m tall (the time of the light bottleneck). It is therefore, unlikely that FTG definitions aimed at individual understory trees are operationally practical. Stand density and size of aspen trees appear to be better measures to predict light transmission and spruce success in juvenile aspen stands, than current FTG criteria. Thus, FTG in juvenile mixedwood stands should be assessed using a stand-average approach, such as measuring the density and size of aspen in large plots or portions of stands.

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Further Information:

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<http://www.rr2.ualberta.ca/research/EFM/Mixlight.htm>

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