

No. 15 August 15, 2024

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UPDATE ON SOYBEAN APHIDS

Scouting update on soybean aphids from IPM scouts, crop consultants and farmers found that soybean aphids are increasing in ND and western MN (source: A. Peltier & A. Hanson, UMN) this past week. Soybean aphids were found in about 86% of the 94 soybean fields surveyed. The percent of plants infested ranged from 2 to 100% with an average of 25 aphids per plant (range of 1 to 387 aphids per plant). About 10% of the fields were above the Economic Threshold (average of 250 aphids per plant, 80% of the plants infested, increasing populations up through the R5 crop stage – beginning seed). See [IPM maps](#) on the next page.

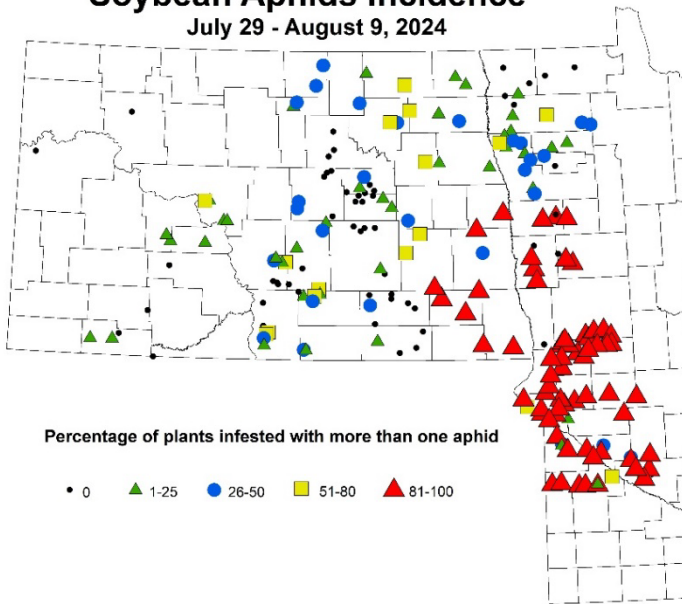
For our Fargo insecticide trial, we are continuing to do soybean aphid counts and have efficacy results for 4, 8 and 12 days after treatment (DAT). This will help determine the residual activity of different insecticide products and modes of action.

Again, all of the pyrethroid products tested (Baythroid XL, Brigade, Warrior II, Asana XL, Hero) showed a small decrease in aphid numbers at 8 DAT probably due to large numbers of predators that moved into plots after treatment (250-500 pyrethroid resistant aphids in plots equate to plenty of food for predators!). The same held true for the untreated check at 8 DAT. At 12 DAT, aphid numbers increased probably due to migrant winged (alate) aphids moving into plots and favorable weather conditions for reproduction (moderate temperatures, mid-70sF to mid-80sF). The aphid-specific products (Transform WG, Sefina, Sivanto Prime) continued to have low aphid numbers at 4, 8 and 12 DAT, and were gentler on beneficial insects than broad spectrum pyrethroids. The pyrethroid + aphid-specific premix products (Leverage 360, Endigo ZC, Ridgeback, Renestra) also had low aphid numbers. However, premixes are best used when multiple insect pests of soybeans are present at economic levels in a field. Extension entomologists are concerned that premixes with a pyrethroids at a low AI (active ingredient) rate may further promote the development of pyrethroid resistant soybean aphids and other secondary insect pests. See graph of treatments on the next page.

Thanks for support from the North Dakota Soybean Council and chemical companies. Disclaimer: Mention of insecticides does not imply any discrimination against any product not tested by the authors or the university.

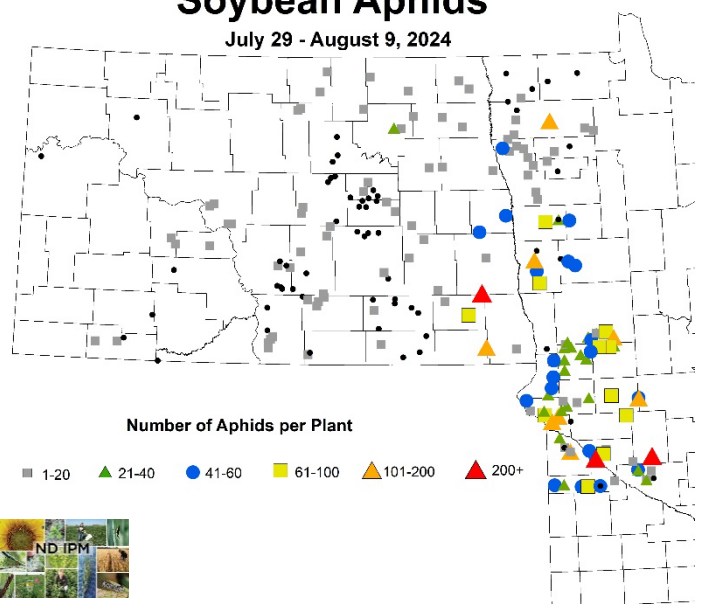
Soybean Aphids Incidence

July 29 - August 9, 2024



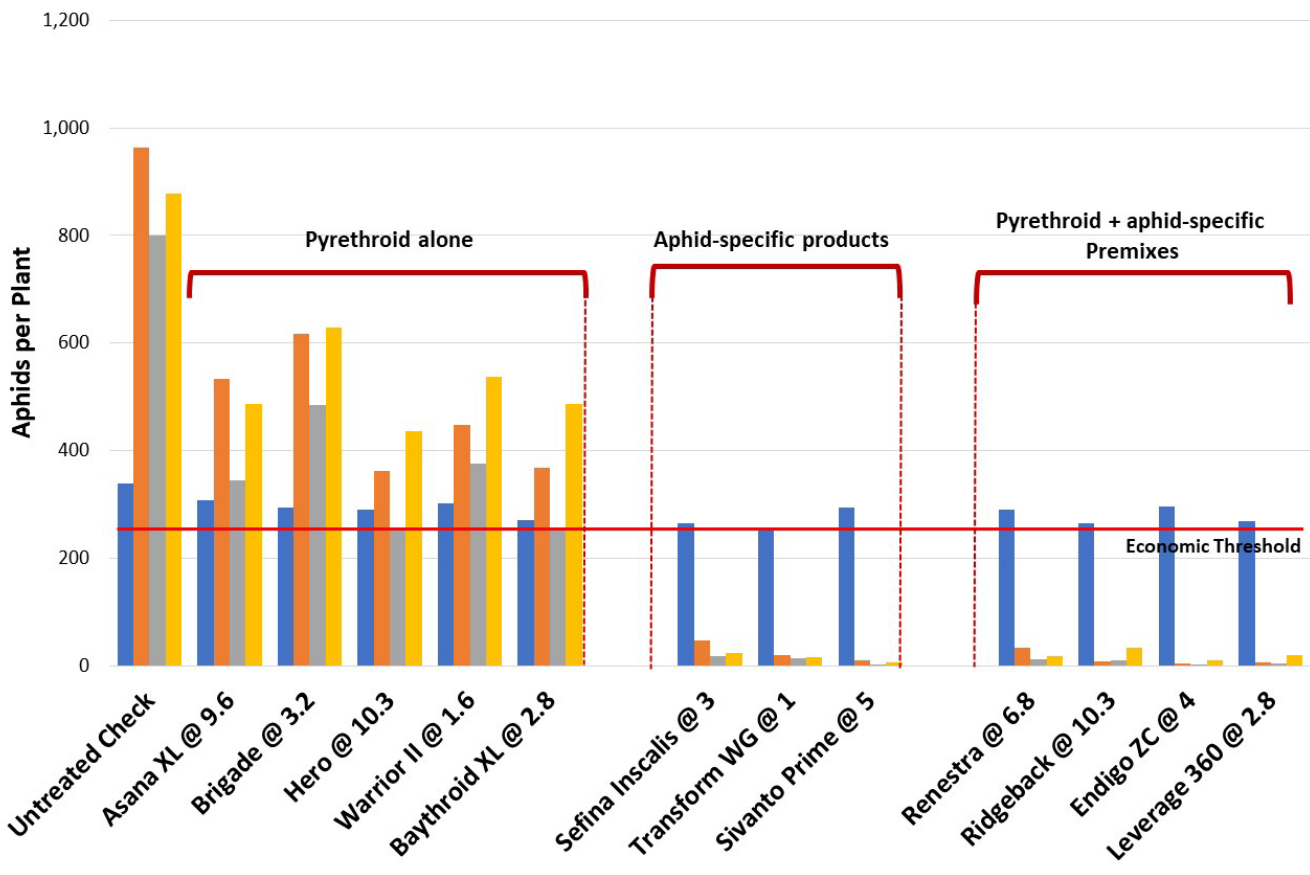
Soybean Aphids

July 29 - August 9, 2024



Treatment Means for Soybean Aphids Per Plant at Fargo, 2024

■ Pre-spray ■ 4 Days ■ 8 Days ■ 12 Days



CONTINUE TO SCOUT FOR RED SUNFLOWER SEED WEEVILS

Sunflowers are starting to flower in early planted fields across North Dakota. This is a critical time for red sunflower seed weevil scouting!

Weevil numbers are usually higher in field edges than field interiors, so be sure to walk into the field >75 feet to start scouting. To get weevils to move forward from the back of the head, rub your hand vigorously across the sunflower face or spray the sunflower face with 25% DEET mosquito spray. These techniques will force weevils to the front of the sunflower face so they can be counted. Count the number of RSSW adults on 5 consecutive plants at 5 sites for a total of 25 plants per field.

Continue scouting until the economic threshold (average of 9-12 weevils per head for oilseed sunflower) is reached or most plants have reached 70% pollen shed (R5.7) or later crop stages. At 70% pollen shed, plants are no longer susceptible for weevil egg laying or significant seed damage.

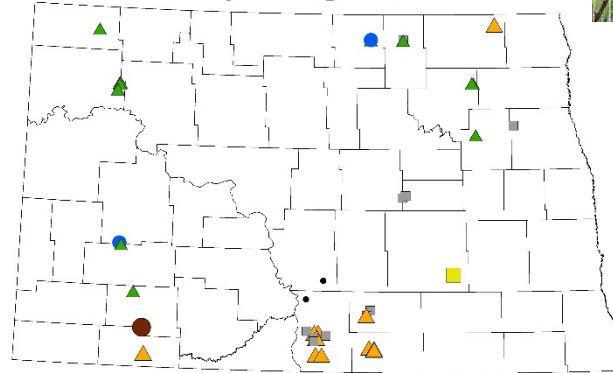
IPM scouts detected economic populations of weevils in south central ND last week.



Red sunflower seed weevils on sunflower head. Photo courtesy of V. Calles Torrez.

Sunflower Growth Stages

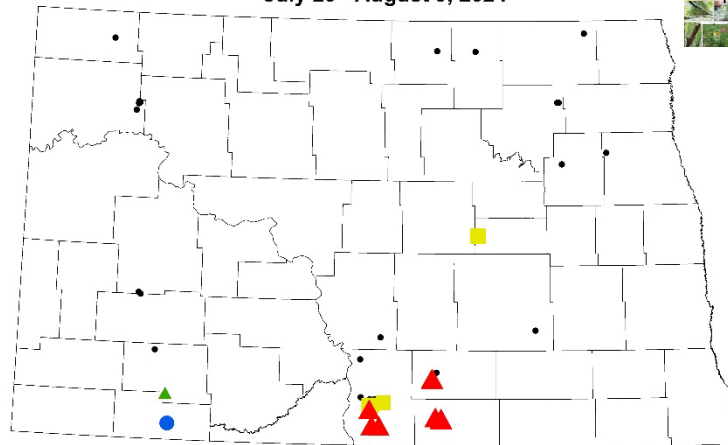
July 29 - August 9, 2024



- V1 - V12 = Vegetative
- R1 = Terminal bud forms a miniature floral head
- ▲ R2 = Immature bud elongates 0.5 to 2.0 cm above nearest leaf
- R3 = Immature bud elongates > 2.0 cm above nearest leaf
- R4 = Inflorescence begins to open, Ray flowers visible
- ▲ R5 = Percent of head area flowering (Ex- R5.3 = 30% , R5.8 = 80%)
- R6 = Flowering complete and ray flowers wilting
- R7 = Back of head turning pale yellow
- ▲ R8 = Back of head yellow but bracts green
- R9 = Bracts yellow - brown and mature

Red Sunflower Seed Weevils in Sunflower

July 29 - August 9, 2024



Average number of weevils per head

- 0
- ▲ 0.1-1
- 1.1-4
- 4.1-8.9
- ▲ 9 or more (economic threshold for 2024 oilseed sunflowers)

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plant pathology

VIRAL SURGE EMINENT IN SOYBEANS

While most of us have been highly informed on viruses over the last few years, it is important to also understand viral issues present in soybeans. With the recent surge in soybean aphid populations across Eastern North Dakota, there's a heightened concern about the transmission of pathogenic viruses to healthy soybean plants. Aphids, serving as vectors, are notorious for spreading viruses such as Soybean Mosaic Virus (SMV) and Alfalfa Mosaic Virus (AMV). Additionally, Tobacco Streak Virus (TSV), transmitted by thrips, is another potential threat.

Soybean Mosaic Virus (SMV)

Soybean Mosaic Virus (SMV) is one of the most common viral diseases in soybeans, with aphids being the primary vector. Symptoms of SMV typically appear as light and dark green mosaic patterns on the leaves, leading to distorted and wrinkled leaves. As the disease progresses, plants may exhibit stunted growth and reduced pod formation. SMV often shows up in fields where aphid populations are high, especially during periods of moderate temperatures and adequate moisture, which favor aphid reproduction and feeding.

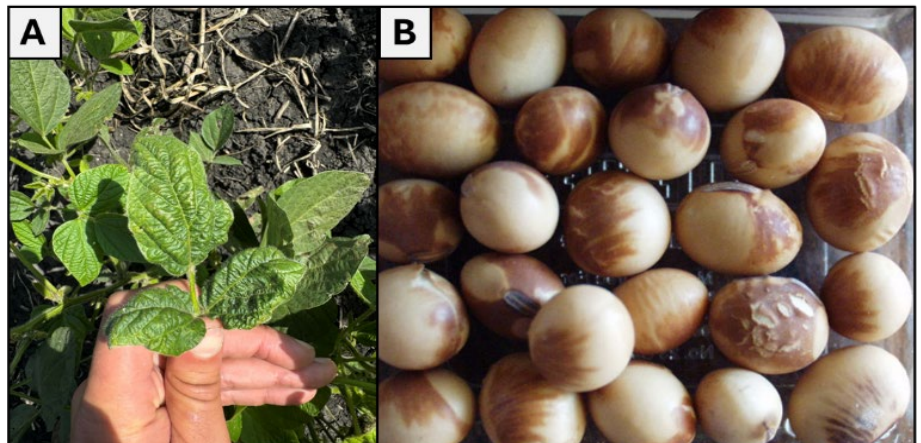


Figure 1. A) Soybean plants with SMV with severely wrinkled leaves and B) soybean seeds with severe and mottled discoloration. (Photo courtesy of Crop Protection Network)

Alfalfa Mosaic Virus (AMV)

Alfalfa Mosaic Virus (AMV) is another virus transmitted by aphids, affecting soybeans and other leguminous plants. Symptoms of AMV include bright yellow spots or blotches on leaves, which can coalesce into larger areas of necrosis as the disease progresses. Infected plants may exhibit reduced vigor and yield. AMV typically manifests in mid to late summer when aphid activity is at its peak, particularly in fields with nearby alfalfa that can serve as a reservoir for the virus.



Figure 2. Soybean leaf with symptomatic AMV infection. (Photo courtesy of Craig Grau, Univ. of Wisconsin-Madison)

Tobacco Streak Virus (TSV)

Tobacco Streak Virus (TSV), unlike SMV and AMV, is transmitted by soybean thrips rather than soybean aphids. TSV causes a distinct symptom known as "bud blight," where the terminal buds of the soybean plants die back, and the plant exhibits stunted growth with a bushy appearance. Plants may also develop necrotic streaks or rings. TSV is usually observed during warm, dry conditions, which favor soybean thrips populations. Soybean thrips can spread TSV quickly within a field, leading to significant yield losses if not managed promptly, especially during the VE to V6 crop stages when soybeans are most susceptible to thrips feeding injury. Fortunately, soybean thrips populations are usually low and non-economic in soybeans grown in North Dakota. The action threshold is when 75% of the sampled trifoliates are damaged and an average of 8 thrips per leaflet. In other North Central states, soybean thrips also have been recorded vectoring [soybean vein necrosis virus](#), a relatively new disease (Source: [Soybean Thrips \(soybean\)](#), Purdue University).

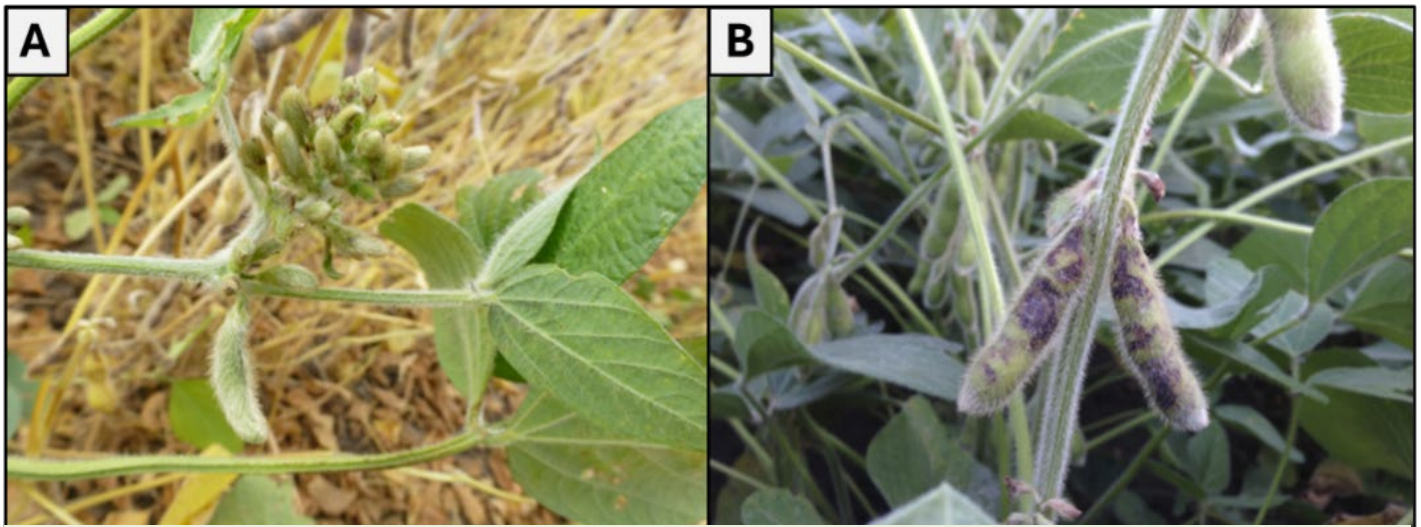


Figure 3. A) Soybean plants displaying the bud blight due to TSV and B) the presence of necrotic lesions forming on pods of the plant. (Photo courtesy of Daren Mueller, Iowa State University)

Management Strategies

The most effective strategy to manage these viral pathogens in soybeans is to control the insect vectors responsible for their transmission. Regular scouting for aphids and thrips is crucial, especially during periods of high insect activity. Insecticide applications, using chemistries effective against the vectors, should be timed appropriately to reduce insect populations before they reach threshold levels. It's interesting to note that soybean viruses can have a negative impacts on the soybean aphid's reproduction, reducing aphid densities by $\approx 50\%$ and growth rates by $\approx 25\%$ (Source: Donaldson and Gratton, University of Wisconsin-Madison). While many viruses can be transmitted by insect vectors, these viruses may also be seed transmitted. Implementing integrated pest management (IPM) practices, such as using virus-resistant varieties when possible, planting clean seed, and use of effective insecticides can help minimize the risk of virus transmission.

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SLOW DARKENING PINTO BEANS

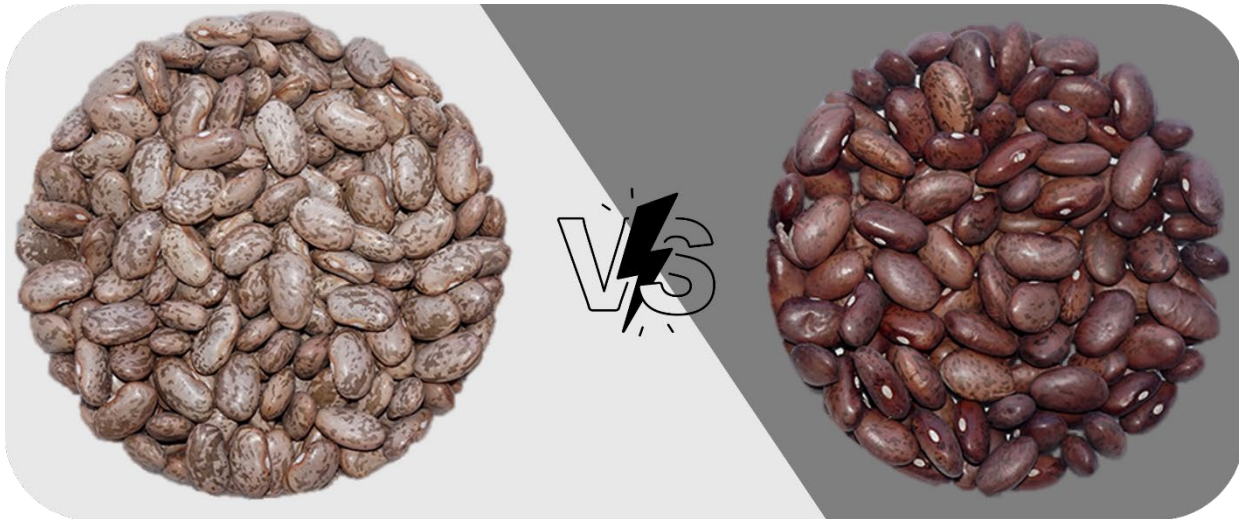


Figure 1. Slow-darkening pinto beans (left) vs traditional variety (right). Photo courtesy of Juan Osorno; icons by Flaticon.

According to the US Dry Bean Council, pinto beans are the most common dry bean market class in the United States. These beans are easy to recognize by their dark and light brown mottled pattern and are especially nutritious, containing protein, fiber, and micronutrients such as B vitamins and folate, as well as anti-cancer properties.

However, a challenge when growing pinto beans is that their seed coats can darken after harvesting, or even before if the harvest is delayed (Figure 1). This is a common issue in our region, for example, when rain causes delays. This darkening is seen as poorer quality for the farmers and the consumers and often results in price discounts at the elevator when farmers bring their harvested grain.

A single gene, named slow darkening or P^{sd} , controls how quickly pinto beans darken. Plant breeders can introduce this gene into new pinto bean varieties using conventional tools, so this is not a genetically modified organism (GMO). However, in the past, when this gene was incorporated, other genes responsible for lower yields or smaller seed size would come along with the slow-darkening gene.

Since around 2010, Juan Osorno's NDSU team has been working to develop new varieties of slow-darkening pinto beans (such as ND Rodeo and ND Palomino) with no major drawbacks in agronomic performance. In addition to faster cooking time, these varieties have 4-7 times more bioavailable iron than regular darkening pintos, making them a significant advancement for developing countries where iron deficiency is a significant health concern, especially for children and women. Moreover, the reduced cooking time leads to less energy requirement and decreased use of wood or charcoal in developing countries, contributing to sustainability (Figure 2, next page).

In conclusion, the slow-darkening pinto beans seem to be what the pinto bean value chain was waiting for.

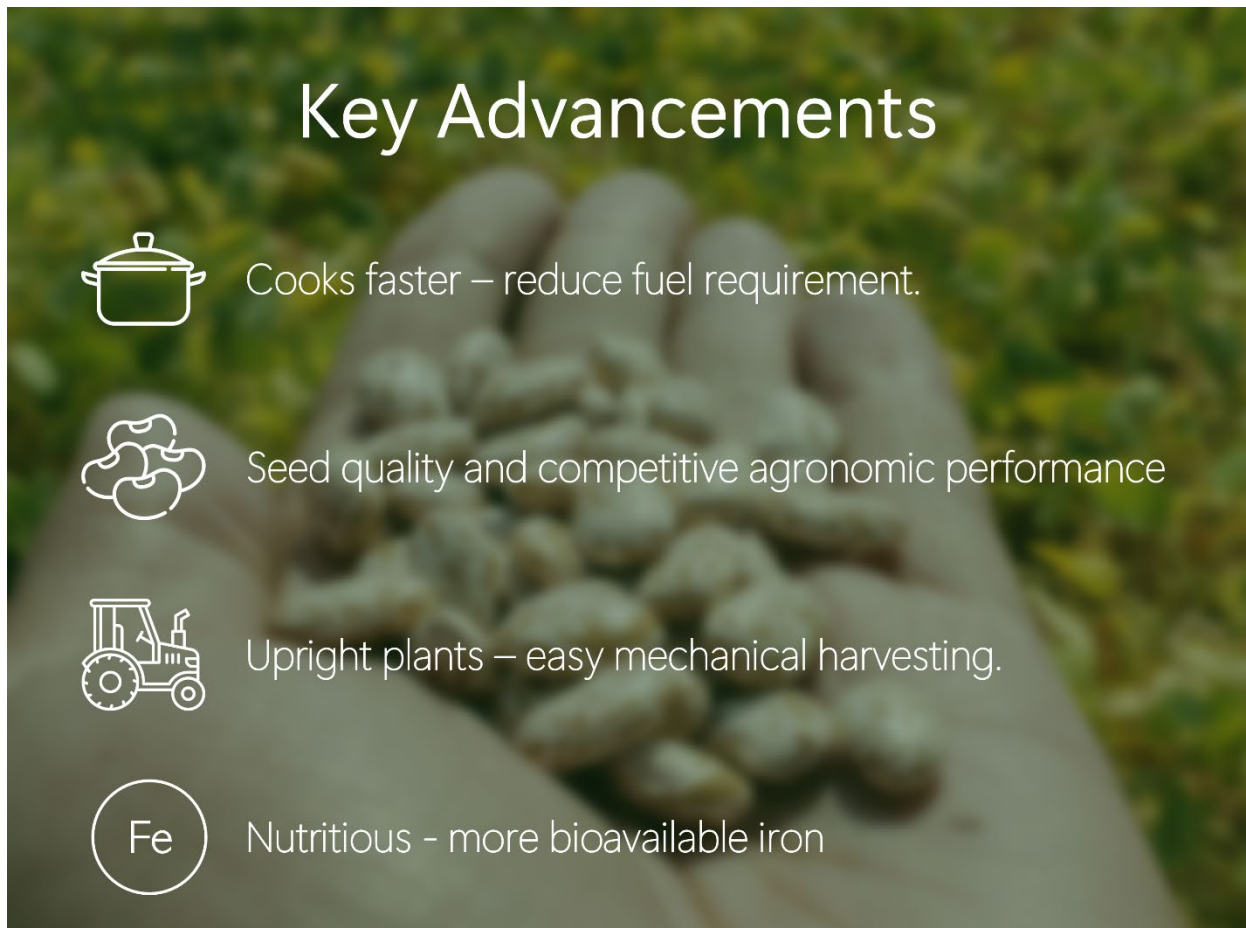


Figure 2. Key advancements of the slow-darkening pinto beans. Photo courtesy of Juan Osorno; icons by Flaticon.

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around the state

AROUND THE STATE

NORTHEAST ND

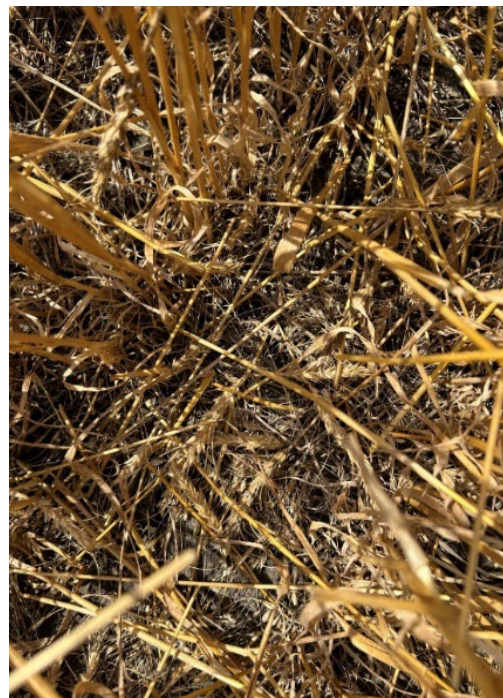
Small grains harvesting has begun in many counties of the NE region. Overall, the yields are very favorable. The initial few reports suggest that barley yields are in the range of 60-100 bu/acre, spring wheat from 55-80 bu/acre and winter wheat at 80 bu/acre. Test weights are being reported as >60 and spring wheat protein is between 11.2% to 15.2%. Scabby wheat and ergot kernels continue to be a concern during this harvest. Wheat stem sawfly damage to spring wheat was seen in Pembina County.

Soybeans are looking very good but could use a shot of rain before they finish up. Majority of the soybeans are between R1 to R4 stage making them still vulnerable to soybean aphids. Overall, aphid numbers crept up in many areas where aphids are starting to move onto the pods. Majority of the fields have good predator and parasitoid populations but some are at or near threshold levels with fewer beneficials to keep them under check. With small grains being harvested, grasshoppers are moving into soybeans, sunflowers and canola causing defoliation and pod feeding.

Canola ranges from late flowering to full seed stage depending on the time of planting. Some of the early sown canola fields are showing severe clubroot infestations in Cavalier County. Dry beans are looking disease free and are progressing well with pods filling. Sunflowers are blooming. Corn is progressing well but some fields that are behind are a concern with freeze episodes being forecasted around late September in the region.



Spring wheat ready to harvest. Photo: Anitha Chirumamilla, LREC



Clipped wheat heads on the ground-damage by grasshoppers. Photo: Anitha Chirumamilla. LREC



Wheat stem sawfly larval feeding in the wheat stem. Photo: Anitha Chirumamilla, LREC



Soybeans at R2-R3 stage in Pembina County. Photo: Anitha Chirumamilla, LREC



Grasshopper damage in soybeans in Pembina County. Photo: Anitha Chirumamilla, LREC



Soybean aphids in lower canopy on soybean pods. Photo: Anitha Chirumamilla, LREC

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SOUTH-CENTRAL/SOUTHEAST ND

The region received the least rainfall in one week for at least the month, but southern portion still received the greatest rainfall. Rainfall in the region this past week ranged from 0 inch near Harvey in Wells County to 2.09 inches near McKenzie in Burleigh County with an approximate average for the region of 0.2 inch, 0.47 inch less than last week. Only locations in Burleigh and Kidder Counties received greater than 1.0 inch of rainfall over the past week! More parts of the region are becoming too dry with Griggs County leading the way. Many fields in a line from Red Willow to Hannaford have crops that are shorter than normal due to lack of rainfall as seen in the photo below! This area is expanding. Average high temperatures for the region last week were way below normal. For Cooperstown in the past week the average daily high temperature for last week was only 72 degrees Fahrenheit, 10.3 degrees Fahrenheit below normal as the second coldest high temperature since 2004 which was 66 degrees Fahrenheit! The daily average low temperature for last week in Cooperstown was 47 degrees Fahrenheit, 8 degrees Fahrenheit below normal and the third coldest low temperature for the week since 1904 which was 40.7 degrees Fahrenheit.

Hard red spring wheat and barley harvest is rolling in most parts of the region after Saturday. All wheat is at or beyond the milk stage now with most mature or nearly mature. Early reports of hard red spring wheat yields in the region are ranging from 50 to 95 bushels per acre. All across the board as suspected. One farmer in Griggs County is averaging 81 bushels per acre which is way above the county average while the lowest farm average I've heard was only 83 bushels per acre. Protein is ranging from 9 to 15.1 percent in the region. Test weight is ranging from 59 to 64 pounds per bushel, so quality is in good shape at the moment, but I've not heard what the vomitoxin (DON) levels are as many farmers are keeping the wheat in their bins at the moment. I'm seeing more waterhemp show up in and above the hard red spring wheat canopies.

Overall corn is looking amazing if water and hail did not damage it, but not all corn in all fields looks this great in the region. As of August 13th, corn growing degree days since May 1st are ranging from 1421 at Harvey in Wells County which is 181 GDD's greater than last week, but 67, 150, and 263 GDD's below the normal, the 5-year average, and 2023, respectively to 1668 GDD's at Mooreton in Richland County which is 90 GDD's greater than last week, but 45, 117 and 225 GDD's below the normal, 5-year average and 2023, respectively! Corn will certainly be wetter than normal at harvest this year across the region! No insect or disease issues are being reported in corn in the region.

Soybean condition improved for some in the region in the past week, but most fields are still highly variable. Soybeans in the region are ranging from R2 (Full flower) stage to R4 ($\frac{3}{4}$ inch pods in one of the upper four nodes) stage with most soybeans at the late R3 (beginning podding) to early R4 (greater than $\frac{3}{4}$ inch pods) stage. In 2022, most soybeans were a little more advanced than this! Phytophthora root rot is showing up in more fields now. Soybean aphids are more present in the eastern part of the region from at least Griggs County to the far eastern part of the state. There are no soybean aphids being reported in the western part of the region with soybean aphid populations decreasing and increasing in Griggs County to beyond threshold with insecticides being sprayed in Richland County. Minor leaf destruction is occurring at the moment in soybean. At least from the road weed control is looking pretty good across the region, however, there are weed lurking below the canopy.

Dry beans look amazing like corn if water did not affect the plants and stands early. Dry bean stage ranges from pin pods to seeds forming in the pods. No diseases or insects are being observed or reported at the moment in the regions. Weed control certainly will be the worst I've seen in the last four years! Weeds of concern include kochia, waterhemp, horseweed (maretail), and wild oat.

I received few sunflower reports this week, so unsure how the crop is truly doing this week and whether there are any significant problems going on. I do know the sunflower rust continues to increase in the ornamental sunflowers in our garden!



Lodged wheat in Griggs County.



The difficulties of harvesting hard red spring wheat in Richland County. Photo by Lacy Christopher.



Waterhemp plants lurking below the hard red spring wheat canopy in Griggs County.



Average stage of corn in the region only at R2 (blister) stage.



Stunted corn in Griggs County due to drought conditions!



Most soybeans in the region are at the early R4 (greater than 3/4 inch pods) stage.



Late-season phytophthora root rot showing up in soybean fields more



Seeds starting to form in dry bean pods now.



Look at all of these waterhemp plants in a dry bean field!

[Jeff Stachler](#)
Griggs County Extension Agent

SOUTHWEST ND

Dry conditions in Southwest North Dakota persist, with very little precipitation recorded over the last 7 days. The highest rainfall was registered in Golden Valley County at the Sentinel Butte station (0.53 inches). According to the National Integrated Drought Information System (NIDIS), the forecast indicates continued dry conditions over the next 7 days. These dry conditions, coupled with warm days, have been challenging for field crops.

In terms of crop progress, winter wheat fields are approaching harvest, while spring wheat fields range from heading to late milk stages. Canola fields are podding and filling grain. Soybeans continue blooming, with some fields entering the pod development stage. Field peas are maturing and will be ready to harvest soon.

Some insect populations have been increasing steadily in our area, especially Hessian fly and banded sunflower moth. Other than that, most insect pests of economic interest remain fairly low. Diseases in small grains are appearing in larger numbers, with scab being of particular concern.

[Victor Gomes](#)

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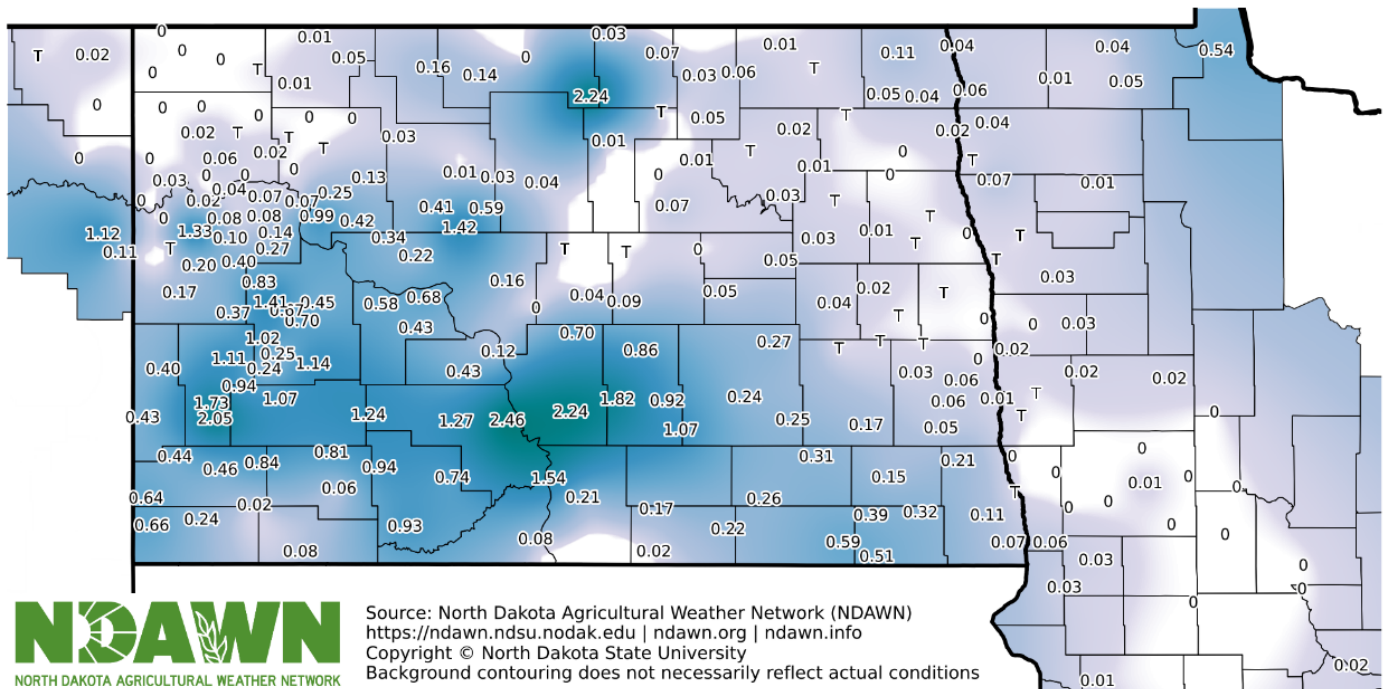
WEATHER FORECAST

The August 15 to August 21, 2024 Weather Summary and Outlook

Much of the past 7 days were dry across the region until Tuesday night into Wednesday. Localized heavy rain hit central North Dakota on Tuesday night and there were pockets of heavy rain again yesterday (Wednesday). The 7 day (168 hour) rain totals through yesterday at Noon is presented in Figure 1.

Total Rainfall Past 7 Days (in)

Aug 14 2024 12:01 PM



Source: North Dakota Agricultural Weather Network (NDAWN)
<https://ndawn.ndsu.nodak.edu> | ndawn.org | ndawn.info
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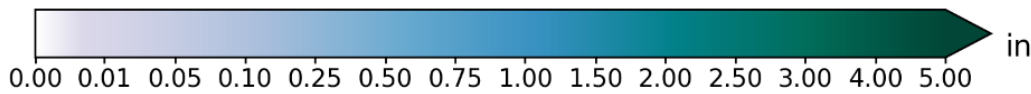


Figure 1. Total Precipitation for the 168-hour (7 day) period ending at 12:00 PM Wednesday, August 14, 2024.

Before the rains of the past 48 hours, most of the state was quite dry during the previous 30 days (Figure 2). A ridge of high pressure aloft will be moving into the region, meaning, above average temperatures are expected next week with only scattered thunderstorms. That will likely transition many areas back to dry, especially the locations that did not record much rain with the recent storm.

Percent of Normal Precipitation - Past 30 Days (%)

Aug 13 2024

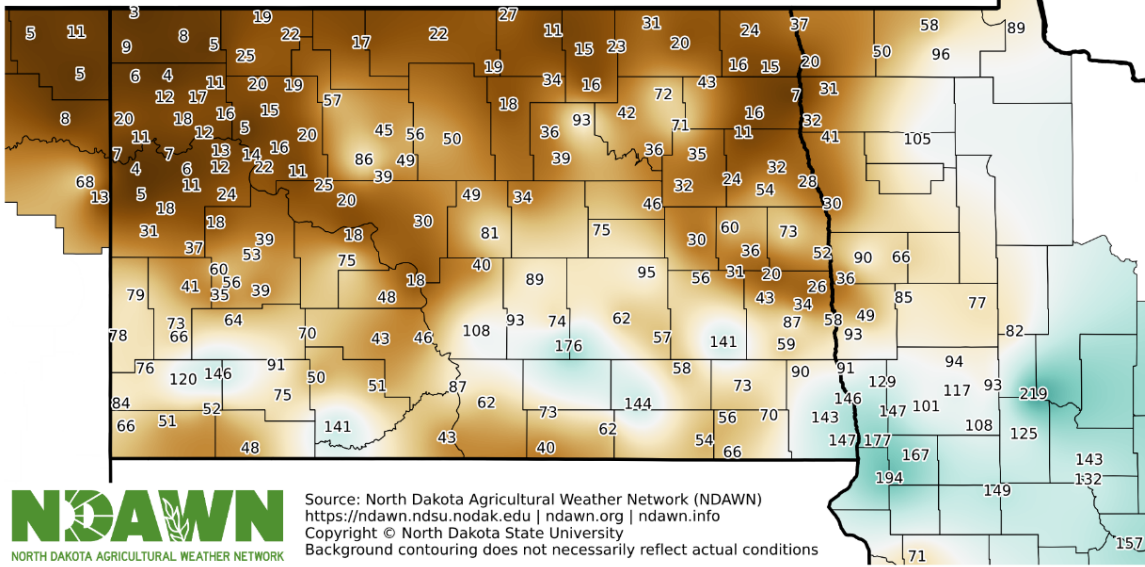


Figure 2. Percent of Normal Precipitation for the 30-day period ending August 13, 2024.

Figures 3 and 4 below are forecasted growing degree Days (GDDs) base 32°F (wheat and small grains) and base 50°F (corn and soybeans) for this forecast period. Temperatures are expected to be mostly above average, especially once we move into next week. There is a possibility that western North Dakota records well above average temperatures, with eastern North Dakota being only slight above average. With the warmer temperatures will come above average GDDs in the next week and probably beyond this forecast period.

Growing Degree Days (Base 32) Forecast

Aug 15 - Aug 21 2024

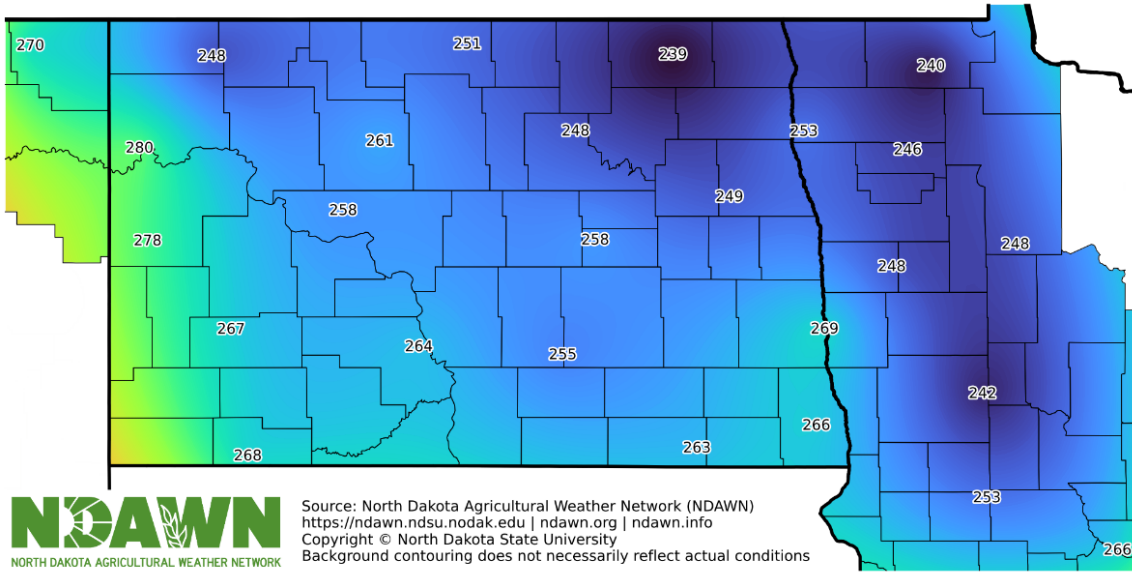
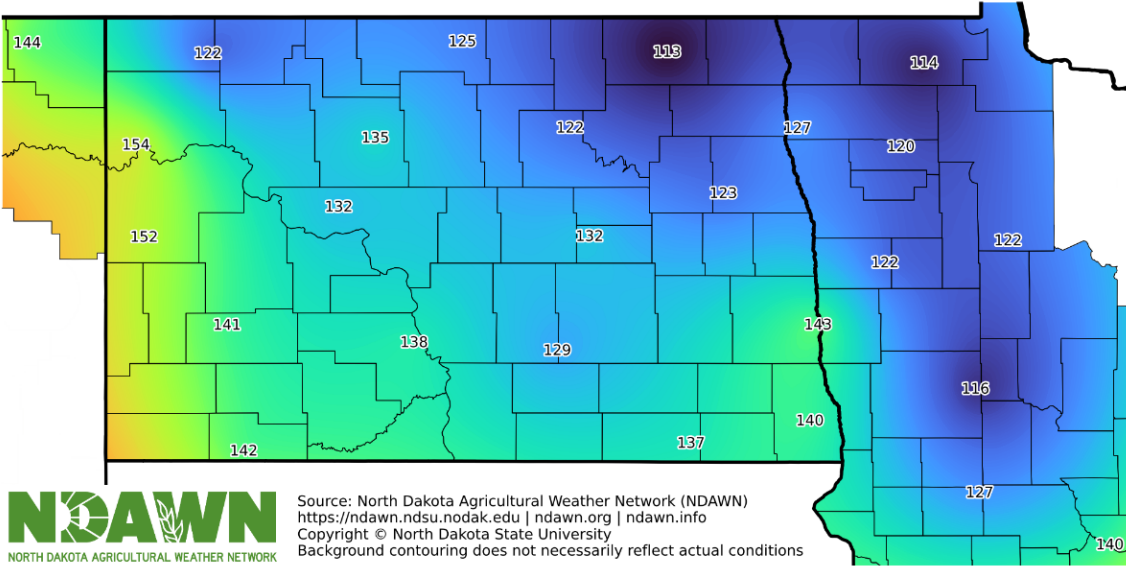


Figure 3. Estimated Growing Degree Days Base 32° for the Period of August 15 to August 21, 2024.

Growing Degree Days (Base 50) Forecast

Aug 15 - Aug 21 2024



Source: North Dakota Agricultural Weather Network (NDAWN)
https://ndawn.ndsu.nodak.edu | ndawn.org | ndawn.info
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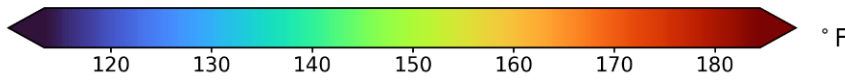
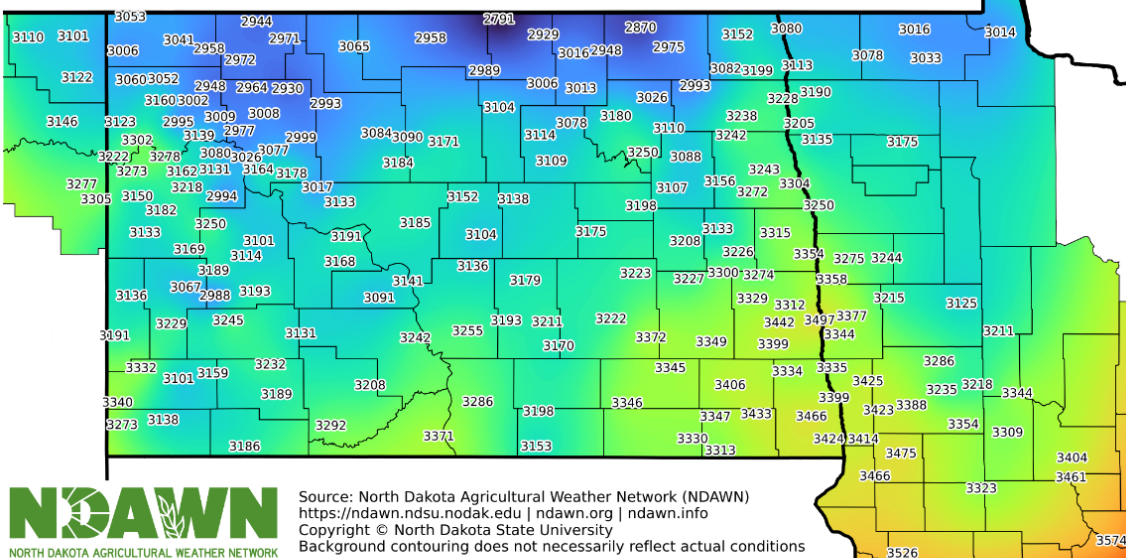


Figure 4. Estimated Growing Degree Days Base 50° for the Period of August 15 to August 21, 2024.

Using May 1 as a planting date, the accumulated growing degree days for wheat (base temperature 32°F) 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>

Wheat Growing Degree Days Since May 1

Aug 13 2024



Source: North Dakota Agricultural Weather Network (NDAWN)
https://ndawn.ndsu.nodak.edu | ndawn.org | ndawn.info
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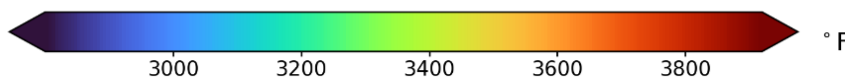


Figure 5. Wheat Growing Degree Days (Base 32°) for the period of May 1 through August 13, 2024

Using May 10 as a planting date, the accumulated growing degree days for corn (base temperature 50°F) 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>.

Corn | Soybean Growing Degree Days Since May 10 Aug 13 2024

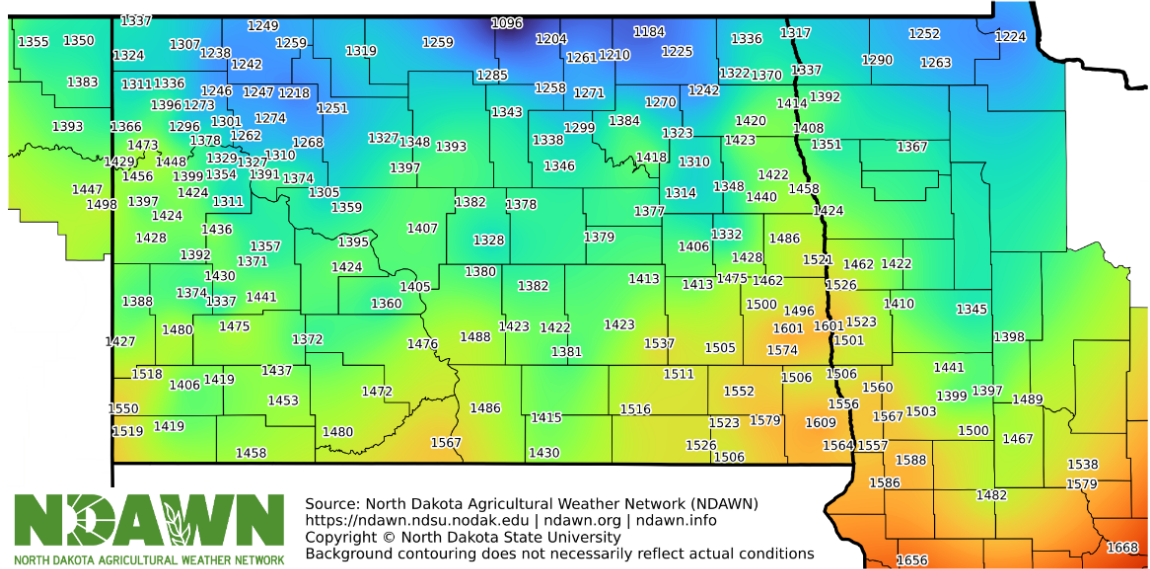


Figure 6. Corn Growing Degree Days (Base 50°) for the period of May 10 through August 13, 2024

Growing Degree Days for other crops can be found on the main website, <https://ndawn.ndsu.nodak.edu/> under the “applications” menu, or on our mobile compliant website, https://ndawn.info/agriculture_gdd.html.

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