

湖南稻田土壤有机磷组分的施磷效应、季节变化及生物有效性研究

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Effects of phosphate fertilization on organic phosphorus fractions and their seasonal variations and bioavailabilities of paddy soils in Hunan Province

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摘要 为探明施用磷肥对湖南稻田土壤有机磷组分的影响、有机磷组分的季节变化及其有效性,以湖南省5种不同母质发育的稻田土壤为供试土壤,通过盆栽试验,研究了稻田土壤有机磷组分的施磷效应、在植稻期间的动态变化及其生物有效性。结果表明,施用磷肥可以使土壤中活性有机磷得到较大的增加,而对活性有机磷、中稳性有机磷和高稳性有机磷影响较小。在施磷和不施磷条件下,土壤有机磷的变化主要是中活性有机磷,而其余3种形态有机磷在水稻生长期几乎保持不变。不管土壤是否施用磷肥,土壤有效磷与有机磷总量总是呈极显著相关,说明土壤有机磷的确是植物可以利用的有效磷源;在早稻生长期土壤各形态有机磷的生物有效性的大小顺序为:中活性有机磷>中稳性有机磷>高稳性有机磷>活性有机磷;在晚稻生长期土壤各形态有机磷的生物有效性一般随水稻生育期不同而不同。

关键词: 水稻土 有机磷组分 磷肥 季节变化 生物有效性

Abstract: Effects of phosphate fertilizer applications on soil organic phosphorus fractions and their seasonal variations and bioavailability were studied using the pot experiments. Five paddy soils derived from different parent materials in Hunan Province were used as test soils for the pot experiment. The results show that soil moderately labile organic phosphorus contents are increased under the P fertilizer application, while the fertilization has less effects soil labile organic phosphorus, moderately resistant organic phosphorus and highly resistant organic phosphorus. Soil organic P variation is mainly caused by the variation of moderately labile organic P under both P-unfertilization and P-fertilization, while the labile organic phosphorus and resistant organic phosphorus are not changed during rice growth and development stages. Available P was closely correlated with organic P in both P-unfertilized and P-fertilized soils, that is to say, the importance of organic P as a source of available P in soil were demonstrated. The bioavailability of soil organic P fractions during the growth periods of early rice in the pot experiment are in order of moderately labile organic P > moderately resistant organic P > highly resistant organic P > labile organic P, while the order for late rice is dependent on the growth and development stages of late rice.

Keywords: paddy soil organic phosphorus fractions phosphate fertilizer seasonal variation bioavailability

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