NEWS REPORT

A & L GREAT LAKES LABORATORIES, INC. SPRING 2007

Refrigerated Storage Increased

Proper sample storage is a concern for all laboratories. For example, compost and manure samples should be refrigerated while in the laboratory to assure sample quality doesn't degrade. Due to increasing sample volume, we recently added a new walk-in cooler, doubling our refrigerated storage capacity. This gives us room for future growth while maintaining quality throughout the entire process.

Storage Expansion

Sample volume has been steadily increasing in our environmental and agricultural divisions. With growth comes the challenge of dealing with the various aspects of increased sample numbers.

We recently completed an addition to our building to improve sample supply storage capacity and handling. More samples coming in to the lab results in more supplies (sample bags, bottles, etc.) needed to process those samples.

Staying In Touch

Many of our customers enjoy the convenience and timeliness of data and reports received by e-mail.

In order that we may provide you with consistent service, please notify us when there are any changes to your e-mail address or when you have difficulties receiving e-mail from the lab, so that any issues can be quickly resolved.

A&L Great Lakes Labs has the flexibility to provide data in many different formats. If you have a special need to receive data in a particular format, we can help. Additionally, SampleTrak status notifications let you know when we receive samples at the lab and when results can be expected.

If you are not currently enjoying the benefit of receiving status notifications or would like to discuss your data format needs, contact one of our office staff and we will be glad to assist you.

Biosolids & Soil Quality

Management practices play an important role in the maintenance and improvement of soil quality. Soil quality refers to the physical, chemical and biological status of a soil; the better the quality of the soil, the greater the potential for high crop yields.

One way that soil quality can be improved is by increasing soil organic matter with the addition of materials such as biosolids. Biosolids are also a good nutrient source, adding nitrogen and other nutrients to the soil.

When biosolids are included in a good management program, grain yields and the amount of crop residue increase. As crop residue increases, soil organic matter levels often increase. Crop residue also reduces wind and water erosion, reducing the loss of organic matter and nutrients.

Considering the current cost of fertilizer, biosolids are an economical option to add plant nutrients to soil while providing benefits to improve soil quality. Biosolids utilization can play an important role in the maintenance and improvement of soil quality by reducing erosion, adding nutrients and building organic matter.

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Biofuel Production:
Soil & Nutrient Aspects

Increasing corn acreage will make more grain available for biofuel production, but at what cost? Switching beneficial crop rotations such as corn / soybeans to continuous corn can provide more corn annually, but with lower yields over time. Economic model analyses show that farms actually have to produce 20% more yield in continuous corn than in corn / soybean rotations to remain profitable due to higher inputs of fertilizer, pesticides, and fuel.

As cellulosic ethanol production becomes more efficient, crop residue removal will become more attractive to farmers. Obviously changes will need to be made in harvesting equipment and the storage and transportation of materials. Farmers will need to implement some changes in their management practices to efficiently supply these base materials needed for biofuel production, but not at the risk of mismanaging their soils.

Through soil erosion models (RUSLE), it is estimated that up to 30% of crop residue can be removed from many no-till fields without risking topsoil removal. For a corn crop, this would allow removal of 5,000 lbs/acre, leaving 2,000 lbs/acre of crop residue behind. Plant available nitrogen would likely increase in the short term, since less residue is present to immobilize nitrogen. Since the breakdown of corn roots contributes more to soil humus than stover, organic matter levels should not be greatly affected. Fine textured, poorly drained fields can actually benefit from some residue removal. Moldboard plowing in these soil types has shown to increase continuous corn yields. Residue removal should not take place on fields where erosion is known to be a problem.

Removal of even some crop residue will affect soil fertility levels since many nutrients remain in the fodder, which are traditionally returned to the soil through decomposition. Less crop residue will also affect available soil moisture since residue reduces evaporation. Microbial and earthworm activity may also be reduced with less residue and possibly drier soil conditions.

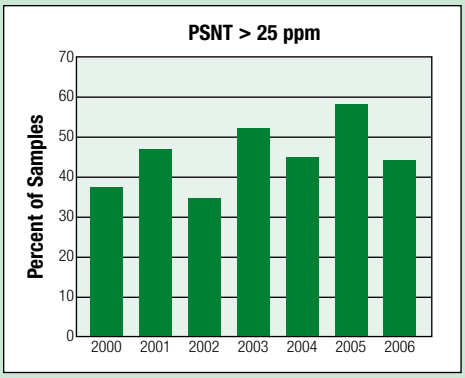
Proper consideration should be given as to which fields will have residue removed and how much can be harvested. Removal rates should be decreased in warmer, more humid climates and for crops with a lower C:N ratio, lower yielding crops, and coarse textured soils. Since residue insulates soil over the winter, stover should be left upright in colder climates providing higher winter soil temperatures and earlier spring thawing. Additional management practices such as contour cropping, conservation tillage, and cover crops will become more important as more crop residue is harvested.

The evolution of integrating energy crops into efficient farming practices will be very complex. New research and innovations may help address some of the current challenges, but good stewardship of the land should not be forgotten.

Timing of PSNT Sampling

Use of the pre-sidedress nitrogen test (PSNT) continues to increase, driven by increased N fertilizer prices and more intensive nutrient management practices. We periodically summarize and evaluate our PSNT results to see if we can glean helpful information.

One significant trend is that the percentage of samples with a PSNT greater than 25 ppm, the level above which no additional N is needed, fluctuates from year to year (see chart). For example, 58% of PSNT samples in 2005 tested higher than 25 ppm while 46% exceeded 25 ppm in 2006. Also note the fluctuation in other years.



We attribute this to soils being significantly cooler prior to sampling in 2006 than in 2005. Nitrogen found in a PSNT sample will primarily be that mineralized from organic matter, manure and other organic materials. When soil temperatures are in the 50-60° range microbial activity is minimal. Last spring (2006) was cool and moist prior to planting and on through emergence, while in 2005 soils warmed up in early April and remained so. In 2006 we also noted that PSNT results trended higher with later sampling.

Traditional instructions indicate that PSNT sampling should be done when corn is 6-12 inches tall. Based on our observations and discussion with others, we suggest that PSNT sampling be delayed when soil temperatures are unusually cool or there is excessive moisture. Either of these environmental conditions will result in delayed N mineralization. Sampling too soon will likely underestimate soil N available to the crop. Refer to our Fact Sheet # 18 for more information on the PSNT.

Lime Quality & When To Apply

Agricultural lime quality is usually measured by three characteristics:

1. Purity - commonly expressed as calcium carbonate equivalent (CCE)
2. Particle size – finer particles react more quickly to raise soil pH
3. Moisture – don't buy, transport and spread too much water

Lime is finely ground rock containing high levels of calcium carbonate ($CaCO_3$) and magnesium carbonate ($MgCO_3$). It is actually the carbonate (CO_3^-) in lime that reacts with acidity (hydrogen) to increase soil pH. Calcium and magnesium in lime, in addition to being essential plant nutrients, exchange with hydrogen (H^+) held on cation exchange sites, moving H^+ into soil solution where it can be neutralized by carbonate.

Particle size determines how quickly lime will dissolve and react in the soil. Generally, 40-50% of the particles in a good quality liming material will pass through a 60-mesh sieve.

States in this region have different lime quality systems, with state-specific terminology and measurements. A & L Great Lake's Fact Sheet #6, *Adjusting Lime Rates*, provides details on how to make adjustments. A & L Great Lakes has also developed a spreadsheet which outlines the various state systems and helps adjust rates for a particular liming material. Contact the lab if you would like to receive a copy of either.

This winter there are still piles of lime in farmer fields waiting to be spread, since the weather didn't cooperate this past fall. The purity and particle size of lime in a pile will not change. Since lime needs time to dissolve and react, 4-6 months minimum, to significantly change soil pH, it is important to get stockpiled lime spread as soon as possible to benefit during the upcoming season.

Corn

Starter Fertilzer and Placement

How important is fertilizer placement? Which is better for corn, pop-up or starter? What is the right rate? Should I use an NPKS formulation or 10-34-0? Can I apply all my P and K requirements in the row? Will I get a benefit from starter even when I have high soil test levels? There are many questions, with the right answer often being specific to the operation, and even the season.

Various fertilizer placement positions have been tried over the years, with each having pros and cons. Pop-up fertilizer is applied directly in the seed slice. Traditional starter fertilizer is usually applied 2x2, 2 inches below and 2 inches to the side of the seed. Another placement that has been tested recently is 2x0, where fertilizer is dribbled on the soil surface 2 inches from the row.

Some research has shown pop-up fertilizer to be risky. With pop-up placement there is potential for direct fertilizer contact with the seed, increasing risk of crop injury. Fertilizer applied directly to the seed can have a desiccating effect. Problems usually occur when the fertilizer salt index or application rate is too high, and can be exaggerated when soil moisture is low.

Corn has a fibrous root system well suited for a 2x2 placement of starter fertilizer. Most research shows that starter fertilizer is more effective when there is adequate moisture and there is soil between the seed and fertilizer. Higher rates of fertilizer can be applied with greater distance from the seed. However, beneficial starter effects may be reduced or lost with placement greater than 2 inches.

Regardless of starter placement, make sure that the rate is not excessive. Table 1 provides guidelines for maximum starter fertilizer rates for various soil type and placement situations.

Starter fertilizer offers significant benefits if the placement and rate are properly managed. Contact us if you need more information on starter fertilizer use.

Table 1. Maximum Pounds of N + K_2O + S Applied as Starter

Placement in 30" Rows	Fine Textured Soils	Sandy Textured Soils
In contact with seed	5 - 8 lb/ac	5 lb/ac
1/2" from seed	7 - 15 lb/ac	8 lb/ac
1 - 2" from seed	20 - 40 lb/ac	15 lb/ac
> 2" from seed	40+ lb/ac	20+ lb/ac

It's Hard To Say Goodbye

A & L Great Lakes Laboratories considers long term employee retention to be a strategic advantage. Over half of our employees have at least ten years of service with the company, so we've never gotten comfortable with saying goodbye, even when our co-worker is ready to retire and enjoy "the good life".

In 2006 we celebrated the retirement of four good friends: Debbie Hohla, Gary Elliott, Myron Warner and Jerry Hohla. While we were expecting Gary and the Hohlas to leave us, Myron's departure came as a surprise. Myron and his wife, Sally, had decided it was time to start planning for their retirement, and they put their Ohio house on the market. The house found a buyer almost immediately, and Myron and Sally took this as a sign that they should leave their beloved Buckeye state behind (even in the midst of a fabulous OSU football season) and move to sunny South Carolina. Both Sally and Myron plan to continue to work while they build their dream retirement home, so we know they will keep busy.

We feel very lucky to have had Myron, Gary, Debbie and Jerry as part of our A&L Family, and we wish them all the best as they experience all of the pleasures that retirement brings.

Regrowth of Fecal Coliform in Biosolids

Wastewater treatment plants use various types of digesters to treat wastewater sludge in order to kill disease-causing organisms (pathogens). In a recent study of wastewater treatment plants, results indicated that fecal coliform may reactivate in the sludge following certain treatment processes. This study collected biosolids samples from seven wastewater plants and four of those plants indicated bacterial reactivation. The study did not determine the mechanisms for reactivation or regrowth.

There are over 16,000 wastewater treatment plants in the U.S. When a wastewater treatment plant creates biosolids, an analysis is performed to determine the concentration of fecal coliform bacteria in the material. The concentration of fecal bacteria is then used as an indicator of bacterial pathogens.

Wastewater plants test for the presence of fecal bacteria to assure compliance with U.S. EPA federal regulations that govern the biosolids use and disposal. (Title 40 of the Code of Federal Regulations, Part 503). Biosolids treated using aerobic or anaerobic digestion, air drying, composting, or lime stabilization are processes considered to be Class B with respect to pathogen destruction.

Additional treatment options are needed to achieve Class A pathogen reduction. These processes further reduce pathogens and, if the material meets Class A standards, it is considered safe from a public health and environmental standpoint.

A more extensive follow up study on bacterial regrowth was begun in 2006 to better understand the nature and extent of this phenomenon. Based on the results of this second research study, new actions for treatment might be proposed for wastewater treatment facilities. The final report on this study is due in the spring of 2007. Detailed information on this study can be found at the Water Environment Research Foundation (WERF) web-site, www.werf.org.

It is important to note that practices for the use of biosolids as an agricultural fertilizer are based on decades of ongoing research. Site restrictions required by EPA and state regulations continue to provide multiple layers of protection for human health and the environment. If you have any questions on fecal coliform analysis, give A & L a call and we will be happy to assist.

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