

Timely information for agriculture

August-September 2018

## NORTHERN NOTES,

Many people feared the drought of 2017 would continue in the Dakotas and the Canadian Prairies, but for the most part, rainfall has been much better than last year. While there are still some dry pockets, most areas will have near normal yields this year. That is a great relief to everyone in the region!

Soil testing has begun in winter wheat areas and will pick up as spring wheat harvest gets going. Having good soil sampling equipment is critical to running an efficient



JOHN LEE Soil scientist/cca

soil sampling program. Your sampling equipment has to handle variable soil conditions (wet or dry, sand or clay). This year we released a new "dry" tip for our HD chromoly-steel probe body. This tip will handle hard, dry soil conditions better than the "wet" tip that we have had for several years. If you have dry soil conditions after harvest, I would recommend that you add the HD dry tip so that you have the most capable sampling equipment for this fall.

If you need any soil testing supplies or sampling equipment, please give us a call. We are ready to provide great service and support this fall. We hope you have a safe harvest.

#### Wintex 1000 – The Ultimate Hydraulic Topsoil Sampler

Since 2010, we have promoted the Wintex 1000, an automatic hydraulic onedepth soil sampling unit that attaches to ATVs or UTVs. This is the "ultimate" topsoil sampler because of its speed, labor-saving qualities, and consistent sampling depth for collecting topsoil samples compared to manual hand probes that many



grid samplers are still using. With the Wintex 1000, you simply press one button while seated on your ATV/UTV, and the Wintex 1000 collects the soil core and automatically expels it into a collection box within 3-4 seconds. No more jumping off your ATV every time to collect the sample! The Wintex 1000 (www.wintex1000. com) has been manufactured for 18 years in Denmark (www.wintexagro.com). We promote and support these units through the U.S. distributor Precision Technologies

#### Fall Special on 24" Hydraulic Sampling System

AGVISE is offering special pricing on the first 25 soil sampling systems sold this fall. This special price applies to our 24-inch electric/hydraulic soil sampling system. AGVISE will credit \$200 of free laboratory analysis to your account with the purchase of one \$2900.00 sampling system. This offer is only good for the first 25 sampling units sold this fall. Our sampling system includes two stainless steel probe bodies and tips and our heavy-duty (HD) probe with the wet tip and the new dry tip included. The HD probe is best for wet and frozen soils. You can view all components of this sampling system on our website. Visit www.agvise.com, click on "Products and Equipment," then "Hydraulic Sampling Equipment."

For customers who need to collect deep soil samples for crops such as sugarbeet, we also have a 42-inch telescoping cylinder system. This system is powered by an 8-HP Honda hydraulic pump or an electric/hydraulic pump. Please call for details on these systems.

#### INSIDE

Sampling after Banded Nitrogen Application2
New "Dry" Tip for Heavy-duty (HD) Probe3
New Poster to Promote Soil Testing3
With no fertilizer or manure, can we eliminate
nitrate in drain tile water?4
Postcards and Poster Promote Soil Testing 5
Online Soil Sample Submission5
Fertility Seminars5
President's Corner6
Southern Trends

## Soil Sampling after Banded Nitrogen Application

Soil testing is often used as an auditing tool in nutrient management. Each year, we are asked, "What is the best method to collect a representative soil sample after a banded nitrogen fertilizer application?" This question often comes from customers trying to see if fallapplied nitrogen is still present in spring, if the correct fertilizer rate was applied, or if nitrogen was even applied at all! More recently, we have heard this question asked about sidedress nitrogen applications, including injected anhydrous ammonia and surface-banded UAN, when the sampling time may only be a few weeks after application.

Of course, we all understand that if you collect a soil core directly in fertilizer band, the nutrient concentration in that soil core will be extremely high compared to soil cores collected

outside the fertilizer band. The discrepancy between on-band and off-band soil cores makes collecting a representative soil sample incredibly difficult.

We conducted a demonstration project to assess on-band and off-band variation after nitrogen fertilizer application. Urea fertilizer was banded 4 inches deep with 30-inch spacing at rates of 75 lb N/acre and 150 lb N/acre. After three weeks, we used an array of square steel tubing to collect soil samples across the entire 30-inch row and analyzed soil samples for ammonium and nitrate. We used a sledgehammer and 2×4s to pound the square steel tubing into the ground; we went through a lot of 2×4s!

This intensive sampling protocol easily located the urea bands. In the band area, inorganic N (NH<sub>4</sub> + NO<sub>3</sub>) averaged 383 and 595 lb N/acre for low and high urea treatments,



respectively. This extreme variation in inorganic N across the row highlights why soil sampling after banded N applications must be handled with care. Averaged across the entire row, inorganic N was 78 and 119 lb N/acre for low and high urea treatments, respectively, which are more plausible results.

In this project, we could reasonably estimate the applied N rate only when averaging all soil samples collected across the row; however, this method still had inaccuracies and certainly is not practical. Our protocol only assessed inorganic soil N (NH $_4$  + NO $_3$ ) content at one location in the field. For a representative sample across the entire field, you would have to replicate this process another 15 or 20 times.

After three weeks, most nitrogen was still present as ammonium in the urea band. Only 10% of fertilizer N had converted to nitrate even though soil temperature and moisture conditions were conducive to nitrification. With

> banded N applications, both ammonium and nitrate analysis are recommended because the high ammonia concentration in the band delays nitrification. As more ammonium converts to nitrate and plant roots draw water and nitrate to their roots, the nitrate concentration will be distributed more evenly across the row.

Soil testing should have specific goals and applications, and this project highlights why auditing a banded N application is not one of them. If you know where the band-center is located, you can still confirm that some N was applied, but determining the application rate remains problematic. However, if you do not know where the band is located or only intercept the band-edge, the task may be entirely fruitless, especially if residual nitrate is high. One misplaced core will quickly throw the entire result.





#### Wintex 1000 Cont...

in Bancroft, IA. To see set-up examples or videos, visit www. agvise.com/wintex-1000 or search online.

#### Benefits of the Wintex 1000 are:

- 1. Increased speed and productivity
- 2. Consistent sampling depth
- 3. Easy operation for any sampler
- 4. High-quality soil cores in all soil types, from sand to heavy clay, even when wet
- 5. Minimal maintenance, durable construction, designed to withstand years of use
- 6. Simple installation, fits on nearly all ATV/UTVs, quick removal within 10-15 minutes
- Change sample depth quickly and easily from 4-inch minimum to 12-inch maximum
- 8. Reduced wear and tear on your body, eliminate hand sampling fatigue

## **New Poster to Promote Soil Testing**

This year we created a new poster to help you promote soil testing to your growers. The new poster highlights 4R Nutrient Stewardship, which has been increasingly discussed in recent years. Of course, we all know that good nutrient stewardship begins with soil testing! Only after you have done the proper soil testing, you can follow the 4Rs: Right Rate, Right Source, Right Place, Right Time.

We will be mailing or dropping off posters before the fall soil sampling season begins. If you have not received a poster, please call 701-587-6010 and we will send you one at no charge.



## New "Dry" Tip for Heavy-duty (HD) Probe.

AGVISE has offered the heavy-duty (HD) probe and tip for our hydraulic sampling systems for 6 years. We designed the HD probe to handle very wet, high-clay soils and even frozen soils. Customers have told us the HD probe and wet tip work great in sticky, wet soils, but they would like to have a tip that works well in hard, dry soils too. This spring we designed and tested a new "dry" tip for the HD probe body. The new dry tip features a cutting edge and larger opening for easier sampling



in hard, dry soils. We have a good supply of HD dry tips ready for this fall. If your area is dry after harvest, you will want to try this new tip on your HD probe.

If you have not had the chance to try our HD probe, you really need to try it out. The wet tip works great in sticky, wet soils. It seldom plugs and gives you full cores (use WD-40 for lubrication in wet conditions). With the HD wet and dry tips, you can get better quality soil samples across a range of soil conditions, which will save you time and reduce frustration in the field. If you have any questions on the HD probe and tips, please give us a call.

## With no fertilizer or manure, can we eliminate nitrate in drain tile water?

Whenever nitrate meets water, you can almost guarantee that nitrate will move somewhere. In agricultural fields with tile drainage, improved drainage often increases nitrate leaching, which ultimately makes its way into streams and rivers. Some people believe that if no fertilizer or manure were applied to tile-drained fields, we could eliminate nitrate in tile water and subsequently in streams and rivers.

To test this hypothesis, Discovery Farms Minnesota worked with Goran Farms of Kandiyohi County and the University of Minnesota on a special project evaluating turkey litter impact on water quality and corn production. One of Goran Farms' fields (5.5-acres harvested, 3.3-acres drained) has not received any commercial fertilizer or turkey litter since 2007. Tile water flow and quality was measured each year to assess the effect on nitrate-N in tile drainage water.

Goran Farms Control field, no fertilizer or manure applied (Data adapted from Discovery Farms Minnesota)					
Year	Rainfall	Nitrate-N in tile water	Nitrate-N removed via tile drainage	Yield	
	inch	ppm	lb/acre	bushel/acre	
2007 (soybean)	20.8	19.3	16.8	52	
2008	18.3	20.8	9.9	139	
2009	25.0	12.3	1.9	108	
2010 (soybean)	41.6	10.8	46.4	61	
2011	34.6	8.6	25.7	129	
2012	21.8	7.2	4.6	108	
2013	21.1	4.1	2.5	76	
2014	32.3	4.6	5.7	81	
2015	21.5	4.9	1.3	104	
2016	36.8	2.1	5.8	90	
2017	30.6	2.2	2.1	93	
Crop sequence	Average				
Soybean	31.2	15.0	31.6	57	
Corn after soybean	26.5	14.7	17.8	134	
Corn-on-corn after soybean	23.4	9.8	3.3	108	
Corn after corn	27.0	5.3	3.4	95	
Initial soil properties in 2008: soil pH 7.9, soil organic matter 5.2%					

Over a ten-year period, nitrate-N concentration in tile water decreased to about 2 ppm, but not to 0 ppm, even with no fertilizer or manure application. University of Minnesota researchers indicated that the "manure legacy" was gone or minimal on this field by now. The amount of nitrate-N (lb/acre) lost each year was greatly influenced by annual rainfall. In 2010, 46.4 lb/acre nitrate-N was lost with 41.6 inches of rain, yet the average nitrate-N concentration in tile water was only 10.8 ppm. In contrast, 2008 had much higher nitrate-N concentration (20.8 ppm), yet the field only lost 9.9 lb/acre nitrate-N because the annual rainfall was only 18.3 inches. The nitrate concentration in tile water is one important factor, but rainfall remains the key driver to determine the amount of nitrate lost in tile water each year.

Purdue University has published "Interpreting Nitrate Concentration in Tile Drainage Water" (Purdue Univ. Ext. Circ. AY-318-W) that provides expected ranges for nitrate-N in tile water under different land uses and production practices. With optimum N rates for corn production, tile water with 10-20 ppm nitrate-N is considered normal. If tile water has over 20 ppm nitrate-N, then applied N fertilizer likely exceeded crop need. When nitrate-N concentration is below 10 ppm, the field

was likely under fertilized. The Goran field had nitrate-N concentrations below 10 ppm since 2010 and less than 5 ppm since 2013. It is obvious that corn yields have been low because the field has been under fertilized. Moreover, the nitrate concentration has not reached zero in spite of no fertilizer or manure application for over 10 years. The bottom line is there will always be some nitrate in tile water leaving a field because there are soil and environmental factors outside our control. In row crop production, you should expect tile water to contain 10-20 ppm nitrate-N even when using best management practices and N rates based on current university research.

NO3-N Concentration (ppm)	Interpretation		
<u>&lt;</u> 5 ppm	Native grassland, CRP land, alfalfa, managed pastures		
5-10 ppm	Row Crop production on mineral soils without N fertilizer Row Crop production with N applied at rate 45 lb/a below the economically optimum N rate* Row Crop production with a successful winter crop to "trap" N		
10-20 ppm	Row crop production with N applied at optimum rate Soybeans (nitrate of 10-20 ppm in tile water is common)		
≥ 20 ppm	Row Crop production where: N rate applied exceeds crop need N application timing not synchronized with crop need Environmental conditions limit crop production and N fertilizer use efficiency Environmental conditions that favor greater than normal mineralization of N from soil organic matter		

Lower than the N rate that maximizes yield.

## **Postcards and Poster Promote Soil Testing!**

This is the 15th year that AGVISE has provided customers with free "postcard mailers" to send to their growers to promote soil testing. These postcards are used to direct growers' attention to soil testing right after harvest begins. Customers who use these postcards tell us that the postcards get their growers' attention, which allows them to start soil testing earlier and ultimately test more fields. We will customize your postcard message so you can tell growers exactly what you want! Here is an example of what one customer had us print on his postcards last year:

"Give our Agronomy Staff a call today to sign up for soil testing (320-123-4567). Soil testing is the first step toward a profitable crop in 2019!"

Once you receive your customized postcards, all you



have to do is put the grower's name and address on the postcard, add a stamp, and put them in the mail. These postcards also fit into most statement envelopes so you can include them with statements if you want. If you want us to personalized some postcards to send to your growers at no charge, please call our Northwood office at 701-587-6010 and ask for Mary. She will ask what you want printed on your postcard and how many postcards you want. If you have any questions, please call John Lee or Richard Jenny.

#### **AGVISE Soil Fertility Seminars January 8, 9, 10**

AGVISE Soil Fertility Seminar dates and locations are set for January 2019. We will send a registration letter to AGVISE customers in early November.

#### **Seminar Locations**

January 8 – Granite Falls, MN | January 9 – Watertown, SD | January 10 – Grand Forks, ND

#### **Online Soil Sample Submission – Still waiting to try it?.**

Since 2011, AGVISE has offered online sample submission as a feature within AGVISOR. Over half of AGVISE customers utilize the timesaving benefits of online submission, now having submitted over 1.7 million soil samples online. Online submission is quicker, easier, and more accurate than paper forms. When using the online system, grower and field information is entered and saved within AGVISOR, so there is no more writing the same information onto paper forms year after year! You simply select the grower, field, and soil test option, then print the barcode reference stickers for each soil sample bag. You can also save default crop choices, P & K guidelines, sample depths, and default soil test packages to streamline the entire process. Online sample submission saves time and prevents mistakes (e.g., spelling mistakes, missing information).

You also can link an FSA map to each field (Surety

Online Mapping subscription required). The FSA map prints on the sample order form and final soil test report, which adds a professional touch for your growers to see on their soil test reports.

For third-party samplers, online submission is particularly convenient because PDF sample order forms and barcode reference stickers can be emailed to the sampler right away (no delays with receiving paper forms anymore). The FSA field map also appears on the sample order form, which helps eliminate confusion for the sampler in the field.

If you want to start using the online sample submission system, please call John Lee or John Breker at Northwood, ND (701-587-6010) or Richard Jenny at Benson, MN (320-843-4109). We can show you how the system works and help you get started by importing grower and field information from last year!



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# **PRESIDENT'S CORNER**

We all know that saline soils can impair plant growth, but do you know just how salt reduces plant growth? Understanding the physiologic effects of salinity can help explain why certain types of salinity are worse than others.

The primary problem with saline soils is that dissolved salts in soil water reduce the ability of plant roots to take in water. Plants try to draw water into their roots, but salts also attract water. As a result, the roots and salts are competing for the same water molecules. If salinity is too high, the plant cannot effectively uptake water. This is

why salt-stressed plants often look like drought-stressed plants, even when soils may have adequate water.

A second way salts impair plant growth is through specific ion toxicity. Certain salt ions, such as sodium, chloride, and boron, are particularly damaging to plant cells. If these specific salt ions are too high in soil, then the ions can accumulate in plant tissue and cause visible leaf chlorosis and necrosis. Certain crops and even varieties are more susceptible to specific ion toxicity. This highlights why saline soils with high sodium and chloride can be more detrimental to plant growth than other saline soils with calcium-, magnesium-, or sulfate-based salinity.

A third way that salts may interfere with plant growth is nutrient uptake antagonism. A high salt ion concentration may compete with nutrient ions for ion transport proteins on plant roots, thus antagonizing uptake of essential plant nutrients. For example, high chloride in soil may reduce plant uptake of nitrate-N.

In our region, soil testing for soluble salts is paramount because salinity affects millions of acres across the Northern Plains and Canadian Prairies. Based on the salinity risk, you can adjust your crop selection to optimize production on your fields. This is why all AGVISE soil test options include the soluble salt test. It is very important.



BOB DEUTSCH PRESIDENT SOIL SCIENTIST/CCA

# **SOUTHERN TRENDS**

During the 2018 growing season, the Benson, MN laboratory has been tremendously busy with early-summer topsoil grid samples and plant tissue analysis. Even with the extremely wet growing season and higher than normal GDDs in the southern



RICHARD JENNY Agronomist/cca

portion of Minnesota and southeastern South Dakota, which are traditionally areas with intense June grid sampling, there has been a strong increase of grid sampling extending farther than usual into July.

Our Benson laboratory will have higher daily capacity for the fall soil sampling season. We have added new instrumentation, personnel, and hours for our already 6-day workweek time frame in October-November. Unlike Fall 2017, let's hope Mother Nature will give us more assistance this upcoming sampling season!

For the rest of 2018, have a safe and prosperous year.