

Agronomy Notes

Capital Region Extension Agronomy Team

Edited by Jeffrey Graybill and Tina Gross

Extra Edition

June 2006

Nitrogen Management: Residual N from Soil Organic Matter and The Leaf Chlorophyll Meter

With the high cost of fertilizers- particularly Nitrogen, growers will want to credit all sources of N on the farm. This would include previous legume crops, recent manure applications, and an often unmentioned source: the soil organic matter's nitrogen supplying ability. A well managed, healthy soil with frequent manure applications has the ability to supply significant quantities of N to a growing corn crop. In fact, the largest "pool" of N in the soil is contained in soil OM. Organic matter mineralization begins as soils warm in April, and increases with temperature throughout the growing season.

According to the Penn State Agronomy guide, up to 25% of the total N from past applications of dairy manure (manure applied 9 of last 10 years) will be available for crop growth. This is in addition to the N from the current seasons manure application. For example, the mineralization of the organic matter from annual applications of 8,000 gallons of dairy manure (average analysis 28 units N) will result in 56 units of residual N available to a growing corn crop. Now, we add to this the N supplied in this seasons manure. This would be 28 units N per 1,000 gal. x 8 (1,000 gal. units) x .35 (35% available N with some incorporation) for another 78 units of N. We now have a total of at least 134 units of N available to the corn crop. Current research is finding that, if anything, this is a conservative estimate. Soil management practices that help to conserve and build soil organic matter such as no-till and conservation tillage may supply even more nitrogen to a growing corn crop.

How do I know if soil mineralization will supply some or all of my crop needs? Penn State, in cooperation with local conservations districts, crop scouts and others, has been field testing a leaf chlorophyll meter. Chlorophyll is composed of proteins and other nitrogen containing compounds. The meter instantaneously measures the "greenness" of 6-leaf corn. Growers can learn to use the chlorophyll meter with minimal training. Nitrogen deficiencies discovered when using the meter can be corrected in season by side dressing the appropriate amount of N.

The meter's use is limited to fields that will have high organic N supplying ability such as the first year after alfalfa and/or frequently manured fields. It's easy and quick to use. Thirty random plants, representing a cross-section of the field, are measured on the 5th leaf. The meter automatically averages the readings and displays a numerical value. The following table is used to determine whether a field needs sidedress N.

*Leaf Meter*

BETTER CROPS AND PROFITABILITY

PENNSTATE



an **OUTREACH**
program of
the College of
Agricultural
Sciences

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112 Pleasant Acres Road
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Average meter reading	< 42.0	42.0 to 45.9	= or > 46.0
N Recommendation	Sidedress 80 lb N/ac	Test again or Sidedress 50 lb N/ac	No sidedress N needed

In order to use this tool you must be willing to:

- 1. Limit commercial starter N to 15 lbs or less.**
- 2. Delay all additional nitrogen application until sidedress time.**
- 3. Use the leaf meter to measure the nitrogen status of each field.**
- 4. Apply any recommended nitrogen in a sidedress application.**

Delaying application of N not only allows you to use the meter (or the PSNT: Pre-sidedress soil nitrate test as well) but, just by delaying the application of your N, you will have consistently better nitrogen use efficiency. Banding a liquid UAN solution between the rows will give you most of the same benefit as incorporation and will be applied much closer to the time when the crop actually needs the bulk of the nitrogen. An additional advantage of sidedressing N is that the timeliness of the application means that leaching and other environmental losses of nitrogen are frequently reduced.

Of the farms that participated last year, very few were found to require additional nitrogen. The test is ideal for those high fertility fields where you suspect that nitrogen mineralization from manure and soil organic matter is sufficient to meet crop needs.

Many county Extension and Conservation District offices now have chlorophyll meters. Check with your local offices. In some cases, you can sign out a meter and receive training to use it. In many offices, staff will be available to assist in using this tool on your farm or with a client. Meters will be available on a first come basis, so call several weeks ahead to get your name on the list to insure that a meter will be available when you need it.

**Jeffrey Graybill, CCA
Lancaster County**



Field Use of Leaf Meter

Leaf Meter Contact Information by County:

Adams:

Conservation District: Tracy Hefelfinger – 717-334-0636 Ext. 305

Cumberland:

Penn State: John Rowehl - 717-240-6500 for evaluation and verification field trails

Conservation District: Amy Skvarka - 717-240-7812 both PSNT (no charge) & meter available

Dauphin:

Penn State: Paul Craig - 717-921-8803

Conservation District: Larry Baum - 717-921-8803

Lancaster:

Penn State: Jeff Graybill - 717-394-6851 or Axel Linde - 717-529-6963

Lebanon:

Penn State: Del Voight - 717-270-4391 to sign out a unit

Conservation District - 717- 273-3908 or Dick Moore – 717-273-2168 for assistance in using the meter

York:

Conservation District: Wendy Kindig – 717-840-7430