

Water Quality and Air Quality Enhancement Activity – WQL25 – Split applications of nitrogen based on a PSNT



Enhancement Description

Use pre-sidedress soil nitrate test (PSNT) to determine the need and/or amount of additional nitrogen to be applied during a sidedress/topdress N application.

Land Use Applicability

Cropland

Benefits

Efficient use of nitrogen (N) fertilizer is important for economical crop production as well as water and air quality enhancement. Split sidedress or topdress applications of fertilizer N improve the efficiency of nutrient uptake and protect water and air resources. Pre-plant soil test nitrogen analysis (not to be confused with PSNT) can be poorly correlated with growing season soil N availability and often does not provide sufficient insight upon which to base sidedress or topdress N applications. Additionally, sidedress or topdress applications of N based on a PSNT may lower the total amount of fertilizer applied, including ammonia fertilizer, minimizing ozone damage and greenhouse gases. Nitrate, while required by plants as a nutrient, is unstable in soil and can move with water through the soil into surface and ground water. Using split applications of N based on a PSNT will minimize nitrate contamination of surface and ground water, improve N use efficiency, and reduce harmful N emissions, improving the overall greenhouse gas footprint.

Conditions Where Enhancement Applies

This enhancement applies to all annually planted crop land use acres in states where a Land Grant University approves the methodology.

Criteria

Conduct a **PSNT** on the selected crop (e.g. corn) to test if additional N fertilizer is needed (sidedress application) on fields with a history of manure application, sewage sludge, or other residual organic products or where a legume crop or a legume cover crop has been grown.

The PSNT attempts to:

1. Gauge the pool of potentially mineralizable organic N in the top foot of soil, and
2. Link that pool with a likelihood of a yield response from additional N fertilizer at sidedressing time.

Adoption Requirements

This enhancement is considered adopted when a PSNT has been conducted on the land use acre.



United States Department of Agriculture
Natural Resources Conservation Service

2013 Ranking Period 1

Documentation Requirements

Written documentation for each year of this enhancement describing the following items:

1. A map showing where the enhancement is applied,
2. Recommendations from the test,
3. Dates of split nutrient applications,
4. Type(s) of nutrients (fertilizer and organic) applied including rate, form and timing,
5. Treatment area(s),
6. Soil test results,
7. Crops grown and yields (both yield goals and measured yield), and
8. Calibration of application equipment.

Note: In lieu of documenting each individual item listed in the Documentation Requirements, a Certified Crop Advisor plan that contains each of the items may be substituted.

References

Follett, R.F. 2001. Nitrogen transformation and transport processes. *In* Nitrogen in the environment; sources, problems, and solutions, (eds.) R.F. Follett and J. Hatfield, pp. 17-44. Elsevier Science Publishers. The Netherlands. pp 520.

International Plant Nutrition Institute (IPNI). 2012. 4R Plant Nutrition – A Manual for Improving the Management of Plant Nutrition (North American Version). IPNI, Norcross, GA.

Randall, G., J.A. Delgado and J.S. Schepers. 2008. Nitrogen management to protect water resources. *In* Schepers and Raun (eds) Nitrogen in Agricultural Systems. SSSA Monograph. 49. Madison, WI. pp. 911-945.

Schepers, J.S. and W.R. Ruan(eds.). 2008. Nitrogen in agricultural systems. Agron. Monogr. no. 49, American Society of Agronomy (ASA). Crop Science Society of America (CSSA). Soil Science Society of America (SSSA). Madison, WI.



United States Department of Agriculture
Natural Resources Conservation Service

IDAHO ADDENDUM 2013

Water Quality Enhancement Activity – WQL25 – Split Applications of Nitrogen based on a PSNT

Additional guidance for PSNT:

Pre-Sidedress Nitrogen Test (PSNT) is a widely used test for optimizing N fertilizer use especially in corn. The test is based upon the timely measurement of mineralized soil nitrate in the top foot of soil just before the corn crop starts its rapid period of N uptake. PSNT can predict the amount of N released from previous legumes, manure applications, soil organic matter and residual nitrate. It can therefore be used to confirm the amount of N credited from these sources. Sidedress applications of nitrogen may not be needed, or the rate may be reduced, based on the test results.

How to sample

- When corn is 6-12 inches tall.
- Between rows (i.e. not in the starter band).
- Not too close to a rain event that could have resulted in nitrate leaching (wait for 2-3 days after significant rainfall).
- Sample down to 12 inches.
- To obtain an accurate measure, 30-40 soil cores should be taken from each field or area with similar management history.
- Dry sample immediately and send to the lab.

Fields with test results of nitrate-N above 25 ppm will likely see little economic response from addition of additional N, while those below 20 ppm will likely see a good response. The PSNT is particularly useful when there is uncertainty as to whether enough manure was actually applied to meet expected corn N requirements. PSNT users and anyone else attempting to adjust N applications to corn, should, over the course of a few years, carefully compare test results with fertilizer and manure inputs AND crop performance to develop the skills and local experience to best use this test.

For additional information on soil sampling and PSNT, refer to:

University of Idaho, *Nutrient management for field corn silage and grain*. PNW Extension Publication 615, 2010.

<http://www.cals.uidaho.edu/edComm/pdf/PNW/PNW0615.pdf>

University of Idaho Cooperative Extension, *Soil Sampling*, Bulletin 704 (revised).

<http://info.ag.uidaho.edu/resources/PDFs/EXT0704.pdf>

South Dakota State University, *Nitrogen Best Management Practices for Corn in South Dakota*, FS 941, 2008

<http://agbiopubs.sdstate.edu/articles/FS941.pdf>

**This activity may NOT be used with the following enhancements:
ANM21, ENR10, SQL08, SQL09**

**Potential Duplicate Practices:
590 – Nutrient Management**