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SPATIAL PATTERNS AND INTER-TREE INTERACTION IN A MATURE LARIX SIBIRICA STAND AT THE NORTHERN ECOTONE IN MONGOLIA

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Global climate changes are expected to cause large vegetation shifts at unprecedented rates, and the influence are considered to be most rapid and intense especially at ecotones. In the forest-steppe ecotone of northern Mongolia, increasing aridity throughout the 21st century because of global warming is anticipated, and Siberian larch (*Larix sibirica* Ledeb.), which is Mongolian most common species, are expected to reduce the growth by drought. On the other hand, in such a harsh environment, the importance of considering facilitation (positive interaction) rather than competition between neighbouring trees are expected. (Brooker et al. 2008). Therefore, in order to evaluate the possibility of degradation of Siberian larch forest ecosystems, it is necessary to consider not only the stand-level climatic effect but also inter-tree-based responses to severe environments.

This study aims to reveal spatial patterns of trees in a Siberian larch forest, which affect inter-tree facilitation and competition. We established a plot (40m×40m) in a boreal forest in the Udleg Forest Research Station, which is located in the ecotone of Mongolian forest-steppe. For all individuals, height, diameter at breast height (DBH) and positions were measured. We divided those trees into three groups: healthy canopy trees ($H \geq 19\text{m}$; $\text{DBH} \geq 31\text{cm}$), declining canopy trees ($H \geq 19\text{m}$; $\text{DBH} < 31\text{cm}$) and subcanopy trees ($H < 19\text{m}$;). Spatial patterns of each group and combinations of those groups were analysed by univariate and bivariate *L*-functions.

The univariate *L*-function showed healthy canopy trees are distributed regularly. On the other hand, both declining canopy and subcanopy trees are clumped. The univariate *L*-function suggested healthy canopy trees are spatially independent of declining canopy and subcanopy trees; declining canopy trees showed a attraction to subcanopy trees. These results indicate that the growth of healthy canopy trees has nothing to do with the existence of declining canopy and subcanopy trees, but declining canopy and subcanopy trees interact with each other positively or negatively. To confirm this assumption, the effect of competition between neighboring trees will be evaluated, using wood core data. Finally, considering spatial patterns and the effect of inter-tree-based commpetition together, we will discuss the dynamics of this Siberian larch forest.

Brooker, R.W. et al., 2008. Facilitation in plant communities: the past, the present, and the future. *J. Ecol.* 96 (1), 18-34.