

AGVISE LABORATORIES

Timely Information for Agriculture

SPRING 2024

INSIDE

Summer Grid Soil Sampling	2-3
Starter Phosphorous.....	3
Best Time of Day to Collect Plant Tissue Samples?.....	4
Soybean Cyst Nematode (SCN) Egg Numbers Continue to Increase.....	5
President's Corner	6
Southern Trends	6

NORTHERN NOTES

What a winter! Across much of the northern Great Plains and Canadian Prairies, this was one of the warmest and driest winters on record. It is quite the change from the cold and snowy winter last year. As spring weather stays for good, spring fertilizer and planting plans are starting to congeal as farmers prepare to hit the field. We hope that Mother Nature continues to cooperate with warm weather and timely spring showers ahead.



JOHN BREKER
SOIL SCIENTIST,
CCA, 4R NMS

Spring soil sampling is already underway in many parts of the region. In fact, some clients were able to take soil samples through much of the winter! As you hit the fields this spring, we are ready to provide you with great service and fast turnaround. Soil samples are analyzed the next day after we receive them at the laboratory, and the results are posted online to AGVISOR in the late afternoon. For most AGVISE clients, this amounts to 48 hours from the morning that the soil samples were shipped to us.

If you require soil sampling supplies or equipment, please give us a call. We have a good stock of hand soil probes and the different styles of hydraulic soil probes and tips that you will need to handle wet spring soil sampling conditions.

Let's Get Serious: Building Soil Test Phosphorus

In 2020, we started three long-term soil fertilizer and amendment projects at the Northwood laboratory. These included 1) lowering soil pH with elemental sulfur, 2) increasing potassium base saturation (%K) according to the base cation saturation ratio concept (BCSR), and 3) increasing soil test phosphorus on high pH, calcareous soils. We have written about the elemental sulfur and potassium projects in previous AGVISE newsletters, so we will focus on the phosphorus project in this newsletter.

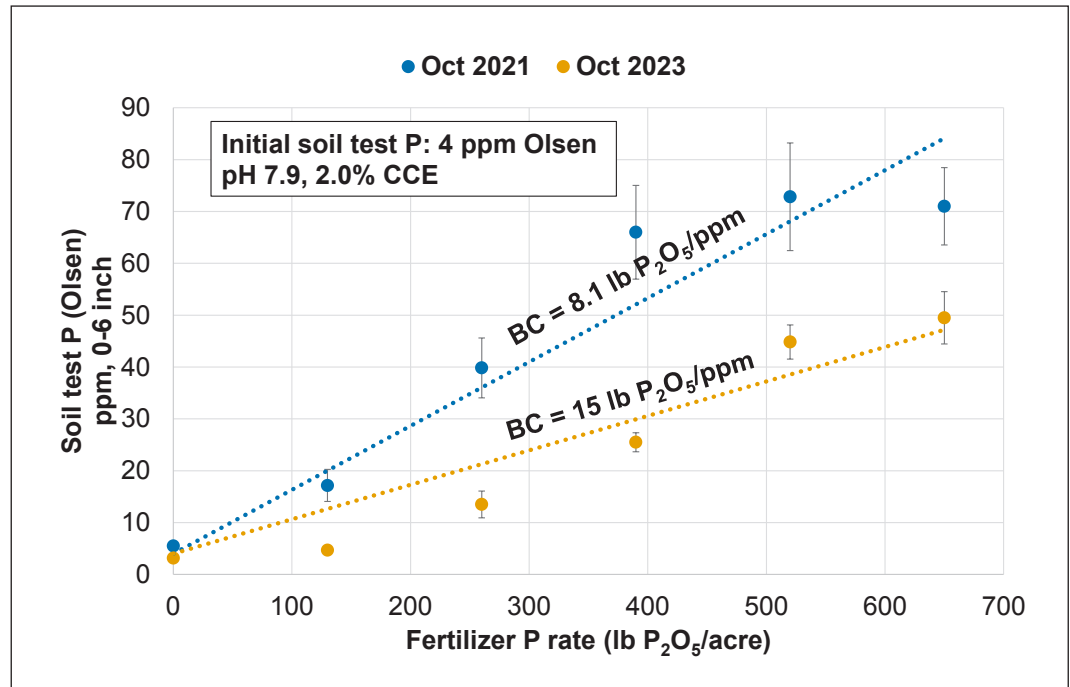
The dominant calcareous soils of the northern Great Plains and Canadian Prairies have high pH (>7.3) and contain ample calcium carbonate (free lime) that result in phosphorus (P) fixation as insoluble calcium phosphate compounds, which are less available in soil. In most soils, it requires 15-20 lb P₂O₅/acre, above and beyond crop removal, to increase the soil test phosphorus level by 1 ppm Olsen P. This is what we call the buffering capacity (BC), or the amount of fertilizer required to change the soil test level. In some highly calcareous soils, the buffering capacity may be over 30 lb P₂O₅/ppm. The high P fixation potential in calcareous soils causes some people to think that you never really can build soil test P.

Continued on Page 2

Soil Test Phosphorus: cont...

The soil test P building project included phosphorus fertilizer rates from 0 to 650 lb P₂O₅/acre as MAP (11-52-0) on a calcareous soil with pH 7.9 and 2.0% calcium carbonate (CCE). One year after application, the soil test P buffering capacity (BC) was calculated at 8.1 lb P₂O₅/ppm in October 2021. This is lower than expected, but we were still seeing the influence of a fresh phosphorus application and some P fixation reactions had not taken place yet. Three years after application, the soil test P buffering capacity was calculated at 15 lb P₂O₅/ppm in October 2023, which shows that P fixation is actively occurring and aligns with expected buffering capacity values.

So far, the project has shown that you can in fact build soil test P, if you apply enough phosphorus. We will continue to monitor the long-term phosphorus project to track the soil test P buffering capacity, which is expected to increase in future years as further P fixation reactions occur. This information will be helpful for long-term phosphorus management planning.



Summer Grid Soil Sampling

Early summer topsoil grid sampling, most commonly in 2.5-acre grids, continues to increase in 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 (crops not fertilized with nitrogen) will follow wheat, the early summer timeframe offers another opportunity to accomplish grid/zone sampling in the early vegetative growth stages of wheat, just make sure to 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 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 during scouting, especially if iron deficiency chlorosis (IDC) is present in soybean

Starter Phosphorus: Ortho- or Poly-P? Does it matter?

Each spring, we get questions about what form of phosphate fertilizer is better. The debate over orthophosphate and polyphosphate has raged for decades. Just when we think we have put the issue to bed, it comes up again! The truth is either form of phosphate fertilizer will provide the same crop yield response. With “new” fertilizer products and additives on the market, it is time to revisit the basics of phosphorus fertilizer materials.

All dry phosphate fertilizers, like MAP (11-52-0) and DAP (18-46-0), are orthophosphate materials. Most liquid phosphate fertilizers contain orthophosphate and polyphosphate of varying proportions. Either way, all phosphorus fertilizer materials, dry or liquid, will act the same once applied to soil.

In fertilizer manufacturing, all products start as phosphoric acid derived from rock phosphate, but if you want to make a high content liquid phosphorus fertilizer, that means you need to remove some water from phosphoric acid in the process. This produces short chains of orthophosphate, which then start linking together to form polyphosphate or longer chains. As more water is removed, the fertilizer material creates more polyphosphate (longer chains), resulting in a denser material, with some smaller amount of orthophosphate (smaller chains) remaining. In most polyphosphate blends, like 10-34-0, the breakdown is around 70% polyphosphate and 30% orthophosphate. This results in a high content liquid phosphorus fertilizer with more phosphorus per gallon, meaning that you have to haul less material to the field to achieve the same phosphorus rate.

When polyphosphate is applied to soil, the fertilizer reacts quickly with soil water and breaks into orthophosphate (short chains) again. Even in cool soil temperatures (40 deg F), over 40% of polyphosphate converts to orthophosphate within 72 hours. Within one to two weeks, the conversion is largely complete, leaving plant-available orthophosphate for crop uptake.

In the end, it all comes back to crop yield, right? In studies across the Midwest and Great Plains, the performance of orthophosphate and polyphosphate have been equal, as long as you apply the same phosphorus rate.

Starter P Rate	Corn grain yield (bushel/acre)	
	Orthophosphate	Polyphosphate
lb P ₂ O ₅ /acre		
15	124	124
30	134	134
45	142	142

Data: Univ. Nebraska, Lincoln. Average of five sites with low soil test P.

Best Time of Day to Collect Plant Tissue Samples?

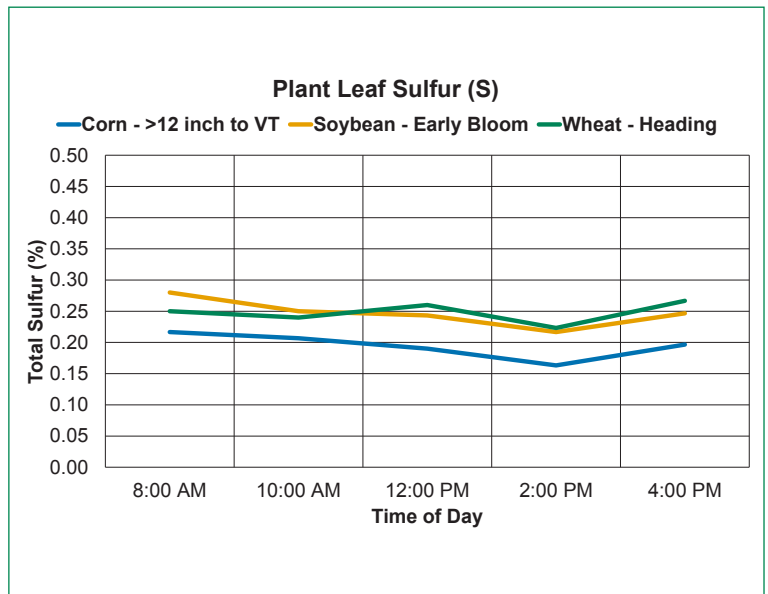
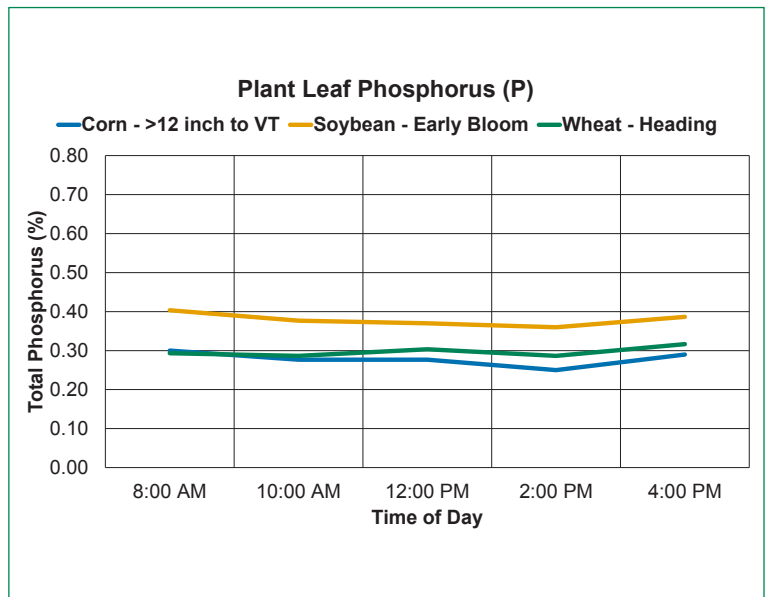
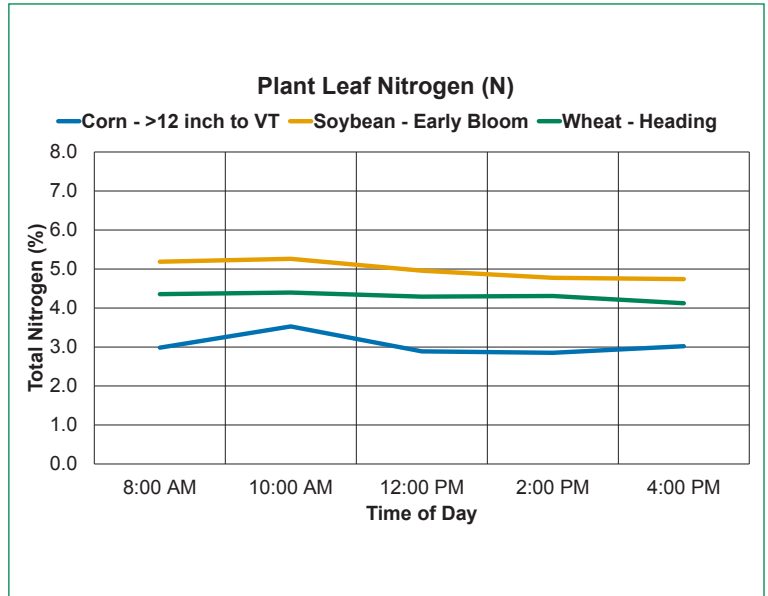
Plant tissue analysis is a useful tool in crop nutrient management, especially if you are troubleshooting problems in fields. Agronomists often ask our staff if there is a best time of day to collect plant samples. We searched for research on the topic and did not find much information, so we conducted a time of day plant sampling project to help our clients answer these questions. We collected plant samples in corn, soybean, and wheat fields at 8 am, 10 am, 12 pm, 2 pm, and 4 pm. All plant samples were collected in triplicate for the project.

The figures show the plant nutrient concentrations for total nitrogen, phosphorus, and sulfur at different times of day. Data for other plant nutrients is available upon request. There were no significant differences in any crop, highlighting the stability of plant analysis throughout the day. For plant samples collected from morning to late afternoon, it appears that any time of day is suitable for collecting plant tissue samples.



"MY HUSBAND ORDERED THIS HUGE BAG OF DIRT, BUT, AS USUAL, HE'S NOWHERE TO BE FOUND WHEN THEY DELIVER IT!"

CartoonStock.com



Soybean Cyst Nematode (SCN) Egg Numbers Continue to Increase

Over the winter months, we received a lot of questions about the increasing soybean cyst nematode (SCN) egg count trends across the region. Soybean cyst nematode is the most damaging soybean pest in the United States, and the problem is becoming worse. The AGVISE SCN summary over the past five years (2019-2023) shows that SCN egg counts are increasing steadily in Minnesota and North Dakota, which is a serious concern for SCN management into the future.

In Minnesota, 65% of SCN soil samples in 2023 had more than 2,000 eggs per 100 cm³ soil. This is the threshold where an SCN-resistant soybean variety is recommended, yet some soybean yield loss is still expected. The percentage of soil samples with zero or low egg counts (<200 eggs) has declined from 17% in 2019 to 8% in 2023, meaning that there are fewer SCN-free fields in the state. More alarming, the percentage of soil samples with more than 10,000 eggs has skyrocketed from 3% in 2019 to 20% in 2023. This is the threshold above which planting soybean is not recommended, whether resistant or

tolerant to SCN, and a non-host rotation crop is suggested.

In North Dakota, 48% of SCN soil samples in 2023 had more than 2,000 eggs per 100 cm³ soil. The percentage of soil samples with zero or low egg counts (<200 eggs) has declined from 43% in 2019 to 20% in 2023. More alarming, the percentage of soil samples with more than 10,000 eggs has quickly increased from 4% in 2019 to 12% in 2023.

These SCN summary trends highlight a growing concern for soybean growers. With SCN, an ounce of prevention is worth more than a pound of cure. A consistent SCN soil sampling program remains one of the best tools to monitor SCN populations. This is how we learn if current SCN management strategies like crop rotation and SCN-resistant varieties are working, or if you need to reevaluate your soybean management plan. A detailed guide to collecting SCN soil samples can be found at the SCN Coalition website: <https://www.thescncoalition.com/wp-content/uploads/2021/12/Scouting-and-Soil-Testing-for-SCN-Resource.pdf>

State	Year	SCN Egg Count (eggs per 100 cm ³ soil, % of soil samples)				
		0	1 - 200	201 - 2,000	2,001 - 10,000	>10,000
Minnesota	2019	17%	16%	36%	27%	3%
	2020	15%	10%	28%	38%	8%
	2021	10%	9%	27%	40%	14%
	2022	11%	8%	27%	40%	15%
	2023	8%	7%	21%	45%	20%
North Dakota	2019	43%	15%	25%	14%	4%
	2020	42%	14%	25%	17%	2%
	2021	30%	15%	23%	23%	9%
	2022	29%	15%	25%	24%	8%
	2023	20%	12%	21%	36%	12%



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PRESIDENT'S CORNER



CINDY EVENSON
 PRESIDENT
 AGRONOMIST, CCA

“Ag support has to be more than a chatbot.” I recently read an article about what can go wrong when tech companies expand into the ag sector and the quote at the beginning of this article could not be truer. AGVISE has always maintained that a person

will answer the phone to greet our customers and direct their call to the best person on our staff to handle their question. If you contact AGVISE through our website, a real person will get back to you and answer your concerns. If one of our sales or support staff is unable to help you remotely, they are always willing to visit you at your location or you can stop in at one of our laboratories. Service and support are paramount at AGVISE. If you ever have a question or concern, please do not hesitate to give us a phone call or email. A real person will be there to help you!

SOUTHERN TRENDS



DR. BRENT JAENISCH
 AGRONOMIST, CCA

What a difference one year can make. A mild winter sure does make the winter go by faster. It was a successful trade show season, and it was great to see so many of you. From our conversations, it sounds like a lot of soil sampling and fertilizer applications were made during the fall which is always good. My hope is that it will take some of the stress off in the spring. However,

we all know that never seems to happen.

I am curious about how many acres of corn and soybeans will be planted in 2024. The stocks-to-use ratios between soybeans and corn favors planting more soybeans. Yet, western Minnesota has been hit hard with iron deficiency chlorosis and soybean cyst nematode for the past few years. With these concerns, I wonder if growers will switch some of those soybean acres back to corn. If additional corn acres will be planted, it will require soil testing before corn planting. Spring offers a great time to get those fields soil sampled that were missed last fall. AGVISE strives to provide next day turnaround on soil samples. I hope you have a safe and successful spring.