Importance of asymbiotic nitrogen fixation to nitrogen immobilization in decomposing green needles of Japanese cedar (*Cryptomeria japonica*)

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Japanese cedar (*Cryptomeria japonica*) is one of the most important conifers planted in Japan, and its litter has high asymbiotical nitrogen fixation activity(Nioh and Haruta; 1988). It was also well known that increased nitrogen content resulting from nitrogen immobilization during the early decomposing stage(Berg; 1988). To determine the effrcts of nitrogen fixation activity to nitorgen immobilization in decomposing green needdles of Japanese cedar and the factors concering nitrogen fixation activity, we investigated decomosing rate, nitrogen activity and nitrogen and carbon contents of green neddles of Japanese cedar.

The study was conducted at the Katsura experimental forest in central Japan and the Nagasaka experimantal forest in northeastern Japan. There were snow at the Nagasaka bur not snow at the Katsura in winter, and srand age of both forests were nearly 40 years old. Fresh green needles of Japanese ceder were collected from each forest after thinning, and litter bags containning green neddles were installed both of on the ground and in the air. Bags were collected periodically. The remaining weight, acetylene-reducing activity and nitrogen and carbon contents of the remaining needles were determined.

Weight loss began in the third months after installation and continued, but the decomposition rate among the treatments was equivalent until 12 months after. Nitrogen fixation activity also appeared at 3 months after and increased until 6 months after, then decreased until 12 months after. Higher nitrogen fixation activity was observed with a high water contents in the needles. For each collection time, the activity and nitrogen contents of the samples on the ground were higher than those in the air. It was clear that putting needles on the ground surface accelerate increments of nitrogen contents in the remaining needles. It considered that contribution of asymbiotical nitrogen fixation activity to nitrogen immobilization of remaining needles was high in the samples on the ground. These facts ware observed at the both of Katsura and Nagasaka experimental forest.

Decomposition rate during 12 month was higher in the Nagasaka than those of Katsura. There were considered that physical compaction and high humidity with snow coverage during winter accelerate decomposition at Nagasaka. At the Nagasaka, effects of thinning was also examined. Higher decomposition rate was observed in the non-thinng than thinning site.

It suggest that returnning green neddles to the soil surface is important for maintain the nitrogen in the thinning site. Thinng also has a mechanism to retain a nitrogen in the green neddles with delaying the decomosition in the early decomoposition stage.We will try to identification of nitrogen fixation bacteria to clear the mechanisms and quantitative effects of nitrogen fixation activity to nitrogen immobilization in the litter of Japanese cedar in the near future.

References

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