Applying Woodchip Bioreactors for Improved Water Quality

Nitrate removed through denitrification
Bioreactors placed at edge-of-field
Does not impact current land management practices

What is a woodchip bioreactor?
Drainage water is diverted through a buried trench filled with woodchips. Microorganisms convert the nitrate in the drainage water to harmless nitrogen gas (denitrification).

Flooding
- 5% streamflow reduction
- Retains water for 4-8 hours within the bioreactor

BENEFITS OF A WOODCHIP REACTOR
- Nitrate removed through denitrification
- Bioreactors placed at edge-of-field
- Does not impact current land management practices

Woodchip bioreactor
Schematic of bioreactors and sample collection systems

Image by John Petersen, www.petersenart.com
DENITRIFICATION

Denitrification occurs when microbes living in the system use the woodchips as a carbon source to convert nitrate to nitrogen gas.

The Process: Nitrates to Nitrogen

The end result is **CLEANER WATER**

RESEARCH

Current research is underway to evaluate the potential for woodchip bioreactors to treat multiple contaminants. Data is being collected at several sites in Iowa to measure effectiveness of field bioreactors in removing nitrate, phosphate, E. coli, and greenhouse gas emissions.

Woodchip Bioreactor Video at https://www.youtube.com/watch?v=pQKtbDFd4A0

Project involves

- Installation of nine pilot scale woodchip bioreactors
- Bioreactors monitored for
  - Nitrate removal under various flows
  - Influent nitrate concentrations in tile-drained watersheds

For more information go to www.extension.iastate.edu/waterquality