WQ-44

# Drainage Water Management for the Midwest

# Questions and Answers About Drainage Water Management for the Midwest

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## Introduction

Subsurface tile drainage is an essential water management practice on many highly productive fields in the Midwest. However, nitrate carried in drainage water can lead to local water quality problems and contribute to hypoxia in the Gulf of Mexico, so strategies are needed to reduce the nitrate loads while maintaining adequate drainage for crop production. Practices that can reduce nitrate loads on tile-drained soils include growing winter forage or cover crops, fine-tuning fertilizer application rates and timing, bioreactors, treatment wetlands, and modifying drainage system design and operation. Drainage water management is one of these practices and is described in this fact sheet. Answers given here apply specifically to Midwest corn and soybean cropping systems, and not to perennial or winter annual crops.

## 1. What is drainage water management?

Drainage water management is the practice of using a water control structure in a main, submain, or lateral drain to vary the depth of the drainage outlet. The water table must rise above the outlet depth for drainage to occur, as illustrated at right. The outlet depth, as determined by the control structure, is:

- Raised after harvest to limit drainage outflow and reduce the delivery of nitrate to ditches and streams during the off-season. (Figure 1)
- Lowered in early spring and again in the fall so the drain can flow freely before field operations such as planting or harvest. (Figure 2)
- Raised again after planting and spring field operations to create a potential to store water for the crop to use in midsummer. (Figure 3)

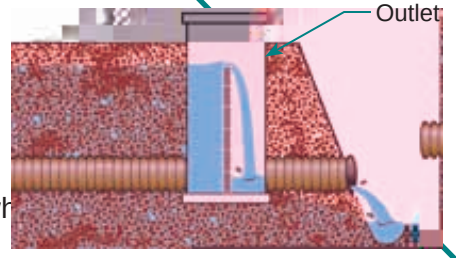


Figure 1The outlet is raised after harvest to reduce nitrate delivery.

Figure 2.The outlet is lowered a few weeks before planting and harvest to allow the field to drain more fully.

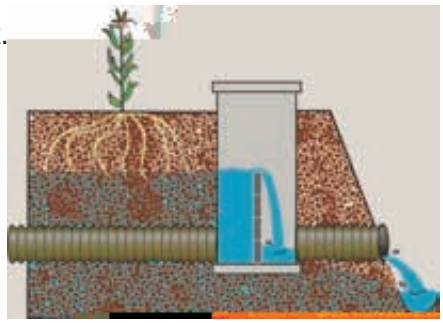

Figure 3.The outlet is raised after planting to potentially store water for crops.

## 2. Is drainage water management the same as subirrigation?

No. Drainage water management relies on natural rain fall to raise the water table, and the water table will fluctuate below that depth without sufficient rainfall. Subirrigation adds water to the subsurface drainage system to raise the water table close to the outlet depth and to maintain it there. Subirrigation typically requires closer spacing of the tiles than that in a conventional or controlled drainage system. Subirrigation also requires an adequate water supply to meet crop needs throughout the growing season.

## 3. What fields are most suitable for drainage water management?

The practice is only suitable on fields that need drainage, and is most appropriate where a pattern drainage system (as opposed to a random system) is installed or is feasible. The field should be flat (generally less than 0.5 percent slope) so that one control structure can manage the water table within 1 to 2 feet for as many acres as possible. If drainage laterals are installed on the contour, the practice could be used with greater slopes. The producer must be able to manage the drainage system without affecting adjacent landowners. The practice can be used with any drain spacing; however, narrower drain spacing reduces the risk of yield loss due to excess wetness during the growing season. If a new drainage installation is being planned for a field, drains should be designed for minimum grade (along the contours), so each control structure can control the maximum possible area of the field.

## 4. How many acres can I manage with one structure?

worms before drainage water management is initiated and then again several years later. ese studies are just beginning.

## 16. Will the practice cause blowouts?

Not with most commercially available control structures installed on shallow gravity ow drainage systems. Exces sive pressure heads within a drainage pipe cause blowouts. Most commercial control structures do not close tile outlets, but simply raise the elevation or height of the outlet. Water is free to ow over the top of the control structure, keeping pressure heads within the eld drainage system only marginally greater than that at the top of the control structure. Some control structure designs use pressure-sensitive valves that, again, will not allow exces

## Reviewers

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## Acknowledgements

*C , E , E , . . D A , A . 2004-51130-03111. A . . D A .*

e Great Lakes Regional Water Program (http://www.uwex.edu/ces/regionalwaterquality/) supported this publication through the Nutrients and Water Quality eme Team. Photo on Page 3 courtesy of USDA Agricultural Research Service.

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