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PRE-SIDEDRESS SOIL NITRATE TEST (PSNT) IN NO-TILL CORN PRODUCTION IN TENNESSEE

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A major challenge with nitrogen (N) management in corn production is determining the appropriate amount of N to attain optimum productivity with minimal environmental risks to other ecosystem functions. Under-application or excessive loss of N can reduce yields in corn. Over-application of nitrogen can result in economic loss and potential environmental consequences. Poultry litter has become readily available to producers in Tennessee and if managed properly, can supply a portion of the total recommended N need for the growing season. However, estimating the amount of supplement N required to meet the total recommended N can be complicated. This fact sheet provides Tennessee corn producers using poultry litter with a guide to estimate the supplemental N using the Pre-Sidedress Nitrate Test.

The University of Tennessee's recommended N application rates for corn production should be based on realistic yield goals. Adjustments to N application rates can be made by using the Pre-Sidedress Nitrate Test (PSNT) to check soil N levels when there are four to six leaves on corn plants. The PSNT is **recommended only for corn producers using animal manure, poultry litter or biosolids** who want to estimate and fine-tune their sidedress N fertilizations following manure/poultry litter application.

An accurate interpretation of the PSNT depends on when and how the soil samples are collected from the field. Information on the sampling time, depth, approach/method and processing is shown in the figure below. Detailed information on sample collection and processing procedures are described in the UT Extension publication, "The Pre-Sidedress Nitrate-N Soil Test (PSNT) For Nitrogen Management in Corn Production Systems of Tennessee" available at https://soillab.tennessee.edu/wp-content/uploads/sites/129/2020/07/FactsheetPSNTCinfosheet105.pdf.

Sampling Time

When the corn is between the **4th to 6th fully matured leaf stage (V4 to V6).** The corn plant height is between 6 to 12 inches.

Sampling Depth

Appropriate depth for the correct interpretation of the PSNT soil test is a **12-inch sampling depth.**

Sampling Approach

Collect samples from approximately **20 random locations within an area not to exceed 10 acres.**

Sample Process

Soil must be completely air-dry within 36 hours (preferably sooner) of sampling.

There are two key considerations when interpreting the results for the PSNT in Tennessee: soil nitrate test level and yield potential of the field. Based on this PSNT, soil nitrate is categorized into three soil test levels in Tennessee — low, medium, and high — indicating that corn response to additional N will be assured, possible or unlikely, respectively. The levels vary depending on the yield potential of the field. For the PSNT, yield potential is characterized into two groups: (1) 125 to 175 Bu/acre and (2) > 175 Bu/acre. The soil nitrate test levels for each yield potential is shown below.

125 to 175 Bu/acre		
Soil Test Levels	Nitrate (ppm)	Response
Low	< 17	Assured
Medium	17–24	Possible
High	25+	Unlikely

> 175 Bu/acre		
Soil Test Levels	Nitrate (ppm)	Response
Low	< 35	Assured
Medium	35–46	Possible
High	47+	Unlikely

Note: *The soil nitrate concentration is based 0- to 12-inch depth sample.*

Sidedress N recommendations for corn based on the PSNT are made only for the low and medium soil nitrate test level regardless of the yield potential. The current recommended sidedress N rates for corn based on soil nitrate is presented in the table below.

Soil Nitrate	125 Bu/A	150 Bu/A	175 Bu/A	175 Bu/A +
ppm	---------- Pounds of sidedress N per acre ----------			
< 10	60–120	75–150	90–180	120–180
10–16	40–60	50–75	60–90	90–120
17–24*	0–40	0–50	0–60	60–90
25–34	0	0	0	40–60
35–46**	0	0	0	0–40
47+	0	0	0	0

** Medium testing soil at Field Yield Potentials 125 to 175 Bu/A or 15 to 25 Tons Silage per Acre.*
*** Medium testing soil at Field Yield Potentials more than 175 Bu/A or 25 Tons Silage/Acre.*

Note: *The soil nitrate concentration is based 0- to 12-inch depth sample.*

FURTHER READING

Hubert J. Savoy. The pre-sidedress nitrate-n soil test (PSNT) for nitrogen management in corn production systems of Tennessee. Biosystems Engineering & Soil Science BESS #105.
https://soillab.tennessee.edu/wp-content/uploads/sites/129/2020/07/FactsheetPSNTCinfosheet105.pdf

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