



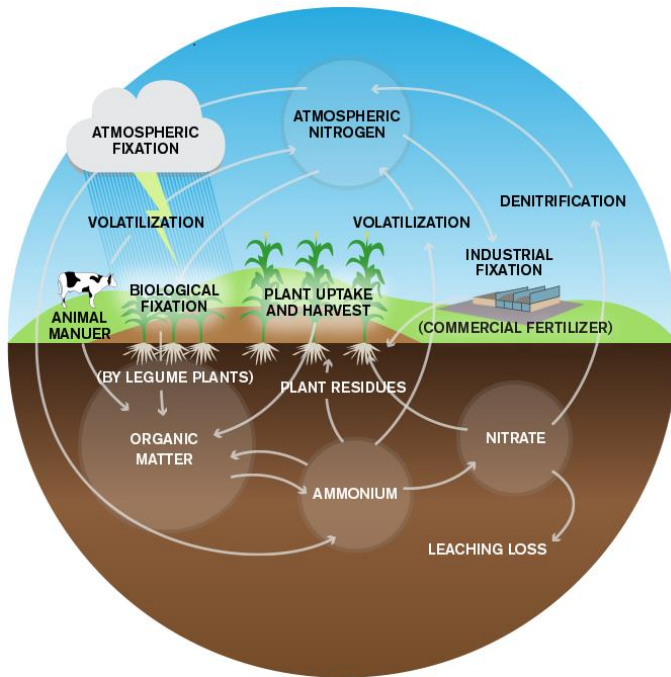
## Understanding and Managing Nitrogen Losses

Nitrogen (N) is an essential nutrient for plant health. N losses from cropland can reduce yields and contaminate ground and surface water, and make well water unsafe to drink.

### How is Nitrogen Lost?

N is lost from through three principal pathways: denitrification, leaching and volatilization.

- **Denitrification** occurs when N in the form of nitrate is converted back to a gaseous form. N diffuses out of the soil and is lost into the atmosphere. Denitrification occurs in soils that are poorly drained or waterlogged.
- **Leaching** happens when negatively charged nitrates are moved below the plant's root zone by percolating water. Leaching occurs most commonly in sandy soils.
- **Volatilization** occurs when the soil's urease enzymes break urea molecules into ammonia gas. Up to 40% of surface-applied urea-based N not incorporated into the soil via rainfall, irrigation or deep mechanical incorporation can be lost through volatilization. This type of loss can occur with every soil type.



The nitrogen cycle. (Credits: IPNI)

### Preventing N Loss

Options depend upon the form(s) of nitrogen being applied, when it is applied and the environment in which it is applied.

Choose an N source and application timing that will minimize losses for your site. For example, when applying ammonium in the fall, make sure to wait until soil temperatures fall below 50°F so that nitrification does not occur.

Cost of N, labor, equipment and power availability are other considerations when choosing a fertilizer source and application timing.

Using a nitrification inhibitor can reduce N loss by holding N in the immobile ammonium form. There are many nitrification-inhibiting products available that can be used with fall and spring applications to delay nitrification closer to crop need.

Spring-applied, urea-containing fertilizers can reduce volatilization if incorporated into the soil. Urea will convert to nitrate much faster than ammonium fertilizer. Split applications of N can also reduce losses and boost yield.

### N Recommendation Tools

<http://www.adapt-n.com/>

N-Rate Calculator

<http://cnrc.agron.iastate.edu/>

### Where can I go for more information?

Agricultural Retailers Association

<http://wwwdd.aradc.org/home>

Iowa State University

<https://crops.extension.iastate.edu/nitrogen-loss-how-does-it-happen>

International Plant Nutrition Institute

[http://www.ipni.net/publication/nitrogen-en.nsf/0/B83A9B5E76ACF78585257C13004C61A3/\\$FILE/NitrogenNotes-EN-01.pdf](http://www.ipni.net/publication/nitrogen-en.nsf/0/B83A9B5E76ACF78585257C13004C61A3/$FILE/NitrogenNotes-EN-01.pdf)