



Soil Testing to Manage Nitrogen for Sweet Corn

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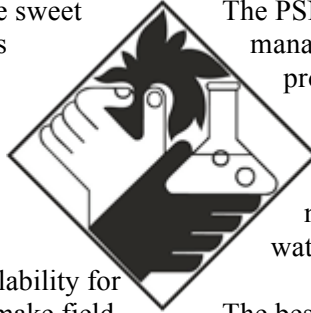
Managing nitrogen wisely is important to the sweet corn grower. Not only are nitrogen fertilizers becoming more costly as oil prices rise but inappropriate use of nitrogen may cause unsatisfactory crop yields as well as environmental damage.

Presidedress Soil Nitrate Test

There is an effective soil test for nitrogen availability for sweet corn allowing a soil testing facility to make field-specific nitrogen (N) fertilizer recommendations. This test, called the June nitrate test or the Presidedress Soil Nitrate Test (PSNT), originally was developed for field corn in the mid-1980s by Dr. Fred Magdoff at the University of Vermont. Use of this test has resulted in substantial reductions in N fertilizer applications to field corn. Research in New Jersey, New Hampshire and Connecticut indicates that the PSNT is a reliable tool for managing N for sweet corn.

The time of sampling and the depth of sampling for the PSNT are different from other soil tests. Soil samples for the PSNT are collected from the surface foot of soil when corn is six to twelve inches tall (measured from the ground surface to the center of the whorl). The test is based on concentrations of nitrate-N ($\text{NO}_3\text{-N}$) in the soil sample. Concentrations of nitrate-N between 25 and 30 ppm indicate that application of N fertilizer likely will not increase yields. Concentrations below this range indicate that application of N fertilizer likely will increase yields.

The development of this test is a major improvement in N management because it provides previously unavailable information about the availability of N to sweet corn. The test provides field-specific estimates of N availability from all sources of N. These sources include manure applications made in previous years, manure applications for this season, soil organic matter, N fertilizer applications made for the current season, and previous crop residues. Use of the test allows adjustment of fertilizer recommendations for all sources of N on a field-by-field basis; substantial reductions in N fertilizer applications usually result.



The PSNT should be used to optimize your nitrogen management for corn. Optimization denotes a process of using the test for several years in the same field to gradually improve your N management. This will save you money on fertilizer and will decrease the potential for nitrate contamination of ground and surface waters.

The best method to optimize your N management for sweet corn is to apply the recommended broadcast rate of N (60 lb/acre) before planting and the recommended banded rate of N at planting (40 lb/acre), and then use the test. You will probably find that some fields test consistently in excess (greater than 30 ppm). If so, gradually reduce the amount of broadcast fertilizer applied before planting to these fields so that they test between 10 and 30 ppm in the future. Fields that consistently test extremely deficient (less than 10 ppm) should receive more N fertilizer before planting so that these fields test between 10 and 30 ppm in the future.

After several years, you probably will find that the amount of N fertilizer recommended by using the test varies from year to year. This occurs because rainfall has a great effect on soil nitrate concentrations. In years with unusually dry spring weather, soil nitrate concentrations typically will be higher than normal; in years with unusually wet spring weather, soil nitrate concentrations typically will be much lower than normal. The only way to know what constitutes the normal range of soil nitrate concentrations for your soils and N management is to test your fields for a few years in a row and maintain records of the results.

The PSNT is recommended for use with mid- and late-season sweet corn varieties. Because research data for early-season cultivars is unavailable, the test should be used with caution for these varieties. Research data also is unavailable for corn planted under row covers. The test should be used with caution where row covers or other methods are used to accelerate growth of the crop.



UConn Soil Nutrient Analysis Laboratory

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The PSNT is a relatively new technology, and growers are advised to adopt it gradually. Initial use of the test requires minimal investments of time and money when used on a few fields on each farm each year. There is no need for larger investments in situations where the test shows that current practices are appropriate. Larger investments in the test should be cost-effective in fields where problems (e.g., where soil nitrate concentrations are consistently too high) are detected. In 2023, PSNT tests cost \$10 per sample for in-state growers at the UConn Soil Nutrient Analysis Laboratory.

How to Sample for the PSNT:

1. Sample when corn is 6 to 12 inches tall.
 - a. Sample the surface 12-inch layer of soil. Samples collected for the PSNT must be representative of the surface foot of soil. Samples representing thicker or thinner layers result in incorrect assessments of N availability.
 - b. Obtain 15 to 20 cores per sample area. If the field to be sampled is larger than 15 acres, divide the field into two or more sample areas if it is convenient and feasible to do so.
 - c. Avoid row fertilizer bands (e.g., starter) by sampling midway between rows. Avoid sampling areas where manure was piled or where manure application was unusually heavy or light.
 - d. Mix cores thoroughly in a clean pail; take one cup as the sample.
 - e. Place sample in the cloth bag provided (available by calling the lab at (860) 486-4274), close and make sure to write name and sample ID on the yellow tag.
2. Complete a field-information sheet for your sample(s) and submit it with the sample(s). Do not fill in the spaces for columns labeled “Lab No.,” “Soil nitrate” or “N fertilizer recommendation”. Be sure to indicate how much, if any, starter or preplant N fertilizer was applied.

3. Protect moist soil samples from temperatures above 75°F by storing in a cooler until delivery to the laboratory. Refrigerate the samples if they cannot be delivered within three days. Mailing usually poses no problem if the samples spend no more than three days without refrigeration. The soil testing laboratory will dry the samples as soon as they are received.
4. Soil samples expected to spend more than three days without refrigeration should be dried as soon as possible. Samples can be air-dried by spreading in a thin layer on paper. A fan will accelerate drying.
5. Soil samples that are extremely wet or muddy should be dried before shipping or storage. Incorrect results will be obtained if water “drips” from the samples.
6. Soil samples are analyzed within 24 hours of arrival (except weekends) at the University of Connecticut’s Soil Nutrient Analysis Laboratory and the results and recommendations are emailed or faxed to growers or program coordinators. Please specify the EMAIL or FAX number where you would like your results sent on the field-information sheet.

For additional information about the PSNT for sweet corn contact the UConn Soil Nutrient Analysis Laboratory (860) 486-4274.

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