Japan Geoscience Union Meeting 2012
(May 20-25 2012 at Makuhari, Chiba, Japan)

MIS21-P01 Room:Convention Hall Time:May 23 17:15-18:30

Effect of winter climate on nitrogen mineralization in forest soil, evaluation from nitrogen mineralization ratio

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A nitrogen mineralization ratio which is nitrogen mineralization rate to total nitrogen content were 0.4 ? 11.9% in Japanese forest soil under field condition, and there were 0.9 -5.8 in cool temperate forest. These values show 3.0-6.5% in the result of newly investigation in this forest. Values of nitrogen mineralization rate estimated from multiple regression model were higher than those of measurement values in the field condition. We consider winter climate affect nitrogen mineralization in the soil, and discussed nitrogen mineralization rate in winter season and seasonal changes of nitrification and ammonification rate. Nitrogen mineralization rate in surface soil was measured with resin core method in Japanese cedar and deciduous broadleaf stand at Katsura experimental site (KT), Ibaraki and in Japanese cypress forest at Terasawa-yama forest, Shinshu University (TR), Nagano. Soil type was dry to slightly wetted brown forest volcanic ash mixture in KT and moderately moist brown forest soil derived granite in TR.

Annual nitrogen mineralization rate were 182-367mgN kg-1at KT, and 167-264 mgN kg-1 at TR. It was high in summer and low in winter with temperature fluctuation. Seasonal changes was not clear at TR. Nitrification was dominated and decreased in spring in the soil located lower to mid slope position distributed Japanese cedar and cypress at both of site. On the contrary, Ammonification was dominated in upper slope position of deciduous forest at KT. Higher nitrogen mineralization ratio was indicated at KT. These values were 3.0-5.0% at KT and 5.7-6.5%at TR.

As mentioned before, nitrogen mineralization ratio was higher in this study site than those of other site in cool temperate forest. Nitrogen mineralization rate in winter was not differing from another season. Snow depth was small but daily average temperature was below 0OC in winter at both site in this research. It was considered that repeated soil freezing and melting introduce the changes of organic matter quality in soil and easily mineralizable properties was highly increased compared heavy snow site. We considered these processes will affect nitrogen mineralization in these sites.

Keywords: Field incubation, nitrogen mineralization ratio, winter