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Cover Crops

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INTRODUCTION

Cover cropping is not a new technique; the Latin poet Virgil authored the tome Georgics around 29 BCE, which mentioned the use of legumes (alfalfa, clovers, and lupine) for increased wheat yields. Recently there has been renewed interest in cover crops and soil health. Benefits to cover crops include:

- reducing soil erosion,
- conserving soil moisture,
- increasing water infiltration rates and thus water quality from runoff,
- may cut fertilizer costs,
- may reduce the need for herbicides and other pesticides,
- may increase yields,
- increasing organic matter which increase soil structure and health in no till systems.

There may also be disadvantages to implementing cover crops including extra cost and management along with difficulty in planting of the primary crop.
Waypoint Analytical offers different analyses dealing with cover crops from establishment through measuring microbial activity of an established system.

Cover Crop Establishment

Soil fertility is an important consideration in any cropping system. Having a reliable soil test that determines soil pH and the nutrient limitations of a soil is a good way to begin the planning process. If certain nutrients are limiting, follow the soil test recommendations for the primary crop, keeping in mind that high fertility also will maximize cover crop growth (Curran et al., 2006). Microbes are sensitive to soil chemistry as well. Most soil bacteria need a pH of between 6 and 8 to perform at peak; fungi (the slow decomposers) are still active at very low pH. Soil microorganisms also need most of the same nutrients that plants require, so low-fertility soils support smaller populations of primary decomposers, compared with high-fertility soils. Don't expect N release rates or fertilizer replacement values for a given cover crop to be identical in fields of different fertility (Clark, 2012).
Within-field nutrient variability causes some areas of a field to be more or less responsive to fertilization. The best soil sampling and fertilization strategies are those that best estimate and apply economic optimum fertilizer rates across a field (Mallarino and Wittry, 2000). Intensive grid or zone soil sampling should optimize the yield, soil

health and environmental benefits of a cover crop system by addressing site specific problems before establishment.

Plant Available Nitrogen Calculations

To find out if you might need more nitrogen (N) than your green manure will supply, you need to estimate the amount of N in your cover crop. To do this, assess the total yield of the green manure and the percentage of N in the plants just before they die. To estimate yield, take cuttings from several areas in the field, dry and weigh them. Use a yardstick or metal frame of known dimensions (1 ft. x 2 ft., which equals 2 ft2 works well) and clip the plants at ground level within the known area. Dry them out in the sun for a few consecutive days, or use an oven at about 140° F for 24 to 48 hours until they are "crunchy dry." Use the following equation to determine per-acre yield of dry matter:.

$$C = \frac{A}{B} \times \frac{43{,}560 \text{ sq. ft.}}{1 \text{ Acre}}$$

A= Total weight of dried samples (lb.)
B= Square feet you sampled
C= Dry yield in lb/Acre

Once a dry matter yield is determined, the next step is to determine the percent N of the cover crop. Chop up enough of the cover crop to fill a gallon freezer bag and request a percent N test on the submittal form. Take the percent N number from the lab and use the following equation to figure total N in the cover crop:

Table 1. Tennessee Soil NO_3-N Interpretation Guidelines for Fields Yielding 125 to 175 Bu/Acre or 15 to 25 Tons Silage/Acre.

NO_3-N *ppm*	Soil Test Rating	Possibility of a yield response with additional nitrogen
< 17	Low	High
17-24	Medium	50%
25 +	High	Low

Table 2. Tennessee Soil NO_3-N Interpretation Guidelines for Fields Yielding More Than 175 Bu/Acre or More Than 25 Tons Silage/Acre.

NO_3-N *ppm*	Soil Test Rating	Possibility of a yield response with additional nitrogen
< 35	Low	High
35-46	Medium	50%
47 +	High	Low

Table 3. Recommended Rates of Nitrogen to Sidedress (*Lbs/Acre*) in Tennessee and Northern Alabama.

NO_3-N *ppm*	Maximum Yield Potential Grain/Silage			
	125 bu/ 15 tons	150 bu/ 16-18 tons	175 bu/ 19-25 tons	175+ bu/ 25+ tons
<10	60-120	75-150	90-180	120-180
10-16	40-60	50-75	60-90	90-120
17-24*	0-40	0-50	0-60	60-90
25-34	0	0	0	40-60
35-46**	0	0	0	0-40
47+	0	0	0	0

* Medium soil test for fields with yield potentials of 125-175 bu grain/acre or 15-25 tons of silage/acre.
** Medium soil test for fields with yield potentials of +175 bu grain/acre or +25 tons of silage/acre.

Table 4. Interpretation Guidelines for Soil NO_3-N Results in Virginia.	
NO_3-N *ppm*	Interpretation
< 11	Apply full rate of sidedress N to meet the realistic yield goal.
11-20	Use specific field history, knowledge of organic N amendments, and management practices to decide how much sidedressed nitrogen fertilizer to apply. Normal sidedressed applications may possibly be reduced by 25-50%.
20 +	No sidedressed nitrogen is needed.

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