

Effects of group cutting on litterfall and organic horizon in the secondary forest dominated by hinoki cypress

NAKANISHI, Asami^{1*} ; INAGAKI, Yoshiyuki² ; SHIBATA, Shozo³ ; OSAWA, Naoya⁴

¹Field Science Education and Research Center, Kyoto University, ²Shikoku Research Center, Forestry and Forest Products Research Institute, ³Kyoto University Graduate School of Global Environmental Studies, ⁴Graduate School of Agriculture, Kyoto University

Nitrogen cycling in forest ecosystem is influenced by cutting and vegetation recovery after cutting. The growth of under vegetation after cutting of a coniferous forest may contribute to nutrient input by litterfall and the decomposition process of organic horizon (O-horizon). These changes may have a significant impact on nitrogen cycling in the forest ecosystem.

Litterfall and O-horizon were investigated to determine the cutting effects on nitrogen cycling at three different slope positions in the secondary forest dominated by hinoki cypress 10 years after group cutting to promote regeneration of broad-leaved tree species.

Carbon inputs by litterfall in the cutting plots were lower than those in the control plots. Nitrogen inputs by litterfall in the cutting plots were similar those in the control plots. In the cutting plots at the middle and lower positions where abundant tall-trees of broad-leaved species regenerated, carbon and nitrogen inputs by broad-leaved tree species leaf-litter were higher and litterfall C/N ratio was lower than those in the control plots, whereas those at the upper position where abundant woody shrubs and red pine regenerated did not differ between the control and cutting plots. Litterfall C/N ratio decreased with increasing nitrogen inputs by broad-leaved species leaf-litter.

Stocks of carbon and nitrogen and the mean residence time (MRT) of carbon and nitrogen in the O-horizon in the cutting plots were lower than those in the control plots at the same position. The MRT of carbon and nitrogen in the O-horizon was shorter with decreasing litterfall C/N ratio. The decrease of MRT of O-horizon in the cutting plots at the middle and lower positions was much more notable, whereas at the upper position that was smaller than in the other two positions.

The results suggest that the change in MRT of O-horizon between the cutting and control plots at each position 10 years after group cutting is strongly influenced by regenerated tree species in the cutting plots, but not by the difference of soil nutrition along a slope.

Keywords: group cutting, litterfall C/N ratio, organic horizon, regenerated tree species, nitrogen input, slope position