



IN SEASON SOIL NITRATE TESTING FOR CORN

FACT SHEET

WHY TEST

Nitrogen is one of the most important nutrients for maximizing corn yield. It is also a major contributor to the high cost of production. Nitrogen rates need to be fine tuned, not only to minimize fertilizer expense but also to prevent leaching of excess nitrogen into the ground water.

Nitrogen is a very mobile nutrient in the soil. Excessive rainfall can cause nitrate to move deep in the soil profile, where it is unavailable to the crop. In poorly drained soils, wet conditions may cause nitrate to be lost through denitrification instead of leaching. On the other hand, when normal rainfall is lacking, nitrate can carry-over from the previous season, reducing the need for nitrogen fertilizer.

The uncertainty of rainfall patterns in the eastern corn belt gives rise to an uncertainty in response to applied nitrogen fertilizer. The early season soil test is a helpful tool for managing this uncertainty. Early season sampling is late enough to reflect the effects of spring weather conditions and early enough to allow additional application of nitrogen if needed.

SAMPLING

Time: Take samples in the spring when the corn is 6-12 inches tall or at least a week before a planned sidedressing.

Depth: Samples should be collected to a depth of 12 inches. All of the interpretative guidelines presented in this fact sheet are based on 12 inch sample depth. Take at least 10 to 15 cores per sample unit.

Place: Areas having different soil types or management histories should be sampled separately. Samples should not exceed 10-15 acres. Avoid starter bands or other unusual areas.

Handling: The soil from all cores should be crushed and thoroughly mixed before a subsample is removed for analysis. Ship only a cupful of sample. Samples should be shipped immediately after collection so that they may be analyzed within 2 days. Samples may be refrigerated or dried for preservation if they cannot be shipped immediately. Do not exceed a temperature of 250 °F in drying.

Shipping: Ship via UPS or courier for best results. Moist samples sent Monday-Wednesday will arrive without weekend delays, which could affect results.

INTERPRETATION OF RESULTS

Not all states have recommended nitrate sampling programs. Interpretative guidelines for states within or adjacent to the A & L Great Lakes market area with similar growing conditions are summarized below:

INDIANA*						
Soil NO ₃ -N (ppm)	Corn Yield Potential (Bu/A)					
	80	100	120	140	160	180
	pounds additional fertilizer N to apply per acre					
0-10	75	100	125	145	170	200
11-15	45	75	100	125	145	170
16-20	30	55	80	110	125	150
21-25	0	10	35	55	80	110
>25	0	0	0	0	0	0

*AY-314-W, *The Sidedress Soil Nitrate Test for Improving N Management in Corn*, Purdue University

MICHIGAN*

$$\text{Sidedress N} = [(1.36 \times \text{yield goal}) - 27] - [\text{ppm NO}_3\text{-N} \times 6]$$

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A & L GREAT LAKES
LABORATORIES, INC.

3505 Conestoga Drive
Fort Wayne, IN 46808

Phone: 260-483-4759
Fax: 260-483-5274
lab@algreatlakes.com
www.algreatlakes.com

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IOWA*			
Corn after Soybeans and Corn after Corn:			
Recommended N Rate (lb. N/acre) = (Critical N Concentration ¹ - ppm NO ₃ -N) x 8			
Manured ² Soils and Corn after Alfalfa:			
Grain and Fertilizer Prices	Soil Test Nitrate ppm NO ₃ -N	Recommended N Rate (lb. N/acre)	
		Excess Rainfall ³	Normal Rainfall
Unfavorable (1 bu. Corn buys 7 lb. of N)	0-10	90	90
	11-15	0	60
	16-20	0	0 ⁴
	>20	0	0
Favorable (1 bu. Corn buys 15 lb. of N)	0-10	90	90
	11-15	60	60
	16-25	0	30
	>25	0	0

* Pm-1714, *Nitrogen Fertilizer Recommendations for Corn in Iowa*, Iowa State University

¹ A critical concentration of 25 ppm NO₃-N is appropriate in absence of additional information. Reduce the critical concentration by 3-5 ppm if rainfall is more than 20% above normal amount between April 1 and time of soil sampling.

² A field should be considered manured if animal manures were applied with a reasonable degree of uniformity since harvest of the previous crop or in 2 of the past 4 years.

³ Rainfall should be considered excess if rainfall in May exceeded 5 inches.

⁴ Addition of 30 lb. N/acre may have no detectable effects on profits, but producers could reasonably elect to apply this rate.

PENNSYLVANIA*	
N Recommendation ¹ (lb N/acre) = Expected Yield - [History Factor ² x ppm NO ₃ -N]	

* Agronomy Facts 17, *Pre-sidedress Soil Nitrate Test for Corn*, Pennsylvania State University

¹ If the soil nitrate level is greater than 20 ppm NO₃-N, the N recommendation is zero.

² History Factor =

Manure Since Last Harvest	+ Previous Crop	+ Manure History Past 3 Years
None = 0.75	Corn or other = 0.00	None = 0.00
Any = 3.50	Soybeans = 1.00	Any = 1.75
	Forage Legume = 3.50	

WISCONSIN*		
Soil Nitrate ppm NO ₃ -N	Soil Yield Potential ¹	
	Very High/High	Medium/Low
	N Application Rate (lb. N/acre)	
>20	0	0
18-20	60	40
15-17	100	40
13-14	125	80
11-12	150	80
0-10	160 ²	120 ²

* UWEX A3630, *Wisconsin's Pre-sidedress Soil Nitrate Test*, University of Wisconsin

¹ UWEX publication A2809, *Soil Test Recommendations for Field, Vegetable and Fruit Crops*.

² No adjustment made to corn N recommendations.