

研究报告

施磷对稻田土壤及田面水磷浓度影响的模拟

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摘要 通过施用不同剂量磷肥稻田土壤淹水培养试验, 研究了施磷对稻田土壤及田面水磷浓度的影响. 结果表明, 土壤速效磷 (Olsen-P) 浓度在施磷后迅速下降, 60 d后趋于稳定. 随施磷量的增加, 土壤速效磷和缓效磷库量均递增, Olsen-P与施磷量呈正相关关系 ($y=21.49+0.086x$), 表明该土壤有很高的固磷潜力. 施磷后田面水中全磷浓度呈先迅速上升后又缓慢下降趋势, 施磷120 d后, 田面水中全磷浓度与施磷量呈指数相关关系 ($y=0.372e^{0.0022x}$), 施磷量在400~800 kg·hm⁻²之间田面水全磷浓度加速增长, 如果施磷量达到或超过800 kg·hm⁻², 则磷容易进入田面水并导致流失, 低于该施磷量时, 则磷进入田面水中的量较少. 利用分段回归模型模拟土壤 Olsen-P与水面全磷关系, 预测出导致田面水中磷激增的土壤 Olsen-P浓度“突变点”为82.7 mg·kg⁻¹, 即施磷量为712 kg·hm⁻². 因此, 土壤 Olsen-P浓度可作为预测田面水中磷损失程度的指标.

关键词 [施磷](#) [稻田土壤](#) [Olsen-P](#) [田面水](#)

分类号

Effects of P application on P concentrations in paddy soil and its surface water: A simulation test

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Abstract

An anaerobic incubation test was conducted to study the effects of different P application rate on the P concentrations in paddy soil and its surface water. The results showed that soil available P (Olsen-P) decreased rapidly at the beginning, but approached to stable after 60 days of P application. Both Olsen-P and residual P increased with increasing P application rate, and Olsen-P had a positive correlation with P application rate, suggesting that the test soil had a strong P adsorption capacity. After P application, the total P (TP) in soil surface water increased rapidly, and then decreased slowly, showing that there was a P exchange between soil and its surface water. After 120 days of P application, there was an exponential relationship between soil surface water TP and P application. The TP in soil surface water increased rapidly when the P application rate was 400~800 kg·hm⁻², and easy to be lost when the P application rate was higher than 800 kg·hm⁻². The simulation with split line model on the relationship between soil Olsen-P and soil surface water TP showed that the change point of soil Olsen-P, which induced a sharp increase of soil surface water TP concentration, was 82.7 mg·kg⁻¹, corresponding to a P application rate being about 712 kg·hm⁻². Soil Olsen-P could be a good indicator in forecasting the P loss from soil surface water.

Key words [P application](#) [Paddy soil](#) [Olsen-P](#) [Soil surface water](#)

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