10. Soil nitrogen dynamics in larch forests, central Siberia

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Abstract

Boreal forest and tundra contain about one thirds of the terrestrial carbon pool. Many studies have pointed out high priority of roots in primary production of high latitude ecosystems. Carbon storage in roots has been reported to comprise 40–50% of total in mature larch forests in eastern and central Siberia (Kanazawa et al. 1994, Kajimoto et al. 1999). Kajimoto and others (2003) found root network of *Larix gmelinii* spreads horizontally especially at mature stage, suggesting that this trend is likely to be related to demand for soil nutrients.

Nitrogen is an essential element for organism's growth in forest ecosystems. Many studies have demonstrated in northern latitude ecosystems that increased nutrient availability influences productivity of plants and roots and decomposition process in soil. Here we report new findings on soil nitrogen dynamics in larch forests, central Siberia, within recent 3-4 years. Preliminary results of nitrogen-fertilization experiments are also discussed.

Surface soils (organic layer and 0-10 cm mineral soil) from larch forests, central Siberia, mostly had soil inorganic nitrogen pools of less than 10 kgN/ha in average, even in nitrogen-fertilized plots. Field incubation of surface soils showed inorganic N production of approximately -5–15 kgN/ha/yr. Annual leachate of inorganic nitrogen mostly amounts to less than 5 kgN/ha/yr. Dominant form of nitrogen in soil solution from these larch forests was organic (DON), implying a possibility of organic nitrogen to control on ecosystem processes in these forests.

Kanazawa et al. (1994) Proceeding of 2nd Symposium on Joint Siberian Permafrost Studies between Japan and Russia in 1993
Kajimoto, et al. (1999) Tree Physiology 19: 815-822
Kajimoto et al. (2003) Plant and Soil 255: 281-292