

Radio-cesium accumulation during decomposition of leaf litter accelerated by fungal grazers

Nobuhiro Kaneko^{1*}, Taizo Nakamori¹, Huang Yao¹, Toshiko Miura¹

¹Graduate School of Environment and Information Sciences, Yokohama National University

Vast forest area in eastern Japan has been contaminated with radio isotopes by the Fukushima NPP accident. Most of the area is covered by deciduous broad leaf forests and some parts are conifer plantation forests. The forest floor in deciduous forests, and canopy of evergreen forest were most contaminated by fall out. Radio-cesium is known to stay bioavailable in forest ecosystems for long time, and it is necessary to terminate the cycling process to decontaminate the forest ecosystem. Ecological process to recycle radio-Cs in forest ecosystem should be studied to enhance decontamination of radio-cesium. Mushrooms (fungi) have been know to show high concentration of Cs. Although mushroom biomass in a forest ecosystem is small, fungal mycelium in detritus and soil is large, thus fungi contain substantial amount of radio-Cs. It is well known that concentration of some nutrients, such as nitrogen and phosphorus, increase, whereas potassium decreases during the leaf litter decomposition. We observed radio-Cs concentration of leaf litter during decomposition on a forest floor where radio-Cs (¹³⁴+¹³⁷) contamination was ca. 100 kBq/kg. We put 16 g (dry weight) of newly fallen mixed deciduous leaf litter (half of which was oak, *Quercus serrata*) into 25 cm x 25 cm litter bag in a deciduous forest about 50 km from Fukushima NPP. Coarse (2 mm) and fine (0.2 mm) mesh size bags were prepared to detect soil invertebrate effects on litter decomposition. Fresh litter ¹³⁷-Cs concentration was ca. 3,000 Bq/kg in December 2011. During the decomposition process on the forest floor, litter ¹³⁷-Cs increased exponentially and exceeded 10,000 Bq/kg after 6 months, indicating that Cs and K show contrasting dynamics during early decomposition phase. Increase in fungal biomass in the early stage of litter decomposition was observed. Therefore, this upward movement of Cs from humus and soil layer suggests fungal translocation of nutrients from outside of litter substrate. The litter in the coarse mesh showed higher concentration of Cs, therefore Interaction between fungal species and grazing effect on fungi by fungivorous invertebrates will enhance the translocation of radio-Cs from soil to decomposing litter.

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