

AGVISE

LABORATORIES

April 2016

SOUTHERN TRENDS

It has been a relatively open and warm winter in our area and if it continues, we'll see an early planting season. Hopefully this nice weather will result in a better than average growing season and high yields!

Our Benson, MN lab is now doing the "Haney Soil Health Test." The Haney test is currently one of the enhancements for NRCS programs that farmers get paid to do. We expect it to increase (see article on Soil Health Test Assessment).

If you have not requested the Haney test yet, here are a couple things to know:

1. This test can be done any time of year. We encourage sampling in spring or early-summer (May – August). This is a special group of tests and requires several days to complete in our lab. If you do this test in the spring/summer you will have the results back well before the fall rush begins and before the December deadline for the government programs.
2. Topsoil only depth required.
3. One sample per field is all that is necessary to fulfill the government program requirement.
4. Samples requesting the Haney test must be submitted on paper sample forms. Online submission is not possible for this special test.
5. If you are going to submit a large number of samples for the Haney test please contact our lab and we will send special sample sheets and sample bags. If you are

only going to send a few samples for the Haney test, you can just write "Haney" on the sample information sheet where it says "other."

6. Reports will be mailed. (We are working on posting "Haney" results to our web site).

7. If you have any questions regarding the Haney test, please give us a call.

Finally, if you are interested in checking out our annual "Regional Soil Test Summaries" and "SCN state summaries" just go to "Agronomic Information" on our website (www.agvise.com). You will also see many articles on pertinent topics, such as the value of Cation Ratios and Base Saturation for making potassium fertilizer recommendations (Not)! There is also information on the myth about CEC telling you how much N your soil can hold! Both of these topics get twisted by uninformed people. I think these two topics could make great episodes on Myth Busters!

Please give us a call if you need sampling supplies or equipment so we can get them to you ASAP. We hope you have a great spring season!



RICHARD JENNY
AGRONOMIST/CCA

Cutting Fertilizer Costs??

With current low commodity prices, many farmers are trying to figure out where they can cut inputs and not lose yield. They know that they need to produce high yields to achieve the best economic return, even when crop prices are low. When nutrient inputs are considered, of course you need to start with a soil test.

Nitrogen (N): Basing your N fertilizer rate on a soil test is the first step. If you are in an area which uses the 0-24" soil nitrate test, you are way ahead of the curve. You may want to fine tune your fertilizer guideline by using a tool like the "North Dakota Corn N calculator" for wheat and for corn." If you are in an area that does not use the nitrate test, you may want to use a tool like "N Rate Calculator" which covers corn production in the Midwest.

You may also want to consider split application for crops like corn and wheat. Research has shown that all of the N upfront in wet years will not give you top

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AGVISE Trade Mark Infringement

"AGVISE Risk Management" from Fargo, ND is in "No Way" associated with AGVISE laboratories of Northwood, ND. AGVISE has held the trademark on our name for over 35 years and we are in the process of enforcing our trademark.

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AGVISE 40th Anniversary

AGVISE Laboratories is celebrating 40 years of service to Agriculture! It takes hardy stock to survive a fire in 1996 and a tornado in 2007. It also takes a great bunch of customers supporting us along the way! Thanks to all of our employees and our customers for a great 40 years! Hope we can continue to serve you for 40 more!



Cutting Costs Cont...

yields. If you have the ability hold back some N and apply it as a side dress or top dress application early in the growing season, you may be able to reduce losses to denitrification and leaching and achieve higher yields reducing cost per bushel.

Phosphorus: Having the ability to apply P fertilizer in a band close to the seed gives you some flexibility in P fertilizer rates in the short term. If you have medium or high soil test levels of P, you can reduce the broadcast rate and apply most or all of the P fertilizer in a band near the seed for corn and wheat. This is a great option for the short term because the rate you apply in the band will be much less and you can save dollars this year. In the long run you will have to account for the P removed in all crops in the rotation to maintain high yield potential.

Potassium (K): For soil testing medium or high in K you can also reduce the amount of broadcast K fertilizer. Care must be taken to ensure seed safety as high rates of KCl fertilizer banded near the seed can damage the seed and reduce stand.

Sulfur (S): Sulfur has been the wild card for nutrient management the last several years. If you now have split fields into management zones for soil testing, you have the best information to work with. Zone samples will show you the differences in the soil test levels for sulfur and organic matter and give you an indication of soil texture. Areas of the field with a low S soil test, coarse soil texture and low %OM will need higher rates of S applied. Rates of > 10 lb/a will likely have to be broadcast to ensure seed safety. Sulfur deficiencies have become very common the past few years across the entire region on many soil types. Soil and tissue tests have confirmed the yellowing early in the season has been sulfur in many instances. On fields where you have confirmed a S deficiency, adding a safe rate of sulfate sulfur in your starter is one approach. Another approach for corn production is adding some sulfur to your side dressed liquid nitrogen. For corn production side dressing S has worked very well and is becoming a very common practice in areas that have confirmed sulfur deficiencies from the past few years.

K Movement in Soil

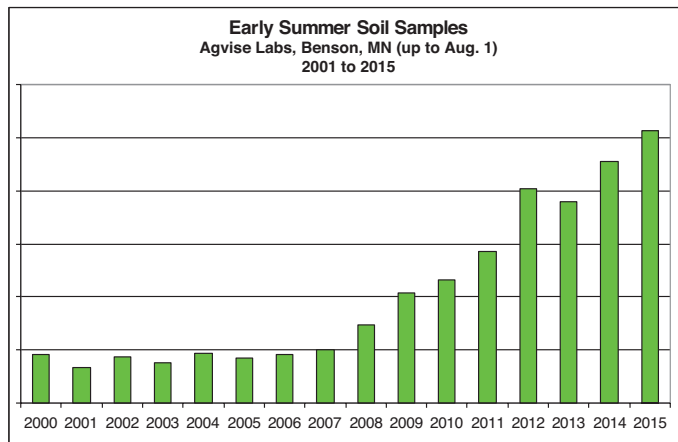
Potassium (K) is a primary nutrient and used by plants in large amounts. We generally think that K does not move in the soil because K^+ is a cation with a positive charge and is held on soil particles which have a negative charge. The different charges should hold the K in place and prevent it from moving in the soil profile. However, if a soil has a coarse texture and a low CEC (<10), K has been shown to move somewhat in the soil profile. Recent research from Carl Rosen from the U of Minnesota is an example of how K can move in the soil profile in the 0-24" soil profile on an irrigated loamy sand soil.

The data in the table shows the K soil test levels in the soil profile after the potatoes were harvested. A wide range of K rates were applied pre-plant and incorporated 3-4" deep before potatoes were seeded. The initial K soil test was very low at about 30 ppm. You can see that when the rates of K exceeded 180 lb/a, the K soil test level in the 12-24" soil profile started increasing. This would indicate K was being moved from the topsoil down through the profile when rates exceeded crop need on this type of soil. If you look at the rate of 180 preplant plus 180 at hilling, the 12-24" K level was not affected as much as when the 360 lb/a rate was applied in one preplant application. The K test level in the topsoil increased quickly after the rate exceeded 180 lb/a. Increasing the topsoil K level to the medium range will allow future K rates to be more modest.

In this study, if the soil texture had been heavier (loam, clay loam etc.) and had a higher CEC, we would not expect K to move as much in the soil profile. In 2015, AGVISE did a demonstration project where we applied K rates at 50, 100, 200 and 1000 lb/a K_2O at four locations. This year we will test the K level in the soil profile (0-6, 6-12, 12-24) on these sites to document any movement of K in the soil profile. We will report on this project at our seminars next year.

Early Summer Soil Sampling Advantages

Early summer topsoil sampling continues to grow more each year. Last year our Benson, MN lab set a record for early summer soil samples (January 1 to July each year) as shown in the chart.



While the amount of early summer soil samples have increased greatly, the number of fall samples is also increasing at a slower rate. If we look at the comparison of early summer vs fall samples, we see that the overall percentage of early summer samples is increasing to about 50% for the past 3 out of 4 years (see chart). The summer of 2013 was very wet which hindered summer sampling.

The vast majority of early summer soil samples are topsoil only samples from 2.5 acre grid in size. Most of these samples come from unfertilized soybean fields and are tested for non-mobile nutrients (P, K, Ca, Mg and Zn), pH, organic matter and soluble salts. In some cases, the carbonate (CCE) test is also included to determine the risk of IDC on soybeans. Mobile nutrients like nitrogen, sulfur and chloride are not tested on early summer samples.

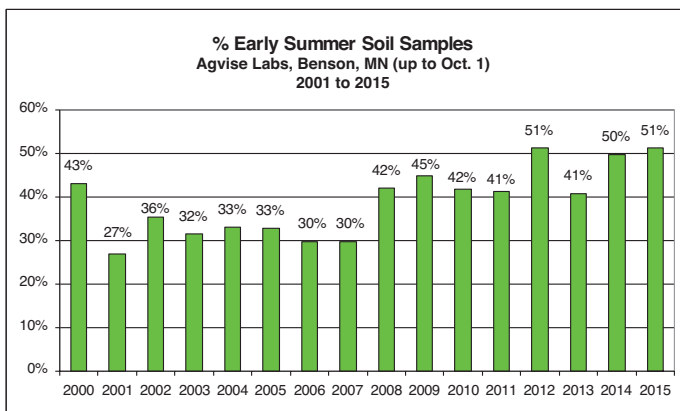
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K movement on Loamy Sand Soil U of M – Rosen 2014-15

Treatment K_2O lb/a	0-6" K - ppm	6-12" K - ppm	12-24" K - ppm
Check	38	25	29
90 lb/a	50	27	32
180 lb/a	58	28	33
270 lb/a	78	25	37
360 lb/a	113	33	69
180 + 180 lb/a ¹	81	30	39

Sand Plain Research Farm Becker MN - Loamy Sand - %OM 1.3% ¹ 180 preplant and 180 at hilling KCl (0-60) applied before planting and tilled to depth of 3-4"

Early Summer Soil Sampling Advantages...



4. Fall application of fertilizer or lime can be applied right after harvest because soil testing is done and the VR maps are ready to go.
5. It is easier to find labor to do summer grid sampling than to find labor in the fall after harvest when schools have started again.

Soil Health Testing

Soil health has gotten a lot of attention the past few years. Research has shown that we can improve soil health by modifying certain practices in production agriculture. Practices such as reducing or eliminating tillage are not new and farmers continue to adopt these practices. Improving crop rotations is also a part of improving soil health. One relatively new practice has been to encourage farmers to include cover crops where they can in their farming system.

As farmers have adopted these practices, soil health has been improving and researchers have been trying to develop new soil testing methods which can measure the changes in soil health over the years. It is important to develop soil testing methods that can measure the changes in soil health over time. Some soil health measurements are already part of USDA NRCS programs and farmers receive payments for doing these soil health tests. We expect new or different tests will probably be included as part of government programs in the future. Developing new soil health testing methods that are meaningful for farmers and can be adopted by commercial testing labs is not an easy task and takes time.

The process begins with researchers developing tests they are confident can measure subtle changes in soil health quickly when a practice is changed. For example, if a grower switches to a no-till system, the new soil tests need to be able to pick up changes in biological activity, soil aggregation and soil chemistry within the first year or two of farmers changing

these practices. Once the researchers have developed a group of tests they think will be able to measure these changes in the soil, the methods are then evaluated in commercial soil testing laboratories.

This step involves including these new soil testing methods into laboratory proficiency testing programs. Most soil testing laboratories are part of proficiency testing programs, such as the North American Proficiency Testing Program (NAPT) or the Agricultural Laboratory Proficiency program (ALP). These programs assist laboratories in monitoring their accuracy and precision when using accepted soil testing methods. In these programs, each laboratory receives a group of unknown soil samples several times each year. The laboratories test these unknown samples using accepted methods and submit their test results. The test results from hundreds of laboratories are compiled to determine the correct test results for each soil test method. Each laboratory is sent a report that shows how they did, with respect to getting the correct test values for each test method.

It is critical that any new soil testing method be evaluated by a large group of laboratories in these proficiency programs. We have to find out if new soil test methods are able to be reproduced in a commercial lab setting as they were in research labs. One example of a new soil testing method being evaluated by these proficiency testing programs is the CO₂ burst test or "Solvita test". In the past two years this new method

Early summer sampling should not be done in soybean fields that have been fertilized or manured, the fall before or in the spring. If you do, the P and K test reports will be inflated. Fertilized soybean fields should be sampled after harvest to get the most accurate soil test levels.

There are many good agronomic and practical reasons to do more early summer sampling. These include the following:

1. Early summer sampling provides good soil test information for P, K, Zn, pH
2. Early summer sampling provides excellent quality soil cores due to moist soil conditions.
3. Variable rate application of nutrients/lime can be decided in the summer, when everyone is not so rushed compared to right after harvest in the fall.

has been evaluated by a large group of commercial testing labs. What we learned in those two years is that it was not possible for a large group of laboratories to consistently get the same test values for the unknown soils when using this new test method. As it turns out, the test method did not work well on certain soil texture classes and the method needed to be changed to fix these issues. This method is still being modified in an attempt to get more consistent test results across a wide range of soil textures. Without evaluating this new method in a proficiency program with different soils by hundreds of laboratories, we would never have learned about the issues with this new method.

This is why new soil testing methods must be evaluated in this way to figure out if they will work on a wide range of soils and in a commercial lab setting. In the future, you may be hearing more about other soil testing methods for soil health that are being evaluated by researchers. Here are a couple tests that you may hear more about in the future.

Soil Protein: is a measure of the fraction of the soil organic matter which contains most of the organically bound N. Microbial activity can mineralize this N and make it available for plant uptake. This is measured by extraction with a citrate buffer under high temperature and pressure.

Active Carbon: is a measure of the small portion of the organic matter that can serve as an easily available food source for

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Can You Change %K on the Base Saturation of a Soil? “Uff Da” That’s a lot of Potash!

This winter we have been getting some questions from farmers about base saturation and cation ratios in the soil. The farmers had attended meetings where they were told that a soil must have a certain %K, (4-8%) on the base saturation to achieve high yields. At some of these meetings, farmers were told they needed to apply high rates of potassium fertilizer to increase the %K of their soils in order to get high yields.

With every piece of research in the past 50 years showing that Base Saturation and Cation Balancing concepts are myths and do not increase yields, some people still hang onto to this bad research from the 50’s. To help farmers see the silliness of the base saturation

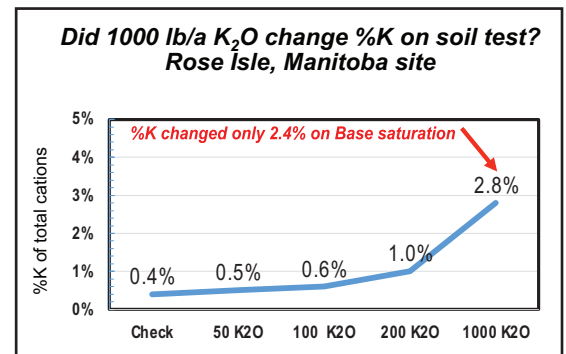
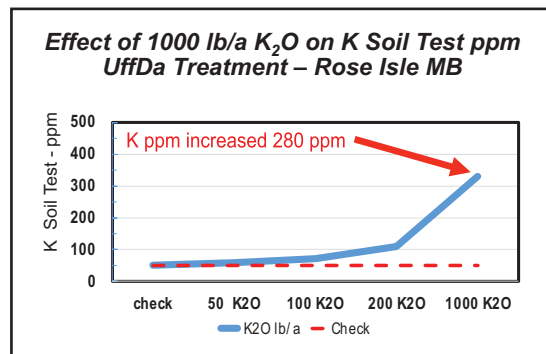
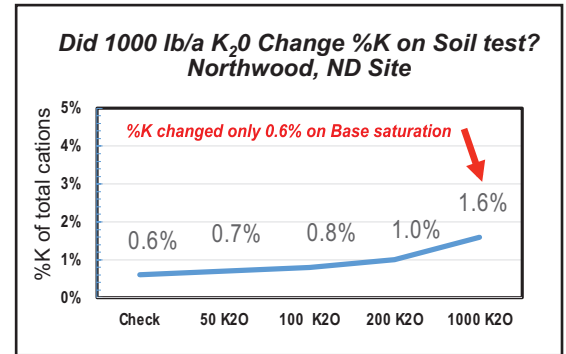
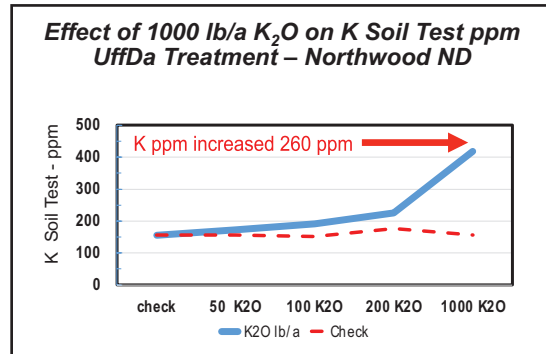
concept, we did a simple project to show just one of the flaws in this failed concept. In this demo project we had three locations in ND, MN and MB where we applied 1000 lb/a K_2O (1666 lb/a potash).

We called this project the “Uff Da” project because my Norwegian grandfather, who farmed in southern Minnesota 50 years ago, would have looked at this high rate and said “Uff Da” that’s a lot of potash!

The potash was tilled into the soil before seeding and we collected soil samples after harvest. The figures show how the K soil test increased greatly as the rate of potassium increased from 50 lb/a to 1000 lb/a K_2O . (The K soil test worked fine.) The other figures show how the %K calculated for the base saturation increased only a little, even when 1000 lb/a K_2O was applied!! These small increases in the %K were not nearly enough to get the magical 4-8 %K proposed by believers in base saturation and cation balancing (I guess we should have had applied more than 1000 lb/a K_2O - Ha Ha!).

While this is just a simple demonstration project, there are some basic facts your growers can learn from this:

1. Soils with a K soil test level over 160 ppm, generally supply plenty of potassium to the crop to get the K tissue level into the sufficient range (use tissue test to confirm)
2. Increasing the %K as calculated for the base saturation on a routine soil test requires extremely high rates of potash fertilizer (1,000 lb/a was not enough to get the % K to 4%)
3. If the K tissue level of a crop is in the sufficient range, it does not matter what %K of the soil base saturation is!
4. Farmers should not worry about the %K in their soil, they should be concerned about the K ppm in their soil. If the K tissue levels of their crops are in the sufficient range, then additional K will not increase yield.
5. There are lots of good reasons to apply potassium fertilizer, but %Base Saturation and Cation Balancing are “NOT” good reasons to apply more K fertilizer! (time to get out of the 50’s)



Soil Health Cont...

soil microbes. It is measured by quantifying potassium permanganate oxidation with a spectrophotometer.

Aggregate Stability: is a measure of how well soil aggregates resist disintegration when hit by rain drops. It is measured using a standardized simulated rainfall event on a sieve containing 0.25mm and 2.0mm soil aggregates. The fraction of soil that remains on the sieve determines the percent aggregate stability.

AGVISE Laboratories has participated in the NAPT and the ALP proficiency testing programs since they were established many years ago. We will keep our customers updated as new soil testing methods are evaluated by these programs.

Safe Rates - Starter Fertilizer? (Mobile device friendly!)

Lower crop prices have increased interest in banding more fertilizer with or near the seed. Banding is a great way to increase the efficiency of P & K fertilizer for crops like corn and wheat. In many situations, a lower rate of fertilizer can be used in a band compared to broadcast rate. Banding is great, but it is important to know how much of each fertilizer material can be placed directly with the seed before delayed emergence and stand losses occur. Research from South Dakota State University helps us determine what rate will be safe for many crops and fertilizer materials. This research combines data from greenhouse and field research to provide real world information.

This research has been put to use in a tool called "Fertilizer Seed Decision Aid" on the SDSU Plant Science website. This decision aid has recently been updated. There is now information on the safe rate of fertilizer for 18 crops and 18 fertilizer materials. All you have to do is choose the crop, row spacing, amount of stand loss you will accept, soil texture and soil moisture status. With this information, the tool will calculate the safe amount of fertilizer that can be placed with or near the seed.

This tool is in a spreadsheet format when you are using your computer. If you are using your mobile device the screens will look different (see example of screens). In this example, the information I input in this

tool was crop choice corn, fertilizer material choice was 10-34-0, seed furrow width of 1" (this is spread width of fertilizer and seed), 30" row width, tolerated stand loss of 3%, fine/medium soil texture, moist soil conditions.

With this information, the tool told me that I can safely apply 6.99 gallons of 10-34-0 directly with the corn seed under these conditions. You can then click on the "Return to input" button if you want to make changes to the information. To view this tool on your phone, you must search

"Fertilizer Decision Aid SDSU." This will bring you to the site (It is not a stand alone app). You will be using the tool from the web on your phone so it will use minutes from your data plan. I have found that this tool works best when used on a full size computer or if you have a very good service from your phone. If you haven't used this decision aid in the past, you should give it a try. This is a great tool!

To find this tool do a search on "Fertilizer Seed Decision Aid SDSU."

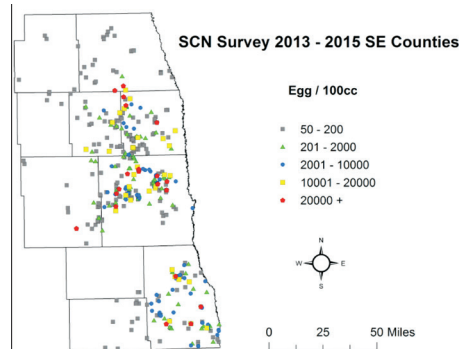
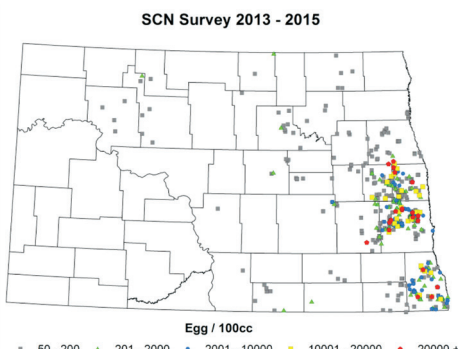
SCN - Marching North Through North Dakota

Three Things Are Forever

- Diamonds
- Taxes
- SCN**

Courtesy Mario Tenuta

North Dakota was the 4th largest state in soybean acres in 2015 (5.9 million acres). Soybean cyst nematode (SCN) was first detected in ND in 2003. Since then, SCN has been detected in more than 20 counties, mostly in the eastern half of the state and from the South Dakota border to the Canadian border. In 2013, the North Dakota Soybean Council (NDSC), with grower checkoff dollars, started to fund research to help growers and agronomists become more aware of the presence and problems with SCN within the state. For the past 3 growing seasons, this SCN research/survey project was coordinated by Dr. Samuel



Markell of the NDSU Plant Pathology Department. Most of the soil samples for this project were analyzed by AGVISE Laboratories in Benson, MN.

The charts below, provided by Dr. Markell, show SCN sample data compiled over the 3-year data collection period (~1,600 total samples and ~900 samples in 2015). The highest infestations were in the south eastern tier of counties.

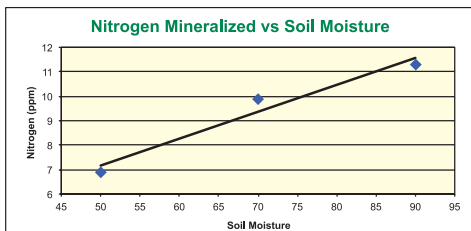
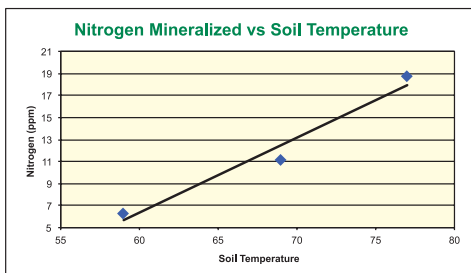
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PRESIDENT'S CORNER

I've recently discussed the possibility of using a new soil test to adjust nitrogen guidelines base on the mineralization potential of the soil. One relatively new test is the carbon burst test or Solvita test. The test is currently being evaluated by several universities and the NRCS.

The problem with using a new test to predict the amount of nitrogen a soil will release is all about what happens in the field. You may have a lab test that when done under very controlled temperature and moisture conditions gives you repeatable N mineralization results. While the lab results may tell you a certain amount of N will be released from the soil in a growing season, Mother Nature will step in and change everything. The weather may end up much cooler than normal resulting in much less N being mineralized than any lab test would have estimated. The two most important factors which effect the amount of N mineralized from a soil are temperature and moisture. Many lab studies have looked at both of these parameters when measuring nitrogen release from a soil (see graph).



water. Finding a soil mineralization test that works seems an impossible task until we can more accurately predict temperature and rainfall. While it would be great to have a new soil test that would give us a better indication of the amount of N each soil will mineralize, I am afraid Mother Nature will have some fun with us along the way as we strive to develop new soil tests that help us make better N fertilizer guidelines for farmers to follow.



BOB DEUTSCH
PRESIDENT
SOIL SCIENTIST/CCA

One study varied both the temperature and moisture of the soil over a 12-week period. By increasing the incubation temperature from 59°F to 77°F, the amount of nitrogen mineralized nearly tripled. While the range in temperature would not be this large for a whole growing season, we can have extended periods of weather that are much below or above average. We have all experienced cool growing and warm growing seasons.

Researchers in the same study also varied the moisture content of the soil from 50% to 90% of available soil water. Their study indicates a soil with good moisture will release nearly twice as much nitrogen as a soil with limited

NORTHERN NOTES

Spring looks like it's coming fast here in the north country. I'm really beginning to like this climate change thing here in the frozen north! Little or no snow on the ground and warm temps in March have many growers scrambling to get equipment ready.



JOHN LEE
SOIL SCIENTIST/CCA

Low commodity prices have farmers rethinking every crop input this year. Soil testing is a very good tool to help them figure out the best way to spend their fertilizer budget. Spring soil testing can be a struggle due to frost and wet soil conditions and AGVISE has the best equipment for collecting 24" samples in the spring. Our HD (heavy duty) soil probe and tip have really performed well under spring conditions. The HD probe is made from Chromoly steel and is very tough. The stainless steel tip is designed to cut through frozen and wet soil without plugging. If you haven't tried our HD probe you need to give it a try. It can save you a lot of time in the field with less plugged probes this spring!

We have all of the soil sampling equipment you need on hand for the spring sampling season. If you need supplies we can send them ASAP or you can order them on our website www.agvise.com. We hope you have a smooth spring season and we are here to help in any way we can.