AGVISE LABORATORIES

Timely Information for Agriculture

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GARDENING TIPS

ALLOW WORMS TO DRAG UNWANTED ORGANIC MATTER DEEP INTO THE SOIL

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NORTHERN NOTES

JOHN BREKER
SOIL SCIENTIST,
CCA, 4R NMS

Following the severe 2021 drought, a proper winter returned in earnest to the northern Great Plains and the Canadian Prairies. Some regions received ample snowfall (and then some), while others only had a thin veneer of snow through most of winter. Personally, I started to run short of creative ways to pile more snow in my own yard! However your snowfall measured, we all hope spring snowmelt will recharge soil water reserves for crops and restore much needed water in stock ponds for livestock.

With warmer weather and spring showers, the approach of spring planting is near. If you still have fields without current soil tests, there is time to pull soil samples before planters hit the fields. The 2021 drought left behind extraordinary amounts of residual soil nitrate-nitrogen in many fields. This is the year you do not want to be caught without current soil test data when making fertilizer decisions.

With high nitrogen fertilizer prices, there is understandable expectation for more soybean acres. I hope all fields destined for soybean have been tested for carbonate and salinity as well as nitrate-nitrogen, especially if following corn. If you know the carbonate (CCE) and salinity level, you can assess the soybean iron deficiency chlorosis (IDC) risk if you intend to plant soybean. Current soybean prices are the highest in years, so you do not want to be losing valuable soybean yield to something manageable like IDC.

Spring soil testing has already started in western areas. We are prepared to provide you with great service again this year. If you need any soil sampling equipment or supplies, we can get it to you ASAP. I hope you have a great spring planting season ahead.

Summer Grid Sampling

Early summer topsoil grid sampling, most commonly in 2.5-acre grids, continues to increase in the corn-soybean growing areas. Early summer (late May through early July) is an excellent period of time to collect soil samples during the soybean growing season, instead of waiting until after soybean harvest, which can be challenging in late and wet falls. Early summer grid soil samples are collected when soybean is in early vegetative growth stages while you can travel across soybean fields without causing unnecessary harm. This soil sampling strategy is well suited to corn-soybean rotations, where the two-year fertilizer blend is applied in the corn year, and no fertilizer is applied in the fall or spring prior to soybean. Over the past 15 years, summer grid sampling has increased considerably at both Benson and Northwood laboratories because of its many advantages.

The early summer timeframe works well for 0-6 inch soil sampling and analyzing non-mobile nutrients and soil properties. The commonly tested nutrients and soil properties are P, K, Ca, Mg, Na, B, Cu, Fe, Mn, Zn, pH, buffer pH, salinity, organic matter, carbonate (CCE), CEC, and base saturation. It is not applicable for 2-ft residual nitrate-N testing, which must wait until after the crop has been harvested. If soybean or pulse crops will follow wheat, the early summer timeframe offers another opportunity to accomplish grid/zone sampling in the early vegetative growth stages of wheat, just avoid any fertilizer bands. You want to avoid soybean fields that have been fertilized or manured in the fall or spring prior, as this nutrient application will skew soil test results. In these situations, it is best to wait until after the soybean crop has been harvested to take soil samples.

Advantages to early summer grid sampling:

- High-quality soil cores with consistent depth
- No post-harvest rush and fall logistical hassles (e.g., chasing around the combine and trying to collect soil samples before fall tillage occurs)
- More time in summer to develop fertilizer management plans with growers
- Fertilizer application can begin immediately after harvest
- More available labor (interns) in the summer timeframe compared to the fall season
- On-ground assessment of weeds, diseases, and plant stands, especially if iron deficient chlorosis is present

John Lee awarded North Dakota CCA of the Year

John Breker, Vice Chair of ND CCA Board, presents John Lee with the 2021 North Dakota Certified Crop Adviser of the Year award.

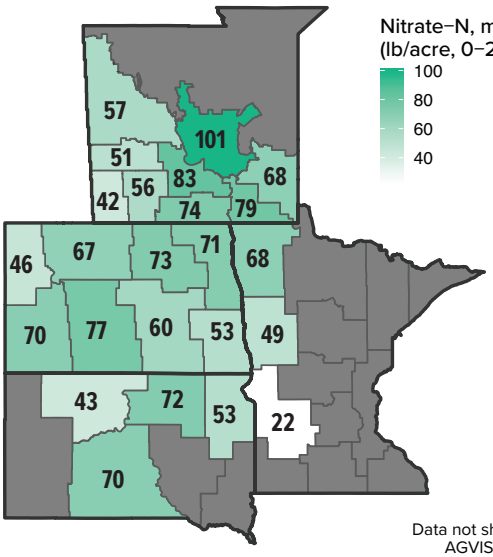
Congratulations to John Lee! He was awarded the 2021 North Dakota Certified Crop Adviser of the Year award during the Advanced Crop Advisers Workshop in Fargo, ND. With a career spanning 40 years, John is well-known as an innovator in the soil testing industry and providing exemplary technical support to AGVISE clients across the northern Great Plains. He has helped countless people decipher soil test reports, develop fertilizer plans, and answer their sticky soil questions. Through his efforts, John made soil science more accessible, more understandable, and ultimately more useful for everyone. He was a member of the inaugural CCA class and served two terms on the North Dakota CCA Board. John retired from AGVISE Laboratories in December 2021.

Can you count on high soil nitrate?

JODI BOE
AGRONOMIST, CCA

This past summer, the drought affected a large expanse of North America, ranging from Alberta to Iowa. A drought of such magnitude or extent had not occurred since 1988. When drought reduces crop growth and yield, there is usually a high amount of residual soil nitrate-nitrogen remaining in soil. This is clearly shown in the AGVISE Soil Test Summary for 2021 (see link for all summary maps: https://www.agvise.com/resources/soil-test-summaries/).

Residual nitrate following wheat in 2021



After a drought, we often get the question, "Can I count on the soil nitrate test for next year's crop?" The simple answer is yes. You can count on the soil nitrate test, but there are important factors to consider. The first factor is field variability. Even in a drought, some areas of the field will produce higher crop yield, often on soils with higher clay content and better water holding capacity, leaving behind less soil nitrate. Meanwhile, other areas of the field had lower or even no crop yield, leaving behind significantly more soil nitrate.

Let's imagine a field that was severely affected by drought, and some areas still had about 50% of normal crop yield. The whole-field composite soil test is 140 lb/acre nitrate-N (0-24 inch soil depth) after harvest, but the better producing zones only had 80 lb/acre nitrate-N remaining. Using the whole-field composite soil test of 140 lb/acre nitrate-N, most crops would only need a little starter nitrogen fertilizer. However, the better producing zones would not receive enough nitrogen and ultimately cost you crop yield and profit.

If you only have whole-field composite soil test results, you really need to consider field variability caused by the drought. You will want to apply some base nitrogen fertilizer rate to address the field variability to ensure that the better producing zones are covered. The nitrogen rate may range from 30 to 60 lb/acre N, and every situation will be different. If you utilize zone soil testing, then you have a much better idea of field variability and nitrogen fertilizer needs in all parts of the field. With productivity zone-based soil testing, you can actually know the soil nitrate test in each zone for making nitrogen fertilizer plans this spring.

The second factor is volunteer crop growth through fall. In August and September, some areas started to receive good rains that spurred on volunteer crop growth. In some cases, the volunteer crop growth became quite substantial, and some volunteer small grains even reached the heading stage. In Fall 2020, AGVISE conducted a cover crop nitrogen project, looking into the amount of soil nitrogen that fall-planted cover crops could acquire from August to October. This project offers a convenient comparison to the similar scenario in Fall 2021 with volunteer crops. In our project, we found that cover crops were able to accumulate 50 to 90 lb/acre N from soil (see the AGVISE Winter 2020-2021 Newsletter for more details). This is a substantial amount of nitrogen!

Recent research from NDSU has shown that nitrogen release from fall-planted cover crops is slow and often not available in time for next year's crop. Similarly, we should not expect the volunteer crop residue to release nitrogen in a timely manner, especially for short-season crops like canola or wheat. Of course, the degree of nitrogen uptake depends on the amount of volunteer crop growth and when termination occurred, whether with tillage, herbicide, or frost. In addition, weather conditions conducive to nitrogen mineralization (e.g. warm temperatures, adequate soil water) will foster faster nitrogen release from volunteer crop residue.

How to monitor SCN during the growing season

Soybean cyst nematode (SCN) is a microscopic, parasitic worm that attacks the roots of susceptible crops like soybean and even dry bean. Since SCN attacks the plant roots and remains unseen during the growing season, it is often the source of unexplained crop yield loss. Soybean is naturally susceptible to SCN, but plant breeders have had some success in breeding for SCN resistance. In contrast, dry bean has not received the same attention from plant breeders, resulting in different degrees of SCN resistance depending on market class and variety. Generally, kidney bean is susceptible; pinto and navy bean are moderately susceptible, and black bean is moderately resistant (Markell and Yan, NDSU 2021).

The female SCN cysts are small and creamy white in color; a magnifying glass is helpful to identify them. The SCN cysts are much smaller than nitrogen-fixing nodules on the plant root, about the size of the period at the end of this sentence.

The most common SCN-resistance trait in soybean is PI88788, which has been widely used for 30 years. In some soybean production areas, SCN has now developed resistance to PI88788, and the trait is failing to protect producers from soybean yield loss. The Peking trait is a newer introduction with good SCN control, but it is currently available in less than 5% of soybean varieties.

To learn if your soybean varieties are effectively managing SCN pressure, it is important to collect SCN soil samples and monitor the SCN population change through the growing season. The first SCN sample should be taken in June to determine the initial SCN egg count. Use a large flag or GPS to mark the location. In late August or September, resample the same location again. It is important to collect the fall SCN sample before any fall tillage occurs because tillage will disperse and dilute the SCN that you are trying to measure. If the SCN egg count decreases or stays the same, then the SCN-resistance trait is working well. If the SCN egg count increases from June to September, then you know the SCN population is resistant and the SCN-resistance trait is failing.

Collecting soil samples for SCN is relatively easy and requires a hand soil probe. Take soil cores, about 6 to 8 inches deep, in the soybean or dry bean row, trying to collect the infected plant root tissue. You should collect 10 to 15 soil cores, mix them together, and fill the soil sample bag. Place the special AGVISE SCN sticker on the soil bag; it is bright yellow and helps identify the soil bag as an SCN sample.

Steps for collecting SCN soil samples

1. In June, locate SCN monitoring site and mark with large flag or GPS
2. Collect 10-15 soil cores in the plant row, about 6 to 8 inches deep
3. Mix soil cores together and transfer to soil sample bag, place yellow SCN sticker on soil bag
4. In August or September, return to the SCN monitoring location and collect another SCN sample
5. Examine if SCN egg count decreased or increased during the growing season to evaluate potential SCN-resistance trait success or failure

Split the risk with in-season nitrogen

For some producers, applying fertilizer in the fall is a standard practice. You can often take advantage of lower fertilizer prices, reduce the spring workload, and guarantee that fertilizer is applied before planting. However, uncertain grain markets and higher fertilizer prices for 2022 have prompted some to wait on fertilizer purchasing decisions until spring or even summer. You only get one shot at phosphorus or potassium fertilization, so make sure that happens before planting. Nitrogen, on the other hand, offers more flexibility with in-season application opportunities. As you work on this year's crop nutrition plan, you may want to consider saving a portion of the nitrogen budget for in-season nitrogen topdress or sidedress application.

Some producers always include topdressing or sidedressing nitrogen as part of their crop nutrition plan. These producers have witnessed too many years with high in-season nitrogen loss, usually on sandy or clayey soils, through nitrate leaching or denitrification. Split-applied nitrogen is one way to reduce early season nitrogen loss or optimize fertilizer logistics, but do not delay too long before rapid crop nitrogen uptake begins.

Short-season crops, like small grains or canola, develop quickly. Your window for topdress nitrogen is short, so sooner is better than later. To maximize yield in small grains, apply all topdress nitrogen before jointing (5-leaf stage). Any nitrogen applied after jointing will be devoted to protein development. In canola, apply nitrogen before the rosette stage. For topdressing, the most effective nitrogen sources are broadcast NPBT-treated urea (46-0-0) or urea-ammonium nitrate (UAN, 28-0-0) applied through streamer bar (limits leaf burn and contact with crop residue). Like any surface-applied urea or UAN, ammonia volatilization is a concern. An effective urease inhibitor (e.g. Agrotain, generic NBPT) offers about 7 to 10 days of protection before rain can hopefully incorporate the urea or UAN into soil. Do not apply UAN with flat-fan nozzles because that will increase leaf burn and ammonia volatilization.

Long-season crops, like corn or sunflower, offer more time. Rapid nitrogen uptake in corn does not begin until after V6 growth stage in northern adapted corn hybrids. The Pre-sidedress Soil Nitrate Test (PSNT), taken when corn is 6 to 12 inches tall, can help you decide the appropriate sidedress nitrogen rate. Soil samples for PSNT are 0-12 inch and analyzed for nitrate-N; PSNT has only been calibrated for corn. Topdress NBPT-treated urea is a quick and easy option when corn is small (before V6 growth stage). After corn reaches V10 growth stage, you should limit the topdress urea rate to less than 60 lb/acre (28 lb/acre nitrogen) to prevent whorl burn.

Sidedress nitrogen, i.e. between rows, provides great flexibility in nitrogen sources and rates in row crops like corn, sugarbeet, or sunflower. Sidedress anhydrous ammonia can be safely injected between 30-inch rows. Anhydrous ammonia is not recommended in wet clay soils because the injection trenches do not seal well. Surface-dribbled or coulter-injected UAN can be applied on any soil texture. Surface-dribbled UAN is vulnerable to ammonia volatilization until you receive sufficient rain, so injecting UAN below the soil surface helps reduce ammonia loss. Injecting anhydrous ammonia or UAN below the soil surface also reduces contact with crop residue and potential nitrogen immobilization.

An effective in-season nitrogen program starts with planning. In years with substantial nitrogen loss, a planned in-season nitrogen application is usually more successful than a rescue application. If you are considering split-applied nitrogen for the first time, consider your options for nitrogen sources, application timing and workload, and application equipment. Split-applied nitrogen is another tool to reduce nitrogen loss risk and maximize crop yield potential.

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PRESIDENT
AGRONOMIST, CCA

PRESIDENT'S CORNER

Supply shortages are not new, but these recent shortages are becoming a larger and more real problem for all of us. Everything from toilet paper to herbicides and lumber have experienced supply shortages in the past couple years. Supplies for our laboratory operations have been no exception. Luckily, we were able to purchase everything to get us through 2021, but it was not always easy. Our laboratory managers are making sure that we have more than enough supply on hand to get us through 2022 and well into 2023. It is essential that we have the supplies we need to provide you with the reliable service you require for your business.

As spring approaches, I hope you and your staff have a safe and timely planting season. A good start at planting is the first step in another good growing season ahead.

BRENT JAENISCH
AGRONOMIST

SOUTHERN TRENDS

The winter brought interesting weather to southern Minnesota, which is thankfully behind us now. The mild weather before Christmas allowed soil sampling activities to continue well into December, before January gave us some very cold temperatures. Similar to last fall, fertilizer prices remain at or near record highs. Some people might try to trim fertilizer rates to save money, but it might cost crop yield and profit if done in the wrong places. Soil testing is the best way to learn how much fertilizer is needed to maximize crop yield and ensure each fertilizer dollar is spent in the right place. If you have not taken soil samples yet, spring is still a great time to soil sample before the crop is planted and ensure your crop has the right soil fertility for a great start.

This is my first Southern Trends column for the AGVISE newsletter. I started in September 2021 as the new technical agronomist for the Benson laboratory. I will continue to lead on soybean cyst nematode (SCN) projects and look to start new soil fertility experiments. I am excited to collaborate on new projects. I hope the upcoming growing season is safe and productive for you.

Something to ponder: Where do you think corn, soybean, and wheat prices will be at the end of harvest? Higher or lower than spring prices? As we get closer to planting time, it will be very interesting to see if growers across the country decide to plant more soybeans or corn. An acreage battle or dry weather could have a huge effect on prices.