The Soil Probe

Volume 1, Issue 12 Winter/Spring 2011

LOGAN LABS SOIL TESTING & CONSULTING SERVICES

Contents:

Updates from the Director

We have been busy increasing our sample throughput capabilities. We have purchased another discreet analyzer to perform nitrate and ammonium analyses. We have also purchased another Inductively Coupled Argon Spectrophotometer (ICP). This instrument is the brains of our laboratory. Every soil, water, and plant tissue sample that we receive is run through this instrument. The new model is a bench top instrument. Our first ICP sits on the floor and is about 4 times bigger than the new ICP.

The new instrument can run a sample through in 20 seconds. We have been running 1 minute per sample on our first instrument. We will be operating both instruments daily. This will definitely help keep our turnaround time short.

We are also increasing our tissue digest throughput. Tissue testing has gained a lot of popularity over the last 2 years. We have made an adjustment to our tissue report. We have omitted the Al result and replaced it with Na. We have had several clients show an interest in Na. We were seeing a lot of Al contamination from soil on plant tissues.

Logan Labs 2011 Calendar

Office Hours 8 a.m.—5 p.m.

Closed:

May 27, 30	Memorial Day
July 1,4	Independence Day
September 5	Labor Day
November 24,25	Thanksgiving
December 23,26	Christmas

Our New Analyzers

Our original Inductively Coupled Argon Spectrophotometer (ICP)

The new Inductively Coupled Argon Spectrophotometer (ICP)

Nitrate and Ammonium Analyzer

Adjusting soil pH

By: Bill McKibben

Adjusting soil pH may seem like a pretty straightforward operation but there are many things to consider before undertaking such a bold step with soil chemistry. The first decision is what direction do you need to go and what products should be used to achieve the goal. I cannot stress enough the importance of getting a good soil test. I've heard people say that based on the type of weeds or the fact that moss is growing means the soil pH needs adjusting. Assuming those statements were true, which direction and how much adjustment should be made? Without a good soil test it is pure and simple guesswork.

Generally I prefer to see the soil pH to be 6.2 plus or minus two tenths on soils with exchange capacities of 10 or higher. This does not apply on the high organic matter soils with organic levels above 15%. These soils may slide down to a pH level of 5.5 or a little less and still have enough calcium and magnesium for adequate plant growth. At the low pH levels I become more concerned with manganese toxicity in the soil solution. I have experienced manganese toxicity on soils that have 5-8 ppm manganese levels on the standard soil test extracted with the Mehlich III. On the light exchange capacity soils I prefer the pH to be 6.5 plus or minus two tenths. This increase in pH is mainly due to the need for soluble cations, which are hard to hold in the sandy soils.

For most soils the tendency is to see soil pH levels drop over time. This is primarily due to the loss of cations by crop removal, erosion and nitrogen displacement. Calcium, magnesium and potassium are the major cations affected by this removal process. Soils consisting of coral and calcareous sands have such large volumes of calcium in the base make up of the soil that a drop in the soil pH may not be seen in ones lifetime. It is for this reason that these calcareous soils, which may have pH levels around 7.5, should not be adjusted downward.

Raising Soil pH

Raising soil pH is the most common practice and relatively inexpensive. Lime is the product of choice, but there are two basic types of lime, high calcium and dolomitic. The high calcium lime will normally test around 30% calcium and 3-5% magnesium and the dolomitic lime will test around 21% calcium and 12% magnesium. There are those who will say lime is lime so use whatever is closer to the farm. I prefer to balance the cations using Albrecht's ratios of 65% calcium and 15% magnesium base saturation. On the heavy soils with exchange capacities greater than 15, base saturations of magnesium greater than 20 tend to increase the tightness of the soil, resulting in more compaction issues and grass control problems. Depending on the soil test data and the balance of the cations either calcitic or dolomitic lime will be selected. If the magnesium base saturation is below 15%, I will start off with an application of dolomite lime. Assuming two ton of lime is needed to adjust the pH, the first ton would be dolomite and maybe a year latter a ton of calcium. Lime applications need to be considered more like yearly fertilizer applications instead of a once every 3-5 year project. Putting on lime can adversely affect the availability of potassium and especially phosphorus. Trace elements as well may be affected by over liming. Even though a soil may need 2 or 3 ton of lime, I prefer to limit most of my lime applications to a 2000-3000 pound per acre unless aggressive tillage will be performed. Since most of the farmers are going to no till or minimum till, incorporation of the lime is very limited. This will reduce the solubility of the lime since the pH in the band will be rapidly increased. This layering of the lime could also affect the results of your next soil test if you are sampling deeper than what the lime has impacted the soil.

In the lab the soil will be ground and thoroughly mixed. Your results will show the soil as if it were a homogeneous mix when in fact you may have a layer of unreacted lime that was dissolved by the extracting solution leading you to believe the nutrients are all available. This stratification is a real concern that is not being addressed in our no till practices. Some new watershed data showed phosphorus levels in the water as high and in some cases exceeding the 1990 levels when no till and minimum were not widely accepted practices. These issues could be alleviated with some aggressive tillage, even moldboard plowing every 5 or 6 years following wheat. This program would require immediate leveling and planting a good cover crop to prevent soil loss.

The turf industry suffers from the same issues of stratification, but only through aggressive core aeration and nutrient balancing of the top dressing materials can this be minimized.

Lowering pH

Adjusting the pH downward with sulfur is designed for calcareous soils and not for soils with a high pH as a result of sodium. High sodium levels as a result of irrigation water needs to be flushed out through watering and possibly the use of gypsum, not sulfur.

Lowering the pH is not generally done on a large-scale basis in general agriculture due to the cost factor. I have done it where a couple of acres were going to be planted to blueberries, gardens and turf situations. In agriculture situations where a farm has been over limed, we generally increase our phosphorus applications preferably through starters and foliar feeding along with foliar feeding traces. The use of more acidifying nitrogen sources during corn rotations is also beneficial.

In the garden or turf situation where it is feasible to lower the pH, I base my sulfur application on the following table that I found in the Knott's Handbook for Vegetable Growers by Lorenz and Maynard.

I would prefer to lower the pH levels over a period of a couple years so I could retest and monitor the progress. These levels are based on a 7-inch soil layer so changing the pH level deeper would require a proportional increase. For example, lowering a loam from a pH of 8 to 6.5 on a 10-inch layer would take about 2150#. Stratification of the sulfur could have much higher consequences than lime, so be sure to incorporate thoroughly to the target depth.

Attempting to lower the pH of calcareous sand based soils is not feasible or economical.

Approximate Quantity of Soil Sulfur Needed to Increase Soil Acidity to 6.5

Desired change in pH level	Sulfur (# / ac.)		
	Sands	Loams	Clays
8.5 - 6.5	2000	2500	3000
8.0 - 6.5	1200	1500	2000
7.5 - 6.5	500	800	1000
7.0 - 6.5	100	150	300

More to a Soil Test than pH?

By: Jack Higgins

"You mean there's more to a soil test than pH?" I remember asking myself this, as I listened silently to my new boss explaining the soil test to me. At the time of graduating from Penn State with a Bachelor's in Turfgrass Sciences I knew little more than, "if the pH is low add lime." Learning the ropes of golf course maintenance as an assistant superintendent I became accustomed to what a soil test with base saturation look liked, but I was clueless in reading it. Then I was presented with the opportunity to work for EarthWorks. Part of my job is being a spokesperson for the benefits of soil testing. So I started to read. As much as I have learned from reading and researching Dr. Albrecht's work on Base Saturation, I have learned twice that from countless conversations with expert consultants. As an EarthWorks representative, I use the tools of Base Saturation and Saturated Paste Extract everyday when working with golf course superintendents.

I am always pushing myself to look deeper at the soil test in order to provide better analysis. With that effort in mind, the remainder of this article discusses how physical differences within a root zone will affect nutrient mobility.

The important distinction often overlooked when reviewing soil analysis is that the readings given are an *averaged representation of the sampling depth.* The first thing the lab does after ensuring that the soil is dry is grind and blend the sample in a homogeneous mixture of all 6 inches (or whatever depth has been sampled) of the root zone. For golf courses this distinction is very important.

As a result of sand topdressing, even native soil golf greens have developed a sandy interface between native clay soil and the soil surface. It is very common for a green profile to have 2-4 inches of sandy interface.

The horizon of the profile that has been modified with sand will behave differently in terms of water and nutrient holding-capacity.

The soil test indicates that the CEC of this root zone is 12 meq/L. But in examining the profile we can see that the physical characteristics of the soil are different throughout those 6 inches; the sandiest area may have a CEC of 2 meq/L and the heaviest clay area may be 18 meq/L.

Golf greens are top-dressed for many reasons including: Mitigate thatch accumulation, firm up the surface for better playability, and create more macro-pores in the upper horizon to allow for more oxygen/carbon dioxide exchange. What is often overlooked is how this cultural practice affects nutrient mobility in this crucial interface where the stems, crowns, rhizomes, and roots meet.

As an agronomic consultant I encourage golf course superintendents to consider this distinction when reading the soil test and building a fertility program. It can be very beneficial for the plant's nutrient uptake to build a fertility program that encourages nutrients to be chelated in the "top-dress zone" of the profile. The benefits are always most appreciated during the high heat/low moisture months of the summer. It's during this time of year when the battle is won and lost. Preparing by buffering nutrients in that interface is crucial for the plants survival.

I have been encouraged by many superintendents who have had great results using a fertility program built with the base saturation and saturated paste extract as the backbone. Encouragement like that makes my job very rewarding. And of course, the best part of the job is that there is always more to learn by "digging" deeper into the soil test!

-Jack Higgins

In sympathy:

We are saddened at the loss of one of our oldest and dearest friends, Lew Flohr. Lew, 89, had been a client of Logan Labs since our beginning. We featured Lew in our Winter/ Spring 2005 newsletter. That newsletter is available on our website. Please take a moment to read Lew's story. We will miss you, Lew!

Logan Labs LLC
620 North Main Street
P.O. Box 326
Lakeview, OH 43331
937-842-6100 or toll free at
888-494-7645
Fax: 937-842-2433
susan@loganlabs.com

Please check out our webpage frequently. We are adding information often.

www.loganlabs.com