



Water use efficiency of stem growth of *Larix sibirica*, *Larix gmelinii* and *Pinus sylvestris* forest in the south of Central Siberia

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Increasing temperatures in boreal forests increase evapotranspiration demands but their effect on the growth is not so straightforward. At the same time growing conditions change (i.e. the permafrost melts) which brings shifts in the species composition. Currently, *Larix* and *Pinus* are the two most common tree genera in Siberia covering more than 80 % of the Siberia's forested area. However, it was observed and predicted that as the climate change proceeds the larch will be gradually replaced by the pine. Therefore, we focused on the comparison of sap flow, growth and water use efficiency of stem growth (WUE) in three mature, even-aged stands of *Larix sibirica*, *Larix gmelinii* and *Pinus sylvestris* in the Central Siberia. The research was carried out in the transition between boreal forests and forest steppe, but at the place where the trees still formed a closed canopy. This way allowed us to simulate conditions which are going to occur in the boreal forest zone when the global change proceeds. Despite the similar leaf area indexes, both species of larch transpired more water than a Scots pine. The stem biomass growth was similar in all species, but the volumetric growth was higher in the Scots pine due to lower wood density. As a result, the pine maintained higher WUE than both species of larch. Water use efficiency of stem biomass production was lowest in *Larix sibirica*. and highest in *P. sylvestris*. *Larix sibirica* in average produced 1.00 ± 0.30 kg of biomass per dm^{-3} of transpired water, *L. gmelinii* 1.39 ± 0.04 kg and *P. sylvestris* 3.15 ± 0.27 kg. The transition from larch to pine forests is going to affect the carbon sequestration of trees and water balance in the ecosystem due to less transpiration of the pine than the larch. Increased water use efficiency of the trees may also mitigate the effect of drought stress on the forest.