

研究报告

草酸对土壤胶体与矿物表面酶的吸附及活性影响

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摘要

采用平衡批处理法,研究了模拟根系分泌物——草酸溶液的浓度、pH对酸性磷酸酶在针铁矿、高岭石及黄棕壤和砖红壤胶体(<2 μm)上的吸附及比活的影响.结果表明,针铁矿对磷酸酶的吸附量受草酸浓度的影响较小,其它供试胶体对蛋白的吸附量随草酸浓度的升高,一般表现为先急剧降低(0~5 mmol·L⁻¹),之后逐渐升高到与对照相当或略低.这与草酸在土壤胶体和矿物表面的配位形态及其对载体表面的电荷改变、溶解有关.草酸体系中,供试胶体对磷酸酶的吸附顺序为针铁矿>黄棕壤>高岭石>砖红壤.酶在草酸体系中的最大吸附点位一般出现在蛋白的等电点(IEP)和供试胶体的PZC之间,而酶在草酸体系中被固定到供试胶体上之后,其最适比活点随胶体类型的不同而没有变化或有所高移.

关键词 [草酸; 磷酸酶; 土壤胶体; 矿物; 吸附; 活性](#)

分类号

Effects of oxalate on acid phosphatase adsorption and its activity on soil colloids and minerals

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Abstract

By a batch method, this paper studied the effects of different concentration and pH of oxalate, an important root exudate, on the adsorption of acid phosphatase and its activity on <2 μm colloids of yellow brown soil and latosol, and on minerals goethite and kaolinite. The results showed that the acid phosphatase adsorption by goethite was less affected by the concentration of oxalate; while the adsorbed amount of this enzyme by the other test colloids and kaolinite was sharply decreased with the increasing oxalate concentration (0~5 mmol·L⁻¹) first, and then gradually increased to the level equal to or less than the blank, which may be related to the coordination type of oxalate on soil colloids and minerals, and their surface charge change and dissolution. In the systems oxalate existed, the adsorbed amount of acid phosphatase by soil colloids and minerals decreased in order of goethite-yellow brown soil > kaolinite > latosol. The pH value for the maximum adsorption of acid phosphatase was between the IEP of the enzyme and the PZC of test colloids and minerals. After the enzyme was immobilized on colloids and minerals, the pH of its maximum specific activity had no change, or shifted to a

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higher value.

Key words [Oxalate](#) [Phosphatase](#) [Soil colloid](#) [Minerals](#) [Adsorption](#)
[Activity](#)

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