



AGVISE

LABORATORIES

Timely Information for Agriculture

SPRING 2025

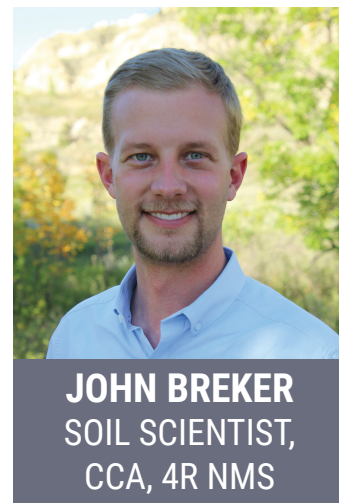
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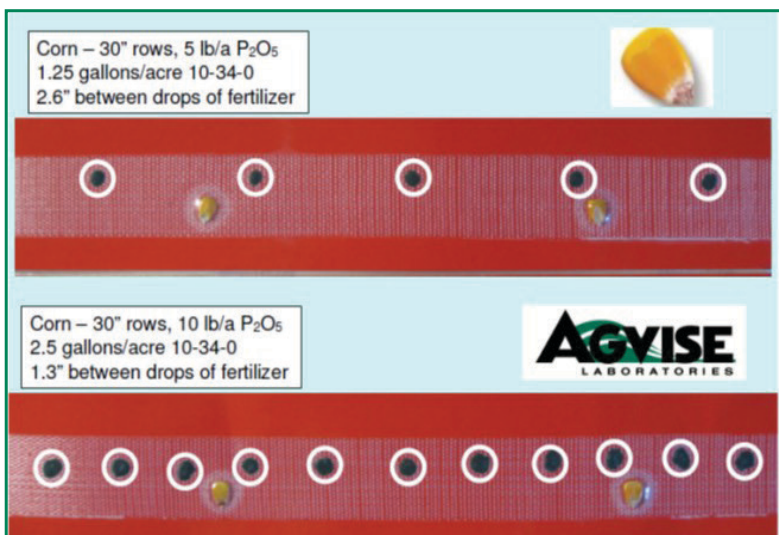
What winter? It probably won't be the warmest or driest winter on record, but the lack of snowpack over winter has most of us hoping for good spring rainfall to replenish soil water reserves and start the growing season right. With predictions of a warmer and drier than normal summer, it would be great to get the crop in early and beat the summer heat.

Spring soil testing is already underway across the region. In fact, some clients were able to take soil samples through the winter! The AGVISE heavy-duty (HD) soil probes were put to the test on frozen soils over winter and performed very well. The HD soil probes are made of chromoly steel and designed for hard, dry soils or frozen soils. If you need any soil sampling equipment or supplies, please give us a call or place an order in our online store (<https://www.agvise.com/shop/>). We are ready to provide you with the highest quality data and great turnaround this spring. We hope you have a great spring season!



JOHN BREKER
SOIL SCIENTIST,
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Starter Fertilizer Displays



When profits are tight, more growers are asking about optimal starter fertilizer rates and how low starter fertilizer rates can be. These questions are the result of wanting to keep fertilizer costs down, to plant as many acres per day as possible, and to take advantage of more efficient, lower rates of banded phosphorus fertilizer compared to higher rates of broadcast phosphorus fertilizer.

To illustrate the role of starter fertilizer rates and seed placement, we put together displays showing the distance between

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Starter Fertilizer Displays, Continued

fertilizer granules or droplets at various rates and row spacings. You can see several pictures with wheat, corn, soybean, canola, and sugarbeet on our website: <https://www.agvise.com/starter-fertilizer-display-how-low-can-you-go/>

The displays show the normal seed spacing for several crops with different dry or liquid fertilizer rates alongside the seed. These displays help visualize the distance between the seed and fertilizer at several rates. University research shows that to achieve the full starter effect, a fertilizer granule or droplet must be within 1.5-2.0 inches of each seed. If the fertilizer granule or droplet is more than 1.5-2.0 inches away from the seed, the starter effect is lost. At very low rates, the fertilizer droplets are spaced too far apart.

Some people wonder about these displays, but you can prove it to yourself pretty easily. Just run the planter partially down on a hard surface at normal planting speed. You will see what you imagine as a constant stream of liquid fertilizer, ends up being individual droplets at normal speed, especially with narrow row spacings and lower fertilizer rates.

These displays will help you explain to growers how the starter fertilizer rate must be adequate to keep fertilizer within 1.5-2.0 inches of each seed for the full starter effect. In addition to an adequate starter fertilizer rate, additional P and K should be applied to prevent nutrient mining, causing soil test levels to decline in years when minimum fertilizer rates are applied.

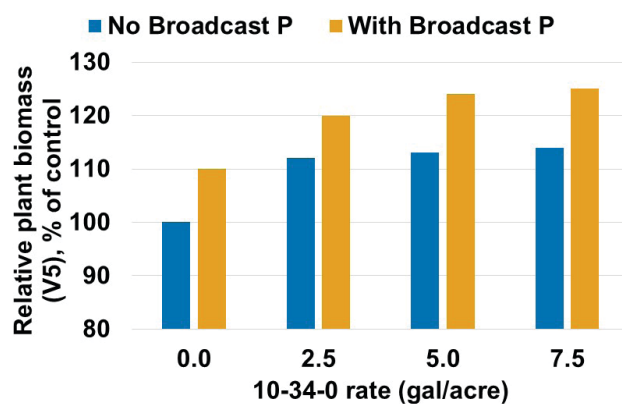
Start Strong, Finish Strong with Starter Phosphorus

Cool and wet soil conditions can limit root growth and phosphorus uptake during the early growing season. This is why starter phosphorus placed with or near the seed can be so effective in enhancing early plant growth and development. In small grains, starter phosphorus helps improve tiller initiation, even on soil with high soil test P. Faster development in spring can also help flowering wheat or canola beat the summer heat, or advance the corn silking date and maturity to help save grain drying expenses in fall.

Research at the University of Minnesota has found that starter phosphorus applied to corn can promote 10-15% more early season corn biomass and advance the corn silking date by 1-2 days, across a range of planting dates and hybrid maturities. This can be achieved with starter phosphorus rates as low as 2.5 gal/acre 10-34-0. It is important to choose a phosphorus source and rate that can provide at least 10 lb/acre P₂O₅ with or near the seed. There are many phosphorus products available. Liquid orthophosphate and polyphosphate sources are

equally effective at supplying phosphorus (in spite of what you may read in marketing materials). Compare products based on the cost per total amount of phosphorus applied; simply multiply the phosphorus content (% P₂O₅), product density (lb/gal), and intended application rate to calculate the total phosphorus rate in lb/acre P₂O₅.

Starter phosphorus to corn increased plant biomass at V5 growth stage



Starter phosphorus increased early corn plant biomass (growth stage V5) when applied as 10-34-0 with seed, with and without broadcast phosphorus fertilizer. Summarized across multiple soils with pH ranges including 6.0 to 8.5. Reference: Kaiser, D.E, and J.A. Lamb. 2023. Banding fertilizer with corn seed. UMN Ext. Circ., Univ. Minnesota, St. Paul, MN. <https://extension.umn.edu/crop-specific-needs/banding-fertilizer-corn-seed>

AGVISE Demonstration Project: Lowering Soil pH with Elemental Sulfur

There may not be 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 on calcareous soils. Such suggestions might work on acidic soils; however, the dominant calcareous soils in the region have high pH (>7.3) and tons of natural calcium carbonate that make such attempts impractical and expensive. To put the nail in the coffin, AGVISE Laboratories started some long-term demonstration projects to show plainly why such ideas do not work or may cost way too much!

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). In soil, elemental S oxidizes to sulfuric acid, which can lower soil pH. However, the large amount of calcium carbonate (free lime) keeps our soils buffered at high pH. To lower soil pH permanently, you must first react and neutralize the carbonate with elemental S before the soil pH can budge. With 100 lb/acre elemental S applied each year, that does not sound too difficult, right?

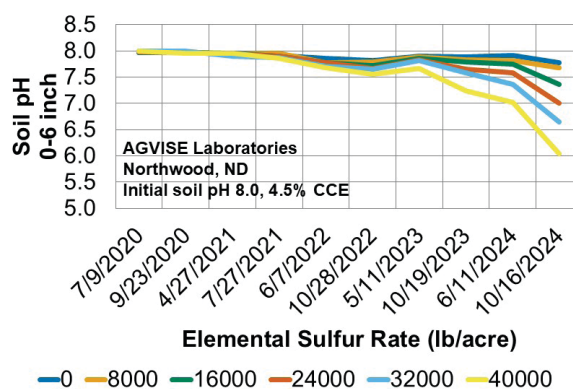
Not so fast. A soil with only 1% calcium carbonate equivalent (CCE) takes 3.2 ton/acre elemental S (6,400 lb/acre) to neutralize the carbonate alone in the 0-6 inch soil depth. In 2020, we started an elemental S project at Northwood, ND on soil containing 4.5% CCE, which would require literal tons of elemental S to lower soil pH. A previous project started in 2005 had used 10,000 lb/acre elemental S, but it was not enough to lower soil pH beyond pH 7.8 after 15 years. This time, we decided to get serious and use elemental S rates from 0 to 40,000 lb/acre (Figure 1). The elemental S rates were intended to hit above and below the target 30,000 lb/acre elemental S rate required to react and neutralize 4.5% CCE.

For the first three years of the project, we saw little to no change in soil pH, regardless of elemental S rate. The oxidation process that converts elemental S to sulfuric acid is a slow, biological process that can take a long time. In Fall 2024, we finally saw real changes in soil pH following elemental S application. The 16,000 lb/acre elemental S rate reached pH 7.5.

The 24,000 lb/acre elemental S rate reached pH 7.0. The 40,000 lb/acre elemental S rate reached pH 6.0, a dramatic change! The lowest 8,000 lb/acre elemental S rate, however, was no different than the control.

There is still some unoxidized elemental sulfur and unreacted calcium carbonate in the soil, and we will continue to monitor these long-term demonstration plots in future years. The project demonstrates that elemental sulfur can lower soil pH, but it also shows that the very high amounts of elemental sulfur required are both impractical and expensive. A few hundred pounds of elemental sulfur applied each year will get you nowhere. In contrast, the very high elemental sulfur rates will break the bank. This is why we consider such “solutions” as either ineffective attempts or downright silly wastes.

Soil pH change after 0 to 40,000 lb/acre elemental sulfur was applied in 2020



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

Early Summer Precision Soil Sampling

The interest in early summer topsoil grid sampling (1.0- to 2.5-acres per grid) continues to increase, especially in traditional corn-soybean growing areas. In Minnesota alone, 30-40% of all grid soil samples are now collected in the summer months. The early summer period (late May to late June) is an excellent period of time to collect grid soil samples, instead of waiting until after soybean harvest when workload and time constraints are heavier. These early summer soil samples are collected when soybean is in early vegetative growth stages while you can travel across soybean fields without causing unnecessary harm.

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, salts, 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 (crops not requiring nitrogen fertilizer), 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 soil sample

Advantages to Early Summer Grid Soil Sampling

- High-quality soil cores with consistent depth
- No more chasing around in the fall trying to soil sample fields that have been harvested and before any fall tillage operation occurs
- More time in summer to develop fertilizer management plans with growers
- Fields can be fertilized immediately after harvest
- Avoid post-harvest soil sampling rush in fall
- More available labor (interns) in the summer timeframe compared to the fall season
- On-ground assessment of soybean stands, especially if iron deficiency chlorosis is observed
- 40% discount on summer grid/zone analysis (May 15 – July 31)

Sodic Soil Problems? Try the NDSU Gypsum Requirement Calculator

Salinity and sodicity are two related but distinct terms to describe salt-affected soils. Salinity is the overall abundance of soluble salts, which compete with plant water uptake and reduce crop productivity. Salinity is measured as soluble salts (mmhos/cm or dS/m) on soil test reports. Sodicity specifically refers to high sodium in soil that destroys soil structure, resulting in poor water movement, poor trafficability, and soil compaction. Sodicity is measured as extractable sodium percentage (%Na) or sodium adsorption ratio (SAR) on soil test reports.

Saline soils have an overall abundance of soluble salts, which must be managed with salt-tolerant plant species or improved soil water management (tile drainage). There is nothing you can add to make the salts disappear, such as the mistaken suggestion to apply gypsum to saline soils. Gypsum, however, can be an effective amendment for sodic soils (those with low salinity yet high sodium). A soluble calcium

Gypsum Requirement Calculator

Soil Depth (m):	0.3
Soil Bulk Density (Mg/m ³):	1.47
CEC (cmol _c /kg):	25
Gypsum Purity (%):	95

I'd like to use:

☐ ESP ☒ SAR

Note: when the initial ESP value is no less than 50, you can only use ESP for calculating; otherwise, you can choose either ESP or SAR.

Initial SAR (%):	18
Target SAR (%):	3

Your Gypsum Requirement Result:

19.5 Mg/Ha

or

8.7 US Ton/Acre

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Gypsum Requirement Calculator, Continued

source, like gypsum, can help reduce soil swelling and dispersion and help improve soil structure and water movement on troublesome sodic soils.

The amount of gypsum required is often in tons per acre. This is no task accomplished with a few hundred pounds of gypsum. To calculate the amount

of gypsum needed, North Dakota State University has released a gypsum requirement calculator, available online: <https://www.ndsu.edu/pubweb/soils/GypsumRequirementWebApp/> The calculator will ask for the soil depth to amend, soil bulk density, CEC, gypsum purity, and initial/target SAR values.



AGVISE Laboratories: Trusted by University and Industry Researchers

As spring arrives and folks prepare to hit the field, our team at AGVISE is finishing another busy winter analysis season working on soil and plant projects for researchers.

While you may know AGVISE Laboratories for the soil and plant analysis services we provide to farmers and agronomists, AGVISE also has a long history of supporting university and industry research.

Over the past 30 years, many university-operated soil testing laboratories have closed in the region. This has left a gap in the on- and off-campus research capacities at some institutions. To help bridge the gap, AGVISE partners with university and industry researchers to provide the laboratory analysis services they need to further research in soil fertility, plant nutrition, nutrient use efficiency, and many other areas. Researchers choose AGVISE for their research projects because of our reliability,

consistency, and standard of excellence.

Each year, AGVISE analyzes thousands of soil and plant samples for researchers across the United States and Canada. These projects include updating soil test correlation and calibration datasets, new fertilizer formulations and additives, improved nutrient use efficiency in new plant genetics and cultivars, and linking soil health indicators with crop productivity.

Our amazing team of technical experts includes agronomists and soil scientists, all with university and industry research backgrounds. We do not let that knowledge and experience go to waste either! We conduct our own research and demonstration projects to help answer your questions. The next time you send your soil or plant samples to AGVISE Laboratories, you can be confident that you will be receiving the highest quality analyses and service—just like we provide to researchers across the United States and Canada.

SOUTHERN TRENDS



The Benson, MN territory received very little snow during the winter. With the lack of snow cover, the bitter cold spells in January and February penetrated deep and drove the frost layer to 40 inches or deeper in some places. Optimistically, this

means we were killing disease and insect pests, right? As the country roads started to thaw this spring, I could not wait for the road grader to hit the

roads near my farm. There were some very large frost heaves (speed bumps) all around.

The USDA is forecasting a large increase in planted corn acres. The stocks-to-use ratios favor corn over soybeans, and there is potential for 3-4 million corn acres in 2025. More corn acres will require more soil testing for accurate fertilizer decisions, particularly with high fertilizer prices. Spring offers a great window to soil sample those fields that were missed last fall or new acres acquired over the winter. We hope you have a safe spring planting season!



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■ PRESIDENT'S CORNER



CINDY EVENSON
PRESIDENT
AGRONOMIST, CCA

role in ensuring all farmers and agronomists have up-to-date soil test information needed to make the most of their fertilizer inputs.

As part of our commitment to excellent service,

As we step into the spring planting season, AGVISE Laboratories is buzzing with activity as soil spring soil samples start rolling in. The arrival of warm spring weather means that farmers and agricultural professionals are gearing up for the planting season. Our laboratories play a crucial

we are excited to announce a few updates to increase laboratory efficiency and throughput. These updates improve our ability to provide you with accurate soil test data and the best technical support and customer service in the industry. In 2025, AGVISE is expanding our soil drying and storage capabilities at both laboratories. We are also updating instrumentation for potassium, zinc, and organic matter analysis at the Benson laboratory and expanding the phosphorus analysis capacity at the Northwood laboratory.

Spring is the time for growth and renewal, and we are thrilled to be a part of your agricultural success. Our dedicated team of Certified Crop Advisers is ready to help ensure that your spring planting gets off to the best start possible. Thank you for trusting AGVISE Laboratories with your soil testing needs.