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太湖水网地区不同种植类型农田磷素渗漏流失研究

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摘要: 采用田间原位小型土壤渗漏计法, 研究了太湖流域水网地区不同种植类型农田土壤中的速效磷累积量与渗漏水中磷素含量之间的关系。结果表明: 研究区菜地、果园年均磷肥施用量分别为 946.8 kg/hm^2 和 832.6 kg/hm^2, 显著高于水田的年均磷肥施用量(83.6 kg/hm^2), 约为水田的 10—12 倍。施入农田中的磷肥主要累积在土壤表层, 0—5 cm 土层中的 Olsen-P 含量最高, 菜地、果园和水田的 Olsen-P 平均含量分别高达 161.75 mg/kg、143.88 mg/kg 和 23.77 mg/kg, 菜地和果园显著高于水田, 约为水田的 6—8 倍。随着土层深度的增加, 土壤中 Olsen-P 的含量显著降低。农田浅层渗漏水中的可溶态磷在总磷中所占的比例远高于颗粒态磷所占的比例。本研究结果显示, 农田浅层渗漏水中溶解性正磷酸盐(DRP)含量与土壤中速效磷(Olsen-P)含量之间具有极显著的指数相关关系, 表明伴随着农田施肥量的增加和土壤中速效磷含量的增加, 浅层渗漏水中的溶解性正磷酸盐含量会显著增加, 大大提高了农田磷素的渗漏淋失风险, 给农业面源污染造成潜在威胁。

关键词: 太湖流域; 磷素; 渗漏流失; 指数相关性
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Phosphorus leaching losses in different planting farmlands in the riverine plain area of Taihu Lake

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Abstract: The method of soil solution collection by soil solution extractor was employed to explore the relationship between Olsen-P accumulated in soil and P concentration in leakage in different types of planting farmlands in Taihu Lake Basin. The results indicate that there are higher application rates of N and P fertilizers on vegetable fields and orchards in the experiment areas. The yearly average pure P application rates are about 946.8 kg/ha in vegetable fields, and 832.6 kg/ha in orchards, which are 10—12 times of that in paddy plots (83.6 kg/ha). The applied fertilizer P is mostly retained in the surface soil, Olsen-P is accumulated in 0—5 cm soil layer, and Olsen-P contents are 161.75 mg/kg, 143.88 mg/kg and 23.77 mg/kg in vegetable fields, orchards and paddy plots, respectively. Olsen-P in vegetable fields and orchards is about 6—8 times higher than that in paddy plots. Olsen-P contents are reduced sharply with the increase of soil depth in farmlands. Dissolvable phosphorus content is much higher than particulate phosphorus content in the lower leakage. There is a significant exponential relationship between Olsen-P accumulated in soil and dissolvable reactive phosphorus concentration in lower leakage, indicating that the risk of P leaching losses increases significantly when Olsen-P exceeded some level in soil.

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