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湖北省早、中、晚稻施磷增产效应及磷肥利用率研究

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Effect of phosphorus fertilizer application and phosphorus use efficiency of early, middle and late rice in Hubei Province

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摘要 2006～2009年通过在湖北省18个县(市、区)布置多点田间肥效试验，研究了当前生产条件下施用磷肥对水稻产量的影响，明确了磷肥的利用率现状，并探讨了早、中、晚稻施磷效果的差异。结果表明，当前生产条件下，早、中、晚稻施用磷肥都有显著的增产效果，平均增产量分别为706、774和565 kg/hm2，增产率分别为13.3%、11.3%和9.4%。不同类型水稻对磷肥投入的反应不同，相应的磷肥利用率也不同，早、中、晚稻的磷肥（P2O5）农学利用率平均分别为13.3、13.3和11.6 kg/kg，偏生产力分别为116.4、148.0和157.5 kg/kg，吸收利用率分别为14.2%、13.7%和11.3%，生理利用率分别为85.2、110.4和65.4 kg/kg。3种类型水稻对土壤磷素的依存率平均在87%～89%之间，说明水稻吸收的磷主要来自于土壤而不是肥料，其中晚稻对土壤磷素的依赖程度相对最大。

关键词： 早稻 中稻 晚稻 磷肥 产量 磷肥利用率

Abstract： Multipoint field experiments of rice were conducted to study the effect of phosphorus (P) fertilizer application on rice yield, to investigate the P use efficiency, and to compare early, middle and late rice in their responses to the P application in 18 counties of Hubei Province during 2006－2009. The results show that the average yields of the NPK (with phosphorus) treatment of early, middle and late rice are 706, 774 and 565 kg/ha higher than those of the NK (without phosphorus) treatment, respectively. It is concluded that the P application increases grain yield significantly, with the yield increase rate of 13.3% for early rice, 11.3% for middle rice and 9.4% for late rice. The responses of early, middle and late rice to the P application are different. At present production conditions, P2O5 agronomic efficiencies (PAE) of early, middle and late rice are 13.3, 13.3 and 11.6 kg/kg, partial factor productivities of applied P2O5 (PFPP) are 116.4, 148.0 and 157.5 kg/kg, P2O5 recovery efficiencies (PRE) are 14.2%, 13.7% and 11.3%, and P2O5 physiological efficiencies (PPE) are 85.2, 110.4 and 65.4 kg/kg in Hubei Province, respectively. The average soil P dependent rates (SPDR) of early, middle and late rice are between 87% and 89%, which mean that P absorption of rice is primarily from soil but not from fertilizer, and the highest SPDR was observed in late rice.

Keywords： early rice middle rice late rice phosphorus fertilizer grain yield phosphorus use efficiency

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