Biomass and litterfall of Sasa dwarf bamboo in forest ecosystem in northern Hokkaido, Japan.

Tsunehiro Watanabe[1]; Hideaki Shibata[2]

[1] Division of Biospere Sci,Hokkaido Univ; [2] FSCNB, Hokkaido Univ.

Biogeochemical cycling among atmosphere, plant and soil in forest ecosystem is very important for understanding response of the ecosystem function to global warming, air pollution or related environmental change. As a component of biogeochemical cycling in the ecosystem, biomass of plant and litterfall plays an important role for the pool and flux of the various elements. Although many studies about biomass and litterfall of tree have been reported, their studies about understory vegetation are still very limited. In forest ecosystem in Hokkaido, northern Japan, Sasa dwarf bamboo covered forest floor as a dominant understory vegetation which would affect the patterns and processes of the biogeochemical cycling in the ecosystem. In this study, we focused Sasa dwarf bamboo covering forest floor in northern Hokkaido, Japan and investigated the quantity of the aboveground biomass, standing stock and litterfall to understand the role of the Sasa dwarf bamboo on the biogeochemical processes in the ecosystem. This study was conducted at the Nakagawa Experimental Forest of Hokkaido University, located in northern Hokkaido, Japan. The dominant forest in this site is cool-temperate natural mixed forest mainly dominated by birch (Betula ermanii), maple (Acer mono, palmatum), Sachalin Fir (Abies Sachalinensis) and so on. The understory vegetation is dominated by Sasa senanensis.

We placed ten litter traps at the flat ridge to measure the amount of litterfall of Sasa and trees from August to November 2005. We also established 10 plots (1m x 1m) to collect all of the aboveground biomass of Sasa in each plot and took it back to laboratory in middle of September (Period of maximum biomass of Sasa). We separated the collected plant to leaf and culm, and then divided to the part of current year and older parts, respectively. We measured dry weight of both culm and leaf to quantify the aboveground biomass and the standing stocks. In this study, we defined aboveground biomass as the sum of the living organisms, and the standing stock as the sum of the aboveground biomass and dead culm attached with the living culm. Mean life span of culm and leaf was calculated as inverse of proportion of current year biomass to each total biomass, respectively. We calculated the proportion of litterfall to the standing stock to discuss the difference of the turnover rate.

Aboveground biomass of Sasa was 1.1 (0.42 SD) kg/m2, and proportion of leaf to the biomass was 18 (3.6SD) %. The standing stock of Sasa including the dead culm attached with the living culm was 1.4 (0.66 SD) kg/m2. The total of litterfall of Sasa and trees during research period was 105 (46.6 SD) and 282 (25.8 SD) g/m2, respectively. The litterfall of Sasa occupied 27% of the total litterfall (sum of tree and Sasa). Although the aboveground biomass of Sasa in this research area corresponds to about 5% of biomass of tree in cool-temperate forest (estimated by previous study), relative contribution of Sasa litterfall was larger than the ratio of the Sasa/tree biomass. The leaf and culm in Sasa litterfall was 42% and 58% to the total Sasa litterfall, respectively. The culm and leaf in Sasa litterfall corresponds to 3% and 30% of the each standing stocks, respectively, suggesting that the turnover rate of calm was larger than that of leaf during the observed period. While the peak of the tree litterfall was once in November, Sasa litterfall increased twice in August and November. In the both peak of Sasa litterfall, leaf litter was dominant compared to the culm. These results indicated that Sasa litterfall play the important role on the biogeochemical cycling based on the quantitative aspects of the Sasa litterfall amount and the different seasonal pattern of Sasa litterfall from the tree litterfall. It was also suggested that these characteristics of the Sasa litterfall might influences the biogechemical cycling through the litter decomposition process.