

WATER QUALITY ENHANCEMENT ACTIVITY

WQL04 – OR Corn Stalk or Leaf Tissue Tests for N Application

The following guidance on taking and interpreting the PHNT for corn is taken from Oregon State University Extension publication EM8978-E, *Silage Corn Nutrient Management Guide-Western Oregon*, available at: <http://extension.oregonstate.edu/catalog/pdf/em/em8978-e.pdf>.

Oregon Criteria

Postharvest nitrate test

The postharvest nitrate test (PHNT) measures soil nitrate-N not used by the crop. The PHNT looks backward in time and evaluates the balance between N supply and crop N uptake. Nitrate-N accumulates in the soil when the total of applied N plus plant-available N mineralized from soil organic matter exceeds corn N uptake.

Use the postharvest test to:

- Evaluate the balance between N supply from manure and other sources and crop N demand
- Identify imbalances in N supply among fields on a farm
- Identify fields that may respond to changes in timing or amount of manure application or other agronomic practices

If fall soil nitrate-N is high, consider ways to reduce the N surplus in the future. Evaluate the overall N supply, including:

- Timing and amount of current-season application(s) of N fertilizer, manure, or lagoon water
- Plant-available N mineralized from a previous cover crop or perennial grass crop

Note that a low PHNT does not indicate that too little N was applied. Continual mineralization of N can provide enough plant-available N for a crop without accumulation of nitrate-N in the soil. Also, the PHNT does not predict the amount of plant-available N that will be mineralized from soil organic matter or crop residues in the fall.

Directions for a PHNT

Collect a soil sample to a 12-inch depth. The amount of nitrate-N in the upper 12 inches is a good predictor of nitrate-N in the rest of the soil profile, provided that nitrate-N was not moved below 12 inches by irrigation or fall rains.

Collect soil samples (15 to 30 cores per field) as soon as possible after harvest (Figure 15). Do not sample fields that received a manure application (including lagoon water) within the past 30 days. Take samples before heavy fall rains move nitrate-N below the sample depth. On medium- to fine-texture soils (loam or clay), sample before 5 inches of cumulative rainfall (after September 1). Coarse soils (sand or sandy loam) have low water-holding capacities; sample

them before 3 inches of cumulative rainfall after September 1. Sampling Willamette Valley locations before October 15 is acceptable in most years. At sites near the Oregon coast, take PHNT samples before October 1. Use Table 12 to interpret PHNT analyses.

Table 12. – Postharvest nitrate-N test interpretation following silage corn.	
Nitrate-N	Interpretation (ppm)
0-20	Acceptable. PHNT test value can be as low as 5 to 10 ppm without compromising yield.
21-45	High*
above 45	Excess*

*See EM 8832-E. *Post-harvest Soil/Nitrate Testing for Manured Cropping Systems West of the Cascades*, for ways to reduce post-harvest test values for fields treated with dairy manure.

Field research in northwest Washington (Lynden area) and western Oregon demonstrated that the pre-sidedress soil nitrate test is correlated with the postharvest nitrate test (Figure 16, page 12). A PSNT test greater than 25 or 30 ppm indicated a high probability of excess N remaining in the soil profile after harvest. In Washington, PSNT values above 40 ppm usually produced PI-INT values of more than 150 lb/a nitrate-N (0- to 24-inch depth).

Because of the correlation between PSNT and PHNT values, you may prefer to make dual use of the PSNT (1) as an indicator of whether sidedress N fertilizer is needed and, (2) as an indicator of postharvest soil nitrate-N.



Figure 15.—Obtain a soil sample immediately after harvest, to evaluate adequacy of the N application rate.

This Enhancement requires stalk or leaf tissue testing. OSU publication EM8677, Laboratories Serving Oregon: Soil, Water, Plant Tissue, and Feed Analysis, provides a list of laboratories, and is available at: <http://extension.oregonstate.edu/catalog/html/em/em8677/>

Documenting the Enhancement

- 1. A map or aerial photo showing fields where the Enhancement is applied.**
- 2. Acres for each Treatment Area (Fields).**

Field(s)	Acres

- 3. Test Used:** _____ Stalk Test _____ Leaf Tissue
- 4. Date of Test:** _____
- 5. Stalk/Leaf Tissue Test Results (attach)**
- 6. Manure Analysis Test Results (if applicable)**
- 7. Yield Goal:** _____ bushels/acre **Measured Yield:** _____ bushels/acre

8. Nutrient Application Records By Treatment Area

Fertilizer Application					
Field	Total (Gross) Applied (lbs./acre)	Formulation (%N-P ₂ O ₅ -K ₂ O)	N	Net Applied (lbs./acre) P ₂ O ₅	K ₂ O

9. Stalk Nitrate N:

Below 3500 ppm
 3500-5500 ppm
 Above 5500 ppm

Below 3500 ppm: N supply may have been inadequate or late; root limitation may have reduced uptake
3500-5500 ppm: Adequate N supply and expected yield
Above 5500 ppm: N supply excessive, late, or both

10. Based on the results above, anticipated change in next year's Nitrogen application:

Expect to Apply Less N
 No Change
 Expect to Apply More N

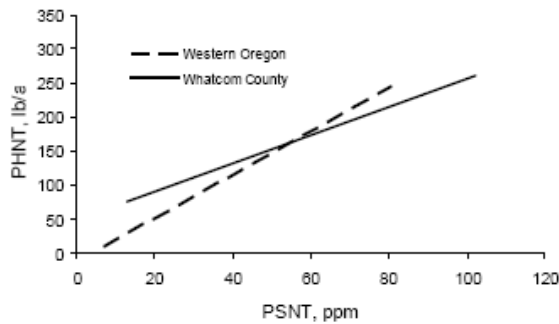


Figure 16.— The relationship between soil nitrate-N measured in midsummer (PSNT) and soil nitrate-N measured in fall (PHNT). Data represent 26 western Oregon fields and 27 sites in Whatcom County, Washington. Sampling depth for the PHNT was 12 inches in western Oregon and 24 inches in Whatcom County. At all sites, lagoon water was not applied after the midsummer (PSNT) test.

For more information

Extension publications

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Other publications

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