

NORTHERN NOTES

While we did have some Prevented Planting (PP) acres in the northern region, most acres were planted, and we got a pretty good crop. The fall harvest season was really enjoyable with great harvest weather. There were even some opportunities to get some fall fertilizer applied, unlike the past two years. In my almost 40-year career, I do not remember many fall seasons like this one (I wish they were all like this)!

Soil testing got an early start after grain harvest and accelerated quickly in October. Many customers commented they were able to get all their soil testing done in record time with the nice weather. It was a pleasant reprieve from the soil sampling struggles of the past two years.

We owe a debt of gratitude to every AGVISE employee in Northwood who worked crazy long hours amid COVID-19 and short staff concerns through the fall. Thank you to all the AGVISE customers we serve for your business and your friendship. We hope you have a great holiday season.



JOHN LEE
SOIL SCIENTIST, CCA

Cancelled: 2021 Soil Fertility Seminars

The AGVISE Soil Fertility Seminars for 2021 have been cancelled. We know that our customers value the new information and ideas shared at the seminars, but another key aspect is the in-person interactions and conversations that take place. We considered hosting a virtual meeting during the COVID-19 pandemic, but we thought that the valuable personal interactions would still be missing. Therefore, we decided to cancel the 2021 seminars in the best interest of our staff and customers.

If you are wondering where to obtain Certified Crop Adviser (CCA) CEUs without the usual in-person meetings taking place, an easy option is the "Online Classroom Subscription" from the Agronomy Society of America (ASA) with 265 topics/classes and corresponding CEUs. For \$100 per year, CCAs can access a wide variety of CEU topics and earn CEUs in all categories. You can find the ASA "Online Classroom" here: <https://www.agronomy.org/education/classroom/subscribe>

Three million soil samples submitted online

Over the past 10 years, AGVISE customers have submitted over three 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 fall, we crossed the 3,000,000th online soil sample mark on September 24. The submitter of this soil sample milestone was Matt Olson of Centrol Crop Consulting in Valley City, ND. To thank our customers who have helped to make the online system a success, we gave the submitter a big check. We hope Matt and his son Emmitt have a lot of fun with that check!



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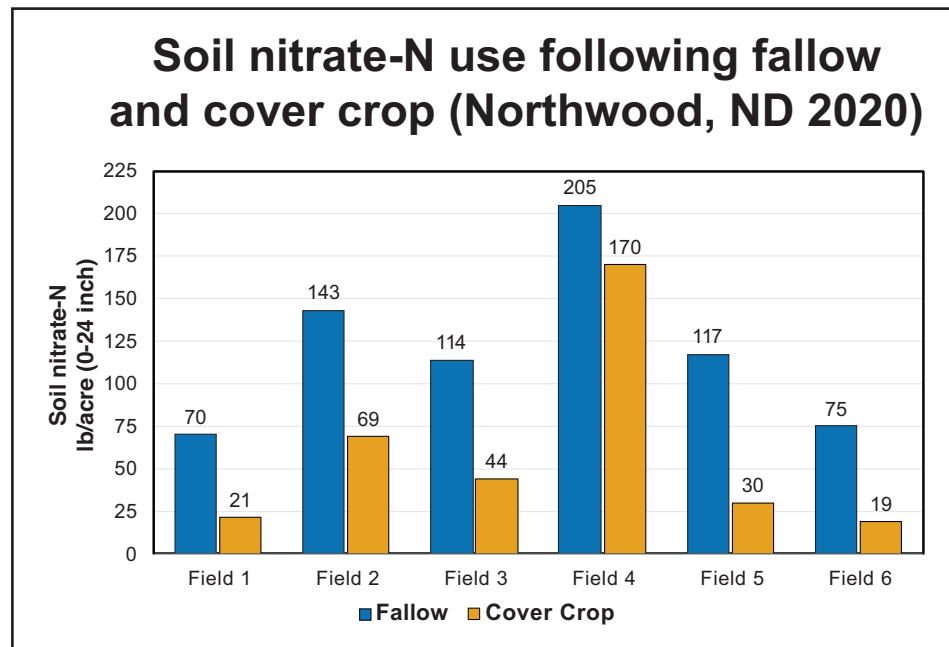
Many cover crop benefits, nitrogen credit not one

To better manage Prevented Planting (PP) acres in 2020, some farmers made the wise decision to plant cover crops on unplanted cropland. If we learned anything from the year-after-year wet phases of the 1990s and 2000s, it is important to establish some kind of plant growth on unplanted cropland to reduce the chance it will go unplanted next year. A healthy cover crop uses excess soil water, controls soil erosion, suppresses troublesome weeds, and even helps prevent fallow syndrome in corn next year.

A question we've frequently received about cover crops on unplanted fields is, "What will my nitrogen credit be for 2021?" The short answer is, "Don't count on one." We worked with a local farmer-cooperator near Northwood, ND to demonstrate why.

The cooperator planted barley or oat on six PP fields in early August 2020 using an air-drill, with the intention to hay the cover crop later in the fall. In each field, we marked out a plot with cover crop and fallow (sprayed out) treatments. Both barley and oat had reached the boot stage before a killing frost hit in mid-October. After the cover crop died, we took soil samples to measure the soil nitrate-nitrogen (0-24 inch) remaining after the cover crop and fallow.

The cover crop plots had 62 lb/acre less nitrate-N than fallow, on average. The large difference in final soil nitrate content was likely all from cover crop N uptake. In the very dry fall of 2020, there was no soil nitrogen loss to nitrate leaching or denitrification.



We know the cover crop captured a large amount of soil nitrogen. Will we ever see that nitrogen again? Will it be mineralized in time for next year's crop to use? The building evidence on cover crop nutrient cycling research is showing that cover crop nitrogen is not efficiently recycled in soil and available in time for the next cash crop. Researchers from Alberta to Wisconsin are finding that a cover crop successfully accumulates residual soil nitrate (like we saw in our project), which helps reduce nitrate leaching potential to groundwater. This is a positive and exciting research finding for environmental water quality. However, we are unsure where the nitrogen goes next.

In North Dakota, NDSU researchers are finding similar results. Dr. Dave Franzen and his team evaluated the effect of fall-planted cover crop mixtures (field pea, flax, radish, winter wheat) with nitrogen fertilizer rates for corn and

spring wheat. Corn and wheat yields following fall-planted cover crops were reduced in 5 of 7 site-years. In addition, the cover crop nitrogen penalties actually required an additional 15 to 120 lb/acre fertilizer N, further lowering profitability with cover crops (D.W. Franzen, unpublished data).

It is clear that cover crop use has water quality and soil conservation benefits, but it may come with very real agronomic costs to plant-available nitrogen supply and crop yield. We still do not know where the cover crop biomass nitrogen goes or when it is released. As we currently understand, there is no cover crop nitrogen credit to include in nitrogen fertilizer budgets.

References: Franzen, D.W. 2020. Nitrogen cycling in cover crops. In: Endres, G. and Peltier, A., chairs, 28th Advanced Crop Advisors Workshop, Fargo, ND. 11-12 Feb. 2020. North Dakota State Univ., Fargo, ND; Univ. Minnesota, St. Paul, MN.

Fertilizer rate strategies: Opportunity and Economics

Broadcast or band? Build-and-maintain or sufficiency? For phosphorus and potassium, these are the big fertilizer questions! Every farm is different, and every crop nutrition plan is different. As you work to optimize inputs (land, seed, fertilizer, fuel, equipment) and maximize profit, it is important to know where you can minimize cost without jeopardizing crop yield.

AGVISE Laboratories offers four broadcast (build) and band guidelines for phosphorus and potassium. There is also a university sufficiency broadcast guideline. Each placement and maintenance strategy has its pros and cons, and you must consider application timing, equipment capability, cost, and tolerable risk. There is an option to meet each individual operation's needs.

Achieving high crop yields is easier when soil fertility is not limiting. The more conservative sufficiency approach will provide the required crop nutrients to optimize crop yield in that one year. Over time, the sufficiency approach will build soil test levels to the medium range. The more aggressive build-and-maintain approach will build soil test levels to the high range and guarantee adequate plant nutrition across multiple years, but the build-and-maintain approach is tougher to sustain when fertilizer prices are high and crop prices are low.

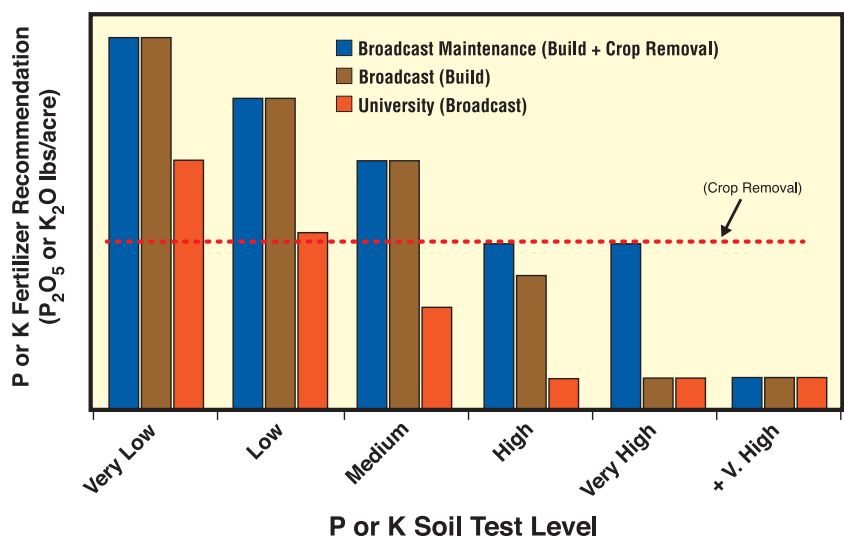
While some people sit firmly in one camp or the other, adaptive farmers will build soil test levels when fertilizer prices are low and withdraw their investment when fertilizer prices are high. A combination of sufficiency and build-and-maintain strategies helps maintain profitability as crop and fertilizer prices ebb and flow.

Remember that the sufficiency approach, although the more conservative option, will still provide optimal crop yield; it just depends if you want to invest the fertilizer dollars now or later. If you decide to build soil test levels, do not forget that soils are not FDIC-insured deposits, and your investment can flow or blow away in water and wind. Be mindful to protect your investment and keep soil erosion and other nutrient losses at bay.

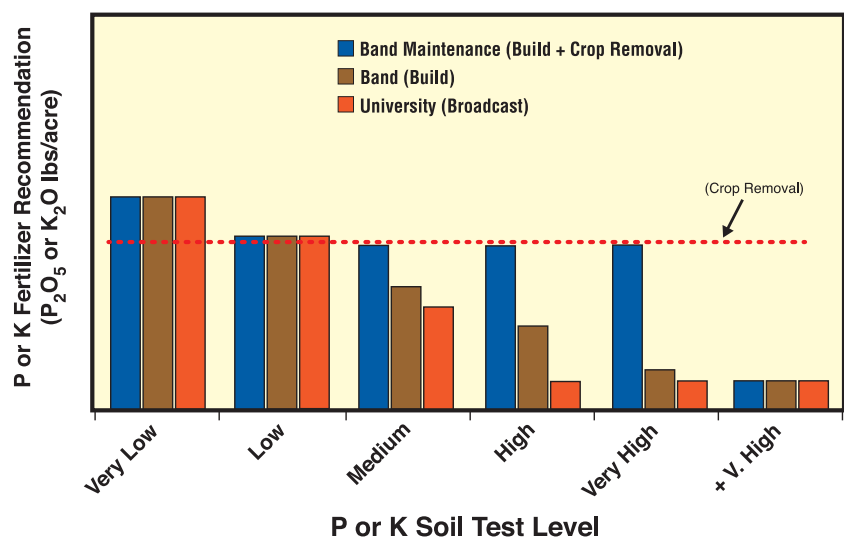


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Comparison of Broadcast Guidelines



Comparison of Band Guidelines

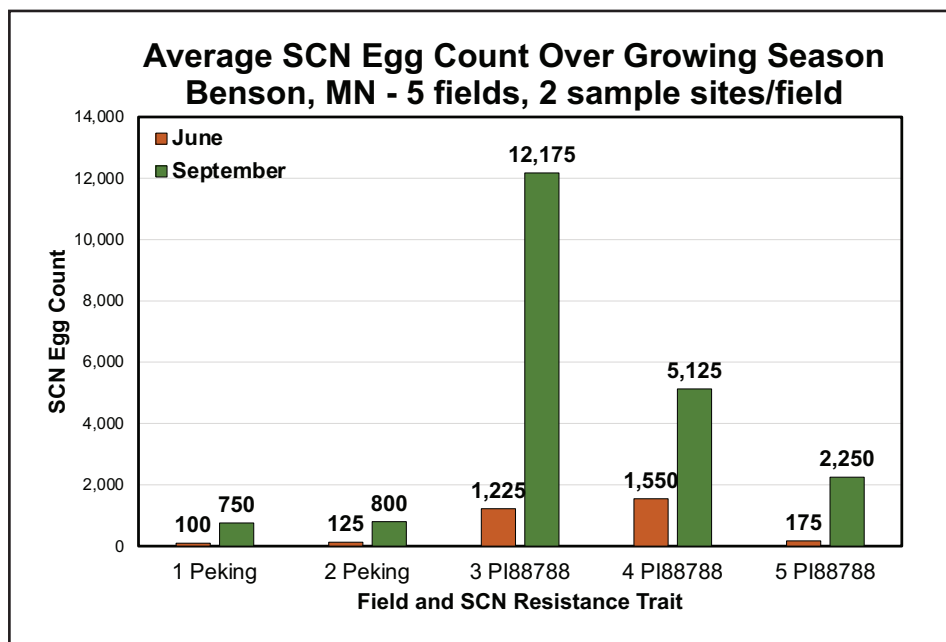


Soybean cyst nematode: Failing resistance traits, increasing SCN populations

In 2019, AGVISE Laboratories investigated if popular soybean varieties with PI88788 or Peking SCN-resistance traits were effectively providing protection from soybean cyst nematode (SCN) and found that a number of the varieties failed to do so. We expanded the project in 2020 with cooperation from agronomists in west central Minnesota.

For over 20 years, PI88788 has been the primary SCN-resistance trait in over 95% of soybean varieties. In the past few years, university research is showing that PI88788 is losing its effectiveness at controlling SCN. Detecting SCN-resistant trait failure with the naked eye is impossible, unlike the detection of failed pesticide control, where you can still see a herbicide-resistant weed that is growing vigorously. Therefore, we wanted to demonstrate how you can measure SCN resistance with soil sampling, even though you cannot see it with your naked eye.

In the project, we had 41 soybean fields with SCN-resistant varieties, 35 with the PI88788 trait and 6 with the Peking trait. In each field, a location was flagged and



soil sampled for SCN egg count in early (June) and late (September) parts of the growing season. From June to September, the SCN egg count increased by 4.9 times on average across all 41 soybean fields (individual field reproduction factor ranged from 1.2 to 12.9). In some fields, the high SCN reproduction rate shows that SCN were successfully reproducing on soybean plants and the SCN resistance trait is failing. We also learned that soybean varieties with the Peking trait had much better control of SCN than those with the PI88788 trait. One

cooperator from Benson, MN grew both PI8878 and Peking soybean varieties on his farm. He noted a 2.5 bu/acre soybean yield advantage with the Peking soybean variety (56.5 bu/acre) over the PI88788 soybean variety (54.0 bu/acre).

The project showed that SCN soil sampling in the early vs. late growing season was a simple way to detect a failing SCN resistance trait. The simple protocol only takes a big flag to mark the spot, then a set of soil samples in June and September to compare the SCN egg count results.



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Chloride: Too much or not enough?

Chloride (Cl) is a micronutrient with a storied history in plant nutrition research. For many years, we did not even know if plants even needed it! We now know that chloride is an important micronutrient needed for some crops, but it might also cause problems for others. It depends on where you are and what you are growing. If you are a corn and soybean producer in Minnesota, you might need to rethink how you are applying potash. If you grow small grains in the northern Great Plains, it might be time to add chloride into your fertilizer program. Keep reading to learn more about this important, somewhat misunderstood, micronutrient.

TOO MUCH

Where soil test potassium is low, you apply potash. Simple enough. Among potassium sources, muriate of potash (potassium chloride, KCl, 0-0-60-50Cl) is the most common and cheapest potassium source. Along with the potassium, you also get 0.5 lb Cl per lb product. It is a nice bonus if you need chloride, but new research is showing where too much might not be a good thing.

Researchers at the University of Minnesota have found that high rates of potassium chloride fertilizer can decrease soybean yields and occasionally corn yields when over 200 lb/acre KCl (0-0-60) is applied. The excessive chloride has been implicated as the cause of soybean yield reduction. To limit any negative effects of high chloride, it is important to consider the following when making potassium chloride fertilizer applications.

- Pay close attention to soil test potassium. Use a soil test to determine the correct potassium fertilize rate. Do not use crop removal rates and accidentally apply too much potassium chloride and overload the chloride.
- Strategically apply potassium chloride in a corn-soybean rotation. Apply the full two-year rate prior to corn or split for both years. Either way, do not apply more than 200 lb/acre KCl before corn or 100 lb/acre KCl before soybean.

NOT ENOUGH

Chloride deficiency is rare outside of the northern Great Plains and Canadian Prairies. With little to no historic potassium chloride use in the northern Great Plains, chloride deficiencies are more common than you think (see map). Small grains (wheat, barley, rye) are most sensitive to chloride and the only crops with proven crop yield response to chloride addition. The soil test chloride critical level is 40 lb/acre Cl (0-24 inch). The

expected yield response is 3-6 bu/acre with improved grain quality (important for kernel plumpness in malting barley). Chloride helps with plant-water relationships and suppress cereal diseases like common root rot and tan spot. To optimize chloride use in small grains, follow these guidelines:

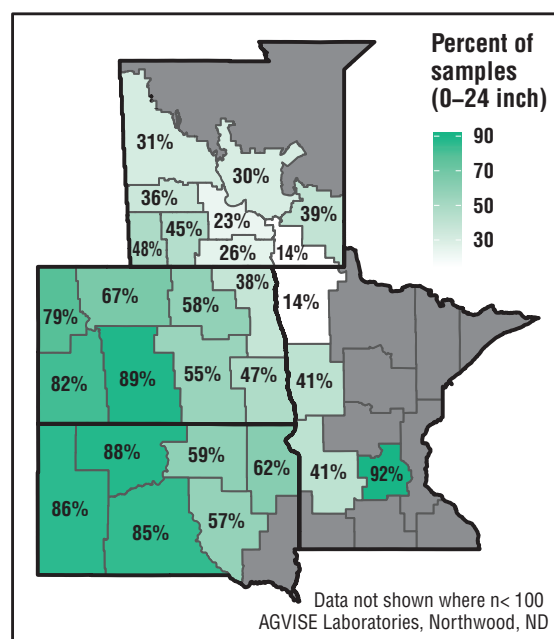
- Take a 2-ft soil test for chloride (0-6, 6-24 inch or 0-24 inch). The AGVISE Small Grain soil test option includes chloride.
- Potassium chloride is the most common and cheapest chloride source. Ammonium chloride is also available as a specialty product.
- Apply potassium chloride to meet the chloride requirement. Do not worry about the potassium part; it is a bonus.
- If mixed in a seed-placed fertilizer blend, ensure the potassium chloride rate does not exceed seed safety. Since the chloride component is mobile, broadcast placement is also okay for providing chloride nutrition to plants.



JODI BOE
Agronomist, CCA

Soil Test Chloride Interpretation (lb/acre, 0-24 inch)				
V. Low	Low	Medium	High	V. High
0 to 15	16 to 30	31 to 40	41 to 60	> 60

Soil samples with soil test chloride below 40 lb/acre in 2020





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PRESIDENT'S CORNER

In this crazy year, we couldn't have asked for a better fall soil testing season. The weather cooperated, which allowed harvest, soil testing, fertilizer applications, and tillage to be done in a timely manner with very few delays. AGVISE Laboratories is very grateful that our employees remained healthy and were eager to comply with COVID-19 safety and health precautions.

I extend a special thank you to all of our customers for trusting AGVISE Laboratories with your agricultural testing needs. We strive to provide you with accurate results in a timely manner with superior technical support. I hope we lived up to your expectations once again.

I will miss seeing many of you at winter meetings and seminars. I always enjoy visiting with you and learning how your year went. These days, it is important that we take an extra minute or two each day to send a quick email or make a phone call to someone we have not seen in a while.

We wish you and your company a successful end to 2020, a Merry Christmas, and a Happy New Year.



CINDY EVENSON
PRESIDENT
AGRONOMIST, CCA

SOUTHERN TRENDS

What a difference one year can make! The 2020 crop growing season was a great blessing in the southern region. Crops were planted quickly and early with good moisture and GDDs to follow. Harvest, soil sampling, fertilizer application, and field work were completed in near record time.



RICHARD JENNY
AGRONOMIST, CCA

This year, we expanded the soybean cyst nematode (SCN) project that we started in 2019. You can learn about the project and its findings inside on page 4. We hope to continue the project in 2021, so I am looking for agronomists wishing to cooperate in the project. In particular, we would like to find cooperators who grow soybean varieties with PI88788 and Peking SCN-resistance traits, which will allow us to compare them under the similar conditions.

We want to wish you a good and prosperous 2021. I also want to thank you for your business and the opportunity to work with you. I greatly appreciate the relationships we have built over the years and the new ones to come.