

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



**Enhancement Description**

Use plant tissue tests to adjust nitrogen application rates.

**Land Use Applicability**

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.
  - a. 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.



- b. 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:

1. A map showing where the activities are applied.
2. Test used (stalk, leaf 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)
10. Change in annual N applied due to adaptive management change per treatment area



United States Department of Agriculture  
Natural Resources Conservation Service

**IDAHO ADDENDUM 2010**  
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**Additional guidance for plant tissue testing:**

The use of plant tissue testing can be used to help make the decision to apply, or not to apply, additional nitrogen. The Western Regional Extension Publication entitled “Critical Nutrient Ranges in Northwest Crops” provides useful information on critical nutrient concentrations, at various crop stages, for a variety of crops grown in Idaho. The publication discusses the importance of timing of sampling, the choice of tissues to be sampled and proper handling of samples. The information provided in this publication can be used to evaluate crop tissue tests to determine if additional nutrient applications are needed for crop productivity or quality enhancement. The publication is available at: [http://efotg.nrcs.usda.gov/references/public/ID/agron\\_tn1\\_attach.pdf](http://efotg.nrcs.usda.gov/references/public/ID/agron_tn1_attach.pdf)

For additional information on plant tissue testing recommendations for Idaho crops, refer to:

Idaho NRCS Agronomy Technical Note 54, *Plant Nutrient Deficiency for Idaho Crops*.  
[http://efotg.nrcs.usda.gov/references/public/ID/Agronomy\\_TN54.doc](http://efotg.nrcs.usda.gov/references/public/ID/Agronomy_TN54.doc)

**This activity may NOT be used with the following enhancements:  
ANM21, ANM22, SOE02**

**Potential duplicate practices:  
590 – Nutrient management - high intensity, precision agriculture**