

A06-P08

AN IMPORTANCE OF BRANCH-BRANCH INTERACTION WITHIN CROWN OF OPEN-GROWN BLACK SPRUCE IN CENTRAL ALASKA

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Black spruce (*Picea mariana*) stand are widely distributed in interior Alaska. Because they are characterized by small individual size and open forest canopy, inter-individual interaction in aboveground part is predicted to be less or week. However, each black spruce tree represents the dense branching, the self-pruning, and the crown rising, suggesting branch-branch interactions play an important role. In this study, we have tested the hypothesis that dense branching and their competition may adjust the crown development.

Study site was black spruce forest in the Caribou Porker Creek Research Watershed (CPCRW, 65.16N&147.50W). Stand density, average stem diameter at ground level, and Maximum tree height is 4300 trees per ha, 2.5cm, and 5m, respectively. We collected six sample trees, which were varied in size and tree age, and measured basal height (Hb), basal diameter (D), and length (L) of all branches. The strength of competition was tested by power function between branch density on the stem and average branch size ($D^2 L$).

Because branch density of each sample tree was decrease bellow the 30cm depth level from top of crown, self-pruning was caused in middle and lower crown. The power of the self-pruning function was the $-1.5\sim-2.0$. In the lower crown, almost all mature branches have been repaired and re-developed by the epicormic shoots. The similar pattern was found in the 450 years old Douglas-fir tree, but not in young one¹, suggesting that the black spruce has a properties of 'the general old trees' since young growing stage.

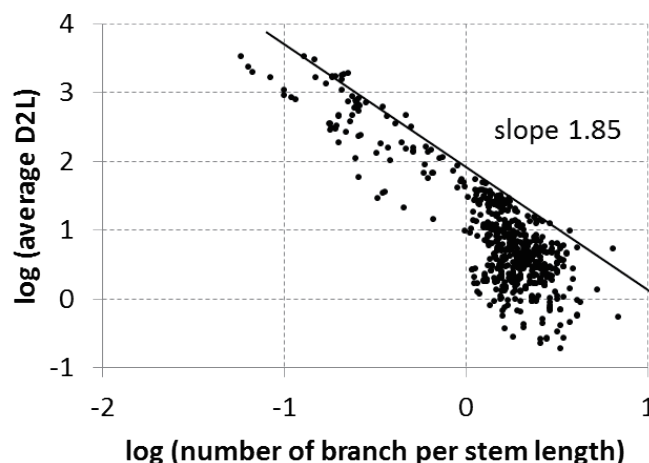


Fig.1 Density-size relationships in self-prunig

¹ Ishii and MacDowell 2002, *Forest Ecology and Management* 169: 257-270