

NORTHERN NOTES

The number of unplanted Prevented Planting acres in eastern North Dakota and northwest Minnesota were a doozy in 2020. Soil testing unplanted fields is the critical first step in developing a crop nutrition plan for 2021. In this newsletter issue, we discuss some common questions on Prevented Planting fields: soil nitrogen variability, cover crop nitrogen credits, and soil sample timing.



JOHN LEE
SOIL SCIENTIST, CCA

In 2020, the growing season weather ranged from excessively wet in the eastern region to extremely dry in the western region. The drought conditions did cause some yield loss in small grains. Luckily, some July rainfall arrived in time to help long-season row crops like corn and sunflower.

The fall soil testing season is approaching, and we are ready to help you with any soil sampling equipment and supplies you need.

AGVISE Soil Fertility Seminars: January 5, 6, 7, 2021

The 2021 AGVISE Soil Fertility Seminar dates and locations are set. We will update you with any changes regarding COVID-19 precautions. If large in-person gatherings are prevented, we may coordinate an online event. Nevertheless, we all hope in-person meetings can resume at sometime. We have a great lineup of topics and speakers, so mark your calendar now!

SEMINAR LOCATIONS

- January 5: Granite Falls, MN
- January 6: Watertown, SD
- January 7: Grand Forks, ND

Fall Special: Hydraulic Soil Sampling Kit (24 inch)

AGVISE Laboratories is offering a fall special on the first 50 Hydraulic Soil Sampling Kits (24 inch) sold this fall. You will receive \$200 credit on soil analysis for each kit purchased. The Hydraulic Soil Sampling Kit (24 inch) is priced at \$3,000.00 USD. The kit includes a 12VDC electric-hydraulic pump, 30-inch hydraulic cylinder and mounting channel, two stainless steel soil probes (solid and slotted), two heavy-duty (HD) soil probes (solid and slotted), and a complete set of 5/8-inch, 3/4-inch, and wet-and-dry-style tips for each probe type. The HD soil probe is ideal on wet and frozen soils. You can view all components of the Hydraulic Soil Sampling Kit (24 inch) on our website: <https://www.agvise.com/equipment>.

For crop consultants who collect soil samples for deep-rooted crops like sugar beet and sunflower, we also have a 42-inch telescoping hydraulic cylinder system, which can be outfitted with an 8-HP Honda gas-powered hydraulic pump or large-capacity 12VDC electric-hydraulic pump. Please call for details on the 42-inch soil sampling systems.

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Prevented Planting Acres: Soil Nitrogen Variability

When cropland goes unplanted, next year's crop nutrition plan can change. In 2020, widespread Prevented Planting acres and cover crop planting prompted more questions about soil nitrogen variability and soil sample timing on unplanted fields. Depending on the weed management strategy (e.g. chemical, tillage) or if you planted a cover crop, the amount of soil nitrate-nitrogen remaining can change. To learn more about soil nitrogen management on unplanted cropland, let's look back to previous years with large Prevented Planting reports.

In 2011, AGVISE Laboratories tracked soil nitrate-nitrogen variation through summer and fall on two unplanted fields near Northwood, ND. One field had excellent weed control with herbicide application in June and additional tillage in July and August. The other field was unmanaged, and weeds grew rampant (looked like a jungle) until the producer mowed down the weeds in August.

Good weed control and some tillage resulted in a large amount of soil nitrate accumulation through summer and fall (Figure 1). This is no surprise to older generations of crop consultants and soil samplers who remember the days of summer fallow. Controlling weeds reduces the amount of soil nitrate removed in plant

biomass. In addition, each tillage event creates a new flush of biological activity and nitrogen mineralization from soil organic matter, increasing soil nitrate in the soil profile.

A "healthy" weed crop will use a lot of soil nitrate, just like a productive cash crop should. As a result, the field with heavy weed growth had taken up the majority of soil nitrate in the soil profile (Figure 1). There was also no tillage to stimulate additional nitrogen mineralization.

The lessons from 2011 clearly demonstrated that soil testing each unplanted field is critical in crop nitrogen management for next year. Although both fields went unplanted and received no nitrogen fertilizer, the amount of soil nitrate remaining in the fall was vastly different (over 60 lb/acre nitrate-N)! Considering such variability, you would not choose the same nitrogen fertilizer rate for both fields next year. The soil nitrate-nitrogen test is the only way to answer the question and actually measure how much soil nitrogen is available for next year's crop.

For Prevented Planting fields with a cover crop, the soil nitrate-nitrogen test is a critical tool. Cover crop mixes including brassicas and grasses (e.g. radish, rye) may leave behind very low residual soil nitrate in fall

because the cover crops, like weeds, can accumulate a large amount of nitrogen. The nitrogen in cover crop biomass does not mineralize quickly, so it may not be available for next year. Legume cover crop mixes may contribute some nitrogen next year.

The proper time to collect soil samples on Prevented Planting fields is another frequent question. For summer fallow (no weeds or cover crop), soil sampling can start in mid-August (just like soil sampling after harvest). There is risk in waiting longer on fallow fields because fall precipitation might make them non-trafficable and impossible to soil sample later in fall. For fields with a cover crop, soil sampling should wait until cover crop growth slows and further plant nitrogen uptake is minimal.

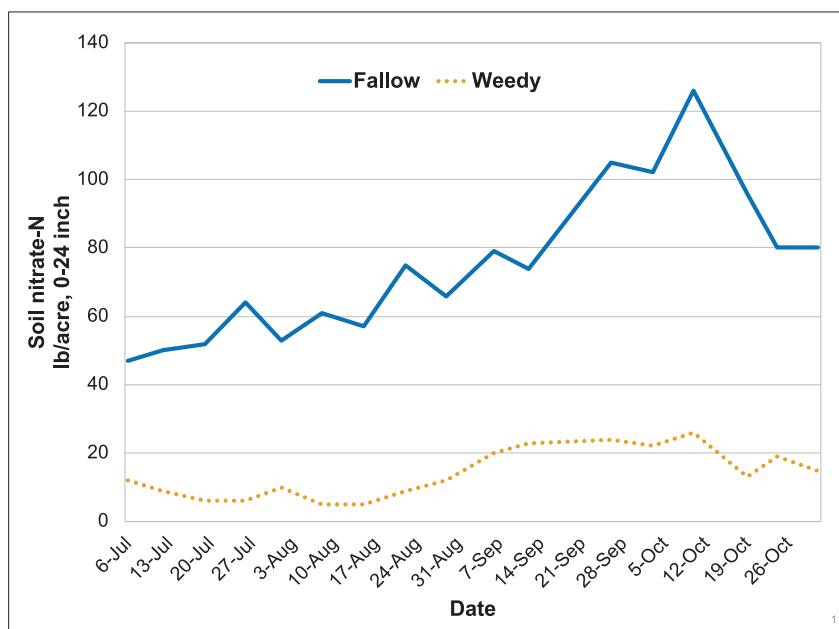


Figure 1. Soil nitrate-nitrogen variation through summer and fall on unplanted cropland in 2011. The fallow field with good weed control and tillage had considerable residual soil nitrate, while the field with uncontrolled weeds had little residual nitrate.

Jodi Boe joins AGVISE Technical Support Staff

In July, we welcomed Jodi Boe as an agronomist on the AGVISE technical support team in Northwood, ND. A native of North Dakota, Jodi was raised on a grain farm near Beulah, in the heart of North Dakota's cattle and coal country. She studied Crop and Weed Science and Agricultural Economics at NDSU, where she also received a minor in Soil Science. She continued her studies at Purdue University, where she obtained her M.S. degree in Weed Science and researched herbicide resistance in weed species.



JODI BOE
AGRONOMIST

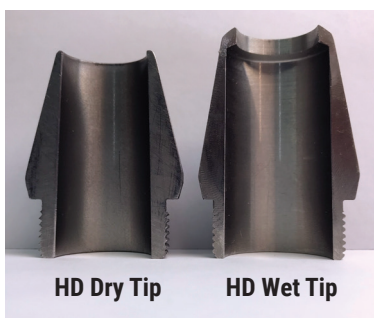
Jodi is an avid nature enthusiast and extensive traveler (Asia, Europe, South America). Arkansas is the only state in the continental U.S. she has not visited. She is excited to be back in her home state where she enjoys birding, hunting, farming, fishing, hiking and reading; she is also trying to cut back on hobbies.

Jodi is a great addition to the AGVISE team, and we hope you can meet her soon. We are excited to have her join the team.

Choosing the Right Soil Probe Tip for Wet or Dry Soil

To help you collect the best quality soil samples, AGVISE Laboratories provides different soil probe and tip options for our 24- and 42-inch hydraulic soil sampling systems.

The stainless steel and heavy-duty (HD) chromoly steel soil probes each have compatible wet and dry soil probe tips for adverse soil sampling conditions. The wet tip is ideal for very wet soils, high clay soils, and even frozen soils. It has a recessed lip just inside the opening, which allows the wet soil to flow into the soil probe without smearing and plugging inside the probe body. The dry tip features a cutting edge and larger opening for easier soil sampling in hard, dry soils. If you have not tried the wet or dry tips, you really must give them a try.



Soybean Cyst Nematode: Failing Resistance Traits, Increasing SCN Population

Soybean cyst nematode (SCN) is the number-one soybean pest in the United States, causing over \$1 billion in lost soybean production annually. The SCN problem is worsening as SCN resistance traits are failing, and we are seeing increasing SCN egg counts in regions where SCN populations were previously well controlled. In 2019, AGVISE Laboratories started a SCN resistance project with cooperating agronomists in southwest Minnesota. We learned that all SCN populations in the project had varying degrees of resistance to the most common SCN resistance trait, PI 88788. In 2020, we expanded the SCN resistance project to survey a larger geography, and we will report the 2020 results at our Soil Fertility Seminars in January 2021.

For over 20 years, the main source for SCN resistance has been the PI 88788 resistance trait. This is a problem because some SCN populations are now overwhelming that resistance trait. Unlike herbicide resistance in weeds, you cannot visually see failed SCN control and increasing SCN populations. Instead, you must collect SCN soil samples to see if the SCN egg count is increasing or decreasing.

To measure suspected resistance in SCN populations, collect soil samples at planting and at crop maturity for SCN egg count. If the SCN egg count increased during summer, then SCN is actively reproducing and the soybean SCN-resistance trait is failing. Collect the SCN soil samples in likely SCN hotspots (e.g. field entrance, drown-out spot) or specific GPS-marked points in the field to minimize spatial variability. If the SCN population builds during the soybean year, it is a simple indicator that the SCN-resistance trait is failing. If you observe SCN populations continuing to increase, even though you use SCN-resistant soybean varieties, you may need to find new resistance traits like Peking. This simple soil sampling protocol, at-planting and at-maturity, is a quick and effective way to check for SCN resistance in fields.

AGVISE Demonstration Project: Let's Get Serious

There may not be any silly questions, but there are silly answers. Every so often, we get questions about unusual solutions to manage calcareous soils in the northern Great Plains and Canadian Prairies. The most frequent oddball “solutions” involve lowering soil pH with elemental sulfur and modifying potassium base saturation (%K), following the base cation saturation ratio (BSCR) concept. Such suggestions might work on acidic soils; however, the dominant calcareous soils in the region have high pH (>7.3) and ample calcium carbonate that make such attempts impractical. Yet, the ideas return again and again.

To put the nail in the coffin, AGVISE Laboratories has started long-term demonstration projects to show plainly why such ideas do not work or may cost way too much! We are calling them the “Let's Get Serious” projects because we are serious about soil management.

Lowering Soil pH with Elemental Sulfur

Soils of the northern Great Plains and Canadian Prairies frequently have high soil pH (>7.3), and high pH reduces the availability of certain nutrients, such as phosphorus and zinc. If possible, we'd like an easy and cheap solution to lower soil pH, like applying only 100 to 200 lb/acre elemental sulfur (S). Elemental S can lower soil pH, but it does not take into consideration what actually causes high soil pH—carbonate. To lower soil pH successfully, you must first neutralize all

carbonate with elemental S before the soil pH can budge. With 100 lb/acre elemental S each year, that does not sound too difficult, right?

Not so fast. A soil with only 1% calcium carbonate equivalent (CCE) takes 3.2 ton/acre elemental S (6,400 lb/acre) to neutralize the carbonate alone. We started an elemental S project at the Northwood Laboratory on a soil containing 4.5% CCE, which would require literal tons of elemental S to lower soil pH. In a previous project, we used 10,000 lb/acre elemental S, but it was not enough. This time, we are getting serious and using elemental S rates from 0 to 40,000 lb/acre (Figure 2). The elemental S rates should hit above and below the target 30,000 lb/acre elemental S rate required to neutralize 4.5% CCE. We will measure soil pH and carbonate content over the upcoming years (maybe decades) to see if the staggering amount of elemental S can permanently lower pH without breaking the bank.

Building the Base Cation Saturation Ratio (BSCR)

The Base Cation Saturation Ratio (BSCR) concept is occasionally suggested as an alternative soil fertility strategy. The concept encourages producers to apply

large amounts of potassium, even if there is little to no chance to increase crop yield. The BSCR concept revolves around reaching a certain percentage (%) of each base cation in soil to obtain the “ideal” soil. If you do not have the right percentage of each cation, then you are instructed to apply large amounts of fertilizer to reach this “ideal” balance of each cation.

Potassium is the most common nutrient where people fall into the BCSR trap, often suggesting that extra potassium will “fix” their soil. The BCSR concept does not work well on soils with high cation exchange capacity (CEC) or high



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Figure 2. Elemental sulfur project with rates ranging from 0 to 40,000 lb/acre elemental sulfur. Can you identify the 20 ton/acre rate?

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AGVISE Demonstration Project Cont...

soil pH (>7.3) because the required amount of potassium to reach the “ideal” balance is simply not economical.

To get serious about the BCSR concept, we started another project trying to apply enough potassium to increase %K saturation into the 4 to 6% range, which is recommended by BCSR promoters. In a previous project, we used 1,000 lb/acre K₂O (1,667 lb/acre potash, 0-0-60), but it was not enough. This time, we are getting serious and using potassium rates from 0 to 7,000 lb/acre K₂O (11,667 lb/acre potash, 0-0-60). We will measure soil test K and base cation percentages over the upcoming years to see if the staggering amount of potassium will reach the BCSR target without breaking the bank.

Postcards and Poster Promote Soil Testing

Each year, AGVISE provides our customers with free postcard mailers to promote soil testing for the producers they serve. The postcards help direct their producers' attention to soil testing right after harvest begins, which gets the soil testing season started on time. Customers who use the postcards tell us the postcards help them start soil testing earlier and ultimately get more soil testing done.

We can customize your postcard message so you can tell producers exactly what you want! Here is an example of what one customer had us print on her postcards last year.

“Call our agronomy staff today to sign up for soil testing (555-123-4567). Soil testing is the first step toward a profitable crop in 2021!”

Once you receive your customized postcards, all you have to do is put the producer's name and address on the postcard, add a stamp, and put it in the mail. These postcards also fit into most statement envelopes, so you can include them with statements. If you want some personalized postcards to send to your producers at no charge, please call our Northwood office (701-587-6010) and ask for Mary. She will ask what you want printed on the postcard and how many postcards you want.

Don't forget, we also have a colorful poster that promotes soil testing with 4R Nutrient Stewardship. Of course, we all know that good nutrient stewardship begins with soil testing! After you have done the proper soil testing, you can follow the 4Rs: Right Rate, Right Source, Right Place, Right Time. If you want us to send you a new poster to promote soil testing, please contact our office.



Online Soil Sample Submission—Still waiting to try it?

Since 2011, AGVISE Laboratories has offered online soil sample submission through our online AGVISOR program. Over half of AGVISE customers utilize the timesaving benefits of online submission, now having submitted over 2.4 million soil samples online. Online submission is quicker, easier, and more accurate than paper forms. In 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, soil sample depths, and default soil test packages to streamline the entire process.

Online soil sample submission saves time and prevents mistakes (e.g. spelling mistakes, missing information). You also can link FSA maps to each field (Surety Online Mapping subscription required). The FSA map prints on the soil sample order form and soil test report, which adds a professional touch for your clients to see on their soil test reports. For third-party soil samplers, online submission is particularly convenient because PDF sample order forms and barcode reference stickers can be emailed to the person soil sampling right away (no delays with receiving paper forms anymore). The FSA map also appears on the soil sample order form, which helps eliminate confusion for the person in the field.



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PRESIDENT'S CORNER

farmers are looking forward to crops maturing on time. A timely planting season in spring was much appreciated after the previous cool and wet springs. It also offered some much-needed distraction from COVID-19 happenings. June was a little dry, but consistent rain returned in July. In the latest USDA Crop Progress Report, 85% of corn and 83% of soybean were rated good to excellent in Minnesota. This is a welcome improvement over 60% of corn and 61% of soybean in 2019.

There were some localized stretches of crop damage from hail and wind, but most farmers have been spared (so far) and remain very optimistic about harvest. We are anticipating a more “normal” fall harvest and soil sampling season with corn and soybean maturing on time. With favorable weather ahead, in-field corn dry down should help reduce grain drying expenses and congestion at the elevator.

While the COVID-19 pandemic certainly has changed some things, agriculture keeps moving forward. The grain bins are empty and waiting to be refilled; the children are returning to school, in some fashion or another; and the laboratory is fully stocked and ready for the fall soil testing season.

I hope everyone has a safe and successful harvest and soil sampling season. At the same time, it can be very stressful. If you know anyone who needs some assistance, there are helpful resources from UMN Extension (<https://extension.umn.edu/rural-stress#>) and NDSU Extension (<https://www.ag.ndsu.edu/extension/farmranchstress/>).



CINDY EVENSON
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SOUTHERN TRENDS

Minnesota and South Dakota. So far, 2020 has offered much better weather. We have our fingers crossed that cooperative weather continues to make for a successful and bountiful harvest.

We had an excellent run with summer topsoil grid soil sampling in June and July. The soil sampling conditions were near perfect to collect soil samples in unfertilized soybean fields. As corn and soybean crop progress advances faster than last year, we hope harvest arrives early and fall soil sampling does too. Soil testing is the most economical tool in making a sound crop nutrition plan. Remember, the 4Rs of proper nutrient management start with a quality soil sample!

The 2020 crop year has been a pleasant blessing in the Benson Laboratory territory. After a few years with challenging weather,



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