AGVISE LABORATORIES

Timely information for agriculture

40 YEARS ANNIVERSARY

Spring 2017

SOUTHERN TRENDS

RICHARD JENNY
AGRONOMIST/CCA

Many of you have been involved with the new Haney soil health test. The Haney test is one enhancement from the NRCS Conservation Stewardship Program (CSP) that some producers are participating in. In 2016, our Benson lab ran a couple thousand of Haney soil tests. These are "non-standard" soil test methods that take a lot of extra time and labor in the lab. In 2017, we are developing better and easier ways for you to collect and submit Haney samples to the lab. This includes no "special" Haney bags or paperwork. You'll be able to use regular bags, paperwork and our Agvisor Online sample submission system. Collecting one topsoil bag of soil will allow you to request both the Haney test and your "regular" soil test option from one bag of soil. We will provide fertilizer recommendations based on our regular soil test methods like usual. At this time, there is no regional research for using the Haney test results for making fertilizer recommendations. We encourage you to collect the "Haney" samples prior to the "Fall Rush" season to ensure you have the test results before the NRCS cutoff. Last summer AGVISE collected monthly Haney samples and found test levels did not change appreciably spring through fall. To encourage Haney samples to be submitted during the growing season this year, the price for a Haney test will be $70 before September 1 and will increase to $85 after September 1 when we get into the fall rush season.

Early summer (late May through June), sampling continues to increase for grid sampling in our region. Nearly 50% of the soil samples received in our Benson lab are now received prior to the normal "Fall Rush" season. If you have any questions on this, give me a call and I'll discuss with you the practicalities of "early summer" soil sampling for you and your growers.

Finally, with all the talk of increasing nitrogen management on corn the past couple of years, the PSNT (pre-sidedress nitrate soil test) has become a very hot topic. This is a simple and inexpensive test for you to do. It involves taking a 12" deep soil sample when the corn is V4-V8 (6-12") tall and test for soil nitrate. Please read the article on PSNT in this newsletter for more details. Thank you for your continued business and support. Call me if you have any lab testing or fertility questions or need sampling equipment.

New Soil Scientist: John Breker

John Breker is joining our staff of Soil Scientists at our Northwood location this spring. John received his B.S. in Soil Science with a minor in Crop and Weed Science from NDSU in 2015. He is finishing his M.S. in Soil Science under Dr. David Franzen at NDSU Fargo this spring. His master's research involved evaluating several soil potassium testing methods, corn yield response to potassium fertilizer and the effect of sampling time on soil potassium levels. He has presented his research at conferences in Fargo, ND, Winnipeg, MB, Phoenix, AZ, and Rome, Italy. John grew up on his family's grain farm near Rutland, ND. At NDSU, John was active in Ag Ambassadors, Alpha Gamma Rho Fraternity and Agronomy Club. He also studied abroad in Puerto Rico and New Zealand to expand his knowledge of agriculture and soils beyond the Northern Plains. John was

JOHN BREKER
SOIL SCIENTIST

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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!

INSIDE

New Soil Scientist John Breker Cont…

busy every summer with internships in soil research, scouted irrigated potatoes and even did an internship with AGVISE in 2014! John first became interested in soil science in high school through an Envirothon competition in natural resources. Even though John is still very young at 24, he has studied soils as an amateur or professional for 10 years. Other than digging holes and calculating fertilizer rates, John enjoys the outdoors (hunting, fishing, canoeing, hiking), curling (yes, those rocks on ice), and a good slice of pie. He is an avid card player (e.g., pinochle, whist) and maintains a growing library on Great Plains history and culture. John is a great addition to our staff in Northwood!

Using "Crop Removal" Rates for P & K Fertilizer Recommendations is a Bad Idea!

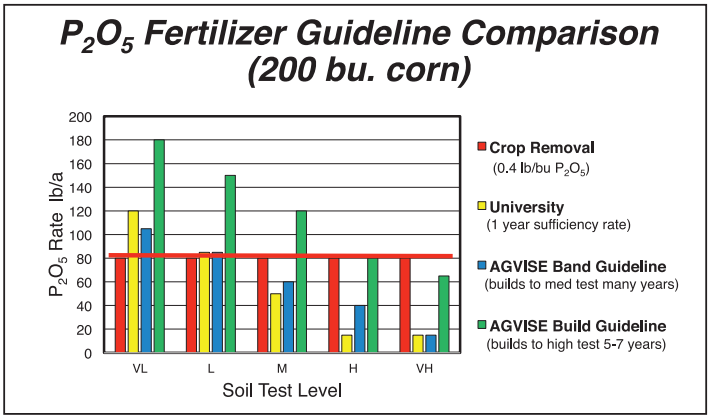
By: Richard Jenny – AGVISE Agronomist

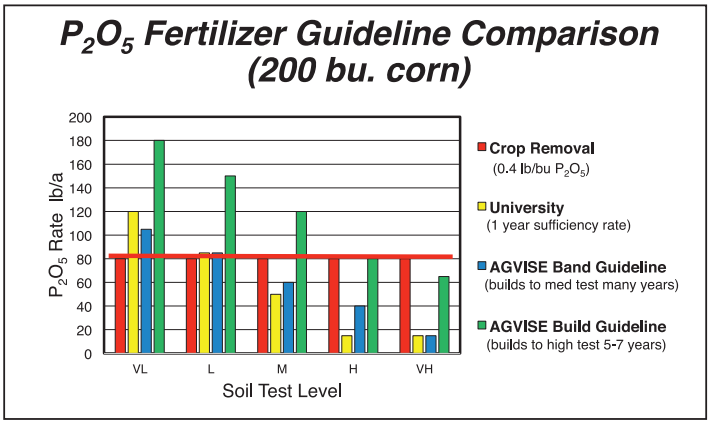
Recently during a presentation on the importance of long term P & K research to improve fertility management, the person next to me said "why don't we just use crop removal (CR) rates for P & K fertilizer recommendations?" I was a little surprised by this comment, and replied to him that if you only use CR rates, then most of a field would either be over or under fertilized. When soil samples test in the high or very high range for P & K, then applying the CR rate would result in an over-application. If soils testing low or very low receive the CR rate then P & K would be under fertilized and reduce yield. The only situation where the CR rates would be about right is when the soil test for P & K are in the medium range.

Another factor to consider is that a tremendous amount of time, labor, energy and money have gone into many decades of research to help develop and update fertilizer recommendations so we apply only the P & K fertilizer that is needed. When CR rates are applied on high testing soil, the result is costly over-application and it also increases the risk of off-site movement, especially phosphorus. Phosphorus movement downstream into ditches, streams, rivers and lakes contributes to water pollution. In the case of low testing soils, using the CR rate, will result in under-application which would likely reduce crop yields and reduce producer profitability. The only solution to this situation is to do intensive soil sampling (grids or zones) and use research from your region to manage P & K fertility to maximize yields, profitability and protect the environment.

In many states, where producers receive federal or state conservation incentive payments, they are usually required to follow university fertilizer guidelines. These guidelines can come from the state where they live or a neighboring state. These University guidelines prevent gross over or under application of P & K because they are based on years of regional research. Using only crop removal rates to make P & K fertilizer guidelines is a bad idea.

To the right are figures of P & K fertilizer recommendations comparing the crop removal (CR) rate to University guideline (1-year sufficiency), AGVISE band guideline and the AGVISE build guideline. The AGVISE build guideline is designed to bring the soil test P & K test level to the High soil test range over a 5-7 years and then maintain them in the High soil test range. The build guideline is often used when growing high value crops. The AGVISE Band guidelines for P & K will slowly build P & K test levels to the medium test range over many years and is used primarily in small grain areas. You can see that at very low and low P & K test levels, the crop removal rate (CR) is lower than any of the fertilizer recommendation guidelines, including the university guidelines. This means if you only apply crop removal rates to low testing soils, yield will likely be lost due to lack of P & K fertility. At H and VH soil test levels, applying crop removal rates results in over application, reduces grower profits and will put the environment at risk.





Predicting In-Season Nitrogen Rates for Corn Production

By: Jerome Lensing and George Rehm Discovery Farms – Minnesota

Corn growers in the North-Central region of this country have continued to increase the efficiency of nitrogen used for corn production. Compared to 10 to 15 years ago, the amount of nitrogen recommended for corn production from fertilizer and/or manure has decreased from 1.25 lb/bu of corn to about 0.6 to 0.7 lb/bu. With the technology available today, this efficiency should continue to increase in the future.

A model which could predict the amount of sidedress nitrogen to use during the growing season would be a great tool to improve N efficiency, but that has been a challenge for researchers. In recent years, nitrogen management professionals have used various strategies to try to determine the most economic rate of N to apply in-season.

In the Discovery Farms initiative, a number of strategies have been evaluated using whole field data from a cooperator in Kandiyohi County. This is a turkey farm where manure is applied in the fall to meet part of the total nitrogen requirements. The remainder is applied during the growing season.

Various strategies that might be used for Nitrogen prediction were evaluated in 2015 and 2016. Grain yield at 15.5% moisture for the various strategies for N management are summarized in the following table.

N strategies for Corn 2015 & 2016

Discovery Farm – Kandiyohi County

Predictive Strategy	2015	2016
	bu/a	bu/a
Control (No N applied 7 years)	112	91
Adapt-N model	178	NA
Encirca model	NA	210
Preplant Nitrate (0-24”)	213	212

nitrate-nitrogen in tile lines were measured for each strategy – data not shown

For the control, neither fertilizer nor manure has been applied since 2007 (Continuous corn except field was soybeans in 2010). Grain yields from this small field provide some indication of the amount of nitrogen mineralized from soil organic matter.

The preplant soil Nitrate test was 0-24””. Doing a spring preplant nitrate testing is an alternative to the widely used fall nitrate test in other areas. Testing for nitrates in the spring is very important for fields with fall applied and incorporated manure. In theory, the spring nitrate test should measure some of the nitrate-nitrogen produced from the mineralization of the organic component of the manure.

GEORGE REHM
DISCOVERY FARMS COORDINATOR

The Adapt-N and Encirca models were developed to predict the amount of nitrogen that should be applied during the growing season to produce optimum yields. Both include a measure of rainfall and soil temperature. These measurements are used to predict the amount of nitrate-nitrogen mineralized from the soil organic matter. The Encirca model also includes a measure of soil nitrate.

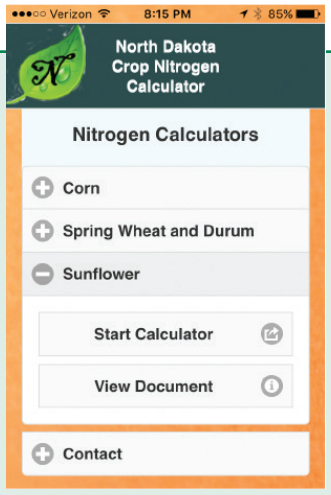
In 2015, the yield from the field where the Adapt-N model was used was substantially lower than yield from where the preplant spring 0-24" nitrate test was used to predict the in-season nitrogen rates. At this time, there is no good explanation for these lower yields. One possibility is the overestimation of the amount of nitrogen mineralized by the organic matter by the Adapt N model.

In 2016, yields were nearly equal when the recommendations from the Encirca model were compared to those produced by using the spring 0-24" soil nitrate test. In both strategies, there is some measure of nitrate-nitrogen in the soil.

It’s important to point out that the information collected at this time is on a whole field basis and the number of measurements is limited. However, it does appear that some measure of nitrate-nitrogen either in the fall or close to planting in the spring is a factor that is needed to predict the amount of nitrogen to apply during the growing season. This is especially true where manure is part of the total management system for corn production. It’s reasonable to expect that other models will be developed for the purpose of predicting the amount of nitrogen to apply during the growing season. Based on what’s been measured at this time, those models should include some measure of nitrate-nitrogen. In the future, the use of the pre-sidedress soil nitrate test at V6 may also be helpful for fields with manure applications.

New Phone App! ND Crop Nitrogen Calculator

North Dakota State University has just released a new app for your mobile devices. To get this free app, just go to the App store on your cell phone and search for “North Dakota Crop Nitrogen Calculator.” This app has the latest N research on corn, spring wheat, durum wheat and sunflowers. This app will ask you for several pieces of information including your soil nitrate test, % organic matter, nitrogen fertilizer price, estimate crop price, previous crop, which part of the state you are located, irrigated or dryland, and if you are in a no till or conventional tillage system. This calculator will provide you with a nitrogen fertilizer guideline based on these inputs. It is always good to have as much guidance as you can get from research in your area and then adjust that N guideline up or down based on your local knowledge and experience.



Ammonium Sulfate With the Seed? (Beware!)

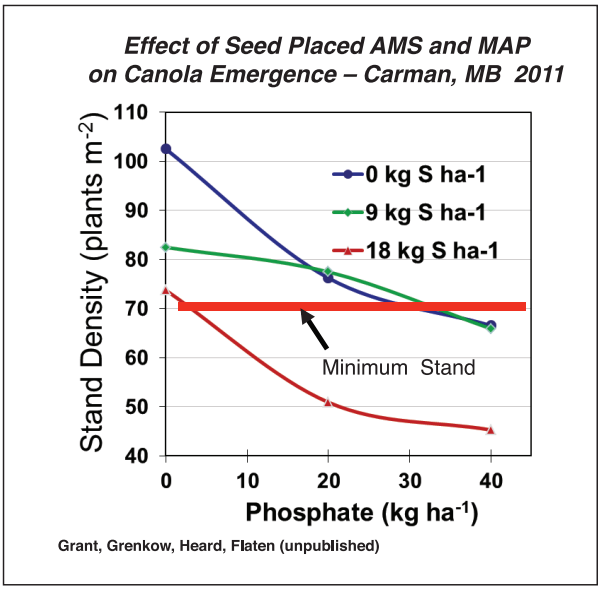
Banding phosphorus fertilizer with canola seed is a common practice for increasing seedling vigor as long as the rate is low so stand is not reduced. Sulfur is very important in canola production as well and we often get questions about placing AMS directly with the seed safely. If you are considering placing some ammonium sulfate (AMS) with the seed you need to know this can turn into a big problem!

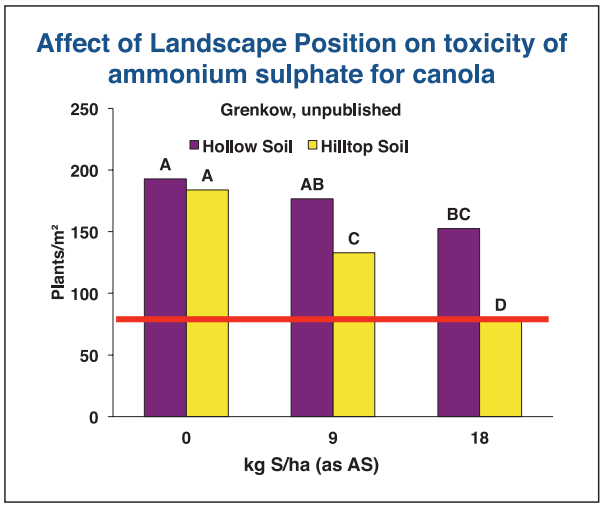
Recent research from the University of Manitoba reminds us that ammonium sulfate can be quite damaging to a canola stand when placed with the seed. Soil with a pH higher than 7.5 which contains carbonates (CaCO3) can cause stand loss when AMS is placed with the seed (see figure). When AMS is applied to a soil with a high calcium carbonate level, it reacts to form ammonium carbonate which transforms to ammonia gas, water and carbon dioxide. When this reaction happens near the seed, the ammonia gas can kill the seed. This is a similar reaction that occurs when urea is placed directly with the seed and causes stand loss.

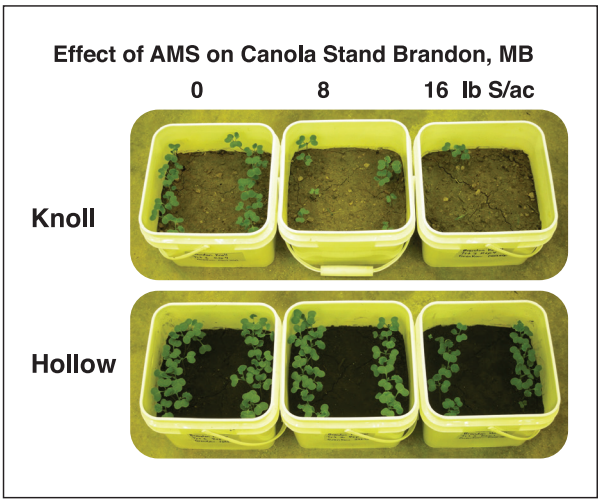
In the figure below, the "Hollow" soil located low on the landscape, has a calcium carbonate (CCE) level of 0.5%. The "Hilltop" soil from an eroded area, has a high CCE level of 21%. In this study, you can see that as the rate of AMS increased, the stand reduction was much worse on the "eroded Hilltop Soil" with high CCE.

Additional research from Carman, MB shows that if both AMS and MAP are placed with the seed, even at relatively low rates, stand loss can be extensive. In the figure you can see that even a rate of 9 Kg/ha S (8 lb/a) applied with 20 kg/ha (18 lb/a), P_2O_5 caused stand loss of about 25%. Once the stand gets below about 70 plants/m2, yield loss would be expected.

While sulfur is important for canola production it must be applied in a safe manner. AMS should be broadcast or placed in a band away from the seed. This will allow you to put the maximum amount of P with the seed safely. Placing AMS with the seed at a very low rate should be the last option and stand loss should be expected, particularly on soils with a pH higher than 7.5 with carbonates. While new seeding equipment is a big step forward for many growers, be sure to remind them that it is important to keep a safe amount of P fertilizer with the seed and that AMS should be broadcast or placed in a band away from the seed to prevent stand loss.







What is the PSNT test?

The PSNT test, pre-sidedress soil nitrate test, is an in-season soil test used to help manage corn nitrogen fertility and maximize yields, profitability and minimize environmental concerns. With the increased interest in corn nitrogen fertility management over the past years, there has been an increased interest in in-season soil testing. Even many of the modeling programs are now including some form of soil nitrate test. The in-season tests are used to determine if additional nitrogen fertilizer needs be applied or if there is a high probability no additional N is needed to maximize corn yields. This in-season soil nitrogen test is commonly referred to as the PSNT (pre-sidedress soil nitrate test) or the LSNT (late-spring soil nitrate test). In this article I will use the PSNT abbreviation instead of the LSNT since they are the same test.

PSNT: The PSNT test determines the soil test nitrate level (0-12") and how it relates to final corn yield early in the growing season.

1. The test is calibrated for dryland corn production, not irrigated corn production.

2. It is calibrated for either the corn/soybean or corn/corn rotation by some states.

3. The correct time to collect the soil samples is when the corn is between 6" to 12" tall, (V4-V6 growth stage).

What is the PSNT Test Cont…

4. The calibrated soil sampling depth is 12" deep. University research has shown that the 0-12" Nitrate test was as good a predictor without having to sample to 24".

5. Collect at least 10-15 cores per sample from a relatively uniform portion of a field or management zone. It may be necessary to sample multiple areas per field (zone management) to get the best representation of the field because of soil variability.

6. Soil core location: Collect cores between the corn rows with 3 to 4 cores per row perpendicular to the corn row, avoiding any fertilizer bands. If cores are collected in a fertilizer band the test results will be greatly inflated.

7. Submit all of the 10-15 cores (0-12") in one sample bag to the laboratory. In-field soil nitrate testing has not been proven reliable so far. The problem is the inability to get a small representative portion of the bulk wet soil cores you have collected. At sidedressing time, soils are usually moist, cloddy and sticky. It is next to impossible to blend these samples by hand in the field without first drying, grinding and blending them to create a homogeneous sample. The only solution is to submit your samples to the laboratory which will dry, grind and blend your sample into a homogeneous mixture for testing. Once the sample is dried and ground you can take a 10 gram portion of the sample and know that it represents all parts of the area you sampled. In the laboratory you also get excellent quality control and turn around within 24 hours of when the samples arrived at the lab.

8. Ship the sample as soon as possible (within 24-hours of core collection) or refrigerate the sample and then send to the lab. Storing the sample in a warm place will result in increasing nitrate levels due to microbial activity.

Using the PSNT Critical Soil Test Level (CSTL) to make N sidedress decisions

The critical level for the PSNT test is a range of 21-25 ppm or 84-100 lbs/acre (ppm x 4 = lb/a for 0-12" samples). Iowa, Indiana and SD use a critical level of 25 ppm, Wisconsin uses 21 ppm, Minnesota is working on a critical level and North Dakota hasn't developed critical level yet. If soil test nitrates are above the critical soil test level, then no additional sidedress nitrogen fertilizer is necessary.

Nitrogen Recommendations based on the PSNT test:

If we look at the Iowa guidelines, their CSTL is 100 lbs/acre (25 ppm). If the PSNT nitrate test is greater than 100 lbs/acre, then no additional N fertilizer is recommended. If the PSNT nitrate test is less than 100 lbs/acre, then apply the additional nitrogen as a sidedress application based upon the equation below:

Iowa State N fertilizer calculation for PSNT test (0-12" sample)

Equation: (CSTL lb/a – PSNT lb/a) x 2 = lbs/acre of N fertilizer to apply

Example: If, CSTL = 100 lb/a and PSNT = 80 lb/a, then N fertilizer recommendation rate is 40 lbs/acre

Example: (100 lb/a – 80 lb/a) x 2 = 40 lb/a

President's Column Cont…

samples where the Olsen test and the Bray test both work and are highly correlated (soils with no carbonates). The red shaded area represents samples where the Bray test failed on high pH samples (soil with carbonates).

In summary, soil test data from over 25,000 samples over many years shows that the Olsen soil test performs well on acid soils and is highly correlated to the Bray test. The Bray test, as expected, does not perform well on high pH soils and its use is not recommended on these soils. When grid or zone soil testing a field for phosphorus, I see no need for two types of phosphorus tests to be run based on soil pH when we know that the Olsen test works across all pH ranges.

Figure 1. Olsen vs Bray Phosphorus Method (Soil pH <6.5)

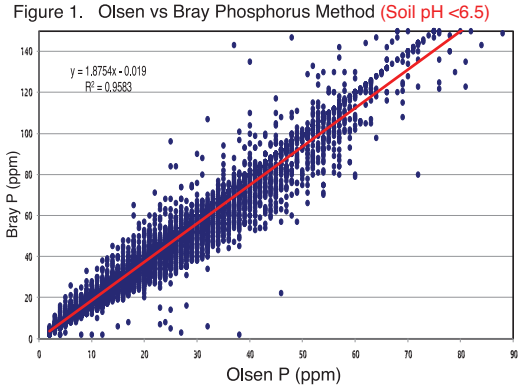


Figure 2. Olsen vs Bray Phosphorus Method (Soil pH <5.0)

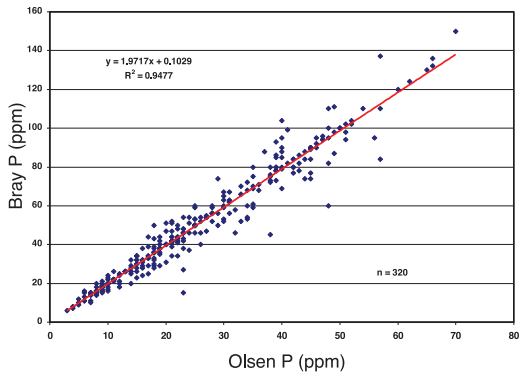
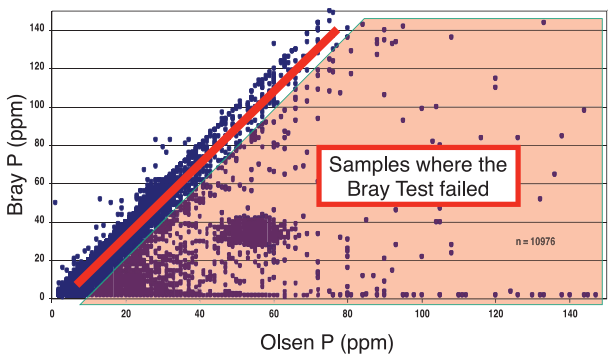


Figure 3. Olsen vs Bray Phosphorus Method (Soil pH >7.5)



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PRESIDENT'S CORNER

BOB DEUTSCH
PRESIDENT
SOIL SCIENTIST/CCA

Bray or Olsen P test?

Recently, I was asked to help an agronomist import soil test data into a fertilizer program. The problem was he had grid sampled a field that had been analyzed using either the Olsen or the Bray phosphorus test based on the pH of each grid. His software could import either Olsen or Bray, but not both. I suggested he convert his Olsen soil test data to Bray values, then import the data. The Bray test fails on high pH soils. The carbonates in the high pH soils neutralizes the Bray extractant and almost no phosphorus is extracted (i.e. 1 ppm Bray test value on a high pH soil where the Olsen test would be 15 ppm).

I suggested that he just request only the Olsen phosphorus test on his gridded fields and learned he believed the Olsen test does not work on acid soils. I believe this is a common misconception, but the reality is researchers have found the Olsen test works well on both low and high pH soils. Historically, the Bray test is used in areas of the Midwest because the overall pH of the fields is less than 7.5. When grid and zone testing started in many areas, agronomists figured out quickly that the Bray test does not work on high pH soils. I believe if the Olsen P test had been developed prior to the Bray test, there would probably be no Bray P test today.

To demonstrate that the Olsen test works very well on low pH soils, I compiled the P soil test data from our Benson MN lab over the last 4 years. Our Benson lab tests thousands of samples each year by both the Olsen and Bray test method. The relationship between the Olsen and Bray P tests when the soil pH is less than 6.5 is shown in figure 1. This figure shows that there is R^2 of 0.9583 between the Olsen and Bray P methods for soils with pH from 4.7 to 6.5. (14,973 samples compared). An R^2 of 1.000 is a perfect relationship so this means these tests are very closely related. Figure 2 shows a very good relationship even with soils with pH less than 5.0!

Figure 3 compares the Olsen and Bray test on 10,976 samples with a pH from 7.5 to 8.4. This graph illustrates the breakdown of the Bray test on high pH soils. The graph essentially has two sets of data points. The line represents

Continued on page 5

NORTHERN NOTES

JOHN LEE
SOIL SCIENTIST/CCA

Spring is quickly approaching and soil moisture conditions range from adequate to excessive in northern areas of ND, MN and southern MB. Some areas that received double their annual rainfall last summer have worries about getting acres planted. Hopefully Mother Nature will cooperate with warm and dry weather this spring!

Spring soil testing is underway in many areas and AGVISE is ready to provide the same great service as always. Samples are tested the day after they arrive at the lab and results are posted to the AGVISOR program late in the afternoon the day the samples are tested. For most AGVISE customers, this amounts to 48 hours from the morning they sent us their samples.

If you need hydraulic or hand sampling equipment please give us a call. We have good stocks of all of the various soil probe tubes and tips you need to handle wet soils in the spring!