

研究报告

## 供水及间甲酚对小麦间作蚕豆土壤微生物多样性和酶活性的影响

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收稿日期 2006-3-6 修回日期 2006-6-23 网络版发布日期 接受日期

**摘要** 通过盆栽试验, 探讨供水(田间持水量的45%、60%和75%)和化感物质间甲酚对小麦、蚕豆不同种植模式生长盛期土壤微生物多样性和酶活性的影响。结果表明, 随灌水水平的降低, 不同处理的土壤细菌、真菌和放线菌数量随之减少, 间甲酚可加剧灌水减少引起的微生物数量的减少; 间甲酚对不同处理土壤微生物多样性指数均具有降低作用, 提高灌水水平可缓解间甲酚对间作群体土壤微生物多样性的负效应, 但间甲酚在75%灌水水平下对单作微生物多样性的负效应最大, 45%的供水水平和间甲酚作用下间作可维持更高的土壤微生物多样性。间甲酚对土壤过氧化氢酶的化感作用不显著, 对脲酶和酸性磷酸酶活性的化感作用显著; 3种土壤酶活性随供水水平的降低均显著下降, 但供水与间甲酚、种植模式的互作效应对酶活性的影响不显著; 间作对土壤过氧化氢酶和酸性磷酸酶活性具有极显著影响。

**关键词** [供水水平](#) [种植模式](#) [土壤微生物多样性](#) [土壤酶](#) [化感作用](#)

分类号

## Effects of water supply and 3-methylphenol on soil microbial diversity and enzyme activity in wheat field intercropped with horse bean

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### Abstract

With pot experiment, this paper studied the effects of water supply levels (45%, 60% and 75% of soil water hold capacity) and allelochemical 3-methylphenol ( $300 \times 10^{-6} \text{ mol} \cdot \text{kg}^{-1} \text{ soil}$ ) on the soil microbial diversity and enzyme activity in mono-cropped and horse bean-intercropped wheat fields during vigorous growth period. The results showed that with the decrease of water supply, the numbers of soil bacteria, fungi and actinomyces in the two fields decreased significantly, and 3-methylphenol enlarged this negative effect. 3-methylphenol had a negative effect on soil microbial diversity, but the increase of water supply could weaken this effect in intercropped field. The strongest allelopathic effect of 3-methylphenol was observed in mono-cropped field when the water supply was 75% of soil water hold capacity, while intercropping could maintain a relatively stable soil microbial diversity, compared to the mono-cropping with 3-methylphenol and low water supply. The allelopathic effect of 3-methylphenol was not significant on soil catalase activity, but significant on soil urease and phosphatase activities. Water supply level affected soil enzyme activity significantly, the lower the water supply level, the weaker the soil enzyme activity was. The interactions of water supply with 3-methyl phenol or cropping pattern were not significant, but intercropping could significantly affect the activities of soil catalase and phosphatase.

**Key words** [Water supply level](#) [Cropping pattern](#) [Soil microbial diversity](#) [Soil enzyme activity](#) [Allelopathy](#)

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