United States Department of Agriculture
Natural Resources Conservation Service

Water Quality Enhancement Activity – WQL04 – Plant Tissue Testing and Analysis to Improve Nitrogen Management

Enhancement Name
Use plant tissue tests to adjust nitrogen application rates.

Land Use Applicability
This enhancement is applicable on cropland.

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.

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 and to make necessary adjustments in nutrient applications. The purpose is to correlate the application of N during the growing season to plant needs. In addition, deficiencies in other plant nutrients that would restrict N uptake and utilization must also be corrected. Follow guidelines from the laboratory and local land grant university for interpretation of the results and appropriate adjustments in the application of N and other nutrients.

1. In addition to leaf tissue analysis, the following testing and analysis information is specific to nitrogen management for corn.

    - 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 Land Grant University guidelines for the use of this type of test.

- Corn leaf tissue testing and analysis
  Chlorophyll meter readings can be used to determine the nitrogen status of corn late in the vegetative growth period. This involves planting "reference strips" where 10-25% more nitrogen is applied than recommended. Then a chlorophyll meter is used to compare the reference strips with the rest of the field to determine if nitrogen is deficient. Additional late season nitrogen is applied if needed. For additional information, follow your Land Grant University guidelines for using and interpreting the results of a chlorophyll meter test.

2. Use similar guidelines for plant tissue testing for other crops that require significant nitrogen inputs.
3. Producer must have a current soil test (no more than 3 years old).
4. Nutrient application rates are within the "Land Grant University (LGU) recommendations based on soil testing and established yield goals and considering all nutrient sources.

Documentation Requirements
Documentation for each treatment area (field) and year of this enhancement describing these items:

- Test used (stalk, leaf or other plant tissue)
- Dates of test(s)
- Acres for each treatment area
- Soil test results for each treatment area
- Manure analysis results (if applicable)
- Crop yields (both yield goals and measured yield(if available))
- Amounts of all nutrients applied in each treatment area
- Plant tissue test results (including reference strips)
- Change in annual N applied due to adaptive management change per treatment area

2) A map showing where the activities are applied.

Water Quality Enhancement Activity – WQL04 – *Stalk or Leaf Tissue Tests for Nitrogen Application*

Reference: 590 – Nutrient Management

Additional information on corn stalk testing can be found at the following websites:

http://www.extension.umn.edu/projects/afe/Corn/nitrogen.html

http://www.extension.umn.edu/cropenews/2005/05MNCN40.htm

PLEASE NOTE:

1. The University of Minnesota has guidance on testing cornstalks for Nitrogen (N) sufficiency. This is an "after the fact" diagnostic tool for adjusting the next year's N management program.