Using the Pre-Sidedress Soil Nitrate Test (PSNT)
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
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
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
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 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.)

3. Collect 30-40 samples randomly throughout 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.
PSNT Sampling Steps (cont.)

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.
Fall Soil Nitrate Test (FSNT)

- same concept as PSNT
- used to test nitrate-N in soil prior to planting wheat or barley in the fall
- use this test if you are considering applying fertilizer N

Photo courtesy of Soil-Net Photo and Image Library
Where Can the FSNT Be Used?

- On any field where wheat or barley 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

Photo courtesy of Soil-Net Photo and Image Library
Blue Yield differences observed between adjacent plots
Diamonds receiving either 30 lbs or 0 lbs of N fertilizer
Black line Avg. yield response as soil nitrate concentration increases
Red line Economic break even point for use of 30 lbs N/Ac
Green line Soil nitrate concentration at 10 ppm
FSNT Sampling Steps

- samples should be taken at a depth of 6 inches
- collect 1 sample per acre *randomly* throughout the field
- Mixing, sub-sampling and drying are the same as for the PSNT
FSNT Results for Wheat

- If samples are tested by a commercial lab and the results are:
  - >10ppm - no fall N fertilizer is recommended
  - ≤10ppm - apply 30 lbs/Acre of fall N fertilizer

Photo courtesy of Soil-Net Photo and Image Library
FSNT Results for Wheat (cont.)

- If samples are tested using a Nitrachek meter and the results are:
  - >12ppm - no fall N fertilizer is recommended
  - ≤12ppm - apply 30 lbs/Acre of fall N 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:
  - >15ppm - no fall N fertilizer is recommended
  - ≤15ppm - apply 30 lbs/Acre of fall N fertilizer

Photo courtesy of Soil-Net Photo and Image Library
FSNT Results for Barley (cont.)

- If samples are tested using a Nitrachek meter and the results are:
  - >17ppm - no fall N fertilizer is recommended
  - ≤17ppm - apply 30 lbs/Acre of fall N fertilizer

(due to more variability associated with field equipment as opposed to laboratory equipment)
FSNT Following Soybeans

- Only one field in 30 comparisons over 3 years showed a positive response to N following soybeans
  - 3 bu/Ac increase is lower than economic break even point
- Fall fertilizer-N application to wheat following soybeans is not recommended.