

Water Quality Enhancement Activity – WQL04 – Plant tissue tests and analysis to improve nitrogen management



Enhancement Description

Use plant tissue tests to adjust nitrogen application rates.

Land Use Applicability

Crop

Benefits

The use of either plant tissue testing or leaf tissue testing is an adaptive nitrogen management technique used to adjust nitrogen application rates in-season (leaf tissue test) or for the following crop year (stalk test). Test such as

these help provide a thorough analysis of how nitrogen is being used by the current crop, giving a basis for adjustments to nitrogen rates. The end result is a more complete utilization of the nitrogen applied and less nitrogen remaining in the soil to be lost to the environment through nitrate leaching or soil emissions of nitrous oxide.

Conditions Where Enhancement Applies

This enhancement applies to all crop land use acres.

Criteria

This enhancement requires the use of an analysis of appropriate plant tissue to monitor the uptake of nitrogen and other nutrients during the growing season or for the following year and to make necessary adjustments in nutrient applications.

In-season tissue testing and analysis

1. This enhancement is limited to crops and state’s with one or more of the following:
 - a. A Land Grant University (LGU) that provide tissue analyses,
 - b. That recognize private commercial laboratory analyses,
 - c. Where chlorophyll tissue testing is a recognized methodology, or
 - d. Where aerial imagery (infrared) technology is a recognized methodology.
2. Participant must have a current soil test (no more than 3 years old).
3. Nutrient application rates are within the LGU recommendations based on soil testing and established yield goals and considering all nutrient sources.
4. Follow guidelines from the laboratory and local LGU for interpretation of the results and appropriate adjustments in the application of N and other nutrients.

Plant tissue testing and analysis for the following year

Corn stalk testing and analysis - The nitrogen status of the corn crop can be determined by measuring the nitrate concentrations in the lower portions of cornstalks at the end of the growing season. This involves taking an 8” sample of the cornstalk after black layer



development in corn. The stalk is analyzed for nitrate to determine if the corn received insufficient, sufficient, or excessive levels of nitrogen. Since this test is conducted after the current corn crop is mature, the results are used to “fine-tune” nitrogen recommendations in the next corn crop. Follow your LGU guidelines for the use of this type of test.

Adoption Requirements

This enhancement is considered adopted when the results from plant tissue testing have been used to make nutrient application adjustments, either in-season or for the next crop year.

Documentation Requirements

Each year, documentation for each treatment area (field) shall describe the following essential items:

1. A map showing where the activities are applied,
2. Test used (stalk, leaf, chlorophyll, infrared, or other plant tissue),
3. Dates of test(s),
4. Acres for each treatment area,
5. Soil test results for each treatment area,
6. Manure analysis results (if applicable),
7. Crop yields (both yield goals and measured yield, if available),
8. Amounts of all nutrients applied in each treatment area,
9. Plant tissue test results (including reference strips), and
10. Change in annual N applied due to adaptive management change per treatment area.

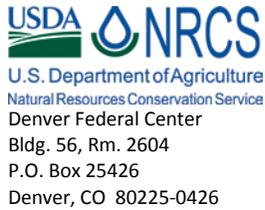
Note: In lieu of documenting each individual item listed in the Documentation Requirements, a Certified Crop Advisor plan that contains each of the items may be substituted.

References

Blackmer, A.M. and A.P. Mallarino. 1996. Cornstalk Testing to Evaluate Nitrogen Management (PM-1584). Iowa State Univ. Extension.

Brouder, S. and D. Mengel. 2003. The Pre-sidedress Soil Nitrate Test for Improving N Management in Corn (AY-314-W). Purdue Univ. Extension.

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



Colorado Supplement

to

National CSP 2014 Enhancement Activity Job Sheet: WQL04

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Criterion #2

Annual soil and organic nutrient sampling and analysis is required for systems that receive organic nutrients.

Soil tests for mineral systems that do not receive organic nutrients must be less than three years old.

Acceptable soil test labs are those that meet the requirements of the [North American Proficiency Testing Program – Performance Assessment Program](#) (NAPT-PAP).

Acceptable manure testing labs are those that meet the requirements of the [Minnesota Department of Agriculture, Certified Manure Testing Labs Program](#).

Criterion #3

Develop a nutrient management plan in a Colorado [Nutrient Management 590 Job Sheet](#), which is consistent with Colorado [Nutrient Management 590](#) planning criteria.

Criterion #4

Refer to CSU Extension Fact Sheet No. 0.116, [Plant Analysis](#), for information regarding the collection and handling of plant tissue samples.

Additional Documentation Requirements

Provide copies of Nutrient Management Plans including current soil and organic nutrient analyses, as applicable, which indicate the amount of N to be split-applied in season based on tissue sampling and analysis and or the appropriate nitrogen credit based on fall corn stalk sampling and analyses.