Pre-sidedress Nitrogen Management to Maximize Fertilizer Dollars

In-depth review and recommendations from the soil perspective.

FIELD CONDITIONS THAT WARRANT PRE-SIDEDRESS NITRATE TESTING (PSNT):

- **Crops grown: Corn, sweet corn**
- **Medium/fine or coarse textured soils**
- **Poorly drained soils**

PRE-SIDEDRESS NITRATE TEST USE:

- **Predicts the amount of plant-available N from organic sources releasing N during the growing season (legumes, manure, soil organic matter)**
- **Provides site-specific estimates of available N**

Capitalizing on management practices of inputs based on soil status could be the difference between ending up on the right end of the market versus an upside down status to kick off the growing season.

Beyond the economic reasons, leaching loss potential should be an additional motivator. Not only are applied nitrates (N) that are washed away from a field expensive and wasteful, but their expense to the environment and groundwater is costly.

The main goal in any N management program is reaping optimal yields while getting as close as possible to complete conversion of applied nitrates to nitrogen through the plants (as opposed to washing away).

Application rates based on assessment

Assessing N availability before application is the key factor to this efficient N management program. Such an assessment, combined with the expertise of a knowledgeable agronomist, can assist in determining the rate, timing, source, and placement on fields growing corn, sweet corn, and winter wheat grown on loamy soils (medium and fine textures), ultimately reducing over-application of N above and beyond the crop's needs - thus reducing costs.

A Pre-sidedress Nitrate Test (PSNT) measures the plant-available N from manure application, legume crops, soil organic matter, and other organic N sources. With this measurement, PSNT can help growers adjust application rates of N while also providing a gauge for the amount of N that should be credited for previous crops or manure applications when these credits cannot readily be assigned.

As compared with the PPNT, PSNT has some less-than-ideal logistics – including the fact that growers utilizing the test are then required to apply any necessary supplemental N through sidedress application. The timing of PSNT can also create a challenge. The window to both sample soil and apply the necessary sidedress N is a short one to two weeks and typically occurs while other growing season tasks are in full swing.

Pre-sidedress Nitrogen Testing Logistics

Collection

Corn or Sweet Corn: Soil samples should be gathered around 4-6 weeks after planting, or when corn plants are 6-12 inches tall.

- Collect samples at a 1 foot depth in 1 foot increments
- Requires a minimum of 15 soil cores sampled randomly from 20 acres
- Samples from various locations within the field that differ in management practices and soil types are encouraged

Storage and delivery

- Store samples in a refrigerator until delivery to the laboratory
- Delivery to the laboratory should be within 1-2 days of pulling the samples
- Freeze or air-dry samples to prevent changes if they cannot be delivered to the laboratory within 1-2 days of sampling

Credits

Corn or Sweet Corn:

- N measured by PSNT is credited against the N application rate.
- Subtract N credits from N application rates for corn to arrive at adjusted application rate.
- N credits based on PSNT will be low (underestimated), meaning higher application rate recommendations, when early growing season temperatures are cool.
- Research shows N credits based on PSNT will likely be high (overestimated), meaning lower application rate recommendations, when average temperatures in May and June are below the long-term average by more than 1°F.
- It's recommended to utilize the book value N credit for manure application or previous legume crop N, together with the PSNT nitrogen credit, when PSNT is used to adjust rates for contributions from organic sources during a growing season with average or below-normal temperatures in May and June.

Nitrogen (N) credits to corn and sweet corn crops based on Pre-sidedress Nitrate Test (PSNT).**

PSNT Value (ppm NO_3-N)	Soil yield potential	
	High	Medium
	Measure as lb N/a to credit	
>21	None*	None*
18-20	100	80
15-17	60	80
13-14	35	40
11-12	10	40
<10	0	0

*No additional N is needed
**Laboski, 2012

PSNT Production Situation Applications

Reasonable for corn following corn

- Identifies sites that don't need additional N fertilization
- Offers a partial estimate of N remainder and an estimate of the amounts of N available to be released by organic sources (manure, legumes, soil organic matter).

Useful in corn following alfalfa

- Test is only applicable when a need arises to confirm the alfalfa N credit.
- Nothing over 40 lb. N/ac. (acre) should be applied if the PSNT measure is less than 21 ppm of N.

Applicable for manured areas

- Provides an N credit estimate of the available N to be released during the growing season.

Sources:

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RockRiverLaboratory1 Rock River Laboratory, Inc.

920-261-0446
scott_fleming@rockriverlab.com
www.rockriverlab.com