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不同水肥管理对太湖流域稻田磷素径流和渗漏损失的影响

## Effects of different water and nitrogen managements on phosphorus loss via runoff and leaching from paddy fields in Taihu Lake basin

关键词: [节水灌溉](#) [控释肥](#) [稻田](#) [磷素](#) [径流](#) [渗漏](#)

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**摘要:** 于2010和2011年在太湖流域开展了为期2年的田间定位试验,对2种灌溉模式(常规连续淹灌与干湿交替节灌)和4种施肥管理(不施氮、常规尿素、控释BB肥与树脂包膜尿素)条件下稻田面水和渗漏水总磷(TP)、溶解态磷(DP)和颗粒态磷(PP)浓度的动态变化及磷素径流和渗漏损失进行了研究.结果表明:田面水TP和DP浓度变化趋势相同,均在施肥后1 d达到最高值,之后急剧下降;渗漏水TP和DP浓度变化趋势也相同,均在施肥后7 d达到最高值,然后逐渐下降.PP是田面水磷素的主要形态,DP是渗漏水磷素的主要形态.节灌降低了田面水和渗漏水磷浓度但对DP/TP影响不大,同时降低了TP径流流失量(24.7%~57.4%)和渗漏淋失量(21.0%~25.3%).施氮增加了田面水和渗漏水的磷浓度,也导致了更高的TP径流和渗漏损失.与常规尿素相比,控释BB肥提高了田面水和渗漏水的磷浓度及TP损失量,而树脂包膜尿素降低了田面水和渗漏水的磷浓度和TP损失量.综上,干湿交替节灌结合树脂包膜尿素施用能有效降低稻田磷素径流和渗漏损失,削减农业面源污染.

**Abstract:** A 2-year field plot experiment was conducted to study the effects of two water regimes (continuous flooding irrigation, CF; and alternate wetting and drying irrigation, AWD) and four N managements (control, N0; conventional urea, UREA; controlled-release bulk blending fertilizer, BBF; and polymer-coated urea, PCU) on the dynamics of total phosphorus (TP), dissolved phosphorus (DP) and particulate phosphorus (PP) concentrations as well as runoff and leaching losses of P in paddy fields in Taihu Lake basin in 2010 and 2011. Results showed that TP and DP concentrations in surface water exhibited a similar trend with both peaking within the first day after fertilization and decreasing sharply afterward. TP and DP concentrations in percolation water also displayed a similar trend with both peaking within the first 7 days after fertilization and then decreasing gradually. PP was the main form of P in surface water, whereas DP was the main form of P in percolation water. The AWD irrigation decreased TP and DP concentrations but DP/TP in surface and percolation water remained unchanged. Meanwhile, AWD decreased the runoff and leaching losses of P by 24.7%~57.4% and 21.0%~25.3%, respectively, in comparison with CF. N fertilization increased P concentrations in surface and percolation water and resulted in more TP loss via runoff and leaching. Compared with UREA, BBF increased P concentrations in surface and percolation water as well as TP loss via runoff and leaching, whereas PCU decreased these parameters. Collectively, the combination of AWD irrigation and PCU application can be helpful in reducing P loss from paddy fields and promoting the reduction of agricultural non-point source pollution.

**Key words:** [water-saving irrigation](#) [controlled-release fertilizer](#) [paddyfield](#) [phosphorus](#) [runoff](#) [leaching](#)

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