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BRANCHING PROPERTIES OF DECLINING *LARIX SIBIRICA* TREES IN NORTHERN MONGOLIAN BOREAL FOREST

Tomoko Tanabe (*Faculty of Agriculture, Shinshu University, Japan*)

Tetsuoh Shirota (*Faculty of Agriculture, Shinshu University, Japan*)

Dai Saito (*Faculty of Agriculture, Shinshu University, Japan*)

Koh Yasue (*Institute of Mountain Science, Shinshu University, Japan*)

Nachin Baatarbileg (*Department of Forest Sciences, School of Biology and Biotechnology, National University of Mongolia, Mongolia*)

12a2031e@shinshu-u.ac.jp

Siberian larch (*Larix sibirica*) forests in Mongolia are located in the southern limit of the boreal forest on the permafrost region which will be affected by the global warming. In the mature larch forest, we can find several declining trees characterized by small stem diameter, sparse crown, and partial defoliated branches. Understanding a process of the tree declining would make it possible to predict tree responses to climate change and the forest dynamics. The aim of this study is to evaluate the degree of tree declining quantitatively. We focus on the scaling properties: the relationships between branch size and numbers of shoots, which consist of short and long shoot. Furthermore, long shoot consists of the normal one and sprouting one. The role of sprouting long shoot is to rebuild up the framework for short shoot within branches rather than to extend branches itself. We also compared the proportion of sprouting long shoot to normal one in their number.

The study site was a mature *L. sibirica* stand in the Udleg Experimental Forest of Mongolian National University, 50km north from Ulaanbaatar city. We collected six and four sample branches from health tree (H=21.5m, DBH=35.6cm) and declining tree (H=19.3m, DBH=29cm), respectively. For each branch, we measured branch length, basal diameter, number of apex, of normal long shoot, of sprouting long shoot, and of short shoot.

Number of apex, one of short shoot, and one of long shoot represented positive correlation to branch size in both health and declining trees. However, the slopes of their relationships were weaker in the declining trees. Furthermore, the declining tree represented smaller proportion of number of long shoot against one of short shoot. These scaling properties suggest that the declining trees have the sparse branching and the smaller amount of needles.

On the other hand, long shoot consisted of normal and sprouting one. It was found that the appearance ratio of sprouting shoot was not different between health trees and declining trees. Although some investigations point out that sprouting shoots are functional for repairing canopy, the formation of sprouting shoot in this declining *L. sibirica* trees are thought to be insufficient. From these results, we concluded that the difference in shoot constructions between healthy tree and declining tree will be extended.