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plant pathology

NEW CROP RISK TOOL ENHANCES DISEASE MANAGEMENT DECISIONS

The Crop Protection Network (CPN) has launched an exciting free resource, the Crop Risk Tool, designed to give farmers the power to better understand the best time to manage foliar diseases in corn and soybeans. This tool is the culmination of many years of pathologists walking fields and collecting disease data to provide field-specific risk values to guide timely and informed fungicide decisions.

The Crop Risk Tool is a web-based platform that forecasts the risk of key foliar diseases by feeding local weather data into the validated models. Models that may be of most interest to ND farmers are tar spot in corn, white mold, and frogeye leaf spots in soybeans. This tool also has models specific for other cropping systems such as dry beans, potatoes, tomatoes, beets, carrots, and onions.

Key Features and Benefits

- Risk levels are updated daily based on recent weather conditions.
- The tool provides a 7-day forecast to assist in planning ahead of incoming weather events.
- This tool covers multiple major above-ground diseases affecting corn and soybeans, making it a versatile resource for integrated disease management.
- Accessible through the Crop Protection Network website, this tool is designed for easy use, with clear instructions for entering field data and interpreting results.

It is important to remember that in order for any disease to develop that we have a crop variety susceptible to the disease, the correct environmental conditions, and for the pathogen to be present (models assume pathogens are present within your field). Regular scouting is important for understanding if the pathogens are present or have been present in the past. These models are tools to help guide decisions on when to make fungicide applications, and it is critical not to rely entirely on these tools.

It is also important to restrict the use of the risk prediction tool to only periods in which the crops are susceptible to the disease. For example, in corn, if a fungicide is considered to manage a disease, application is best done between V10 (10 emerged leaves) and R3 (milk). For soybeans, the

growth stages of concern for white mold are between R1 (first flower) and R3 (first pod), and the crop needs to have reached crop canopy closure for the mushroom-like structures of the white mold fungus to form. The white mold models in soybeans also differ between dryland and irrigated environments due to changes in the microenvironments of those systems. The growth stages of concern for frogeye leaf spot would be between R1 (first flower) and R5 (beginning seed set). White mold models are also present for dry beans, however, these models have not yet been validated on dry beans in North Dakota. Despite this, these risk models still have value in guiding increasing or decreasing risk levels.

Examples of the tool in action are shown below.

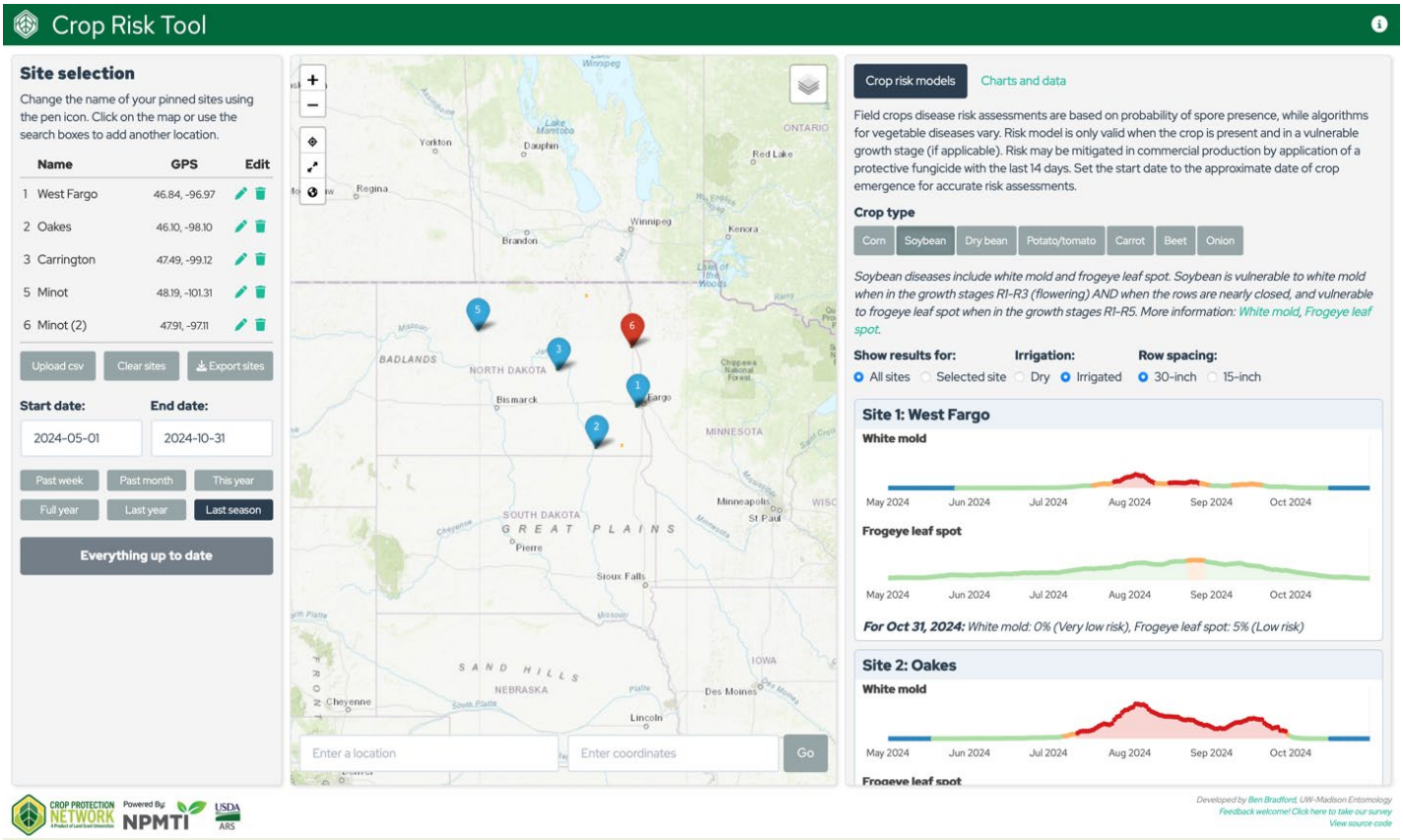

Figure 1. The Crop Risk Tool in action looking at risk level of soybean white mold and frogeye leaf spot at multiple NDSU REC's during the 2024 growing season.

Figure 2. Season-long risk probabilities of white mold and frogeye leaf spot in West Fargo, ND and Oakes, ND, during the 2024 season.

The Crop Risk Tool is freely available through the Crop Protection Network's website at https://cropprotectionnetwork.org/crop-disease-forecasting. The platform is supported by research from land-grant universities, their Extension specialists, and the Crop Protection Network. Additional resources, such as fungicide efficacy tables and disease identification guides, are also available on the CPN website to complement the tool's use.

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SUGARBEET

Keep alert for seedling diseases

In parts of the Red River Valley, sugarbeet emergence and stand establishment have been affected by wind, soil crusting, and springtail damage. Dry conditions before May 21st did not favor soilborne diseases, but sugarbeet seedlings are particularly vulnerable to Rhizoctonia damping off, especially in fields with a history of the disease. Fungicide applications made at the 4-8 leaf stage can help protect seedlings as seed treatments and in-furrow products become less effective with time. Proper identification of the reason for sugarbeet stand loss from biotic (e.g. disease) or abiotic (e.g. wind, soil crusting, etc.) factors can help inform choices for future growing seasons as well as the potential benefit from post-emergent fungicide applications.

Cercospora leaf spot update: Spores already detected

The effort to monitor Cercospora leaf spot (CLS), the most serious foliar disease of sugarbeet, begins each year through a system of spore trapping led by Dr. Gary Secor, NDSU Plant Pathologist. The fungus that causes CLS, *Cercospora beticola*, overwinters in sugarbeet leaf residue and plant debris. In the spring, the surviving fungal structures, called pseudostromata, produce spores that are spread by the wind and rain. Spore traps catch airborne spores, which can then be assessed in the lab.

Work completed so far in 2025 by Dr. Secor, Viviana Rivera, and cooperators indicates that CLS spores were already present when the traps were first placed in six locations across beet-growing regions of North Dakota and Minnesota. April 4th was the first trap deployment (and spore detection) date. In contrast, spores were first detected in the last week of April in 2024. Minimal snow cover and warm days in April and early May have likely contributed to *C. beticola* spore production. Although the first fungicide application to manage CLS in sugarbeet is still several weeks away, the beginnings of potential CLS outbreaks are widespread in the region.

Eric Branch
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plant science

SO MUCH HAPPENS DURING SOYBEAN EMERGENCE

The 2025 soybean planting season got off to a strong start, thanks to the warm and favorable conditions in early May. However, the past few weeks have brought several challenges across the region. Here's a look at some of the major factors affecting soybean emergence this season.

Flooding

Heavy rains last week led to saturated soils in many areas. Excess moisture right after planting can damage or kill seeds before they emerge, and seedlings can also be lost after emergence. Flooding later in the season, especially when combined with high temperatures, can be just as damaging.

Soybean plants can survive short-term flooding, particularly under cool conditions, but even if they recover, they may be stunted. At the vegetative growth stage, waterlogged soils can reduce yields by as much as 52%. These losses are driven by reduced root and shoot growth, impaired nodulation and nitrogen fixation, diminished photosynthesis, and plant stress or death due to disease.

Frost Damage

Frost made an unexpected appearance in parts of the state this spring. My own plots weren't spared! Soybean seedlings exposed to temperatures below 32°F can suffer cellular damage due to ice crystal formation, which disrupts cell membranes.

Some seedlings may recover by sprouting new growth from axillary buds, especially if the damage is above the cotyledons. However, if injury extends below the cotyledons, the plant will not survive. When evaluating frost damage, consider the percentage of plants killed versus those recovering. Interestingly, if a reasonable number of seedlings survive, it's often better to keep the existing stand rather than replant. Surviving plants may mature 5-8 days later, but replanting could delay maturity even further.

Ana Carcedo
Broadleaf Agronomist

AROUND THE STATE

NORTHEAST ND

Field Conditions and Crop Progress Update

Rain and cold conditions during the first half of the week significantly delayed field operations across the northeastern region. Wet field conditions slowed down field operations. However, by Saturday, activity resumed and has since picked up full momentum, with producers making strong progress in planting and spraying.

Small Grains

Planting of small grains is nearly complete, with an estimated 80–90% of the crop already emerged. The majority of crop stands range from good to excellent, benefiting from recent precipitation. However, emergence in some fields has been rated poor to fair, particularly in areas affected by excessive moisture, dry spots, or saline soils. Wheat and barley growth stages vary from the 1- to 5-leaf stages, largely depending on planting dates.

Sugarbeets

Sugarbeet planting is complete, and most of the crop has emerged in the Red River Valley. High winds earlier in the week have caused issues with soil movement, leading to seedling damage. In some cases, sugarbeets were blown out or buried under displaced soil, creating a potential need for replanting in affected fields.

Soybeans and Dry Beans

Early-planted soybeans and dry beans are beginning to emerge. However, the majority of planting for these crops is expected to occur this week as field conditions have improved.

Corn

Corn fields that emerged in early May suffered frost damage, with visible purpling and browning of leaves. Despite the frost impact, many of these fields are recovering well, as the growing point remains viable and plants are beginning to green up again.

Canola

Early-planted canola has emerged with stand conditions rated good to excellent. Flea beetle pressure has remained low so far. Most canola planting is scheduled for this week, and there is potential for flea beetle activity to align with seedling emergence, which will require close monitoring.

Weed Pressure

Leafy spurge is now flowering and being reported in several locations across the region. Farmers should monitor the ditches and manage these infestations to prevent further spread.

Barley field in Ramsey County. Photo: Lindsay Overmyer, ANR Extension Agent, Ramsey County

Frost damage on corn seedlings in Grand Forks County. Photo: Isaac Cuchna, ANR Extension Agent, Grand Forks County.

Flea beetle injury on canola in Grand Forks County. Photo: Isaac Cuchna, ANR Extension Agent, Grand Forks County.

Leafy spurge in Grand Forks County. Photo: Isaac Cuchna, ANR Extension Agent, Grand Forks County.

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SOUTH-CENTRAL/SOUTHEAST ND

The story of the week was the continued cold and wet conditions throughout the region last week on Wednesday, Friday, and Sunday in the southeast and northwest sections of the region! The lowest daily low temperatures across the region got down to 32 degrees Fahrenheit in Wished and Zeeland on Tuesday and Wednesday of last week. Linton, Pickardville, Wirch, Wing had low temperatures for at least one day of 33 or 34 degrees Fahrenheit at some point in time during the week with Pickardville on Friday and the others Tuesday or Wednesday of last week. Emerged corn took the greatest hit throughout the region last week, with plants up to three collars completely frozen to the soil in Logan County (**Photo 1**), and all emerged corn in the region showing some frost damage (**Photo 2**) even if the temperatures were above 34 degrees Fahrenheit. All locations in the region had at least one day 39 degrees Fahrenheit or below last week with Dazey, Oakes, and Pickardville having at least 6 days last week below 40 degrees Fahrenheit and Dazey being as low as 36 degrees Fahrenheit one day of the week and Oakes and Pickardville having two days at 35 degrees Fahrenheit and one day at 34 degrees Fahrenheit, respectively. I have not heard from enough people yet, but soybeans appear to be completely frozen in **photo 3** from Logan County, but not many soybeans were up during the cold weather anyway.

Photo 1. V3, three collar corn in Logan County completely frosted off to the soil line. Photo by Josh Becker of Logan County

Photo 2. V2, two collar corn in Emmons County showing the most common frost injury across the region. Photo by Nancy Deis of Emmons County.

Photo 3. Unifoliate soybeans in Logan County that appear to be mostly dead from freezing temperatures last week, but recovery is unknown at this time. Photo by Josh Becker of Logan County.

Few crops were planted in the past week throughout the region except on Monday and Tuesday. As of May 27th, nearly all small grain species, field peas, corn, canola, and potatoes have been planted across the region, with nearly all of these crops emerged in the region, except corn, which is at least 50% emerged as of May 27th. Small grain crops and canola are emerging non-uniformly across the region, but looking much better this past week (**Photos 4 and 5**), with most of these two crops having emerged. The most advanced hard red spring wheat in the region is starting to joint in Griggs County (**Photo 6**). Field peas probably look the most uniform and have the best quality of the crops in the region. Few potatoes have emerged yet.

Photo 4. Hard red spring wheat having up to 4 tillers and very close to jointing in some of the earliest planted hard red spring wheat in Griggs County.

Photo 6. Jointing beginning in this photo of hard red spring wheat of likely the earliest planted hard red spring wheat field in Griggs County.

Photo 5. Two-leaf canola looking good in Kidder County as of May 23rd. Photo by Monica Fitterer of Kidder County.

The winter rye crop looks the worst that I can remember. **Photo 7** shows how short winter rye is in Kidder County and it is nearly in the boot stage already.

As of May 20th, soybean planting ranged from 25% in Eddy County to nearly 100% in Sargent County with an average across the region of just over 60%. Soybean emergence in the region ranges from 3% in Eddy County to at least 60% in Sargent County with an average emergence across the region of only 20%. With the cold temperatures and large rainfalls, soybean emergence is slow and many soybeans emerged prior to the rain were harmed in some manor to frost, but the true extent of damage is not known yet. **Photo 8** shows how soybeans planted and starting to emerge prior to the rain and cold are struggling to emerge. The biggest concern now is for seedling diseases caused by Rhizoctonia, Phytophthora, and Pythium to show up in soybean fields planted closest to the rain, but all fields not emerged yet may be at risk. Scout fields over the next few days, looking for seedling blight damage and the need to replant. Be patient on emergence.

Sunflowers are being planted now at least in Burleigh and Emmons Counties but none have emerged. Few if any dry beans having been planted in the region yet, which is a positive situation.

Photo 7. Very short winter rye nearly in the boot stage in Kidder County as of May 23rd. Photo by Monica Fitterer of Kidder County.

Photo 8. Soybeans planted and starting to emerge prior to the rain and cold weather struggling to emerge from the soil at the Carrington Research Extension Center on May 21st.

The biggest problem for the region is weeds. **Photo 9** shows how large kochia is becoming that survived vertical tillage during seedbed preparation. This photo happens to be from a corn field, and kochia is the most prevalent weed, with some approaching 3 to 4 inches, which means herbicides need to be applied. Yet the corn is only V2 (second collar) and just recovering from slight frost damage. Few other weeds exist in the field, and I am unsure if a preemergence herbicide was applied. **Photo 10** shows a 1-inch kochia that survived tillage at planting, producing axillary growth that many believe starts to make kochia more difficult to control. This is a concern. Weeds in the earliest planted wheat are getting up to 3 inches already. **Photo 11** shows a 1.5-inch waterhemp plant, and kochia in this field was up to 3 inches already. This field will fortunately be sprayed on Wednesday or Thursday of this week. **Photo 12** shows how leafy spurge is in full flower in much of the region and is one of the best times to apply herbicides for effective control.

Photo 9. Current size and quantity of kochia on May 27th in a V2 (2 collar) corn field surviving vertical tillage just prior to planting. Not a good situation as herbicides should be applied, but few other weeds exist and the corn is small yet.

Photo 10. One-inch kochia on May 27th that survived vertical tillage after seedbed preparation having axillary/nodal bud/shoot growth already which some weed scientist believing this plant will be more difficult to control with all herbicides due to the axillary growth now.

Photo 11. A 1.5 inch waterhemp plant already in an early planted hard red spring wheat field in Griggs County!

Photo 12. Flowering leafy spurge on May 23rd in Kidder County. One of the best leafy spurge stages to control leafy spurge with herbicides. Photo by Monica Fitterer of Kidder County.

Of the 27 NDAWN stations chosen this season for this region, the average maximum daily air temperature from May 20 to May 26, 2025 ranged from 59 degrees Fahrenheit near Wishek to 68 degrees Fahrenheit near Hillsboro and Mayville (strange again for Traill and northern Cass County to be the warmest) with an average for the region this past week of only 62 degrees Fahrenheit, 1 degree Fahrenheit below last week. For most parts of the region, Tuesday and/or Wednesday daily high temperatures were new record low high temperatures. The average daily minimum air temperature for the past week at the 27 NDAWN stations across the region ranged from 37 degrees Fahrenheit near Zeeland (10 degrees colder than last week!) to 43 degrees Fahrenheit near Wahpeton (11 degrees colder than last week!) with the daily average for the region for the week of 40 degrees Fahrenheit (4 degrees colder than last week).

Rainfall for these stations across the region for last week ranged from 0.77 inch near McKenzie to 1.95 inches near Wahpeton, with an average for the week of 1.15 inches, 0.35 inch below last week. The western part of the region received the least rainfall this past week, with the eastern and southern (see **photo 13** from Logan County on May 23rd) parts of the region receiving the greatest rainfall this past week. As of May 26th, the Skogmo NDAWN station had the

lowest four-inch depth of soil moisture at 14%, with the greatest station being McKenzie at 42%. The average four-inch soil moisture over the region decreased 6% over the last week to 27%. As of May 26th, the Wing NDAWN station still had the lowest 39-inch depth of soil moisture at only 5%, with the Cooperstown and Leonard NDAWN stations the greatest at 51%. The only other NDAWN stations having a 39-inch depth of soil moisture below 10% on May 26th were still Linton, Livona, Pickardville, and Stirum.

The lowest average daily four-inch bare soil temperature in the region for the week was 54 degrees Fahrenheit, 2 degrees Fahrenheit below last week's average for the region. However, on May 26th, the average 4-inch bare soil temperature across the region was now at 60 degrees Fahrenheit. It's warming up, thank goodness. The coldest average soil temperature for last week was 50 degrees Fahrenheit at the Bremen and McKenzie NDAWN stations.

Photo 13. A flooded road on May 23rd in Logan County from last week and the previous week's rainfall. Photo by Josh Becker of Logan County.

The winds finally calmed down in the entire region this past week. The average daily wind speed for the week in the region was 6 mph compared to 14 mph the week before.

Looks like this weekend will be hot and dry, allowing planting to likely get completed, but the following week will cool off and be wet based on the current forecast. Looks like the rest of June will be below average temperatures, similar to last year.

Jeff Stachler
Griggs County Extension Agent

weather

WEATHER FORECAST

The May 29 to June 4, 2025 Weather Summary and Outlook

Over the past week, lingering showers brought moderate rainfall to the region. Showers mainly in the central region after moving from the east. Much of the area recorded around a quarter inch of rain, but localized heavier amounts up to 0.83 inches were recorded (Figure 1). The steady, moderate rain, in addition to several inches from the past week, allowed much of it to soak into the soil. Many NDAWN stations report soil saturation down to 40 inches in the heaviest-hit areas. The next seven days could contain light, spotty showers, but sunshine and average temperatures will continue to give fields a chance to dry out.

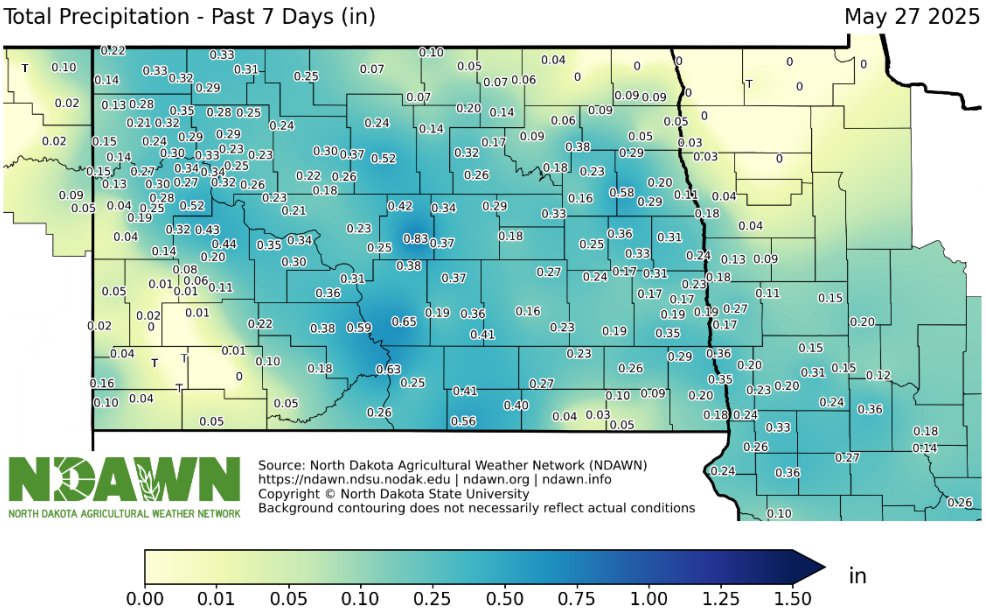

Figure 1. Total Rainfall for the period of May 20 through May 27, 2025.

Things have warmed up after the passing of the rain last week, bringing temperatures closer to average. Temperatures have reached into the 70s with sunshine, around 5°F below average in Southern ND, and average in the North, where precipitation totals were lower (Figure 2) in recent days. The good news, temperatures will gradually warm up across the state this forecast period. Temperatures will be well above average through the weekend, and are expected to cool to average levels next week.

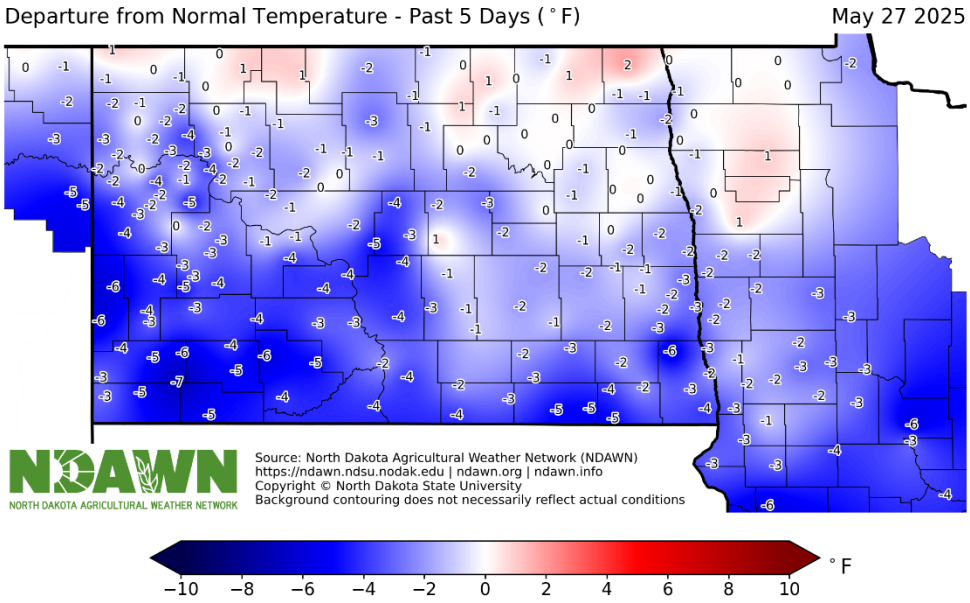

Figure 2. Departure from Average Air Temperature for the Period of May 22 through May 27, 2025

Figures 3 and 4 show forecasted Growing Degree Days (GDDs) for base 32°F (wheat and small grains) and 50°F (corn and soybeans) during this forecast period.

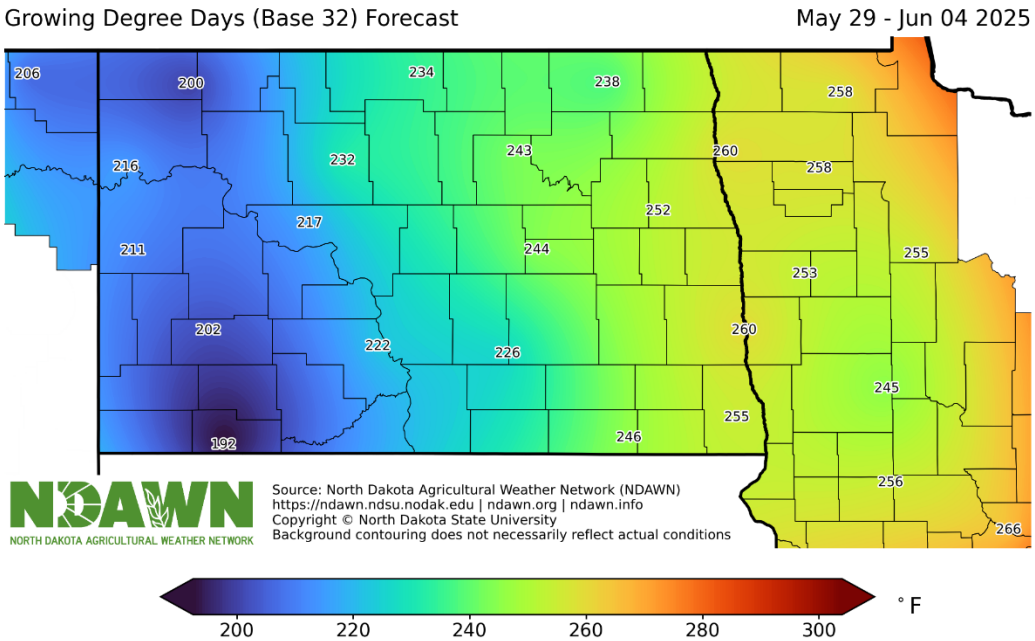

Figure 3. Estimated growing degree days base 32° for the period of May 29 to June 04, 2025.

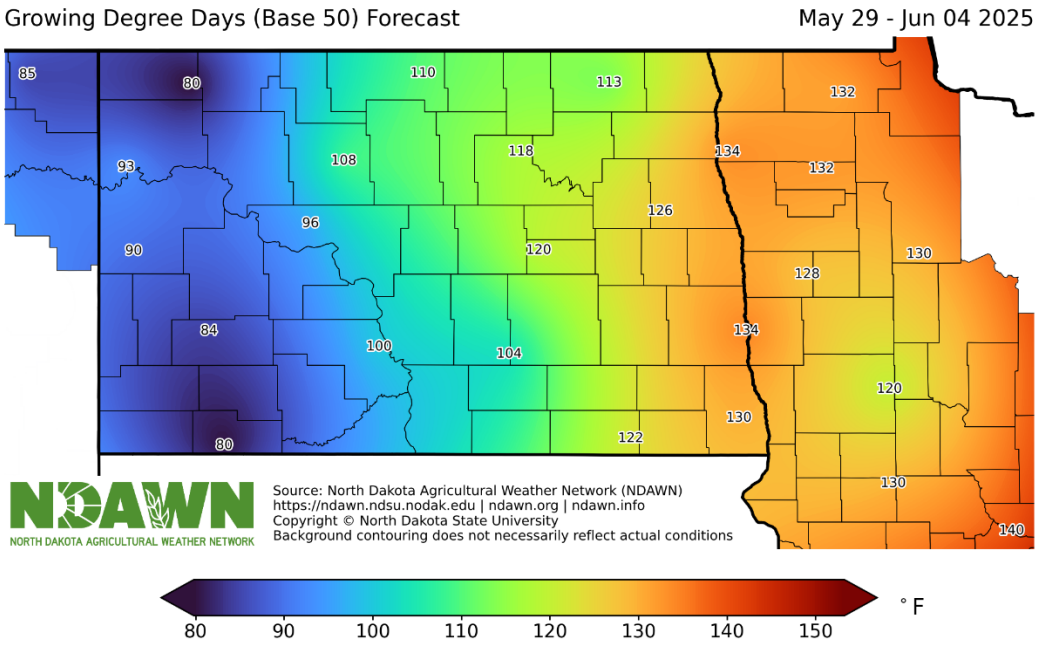

Figure 4. Estimated growing degree days base 50° for the period of May 29 to June 04, 2025.

Using May 1 as a planting date, the accumulated growing degree days for wheat (base temperature 32°) is given in Figure 5. You can calculate wheat growing degree days based on your exact planting date(s) here: https://ndawn.ndsu.nodak.edu/wheat-growing-degree-days.html

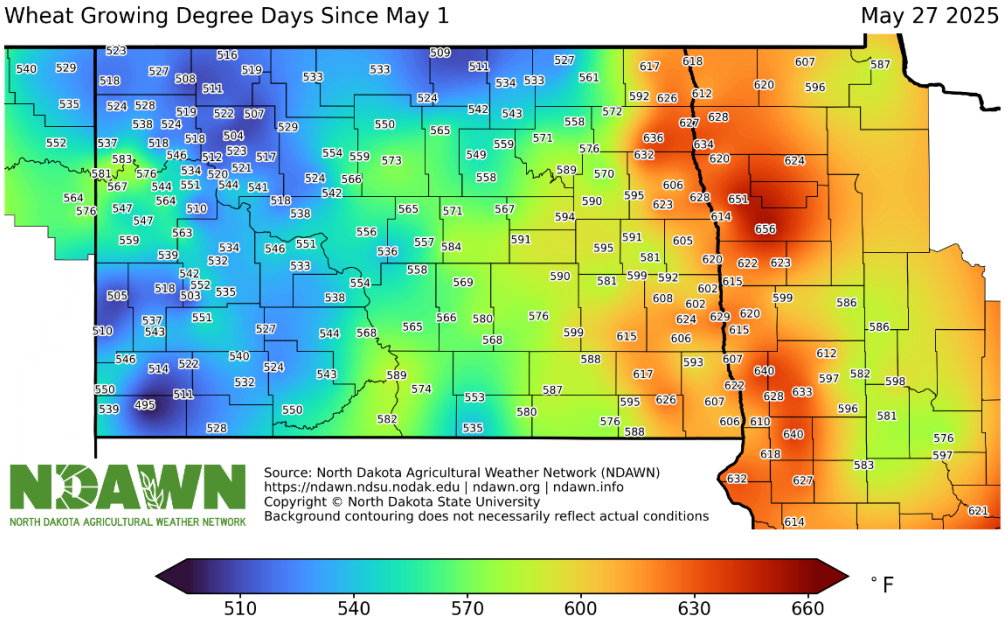

Figure 5. Wheat Growing Degree Days (Base 32°) for the period of May 1 through May 27, 2025

Using May 10 as a planting date, the accumulated growing degree days for corn (base temperature 50°) is given in Figure 6. You can calculate corn growing degree days based on your exact planting date(s) here: https://ndawn.ndsu.nodak.edu/corn-growing-degree-days.html.

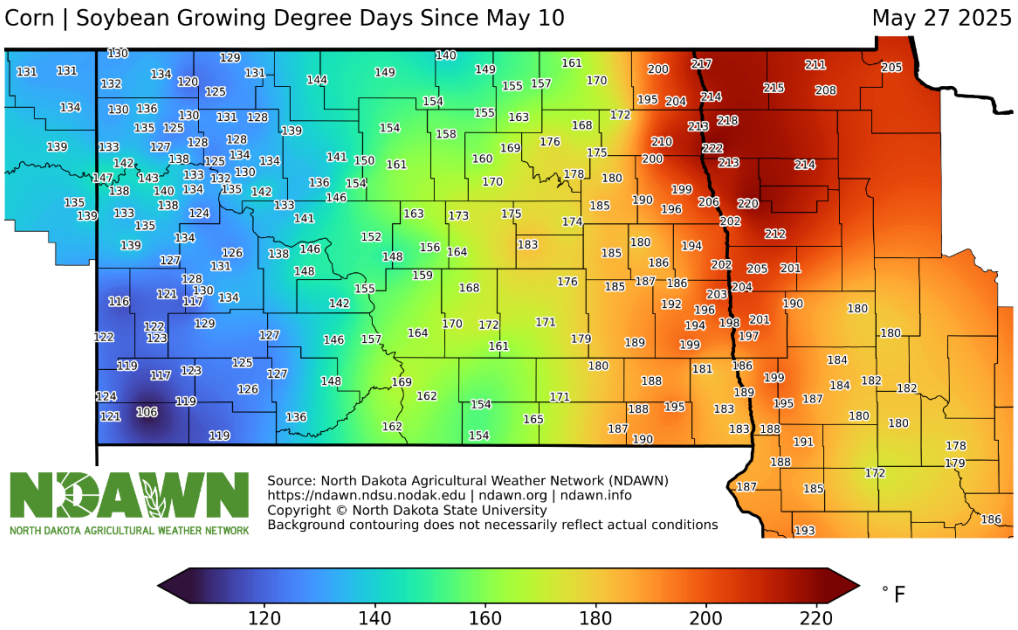

Figure 6. Corn Growing Degree Days (Base 50°) for the period of May 10 through May 27, 2025

Soybeans also use base 50° like corn, but NDAWN has a special tool for soybeans that, based on your planting date and cultivar, can estimate maturity dates based on average temperatures, as well as give you GDDs based on the planting date(s) you set. That tool can be found here: https://ndawn.ndsu.nodak.edu/soybean-growing-degree-days.html

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NDSU EXTENSION

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