



Timely Information for Agriculture

FALL 2023

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NORTHERN NOTES

The 2023 crop year advanced very quickly with an unusual number of 90+ °F days in May and June. These warm temperatures came at a tough time for small grain crops, but the later planted corn and soybean crops fared much better under the heat stress. Much of the upper Midwest and Canadian Prairies experienced some degree of drought in 2023, ranging from abnormally dry to extreme drought in places.

While the drought limited crop yield for some, others still managed to achieve some surprising crop yields with a well-timed rain or two!

The drought conditions also prompted a wide range of nutrient deficiency questions to our technical support team during the summer months. The use of paired good-bad plant and soil samples helped identify that the most common culprits were nitrogen, potassium, and sulfur deficiencies. In most cases, the grower had applied sufficient fertilizer, but the sporadic and infrequent rainfall left a bone-dry soil surface that did not contain enough water for the applied nutrients to diffuse through soil and into the plant root. These were classic cases of positional nutrient availability issues. A little rain later in the growing season helped alleviate most of these drought-induced deficiencies, but it also put some “new” deficiencies, like potassium, on the radar for growers to watch in future years.

Are you ready for the fall soil testing season? Believe it or not, it is already here! Small grain harvest has started, and eager soil samplers are following right behind the combine with their soil sampling trucks. AGVISE has a full inventory of soil sampling equipment and supplies for the fall season. We are again offering a \$200 soil analysis credit on the first 50 soil sampling kits sold this fall. This is a deal you do not want to miss!



JOHN BREKER
SOIL SCIENTIST,
CCA, 4R NMS

AGVISE Soil Fertility Seminar Dates are Set for 2024

The AGVISE Soil Fertility Seminar dates are set. These seminars cover soil fertility and plant nutrition topics along with other issues that currently challenge our region. You will not want to miss the great program lineup, so mark your calendar now! More details and registration will be mailed in November.

January 9: Willmar, MN
January 10: Watertown, SD
January 11: Grand Forks, ND
March 12: Portage la Prairie, MB
March 14: Saskatoon, SK



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 \$3,400.00 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-style tips for each soil probe type. The HD soil probe is ideal on hard, compacted, or frozen soils. You can view details of the Hydraulic Soil Sampling Kit (24 inch) on our website: <https://www.agvise.com/product/hydraulic-soil-sampling-kit/>

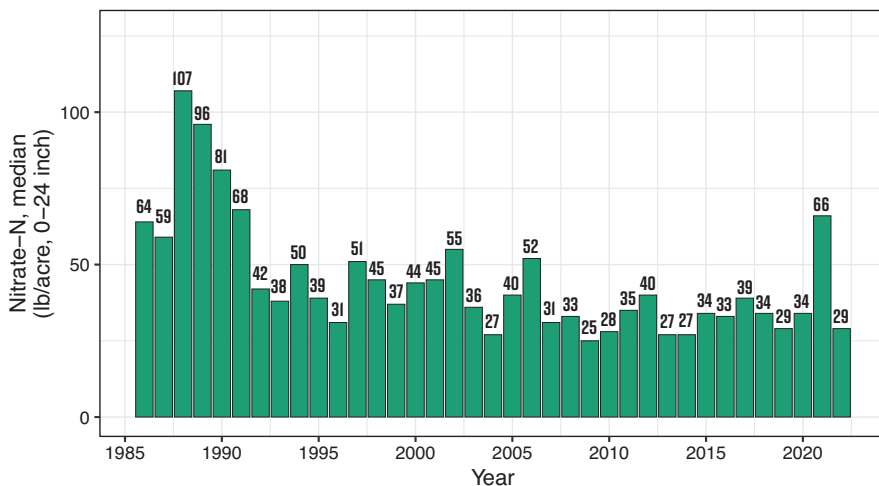
If you need to collect deep soil samples for deep-rooted crops like sugar beet and sunflower, we also have a 42-inch telescoping hydraulic cylinder system, which can be outfitted with an 8-HP Honda gas-powered hydraulic pump or large-capacity 12VDC electric-hydraulic pump. Please call for details on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

Soil Nitrate-Nitrogen Trends Following Drought Years

From Alberta to Iowa, the region has experienced everything from abnormally dry to exceptional drought. In some places, the drought has continued for two or three years, further compounding the problem. In drought years with lower than expected crop yields, we expect that residual soil nitrate-nitrogen levels will be higher following wheat, canola, corn, and other N-fertilized crops. There was reduced crop nitrogen uptake and little to no soil nitrogen losses to leaching or denitrification through the growing season, which should result in more residual soil nitrate remaining in the soil profile.

Residual nitrate following wheat

Trend from 1986 to 2022



Data not shown where n < 100
AGVISE Laboratories, Inc.

In major drought years, this is a normal phenomenon. In 1988, the average soil nitrate test across the region was a staggering 107 lb/acre nitrate-N (0-24 inch soil profile) following wheat. This is considerably higher than the long-term average around 30-45 lb/acre nitrate-N (0-24 inch soil profile). More recently, the 2021 drought left an average of 66 lb/acre nitrate-N after wheat. Based on previous drought years, it will be no surprise to find wheat fields with 80-100 lb/acre nitrate-N or even higher with the variability that drought brings. A fall soil test is the only way to know what amount of soil nitrate-nitrogen remains in each field or management zone. It is also important to collect 24-inch soil samples to know what the entire soil profile and rooting zone contains for next year. This information is vital to determining the right nitrogen fertilizer rate. If the soil test nitrate-nitrogen level is very high, then the nitrogen fertilizer rate required next spring can be reduced, allowing producers to save on nitrogen fertilizer costs.

What do high sulfur soil test results mean?

You may notice that the sulfur soil test results on your AGVISE reports are sometimes at the maximum reporting limit of 120+ or 360+ lb/acre sulfate-S for the 0-6 and 6-24 inch soil depths, respectively. People occasionally ask us why this is, and the short answer is the sulfate-S analyzers in the laboratory have a maximum detection limit that limits the highest reportable sulfate-S value for routine soil analysis. We choose these instruments because the analyzers have a sensitive low detection limit, which is more important for identifying soils with low sulfur and preventing potential sulfur deficiencies in crops. In addition, the maximum reporting limit is well beyond agronomic sulfur use rates, which is no higher than 30 lb/acre sulfur for the highest sulfur-demand field crops.

This still doesn't answer why some sulfur soil test results are high. Throughout the northern Great Plains and Canadian Prairies, soil salinity or soluble salts are a common occurrence and simple fact of life in agricultural lands. Many common salts in the region are sulfate-based salts, such as calcium sulfate (gypsum), magnesium sulfate (Epsom salt), and sodium sulfate. Wherever salinity occurs on the landscape, a saline soil could contain anywhere from 2,000 to 5,000 lb/acre sulfate-S or more. Collecting one or two soil cores from a saline spot can easily skew a whole-field composite soil sulfur test result, even if the rest of the field has low sulfur.

This is one problem with whole-field composite soil sampling. If you see maxed sulfur soil test results

on your report, it is likely that some soil cores were taken in a saline part of the field. Precision soil sampling (grid or zone) helps reduce this issue because you can separate the landscape variability from the salinity-sulfur relationship. You can verify this with the soluble salt (electrical conductivity, EC) result on the soil test report, like in the example below. The AGVISE soil test database reinforces this salinity-sulfur relationship. A summary of 3.3 million soil samples with sulfur and salinity in the AGVISE database showed that a sulfur soil test result with 120+ lb/acre (0-6 inch) has a 95% chance that the EC is 0.50 mmho/cm or greater.

Sulfur	0-6"	120 +lb/acre	*****	*****	*****	*****
	6-24"	360 +lb/acre				
Sol. Salts	0-6"	2.27 mmho/cm	*****	*****	*****	*****
	6-24"	1.64 mmho/cm				

In short, if you see maxed sulfur soil test results, it means you have some amount of salinity in the field. For reference, a soil with EC > 1 mmho/cm is considered saline. But, keep in mind that any soil with EC > 0 mmho/cm has some amount of salt present.



JODI BOE
AGRONOMIST,
CCA

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 wet and dry soil probe tips for adverse soil sampling conditions. The wet tip is ideal for very wet soils, high clay soils, and 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.

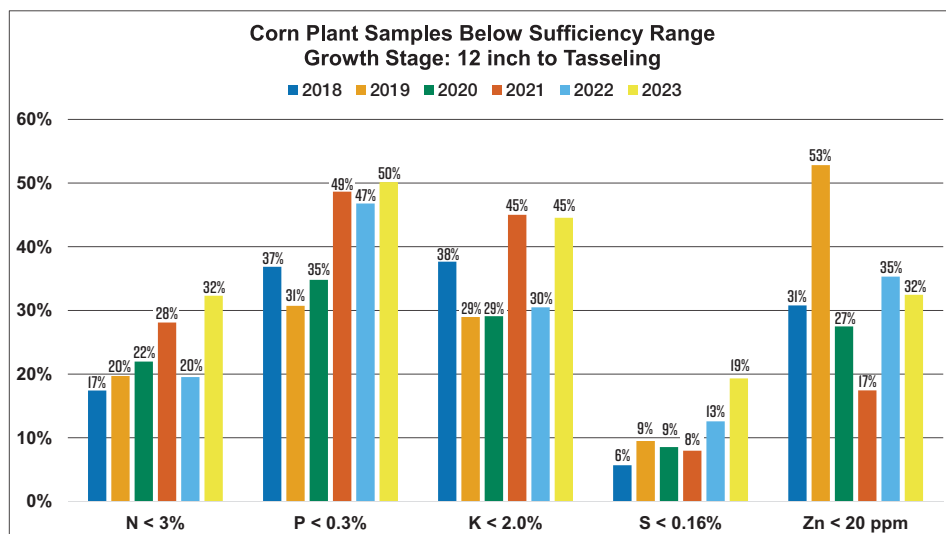


Plant Analysis Reveals Plant Nutrition Trends in Corn

Plant analysis continues to provide valuable information for improving nutrient management and diagnosing problems during the growing season. Each summer, we analyze thousands of plant samples for nutrient content, which help agronomists and growers make better fertilizer decisions. These plant samples reveal some important insights into the growing season.

We summarized plant analysis data for early season corn plant samples in June for 12-inch tall to tasseling corn (V5 to VT growth stages). The summary graphs for 2017-2023 show the percent of corn leaf samples that tested below the sufficiency range for each nutrient.

For soil mobile nutrients, a higher percentage of corn samples had low nitrogen and sulfur in 2023 compared to previous years. Although we think of nitrogen and sulfur deficiencies occurring more often in wet years, we can sometimes see them in dry years too. Ammonia volatilization losses of fall- and spring-applied nitrogen along with nitrate leaching after snowmelt are contributing factors. In June, warmer than normal temperatures advanced corn development rapidly, while rainfall was far below normal. Plant roots acquire nitrate and sulfate through a process called mass flow, where the nitrate and sulfate move with water to the plant root. Under drought, soil water is limited and the nutrient supply to the root may not



meet plant demand. The reduced mass flow of soil nutrients in soil water results in a nutrient deficiency.

For soil immobile nutrients, seasonal weather patterns can cause the same availability and uptake issues for root interception and diffusion in soil. In the drought years of 2021 and 2023, we similarly saw 45% of corn samples with low potassium. Potassium deficiencies are more common in drought years, where very dry soil conditions limit potassium availability and uptake in soil.

For phosphorus, 47 to 50% of corn samples were low in 2021-2023. This more consistent trend in corn samples with low phosphorus aligns with multiple years of high phosphorus fertilizer prices that may have resulted in lower phosphorus application rates or skipping starter phosphorus at planting. In addition, wet spring planting conditions with slow root growth and sidewall compaction issues cannot be ignored.

Four Million Soil Samples Submitted Online



Over the past 12 years, AGVISE customers have submitted over four million soil samples through AGVISOR online! The online system has been very popular with customers looking to reduce time spent filling out paper forms. Saving grower and field information, setting default crop fertilizer guidelines, and linking FSA maps has made the online system even better.

This spring, we crossed the 4,000,000th online soil sample mark on June 6, 2023. The submitter of this milestone was Justin Schmitz and Makayla Breth of Centra Sota Cooperative in St. Martin, MN. To thank our customers who helped make the online system a success, we gave the submitter a big check. We hope the Centra Sota Cooperative staff have a lot of fun with that check!



CINDY EVENSON
PRESIDENT
AGRONOMIST, CCA

PRESIDENT'S CORNER

Summer always goes too quickly, even at AGVISE. The summer months at the laboratories were filled with plant samples and summer grid soil samples. The challenging 2023 growing season prompted more agronomists and farmers to collect plant samples for diagnosing problems, while the drier weather provided good conditions for the summer grid soil sampling season.

This summer, we installed new equipment at both laboratories. We expanded our chloride, potassium, and zinc analysis capabilities, which will help improve sample throughput during the busy fall soil testing season. Each year, our customers update their soil sampling equipment to make field operations more efficient and faster, meaning more soil samples per day. AGVISE does the same to keep our operation flowing smoothly and returning soil test data to you as quickly as possible. This is always our first priority.

As fall approaches, AGVISE is prepared to provide you with high-quality soil test data in a timely manner. From all of us at AGVISE, we hope you have a safe and successful harvest season ahead.

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 towards a profitable crop in 2024!”

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 them in the mail. The postcards also fit into most statement envelopes. 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.





804 Highway 15 West
P.O. Box 510
Northwood, North Dakota 58267
701-587-6010 / FAX: 701-587-6013
www.agvise.com

■ SOUTHERN TRENDS

Another dry year. That is the first thing that comes to mind about the 2023 growing season. The growing season also presented three key issues: 1) more common potassium deficiencies in corn due to drought, 2) widespread and extreme cases of iron deficiency chlorosis (IDC) in soybean, and 3) higher soybean cyst nematode (SCN) egg counts.

In particular, soybean IDC severity was worse than previous years, and I feel like we have been saying that year after year. Often, soybean plants will recover in June and July, but we had completely dead plants before the end of June.

This means we really need to choose better fields with low soybean IDC risk through soil testing all soybean fields for carbonate and salinity (two main risk factors). Then, choose proven IDC-tolerant soybean varieties and consider chelated iron fertilizer at planting to combat soybean IDC more successfully.

Soil sampling for soybean cyst nematode (SCN) will also be important this fall. As you make crop plans for 2024, it is important to know the SCN egg count for choosing the right SCN-resistant soybean variety, or extending the crop rotation away from soybean for another year. The hot and dry growing season provided beneficial conditions for SCN reproduction on soybean roots, and the early season SCN samples at the Benson laboratory are running higher than normal. This is an indicator that the fall SCN samples will likely be even higher.



BRENT JAENISCH
AGRONOMIST