

Drainage Water Recycling Increases Crop Yield and Improves Water Quality in Iowa

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What is drainage water recycling?

A drainage water recycling system consists of three components:



CAPTURE

Water from subsurface (tile) drainage, and potentially also surface runoff, is captured from the same field or upstream fields.



STORE

The captured drainage water is stored in a pond or reservoir.



RECYCLE

The drainage water is recycled back onto cropland as supplemental irrigation.

Why do it?

Drainage water recycling has two primary benefits:



CROP YIELD

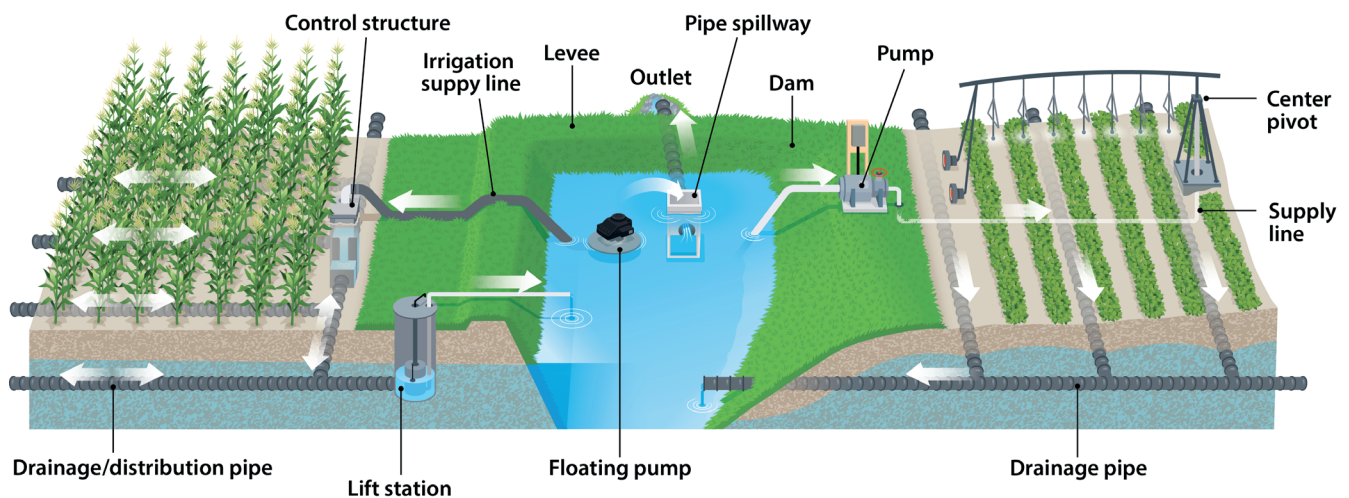
Drainage water recycling increases crop yields from supplemental irrigation.



WATER QUALITY

Drainage water recycling improves water quality by capturing water and nutrients that would otherwise be released downstream and recycling them back onto cropland.

Drainage water recycling systems can also be designed and managed for other benefits such as additional drainage system capacity, wildlife habitat and buffering high flows.



Drainage water recycling systems can have multiple configurations. Examples shown include subirrigation (left) or center pivot (right) for the irrigation system and excavation with a raised levee (left) or an embankment dam (right) for the reservoir. Figure by Purdue University from conservationdrainage.net/medialibrary and used under CC BY-NC 4.0.

Initial research

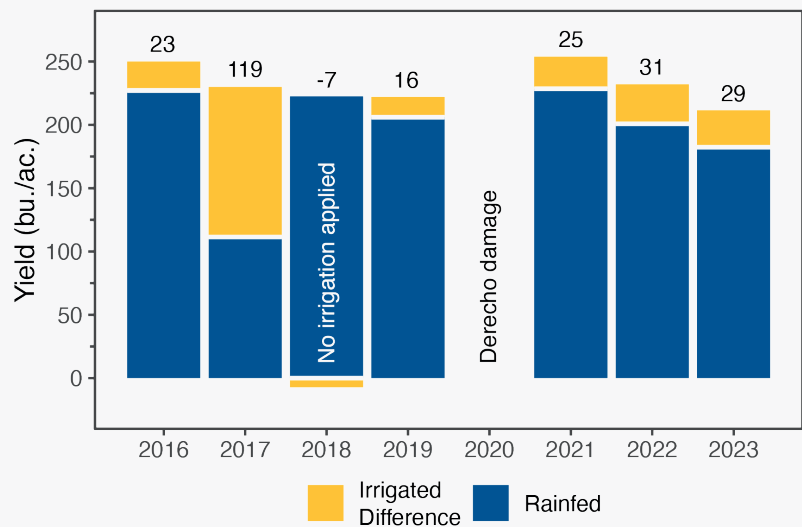
Initial research is being conducted on three privately-owned drainage water recycling systems in Calhoun, Story and Webster counties. Sites were established in 2015, 2021 and 2023. Additional monitoring of more sites is needed to better understand the costs and benefits of drainage water recycling across the state.

CORN YIELD IMPACTS

34

bushels per acre

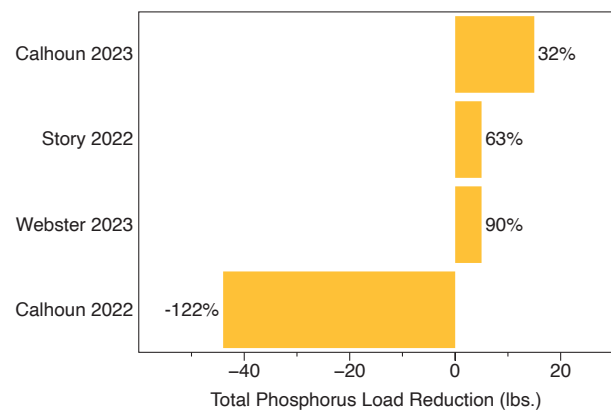
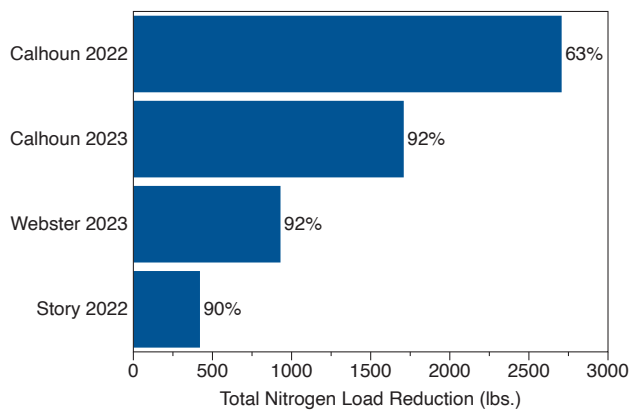
Average corn yield increase from supplemental irrigation in Story County.



Corn yields at the Story County site (blue). The difference between irrigated and rainfed yields (yellow) is indicated above the bars.

Water quality impacts

There were substantial nitrogen load reductions from drainage water recycling, but results for phosphorus were mixed.



Nitrogen (blue) and phosphorus (yellow) load reductions from drainage water recycling. Load reductions are calculated as the difference between inflow and reservoir overflow plus seepage and expressed in pounds and as a percentage of inflows.

For more information

Transforming Drainage drainage water recycling practice page with videos, publications and additional information: transformingdrainage.org/practices/drainage-water-recycling/

Hay and Helmers (2024). *Drainage Water Recycling for Crop Production and Water Quality in Iowa*. Iowa Soybean Association. iasoybeans.com/PDFLibraryUploads/RCFI223_White%20Paper_Chris%20Hay_digital.pdf