

Soil Nutrient Analysis Laboratory

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SOIL TESTING TO IMPROVE NITROGEN MANAGEMENT FOR CORN

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This fact sheet is primarily for corn producers who presently do not use the June nitrate test. The fact sheet provides general information about the test and provides suggestions about the best way to begin using the test. The information is organized around the most commonly asked questions about the test.

IS THERE A SOIL TEST FOR NITROGEN FOR CORN?

Yes. The test, known as the **June nitrate test** or the **preside-dress nitrate test**, was developed in the mid-1980s, and it is the first soil test for N in humid regions like New England.

HOW DO I USE THE JUNE NITRATE TEST FOR CORN?

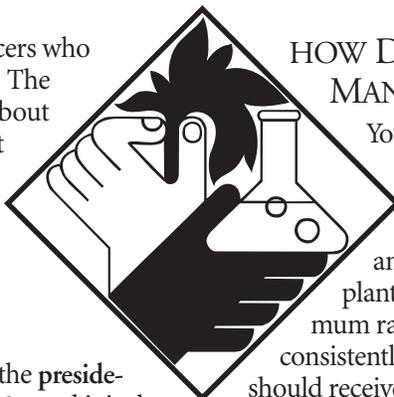
Soil samples are collected from the surface foot of soil when corn is 6 to 12 inches tall (measured from the ground surface to the center of the whorl). The samples are mailed or hand-carried to the Soil Testing Laboratory at the University of Connecticut, and N fertilizer recommendations are sent within 24 hours by FAX to producers.

HOW DOES THE TEST WORK?

The test is based on concentrations of nitrate-N ($\text{NO}_3\text{-N}$) in the soil sample. When the soil nitrate concentration is greater than 25 ppm, the probability of increased yield from N fertilizer applied to the field is very low. The test provides an indication of how much N will be available to the crop during the growing season. Because it measures nitrate in the soil immediately before the corn plant requires it, the test minimizes the uncertainty inherent in older methods used to make fertilizer recommendations. For example, it is not necessary to know the rate of manure application, when the manure was applied, how quickly it was incorporated or what its N content was.

WHY USE THE JUNE NITRATE TEST?

You should use the test to optimize your nitrogen management for corn. Optimization denotes a process of using the test for several years at a field to gradually improve your N management. This will save you money on fertilizer and make better use of your manure. You also will decrease the potential for nitrate contamination of ground and surface waters.



HOW DO I OPTIMIZE MY NITROGEN MANAGEMENT BY USING THE TEST?

You have to keep a record of the test results for several years. You will probably find that some fields test consistently in the **excess range** (greater than 30 ppm). Gradually reduce the amount of manure or N fertilizer applied before planting to these fields so that they test in the optimum range (20 to 30 ppm) in the future. Fields that consistently test in the **deficient range** (less than 20 ppm) should receive more manure or fertilizer before planting so that these fields test in the optimum range in the future.

After several years, you will probably find that the amount of N fertilizer recommended by using the test varies from year to year even though your N management has not varied. This is different from N recommendations that are based on yield goal. Yield goal based recommendations are consistent from year to year if the yield goal and N management have not changed. Yield goal based recommendations also are typically higher than recommendations derived from the soil test. The two recommendation systems are not in conflict. The soil test recommendation is usually lower and more accurate because it is based on site-specific information, while recommendations without the soil test are higher and less accurate because they are based on average N response data with a large fudge factor build in to insure against underfertilization.

I BELIEVE THAT I AM ALREADY OPTIMIZING MY NITROGEN MANAGEMENT.

It is extremely difficult to optimize your N management without having the information provided by the soil test. The test will provide you with previously unavailable information about the N status of fields immediately before corn begins removing large amounts of N from the soil. This information enables field-specific adjustment of N rates toward optimum.

ARE THERE OTHER REASONS TO USE THE SOIL TEST?

Yes. The soil test provides you with the ability to detect excess applications of N. You have never had this ability before. You have always had the ability to detect N deficient corn: the plants were stunted with yellow leaves. But corn plants will not show any visible signs of excess N



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applications. This means that corn plants that have received excess N, from manure or fertilizer, look identical to plants that have received optimum amounts of N.

ARE EXCESS APPLICATIONS OF N COMMON?

The results of corn producers' use of the June nitrate test since 1988 suggest that many producers unknowingly apply more N than needed. This is understandable because corn plants grow equally well when supplied with profitable or unprofitable rates of N. The soil test results from 1994 are typical: 62% of the fields tested required no topdress fertilizer, and 25% of the fields had more than double the amount of soil nitrate required for maximum yield.

DO I NEED TO SIDEDRESS TO USE THE TEST?

No. Corn producers who do not sidedress can use this test to obtain feedback on their N management. The feedback shows where improvements are needed and enables optimization of N management for the next crop. Producers who normally sidedress can use the test to adjust N rates for all factors (rainfall, temperature, etc.) affecting soil nitrate concentrations in late spring.

HOW SHOULD I START USING THE TEST?

The June nitrate test is a new technology, and corn producers are advised to adopt it gradually. A good way to assess the benefits of using the test is to compare yields on strips fertilized by using the soil test with yields on strips fertilized by

using the producer's normal N rate. The two types of fields where the test has the greatest probability of saving money are listed below.

1. Fields that are manured frequently and receive N fertilizer.

Manured fields typically test high in nitrate and require little or no N fertilizer. Use of the test on long-time manured fields usually shows that applications of N fertilizer on such fields is an unnecessary expense.

2. Fields that are manured frequently and receive no N fertilizer.

If you don't normally apply N fertilizer to manured fields, the results of the soil test can provide useful information about your manure management. Soil nitrate concentrations that are consistently too high (especially fields testing greater than 40 ppm) indicate that excessive amounts of manure have been applied. Applying some of this manure to another field that consistently needs N fertilizer would be profitable. The reduction in fertilizer cost should more than pay for the extra expense of hauling the manure (assumes the excess manure has to be hauled a greater distance, if not then the savings would be greater). Use of the soil test sometimes indicates that N fertilizer should be applied to manured fields. The greatest profit would occur in this situation if the recommended fertilizer results in increased yield.

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