

# External knot characteristics in black spruce from three initial spacings

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The objective of this paper is to examine the effects of initial spacing on knot size with respect to vertical position in the stem for black spruce trees. A knot is defined as the portion of a branch contained within the tree stem. For the purposes of this study, a minimum knot size of 0.5 cm is used to coincide with current visual lumber grading rules. Many tree growth models<sup>1,2</sup> and branch growth models<sup>3,4</sup> have been developed, but their utility in predicting locations and sizes of individual branches or knots is often limited and little work has been published for black spruce.

The Ontario Ministry of Natural Resources (OMNR) established two spacing trials near Thunder Bay in 1950 using black spruce, white spruce and red pine. The objective of the trials was to determine the effect of initial spacing on tree size (height, diameter and volume) over time. Blocks were established at spacings of 1.8m, 2.7m and 3.6m for all species. OMNR has permitted destructive sampling of trees within the Stanley trial for the purpose of wood quality research. In 1998, Forintek Canada Corporation harvested 139 trees from the Stanley trial to assess the impact of initial spacing on black spruce lumber grade yield and strength properties<sup>5</sup>. Knot characteristics were not considered at that time, so this paper is a continuation of that research.

A total of 18 trees were harvested from the Stanley trial (7 @ 1.8m, 6 @ 2.7m and 3 @ 3.6m). Five parameters (vertical location, horizontal diameter, vertical diameter, stem intersection angle and horizontal projection angle) were measured for each branch stub on each tree. Knot size will be modelled using tree diameter at breast height, tree height, whorl location, depth in crown and initial spacing. Based on preliminary results it is expected that this relationship will be non-linear. Whorl location is the one parameter that could not be measured directly as black spruce does not have well defined whorls. However, a method for interpreting branch size changes with respect to vertical location is being developed that will provide an estimate of whorl location. This can be calibrated by comparing annual ring counts of disks cut from known heights in each tree.

## References

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