RR4. Shoot morphology and photosynthetic properties in response to irrigation in a mature larch stand in eastern Siberia

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Abstract

To understand impact of changing precipitation regimes on carbon sink function in east-Siberian taiga, observational and experimental investigations by shoot scale approach were conducted during summer in a mature larch (*Larix cajanderi*) forest in Yakutsk; (1) year-to-year variations in shoot morphology and photosynthesis, and (2) responses of shoot morphology and photosynthesis to irrigation. Significant increase of shoot leaf area was found in next year of rainy summer. This increase of shoot leaf area was consequent to increase of leaf number without change of individual leaf size. Irrigation treatment resulted in an increase of the shoot leaf area, which was accompanied by increase of leaf number and size of individual needle. These results indicated that both of needle number and needle size was determinant of shoot leaf are in response to soil moisture condition in the canopy, however in the determination, the contribution of needle number was greater than individual leaf size. Since total leaf area of canopy (*LAI*) was not so much around 2 m^2 m^{-2}, the increase of shoot leaf area could directly lead to increase of potential canopy photosynthesis due to increasing effective *LAI*. On the other hand, there were no significant effects of annual fluctuation of precipitation and of irrigation treatment on light saturated net CO_2 assimilation rate. Thus photosynthetic capacity was little sensitive to changing precipitation regimes rather than shoot leaf area. We concluded that precipitation is an important factor to determine the annual carbon uptake in the taiga due to acclimation of shoot leaf area. If global warming causes increase in precipitation, the carbon sink function of this taiga will sensitively improve, but if decreasing precipitation regimes occurs, this taiga will plays a serious role as the positive feedback of the carbon sink function to global warming.