

## 长白山阔叶红松林树木短期死亡动态

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## Dynamics of short-term tree mortality in broad-leaved Korean pine (*Pinus koraiensis*) mixed forest in the Changbai Mountains

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摘要

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**摘要** 树木死亡是森林群落动态的重要过程, 是多种因素共同作用的结果。本文基于长白山阔叶红松林25 ha样地2004年和2009年两次调查数据, 从物种组成、数量特征、径级结构和空间分布等方面分析了5年间样地中死亡树木的特征。结果表明: 5年间样地DBH  $\geq 1$  cm的独立个体树种数由52变为51, 3个树种因仅有的1个个体死亡而消失, 新增2个树种; 独立个体数从36,908变为34,926, 死亡个体数为4,030, 死亡个体数占2004年个体总数的10.9%, 新增个体数为2,048, 独立个体数净减少1,982; 死亡量大的树种其新增量也较大, 灌木树种的死亡量和新增量均多于乔木树种; 有5个树种的平均胸径减小, 44个树种平均胸径增加; 从死亡个体的径级结构来看, 小径级个体死亡较多, 大径级个体死亡少, 5 cm以下的死亡个体占总死亡量的81.5%, 不同林层的优势树种死亡个体的径级分布与2004年该树种的径级分布基本相同; 不同树种死亡个体的空间分布具有较大差异, 不同林层的优势树种死亡个体空间格局主要以聚集分布为主, 小径级死亡个体在小尺度呈聚集分布, 在其他尺度呈随机分布, 中径级和大径级死亡个体在各尺度上都呈不同程度的随机分布。

**关键词:** 树木死亡 生长 更新 径级结构 空间分布 阔叶红松林 长白山

**Abstract:** Tree mortality, usually resulting from interactions among multiple factors, is a crucial process in forest dynamics. Using two census datasets (2004 and 2009) from a 25 ha plot in the Changbai Mountains, we analyzed the composition, size class structure and spatial distribution of individual trees (DBH  $\geq 1$  cm) that died during the 5-year period. The number of species went from 52 in 2004 to 51 in 2009, with 3 species disappearing and 2 others appearing. The number of individuals changed from 36,908 to 34,926, with 4,030 dying and 2,048 being recruited. The number of dead individuals accounted for 10.9% of total individuals in 2004. Species with high mortality also tended to have high recruitment. Compared with tree species, shrub species had both higher mortality and recruitment rates. In addition, 44 species showed an increased mean DBH in 2009, while the mean DBH of 5 other species decreased. Mortality decreased as DBH increased. Size class distributions of dead dominant species in different vertical layers were similar in the two censuses. Spatial distributions of dead individuals were species-specific. Dead individuals from smaller size classes were spatially clumped at small scales and became randomly spaced at larger scales. However, dead individuals from larger size classes tended to show random distribution at various scales.

**Keywords:** tree mortality growth recruitment size class structure spatial distribution broad-leaved Korean pine (*Pinus koraiensis*) mixed forest Changbai Mountains

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