

窒素飽和状態の森林・耕地土壌における急速な有機物分解 セルロースろ紙培養試験による解析

Rapid decomposition of organic matter in N-rich forest and cropland soils as revealed by cellulose filter incubation

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The microbial decomposition of organic matter plays important roles in soil C cycles. The decomposition activity of soil microorganisms may increase in response to the increased N deposition or fertilization. By using filter paper of cellulose (major constituent of plant litter) as a standard substrate for soil microorganisms, effects of N availability on microbial decomposition activity can be compared between different forest and cropland types. The mass loss of filter papers buried in the surface soils was measured in the N-rich cropland and three forest sites varying in N deposition in Japan. The rates of cellulose decomposition were higher in the cropland soil than in three forest soils. Despite a small biomass of the cropland soil microorganisms, their decomposition ability is considered to be enhanced by higher soil temperature and N availability. Among three forest soils, decomposition rate on cumulative degree-day basis was greatest in the suburban forest receiving high N deposition (20 kg N ha⁻¹ yr⁻¹). The mineralization experiment of ¹⁴C-glucose showed that the mineralization rates of glucose increased with soil microbial biomass, which contrasts with results of cellulose decomposition. This suggests that the rate-regulating factors of cellulose decomposition are different from those of glucose mineralization. Cellulose can be rapidly decomposed in the forest soils receiving high N deposition, as well as N-rich cropland soils. The N input from the external sources may be taken into account as one of rate-regulating factors of organic matter decomposition in the suburban forests.

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