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研究论文

亚热带红壤丘陵区四种人工林凋落物分解动态及养分释放

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摘要 应用网袋分解法，连续2a对我国亚热带红壤丘陵区内有代表性的人工林类型马尾松(*Pinus massonian a*)、湿地松(*Pinus elliottii*)、杉木 (*Cunninghamia lanceolata*)、木荷(*Schima superba*)+马尾松(*Pinus massoniana*) 混交林的凋落物的分解速率，及其C、N元素释放动态进行了研究，凋落物样品分地上、地下两组处理方式。4 种林分凋落物地上组的第1、2年分解速率（凋落物的年失重率）依次为马尾松林>混交林>湿地松林>杉木林，马 尾松林>混交林>杉木林>湿地松林；地下组的第1、2年分解速率顺序分别为马尾松林>混交林>杉木林>湿地松 林，马尾松>杉木林>湿地松林>混交林。各林分地上组凋落物分解速率明显快于地下部分，马尾松林凋落物的分 解速率在不同时期均高于其它林分。4种林分凋落物的分解动态符合Olson指数衰减模型。根据拟合方程得出的 凋落物分解95%时间为4~10a，介于暖温带常见树种凋落物95%被分解所需时间8~17a，地处南亚热带季风区的鼎 湖山凋落物分解95%所需的时间2~8a。养分元素释放率的变化因不同林分和分解时期而异。C在各林分中始终表 现为净释放，地上组凋落物的释放率大多数时间均高于地下组。N则于湿地松林、马尾松林和混交林中前期表现 出富集现象，而后开始净释放，其中湿地松林凋落物的N富集现象最为显著，释放速率在两个试验年度均为各林 分中最低，凋落物中初始的高C/N比是导致上述现象的原因。杉木林凋落物具有最低的初始C/N比，没有出现N 富集现象，且在两个试验年度末期均维持了较高的N释放率。

关键词 凋落物 分解 养分释放 林分 亚热带

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Decomposition dynamics and nutrient release of litters for four artificial forests in the red soil and hilly region of subtropical China

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Abstract Litter decomposition and nutrient release of four artificial forests in the subtropical, red soil and hilly region of China were examined using the litter bag method within two consecutive years in this paper. Decomposition rates and the release dynamics of carbon and nitrogen of the four forests, *Pinus massoniana*, *Pinus elliotti*, *Cunninghamia lanceolata* and *Schima superba+Pinus massoniana* were measured. The experiments were conducted in two different decomposition conditions of aboveground and belowground. The orders of litter decay rates(annual mass loss) of the four forest types for aboveground group were *P.massoniana> S.superba+ P.massoniana > P.elliottii > C.lanceolata* in the first experimental year, and *P.massoniana> S.superba+ P.massoniana > C.lanceolata > P.elliottii* in the second year. The litter decay rates for aboveground group were generally higher than those for belowground group in the above forests, and that for *P.massoniana* forest was the highest among all during the whole experimental period. Litter decomposition processes were simulated using Olson′s exponential models, which were found the best of fits to the data. According to the models, it needs 4-10 years to reach the 95% of decay rate for the investigated forests in the experimental region, and the time is between that of 8-17 years for the warm temperate forest and that of 2-8 years for the south subtropical forest. Release dynamics of nutrients differed in four forest types and also by different decomposition periods. The release rates of carbon showed a continuously increasing pattern in all the forests and those for aboveground group were higher than those for belowground group. At the earlier decompos

ition stage, the absolute content of nitrogen was increased in *P. elliottii* forest, *P. massonian* an d the mixed forest. Among all there was the most significant nitrogen accumulation, and therefore t he lowest release rate of nitrogen for litters in *P. elliottii* forest during the two experimental year s, which was strongly influenced by the initial ratio of carbon to nitrogen for litter samples in the ov erhead forest. The litter samples for Cunninghamia lanceolata had the lowest C/N ratio and theref ore a relatively high release rate for nitrogen during the two experimental years.

Key words litter decomposition _ nutrient release _ forest type _ subtropical

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