

Title: Ecophysiological study on the effect of elevated O₃ and salinity stress on the growth and photosynthesis of three larch species

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Abstract

Soil salinization area is estimated to increase due to global warming, especially low precipitation region in the northeastern part of Asia. In addition, due to rapid development of industrialization and urbanization, emissions of ozone (O₃) precursors have been increasing rapidly, which has led to pronounced air pollution of ground level O₃. In the region, larch species are recognized as major trees for afforestation, and have been planted widely for timber production and forest rehabilitation in the Northern Eurasian. Therefore, under these environmental changes, it is important for us to consider the suitability of these larch species for re-plantation.

This study evaluated whether elevated O₃ has negative effects on three larch species; Japanese larch (*Larix kaempferi*), Dahurian larch (*Larix gmelinii* var. *japonica*) and its hybrid larch F₁ (*L. gmelinii* var. *japonica* × *L. kaempferi*) under alkaline salt treatment. We employed a set of open top chamber (consisted with 16 chambers) with 60 ppb O₃ concentration. This concentration is frequent observed in northern Japan and northeast China. To know the effect of soil salinization, we used nutrient poor soil (Andosols), and treated with NaHCO₃ and NaCl solution (9:1 molar ratio) under O₃ exposure for 3 months. I monitored growth and some physiological responses to elevated O₃ under salinity conditions. In result, effect of elevated O₃ on three larch species has hardly been found interact with salinity treatment. Low salinity stress did not significantly inhibit the growth of F₁, and even promoted it to some extent. However, based on a leaf nutrient analysis, Japanese larch and Dahurian larch have certain negative influence by salinity treatment. This result implies that there is a chance for afforestation with F₁.