How Does Fertilizer Affect the Effluent of Agricultural Drain Tile in Fields?

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In search of higher productivity, some farmers are installing drain tile systems in their fields. Although they can increase yields, drain tiling can harm the environment through fertilizer leaching. Nitrates are one of the most dangerous components of this runoff as higher levels of nitrates can eventually lead to eutrophication. To analyze this problem, a simple test of leaching was conducted on a sample of soil within a five gallon bucket. Nitrate samples were collected from effluent before and after urea was added to the soil. The nitrate levels did increase within the effluent after the urea was added, indicating that leaching had occurred. We then attempted to remove nitrates from the effluent with a water filtration system, which showed a small reduction in the nitrate levels within the effluent. Any system designed to remove nitrates must also maintain the flow rate of the system. This may prove difficult using traditional ion exchange or reverse osmosis filters. To overcome this obstacle, we are testing a system of bioreactors, which primarily uses wood chips, to see if they can maintain a flow rate and also decrease the level of nitrates. Overall, reducing the level of nitrates will require a two pronged approach; applying nitrogen more efficiently to the fields and developing bioreactors or buffers to help remove the excess nitrates from the effluent.