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Field scale optimization of woodchip bioreactors for nitrate removal from drainage water in the Netherlands

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It is known from recent international research that woodchip bioreactors can be an effective measure to reduce emissions of nitrate from agricultural drainage water. In the Netherlands, up till now no experience was present with woodchip bioreactors. Therefore, a field pilot was started at an agricultural test location situated in a lowland catchment in the south of the Netherlands (Vredepeel). A woodchip bioreactor was installed to treat drainage water from 4 ha arable land on sandy soil. Nitrate was measured in the in- and effluent of the bioreactor to estimate nitrate removal efficiency over time. Also, water chemistry and discharge were monitored.

With a series of sampling points in the woodchip bioreactor, biogeochemical processes in the reactor are investigated that can explain the performance of the reactor. The goal is to not only determine the removal efficiency, but also potential side effects and effects of temporarily limited flow rate (e.g. sulfide and ammonia production and oxygen demand). We aim to give practical guidelines for practical design and application for agricultural fields in sandy lowland catchments. In this contribution we will present the monitoring results of one drainage season.