

稻田与沟塘湿地协同原位削减排水中氮磷的效果

The effect of Paddy Eco-Ditch and Wetland System on nitrogen and phosphorus pollutants reduction in drainage

中文关键词: [稻田](#) [控制灌溉](#) [控制排水](#) [沟塘湿地](#) [氮磷](#)

英文关键词: [paddy field](#) [controlled irrigation](#) [controlled drainage](#) [wetland](#) [nitrogen and phosphorus](#)

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中文摘要:

农田排水中过多的氮磷会造成水体富营养化以及面源污染等一系列水环境问题。本文提出控制农田面源污染的稻田沟塘湿地协同系统, 研究了该系统及其各组成部分对农田排水中氮磷的削减效果及机理。研究结果表明: 该系统可有效地减少稻田排水量, 降低稻田排水中氮磷浓度, 对稻田排水中氮磷实现原位削减。其较传统灌排系统减少排水量73.03%, 分别减少总氮(TN)和总磷(TP)流失负荷90.17%和79.53%; 该系统中各组成部分都具有控污效果, 其中稻田控制灌排可有效地减少稻田排水、降低排水中氮磷浓度和田间产污能力, 控制灌溉稻田TN和TP负荷较传统灌溉减少53.72%和37.45%, 明沟控制排水对稻田排水中TN和TP的去除率达到64.59%和54.35%, 沟塘湿地能够有效地净化稻田排水中氮磷等污染, TN去除率达到37.13%, TP去除率达到27.32%。本文研究结果可为该系统在我国的应用提供理论支持及实践指导。

英文摘要:

A series of water environment problems as water eutrophication and non-point pollution are caused by nitrogen and phosphorus loss in farmland drainage. This paper presents a system of water comprehensive management to control agricultural non-point source pollution, which is called Paddy Eco-Ditch and Wetland System (PEDWS). It investigates the mechanism and subtractive effect of the system on nitrogen and phosphorus loss in farmland drainage. The results indicate that PEDWS could effectively decrease the paddy field drainage and concentration of nitrogen and phosphorus in the drainage that realizes nitrogen and phosphorus pollutants reduction in paddy fields. The drainage of PEDWS is 73.03% less than the traditional irrigation and drainage system. The total nitrogen (TN) and phosphorus (TP) loads of PEDWS are 90.17% and 79.53% less than traditional irrigation and drainage system. The components of PEDWS also have effect on pollution control. Controlled irrigation could effectively decrease the paddy field drainage and concentration of nitrogen and phosphorus in the drainage, reducing ability to produce pollution and risk of pollution discharge. The TN and TP loads of controlled irrigation paddy field are 53.72% and 37.45% less than traditional irrigation paddy field. The TN removal rate in controlled eco-ditch reaches 64.59% and 54.35% for TP. Wetland could effectively purify nitrogen and phosphorus loss in drainage. The TN removal rate reaches 37.13% and 27.32% for TP. This research results could provide theoretical support and practical guidance for the application of the PEDWS in China.

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