Soil Nitrate Tests in Maryland PSNT and FSNT

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What is the PSNT?

- a tool that helps you decide whether to apply sidedress nitrogen to corn
- measures amount of nitrate-nitrogen in soil just before rapid N uptake by crop begins

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Nitrogen Measured by the PSNT

- nitrate-nitrogen is a by-product of the mineralization of manure and/or last year’s forage legume crop
Nitrogen Measured by the PSNT

- amount measured indicates if enough N will be available from organic sources to meet the crop’s needs
- availability is affected by soil temperature and moisture
Nitrogen Measured by the PSNT

- adequate nitrate-nitrogen in soil (skip sidedress)
- inadequate nitrate-nitrogen in soil (consider sidedress)
Benefits of Using the PSNT

- save $$$ on N fertilizer if there is adequate nitrate-nitrogen in the soil from organic sources
- optimize yield if there is inadequate nitrate-nitrogen in the soil from organic sources

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Where **Can** the PSNT Be Used?

- corn for silage or grain is grown
- manure/biosolids have been applied this year or in the past 2 years

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Where Can the PSNT Be Used?

- forage legume was grown last year
- less than 50 lbs/A of commercial fertilizer nitrogen was applied prior to sidedress
Where Can’t the PSNT Be Used?

- more than 50 lbs/A of commercial fertilizer nitrogen was applied prior to sidedress
- commercial fertilizer has been the only nutrient source
- irrigation is used
When Should Soil Samples for the PSNT Be Taken?

Take soil samples for the PSNT when the corn is between 6 and 12 inches tall.
PSNT Sampling Steps

1. Use a soil probe to take your soil samples.
PSNT Sampling Steps (cont.)

2. Take soil samples that are 12 inches deep.
PSNT Sampling Steps (cont.)

3. Collect 30-40 samples *randomly* throughout the field.
PSNT Sampling Step #3 (cont.)

- sample between rows - stay out of the fertilizer band
  - fertilizer from the starter band may skew PSNT result
- avoid manure residues on the field
PSNT Sampling Steps (cont.)

4. Put all samples in a clean bucket. Break up clods. Mix well.

5. Spread soil out on paper or plastic and scoop soil from different areas in order to collect a sub-sample. Collect about 1 cup sub-sample.

6. Spread sub-sample in a thin layer on paper or plastic and air-dry quickly to stop microbial activity (no longer than overnight). Do not dry in oven or microwave. Use a fan to enhance air flow and drying if necessary.
7. Label a paper bag with the field name(s) or number(s) from where the samples were taken.

8. CFO’s - Take the sample to your Extension Nutrient Management Advisor for analysis. Consultants - Conduct the test or send to a private lab.
Combining Fields

- Up to 3 fields can be combined for one analysis if the fields have:
  - same cropping history
  - same fertility regime for last 2 years
  - same application rate of same manure this year
Sampling Multiple Fields (cont.)

- take soil samples from each field that is to be included in the management unit
- example: if you combine 3 fields, take 10-12 samples from each field
PSNT Results

- your Extension Nutrient Management Advisor will report the results of PSNT and provide sidedress recommendations, if any
- PSNT-based sidedress recommendations supersede original recommendations in the nutrient management plan
For More Information

Contact your University of Maryland Extension Nutrient Management Advisor for more information about the PSNT and to reserve a soil probe to sample your fields.

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Fall Soil Nitrate Test (FSNT)

- same concept as PSNT
- used to test for residual nitrate-N in soil in the fall
- conducted prior to planting wheat or barley for grain
- when fall N application is planned
Nitrogen Measured by the FSNT

- organic or fertilizer nitrogen
- nitrate-nitrogen left over from fertilizer applications on corn
- nitrate-nitrogen provided by previous soybean crop
Where Can the FSNT Be Used?

- on any field where wheat or barley for grain is the intended crop
  - not limited to fields that received organic nutrient applications
Benefits of using the FSNT

- save $$$ on N fertilizer if there is **adequate** nitrate-nitrogen in the soil left over from the previous corn crop
- optimize yield if there is **inadequate** nitrate-nitrogen in the soil
Yield differences observed between adjacent plots receiving either 30 lbs or 0 lbs of N fertilizer

Avg. yield response as soil nitrate concentration increases

Economic break even point for use of 30 lbs N/Ac

Soil nitrate concentration at 10 ppm

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FSNT Sampling Steps

- samples should be taken at a depth of 8 inches
- collect 15-20 samples per acre *randomly* throughout the field
- Mixing, sub-sampling and drying are the same as for the PSNT
# Soil Sampling Comparison

## PSNT
- Sample when corn is 6-12 inches tall
- 12 inch soil sample
- Sample randomly and between rows
- 30-40 samples

## FSNT
- Sample pre-plant
- 8 inch soil sample
- Sample randomly
- 15-20 samples
FSNT Results for Wheat

- If samples are tested by a commercial lab and the results are:
  - >8 ppm - no fall N fertilizer is recommended
  - ≤8 ppm - apply 30 lbs/Acre of fall N fertilizer

Photo courtesy of Soil-Net Photo and Image Library

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FSNT Results for Wheat (cont.)

- If samples are tested using a Nitrachek meter and the results are:
  - >10 ppm - no fall N application is recommended
  - ≤10 ppm - apply 30 lbs/Acre of fall N as manure or fertilizer

(due to more variability associated with field equipment as opposed to laboratory equipment)
FSNT Results for Barley

- If samples are tested by a commercial lab and the results are:
  - >11 ppm - no fall N application is recommended
  - ≤11 ppm - apply 30 lbs/Acre of fall N as manure or fertilizer
FSNT Results for Barley (cont.)

- If samples are tested using a Nitrachek meter and the results are:
  - >13 ppm - no fall N application is recommended
  - ≤13 ppm - apply 30 lbs/Acre of fall N as manure or fertilizer

(due to more variability associated with field equipment as opposed to laboratory equipment)
# Misaligned Thresholds

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¹Based on an 8 inch sampling depth  
²Based on a 6 inch sampling depth

## Options:
1. Follow the science  
2. Follow the law