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污染控制与修复

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三江平原农田源头排水沟渠截留排水中氮素动态

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Dynamics of Nitrogen in Farmland-Originating Drainage Water Retained in Ditches in the Sanjiang Plain

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摘要

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摘要 通过小尺度野外原位试验,研究排水沟渠水体、底泥和植物氮含量的变化规律。结果表明,随水体停留时间增加,沟渠对水体氮素的净化能力增强,认为停留8d左右较适宜。沟渠对 NH_4^+ -N的截留率大于TN和 NO_3^- -N。渠水停留11d时,4条试验沟渠[氮浓度高、磷浓度低($N_{\rm H}$ PL),氮浓度高、磷浓度高($N_{\rm L}$ PL),氮浓度低、磷浓度。($N_{\rm L}$ PL),氮浓度低、磷浓度($N_{\rm L}$ PL),氮浓度低、磷浓度。($N_{\rm L}$ PL)]对 NH_4^+ -N的截留率均达100%,对 NO_3^- -N的截留率分别为84.63%、84.35%、75.67%和76.14,对TN的截留率分别为88.02%、89.89%、90.88%和88.53%。试验结束时沟渠表层(0~15cm)底泥氦含量降低,植物氦累积量远大于进水TN总量,说明植物生长同时吸收了水体、土壤和底泥中的氦,建议在秋季适时收割植物,以避免植物分解导致二次污染。

关键词: 排水沟渠 氮 农业非点源污染 三江平原

Abstract: A small-scaled in-situ field experiment was carried out to study dynamics of nitrogen in farmland originating draninage water retained retained in draninage dithches and in sediments and plants in the ditches as well. Results show that the longer the water is retained in the ditch, the more the nitrogen in the water is sequestrated by the ditch, if the water is retained in the drainage ditch for 8 d or so as recommended. The sequestration rate of NH_4^+ -N was higher than that TN and NO_3^- -N. When the water was retained in the ditches for 11 d, NH_4^+ -Nsequestration rate reached 100% in all the four ditches with drainage water different in N and P concentration, i.e. N_H^P (high N concentration and low P concentration), N_H^P (high N concentration and high P concentration), N_L^P (low N concentration and low P concentration) and N_L^P (low N concentration and high P concentration), whereas NO_3^- -N sequestration rate was 84.63%,84.35%,75.67% and 76.14%, and TN sequestration rate 88.02%,89.89%,90.88% and 88.53%, respectively. At the end of the experiment, it was found that N content in the surface layre (0-15 cm) of sediments in the ditches decreased and N accumulation in the plants growing in the ditches was much higher than TN in incoming water, suggesting that the plants absorbed N from the waterbody, soil and sediments at the same time for growth. It is, therefore, recommended that the plants in the ditches should be harvested duly in fall to avoid secondary pollution of N from plant decomposition.

Keywords: drainage ditch nitrogen agricultural nonpoint source pollution the Sanjiang Plain

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