川西亚高山不同海拔森林土壤活性氮库及净氮矿化的季节动态

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Seasonal dynamics of soil labile nitrogen pools and net nitrogen mineralization in subalpine forests along an elevational gradient in western Sichuan, China.

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摘要
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摘要

研究了川西理县毕棚沟不同海拔梯度(3600 m、3300 m和3000 m)森林群落土壤活性氮库及土壤净氮矿化速率的季节动态.结果表明: 研究区森林土壤活性氮库(铵态氮、硝态氮、微生物生物量氮和可溶性有机氮)及净氮矿化速率存在明显的季节变化,但不同形态土壤活性氮库的季节动态有一定差异.4个采样时期(非生长季与生长季初期、中期及末期)各海拔土壤硝态氮浓度(8.38～89.60 mg·kg^{-1})均显著高于铵态氮浓度(0.44～8.43 mg·kg^{-1}).生长季初期各海拔梯度的土壤净氮矿化速率均表现为负值(-0.77～-0.56 mg·kg^{-1}·d^{-1}),而非生长季、生长季中期和末期均为正值.除硝态氮外,不同海拔的土壤铵态氮、微生物生物量氮和可溶性有机氮浓度的差异极显著,海拔对它们的影响与季节变化有关.该区土壤净氮矿化以硝化为主,且氮矿化过程不受海拔梯度的影响.冬季土壤净氮矿化明显(0.42～0 99 mg·kg^{-1}·d^{-1}),早春高的土壤无机氮可能为植物生长提供基础养分，也可能通过淋溶方式从系统中丢失.

关键词： 亚高山森林 土壤活性氮库 生长季 非生长季 川西

Abstract:

The seasonal dynamics of soil labile nitrogen pools and net nitrogen mineralization of three subalpine forests along an elevation gradient (3600, 3300 and 3000 m), western Sichuan, China were examined. Obvious seasonal dynamics were found in soil labile nitrogen pools (ammonium, nitrate, microbial biomass nitrogen and dissolved organic nitrogen) and net nitrogen mineralization rate, but the seasonality varied with the measured nitrogen pools. The concentrations of soil nitrate (8.38-89.60 mg·kg^{-1}) were significantly higher than those of ammonium (0.44-8.43 mg·kg^{-1}) in four sampling periods (non-growing season, early, middle and late growing season). Regardless of the elevation, the rate of soil net nitrogen mineralization was negative (-0.77 to -0.56 mg·kg^{-1}·d^{-1}) early in the growing season, but positive in the other three periods. Except for nitrate, the contents of ammonium, microbial biomass nitrogen and dissolved organic nitrogen varied significantly with elevation and the altitude effects on those pools were depen dent on seasons. In summary, soil nitrification was the major process of net soil nitrogen mineralization and soil nitrogen mineralization was not affected by elevational gradient. Soil nitrogen mineralization (0.42-0.99 mg·kg^{-1}·d^{-1}) in winter was considerable in this area. Relatively high inorganic nitrogen in early spring might be favorable for vegetation growth, but might also be lost from soil ecosystem through leaching.

Key words: subalpine forests soil labile nitrogen pools growing season non-growing season western Sichuan.

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