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长期有机物循环利用对红壤稻田土壤供磷能力的影响

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Effects of long-term cycling of organic matter on soil phosphorus supplying capacity in a red soil paddy ecosystem

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摘要 采用盆栽试验，研究了长期不同施肥处理定位试验土壤供磷能力的差异，并从土壤磷素平衡、全磷、有机磷、Olsen-P和MB-P的含量的变化等方面探索了导致供磷能力差异的原因。结果表明，长期施用磷肥能显著提高土壤的供磷能力，其中以有机物循环利用配合磷肥施用处理土壤的供磷量能力最高，植株平均吸磷量是长期不施磷肥处理的3.5倍，比长期施用磷肥处理平均高出59.8%。长期单施氮肥导致土壤供磷能力衰竭，植株总吸磷量比长期不施肥还低17.2%，单一有机物循环利用和配施N肥植株总吸磷量比长期不施肥分别高80.3%和40.2%。有机物循环利用能明显提高土壤微生物对磷素的固持量，土壤微生物对无机磷的利用可能是其向有效磷转化的关键途径。磷肥配合系统内有机物循环利用，是提高红壤稻田土壤供磷能力的有效施肥模式。

关键词： 红壤性水稻土 有机物循环利用 土壤供磷能力 长期施肥 红壤性水稻土 有机物循环利用 土壤供磷能力 长期施肥

Abstract:
The soil P supplying capacity in red paddy soils of different long-term fertilization systems (1990-2004) was investigated using pot experiment, and the differences of soil P supplying capacity in different fertilization treatments were also studied according to the change of soil P balance, total P, organic P, Olsen-P and MB-P. The results indicated that soil P supplying capacity was significantly increased by long-term chemical P fertilizer application and kept at the highest level in the chemical P fertilizer application combined with long-term cycling of organic matter, at the same time, the average P uptake of plantation in this treatment was 3.5 times than control (no chemical P fertilizer application), and 59.8% higher than chemical P fertilizer application (NP, NPK). In the long-term chemical N fertilizer application treatment, soil P supplying capacity was very low and the total P uptake of plantation was decreased by 17.2% compared with no fertilizer application. In the application of organic matter cycling and organic matter combined with N fertilizer treatments, the total P uptake of plantation were increased by 80.3% and 40.2%, respectively. Long-term organic matter cycling obviously improved microbial fixation of soil P, and it was the key approach for the conversion of inorganic P into extractable P accomplished by microorganisms in paddy soils. Therefore, cycling of organic matter combined with chemical P fertilizer was a good fertilizer management strategy to improve soil P supplying capacity.

Keywords:

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