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plant pathology

WHEAT DISEASE TRENDS FROM 2010 TO 2025

Disease Prevalence in North Dakota

Efforts from the IPM survey have provided valuable in-season information to help gauge pest pressure in the wheat crop. The data can also be used to examine trends in late-season disease prevalence (from flag leaf to soft dough) to help determine which diseases pose the greatest economic threat on an annual basis. Below, I present late-season disease prevalence data (% of fields with at least one symptomatic plant) for tan spot, bacterial leaf streak, Fusarium head blight and ergot from 2010 to 2025 (Figures 1-4). You will notice that overall disease levels in 2025 were comparable to those in 2024, with fewer reports of Fusarium head blight, tan spot, and ergot, and more reports of bacterial leaf streak. Reports of leaf rust, stripe rust, and stem rust in 2025 were minimal, with only one field documented to have leaf rust (very late in the season - data not shown). Based on this data and conversations with agricultural professionals, the top two diseases for wheat producers continue to be Fusarium head blight and bacterial leaf streak. Aside from frequent occurrences in fields, these diseases do not have complete management plans.

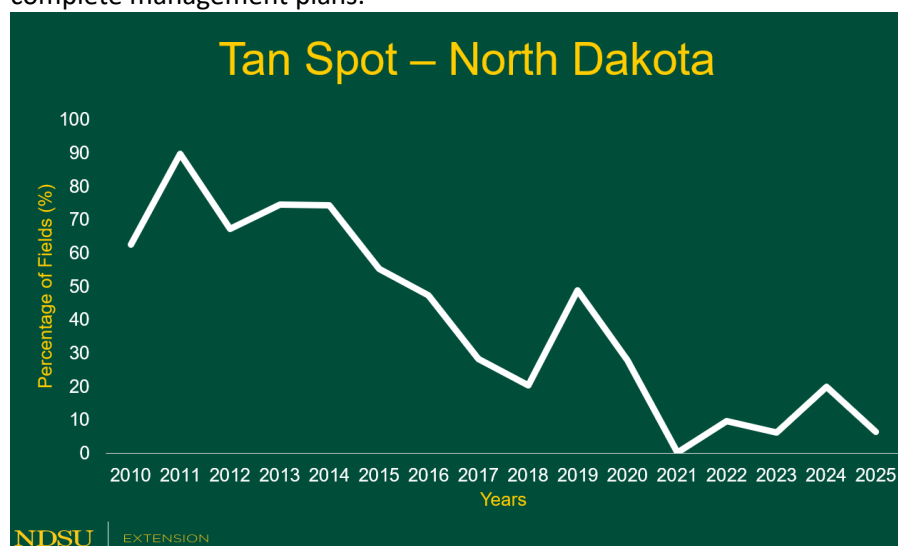


Figure 1. Tan spot prevalence data (% of fields with at least one symptomatic plant) for wheat fields scouted between flag leaf to soft dough from 2010 to 2025.



Figure 2. Bacterial leaf streak prevalence data (% of fields with at least one symptomatic plant) for wheat fields scouted between flag leaf to soft dough from 2010 to 2025.

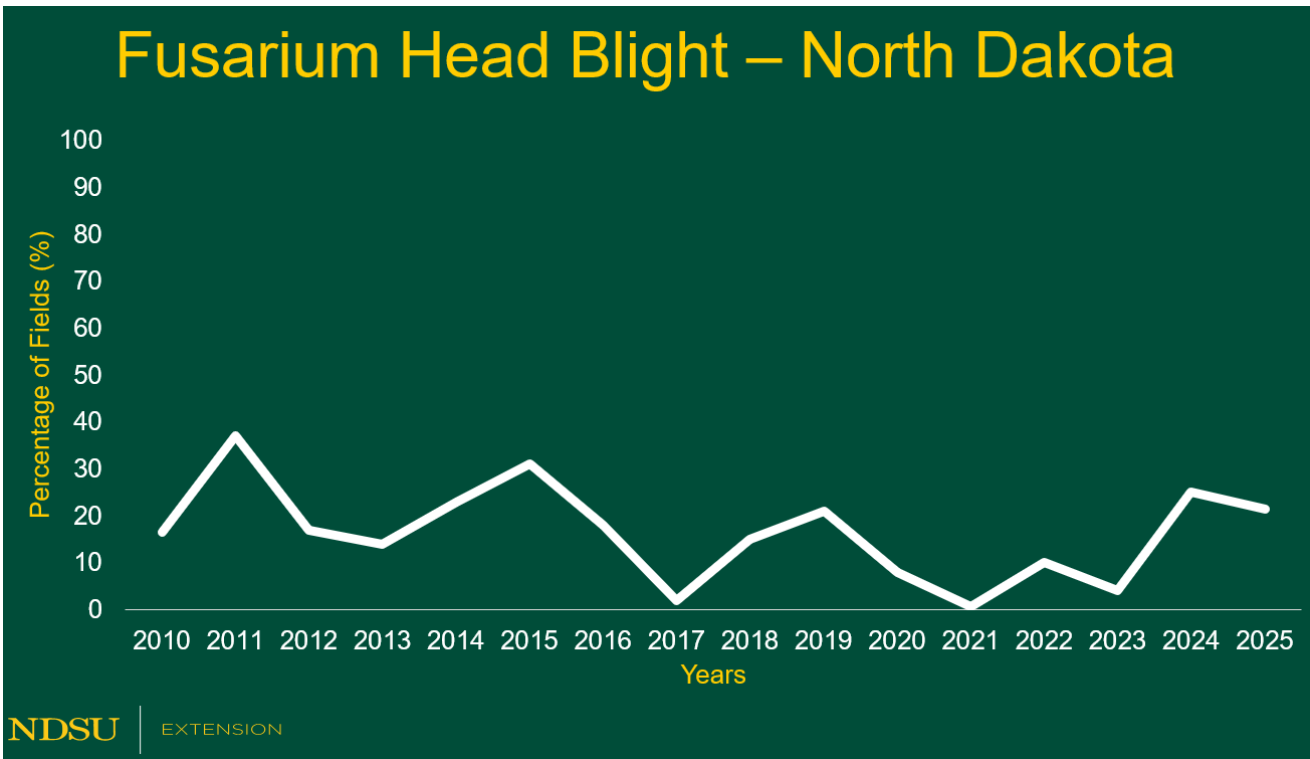
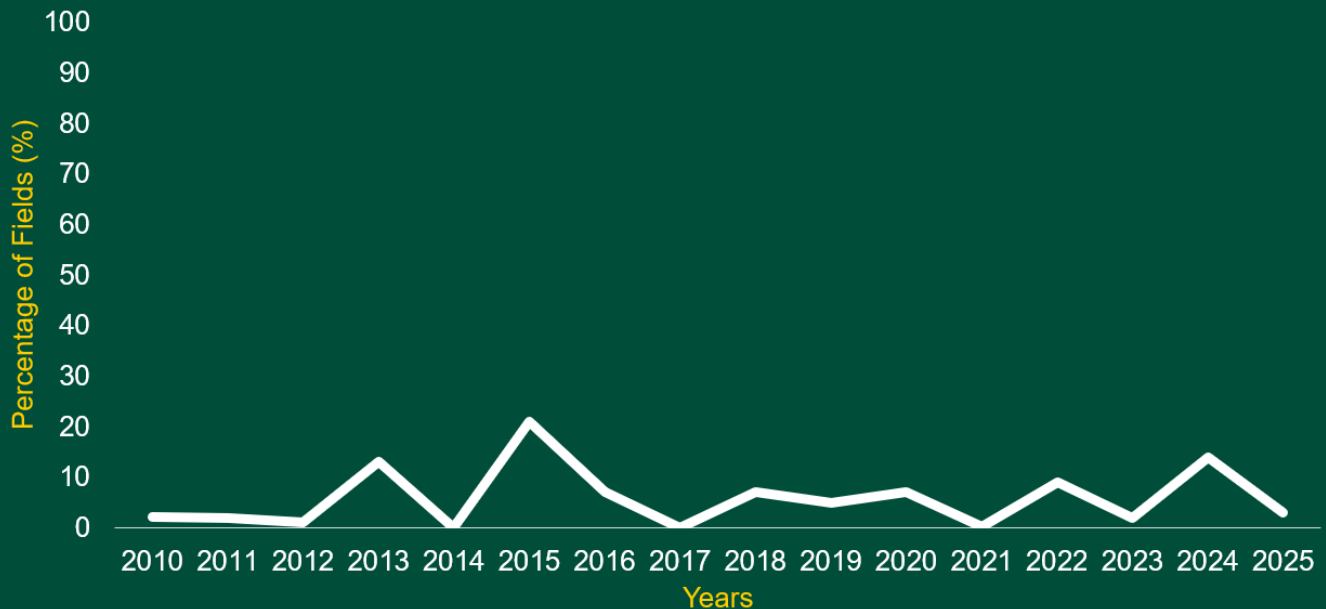


Figure 3. Fusarium head blight prevalence data (% of fields with at least one symptomatic plant) for wheat fields scouted between flag leaf to soft dough from 2010 to 2025.

Ergot – North Dakota



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Figure 4. Ergot prevalence data (% of fields with at least one symptomatic plant) for wheat fields scouted between flag leaf to soft dough from 2010 to 2025.

[Andrew Friskop](#)

Extension Plant Pathology, Cereal Crops

RED CROWN ROT DEVELOPING ACROSS THE MIDWEST

A new soybean disease, Red Crown Rot (RCR), has recently been confirmed for the first time in Minnesota, in Rock County, located in the far southwestern corner of the state, near the borders with South Dakota and Iowa. The disease was identified and confirmed by the University of Minnesota and Dr. Dean Malvick, marking the first known occurrence in the upper Midwest. Read [here](#) for specifics on this report. This disease was first identified in the Midwest in 2018, primarily in Illinois, and has since spread to other areas. In 2025, there have now been reports from both Wisconsin and Minnesota. This new disease, RCR, is known to be caused by the soilborne fungus, *Calonectria ilicicola*, and it has been spreading northward from the southern United States over the past several years. This detection is an



Figure 1. Interveinal chlorosis on soybean leaves due to red crown rot. (Credit: N. Kleczewski, S. Geisler, and D. Telenko and the Crop Protection Network)

incredibly important warning for North Dakota soybean farmers to be vigilant as this pathogen continues to move northward.

Red Crown Rot symptoms can resemble those of several other soybean root and stem diseases, making field identification challenging. Infected plants often exhibit interveinal chlorosis and necrosis on the upper leaves (Fig. 1), similar to those observed in sudden death syndrome (SDS). A key distinguishing feature, however, is the presence of reddish discoloration at the base of the stem and taproot, especially near the soil line (Fig. 2). When roots are split open, grayish-brown streaking can often be seen in the cortical tissue, and small red structures (perithecia) may appear on the stem base under moist conditions. Plants may wilt prematurely, and infection can occur in scattered patches across fields, often more severe in compacted or poorly drained soils.



Figure 2. Soybean roots with reddish discoloration on crown. (Credit: N. Kleczewski, S. Geisler, and D. Telenko and the Crop Protection Network).



Figure 3. Small, red colored perithecia forming on soybean crown infected with *Calonectria ilicicola*. (Credit: N. Kleczewski, S. Geisler, and D. Telenko and the Crop Protection Network).

During the 2025 growing season, the NDSU Extension Soybean Pathology crew conducted scouting surveys across North Dakota and did not find any positive samples of RCR. While this is good news for our state, the close proximity of confirmed detections in the Upper Midwest and the rapid movement of the pathogen highlights the need for continued scouting and avoidance of this pathogen. If you are purchasing or relocating any equipment from outside the state, it is essential to take the time to thoroughly clean and sterilize all equipment before bringing it onto your farm. If this step is not taken, this could lead to the accidental introduction of soilborne pathogens such as RCR, SDS, and SCN. Practicing good sanitation and limiting soil movement remains one of the most effective and proactive strategies for protecting North Dakota's soybeans from new and emerging diseases. If you suspect RCR in any of your fields, please contact us for confirmation.

[Wade Webster](#)

Extension Plant Pathology, Soybeans

CERCOSPORA LEAF SPOT INOCULUM: WATCH OUT IN 2026!

As sugarbeet harvest continues and nears the finish line in North Dakota and Minnesota, the next phase of the Cercospora leaf spot (CLS) disease cycle begins: overwintering inoculum on crop residue. The fungal pathogen, *Cercospora beticola*, produces pseudostromata, structures with CLS lesions that produce spores, but also enable survival overwinter (Figure 1). Each CLS lesion contains many pseudostromata. New spores are released when these structures survive the winter and are exposed to adequate temperature and moisture in the spring and summer.

From late June until October this past season, many sugarbeet fields frequently experienced environments that were conducive to Cercospora leaf spot development. Compared to the 2023 season, the 2025

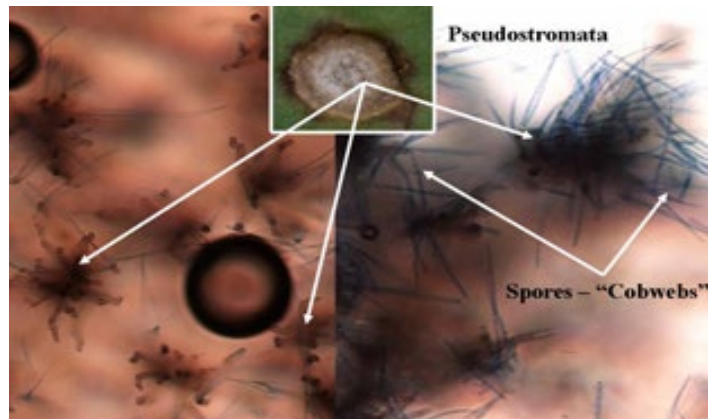


Figure 1. Pseudostromata and spores of *Cercospora beticola*. Even in fields where CLS lesions are below economic threshold, significant quantities of pseudostromata may overwinter and serve as primary inoculum. Image credit: Bob Harveson, <https://extensionpubs.unl.edu/publication/q1753/2013/ht>

Accumulated Cercospora Leaf Spot Daily Infection Values in Eastern ND and Western MN, 2023-2025

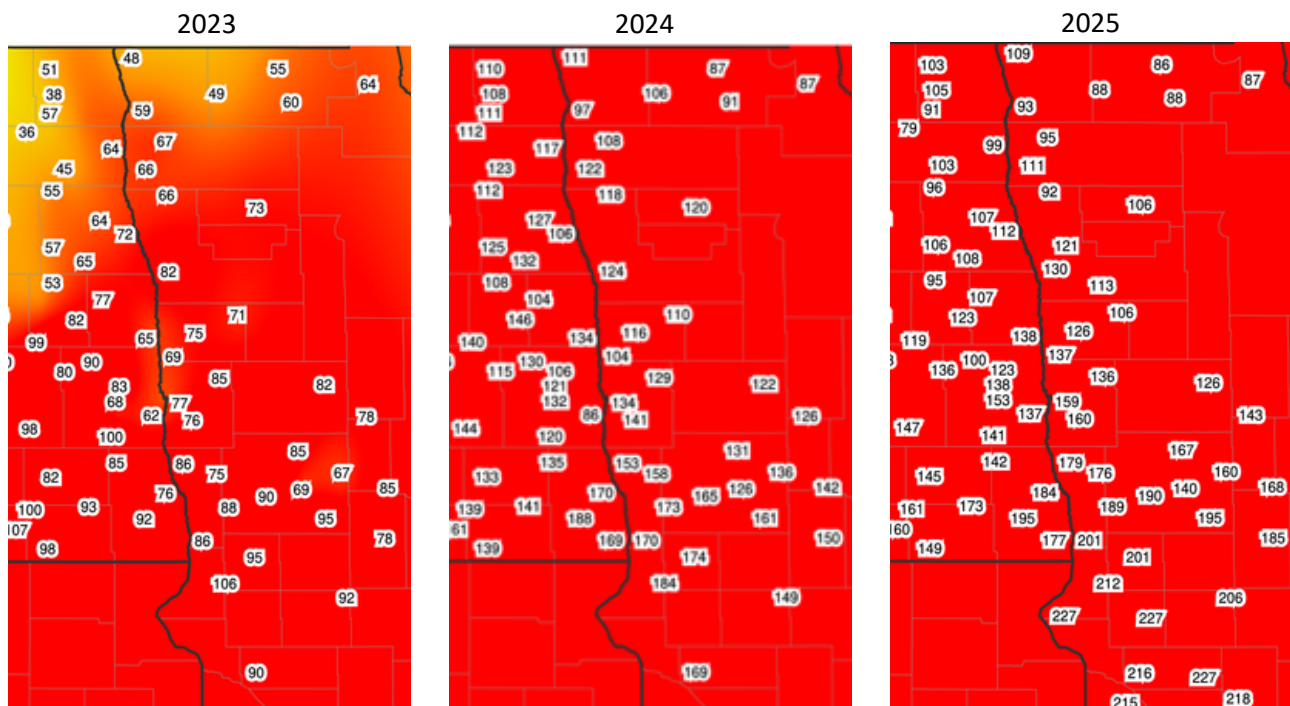


Figure 2. Environmental conditions were extremely conducive to Cercospora leaf spot (CLS) development in both 2024 and 2025, contributing to increased region-wide CLS inoculum for future years. Images depict season-long accumulation of daily infection values from the Shane and Teng model. Image credit: <https://ndawn.ndsu.nodak.edu/>

season experienced a notable increase in Daily Infection Value (DIV) throughout most of the region (Figure 2). 2024 had a similar total DIV accumulation to 2025, indicating that we now have two consecutive years with high levels of CLS inoculum. Even fields with acceptable CLS control during the season—fields that look green from the highway—can contribute to next year’s CLS inoculum, simply because of the sheer numbers involved. The success of in-season disease management (fungicide applications) depends in part on cultural controls such as residue management and crop rotation.

What actions can minimize the impact of high inoculum loads going into 2026? Sugarbeet fields adjacent to the previous year’s sugarbeet crop typically experience earlier disease onset and greater disease severity compared to fields with more geographic separation. Increasing the distance between sugarbeet fields is likely to be one of the most effective strategies in the long run. Research conducted by the Southern Minnesota Beet Sugar Cooperative from 2019-2021 indicated decreased disease severity when tillage was used to bury residue in the spring to a 4-inch depth compared to residue left on the soil surface. Unfortunately, aggressive tillage for sugarbeet residue management must be considered alongside its negative impacts on soil health, the risk of soil erosion, and the associated costs.

Actions to reduce the impact of overwintering CLS inoculum include:

- Increase distance between 2025 and planned 2026 sugarbeet fields
- Deep tillage to bury inoculum (even just on the field margins/borders)
- Prepare for aggressive fungicide programs should 2026 again be a warm and wet year.

[Eric Branch](#)

Extension Plant Pathology, Sugarbeets



CLOSING TIME: PREPARING YOUR SPRAYER FOR WINTER

Despite our prolonged stretch of unseasonably warm weather, we must face a cold reality: it will soon be time to winterize sprayers in preparation for next year.

For an extensive resource on the topic, see Purdue Extension publication *Preparing Spray Equipment for Winter Storage and Spring Startup* (PPP-121), available on the [web](#) or as a [PDF](#).

Also consider the following articles from [Sprayers101](#). Sprayers101 is an excellent resource authored and maintained by two application specialists in Canada, Drs. Tom Wolf (Saskatchewan) and Jason Deveau (Ontario). Although some of the tips shared throughout the site are specific to the Canadian audience, most advice is also applicable to North Dakota.

- [End of Spraying Season Checklist](#). This convenient checklist outlines processes for winterization, sprayer inspection, and reflecting on your experiences during the past spray season.
- [Clean Your Nozzles](#). Consider cleaning your nozzle tips during the offseason. This article offers helpful advice. Nozzle tip cleaning can be delayed until winter rather than competing with fall’s numerous time-sensitive tasks, as long as you remove and set aside the tips after winterizing your sprayer.

TO BUY OR NOT TO BUY? EXTENSION RESOURCES FOR SPRAYER TECH ECONOMIC PLANNING

Agricultural spray drones and ‘sense-and-act’ sprayers (such as John Deere See & Spray) are emerging tools for custom applicators and farmers alike. In a challenging business environment, it is especially important to critically evaluate the economics of these tools as part of any adoption decision. Two recent publications offer assistance.

Economics of Drone Ownership for Agricultural Spray Applications (G1274), from University of Missouri Extension, addresses the (i) initial investment costs and (ii) ownership costs of drones for agricultural spraying. The [publication webpage](#) also includes Microsoft Excel spreadsheets for estimating drone spray costs, one each for custom operators and farmers.

The *Smart Spray Annual ROI Calculator*, from Montana State University Extension, is a [webtool](#) for comparing the application economics of a sense-and-act sprayer to a broadcast sprayer. It offers scenario planning based on factors including acreage, weed pressure, herbicide costs, herbicide passes, labor costs, system costs and productivity estimates. An August 26, 2025 [news post](#) on the GROW IWM site provides additional information regarding the tool.

These resources provide estimates and should not be solely relied upon for financial decisions. Consult with trusted financial advisors and technical experts before making any purchases, using these resources as conversation aids.

[Rob Proulx](#)

Extension Agriculture Technology Systems Specialist



SIMPLE WELLNESS TOOLS – AT HOME AND ON THE FARM

Just as farms need to be operated in a sustainable way that preserves resources for the long term, an individual’s life needs to be managed in a sustainable way for long-term well-being. Feeling overly tired, overwhelmed by stresses or under constant pressure is not a recipe for a sustainable lifestyle.

Wellness occurs across different aspects of a person’s life, such as physical wellness, mental wellness, and wellness in one’s occupation. The list below offers short, actionable wellness steps you can take to pursue wellness at home and on the farm or ranch.

Simple Wellness Strategies

Physical

1. Exercise 20 minutes or more a day (walk, swim, bike, etc.). Physical activity increases well-being.
2. Get a medical checkup from a healthcare professional. Stress can cause or worsen physical problems.

Mental

3. Spend 10 minutes planning your day and your priorities. A few minutes of planning reduces stress and helps you stay focused.
4. Take regular five- to ten-minute breaks throughout the day to relax and recharge. Doing this several times a day renews your energy.

Emotional/Spiritual

5. Write down three things you're grateful for every day. Mindful gratitude calms your mood.
6. Share your concerns with a counselor or other professional. A listening ear will help ease your burdens.

Personal/Relational

7. Spend 15 minutes a day having an uninterrupted conversation with your spouse or other family member. A few minutes of conversation reduces stress and helps you feel needed social support.
8. Get involved or stay in touch with a friend or group of friends. Enjoying activities together is a great way to lower stress.

Work/Professional

9. Analyze the needs of the farming operation, but don't let them dominate all other aspects of your life. Plan other daily work tasks to shift your focus.
10. Seek constructive feedback about your farming operation and ways to grow or improve. Others may be able to share ideas or help in new ways.

Financial/Practical

11. Create a family budget and try to live within your means.
This will help you feel more financially secure.
12. Select three healthy habits you'll try to practice daily. Start today!

Access Helpful Resources

To learn more specifically about wellness tools in managing stress, read the NDSU Extension publication FS1928, "My Wellness Tools and Plan – At Home and on the Farm" – link:

<https://www.ndsu.edu/agriculture/extension/publications/my-wellness-tools-and-plan-home-and-farm>.

If you or someone you know is in need of mental health or substance abuse resources, call or text the **9-8-8 Suicide and Crisis Lifeline**, or chat at <https://988lifeline.org>.

Contact your NDSU Extension County office or search the Web for *NDSU Extension farm stress* for more resources on wellness in agriculture.



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Prioritize your health first and practice daily wellness efforts. Take care of yourself.

[Sean Brotherson](#)

Extension Family Science Specialist

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NORTHEAST ND

Precipitation over the past week ranged from 0.6 to 1.6 inches. While the moisture is appreciated in some seasons, many farmers aren't thrilled about the timing of this rain, especially with crops like soybeans, corn, and sunflowers still standing in the field.

Soybean harvest is ongoing but progressing slowly due to wet conditions. Farmers are focusing on high ground first and leaving the low spots for later, hoping for a hard freeze to help avoid getting stuck in the mud.

Corn harvest is underway with yields coming in strong — reports are averaging between 160 to 170 bushels per acre, which has been encouraging for growers.

Sunflowers still out in the field are facing some pressure from recent heavy winds. Lodging is becoming a concern, particularly in fields where the heads are heavy and the stalks are weakening.

On the operations side, tillage and fall anhydrous applications have started across the region as conditions allow.

[Anitha Chirumamilla](#)

Extension Cropping Systems Specialist
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SOUTH-CENTRAL/SOUTHEAST ND

For most farmers in the region are left to harvest just sugarbeet, soybean, sunflower, and corn, although there are few fields of dry bean to harvest in parts of the region. It's been another damp, if not wet, week!

All corn in the region should be at R6 (physiological maturity [black layer]), unless it was planted late for corn silage. Now we're just waiting for corn moisture to decrease to harvestable levels, which most have reached if you have a dryer system and can afford to run it. Only about 1 to 30 percent of the corn has been harvested in the region so far, with Eddy County reporting the fewest harvested acres and Sheridan County with the most acres harvested as of October 21, 2025. Early field average yield reports have ranged between 150 and 220 bushels per acre, with Richland County reporting the highest yields so far. Corn in Griggs County is currently averaging around 165 bushels per acre, which is above the 5-year average of 143 bushels per acre. However, we don't have enough acreage harvested to determine if this level will be sustained. However, it should. Helping someone estimate corn yields in stressed areas of Foster County, the average yield of five fields was 136 bushels per acre. Not too bad, and more proof, corn yields will be above average. Corn grain moisture in the region ranges from 15 to 25 percent, with most samples having a moisture content of around 20 percent. Test weight is acceptable right now, but is lower than normal (I say this because over the last 5 to 10 years, test weights have been getting into the 60 pounds per bushel), running at about 56.6 pounds per bushel (slightly above the standard). Farmers farther west in the region are getting back to harvesting at the time of writing this, while others continue to wait for soil moisture levels to decrease to resume harvest. The soils are generally wet in the region, from about Wells County east to the Red River. The ideal corn harvest moisture to obtain the highest test weight and the least kernel damage is around 22%; however, this requires time to dry the corn, which incurs additional costs for fuel and

electricity. Corn leaf diseases continued to increase over time, despite the leaves remaining green, as evident in the presence of common corn rust in photo 1. If the corn harvest is delayed, please take the time to check stalk quality/integrity by squeezing the stalk at about 12 inches from the soil line to tell if it is still firm. If stalks are already lodging, which I have not yet observed, or stalks are not firm, plan to harvest the fields with poorer stalk quality to reduce harvest losses. Most corn should stand well; however, I have heard from some farmers that stalk quality is an issue in a small percentage of fields, and I am aware that the “ghosted” plants in many fields will have poor stalk quality.

The soybean harvest is nearing completion. Soybean harvest completion ranges from just over 50% in Burleigh County to greater than 95% in Kidder, Sheridan, and Richland Counties, with most other counties between 80 and 90% completed. With the majority of the soybeans harvested now, the theme of “disappointing soybean yields” remains unchanged. Field averages range from 5 (likely due to severe hail damage) to 65 bushels/A, with the most consistently higher yields in the western part of the region. Average soybean yields across the region are likely around 30 bushels per acre, which is below or at county averages.

Soybean moisture was very dry for most of the harvest, but it is a challenge now for those still needing to harvest. Soybean test weights are between 56 to 60 pounds/bushel. Soybean size is smaller than normal in most fields. As I examined the plants at harvest, I noticed that most late-season pollinated pods in both the lower and upper parts of the canopy either aborted or produced small soybean seeds (photos 2 and 3). I attribute the smaller seed size to the late-season lack of moisture in much of the region, as well as the early September freeze, which likely affected some fields.



Photo 1: Corn leaf showing common corn rust.



Photo 2: Soybean pods in the lower canopy having aborted pods, seeds, and small seeds.



Photo 3: Soybean pods at the top of the plant having pods with aborted and small seeds.

Nearly all dry beans are harvested in the region, with yields disappointing like those of soybeans.

Sunflower harvest is slow in much of the region. Only about 50% of the sunflowers have been harvested across the region. The only yield report I heard came from Burleigh County with yields at about 2,900 pounds per acre. Some fields that appeared fairly good a few weeks ago have declined in yield and quality due to the continued spread of head rot (*Sclerotinia*) in certain fields.

Approximately 75% of the sugarbeets have been harvested now. Sugarbeet yields in the Minn-Dak Cooperative region are good from a historical perspective at low 30 tons/A, but lower than in more recent years due to the extreme presence of *Cercospora* late into the season and too much rain throughout the region, which is allowing Minn-Dak sugarbeet farmers to harvest all planted acres to have the maximum amount of sugarbeets to process.

At 10:30 p.m., October 21, 2025, the 4-inch bare soil temperature ranged from 46 degrees Fahrenheit near Bremen, Jamestown, and Oakes to 57 degrees °F at Marion. Ayr, Casselton, Linton, Marion, McKenzie, Milnor, Mooreton, Skogmo, Wing, and Wirch had soil temperatures at 49 to 57 degrees °F. Based upon these soil temperatures and the end of this week's weather forecast, it is still too early to apply the residual herbicides Zidua and Valor and fall nitrogen. Soil temperature at a 2- to 4-inch depth needs to be below 50 degrees °F to remain stable through the winter. The weather at the end of this week will be ideal for applying postemergence fall herbicides to control cool-season perennials, winter annuals, and biennial weeds.

Of the 27 NDAWN stations, I've chosen this season across the region, the average maximum daily air temperature from October 7, 2025 to October 20, 2025 ranged from 57 degrees °F near Finley to 78 degrees °F near Brampton, Leonard, Milnor, Mooreton, Oakes, and Stirum, with an average of 60 degrees Fahrenheit, a whopping 19 degrees F below the last two weeks! What a change. The average daily minimum air temperature for the past two weeks at the 27 NDAWN stations ranged from 36°F near Pickardville to 41°F near Milnor and Wirch, with an average of 39°F, 10°F cooler than reported in the last Crop and Pest Report!

The average 4-inch bare soil temperature at the 27 NDAWN stations for the last two weeks ranged from 49°F near Bremen and Steele to 55°F near Brampton, with an average of 52°F.

Rainfall across these 27 NDAWN stations ranged from 0.46 inch near Linton to 1.5 inches near Mayville, with an average for the period of 0.91 inch, 0.5 inch greater than the average reported in the last Crop and Pest Report.

Please stay safe while completing the harvest, and we hope to see many of you at our meetings this fall and winter! Thank you for the opportunity to prepare this article throughout the growing season. Please let me know if you like the detail I've included in this article when you see it, or feel free to email me with your opinion. Have a great weekend!

[Jeff Stachler](#)
Griggs County Extension Agent

SOUTHWEST ND

Southwest North Dakota has received significant rainfall over the past week, ranging from about 0.5 to 2.3 inches across the region, which has slowed harvest progress and delayed drying down of corn and soybeans.

Corn harvest is underway across the region, with completion ranging from 30% to 70% depending on field conditions. Yields are variable, ranging from 50 to 125 bushels per acre (bu/ac), depending on the severity of hail and frost damage, but overall trending near average. Many producers are taking corn at higher moisture levels this year. Test weights are lighter in frost-affected fields (50–53 lb/bu) and closer to 54–56 lb/bu in other areas.

Soybean harvest is 75–85% complete in most areas. Yields are around average, with many reports in the upper 30 bu/ac range. Rapid dry-down led to some pod shatter losses, as fields transitioned from green to overly dry in a short period.

The sunflower harvest is underway, with about half of the fields now completed. Early reports suggest variable yields, in some areas exceeding 2,000 lb/ac in others at around 1,200 lb/ac.

Flax yields have also been good, ranging from 30 to 70 bu/ac, while canola yields are averaging near 2,000 lb/ac.

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