Japan Geoscience Union Meeting 2010
(May 23-28 2010 at Makuhari, Chiba, Japan)

MIS006-P08 Room: Convention Hall Time: May 26 17:15-18:45

The response of litterfall and litter decomposition of Sasa dwarf bamboo to change of soil fertility

Tsunehiro Watanabe[1*], Hideaki Shibata[2]

[1]Hokkaido University, [2]Hokkaido University

In biogeochemical cycling between plant and soil, litterfall and litter decomposition are important processes associated with maintenance of the soil fertility, nutrient release from the litter to the soil and humus formation in the soil. In forest ecosystem of northern Hokkaido in northern Japan, dense Sasa dwarf bamboo on forest floor are important components of vegetation in addition to canopy trees such as evergreen coniferous and broad-leaved deciduous trees. We have reported that total annual litterfall accounted for 34 % of the total litterfall and litter decomposition rates of Sasa leaf and culm were slower than that of tree leaf because of the high silicon content of the Sasa leaf and the low nitrogen content of the Sasa culm. It is considered that the soil nitrogen fertility is affected by forest management, climate change and so on. However, the response of Sasa litterfall and litter decomposition to the change is not clear. The purpose of this study is to clarify the response of Sasa litterfall and litter decompositioon to the increased soil nitrogen fertility and we conducted experimental manipulation in field. It is expected that the increased amount of nitrogen absorption of Sasa to the change of soil fertility influence on initial nitrogen content in Sasa leaf litter and litter decomposition rate on the soil.
Experimental manipulation was carried out in the Nakagawa Experimental Forest of Hokkaido University in northern Hokkaido, northern Japan. Vegetation in this site is natural cool temperate mixed forest common in northern Hokkaido. The forest floor is covered with dense understory vegetation, Sasa dwarf bamboo (Sasa senanensis). We established experimental plot of approximately 300 m^2at a ridge and conducted nitrogen addition experiment. The experimental period was from September 2007 to November 2009. We established control plot and two treatment plots to apply different amount of nitrogen. In each plot, we investigated aboveground standing stock, litterfall and litter decomposition. The application of nitrogen began from 2008 and sprayed monthly from June to November. The applied amount of nitrogen is 5 gN $m^{-2}y^{-1}$in Low -Nitrogen treatment plot and 15 gN $m^{-2}y^{-1}$in High-Nitrogen treatment plot. In the each plot, we sprayed water in control plot and NH_4NO_3solution in Low-N and High-N treatment plots by hand sprayer onto the floor. We conducted litterfall, litter decomposition and aboveground standing stock survey in pre- and after-treatment. Sasa leaf litter decomposition experiment was measured with the litter-bag method for 1 year. We used Sasa litter for litter decomposition experiment collected at pre and after treatment. The collected litter and plant samples measured the dry weight and were ground using a ball mill and analyzed for total carbon and nitrogen concentration. It was expected that litter initial nitrogen concentration increased and the litter decomposition rate was fast as increased soil nitrogen fertility. However, the change of the litter nitrogen concentration of Sasa leaf was not recognized both treatment plots and also the litter mass remaining of Sasa leaf after 1 year did not change in pre- and after- treatment. These results indicated that Sasa leaf litter decomposition was not affected by the change of soil nitrogen fertility.
The increase of aboveground dry weight and nitrogen pool was recognized in only High-N treatment plot. The supplied amount of organic matter and nitrogen mass and the concentration of nitrogen of litterfall were comparable in pre- and after- treatment and among plot. Thus, the

nitrogen concentration of Sasa leaf litter did not change due to the increase aboveground nitrogen pool and dry weight. As a result, it was suggested that litter decomposition rate of Sasa leaf did not change.

Keywords: Biogeochemistry, Litter-bag method, Nitrogen cycling, Biomass