

论文

三峡库区消落区土壤磷释放的环境影响因子

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摘要:

以三峡库区消落区万州段为试验基地,选取释磷能力较强的紫色冲积土,根据三峡水库消落带的“干湿交替”空间和时间特征,进行万州断面土壤磷释放的影响因子的实验室模拟试验和万州江面淹没的对照试验。研究发现,随着淹水时间的变化,各种形态的磷在前5~10 d各形态磷变化有相当的差异,随后变化趋势趋于稳定。TP有降低的趋势,土壤磷有一定的释放。野外研究表明Olsen P在淹水10周左右到达最大值,以后缓慢降低。淹水时土壤Olsen P增加,干燥后降低。多次淹水时每次淹水后土壤的有效磷水平都略有增加,落干后相较上次落干后有效磷水平降低,最后一次淹水后相较与初始时Olsen P水平低16.7%。随着淹水深度增加,土壤的Olsen P水平在淹水时由淹水前20.53 mg/kg提高到43.23 mg/kg,增加110.6%。当上覆水磷浓度较低时(<2 mg/L),磷吸附到达平衡的时间较短,约需要6周。当上覆水磷浓度较高(>2 mg/L)时,磷吸附到达平衡的时间较长。微生物活动对淹水土壤的磷释放有一定影响,有微生物时磷的释放高于无微生物者0.048 mg/L。种植植物的土壤在淹水后Olsen P含量大于土壤直接淹没时的释放量,种植狗牙根(Cynodon dactylon)和野地瓜藤(Ficus tikoua)的土壤中Olsen P分别较未种植物土壤释放量高出21.5%和12.7%。

关键词: 三峡库区; 消落区; 磷释放; 影响因子

The effective factor of phosphorous release from soil in Water Fluctuation Zone of the Three Gorges Reservoir.

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Abstract:

According to the Water Fluctuation Zone (WFZ)'s alternately waterlogged and drained environment, we have carried out the experiment for controlling phosphorous release at both laboratory and in situ flooding conditions at Wanzhou with purple alluvial soil of the WFZ at the Three Gorges Reservoir. This study focused on the environmental effective factor of phosphorous release from soil in the WFZ in periodic inundating-draining environment. Results showed that there was evident change between each phosphorous fraction in concentration during first 5-10 days, and then the trend became stable. TP of soil decreased, and there was phosphorous release from soil. After several inundating-draining processes, the Olsen P of soil decreased after each inundating process and increased after each draining process. There was 16.7% lower of Olsen P at last draining process than that at the beginning. Olsen P of the soil increased from 20.53 mg·kg⁻¹ to 43.23 mg·kg⁻¹, with a 110.6% increase, when the inundating depth increased to 40 m. Phosphorous concentration of overlying water exerted an influence on phosphorous release. Time required to reach adsorption equilibrium was much shorter when phosphorous concentration in overlying water was low (<2 mg/L) than that when phosphorous concentration in overlying water was high (>2 mg/L). It took six weeks to get balance when phosphorous concentration in overlying water was low (<2 mg/L). After adding HgCl₂, Phosphorous concentration in overlying water was not changed in first 10 days, and then there was an evident decrease compared to that not adding HgCl₂, with 0.048 mg/L lower. In addition, the content of Olsen P of soil with plants was higher than that of soil without plant for soils with Cynodon dactylon and Ficus tikoua by 21.5% and 12.7%.

Keywords:

Key words: Three Gorges Reservoir; Water Fluctuation Zone; phosphorous release; effective factor

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