生态学报 2006 26 (26(04)): 1037-1046 ISSN: 1004-616x CN: 44-1063/R

研究论文

长白山各植被带主要树种凋落物分解速率及模型模拟的试验研究

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收稿日期 2005-7-28 修回日期 2006-2-10 网络版发布日期: 2006-4-25

摘要 2001～2003年在长白山自然保护区内3个垂直植被带的典型群落红松阔叶林、云冷杉林和岳桦林内，利用网袋埋藏法对群落内的6个主要优势乔木树种凋落物进行埋藏分解试验，研究凋落物分解速率及其变化动态；同时利用分解模型，模拟预测凋落物的分解进展，为深入研究这6个树种的营养策略、群落养分循环等奠定基础，也为森林生态系统管理提供理论依据。研究结果表明，所研究的6个树种凋落物都表现出随时间进程失重率增大的现象，但失重率并不与时间呈线性相关。在分解的638d（1.75a）后，6种叶凋落物的分解速率明显升高。到分解实验结止时（699d），叶凋落物干重剩余率从小至大依次为白桦（24.56%）、紫椴（24.81%）、红松（38.48%）、鱼鳞云杉（41.15%）、岳桦（41.53%）和臭冷杉（42.62%）。枝凋落物分解速率明显低于叶，枝干重剩余率从小至大依次为紫椴（44.98%）、臭冷杉（64.62%）、红松（72.07%）、鱼鳞云杉（73.51%）、白桦（77.37%）和岳桦（80.35%）。在同一海拔高度，阔叶树种叶凋落物分解速率大于针叶树种。并且随着海拔的升高，叶凋落物分解速率逐渐减慢。模型分析预测结果表明，长白山北坡各垂直植被带的优势树种叶凋落物分解95%需4.5～8.0a；年分解系数为紫椴(0.686)>白桦(0.624)> 红松 (0.441)> 鱼鳞云杉(0.406)> 臭冷杉(0.397)>岳桦(0.385)；枝凋落物分解95%需7.8～29.3a，不同树种间的差异明显。枝年分解系数为紫椴(0.391)>臭冷杉(0.204)>红松(0.176)＞鱼鳞云杉(0.157) >白桦 (0.148)> 岳桦(0.102)。

关键词 优势树种； 凋落物； 分解速率； 分解模型； 长白山

分类号 Q948

Researches on litterfall decomposition rates and model simulating of main species in various forest vegetations of Changbai Mountains, China

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Abstract litter decomposition rates of dominant tree species were determined using litterbag burying method in three altitudinal belts of the Broad-leaved Korean Pine forest, Spruce-fir forest and Ermans Birch forest in Changbai Mountain nature reserve during a period of three years from 2001 to 2003. Spatial and temporal dynamics and impact of litter quality were examined with a simulation model for understanding the trophic strategy of main species and ecosystem circulation of material and promoty ecosystem based forest management. The results indicated that annual mass loss increased over time, following a non-linear pattern. The leaf decomposition of all major tree species accelerated after 683 day(1.75year).By the end of study period(699 day), the remaining dry weight of buried leaves from 1ess to bigger was 24.56 for Asian White Birch(Betula platyphylla), 24.81% for Amur Linden(Tilia amurensis), 38.48% for Korean Pine(Pinus koraiensis), 4

1.15% for Yezo Spruce Cheng et L.K.Fu(Picea jezoensis var. microsperam), 41.53% for Erman s birch(Betula ermanii) and 42.62% for Khingan Fir(Abies nephrolepis). The decomposition rate s of twigs were lower than those of leaves, and the remaining dry weight followed to order of AL (44.98%)<KF(64.62%)<KP(72.07%)<YS Cheng et L.K.Fu(73.51%)<AWB (77.37%)< E B (80.35%).At the same altitude, the decomposition rates of broad-leaved litterfall were highe r than those of conifer's. Among different altitude, decomposition decreased with the increase ele vation.

The modelly analysis suggested that 95% decomposition of leaves takes about 4.5 to 8.0 years fo r major tree species in the three altitudinal belts. Annual leaf decomposition rates (k) 0.686 for A L, 0.624 for AWB,0.441 for KP, 0.406 for YSCheng et L.K.Fu, 0.397 for KF and 0.385 for E B. The 95% decomposition for twig ranged from 7.8 to 29.3 years,with large differences amon g different species. The annual decomposition rate (k) for twigs from high to low was 0.391 for A L, 0.204 for KF, 0.176 for KP, 0.157 for YS Cheng et L.K.Fu, 0.148 for AWB and 0.102 fo r EB.

Key words dominant tree species； litterfall； decomposition rate； decompositio n model； Changbai Mountain

DOI

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