

Quantification of the sources of soluble organic N (SON) from new litter or indigenous soil in a typical subtropical forest

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Abstract

Decomposition of forest litter plays a major role in nitrogen (N) dynamics in soil. But to which extent that forest litter affects soil N and how much soil N is derived from the new litter remains unknown. An in-situ soil column experiment with 14-month litter decomposition was conducted to examine the effect of litter retention on soil N dynamics in a typical forest of subtropical China in 2018. Litter removal in the soil column was used as a control treatment, while natural litter or identical amount of ¹⁵N labeled litter was added to soil columns as litter retention treatment. The results showed that litter removal caused a continuous decrease in concentration of soil soluble organic nitrogen (SON) in the first 5 months, and then SON began to accumulate and its concentration went up in spring showing obvious seasonal change. Litter retention accelerated the reduction of soil SON concentration in the first 2 months, while maintained a high concentration after that period. Soil NH₄⁺-N derived from litter was nitrified rapidly, and newly formed NO₃⁻-N was quickly immobilized or lost. Only 1.8% of soil SON came from litter N and 98.2% from indigenous soil N under the decomposition of labeled litter. Litter provided supplementation N to form new soil SON continuously, however, only a small part of SON was relatively stable, and SON played the role of reserve and regulatory pool. Soil SON and TN were formed after long-term litter accumulation and decomposition.

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