

Wild ungulates and cattle have different effects on litter decomposition as revealed by fecal addition in a Northeast Asian temperate forest

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Abstract

In forest ecosystems, litter decomposition is essential to sustaining productivity and nutrient cycling. Large herbivores are crucial in determining the processes of nutrient cycling. The temperate woods of Asia are growing more and more damaged and broken up by the widespread increase in human activity, including excessive livestock grazing. However, less research has been done on the impact of wild ungulates and cattle on the decomposition of forest litter. In this study, the effects of adding cattle and sika deer (*Cervus nippon*) feces to litter decomposition were examined using a litterbag experiment. Northeastern China was the study's location from July 2022 to October 2023. We found that the addition of deer feces significantly reduced litter decomposition, but the addition of cattle feces greatly increased litter decomposition. The presence of cattle and deer excrement significantly accelerated the release of C after one year of litter decomposition. Compared with the results of the control group (no addition of feces), the addition of cattle and sika deer feces increased C release by 37.45% and 22.69%, respectively. Fecal addition increased the release of N; however, for the three treatment groups, the maximum accumulation of N occurred in the middle of litter decomposition, which may have been due to the initial chemical quality of the leaves and snow melt as well as nutrient limitations at the sites. Compared with the results of the control group, P release in the feces of cattle increased by 4.35%, but P release in the feces of deer decreased by 27.55%. Our findings demonstrate that broad-scale patterns of nitrogen cycling should be closely monitored for the consequences of fecal deposition by an excess of large livestock and ungulates in forests.

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