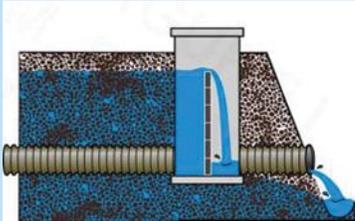


Drainage Water Management Dr. Jane Frankenberger, Purdue University

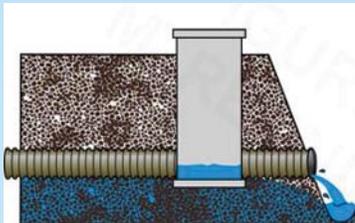
Subsurface tile drainage, which is used to enhance crop yields on naturally poorly-drained soils, is an important component of crop production in the Midwest. Because nitrate loads from tile-drained fields have been shown to contribute to hypoxic conditions in the Gulf of Mexico, conservation practices are needed to reduce nitrate loss while maintaining drainage function during the cropping season. Drainage water management is the practice of using a water control structure in a drain to raise the drainage outlet during parts of the year when a higher water table will not harm and may benefit the crop, resulting in reductions in nitrate load to ditches and streams and potential increases in crop yield. Water quality benefits from reductions in annual nitrate load in drain flow has ranged from about 15% to 75% in published studies, depending on location, climate, soil type, and cropping practice. This nitrate load reduction is due to the reduction in drain flow volume and to potentially higher denitrification with more soil anaerobic conditions. Crop yields can also increase with drainage water management, if rainfall is timely and the outlet is well managed. Yield increases from 5% to 10% have been found, although published studies are quite limited. Effects on carbon are even more uncertain. We expect that if the crop yield improves, more carbon would likely be sequestered in the soil. In addition, a wetter soil would be expected to reduce decomposition of organic matter, and therefore slowly build organic carbon. Studies to establish these effects are just beginning. Although drainage water management adoption is limited, it is being encouraged through training in the design and installation of drainage management systems, education of landowners, and financial incentives provided by state and federal conservation programs.



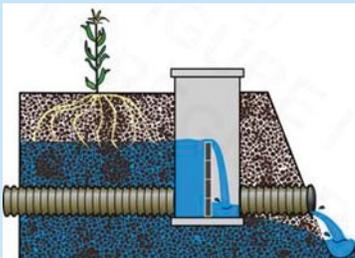
(1) Photograph courtesy of USDA Natural Resources Conservation Service



(2) After harvest



(3) Before planting or harvesting



(4) After planting

(1) Tile drainage is critical to crop production, but nitrate loss is a concern. Drainage water management improves water quality as the outlet or control structure is (2) raised after harvest until early spring to reduce nitrate loss during the off-season, (3) lowered so the drain can flow freely before field operations such as planting or harvest, and (4) raised again after planting and spring field operations to create a potential to store water that could be used by the crop.



Installation of a control structure for drainage water management

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