

## Identifying Opportunities to Improve Soil Fertility on Your Farm

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Today's high production costs and environmental concerns make it more important than ever to identify and address factors that limit crop yield, quality and profit on your farm.

Agro-One Agronomy Services can help you pin point opportunities to improve the balance of essential plant nutrients that are so critical to optimum crop performance by testing your soil, manure and plant tissue samples. This is crucial since you need to get the most out of all of your inputs including fertilizer, seed, crop protectants and the time you invest in planting and harvesting your crop.

### Keep nutrients in the proper balance

Testing the soil is probably the best place to start. If you took a basic soils course in college, you probably learned about Justice von Liebig's Law of the Minimum which states that crop yield is determined by the plant nutrient that is most limiting. In other words, plant growth will be limited by the nutrient present in the smallest amount even when all other plant nutrients are adequate.

Agro-One Agronomy Services offers a number of tools to manage soil fertility on your farm;

#### State Specific Soil Test Packages and Nutrient Guidelines

Agro-One offers soil test packages and nutrient guidelines to meet the diverse needs of commercial crop producers and homeowners here in the Northeast. New York customers also have the option of an Agro-One analysis with Cornell recommendations. Testing every 2 to 3 years for stable nutrients like phosphorus (P) and potassium (K) is highly recommended.

#### PSNT Soil Test

For mobile nutrients like nitrogen, Agro-One offers an in season pre-sidedress nitrate test for field corn and annual vegetable crops to help you make nitrogen sidedress decisions in season.

#### CSNT Plant Tissue Analysis

A late season Corn Stalk Nitrate test, taken shortly before or immediately following harvest, can be used to assess your overall nitrogen management program so adjustments can be made the following season.

For more information on soil testing, manure analysis, or plant tissue analysis contact the Agro-One Soils Lab in Ithaca, New York at 800-344-2697 or www.dairyone.com

If you would like help with soil management or crop production on your farm contact Agricultural Consulting Services (ACS) at 800-540-8716 or www.acscrops.com

Justice von Liebig was on the right track way back in the mid 1800's and this concept is still being used in nutrient management and crop production today. However, we now know that many other factors including soil physical and biological characteristics are just as important as the soil's chemical composition. Some of these were discussed by Patty Ristow in the last issue of the Dairy One Improver [http://www.dairyone.com/Publications/Improver/2013/July2013\\_ImproverPage\\_web.pdf](http://www.dairyone.com/Publications/Improver/2013/July2013_ImproverPage_web.pdf)

Back to testing the soils chemical composition. Soil testing is a required component of nutrient management plans for many commercial farming operations and is highly recommended for all crop enterprises wishing to optimize crop yield and profit.

It is necessary because soil fertility changes over time for a number of reasons including; soil type, tillage, crop removal, use of nitrogen fertilizers that can acidify the soil, precipitation, flooding, erosion and addition of chemical or organic amendments such as animal or green manures to name a few.



Eric Jensen, planner with the Skaneateles Lake Watershed Ag Program reviews an Agro-One soil test report.

### TEST – DON'T GUESS

Testing the nutrient content of your soil is the only way to determine if essential plant nutrients are present in the right balance. It is also the best way to develop a strategy to keep those nutrients in the right balance

while avoiding costly over or under application of nutrients. Maintaining soil pH in the optimum range is also important to optimize the availability of essential plant nutrients.

An agronomic soil test extracts a portion of the plant available nutrients (phosphorus, potassium, calcium, magnesium, zinc) contained in a soil sample and results are then classified as low, medium, high or very high based on expected crop response to added crop nutrients. Crops grown on soils that test high to very high for a specific nutrient are not likely to respond with a yield increase if that nutrient is applied to the soil. However, soils testing low or medium are likely to show improved yield and quality if that nutrient is applied (provided other nutrients are present in adequate amounts). Soil organic matter, soil pH and buffer pH are also tested to fine tune nitrogen requirements for the crop and the amount of limestone needed to bring the soil pH into the optimum range.

### MANURE ANALYSIS

Likewise, determining the N, P, and K content of manure provides information regarding its fertilizer value. Using this information in conjunction with a soil test is necessary in the development of nutrient management plans in accordance with state and federal regulations. This helps ensure efficient and effective application of manure to fields where it will provide the most value to the crop at the lowest risk to the environment.

### PLANT TISSUE ANALYSIS

Historically, plant tissue analysis has been used on higher value fruit and vegetable crops. It is becoming an increasingly important tool for field crops as well as farmers strive to improve their crop yields and fertilizer efficiency. The CSNT test is one example of that.

The late season Corn Stalk Nitrate Test, or CSNT, is used as a "report card" if you will. It tells the farmer if the nitrogen fertility program provided too much, too little or just enough nitrogen to grow the current crop.

The CSNT test can be used for silage or grain corn. Stalk samples can be collected up to 7 days prior to harvest until 5 days after harvest. The sampling procedure is slightly different for pre-harvest samples vs. post harvest samples.

**Before harvest**, an 8 inch portion of each stalk is collected between 6 and 14 inches above the ground. If sampled **after silage is harvested** and stubble height is less than 14 inches but greater than 8 inches, stalk samples can be taken between 2 and 8 inches off the ground. This alternative cutting height must be reported to the lab when submitting CSNT samples since stalk nitrates will be more concentrated lower in the stalk and a conversion factor is needed for test results to be comparable to the NY interpretive scale.

It is recommended that samples represent no more than 15 acres with at least one stalk sub-sample per acre. It is important to sample areas that differ in management or soil type separately. Each stalk segment is split into 4 parts lengthwise. One quarter is saved and combined with other sub-samples taken in the field. (That means a 15 quarter stalk sample makes up ONE composite sample representing 15 acres of corn) It is important to avoid soil contamination of the stalk segment. Samples are then placed in a paper bag to allow the sample to air dry and shipped to the lab within 24 hours after they are collected.

CSNT results are reported as PPM N –NO<sub>3</sub> (Nitrate N) where;

- LOW** = < 250 ppm N –NO<sub>3</sub>
- MARGINAL** = 250 – 750 ppm N –NO<sub>3</sub>
- OPTIMAL** = 750 – 2000 ppm N –NO<sub>3</sub>
- EXCESS** = > 2000 ppm N –NO<sub>3</sub>

Armed with this information, farmers can adjust their nitrogen management for the following year to improve crop performance, save money and minimize loss to the environment.

### Consult with a Certified Crop Adviser

Once you know the concentration and balance of nutrients in your soil, you need to consider the crop to be grown and set a realistic, yet challenging yield goal to determine the quantity of supplemental nutrients needed to produce that crop. It is important to factor in all of the nutrient sources available including those coming from a prior legume crop or sod, manure or commercial fertilizer as well as utilize PSNT or CSNT tests to fine tune your nitrogen management. Planting date, time and method of fertilizer or manure application, and fertilizer placement should be considered as well.



CSNT samples can be taken up to 7 days before harvest from 6 and 14 inches above the ground or after harvest from 2 to 8 inches above the grounds.