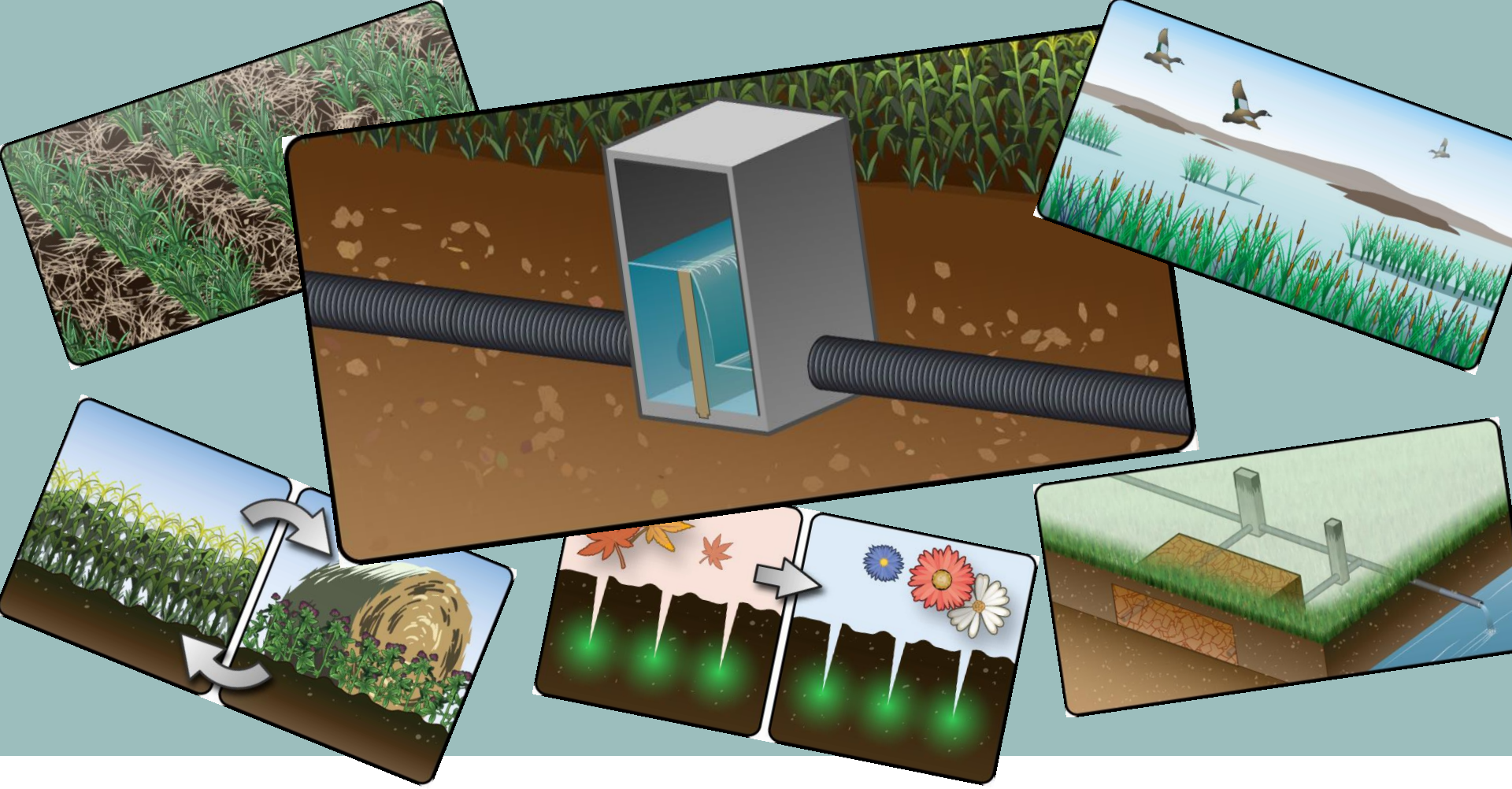
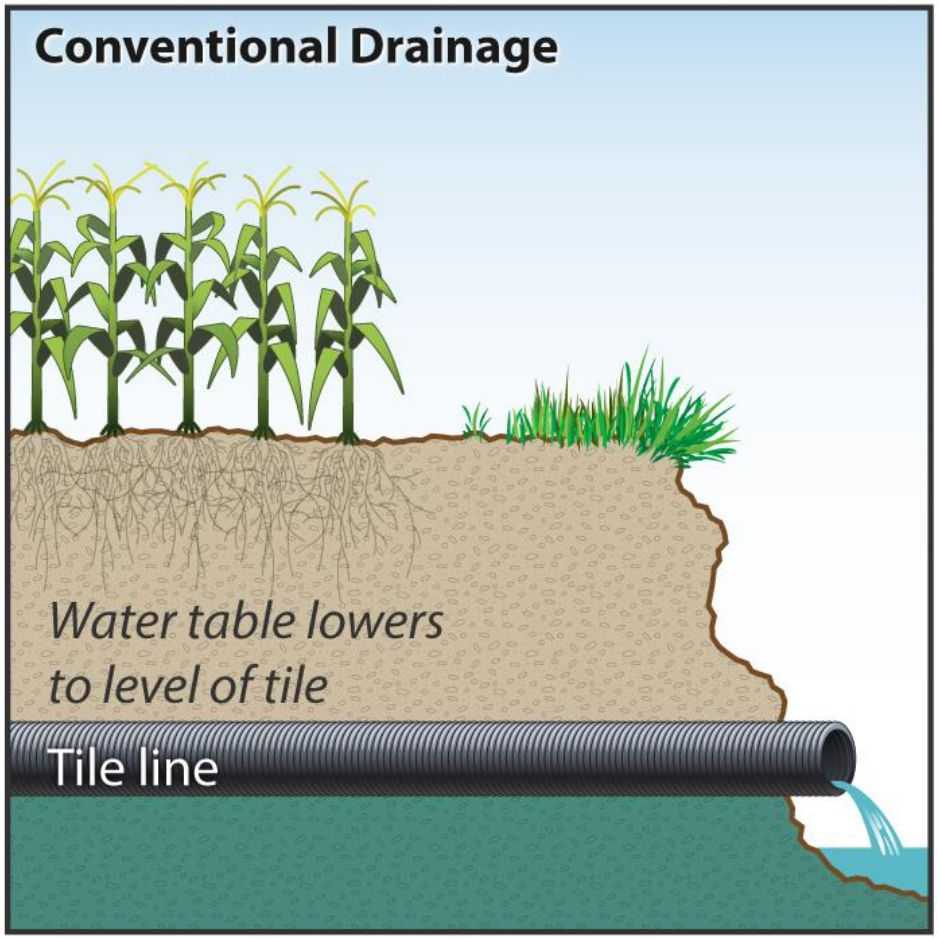


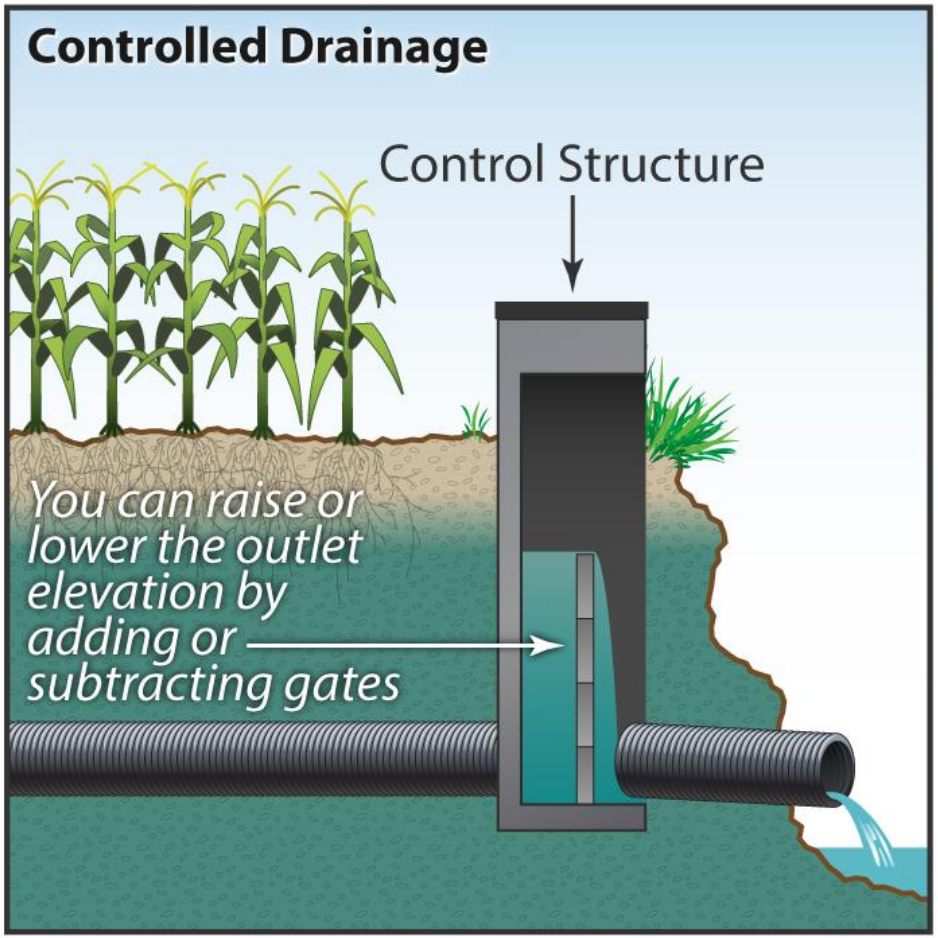
DRAINAGE WATER MANAGEMENT (CONTROLLED DRAINAGE)

Dr. Laura Christianson
University of Illinois at Urbana-Champaign

IN-FIELD DRAINAGE SYSTEM PRACTICE:

CONTROLLED DRAINAGE

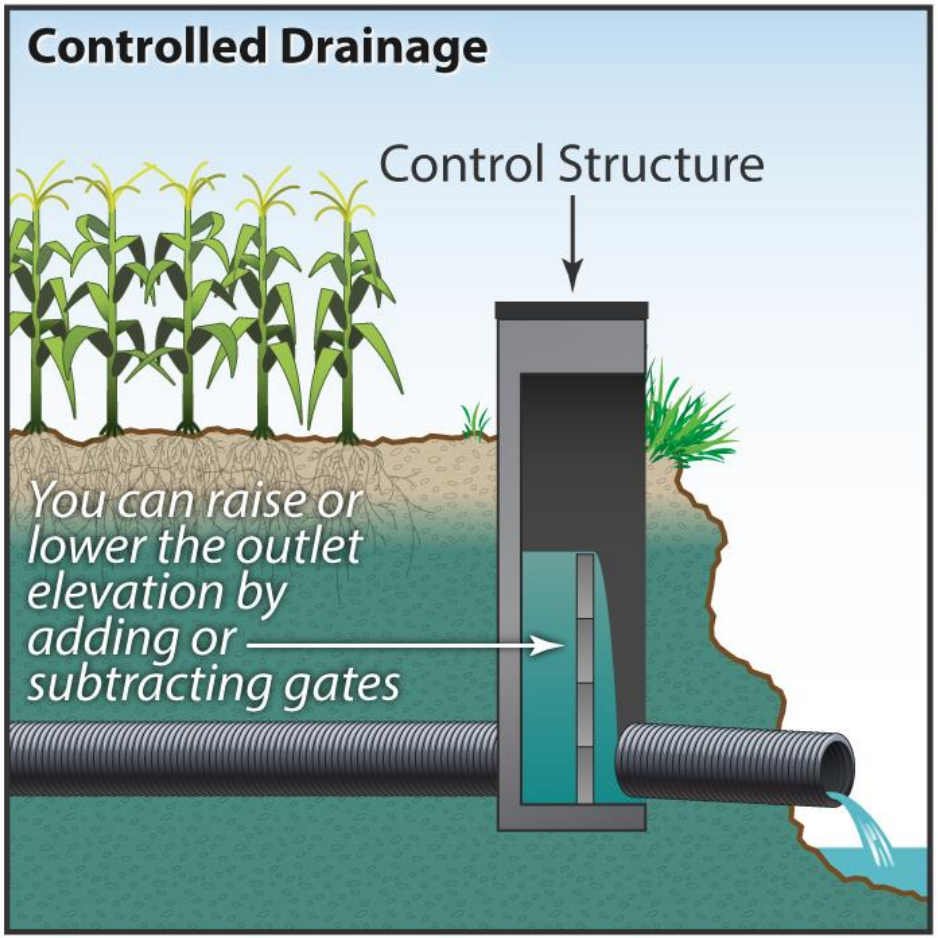




IN-FIELD DRAINAGE SYSTEM PRACTICE:

CONTROLLED DRAINAGE

What is it? Adjustable structures to manage the level of the drainage outlet



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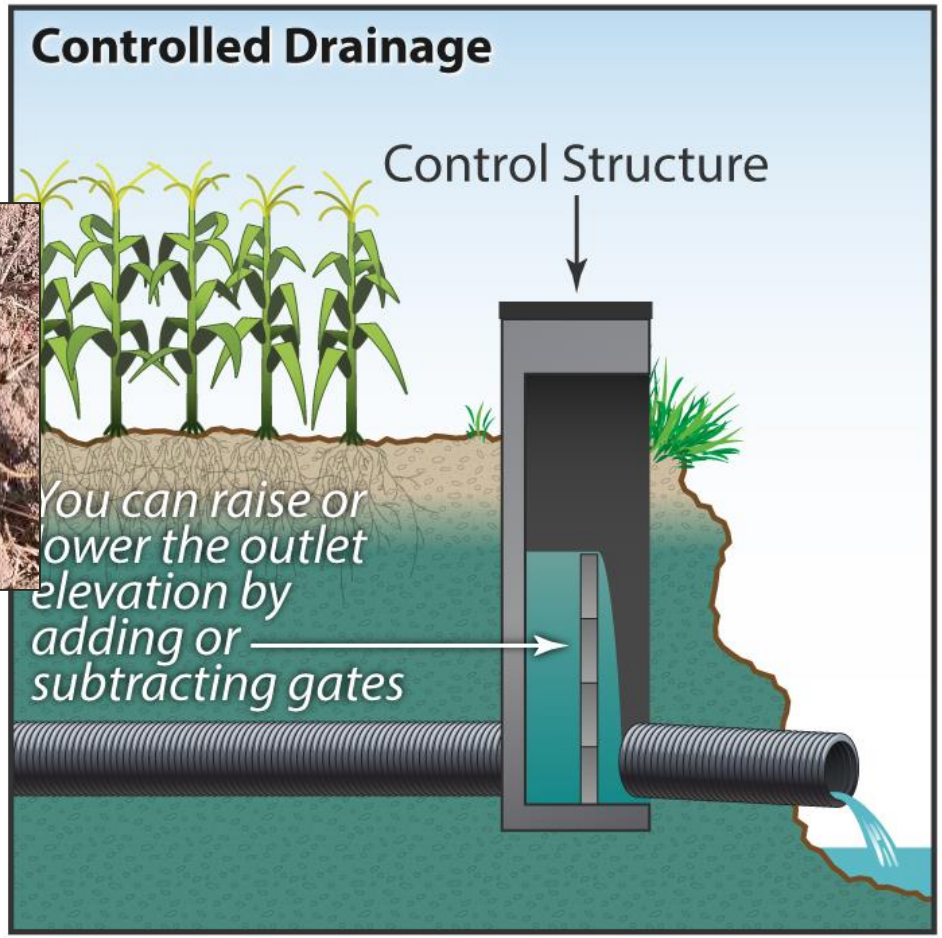


Source: L. Brown (The Ohio State Univ.)

IN-FIELD DRAINAGE SYSTEM PRACTICE:
CONTROLLED DRAINAGE

What is it? Adjustable structures

How does it reduce N loss in drainage? Holds back water and nitrate in the water during periods

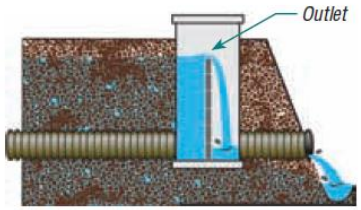


Figure 1. *The outlet is raised after harvest to reduce nitrate delivery.*

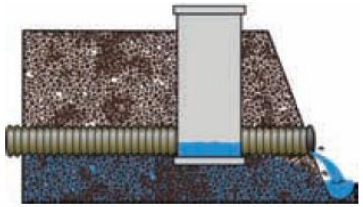


Figure 2. *The outlet is lowered a few weeks before planting and harvest to allow the field to drain more fully.*

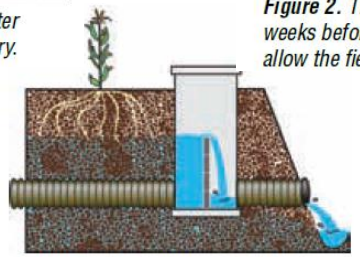
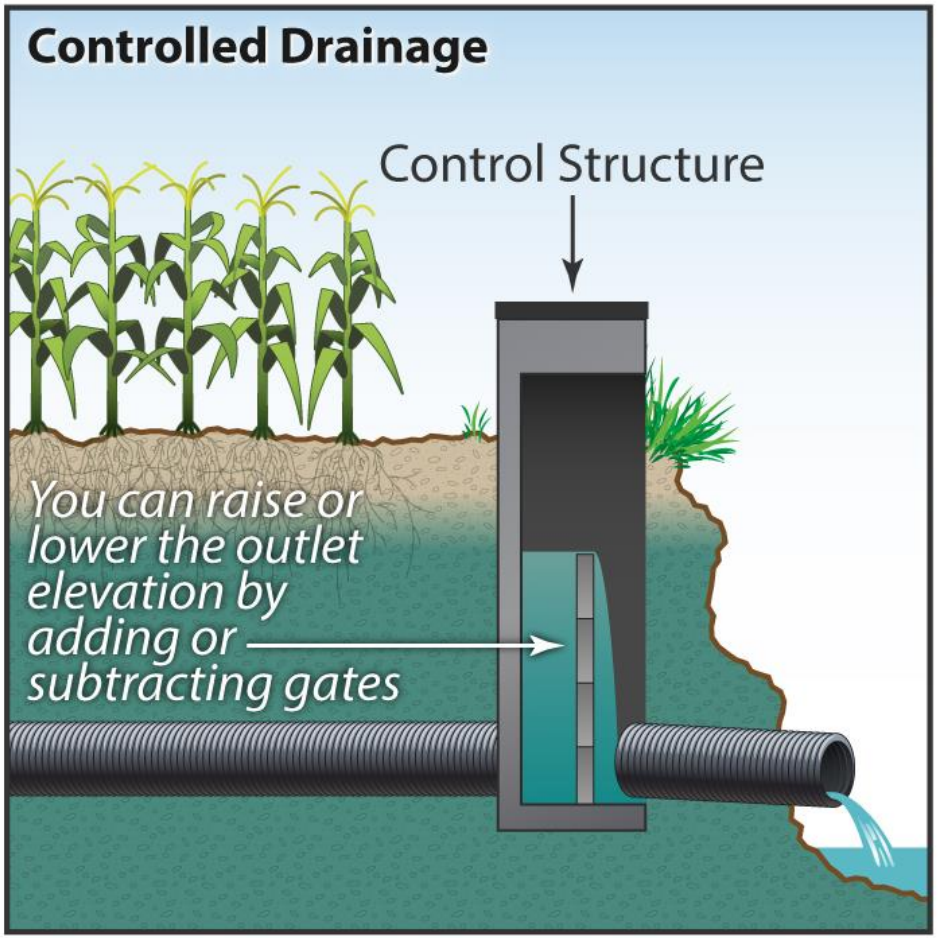


Figure 3. *The outlet is raised after planting to potentially store water for crops.*



Source: Frankenberger et al. (Purdue Extension publication WQ-44)

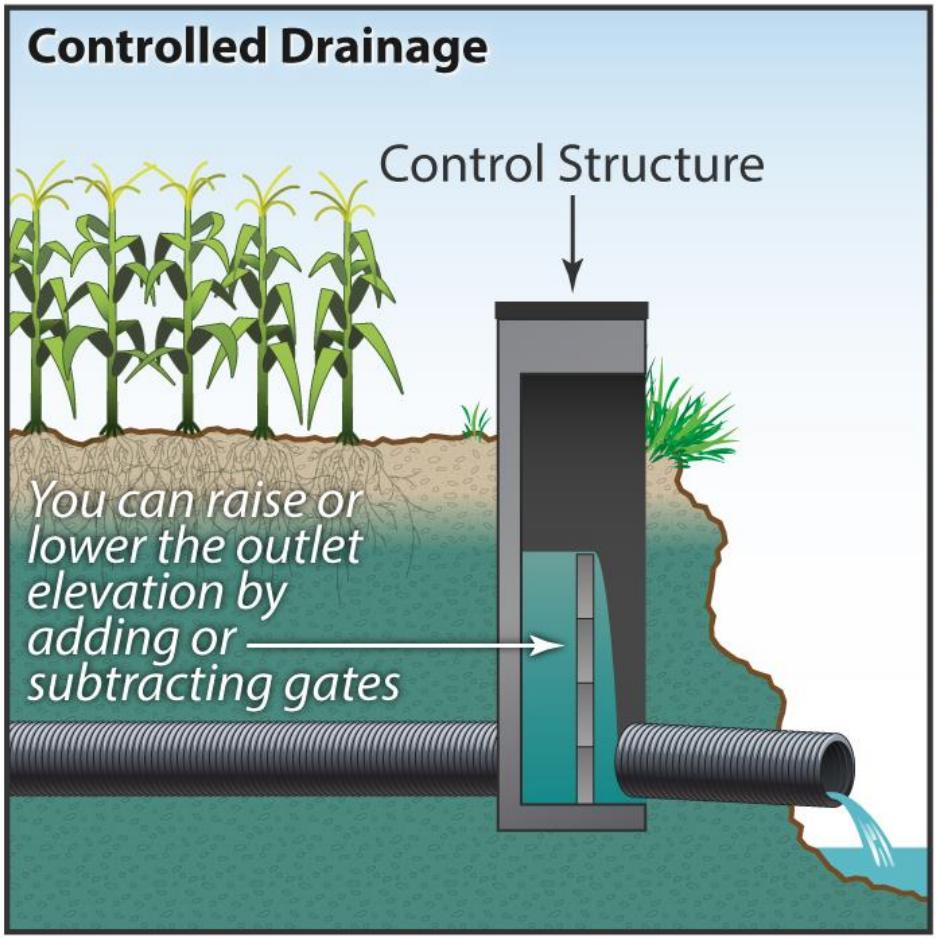
IN-FIELD DRAINAGE SYSTEM PRACTICE:

CONTROLLED DRAINAGE

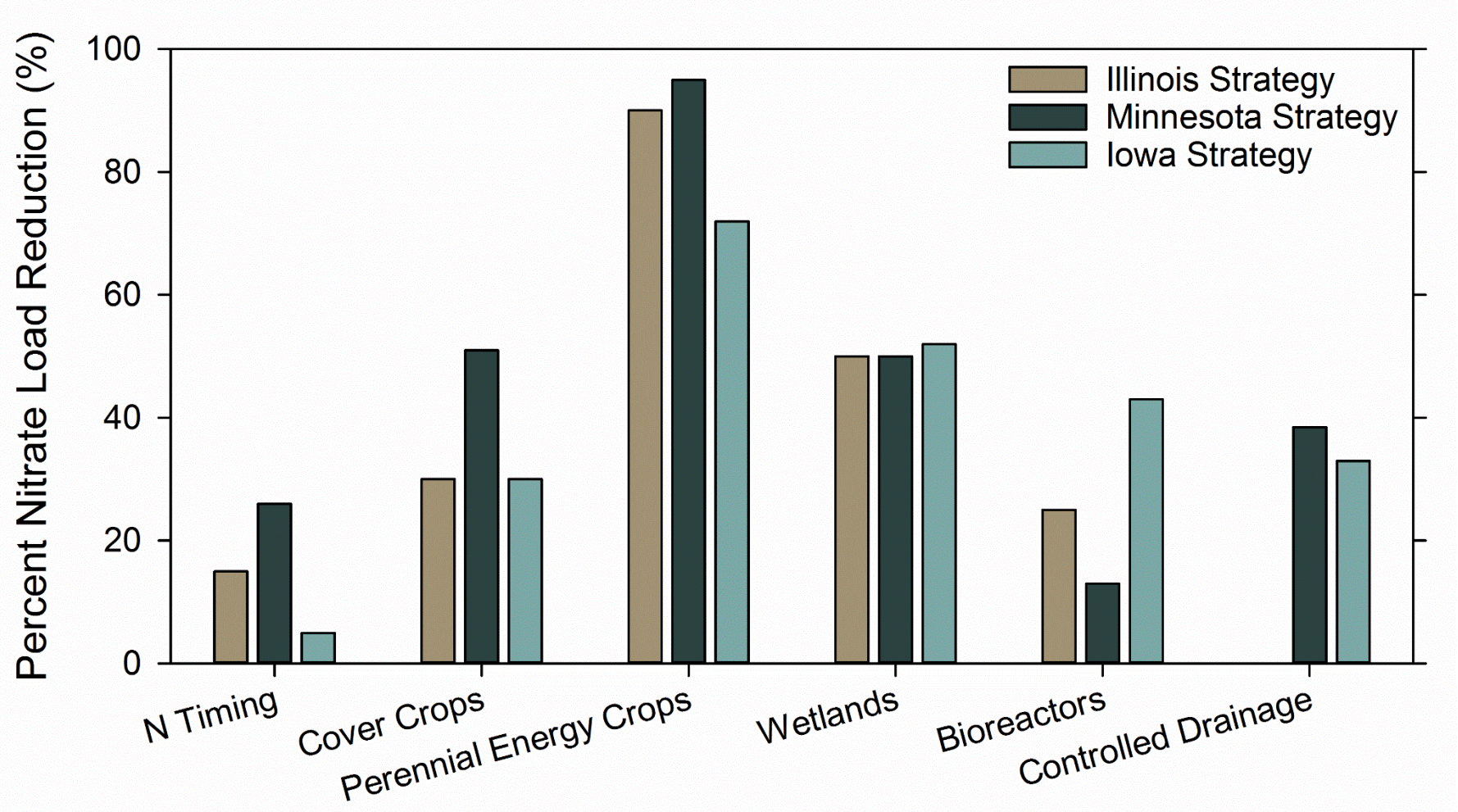
What is it? Adjustable structures

How does it reduce N loss in drainage? Holds back water and nitrate in the water

How effective is it? 30% N reduction (15-75%), but is not in the IL Nutrient Strategy



HOW EFFECTIVE IS IT? STRATEGY COMPARISONS



Reid Christianson, The Center for Watershed Protection/Walton Family

IN-FIELD DRAINAGE SYSTEM PRACTICE:

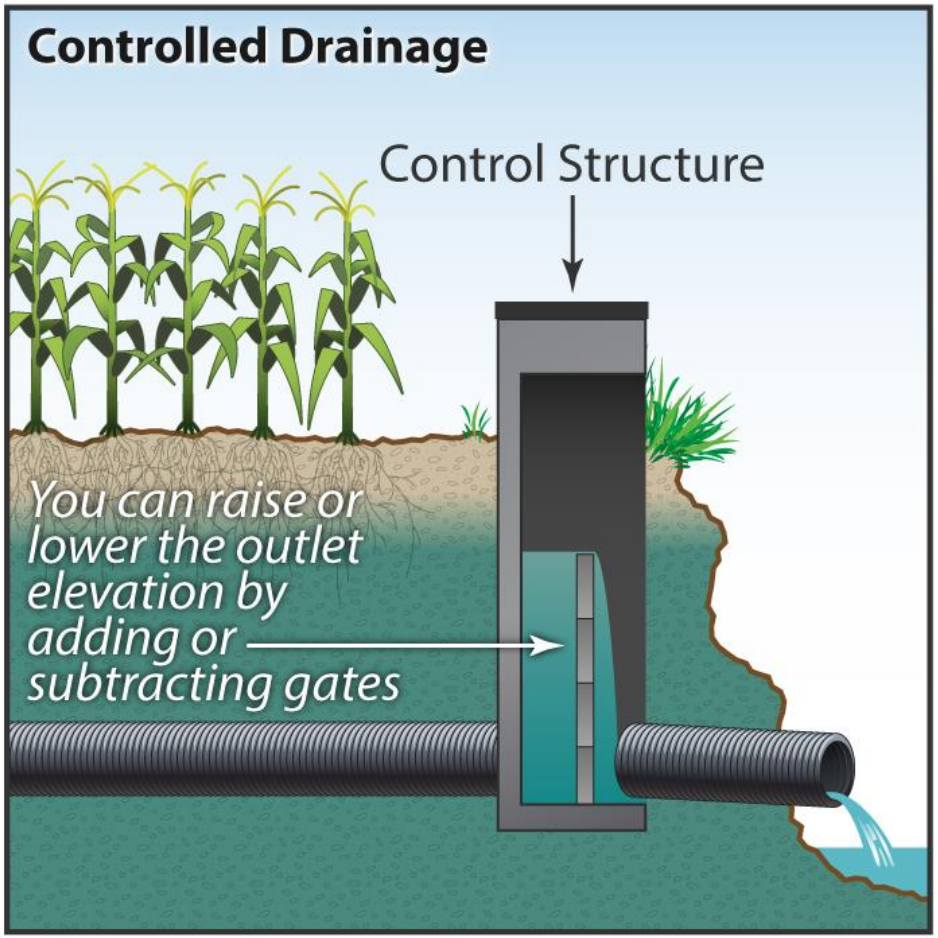
CONTROLLED DRAINAGE

What is it? Adjustable structures

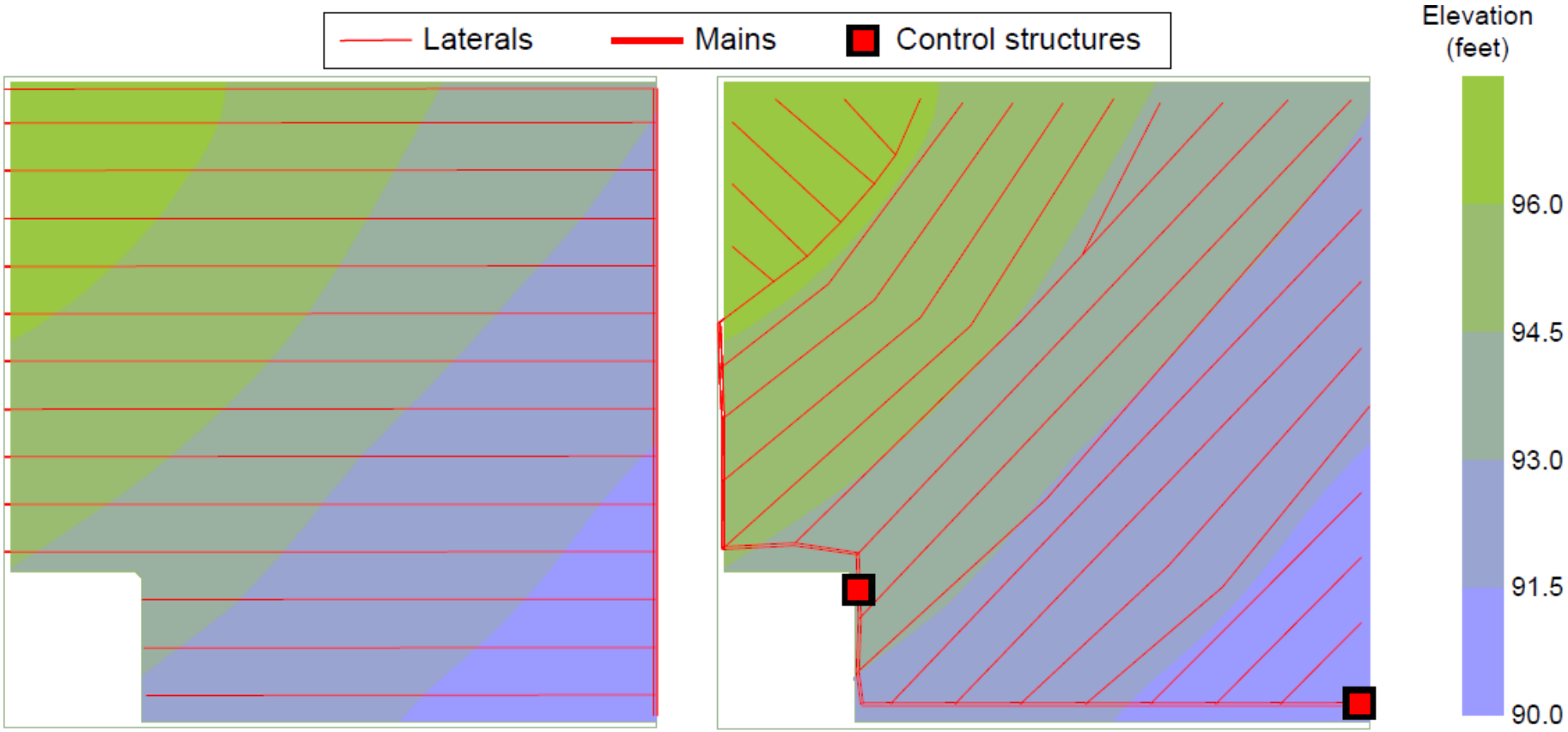
How does it reduce N loss in drainage? Holds back water and nitrate in the water

How effective is it? 30% N reduction (15-75%), but is not in the IL Nutrient Strategy

Where does it work? Most practical on slopes of <0.5% because more structure are needed with steeper slopes.



WHERE WILL IT WORK?



Optimized for cost of installation

Optimized for drainage water management

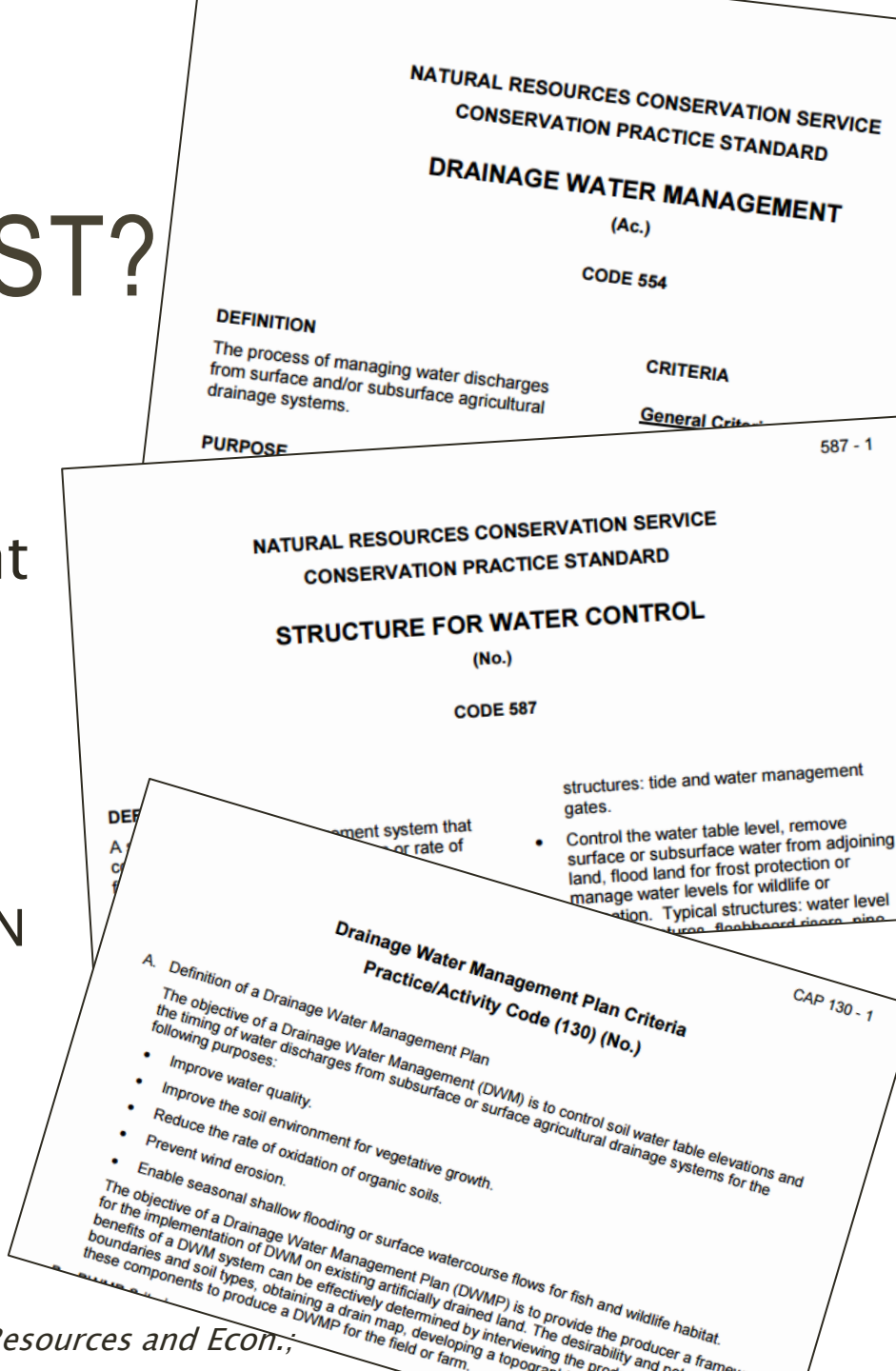
R. Cooke, Univ of IL

WHAT'S THE COST?

The USDA NRCS may provide incentive payment assistance.

DWM cost efficiency is about a dollar per lb N removed.

- DWM: $0.37 to $1.23 per lb N
- Bioreactor: $1.38 per lb N
- Wetland: $5.06 per lb N
- Cover crops: $3.21 per lb N


NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD

DRAINAGE WATER MANAGEMENT
(Ac.)

CODE 554

DEFINITION

The process of managing water discharges from surface and/or subsurface agricultural drainage systems.

CRITERIA

PURPOSE

587 - 1

NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD

STRUCTURE FOR WATER CONTROL
(No.)

CODE 587

structures: tide and water management gates.

- Control the water table level, remove surface or subsurface water from adjoining land, flood land for frost protection or manage water levels for wildlife or

Drainage Water Management Plan Criteria
Practice/Activity Code (130) (No.)

CAP 130 - 1

A. Definition of a Drainage Water Management Plan

The objective of a Drainage Water Management (DWM) is to control soil water table elevations and the timing of water discharges from subsurface or surface agricultural drainage systems for the following purposes:

- Improve water quality.
- Improve the soil environment for vegetative growth.
- Reduce the rate of oxidation of organic soils.
- Prevent wind erosion.
- Enable seasonal shallow flooding or surface watercourse flows for fish and wildlife habitat.

The objective of a Drainage Water Management Plan (DWMP) is to provide the producer a frame
for the implementation of DWM on existing artificially drained land. The desirability and
benefits of a DWM system can be effectively determined by interviewing the
boundaries and soil types, obtaining a drain map, developing a topogra
these components to produce a DWMP for the field or farm.

Sources: IL NRCS; AgriDrain; Christianson et al., 2013 *Water Resources and Econ.*;

LIMITATIONS AND RESEARCH GAPS

Where do the nitrate and water that are not lost through the drainage system go? Most likely the water ends up in deep or lateral seepage and the nitrate may be denitrified, but the extent of these processes are not known.

To what extent does this practice increase surface runoff?

What are crop responses to controlled drainage?

Are there negative impacts? Increased loss of dissolved phosphorus?

WHAT'S NEXT?

WHAT'S YOUR STRATEGY?

The Illinois Nutrient Loss Reduction Strategy: Illinois farmers across the state share their conservation stories

BMPs › Partners › About › Calendar

Bioreactors

Buffe

Cover Crops

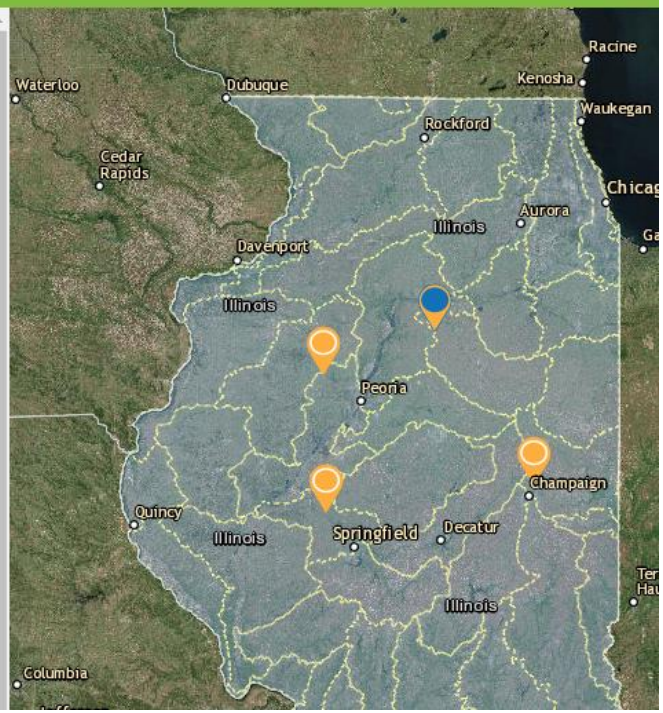
Drainage Water Management

Nutrient Management (4Rs)

s Tile and No-Till on

Farmer/Landowner: Jim Martin
Location: Wenona, IL
Organizations Involved: Illinois Soybean Association
Best Management Practice(s):

- Drainage Water Management (control structure at end of tile)



Laura Christianson
@IL_DrainDrop

The Christianson Drainage Research and Outreach Program at the University of Illinois (I-DROP) is all about practical solutions to improve ag. water quality.

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