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模拟氮沉降对鼎湖山森林土壤酸性磷酸单酯酶活性和有效磷含量的影响

李银1,2,曾曙才1,4,黄文娟2,3**

1华南农业大学林学院| 广州 510642；2中国科学院华南植物园| 广州 510650；3中国科学院研究生院| 北京 100049；4农业部生态农业重点开放实验室| 广州 510642

Effects of simulated nitrogen deposition on soil acid phosphomonoesterase activity and soil available phosphorus content in subtropical forests in Dinghushan Mountain.

LI Yin1,2, ZENG Shu-cai1,4, HUANG Wen-juan2,3

1College of Forestry, South China Agricultural University, Guangzhou 510642, China|2South China Botanical Garden, Chinese Academy of Sciences, Guangzhou 510650, China|3Graduate University of Chinese Academy of Sciences, Beijing 100049, China|4Ministry of Agriculture Key Laboratory of Ecological Agriculture, Guangzhou 510642, China

摘要

采用野外原位试验模拟氮（N）沉降，研究了其对鼎湖山马尾松林、混交林和季风林3种森林类型土壤酸性磷酸单酯酶活性（APA）和有效磷（AP）含量的影响.在季风林中设置对照（0 kg N·hm^{-2}·a^{-1}）、低N（50 kg N·hm^{-2}·a^{-1}）、中N（100 kg N·hm^{-2}·a^{-1}）和高N（150 kg N·hm^{-2}·a^{-1}）处理，在马尾松林和混交林中只设置对照、低N和中N处理.结果表明：随着土层加深,土壤APA和AP含量降低.土壤APA在季风林中最高，而AP含量在3种林型中没有显著差异.N沉降增加对土壤APA的作用与林型有关.季风林中适度N沉降可使APA升高，且低N处理的APA（19.52 μmol·g^{-1}·h^{-1}）最高；马尾松林和混交林中，中N处理的APA最高，分别为12.74和11.02 μmol·g^{-1}·h^{-1}.3种林型的AP含量均在低N处理下最高，但各N处理之间的差异并不显著.土壤APA与AP含量之间呈显著正相关关系.

关键词： 酸性磷酸单酯酶活性 有效磷 氮沉降 鼎湖山

Abstract:

An *in situ* field experiment was conducted to study the effects of simulated nitrogen (N) deposition on soil acid phosphomonoesterase activity (APA) and soil available phosphorous (AP) content in *Pinus massoniana* forest (PF), coniferous and broad-leaved mixed forest (MF), and monsoon evergreen broad-leaved forest (MEBF) in Dinghushan Mountain. In PF and MF, three treatments were installed, *i.e.*, CK (0 kg N·hm^{-2}·a^{-1}), low N (50 kg N·hm^{-2}·a^{-1}), and medium N (100 kg N·hm^{-2}·a^{-1}); in MEBF, four treatments were installed, *i.e.*, CK, low N, medium N, and high N (150 kg N·hm^{-2}·a^{-1}). The soil APA and soil AP content decreased with soil depth. The soil APA was the highest in MEBF, while the AP content had no significant difference in the three forests. The effects of N addition on soil APA differed with forest types. In MEBF, the APA was the highest (19.52 μmol·g^{-1}·h^{-1}) in low N treatment; while in PF and MF, the APA was the highest (12.74 and 11.02 μmol·g^{-1}·h^{-1}, respectively) in medium N treatment. In the three forests, soil AP content was the highest in low N treatment, but had no significant differences among the N treatments. There was a significant positive correlation between soil APA and soil AP content.

Key words: acid phosphomonoesterase activity available phosphorous nitrogen de position Dinghushan Mountain

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