



## **Long-term study on litterfall and litter quality in a zonal climax forest [U+F020]**

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**Abstract:** Climax forest is generally considered having relatively stable plant community. Korean pine (*Pinus koraiensis*) -mixed broadleaf forest (KBMF) is a zonal climax forest with highly complicated structure and diversity. However, it is still unclear whether its forest floor environment remains relatively static. Litterfall and litter quality play dominant roles in affecting forest floor nutrient cycling and soil properties. In this study, we used long-term in site observation litterfall data to demonstrate the dynamics of litterfall and litter quality and the mechanisms underlying them. Litterfall increased significantly over the past 27 years and such changes were mainly caused by the increment in Korean pine needle and twig litterfall. A significantly and negatively relationship between broadleaf litter and its reproductive structures was found, which partly affected annual litterfall. Litterfall of various litter components and their proportions in the total, and the basal areas for dominant species and their relative proportions changed over time and showed different temporal trends. Changes in proportion of different litter components, combined with the inherent litter quality differences among them, made litter C:N and lignin:N ratios increase at an average rate of 0.19 and 0.16 per year, respectively, from 1981 to 2007, suggesting that forest floor N cycling rate decreased with time. Changes in dominant tree species biomass significantly affected their corresponding foliar litter production and proportions in the total litterfall and therefore played a dominant role in affecting the dynamics of the litter quality and quantity in this forest. These results indicated that forest environment in climax forest still showed a directional change and this resulted from the intrinsic changes within the forest rather than yearly climate fluctuation.

**Key words:** long-term observation; litterfall; climax forest; forest floor; litter quality; species composition