

Late Spring/In-Season Nitrogen (PSNT) Testing

A Pre-Sidedress Nitrate Test (PSNT) can be used to determine whether additional fertilizer nitrogen (N) is needed. The timing of this test is right before corn will demand major nitrogen supply and is ideal for making the most of your fertilizer options.

Testing can reduce guessing and unnecessary or excessive fertilizer applications. The test is also called the “late-spring” nitrate test to emphasize that the time of sampling and sample depth make this test different than other soil nitrate tests.

Benefit of Testing

Some fields do not respond to additional nitrogen in the spring. This is one way to screen out those fields. In other fields growers use this test to determine how much supplemental nitrogen is needed. The late spring nitrogen soil test measures the concentration of nitrate-nitrogen ($\text{NO}_3\text{-N}$) in the top 12 inches of soil. This test is very useful for:

- Verifying that the current N fertilization program will supply adequate N fertility to this year’s crop
- Measuring fields for nitrate carryover after a drought
- Checking fields that have a history of manure applications
- Evaluating fields that have had previous legume crops in the rotation
- Monitoring fields after wet springs

What is Happening in the Soil

During early spring, relatively little growth of the corn plant occurs and the subsequent demand for nutrients is low. The young corn plant accumulates relatively little dry matter and takes up only small amounts of nitrogen, P_2O_5 and K_2O during its first 25-30 days of growth. After approximately the first month, rapid growth and dry matter accumulation result in dramatic increases in plant demand for nutrients.

Because of the increased microbial activity and low plant uptake early in the growing season there is a temporary buildup of $\text{NO}_3\text{-N}$ in the soil. Nutrient uptake by plants increases dramatically soon after sidedressing time (when the plants are about 12 inches tall) making this the most appropriate time to test for soil $\text{NO}_3\text{-N}$. For the most accurate and consistent soil test results, it is critical that the pre-sidedress $\text{NO}_3\text{-N}$ soil test be used only during this rigidly specified and narrow time slot.

When to Sample

Sample when the corn is 6 inches tall (measuring from the ground surface to the center of the whorl), usually four to six weeks after planting. If you have many fields to sample, start sampling early! The window to apply side-dress N on corn closes fast.

Where to Sample

Sample to a depth of 12 inches. Samples representing depths other than 12 inches can result in incorrect assessments of N availability. Collect samples from between cornrows, staying away from the starter band. Limit samples to areas of 15 acres or less and take separate samples for areas with different corn stands (different population densities, stage of development, and/or color), crop histories, fertility management, or significant changes in slope, etc.

How to Sample

Soil samples analyzed for this test must be 12 inches deep and should be derived from at least 16 to 24 cores collected within an area not exceeding 15 acres.

The most appropriate sampling strategy varies with location. Collection of samples as suggested above provides information that can be used to identify future sampling strategies that are more efficient for the fields being tested.

Care should be taken when sampling fields where N was applied as bands of fertilizer. At least 24 cores should be collected in fields where more than 50 lb. N/acre was applied as anhydrous ammonia. Our results with ammonia treated fields have not been as consistent as with other nitrogen fertilization programs.

Where nitrogen fertilizer application methods are uncertain, sampling bias can be minimized by collecting soil samples in “sets of eight” cores that have various assigned positions relative to corn rows. By this method, the person doing the sampling moves in a random pattern within the test area to select approximate positions for collecting cores. Each time a core is collected, however, its exact position is selected relative to the two nearest corn rows. The first core is collected in the row. The second is collected one-eighth of the distance between any two rows after moving to another part of the test area. The third is collected one-quarter of the distance between any two corn rows after moving to another part of the test area. The process is continued until the eighth core is collected seven-eighths of the distance between any two corn rows.

The soil from all cores should be crushed and thoroughly mixed in a clean pail before a sub-sample is removed for analysis.

Handling and Shipping Soil Samples

Moist soil samples should be protected from temperatures above 75°F and should be refrigerated if they cannot be analyzed within two days. Mailing usually poses no problem if the samples are without refrigeration for no more than two days. Avoid mailing samples Thursdays and Fridays.