

Nutrient Management and Soil Health:
**MOBILE MACRONUTRIENTS –
NITROGEN**

Implementing nutrient and soil health best management practices

Properly managed nutrients and soil health can provide economic and environmental benefits; however, cropping systems are complex. Nutrient management decisions must support or align with soil health management decisions for optimal results.

4R Nutrient Stewardship provides a framework to achieve cropping system goals, such as increased production, increased farmer profitability, enhanced environmental protection and improved sustainability.



Right Source

Matches fertilizer type to crop needs.



Right Rate

Matches amount of fertilizer type to crop needs.



Right Time

Makes nutrients available when crops need them.

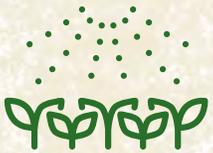


Right Place

Keep nutrients where crops can use them.

“The transition of management practices to make strip till work on our farm has allowed us to do the same with less. We can adjust during the season to stay profitable and keep the nitrogen on the farm where our crops need it.”

Wisconsin farmer



Nitrogen fertilizer

Nitrogen fertilizer is commonly applied to row crops, such as corn, to improve yield and quality of the harvested crop. However, nitrogen that is not used by a crop or leaves the field can be released into the air (as ammonia and nitrous oxide) and surface and groundwater (as nitrate).

Here, we highlight the stories of two U.S. farmers who incorporate 4R practices into their soil health management system to optimize nitrogen use.



Farmer profile:

Indiana cover cropper

- Focuses on applying nitrogen at the **right time** for optimal crop growth.
- Soil health management system includes cover crops and no-till.
- **Key Takeaway:** Growing a cover crop can enhance soil health and nutrient stewardship.



Farmer profile:

Wisconsin strip-tiller

- Applies nitrogen at the **right rate, right place, and right time** to maximize yield potential in productive soils.
- Incorporates strip tillage as part of their soil health management system.
- **Key Takeaway:** Strip tilling allows for modification of nutrient application while also reducing nutrient loss.

The Soil Health Partnership and The Fertilizer Institute: Nutrient Management and Soil Health



Indiana cover cropper

This farmer grows corn and soybeans, and incorporates over-wintering cover crops. He grows annual ryegrass as the cover crop before corn, and cereal rye as the cover crop before soybeans. This farmer grows these species of cover crops because they are nitrogen-loving, meaning they scavenge any nitrogen left behind after the cash crop. By not applying additional nitrogen to the cover crops, they are forced to use the remaining nitrogen in the soil.

To further reduce the nitrogen lost to the environment and optimize nitrogen efficiency for crop growth, this farmer splits his application of nitrogen between planting (30%) and the growing season (70%). Applying 30% of nitrogen at planting gives the growing corn plant enough nitrogen for early vegetative growth, and also provides the necessary nitrogen to feed the soil microbes working hard to break down the cover crop. By applying the remaining majority of nitrogen when the corn is actively growing, it maximizes the opportunity for the crop to utilize the fertilizer applied and decreases the chances for leaching through their sandy soils into the groundwater.

When annual ryegrass is unavailable, this farmer plants cereal rye before corn. If the cereal rye cover is not completely dead at corn planting, he will include a 28% nitrogen solution with the preemergent herbicide pass to kill the rye more quickly and boost the corn. However, he does not apply more nitrogen; he just adjusts the split. This farmer's careful attention to his nitrogen use means he grows 1 bushel of corn on average for every .87 units of nitrogen on a loamy sand soil. This farmer says "Paying attention to when I apply nitrogen fertilizer is a critical part of growing a grass cover crop, and helps me build soil health on my farm."



Wisconsin strip-tiller

This farmer grows corn and soybeans on a silt loam soil. Although his neighbors were initially skeptical, he began transitioning to strip tillage 20 years ago, and by 2004, had fully implemented it on his farm. Because of the high yield potential on his productive soil, he considers nitrogen rate, timing, and placement to maximize his corn yield potential. Incorporating a late season nitrogen application allows flexibility to increase or decrease nitrogen inputs depending on the year's growing conditions and crop yield potential.

"The transition of management practices to make strip till work on our farm has allowed us to do the same with less. We can adjust during the season to stay profitable and keep the nitrogen on the farm where our crops need it." says this farmer.

Strip tilling has a number of benefits on this farmer's farm: it holds soil in place, mellows the soil structure, and makes the fields more workable during less-than-ideal weather in the spring and fall. He also sees less ponding in areas of the field with heavier soil since the transition. In addition to these benefits, he credits strip tillage with keeping the nutrients in the strip and close to the growing plants, which he believes is one of the contributing factors to keeping their nitrogen use rates low.

This farmer is always exploring new ways to improve how they manage nitrogen, and in partnership with SHP he has been exploring the results of additional splits to his multiple application strategy and the consequence of decreasing N units by about 15%. To apply nitrogen, he uses the planter to place nutrients in strip, a liquid sidedress bar, and a Y drop system for a late season application. On average, this farmer grows 1 bushel of corn for every .78 units of nitrogen.

The Soil Health Partnership and The Fertilizer Institute: Nutrient Management and Soil Health



The Fertilizer Institute represents, promotes and protects the fertilizer industry.



The Soil Health Partnership promotes the adoption of soil health practices for economic and environmental benefit.

Learn more about the Soil Health Partnership by visiting soilhealthpartnership.org or contacting soilhealth@ncga.com

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