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**TITLE: BENEFITS FROM COMMERCIAL THINNING IN BOREAL FOREST MAY BE LONG TERM.**

**ABSTRACT:** What are the long-term impacts of commercial thinning and fertilization on timber production? What may be the role of thinning in ecosystem management based on natural disturbances? A growth analysis was done to answer these questions using an experimental design set up in 1961 in a boreal black spruce stand located on a mesic site, north of Baie-Comeau (North Shore region, province of Quebec). This experiment followed a split-plot factorial design, testing three levels of free thinning (0, 25 and 50% of basal area) as the main treatments, and three levels of N fertilization (0, 112 and 448 kg/ha of urea) as sub-treatments. The analysis combines the data previously published by Weetman (1975, 1980), and the growth ring analysis of core samples taken at 1.3m in 2001. Concerning the effects of thinning, the results show:

- a) statistically, only heavy thinning (50%) significantly improved the increment of residual trees, but gains in average diameter were negligible;
- b) volume increment in plots thinned at 50% was significantly higher than that in control plots. No significant difference was observed in volume increment between plots thinned at 25% and controls.
- c) heavy thinning increased the survival rate of residual stems. This permitted thinned plots to catch up with the standing volume of unthinned plots, which started a senescence phase during the last 20 years.

The effect of fertilization could not be statistically tested because of the structure of the experimental design. However, it seems there is no evidence of interaction between the effects of thinning and those of fertilization. Fifteen years after treatment, moderate and heavy fertilization increased merchantable yield by 2 and 15 m<sup>3</sup>/ha, respectively.

Following the model of Oliver and Larson (1996) describing stand development after a severe disturbance, heavy thinning seemed to prolong the stem exclusion phase, since stand senescence was delayed and no significant seedling establishment was observed under the residual stand. In an ecosystem management system that emulates the structure and dynamics of stands under natural disturbance regimes (Bergeron and Harvey 1997), commercial thinning could be used to extend the “useful life” of stands.