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EFFECT OF N FERTILIZATION AND ROOT CUT TREATMENT ON SOIL RESPIRATION IN A LARIX GMELINII FOREST IN CENTRAL SIBERIA

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Boreal forest soils in Russia acts as an important sink of carbon, and N input increasing in near future is predicted. The purpose of this study is to separate soil respiration to root and microbial components using trench method in relation to nitrogen fertilization. This study was conducted near the settlement of Tura (64°16'N, 100°13'E) in central Siberia, Russia. The forest consists of *L. gmelinii* trees those are about 100 years old, and the forest floor vegetation is mainly composed of the dwarf woody shrubs *Vaccinium vitis-idaea*, *V. uliginosum*, and *Ledume palustre*, and under the shrubs, the moss species of *Pleurozium schreberi*. Nitrogen fertilization plots were established in 2004 and the fertilization as granular urea of 60 kg N ha^{-1} y^{-1} was applied in from 2004 to 2008 by hand. We measured soil respiration rate in July and September 2007, September 2008, and July 2011. At the same time, soil temperature at a depth of 5 cm and soil moisture at a depth of 0–12 cm were measured. Before root cutting treatment, the mean soil temperature and soil moisture were not different among the plots. In contrast, soil respiration rate in July was higher in fertilization plots (167 ± 55 mg CO_2-C m^{-2} h^{-1}) than in no fertilization plots (106 ± 27 mg CO_2-C m^{-2} h^{-1}) before the treatment ($P < 0.001$). However, there was not different in soil respiration rate in September before the treatment between no fertilization (49 ± 10 mg CO_2-C m^{-2} h^{-1}) and fertilization (50 ± 14 mg CO_2-C m^{-2} h^{-1}) plots. Soil respiration rate at each plot positively correlated with soil temperature not with soil moisture. After the treatment, the mean soil temperature and soil moisture were not different among the plots. On the other hand, soil respiration rate was statistically different among the plots ($P < 0.001$). Soil respiration rate at fertilization plots (101 ± 31 mg CO_2-C m^{-2} h^{-1} in July and 33 ± 10 CO_2-C m^{-2} h^{-1} in September) was higher than at no fertilization plots (63 ± 32 mg CO_2-C m^{-2} h^{-1} in July and 24 ± 10 CO_2-C m^{-2} h^{-1} in September). Furthermore, soil respiration rate was lower at root cut plots than at no root cut plots. Soil respiration after root cutting increased with soil temperature increasing ($P < 0.01$), not changes in soil moisture. Soil respiration rate after root cutting decreased at the root cut plots, when soil temperature was higher condition. Therefore, the difference of soil respiration rate between root cut treatments was due to disappearance of plant root. From our results in July, the contribution of root respiration was estimated 20.6% and 38.6% in no fertilization plots and fertilization plots, respectively. It may suggest nitrogen fertilization increased root respiration rather than microbial respiration from our results.