

# MANAGING THE N FACTOR

Farmers and landowners have made great strides in reducing soil and phosphorus loss thanks to the adoption of soil conservation practices over the past several decades. To address another great challenge facing the protection of soil and water—the loss of nitrate-nitrogen—new methods will need to be incorporated into efforts to protect land and water.

## WAYS TO PREVENT NITRATE LOSS

### LAND USE/IN FIELD:

Land use practices can reduce nitrate loss by 10-85 percent.

- » Add cover crops to corn-soybean rotations
- » Extend crop rotations and pasture rotations
- » Incorporate energy crops

### EDGE-OF-FIELD:

Edge-of-field practices can reduce nitrate loss by 30-50 percent.

- » Build wetlands
- » Install saturated buffers
- » Construct bioreactors

### IN FIELD NITROGEN MANAGEMENT:

Nitrogen fertilizer use is not the primary reason for nitrate loss, nevertheless improved nitrogen fertilizer management is important and can contribute to reducing loss.

- » Most nitrate loss to Iowa waterways is caused by a mismatch in timing between nitrate production from soil organic matter and nitrate demand from rapidly growing crops. The majority of nitrate is lost when crops are in early growth stages (in April–June).
- » Due to this fact, nitrate loss from corn and soybean crops is the same despite the fact that fertilizer is applied to corn and not applied to soybean.



Farmers apply about 150 lbs/acre of nitrogen to corn fields to increase growth. Farmers do not apply nitrogen to soybean fields. Corn removes about 100 lbs/acre during harvest when the yield is about 175 bushels/acre. Soybeans remove about 175 lbs/acre during harvest when the yield is about 55 bushels/acre.

» On average, corn or soybeans lose 30 lbs/acre of nitrogen in the form of nitrate to leaching each year when crops aren't present. More nitrate loss happens in the spring in Iowa because soils are warm and wet, often above water holding capacity, and there is no crop present to take up the nitrogen. Soils also are susceptible in fall after harvest.

» An average Iowa soil contains 10,000 lbs of nitrogen/acre in organic matter. This nitrogen isn't susceptible to rapid loss.

» When the soil is warm and moist, microbes transform nitrogen into nitrate. Nitrate is susceptible to loss.

### IN FIELD NITROGEN MANAGEMENT

[Cover Crops]

### EDGE-OF-FIELD

[Bioreactors]

[Wetlands]

### LAND USE/IN FIELD

[Energy Crops]

[Saturated Buffers]

[Extended Crop Rotations and Pasture Rotations]

STORIES EXTRA: [www.stories.cals.iastate.edu](http://www.stories.cals.iastate.edu)

Learn more about managing nitrogen with Iowa State University experts Matt Helmers and Mike Castellano in videos online and find links to Iowa State University Extension and Outreach resources.

Sources: Matthew Helmers, professor of agricultural and biosystems engineering, Michael Castellano, assistant professor of agronomy, Jamie Benning, water quality program manager, John Lawrence, associate dean and director agriculture and natural resources extension and outreach