



Winter 2016

SOUTHERN TRENDS

Greetings from our Benson lab! It has been a big fall soil sampling season and our second largest early-summer sampling season (June topsoil grid samples on unfertilized soybeans).

What an unexpected and pleasant surprise for many producers during harvest in our area this fall! Crop yields have been much better than expected, even though some areas were extremely wet in August and September. It looks like the crops used much of that moisture to create yield (except the spotty droughty areas to the west).



RICHARD JENNY AGRONOMIST/CCA

In some of the very wet areas, some soil test potassium (STK) levels have been testing lower than "expected." This issue becomes more obvious when fields that have traditionally been tested as a composite whole field sample and are now tested with a grid or zone sampling scheme. For some fields with a history of gridding/zoning, particular sampling points are 50 to 100 ppm lower in K this fall compared to 2014 or 2012. This is an additional value of having a history of intensive sampling. You can identify situations that are "unexpected" and try to learn from them and make the necessary fertility adjustments. In the drier areas where crops have yielded poorly, the carry-over soil test nitrate (STN) is higher than normal in many fields.

We hope you and your clients have a successful and safe fall harvest season. We wish you a very Happy Thanksgiving. We'll be at the Winter Trade Shows, so stop by and visit.

Soil Fertility Seminars January 10, 11, 12

AGVISE Soil Fertility Seminar dates and locations are set. The dates and locations for our 2017 Soil Fertility Seminars are listed below and a registration letter was sent to AGVISE customers in early November. If you did not receive the mailing, please call 701-587-6010 and we will send it to you. Please make sure you register early for these seminars if you plan on attending. Space is limited and there is usually a waiting list. An email was also sent to everyone on our mailing list in mid-November to let people know about these seminars. If you received this newsletter, you are on our mailing list, but you may not be on our email list. If you want to receive future emails on our seminars, newsletters and technical information, please call Teresa at our Northwood office and give her your current email (701-587-6010). To register for our Soil Fertility Seminars, call 701-587-6010 and ask for Shelly or Patti.

Seminar Locations	CEU Credits applied for
January 10, Granite Falls, MN	1.5 - SW, 4.5 NM
January 11, Watertown, SD	1.5 - SW, 4.5 NM
January 12, Grand Forks, ND	1.5 - SW, 4.5 NM
March 14, Portage La Prairie, MB	To be determined

AGVISE Laboratories— Celebrating 40 years of Service

Most of you may not know that AGVISE Laboratories is celebrating 40 years of service to our customers. AGVISE has a rich history of providing agronomic testing services to customers across North America and as far away as China!

AGVISE was founded in 1976 by Dr. Ed Lloyd, who was a professor in plant pathology at NDSU in Fargo, ND. Ed saw an opportunity to provide research services to chemical companies for product development and crop consulting services to area growers. He purchased some land near Northwood, ND for the research business and Jeeps to soil sample fields for the crop consulting program. In the winter of 76-77 Ed approached me to setup a soil testing lab for his operation. The soil testing laboratory was up and running by the spring of 1977 and I'm still here 39 years later. A second AGVISE

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AGVISE Laboratories - Celebrating 40 years of Service Cont...

location was started in Benson, MN in 1979. As the years went by, AGVISE chose to concentrate on the research and laboratory portion of the business and phase out the crop consulting. Many former AGVISE consultants are some of our best and oldest customers today!

Just after Christmas on December of 1996, a fire destroyed our laboratory in Northwood. It was at that time that AGVISE was split into two companies. The research portion of the company was renamed AGVISE Research and was kept by Ed Lloyd and his sons. The laboratory portion of the business was launched by the employees involved in the testing lab, and was renamed AGVISE Laboratories. AGVISE Laboratories was established as an ESOP (Employee Stock Ownership Plan) company, with every full-time employee becoming a partial owner. As the Northwood lab was being rebuilt, our Benson MN laboratory was able to test soil samples normally tested in Northwood. They saved our bacon!

Through this time we added many critical staff members at both our Northwood and Benson locations (too many names to mention!) Many of our employees have now been with AGVISE more than 25 years. In late August of 2007, calamity struck a second time, when an EF-4 tornado leveled our laboratory in Northwood. We again called on the staff of both our labs to help rebuild

the lab in Northwood and keep our customers happy by testing all soil samples at our Benson, MN lab for several months. Every employee performed like a superhero as they served our customers and rebuilt the Northwood lab again; a task which seemed impossible at times!

AGVISE continues to grow quickly in the areas of soil and plant analysis. Our annual soil sample volume alone now exceeds 500,000



BOB DEUTSCH PRESIDENT SOIL SCIENTIST/CCA

between both laboratories. The advanced computer technology used in all aspects of our laboratory testing, and the ability to deliver test results through the internet to our customers is quite amazing. This year over 50% of all soil samples will be submitted online (no paper work needed!) and tracked with unique bar-coded reference number stickers. Who would have thought we could come this far in only 40 years!

We would like to thank all of our customers and especially our loyal employees. With your help and support we will be able to continue serving you for many years to come!

Nitrogen Rate and Water Quality

By: Jerome Lensing and George Rehm Discovery Farms – Minnesota

The 4R concept is an excellent guide for nutrient use in Minnesota. This concept is usually thought of as affecting production; but, there are water quality implications as well. As harvest wraps up, thoughts turn to RATE of N to be used for the grain crop in the rotation next year. This discussion will focus on the importance of testing in determining RATE of N to use.

To illustrate the impact of RATE of N used, let's consider the edge of field monitoring at a farm in Blue Earth County, where both surface flow and subsurface flow were measured for nitrogen. Manure from hogs in confinement is usually applied before the corn crop in a corn/soybean rotation. Soils have a silty clay or silty clay loam texture.

RATE of manure used is adjusted for the analysis of the manure which has

remained relatively constant from year to year. Potential loss of N is minimized because manure is fall applied and injected. Based on the manure analysis, RATE of manure used is considered to be adequate for optimum yields which have been in the range of 180 to 220 bu/acre.

Data from the 2015 water year (Oct. 1, 2014 through Sept. 2015) are used to illustrate nitrogen movement in the landscape. Most of the rainfall (30.8 inches) occurred during the spring and summer. Nitrogen from surface flow was 3.4 lb. N per acre. For subsurface flow (tile lines), N movement was 23.0 lb. N/acre. Soil samples following corn harvest showed a total of 34 lb. N/acre to a depth of 2 feet. Considering the high organic matter content (5.0% to 6.0%), this is a low amount and a good indication that an excessive RATE of N was not used.

Use of laboratory analysis is an important management practice for this Minnesota Discovery Farm. Analysis of the manure is a very important piece of information. Analysis of soil samples to a depth of 24 inches for nitrate-N after harvest is an excellent tool to indicate if N RATE has been excessive.

Analysis of soil samples collected to a depth of 24 inches for nitrate-N has been a suggested management practice to determine RATE of N to use for corn for many years. This is a fall practice for the western Corn Belt. Suggested time for sampling shifts to spring in eastern Minnesota and the Eastern Corn Belt. In addition to an asset in making decisions regarding production, analysis of manure and/or soil will continue to be a suggested management practice for protecting water quality.

Rick Swenson Sets Guinness Record for Pumpkin Paddling!

Rick Swenson from Fergus Falls, MN has been growing giant pumpkins for six years. In the past he participated in local giant pumpkin contests for AGVISE customers and is now competing in big time competitions! Ricks personal best giant pumpkin was 1,227 lbs. last year!

This year Rick decided to take one of his giant pumpkins for a ride on the red river in search of a Guinness record! When he started out in Grand Forks on the Red River at 7:30 AM, he thought he only had to go 8 miles to break the Guinness record. A few hours into

his journey he found out a lady in Washington had just paddled 15 miles in a pumpkin! Rick decided it wasn't a big deal, since his original plan was to paddle to Oslo, MN which was over 25 miles.

The entire trip took 13 hours and 40 minutes and I heard that Rick had blisters on his hands from a lot of paddling! Rick said the whole event was not possible without the help of family members and friends who escorted

him in two boats while giving him moral support, cooking burgers and being there in case he needed help. In addition to paddling down the red, each year Rick carves one giant pumpkin into a Jack O Lantern for the "Zoo Boo!" celebration at the Chahinkpa Zoo in Wahpeton, ND for the kids to enjoy! I am sure the kids enjoy a 1,000 pound Jack O Lantern very much!











Adam Grew a Giant this year! 1,535 pounds!

AGVISE did not have a giant pumpkin contest this year but once it gets in your blood, you just keep going for it! Adam Johnson has been growing giant pumpkins for many years and was rewarded this year with a 1,535 lb giant pumpkin. Adam won 5th place at the Stillwater, MN Harvest festival this fall with very tough competition. This is a great achievement, but I am sure he will be trying to break records again next year! Congratulations to Adam for growing a 1,535 pound Giant this year and best wishes for next year!

Updated Corn Fertilizer Recommendations for Minnesota

About 6-8 years ago, the University of Minnesota, along with the other Corn Belt states of Iowa, Wisconsin, Illinois, Michigan and Ohio, updated their corn nitrogen recommendation guidelines and is now referred to as the MRTN (Maximum Return To Nitrogen) system. The MRTN system has replaced the "yield goal x corn N factor" system. The most common "yield goal x corn N factor" example is:

N recommendation = (yield goal x N factor) - (soil test N) - (previous crop credit)

In Agvisor, both of these types of recommendations are available for corn and you can adjust the N factor as well. By choosing the crop choice "Corn-Grain" you'll receive the "yield goal x corn N factor" nitrogen recommendation and by choosing the crop choice "Corn NP/CP" you'll receive the MRTN nitrogen recommendation. The NP/CP refers to the nitrogen price/corn price ratio that is central in the MRTN system. This is a Corn Belt regional approach to nitrogen rate recommendation and can be viewed online at http://cnrc. agron.iastate.edu/ or at our "educational articles" section at www.agvise.com. This "corn nitrogen rate calculator" website is hosted and managed by Iowa State University Extension Service.

	ines for use of nitrog rrigation is not used.	en fertilizer for corn	grown following cor	n or soybean when
	Corn/Corn		Soybean/Corn	
N price/Crop	MRTN	Acceptable range	MRTN	Acceptable range
value ratio	lb N/acre			
0.05	180	160 to 200	140	125 to 160
0.10	155	145 to 170	120	105 to 130
0.15	150	140 to 155	105	95 to 115
0.20	140	130 to 150	95	85 to 105

For the updated nitrogen guidelines, new data from university corn test plots has been added into the database, resulting in updated guidelines. This will increase the suggested nitrogen rate slightly, reflecting the corn yield increase with added nitrogen over the past few years. These

new guidelines are currently available online and should be in publication by the MN Extension Service later this year or early next year (Table 1).

Table 2. Guidelines for use of N fertilizer

For situations of irrigated sands with corn/corn rotation, the following table below is the newest U of MN Extension Service nitrogen rate guideline (Table 2).

Table 2. Guide for corn follow irrigated sandy	ing corn whe		
N price/Crop value ratio	MRTN	Acceptable range	
	lb N/acre		
0.05	235	210 to 255	
0.10	210	190 to 225	
0.15	190	175 to 210	
0.20	180	165 to 190	

This specific nitrogen guideline for irrigated corn is not available in Agvisor. It should be noted, that for farmers in Minnesota to comply with various government conservation programs, the recommendations must either be University of Minnesota guidelines or that of another land grant college in a contiguous state. These 2016 revised guidelines (AG-FO-3790-D) can be found online using the search for "Fertilizing Corn in Minnesota."

Sulfur guidelines for corn have also been updated (Table 12). Sulfur will be recommended in

Table 12. Broadca corn grown in Mir		ulfur guide	elines for	
	0-6" Soil Organic Matter Concentration			
Crop Rotation	0-2%	2-4%	4%+	
	lb S/acre as SO ₄ -S			
Soybean/Corn	10-25	10-15	0*	
Corn/Corn	10-25	10-15	5-10**	
Sandy Soils	25	25-25	15-25	

more situations than in the previous

Research data suggest that a rate of 10 lbs of sulfate 8 may be warranted when corn follows soybeam on poorly drained calcareous soils "A low rate of 8 is suggested when corn follows corn and SOM is 4% or greater. A rate of 10-15 lbs of 8 is suggested for corn following corn on reduced tillage in the presence of high levels of surface residue

guidelines. For example, in Western Minnesota with poorly drained, high pH and high organic matter soils, university research shows a positive

and consistent yield increase with the addition of 10-15 lbs/acre of broadcast sulfate-sulfur in both a corn/soybean and corn/corn rotation. Also, they have documented positive corn yield response to 10-15 lbs/acre sulfate-sulfur on high residue corn/corn rotations.

Beet Lime Update.

We started a beet lime demonstration project three years ago near our Northwood, ND laboratory. While most of the soils in this area have a pH over 8.0, there are some coarse textured soils that can have a very low pH. We were looking for a check soil to use in our laboratories when we came across a soil with a pH of 4.7! I was pretty surprised to find a soil that was this acidic, so I resampled the site and had our lab test it again (you can never trust those labs! Ha Ha!). The pH of the resample was 4.7 so this confirmed that very low pH soils do occur in

Effect of Beet Lime on Soil pH (so far!)				
Beet Lime Rate	Soil pH 05/14 Initial	Soil pH 09/14 Soybean	Soil pH 07/15 Corn	Soil pH 08/16 Soybeans
Check	4.8	4.8	4.7	5.1
2500 lb/a ENP	4.8	5.5	5.2	5.4
5000 lb/a ENP	4.8	5.6	5.7	5.5
10000 lb/a ENP	4.8	7.4	7.0	7.4

eastern ND. This was a perfect site to start a beet lime project. In May of 2015 we applied beet lime at three rates and tilled it into the soil. The farmer has this field in a corn, soybean rotation and we have been sampling the site each year to see what is happening to the soil pH. If you look at the data in the table you can see that the highest rate of beet lime (13,000 of material) has increased the soil pH to greater than 7.0 and has held it there now for 3 years. The lower rates appear to still have increased the pH a little, but were not able to increase the pH above 6.0. We will continue testing these sites each year to see how long the beet lime will have an effect on the soil pH on this coarse textured very acidic soil.

Water Logged Soils—How Can There be any N left?_

Some areas in NE North Dakota and NW Minnesota were water logged from midsummer through harvest. We have had several questions from customers wondering how there can be any nitrate left in the 0-24" profile on the heavy clay soils with the excessive rainfall the area has received.

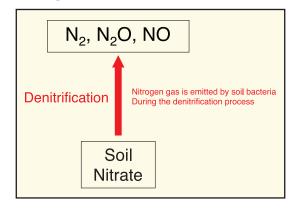
Nitrogen losses from poorly drained, fine textured, water logged soils is mostly cause by denitrification. Denitrification occurs when soils become saturated and many types of bacteria use oxygen from the nitrate (NO_3) for respiration. The nitrate is transformed mostly to N2 gas which is lost to the atmosphere (see figure)

For denitrification to occur you need four things:

- Nitrate in the soil profile
- Warm soil temperatures (80-100° F is best for denitrification)
- Water logged soil
- Dissolved carbon (high organic matter soil)

Denitrification is greatest in the topsoil where the organic matter is the highest, where the soil is the warmest, most of the bacteria are located and where the highest amount of nitrate usually is. So in these water logged soils in our region, it makes sense that most of the N was denitrified from the topsoil, but there is substantial nitrate remaining in the subsoil in some fields. Denitrification of N from the subsoil is lower due to cooler temperatures, lack of bacteria and much lower organic matter. This is a good thing as it will reduce the N fertilizer needs for farmers next season. Hopefully the areas with water logged soils will have a chance to dry out this fall and winter and be able to be planted next spring.





Soil Health Testing: Calibration and Correlation Research Needed

AGVISE laboratories has offered new soil health testing methods for the past two years. The Haney test and the Solvita test are examples of soil health tests now being evaluated. There has been a lot of interest in these tests as some NRCS programs include these tests as one of the enhancements farmers can choose to do when they participate in the programs.

As farmers get test results from these new soil health test methods, they are asking how they can use these results to modify their fertilizer guidelines. The problem is that these new tests do not have the needed research from this region to make fertilizer recommendations at this time. It is very important that any new soil testing method have research that shows it is correlated to crop uptake or yield. A soil test is well correlated if a low test predicts a low yield for a crop and a high test result predicts a high yield. If the research shows a strong relationship then that test is well correlated with crop response. Once a test is found to be well correlated with crop yield, you need calibration research. Calibration research tells you if the new soil test can predict how much of a nutrient is needed to meet the crops need at low test levels and at high test levels.

At this time there is some research at the University of Minnesota evaluating the Haney tests methods. A recent publication from the U of M discusses the new Haney soil health method and compares it to the accepted soil test methods which have extensive correlation and calibration research in this region. The conclusion they came to is the Haney test needs to have correlation and calibration research in this region to be of value to farmers. Since the Haney test does not have this research behind yet, they recommend that farmers still do regular soil testing to get their fertilizer recommendations. Sometime in the future, after the research has been done on these new tests, they may be useful for farmers in this region. On September 26 there was a blog from the University of Minnesota titled: *Should soil health test results be used when determining fertilizer needs in Minnesota?*

This research compares the fertilizer recommendations based on accepted soil testing methods to the Haney test methods. To view this blog and the research comparing the N, P, and K recommendations for accredited methods and the Haney test, go to the AGVISE website. Go to www.agvise.com, click on agronomic information—> educational article—> soil health. Then click on the link to view the pdf.



604 Highway 15 West P.O. Box 510 Northwood, North Dakota 58267 701-587-6010 / FAX: 701-587-6013

Home Page: www.agvise.com

PRESIDENT'S CORNER

This past week I was having morning coffee with a farmer friend of mine and I asked him how corn harvest was coming along. He said his harvest was going well and he was getting some of the best yields ever, but corn prices were too low! He then proceeded to tell me I, along with everyone at AGVISE, were part of the reason for the low prices. He told me our fertilizer guidelines were too good and everybody is getting big yields and causing these low prices. I'm still not sure if he was giving me some type of backward compliment or not.



BOB DEUTSCH PRESIDENT SOIL SCIENTIST/CCA

I told him if AGVISE was part of the cause for the low prices, then our customers, the agronomists and crop consultants, should get part of the blame too (we need to spread the blame around!). They are always helping their farmers get the highest yields by advising them to apply the right amount of fertilizer in the best way, seed the best varieties and apply the appropriate pesticides as needed.

My friends' response made me wonder "What would crop yields be without fertilizer?" Here are some numbers I found from various sources:

- 1. A survey of U.S. crop production estimated that average corn yield would decline by 40 percent without nitrogen (N) fertilizer.
- 2. Long-term studies in Oklahoma showed a 40 percent wheat yield decline without regular N and P additions.
- 3. A long-term study in Missouri found that 57 percent of the grain yield was attributed to fertilizer and lime additions.
- 4. Long-term trials from Kansas show that 60 percent of the corn yield was attributed to fertilizer N and P.

After looking at this data, I guess my farmer friend is right. Without proper fertilization, yields would go down a lot and I am sure commodity prices would be higher today, but nobody would want to go there. American farmers have always helped feed the world and they know how important that is!

NORTHERN NOTES

This year was a real roller coaster. Dry soil conditions at planting time had everyone thinking about the drought year of 1988. It finally did start raining in June. Some areas continued to get rainfall and it became excessive. Some areas of NE North Dakota and NW Minnesota had over 30" of rain from Mid-June to September.



JOHN LEE SOIL SCIENTIST/CCA

On these flat poorly drained soils this caused a lot of crop losses.

Other areas did have quite a bit of rain later in the summer and it really helped the soybeans and corn crops. Many areas had record soybean and corn yields. Harvest was a real challenge in the wet areas, but with the assistance of tracks on combines it did get done. Fields in the wettest areas have deep ruts and will be a challenge to get planted next spring.

Soil testing was also a challenge as harvest was delayed with the wet weather. Samplers who used our Heavy duty soil probe and tip were able to get good quality soil samples in wet soils. Some sampling will be done once soils freeze and trucks can get across the fields. The HD probe also works great in frozen soil. The HD probe is made of chromoly steel and is much harder to bend than our stainless steel probe bodies. If you are having a difficult time sampling wet or frozen soils, please give us a call so we can send you the HD Probe and tip. You will be surprised how well this probe works!