

Public Abstract

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Title:UTILIZATION OF MANAGED SUBSURFACE DRAINAGE TO INCREASE CORN AND FORAGE YIELDS AND REDUCE NITROGEN LOSS IN POORLY-DRAINED, UPLAND AND BOTTOMLAND SOILS

Corn and forage yield production in poorly-drained soils are often limited due to saturated soil conditions which negatively affect plant establishment, growth, and have a high potential for gaseous N loss. Installation of subsurface tile drainage is a commonly used management practice throughout the Midwest U.S. to improve drainage and increase crop yields in poorly-drained soils. However, usage of tile drainage has been linked to increased nitrate-N loading of surface waters which has a deleterious effect on the environment, as well as drinking water quality. Managed subsurface drainage systems (MD) is a new technology which allows for tile water flow to be restricted during dry periods and during the non-cropping period which can increase crop yield production and reduce annual nitrate-N loss through the tile drainage water compared to conventional/free subsurface drainage systems (FD). The objectives of this research were to: 1) determine the effect of tile drainage systems (FD, MD, and no-drainage) on corn and forage yields in non-traditionally tile drained upland and bottomland soils and 2) evaluate if MD could reduce annual nitrate-N loss through the tile drainage water compared to FD. The presence of tile drainage increased corn yields up to 21% and annual forage yields by 29%, although yield response did vary over years due to soil properties, landscape position, and weather. Annual nitrate-N loss through the tile drainage water was reduced by up to 85% with MD compared to FD.