

## Response of Siberian larch in Mongolia to environmental variability for the last century

KITAYAMA, Asami<sup>1\*</sup> ; SUGIMOTO, Atsuko<sup>2</sup> ; YONENOBU, Hitoshi<sup>3</sup> ; MIJIDSUREN, Byambasuren<sup>4</sup> ;  
LOPEZ, Larry<sup>5</sup>

<sup>1</sup>Graduate school of environmental Science, Hokkaido University, <sup>2</sup>Faculty of Earth Environmental Science, Hokkaido University, <sup>3</sup>College of Education, Naruto University of Education, <sup>4</sup>Plant Protection Research Institute, Mongolian state university of Agriculture, <sup>5</sup>Faculty of Agriculture, Yamagata University

Mongolian forest locates the southern boundary of Siberian Taiga forest. Patchy forests are observed only on the permafrost in moisture area in Mongolia where annual precipitation exceeds about 300mm. Therefore, this means moisture condition is a major factor controlling forest distribution. Recently, increase in temperature and decrease in precipitation have been reported in large area of Mongolia (Batima, 2006), and that these environmental changes may be a potential trigger tree mortality, change in forest distribution and future thaw of permafrost. In this study, we selected five areas showing different moisture condition and growth environment, Terelj (47N, 107E) in Khenty mountain region, Tsagaannuur (51N, 99E) and Hatgal (50N, 100E) near Khuvsgul Lake in the northern forest area, and Tariat (48N, 100E) and Uyanga (51N, 102E) in Hangayn mountain region respectively. Tree-ring cores were collected from Siberian larch and tree-ring width was measured for each areas. Carbon isotope ratio in tree-rings were analyzed to understand tree response to environmental variability for two areas of these.

Tree-ring width at Terelj negatively correlated with temperature and positively correlated with precipitation, and carbon isotope ratio positively correlated with temperature and negatively correlated with precipitation of previous and current summer. Especially, tree-ring width shows more clear correlation with precipitation in previous summer than that in current summer, whereas carbon isotope ratio shows more good correlation with precipitation in current summer than that in previous summer. These results suggest that stem growth depends on the moisture condition in previous year, while tree-ring is formed with carbon assimilated in the current year. Siberian larch showed very narrow ring width in recent years (after 1997) with very high carbon isotope ratio at Terelj, suggesting severe drought stress. On the other hand, tree-ring width and carbon isotope ratio in northern forest area did not show clear correlation with climate parameters. This results imply that trees in Tsagaannuur and Hatgal grow under relatively wet condition compared to trend at Terelj. Narrow ring width and high carbon isotope ratio found for Terelj was not observed trees in northern forest area.

Keywords: Monoglia, Larch, Tree-ring, Carbon isotope ratio, Drought stress