Timely information for agriculture

AGVISE LABORATORIES

Fall/Winter 2009

NORTHERN NOTES

JOHN LEE
SOIL SCIENTIST/CCA

2009 has been a struggle for everyone and this is one of those years you want to forget. A cold wet spring delayed planting and millions of acres did not get planted in North Dakota alone. A cool summer resulted in incredibly high wheat yields and very disappointing protein levels. Row crops looked pathetic until a warm September saved our bacon. October came and went with little harvest due to cold and wet conditions. November started as another warm dry month. I hope it stays that way so we can finish harvest.

Soil testing has been progressing as harvest has allowed. Wet soil conditions have made soil sampling difficult. One bright spot has been the performance of the new "Giddings wet probe and tip." The Giddings probe was designed specifically for the wet soil conditions we anticipated for this fall. While there is no perfect probe for sloppy wet sampling conditions, customers told us the Giddings probe performed better than any other probe in these conditions. If you have ideas on how to make this probe and tip perform better, please give us a call. The Giddings Company will change the design to accommodate our needs.

The meeting season is approaching, and we have a great group of speakers and topics for our upcoming soil fertility seminars (see article). We hope to see you there! Be safe and have a great Holiday Season with family and friends.

Consequences of Inconsistent Sampling Depth

Soil sample depth is one key to achieving accurate and consistent soil test results. Sample depth is important for mobile nutrients like nitrate-N for 0-24" samples and also for immobile nutrients like phosphorus, potassium and zinc, which are tested on the 0-6" sample only.

If a topsoil sample is collected deeper than normal, for example 0-8" instead of 0-6", soil test results will be affected. The data in the table shows a real world example of the affect of collecting a topsoil sample to a 0-8" depth, compared to collecting a 0-6" sample. In this situation, the initial soil test data did not match the history of the field, so it was resampled, making sure the sample depth was 0-6". GPS was used each time the field was sampled to make sure the soil cores were from the same points in the field each time. The field was untilled soybean stubble and the samples were collected within a couple weeks of each other.

The data in the table shows that the test results for nutrients like phosphorus were lower when a deeper sample was collected initially. The reason the P soil test is lower for a deeper sam-

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AGVISE Soil Fertility Seminars January 5, 6, 7

AGVISE Soil Fertility Seminars are set. The dates and locations for our 2010 Soil Fertility Seminars are listed below. A registration letter was sent to all AGVISE customers in early November. 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 we may not have your current email. If you want to receive an email in the future announcing our seminars, 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.

Seminar Locations	CEU Credits applied for
Jan. 5 Willmar, MN	1.0 - SW, 3.0 NM, 1.5 PM
Jan. 6 Watertown, SD	1.0 - SW, 4.0 NM, 0.5 PM
Jan. 7 Grand Forks, ND	1.0 - SW, 4.0 NM, 0.5 PM

In this Issue

Consequences continued...

ple, is that phosphorus does not move in the soil. Any applied P fertilizer stays where you put it unless tillage mixes it deeper in the soil profile. If you collect a deeper sample, you will be including a couple inches of subsoil that do contain much phosphorus, which will cause the P soil test for this deeper sample to be lower. You can also see the affect the deeper sample has on the zinc and % organic matter tests. Just like with phosphorus, the concentration of zinc and %OM levels are lower if you include a couple inches of subsoil.

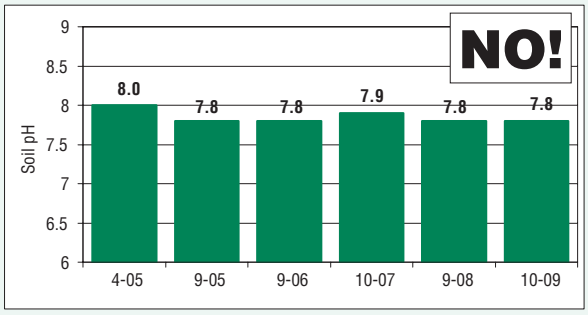
Collecting a deeper sample will actually increase the test level for some soil properties and nutrients. In this situation, you can see the soil pH was higher for the deeper sample. This is normal for most soils in the Midwest. Subsoils usually have a higher pH due to calcium and magnesium carbonates, which will result in a higher soil pH. Sulfate sulfur and soluble salts are also normally higher in the subsoil due downward movement with water. Potassium will usually test higher in a deeper sample because subsoil texture is usually finer, with a higher clay content. A higher clay content soil will test higher in potassium.

When you are training soil sampling personnel, it is important to tell them the depth you want them to collect the topsoil sample. Even though most subsoils have a lighter color, you cannot use the color as a way to determine the 6" depth. Many soils have a dark topsoil layer that is well over 6" deep, but the correct sample depth is still only 6" deep. You need to show them an easy and fast way to measure 6" when sampling. You could cut a wood dowel to 6" or you could make a mark on the palm of their hand at 6". Once they have been sampling for a few days, the 6" depth will become easy for them to determine. Please give our technical staff a call if you have any questions.

Sample ID	Depth	P-Olsen ppm	Potassium Ppm	Sulfur lbs/a	Zinc ppm	OM %	Salts mhos/cm	pH
1	Too Deep 0-8"	9	260	10	0.65	3.7	0.4	6.8
1B	Correct 0-6"	38	288	12	1.3	5	0.21	6
2	Too Deep 0-8"	4	229	12	0.77	4.9	0.45	7.8
2B	Correct 0-6"	22	266	12	1.39	5.4	0.34	7.1
3	Too Deep 0-8"	6	180	8	0.5	4.1	0.37	7.8
3A	Correct 0-6"	13	195	12	1.19	4.3	0.26	6.8

Soil Ammendment Update

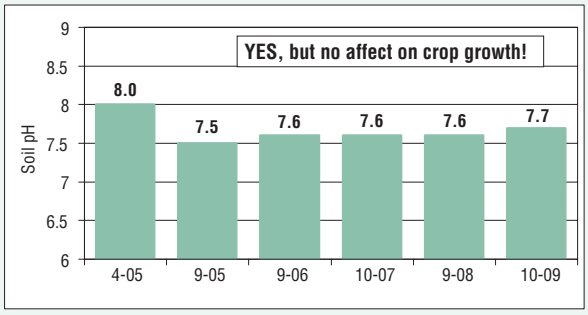
Does Gypsum Decrease Soil pH?
5,000 lb/a Gypsum applied in 2005



Loam Soil texture, Carbonate level (CCE) = 1.5%, poorly drained

5000 lb/a Gypsum tilled into top 6" of soil 4-26-2005

Does Elemental Sulfur Decrease Soil pH?
10,000 lb/a elemental Sulfur applied in 2005



Loam Soil texture, Carbonate level (CCE) = 1.5%, poorly drained

10,000 lb/a elemental Sulfur tilled into the top 6" soil 4-26-2005

AGVISE staff of Soil Scientists and Agronomists often receive questions on soil amendments. Many of these questions are on applications of gypsum on soil pH and salt levels. Many farmers refer to salt affected soils as "Alkali" soils. Since much of the northern area of the Midwest has soil pH levels higher than 7.0, we also get a lot of questions about possible ways to lower soil pH. To address these questions, AGVISE established a soil amendment demonstration project in 2005. High rates of gypsum and elemental sulfur were applied and tilled into the top 6" of soil. The soil pH and salt level of these sites have been tested each year since then.

The soil test results following the application of gypsum and elemental sulfur are shown in the figures. As you can see, the 10,000 lb/a rate of elemental sulfur decreased the soil pH by 0.5 pH units the first year, but it appears that the soil pH

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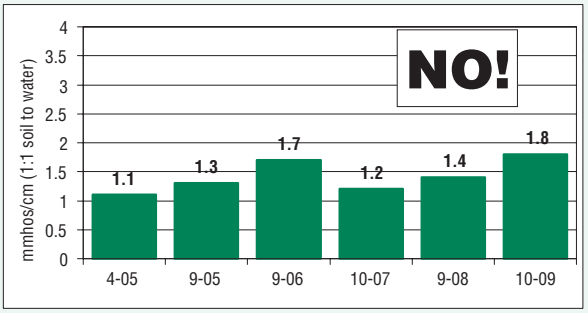
Soil Ammendment continued...

is creeping back up towards the initial pH after 5 years. This was expected, because this soil has 2% calcium carbonate equivalent (CCE) and a rate of 10,000 lb/a of elemental sulfur is not enough to react with all of the carbonate in the soil and permanently change the soil pH. Alfalfa has been growing on this demonstration site for 5 years now with no observed difference in crop growth for any treatments. The soluble salt level on this site has increased slightly in the past 5 years. You would not expect elemental sulfur to reduce the salt level in the soil.

The soil test result following the gypsum application are shown in the tables as well. As you can see, the 5,000 lb/a gypsum application has had no affect on the soil pH. Since gypsum is a neutral salt, there is no chemical reaction that occurs in the soil that would affect the soil pH.

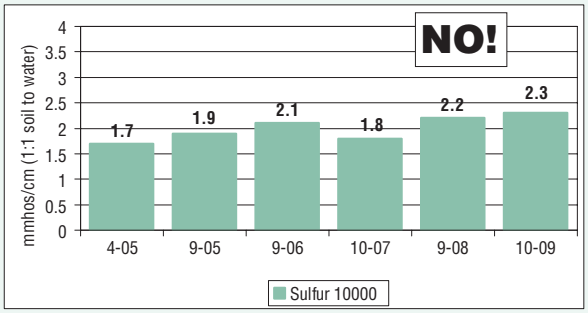
Gypsum is used around the world as a soil amendment to reclaim sodium (sodic) affected soils. Using gypsum to try and lower soil pH and reduce salt levels does not work as shown by this AGVISE demonstration project.

Does Gypsum Reduce Soluble Salts?
5000 lb/a Gypsum Applied in 2005



Loam Soil texture, Carbonate level (CCE) = 1.5%, poorly drained
5000 lb/a Gypsum tilled into soil 4-26-2005

Does Elemental Sulfur Reduce Soluble Salts?
10,000 Elemental Sulfur Applied 2005



1000 lb/a elemental sulfur had no affect on soluble salts in three years

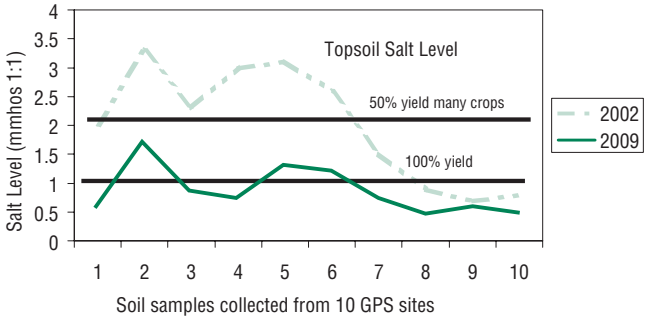
Tile Drainage Removes Salts

The past 15 years have been historically wet in many areas of the northern Midwest. The result of this high rainfall period has been water tables moving closer to the soil surface. Having a water table too close to the soil surface results in water being wicked to the surface and evaporated away, leaving any dissolved salts on the soil surface. Many farmers will call these "Alkali" areas in fields. The only known way to improve these salty soils is to lower the water table so that salts cannot be wicked to the soil surface. Some ways to reduce salt accumulation at the soil surface include improving surface drainage, maximizing plant growth on the area and installing tile drainage.

In 2002, AGVISE established a demonstration project on a newly tile drained field. Our staff of Soil Scientists and Agronomists thought it would be interesting to see how long it would take for the salt level in a tile drained field to be reduced enough to improve crop yields. 10 points were located by GPS in the tile field demonstration site. The soluble salt level has been tested each fall after harvest for the past 8 years. As you can see in the table, the soluble salt level has greatly decreased in these 10 sites. The result has been greatly increased crop yields. Soybean production on this field has improved. By lowering the soluble salt level in this field, the problem with iron chlorosis in soybeans was much less of an issue. Corn yields on this field are now higher than the farm average.

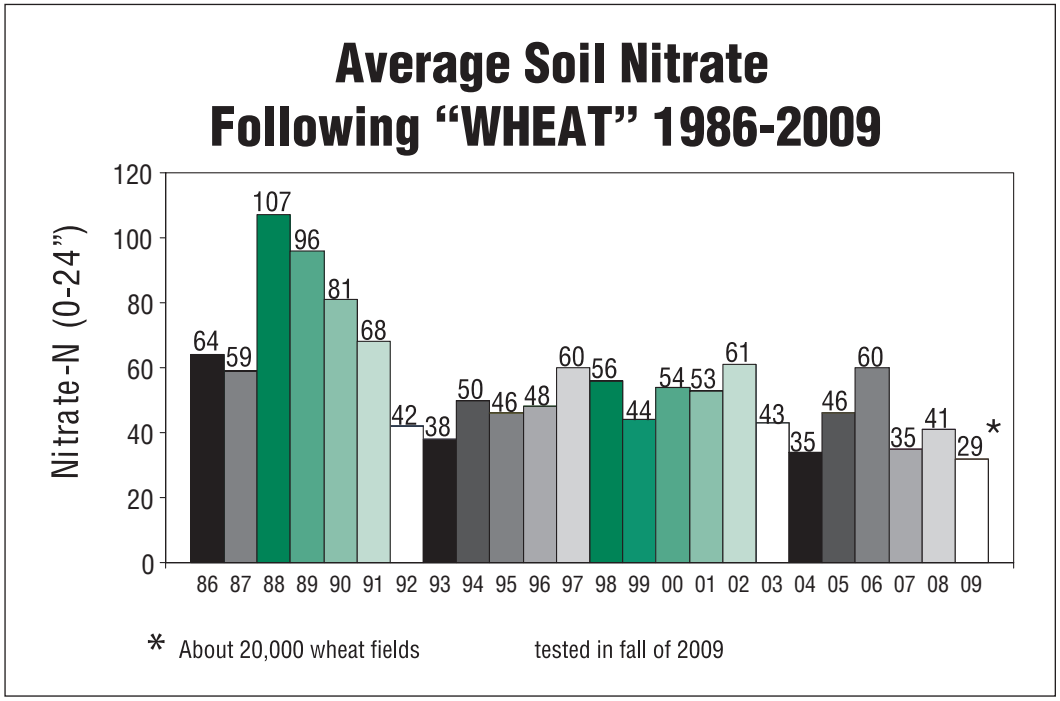
While tile drainage is not the answer in every situation, it is clear from this demonstration project, that tile drainage is a proven way to lower the soluble salt level and increase crop production over time.

Tile Drainage Project
Soluble Salts Decrease - Topsoil Samples
(Only 2002 and 2009 Test Results Shown)

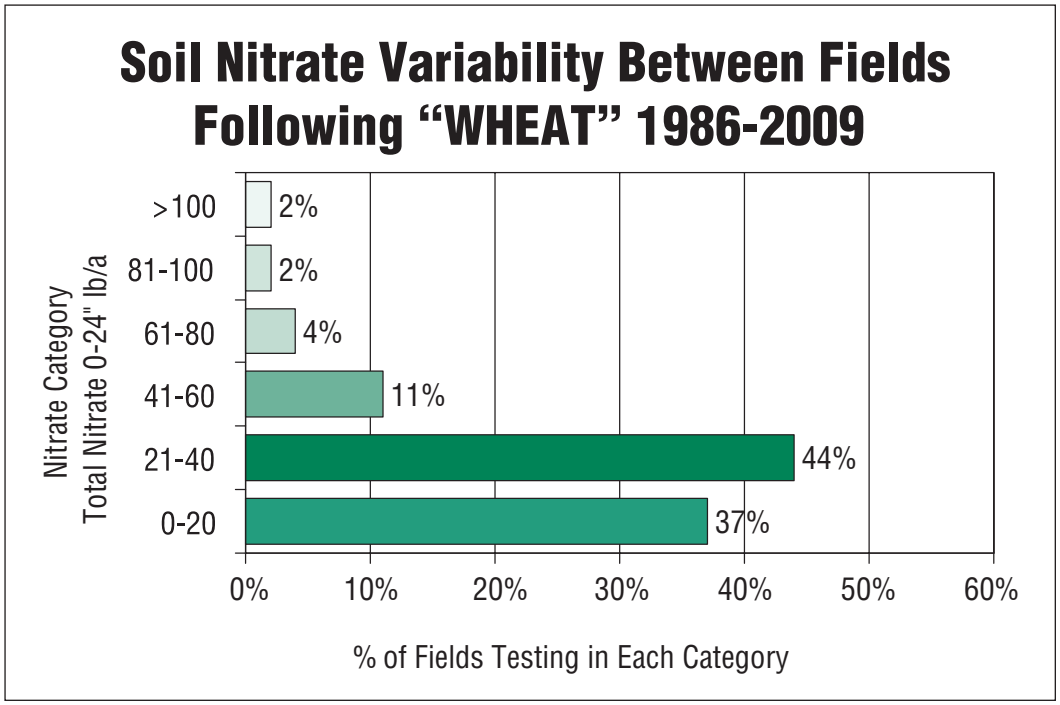


Low Soil N Following Wheat

AGVISE Laboratories has been providing soil analysis information to agronomists and growers for 33 years (1976 – 2009). Because we test hundreds of thousands of soil samples each year, we can give our customers some perspective on trends in our region. One trend that sticks out this year is the low level of soil nitrate following wheat production. As you can see in the figure, the average soil nitrate level following wheat production was only 29 lb/a (0-24"). This average is from over 25,000 soil samples tested following wheat production in 2009. This is the lowest average nitrate level we have recorded in the past 23 years.



The second figure also breaks down the percentage of wheat fields tested in each soil test category. As you can see, there are 37% of the wheat fields testing have less than 20 lb/a in the 0-24" soil profile. University researchers have told us that if the soil nitrate level is less than 30 lb/a following wheat, you have lost protein and maybe even some yield due to insufficient nitrogen.



Managing nitrogen for wheat this past year was difficult. Losses of nitrogen to leaching and denitrification occurred in many areas due to the very wet spring. Later planting dates had growers cutting back on N rates, because planting that late, they expected lower yields. Who could know that the entire summer would be cool and even late planting dates would result in very high wheat yields.

What about N rates for next year? Higher nitrogen rates will result in higher protein, once the crop has enough N to supply the yield component. If you intend to push the N rates higher in search of higher protein, you also need to consider choosing varieties which have the genetics for higher protein, and the straw strength to pull off high yields and higher protein. Of course nobody expects to have another season like 2009, but if your yields have gone beyond your expectations the past two years, you may want to increase your N rates to have a better chance at good protein levels next year.

Beet Lime Demonstration Project

AGVISE laboratories established a demonstration project using sugarbeet factory lime (beet lime) in the fall of 2008. Recent research has shown that beet lime can reduce Aphanomyces root rot in sugarbeets. In addition to possible disease reduction, beet lime is known to contain some level of essential nutrients like phosphorus. AGVISE established a demonstration area where beet lime was applied and tilled into the soil in November of 2008. The rates applied vary from 1-6 tons beet lime per acre (dry matter). AGVISE will monitor the nutrient levels of these plots long term to see what affect beet lime has on soil test levels. The changes in soil pH and soil phosphorus test levels are shown in the tables. The initial soil pH of the site was 7.8-8.0, which is very common in the Red River Valley. Since the soil pH is basic (higher than 7.0), there is no acid for the beet lime to react with and the soil pH has not changed. Some growers wondered if beet lime would increase the soil pH. Soil pH did not change in the first year and we do not expect the soil pH to increase in the future.

Beet lime contains about 20 lb P_2O_5 per ton of dry matter. Since beet lime is calcium carbonate, which has a very low solubility in this basic soil, researchers do not know if the phosphorus in the beet lime will be available for plant uptake. The Olsen P soil test after one year did increase as the rate of beet lime increased (see figure). All nutrient levels will be monitored yearly for this demonstration project. AGVISE will have periodic updates in our newsletter on this beet lime project. Albert Simms, from the University of Minnesota Crookston has ongoing research projects dealing with nutrient uptake from beet lime, which will provide much needed information.

Beet Lime Demo Project Soil pH Change?

Rate of Lime (DM)	Soil pH October 2008	Soil pH October 2009
1 ton	7.8	7.7
2 ton	7.9	7.9
3 ton	7.9	7.9
4 ton	7.8	7.8
5 ton	7.8	7.9
6 ton	8.0	8.0

Lime ($CaCO_3$) applied to a high pH does not increase the soil pH

Beet Lime Demo Project Olsen P Soil Test Change?

Rate of Lime (DM)	Olsen P Soil Test October 2008	Olsen P Soil Test August 2009	Change in Olsen-P Soil Test 1 year
	ppm	ppm	ppm
1 ton	4	8	+4
2 ton	4	7	+3
3 ton	4	11	+7
4 ton	8	16	+8
5 ton	5	12	+7
6 ton	4	10	+6

Beet lime contains about 20 lb/ton P_2O_5

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BOB DEUTSCH
PRESIDENT
SOIL SCIENTIST/CCA

The 2009 growing and harvest season will have to go down as a "challenge" to say the least. It all seems to have started with the winter of 2008-2009 with its record snowfall and below normal temperatures. These events led to spring floods and a very late planting season. In some areas, thousands of acres were left unplanted. Crops such as spring wheat and barley were seeded much later than normal. Yields were anticipated to be low due to the lateness of season. In most of the area row crops were seeded later than normal as well.

The late spring was followed by a summer with below normal temperatures as well. When harvest finally came for small grains, yields exceed yield goals by 10, 20, 30 and even 40 bushel. Who could imagine a record wheat crops with planting dates in late May to early June. When wheat yields exceed yield goals, the results are predictable—low protein. I have heard of wheat proteins under 8 percent in our western trade area with some proteins in the 6 percent range. The nitrogen levels in fields following wheat are the lowest we have ever seen.

By late August, the development of rows crops was way behind. The corn crop in most of our trade was considered doomed if the spring and summer temperature pattern held. To my amazement, we had a September that was warmer than normal, sunny and dry. The warm September allowed the row crops to "catch up" somewhat. By the end of September a large portion of the small grain harvest was complete.

About the time things were looking better for harvest, September ran out of days and we turned the calendar to October. The weather switched from warm and sunny to cold, wet, and cloudy. Hardly a day went by with out some form of precipitation. Growers were wondering if the combines would ever roll again in 2009.

When we flipped the calendar to November, the weather has turned warm and dry again. Farmers are now struggling in wet fields to complete soybean harvest, lifting beets, and to finish off the dry beans. As I am writing this article, little corn has been harvested in our trade area. The challenge continues for corn growers as reports suggest the crop is wetter than normal and mold is becoming an issue. Hopefully, when we replace the 2009 calendar with the 2010, we replace "challenge" with "normal."

SOUTHERN TRENDS

RICHARD JENNY
AGRONOMIST/CCA

Wow, has this ever been a memorable summer and fall! I've visited with some "veteran" agronomists and they can't remember a year like this one. Most of southern MN and SD planting was on time and had great subsoil moisture to carry the crops through the dry and cool summer. Then the monsoon season hit on October 1st. Crop yields have been great for corn, soybeans, wheat and sugarbeets. But, harvesting, soil sampling, fertilizer application and tillage has been a tremendous struggle.

We got into our new lab expansion on September 1st and everything is working out great. With better weather in November, we hope to test the limits of our new facilities with a lot of samples.

Please note that we have a great line-up of speakers and topics for all of our soil fertility seminar locations. We have received numerous questions on corn nematodes from southern Minnesota and surrounding areas. To address these questions on corn nematodes, we have Dr. Greg Tylka from Iowa State University speaking on the corn nematode topic at the Willmar, MN seminar. We hope to see you at our seminars in January.