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模拟酸雨对亚热带三个树种凋落叶分解速率及分解酶活性的影响

The influence of acid rain on leaf litter decomposition and enzyme activity of three trees in the subtropical forests

关键词: [酸雨](#) [凋落物分解](#) [酶活性](#) [亚热带](#)

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摘要: 利用凋落物袋法研究了模拟酸雨对中国亚热带地区3个典型树种杉木(*Cunninghamia lanceolata*)、香樟(*Cinnamomum camphora*)、银杏(*Ginkgo biloba*)凋落叶分解速率及酶活性的影响.酸雨分别设置为重度酸雨(pH=2.5)、中度酸雨(pH=4.0)、对照处理(pH=5.6)3个梯度.试验结果表明:酸雨胁迫会抑制凋落叶的分解,且随着酸雨强度的增强,抑制作用更明显.杉木、香樟、银杏3个树种对照处理下周转期分别比中度酸雨短33%、43%、14%,比重度酸雨短44%、52%、17%.3种分解酶对酸雨胁迫的表现不同,脲酶和纤维素酶表现为一定的抑制作用,基本呈现为对照处理(pH=5.6)>中度酸雨(pH=4.0)>重度酸雨(pH=2.5),与凋落物的分解速率排列情况一致,蔗糖酶在酸雨胁迫下反而有激活的趋势,表现为重度酸雨(pH=2.5)>中度酸雨(pH=4.0)>对照处理(pH=5.6).不同树种对酸雨胁迫的影响有一定的差异性,针叶树种杉木受影响最大,阔叶树种香樟和银杏受影响较小,银杏的抗酸性较强,且针叶树种的分解速率比阔叶树种慢.脲酶和纤维素酶对凋落叶的分解贡献较大,而蔗糖酶的影响相对较小.酶活性与季节有较大的关系,夏季活性相对偏高,冬季活性相对偏低.

Abstract. The effect of acid rain on its decomposition and enzyme activity of three tree species, *Cunninghamia lanceolata*, *Cinnamomum camphora* and *Ginkgo biloba* were investigated in this study at three pH levels, 2.5, 4.0 and 5.6. The results showed acid rain can decrease leaf litter decomposition rate of the trees, and the inhibition becomes more significant when the acidity is higher. The turnover period of the three tree species in the control condition (pH=5.6) is 33%, 43% and 14% shorter than moderate acid rain condition (pH=4.0), respectively, and is 44%, 52% and 17% shorter than severe acid rain condition (pH=2.5), respectively. The performances of the three kinds of decomposition enzymes under acid rain stress are different. Urease and cellulose exhibit certain inhibition with control (pH=5.6) > moderate acid rain (pH=4.0) > severe acid rain (pH=2.5), consistent with decomposition rate trends. In comparison, sucrose in acid rain stress has a reverse activated trend with severe acid rain (pH=2.5) > moderate acid rain (pH=4.0) > control (pH=5.6). The influences of acid rain on different species are also different, with the strongest effect of coniferous tree species *C. lanceolata*, weaker effect of broad-leaved tree *C. camphora*, and the almost anti-acid effect of *G. biloba*. The decomposition rates of coniferous trees are slower than the broad-leaved. Contributions of urease and cellulose enzymes to litter decomposition are bigger, and sucrose influence is relatively smaller. Enzyme activity of leaf litter decomposition was greatly influenced by temperature, with higher enzyme activity in higher temperature.

Key words: [acid rain](#) [litter decomposition](#) [enzyme activity](#) [subtropical regions](#)

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