North Dakota State University
# CROP & PEST REPORT

NDSU EXTENSION

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**NDSU FIELD DAYS FOR 2021**

The following is a list of 2021 annual Field Days events. Please visit the Research Extension Center and Agronomy Seed Farm websites for more details. Hope to see you there in person!


July 13 -**Hettinger Research Extension Center**
*(5-7 p.m. MDT followed by supper)*

July 14 - **Dickinson Research Extension Center**
*(9 a.m. start MDT)*

July 14 & 15 - **Williston Research Extension Center**
July 14: dryland tour - Williston Research Extension Center *(4-7 p.m.)*
July 15: irrigated tour - Nesson Research & Development farm, located 23 miles E of Williston on #1804 *(8:30 a.m.-12 noon)*

July 19 - **Agronomy Seed Farm** Casselton
*(5 p.m. start)*

July 20 - **Carrington Research Extension Center**
*(9 a.m.-3 p.m.)*

July 21 - **North Central Research Extension Center**
*(tentatively 9 a.m.-12 noon)*

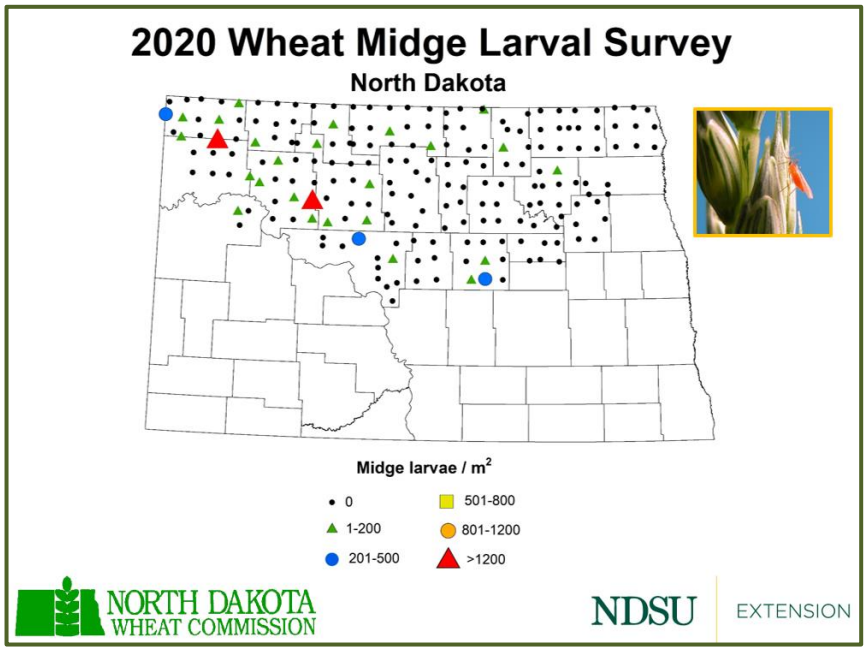
July 22 - **Langdon Research Extension Center**
*(8 a.m.-1 p.m.)*

July 27 - **Central Grasslands Research Extension Center**
*(10 a.m. - 3 p.m.)*

# entomology

**DRY WEATHER DECREASES RISK FOR WHEAT MIDGE IN 2021**

Wheat midge is an economic insect pest of hard red spring wheat and durum wheat in the northern tier of North Dakota. Soil samples collected in North Dakota wheat fields indicate low levels of overwintering wheat midge larvae (cocoons) for the 2021 season. A total of 205 fields were sampled from 22 counties in the fall of 2020 to estimate the statewide risk for wheat midge in the 2021 field season. The distribution of wheat midge is based on unparasitized cocoons found in the soil samples.




The majority of the soil samples, 86%, had zero wheat midge cocoons in the soil (black dot on map). This is the record low since the wheat midge larval survey for overwintering cocoons started back in 1995. In 2018, we had another dry year with 84% of the soil samples with no cocoons. Twelve percent of the soil samples were at low risk (green triangle on map), with one to 200 midge larvae per square meter.

The moderate risk level (201 to 500 midge larvae per square meter, blue dot on map) was observed in 1.5% of the samples. Moderate risk areas were scattered in three counties throughout the state, including the central area (Wells County), the west-central area (McLean County) and the northwestern area (Divide County).

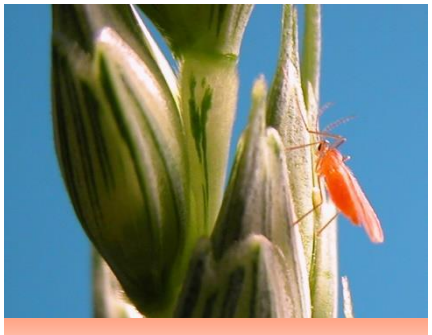
Only 0.5% of the soil samples had very high population densities of wheat midge (greater than 800 midge larvae per square meter, red triangle on map). The hot spots were located in south-central Divide County, close to the Williams County line and southeastern Mountrail County. These areas will definitely need to be scouted for wheat midge to make effective management decisions. Insecticides may be needed to reduce yield losses from economic populations of wheat midge.

This dramatic decrease in wheat midge populations from 2019 is probably due to dryness in 2020, especially in August. Larvae are susceptible to dryness and require rain to emerge from the soil in late June through mid-July, and to drop out of the mature wheat heads and dig into the soil to overwinter as cocoons. Plotting precipitation from May through August against wheat midge cocoons for each surveyed county over the past 10 years shows a strong positive correlation between precipitation and wheat midge populations.

Scouting for tiny, orange adult flies is always recommended because any areas with moist soils can cause rapid increases in the number of midges during emergence. Some tips for monitoring for wheat midge include scouting during the night, when wheat midge is most active, warm night temperatures about 59 F and winds less than 6 mph. Wheat is most susceptible to midge infestations from heading to early flowering (less than 50% flowering).

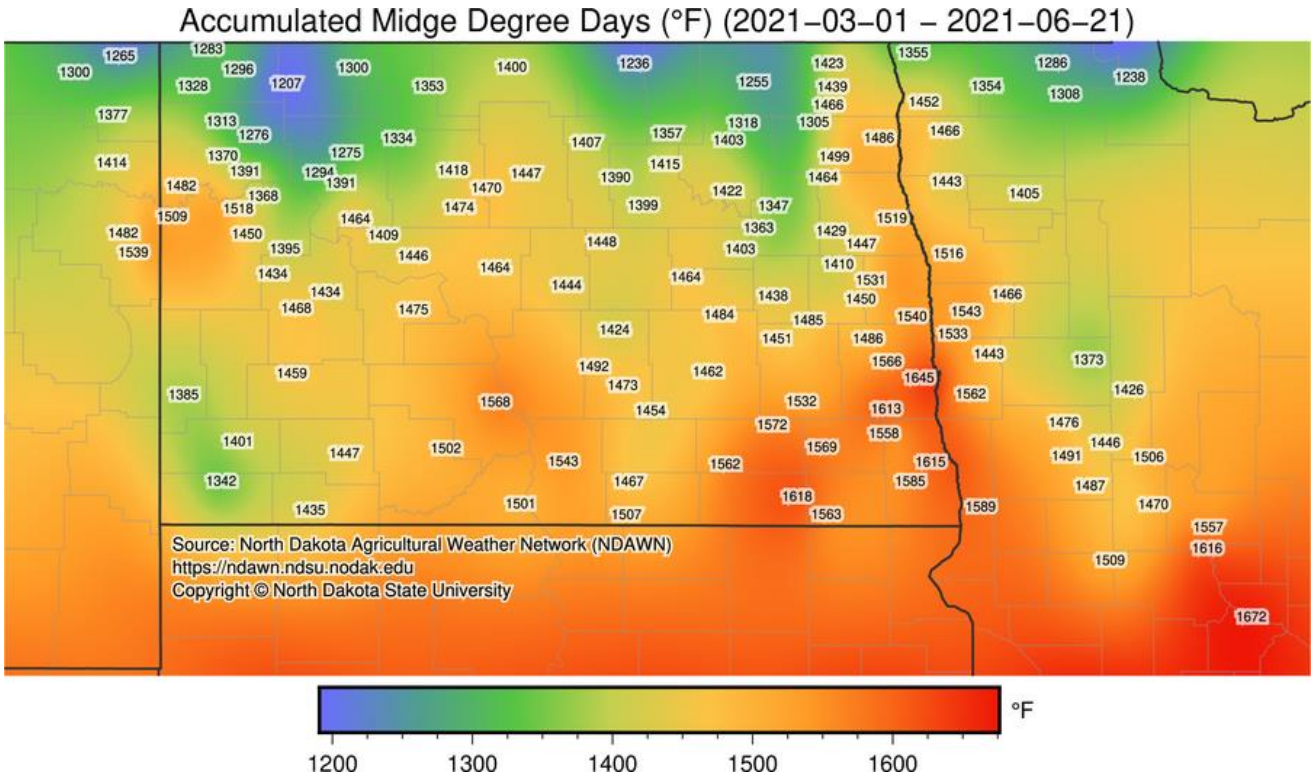
**Wheat Midge - Economic Thresholds for Foliar applied Insecticides**
Hard red spring wheat = one or more midge observed for every four or five heads
Durum wheat = one or more midge observed for every seven or eight heads

Wheat midge emergence is starting in the northern tier of North Dakota. Since conditions are dry this year, larvae also could remain in extended diapause for at least one additional year and emerge in 2022. See wheat midge AGDD map.



*Adult wheat midge (P. Glogoza)*

| Wheat Midge Degree Days (base temperature of 40 F) | |
|---|---|
| | |
| **Degree Day Accumulations** | **Wheat Midge Emergence** |
| **1,100** | **Male wheat midge emerging.** |
| **1,300** | **10 percent of females will have emerged.** |
| **1,475** | **50 percent of females will have emerged.** |
| **1,600** | **90 percent of females will have emerged.** |




Producers are encouraged to use the wheat midge degree-day model to predict the emergence of wheat midge, to determine when to scout, and if their wheat crop is at risk. Producers can access the wheat midge degree-day model on the North Dakota Agricultural Weather Network (NDAWN) website. Select your nearest NDAWN station and enter your wheat planting date. The output indicates the expected growth stage of the wheat and whether the crop is susceptible to midge infestation, as well as the timing of wheat midge emergence.

Although the forecast is good for wheat growers to avoid the ravages of wheat midge, the bad news for 2021 is that the beneficial parasitic wasp is at a historic record low, with only 1.5% of the wheat midge cocoons parasitized. Parasitic wasps play an important role in natural control of wheat midge by parasitizing the egg or larva. In contrast, the parasitism rate was 15% in 2020, 36% in 2019 and 9% in 2018. Parasitism was only observed in Williams, Mountrail and Ward counties.

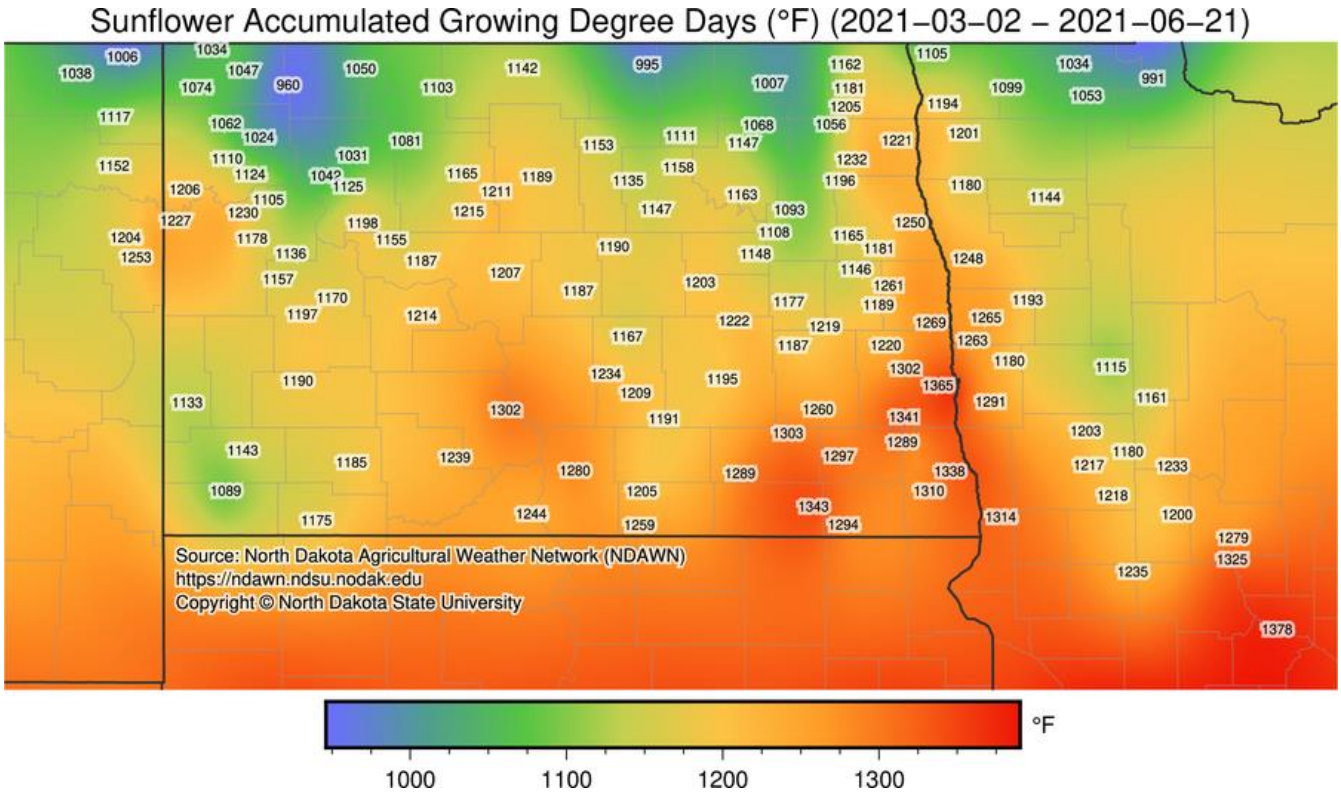
NDSU Extension agents collected the soil samples. The North Dakota Wheat Commission supports the wheat midge survey.

**LEAFY SPURGE FLEA BEETLES**

Leafy spurge is flowering and land managers are interested in obtaining leafy spurge flea beetles (*Aphthona* species) for biocontrol of this noxious weed. Leafy spurge flea beetles are an effective means of controlling leafy spurge in North Dakota. This group of flea beetles is host-specific to the leafy spurge plant, which makes them an ideal biological control choice.

The accumulated growing degree days (AGDD) for sunflower (base of 44 F) can be used as a guide to determine when to begin scouting for adult flea beetles. Begin scouting for adult flea beetles when the AGDD approaches 1,000. **Flea beetles should be collected between 1,200 and 1,600 AGDD using the sunflower GDD model from NDAWN.** Adult flea beetles can be collected with sweep nets. Due to the warmer than normal spring, emergence of leafy spurge flea beetles will be earlier this year. As of June 21, only the southeast and south-central areas of North Dakota have accumulated enough growing degree days (GDD) for collecting for adult leafy spurge flea beetles. Use the sunflower degree days/growth stage application on NDAWN website. Enter "2021-03-01" for the planting date and select "degree day" for map type.

After late July (or 1,600 AGDD), flea beetles begin to lay eggs and should not be moved or collected. Leafy spurge flea beetles typically take three to five years to establish and impact leafy spurge infestations.




To find collecting sites for leafy spurge flea beetle, contact your local county weed office (number listed in local phone book). Leafy spurge flea beetles also are available commercially for purchase at Biological Control of Weeds or WeedBusters BioControl in Montana.

For more information, see the NDSU Extension publication on Leafy Spurge Control Using Flea Beetles (*Aphthona* spp.) (W1183 (Revised)).

Janet J. Knodel
Extension Entomologist

**SOYBEAN GALL MIDGE UPDATE IN NORTH DAKOTA**

Soybean gall midge, *Resseliella maxima*, is a new insect pest, which has been confirmed from Minnesota, Nebraska, Iowa, South Dakota, and Missouri. However, soybean gall midge has not been detected in soybeans grown in North Dakota in spite of intensive survey efforts. See the 2020 soybean gall midge survey map.

Adults are small mosquito-like flies and hard to see in the field. They are light to dark brown, about ⅛ inch in body length with an orange abdomen. Their characteristic markings are the white and black banding on the antennae and legs, and mottled wings (Figure 1). Young soybean gall midge larvae (Figure 1) are white and very small, whereas the mature larvae are orange to reddish orange and about $^{1}/_{12}$ inch in length.

Soybean gall midge larvae feed beneath the epidermis near the base of the stem (Figure 1). Sometimes the base of the stem is necrotic (dark coloration), swollen, deformed and gall-like. Heavily infested soybean plants are stunted, wilted, lodged or dead. Significant yield losses at field edges have been recorded in states with severe infestations.

***Figure 1. Left photo – Adult female and male soybean gall midge (M. Helton, Iowa State University); middle photo – Larvae in soybean stem (V. Calles-Torrez, NDSU); right photo – Dark discolorations from soybean gall midge feeding injury at the base of soybean stems (V. Calles-Torrez, NDSU)***

When you scout for soybean gall midge, look for the larvae in stems and stem injury. Adult flies are too difficult to observe. Walk a transect in the first four rows near the field edge, especially in areas where dense vegetation occurs along the field edge. Examine 10 consecutive plants at 10 sampling sites per field (total of 100 plants per field). Sampling sites should be spaced more than 50 feet apart. At each sampling site, examine plants for the presence of necrosis and brown or dark discoloration at the base and lower portion of each stem. If necrosis is observed, pull up the soybean plant and peel back the outermost layer of the stem on the necrotic area to look for small white or orange larvae.

Currently, soybean gall midge adults are emerging in Minnesota, South Dakota, Iowa, and Nebraska. We encourage you to look for soybean gall midge when scouting your soybean fields. Please let us know if you happen to see any tiny white to orange larvae in lesions at the base of the stem. To confirm its identification, collect more than 10 larvae and place them in alcohol vials or collect two infected plants with larvae and put them in a plastic bag. Send collected samples to your local county Extension agent or to NDSU Extension Entomology for further identification.


For more information, please see the new NDSU Extension publication on Soybean Gall Midge and White-mold Gall Midge in Soybean (E2006, Dec. 2020). Thanks to the support from the North Dakota Soybean Council.

Veronica Calles-Torrez
Post-doctoral Scientist

Janet J. Knodel
Extension Entomologist

# plant science

**HARVESTING DROUGHT-STRESSED SMALL GRAINS AS FORAGE**

The unprecedented hot and dry weather in the upper Midwest has continued to deteriorate large acreages of the small grain crops. In some cases, grain yield potential has declined to a point where it may make more sense to harvest the small grains as forage rather than waiting to harvest as grain. Reports of chopping small grains for forages have already come in from dry areas.

**Crop Insurance and RMA**

Before doing anything, begin having conversations with your crop insurance provider. There are provisions related to harvesting drought-stressed crops as forages. To ensure crop insurance payments, you need to provide a notice of loss to your insurance provider and get those acres released. For additional information contact your crop insurance agent.

Additional information from USDA's Risk Management Agency can be found here:

**Small Grains make Excellent Forage**

Small grain hay and silage can make excellent forage. Forage supplies will tighten if the drought conditions persist. The forage quality of small grains is largely determined by the growth stage when small grains are harvested. If your primary objective is tonnage, waiting to harvest small grains until the dough stage will maximize yield, but will sacrifice forage quality. The heat and dry conditions have sped small grains along, meaning many are at or beyond the boot stage already. Forage quality will continue to go down as the small grains mature. If small grains are severely drought-stressed and withering away, additional biomass will not accumulate without additional moisture. Drought will likely not have a substantial impact on forage quality compared to conditions with adequate soil moisture.
Forage samples should be collected from all harvested forage to test for forage quality. Some additional information regarding forage quality testing can be found here.

**Check for Nitrates!**

The primary concern with harvesting drought-stressed small grains as forage is excessive accumulation of nitrate. This can lead to nitrate poisoning without proper care. When submitting forage quality samples, be sure to have samples tested for nitrate concentrations.
For help collecting forage samples, interpreting nitrate sample analysis results and additional information regarding nitrate poisoning in cattle, sheep, and goats follow the link here.

**Harvesting**

As drought conditions intensify, the lower leaves on small grains will dry out, which increases leaf loss potential when harvesting as forage. Cutting and harvesting small grains prior to excessive leaf loss will improve yield and quality. However, small grains will likely have lower nitrate concentrations as the plants mature.

*Chopping Silage*

Chopping small grains at 60 – 70% moisture is best to make good silage. In drought-stressed situations, the moisture content may already be below this level, meaning direct chopping will likely be best. If the moisture content is still 70% or greater, allow wilting time to decrease the moisture content. The hollow stems in small grains do cause some challenges in eliminating oxygen. Using a shorter cut length of 3/8 – 1/2 inch will assist with packing. Whether piling or bagging, insufficient packing will result in greater storage losses. Allow a fermentation period of at least 21 days before

feeding. Another benefit of ensiling is it can reduce nitrates by 30-70%, meaning ensiling is the preferred harvest method for crops with concerns about high nitrate levels.

*Making Hay*

Especially if nitrates are not a concern, small grains can be made into dry hay. More mature small grains may have moisture present in developing heads, which can take more time to dry compared to moisture in the stem. Ensure baled small grains are indeed dry enough, especially before storing inside buildings to prevent hay fires. Using a conditioner can aid in dry down. If the crop is later in maturity, conditioners may increase shattering losses, however.

An alternative to making dry hay is making baleage, which works well for storing small grain forage. Regardless of the moisture content hay is harvested at, ensure enough wrap is used (at least 6 mils), which typically means 7-8 wraps when accounting for the stretch of the plastic film.

***Drought stressed wheat. Photo Credit: Tyler Goplen***

**Feeding Forages High in Nitrates**

Drought-stressed small grain forages should be tested for nitrate concentration before feeding. Forages high in nitrates can be fed when diluted with other feedstuffs (i.e. concentrates or forages) low in nitrates. Ruminant animals can consume small amounts of high-nitrate feeds and gradually adapt to increasing amounts of high-nitrate forages over time. With hay, the best way to blend low- and high-nitrate forages is with grinding. If grinding is not possible, distribute the low-nitrate hay first, allowing the ruminant animals to consume most of the low-nitrate hay. Then distribute the high-nitrate hay. Prevent animals from consuming high-nitrate forages when they are hungry. Slow intake of high-nitrate feeds is the goal. If possible, feed high-nitrate forages in smaller amounts several times daily instead of one large daily feeding. Always provide livestock access to fresh, nitrate-free water at all times.

Feeding forages high in nitrates does have inherent risks but can be done safely. Guidelines on how to manage and feed forages high in nitrates can be found here:

Additonal resources can be found here:

1. Harvesting small grains for forage: https://extension.umn.edu/small-grains-harvest-and-storage/harvesting-small-grains-forage
2. Managing feed high in nitrates: https://extensionpublications.unl.edu/assets/html/g1779/build/g1779.htm
3. Testing silage and hay moisture at home: https://extension.sdstate.edu/silage-moisture-testing-tips

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Hans Kandel
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Broadleaf Crops

**IRON DEFICIENCY CHLOROSIS**

Iron deficiency chlorosis (IDC) is starting to show in soybean fields in the Red River Valley. There is usually enough iron (Fe) available in the soil; however, young soybean plants may not be able to take up enough Fe. Iron chlorosis can appear if the soil is calcareous and there is sufficient moisture to dissolve carbonates to produce bicarbonate to neutralize root acids in the soil. Apparently, there is enough moisture in many fields to produce bicarbonate and initiate IDC. Stressed plants usually exacerbate IDC symptoms. Elevated soil salts levels often result in greater plant stress and more severe IDC symptoms. With excess moisture, cool temperatures, and/or high soil nitrate content, IDC symptoms can be more severe. An application of some post herbicides may also briefly stress plants and move them into a state of increased IDC.

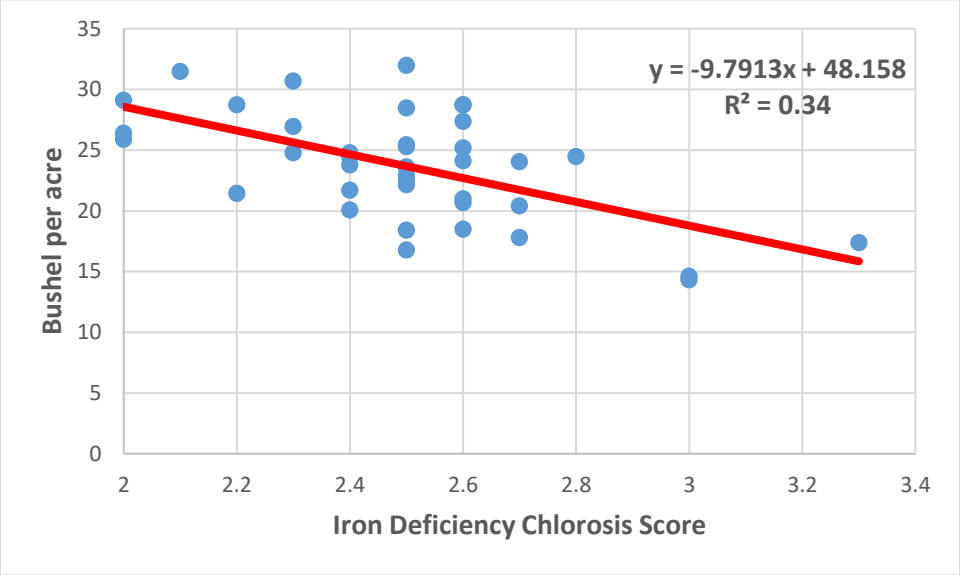
***Photo 1. Soybean plants with iron deficiency chlorosis (IDC) near Fargo ND, mid-June 2021.***

The cotyledon and unifoliate leaves of soybeans emerge green because Fe is mobile in the plant until the trifoliolate leaves emerge. As the trifoliolate leaves start to develop, the plant's physiology changes and Fe becomes immobile, and the essential Fe needs to be taken up by the soybean roots. This is when chlorosis often starts to appear if soil and environmental conditions are favorable (Photo 1) for IDC expression. The IDC symptoms appear as yellowing leaf tissue between the veins while the veins may remain green. In a severely affected plant, the tissue will become brown and tissue may die. Plants with chlorosis are often stunted and growth and development are slow compared to healthy plants. Soybean plants may grow out of the chlorosis and become green again; however, yields are usually reduced due to IDC.

The most important management practice to reduce IDC, in IDC prone soils (pH greater than 7 and free carbonates present), is selecting chlorosis tolerant soybean varieties. At NDSU, scientists use a rating of 1 to 5 to score the IDC symptoms, where 1 is green, 3 is yellow, and 5 is dead tissue (Photo 2).

Soybean varieties have genetic differences for tolerance and susceptibility to IDC symptoms. No soybean variety is immune to the chlorosis, but large differences in yellowing, subsequent plant stunting, and reduced yield occur between the most tolerant and most susceptible varieties (see graph 1). However, when IDC is anticipated in a field, producers should select varieties with tolerance to IDC and high yield potential. For instance in graph 1, varieties with a similar IDC score of 2.5 yielded between 17 and 32 bushel per acre.


***Photo 2. Scale used for IDC scoring (Source: NDSU soybean breeding program).***




***Graph 1. IDC score and yield, NDSU variety trial with 40 different varieties.***

Other management strategies in addition to variety selection to reduce IDC include: proper field selection, using an ortho-ortho-EDDHA chelate Fe treatment with a proven track record of performance at seeding, an increase in seeding rate, seeding in wider rows with the same seeding rate (plants closer together within the row) if weed management will allow it, managing the nitrate content in the field using a companion crop at the beginning of the season, and managing the crop to avoid additional stress conditions. It is important to note that since Fe is not mobile in soybeans after trifoliate leaves emerge, application of foliar Fe fertilizers are not useful nor economically practical.

Hans Kandel
Extension Agronomist Broadleaf Crops

Dave Franzen
Extension Soil Specialist

**THINGS TO CONSIDER WHEN MANAGING ALFALFA FROM NOW ON**

When moisture is the main limiting factor, nutrient levels aren't going to make much of a difference to crop yield. When in a drought one can feel helpless in coming up with strategies to better manage the crop. Forages have been impacted the most by the drought this year and there really isn't anything that can be done now to improve the growth of perennial forages. Some may have noticed that certain producers in their region have better forage and alfalfa stands than others. While moisture is definitely an important factor here, so is management. While alfalfa has the potential to fix nitrogen, other nutrients are not being provided and with each cutting, nutrients are being removed. Phosphorus, sulfur, and (if soil tests indicate) potassium fertilization are essential to receiving optimal returns from alfalfa and are often limiting factors in production in ND. As the stand continues past 5 years, N fixation and productivity decreases. For older stands it is recommended to switch to an annual forage crop for a year and then reseed the following year.

***Figure 1 Alfalfa in Dickinson, ND June 2021***

Table 1. Nutrients removed per ton of forage produced

| Nutrient | lb removed/ton |
|---|---|
| N | 60-80 |
| K | 50-60 |
| Ca | 30-35 |
| P | 5-6 |
| Mg | 6-7 |
| S | 5-6 |
| B | 0.08 |
| Zn | 0.05 |
| Cu | 0.33 |
| Mn | 0.12 |

Along with stand integrity and fertility, there are soil factors that can greatly impact water uptake and N fixation, including salinity and soil acidity. If the pH is below 5.3 alfalfa roots will be stunted and rhizobia growth will be reduced. Liming may be in your future management decisions. Remember to sample zones at a 0-3" and 3-6" depth for pH if surface acidity is a concern in reduced and no-till systems.

For more detailed information on alfalfa nutrient requirements please refer to the Alfalfa Soil Fertility Requirements in North Dakota Soils by Dave Franzen and Marisol Berti https://www.ag.ndsu.edu/publications/crops/alfalfa-soil-fertility-requirements-in-north-dakota-soils.

Ryan Buetow
Extension Cropping Systems Specialist
NDSU Dickinson Research Extension Center

# plant pathology

**SCAB RISK REMAINS LOW IN ND**

The warm to hot temperatures, infrequent dews, and low humidity have contributed to the low scab risk in the state (Figure 1). Some areas of the state received rainfall this past weekend, but unfavorable scab conditions in the forecast will likely keep scab risk low in the state. Growth stages of small grains vary, ranging from late tillering to a few days past flowering onset (sometimes in the same field). It is important to continue to monitor scab risk in small grain fields as they enter heading (Figure 2) and flowering stages.

(*Figures on next page*)

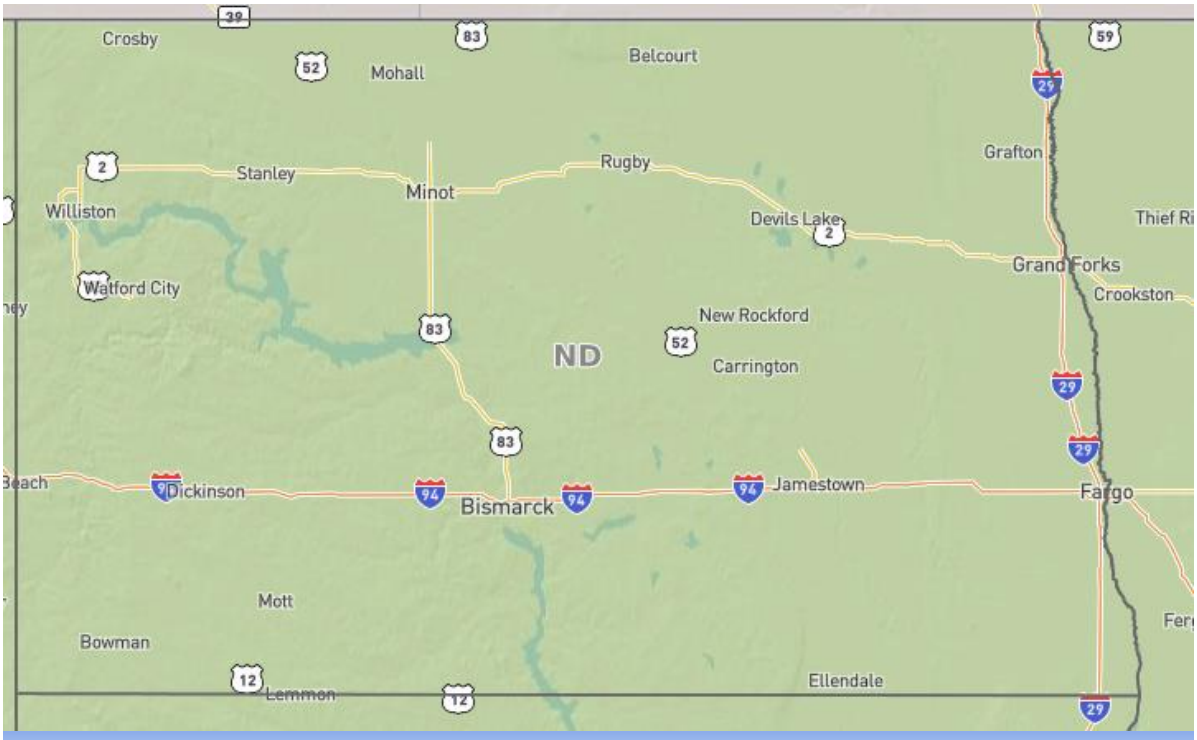



*Figure 1. Scab risk for very susceptible varieties remains low (green).*

*Figure 2. A barley crop starting to enter full-head growth stage.*

Andrew Friskop
Extension Plant Pathology, Cereal Crops


**POST-ANTHESIS N FOR EXTRA PROTEIN THIS YEAR?**

This 2021 spring wheat growing season has been challenging for lack of a better word. Wheat fields have experienced lack of moisture to full-blown drought, wide ranges of low to high temperatures each day in May, and hot conditions, with several to many days in the 90-100 degree maximums. All of this has resulted in reduced tillers, loss of tillers, reduced head size and, yet to come maybe, poor pollination and small kernel size in the most drought-affected areas. I hope that it is obvious to most that there will be no need for post-anthesis N application this season. There will be plenty of N in the soil and in the plant presently to produce at least market-acceptable protein with no dockage. In areas with substantial soil loss early, it might be prudent to take some plant/leaf samples as directed by the laboratory to make sure that the wheat has adequate N. If adequate N is present at jointing/boot, then no additional N would be necessary for increased protein. If the N blew away, then the plant analysis will show the results and application of 'the recipe' might be needed to avoid substantial dockage. With most wheat high in protein, no premiums are expected, but dockage might or might not be high. Checking with local elevators may provide guidance for this. They may just be happy to receive some wheat, and blending will take care of the bulk protein expectation of their buyers. My research crew, together with shared recent archived data from Dr. Chatterjee of the NDSU Soils Department and Dr. Joel Ransom, retired from NDSU Plant Sciences, are working towards an active-sensor algorithm from flag-leaf N sensing to direct yes/no evaluation of whether in years with greater yield potential, post-anthesis N application is necessary. I expect some positive outcomes from this research to be published before next growing season.

Dave Franzen
Extension Soil Specialist
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**PERENNIAL WEED CONTROL IN HOT, DRY WEATHER**

I have been receiving several questions regarding control of noxious weeds during this year's drought. Many are concerned about both injuring drought-stressed grass, as well as getting poor weed control due to hardened-off weeds. Since many folks are comparing this year to 1988 and 1989, I thought it would be good to take a look at Dr. Rod Lym's research data from those years to determine the best course of action. Luckily, Dr Lym wrote an article for Crop & Pest in August 2017 addressing this same issue. No need for me to reinvent the wheel, so here are Dr. Lym's words about perennial weed control in 1988:

**QUESTION:** I am wondering about continuing to treat leafy spurge in the dry conditions we are experiencing this year. The leafy spurge plants I have treated with Tordon do not look like they are dying. Should I continue to treat, use a different chemical, or just stop until we get some rain?

**ANSWER:** While herbicides are typically not as effective when plants are under moisture stress, I think it is better to continue to treat leafy spurge rather than stop. My reasoning comes from the lessons learned during the drought in 1988 (that was the year Yellowstone burned). The entire state was very dry and temperatures were often in the 90's and even over 100 with very little rain. No one really knew if they should continue to spray weeds or just stop and save the money. In my own research program, we stopped the field work in July and moved to lab and greenhouse research because the plants in the field did not appear to respond to any treatment. Some counties continued their treatment program and others stopped applications. What did we learn?

The following spring of 1989 the counties that quit treating leafy spurge had large increases in acres infested. Since the grass and most other species also stopped growing, it appeared the leafy spurge roots with no competition continued to spread. I remember leafy spurge was just about the only green plant in the Badlands. The counties that continued to treat (using Tordon + 2,4-D) had less than average control, but the leafy spurge did not spread and infestations were similar in size to 1988. Tordon has fairly long soil residual, so even if the chemical is not absorbed or translocated immediately after application, the herbicide will still reduce regrowth following moisture. Based on this experience I recommend land managers continue to treat leafy spurge, but if possible, wait until the temperatures cool and perhaps rain lessens the drought. The lesson from 1988 is: Do not stop the treatment program!

Joe Ikley
Extension Weed Specialist


**AROUND THE STATE**

**NORTH CENTRAL ND**

After a brief cool down at the start of the week, warmer temperatures and drier weather appear to be part of the forecast. With that being said, some shower activity occurred in the region of over the last week. Here are some quick precipitation reports as observed by area NDAWN stations over the last week (beginning June 13th): Minot: 0.14" (NCREC: 0.36"); Bottineau: 0.06"; Garrison: 0.39"; Karlsruhe: 0.11"; Mohall: 0.04"; Plaza: 0.38"; and Rugby: 0.04". Additionally, the bare soil temperature at the NCREC is observed at 71 degrees F.

Conditions for crop disease remain relatively low at this time. While precipitation has fallen in the area, warmer temperature and breezy conditions have allowed those areas to dry out. Some discussion around canola flea beetle continues in the region, however, many of those calls seemed to be concentrated along the Canadian border. Wheat midge has been observed at some of the IPM traps in ND, however, numbers remain very low at this time.

Many of the small grains are progressing rapidly through the warmer temperatures. Some of the spring wheat in the area is into the heading stages with some varieties beginning to flower. Canola fields are ranging from 4 leaf stage to flowering in the same fields in the region. At the NCREC, some of the pulses have begun to flower as well. As we look forward, the region continues to hope for more precipitation. However, the forecast doesn't appear to be on our side.

TJ Prochaska
Extension Crop Protection Specialist
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NDSU North Central Research Extension Center

**NORTHEAST ND**

Most of the NE region received the much-needed rain ranging from 0.1 to 0.75 inches with few areas missing them altogether. Uneven emergences continue to be an issue in all crops. Many small grain fields are short and in the boot stage or headed out with very uneven stands. Some small grain fields are too far in their drought situation that it was too late for the rains to make a difference. There are fields that are being reseeded with canola and soybeans due to wind, hail and moisture stress damages. Many canola fields are just emerging or at 4 leaf stage while several fields are at bolting. Fields are also getting zeroed out. A lot of herbicides were applied last week with more to go. Producers are debating on the worth of adding inputs to not so well doing crops. Crops on prevent plant ground are looking good. Some annual forage crops are being planted now. Ranchers are selling some cows due to poor hay and grazing conditions.

Anitha Chirumamilla
Extension Agent Cavalier County

**SOUTH-CENTRAL/SOUTHEAST ND**

According to NDAWN, the region's June 1-21 rainfall ranges from 0.5 inch (Zeeland) to 5 inches (Marion) and during the last 10 days the area north of I-94 generally received 0.5-1 inch. To be realistic, the region needs the later amounts of rain on a weekly basis for the next three months to have satisfactory row crop yield and seed quality.

Spring-seeded small grain are near heading to initial seed set. Potential grain yield appears well below average. If conditions continue, we may have significant transformation of the crop from grain to forage (see picture).

Corn generally is in the 5- to 8-leaf collar stages. Yield may not be substantially reduced if drought stress ends before the 13-leaf stage. The next yield determining factor of number of seeds per row on the ear is set at V12-15 leaf stages. Cool-season broadleaf crops are flowering including canola, field pea and flax. Sunflower currently appears to be the most tolerant broadleaf crop to drought while barley appears the least tolerant among cool-season grasses.

If corn fields low in zinc did not receive zinc fertilizer at planting time, is there a grain yield response with a foliar application? An average of 3 years of research at the Carrington REC indicates the following yield increase (soil generally low in P and Zn; treatments include 2.75 gpa in-furrow applied 10-34-0) with 0.25 gpa chelated zinc compared to the untreated check: in-furrow = 8 bu/A; foliar (application at V4-6 corn stage) = 3.3 bu/A. The current data indicates a more likely response with starter (seed placed) vs. foliar Zn.

Upcoming crop tours planned by the Carrington REC:

*Durum Day: June 29; Carrington REC, 9:45 a.m.

*Tri-county off-station: July 1; Wishek area; 6:30 p.m.

*Barnes County off-station: July 7; Dazey area; time TBD.

***Partially hayed wheat field in Wells County***

Greg Endres
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NDSU Carrington Research Extension Center

**SOUTHWEST ND**

Drought stress is visible across SW ND, with some pockets more heavily impacted than others. A zone around Dickinson and into Hettinger County that is evident on the US Drought Monitor map looks relatively good thanks to small, but timely rainfall events. That being said, yield loss is still expected. Small grains are beginning to head out and canola and flax are flowering. Corn, soybeans, and sunflowers are holding on, but will need significant rain in the next months to be productive. Forages have been hit the hardest, but there are some who, through a mixture of catching timely rains and good fertility management in previous years, will have a decent first cutting of alfalfa within the next week. According to NDAWN from June 14th to June 21st Dickinson received 0.11 inch, Beach 0.02, Amidon 0, Bowman 0, Hettinger 0, Mott 0, Carson 0.21, Mandan 0.42, Hazen 0.78, and Dunn 0.54.

Ryan Buetow
Extension Cropping Systems Specialist
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# weather

## WEATHER FORECAST

**The June 24 to June 30, 2021 Weather Summary and Outlook**

This past week had one main period of rain across the region that occurred on Saturday night into Sunday. The highest rain totals were between Highway 2 and Interstate 94 where some localized areas near one inch were recorded (Figure 1). Most other locations recorded at least some rain with the main exception in the southwest corner of North Dakota.

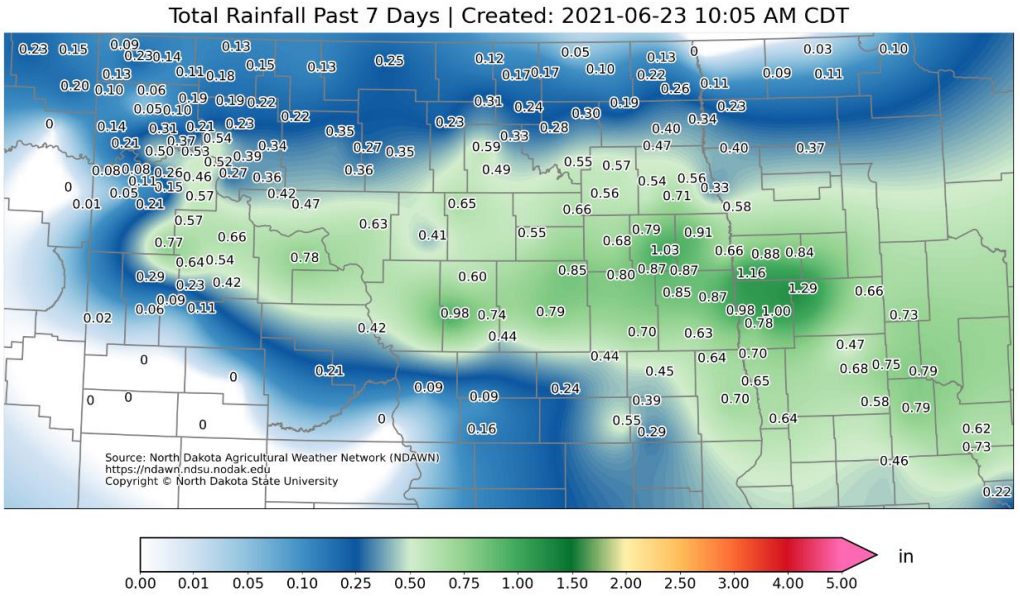


***Figure 1. Total rain at selected NDAWN for the 168 hours ending at 10:00 AM June 23, 2021***

The rain was associated with an area of low pressure and a cold front. Temperatures were well below average for two or three days depending on your location. It was cold enough for frost to be reported in portions of western and southern North Dakota on June 21. Overall, this past week the temperatures were mostly in the 2° to 5° below average range (Figure 2).

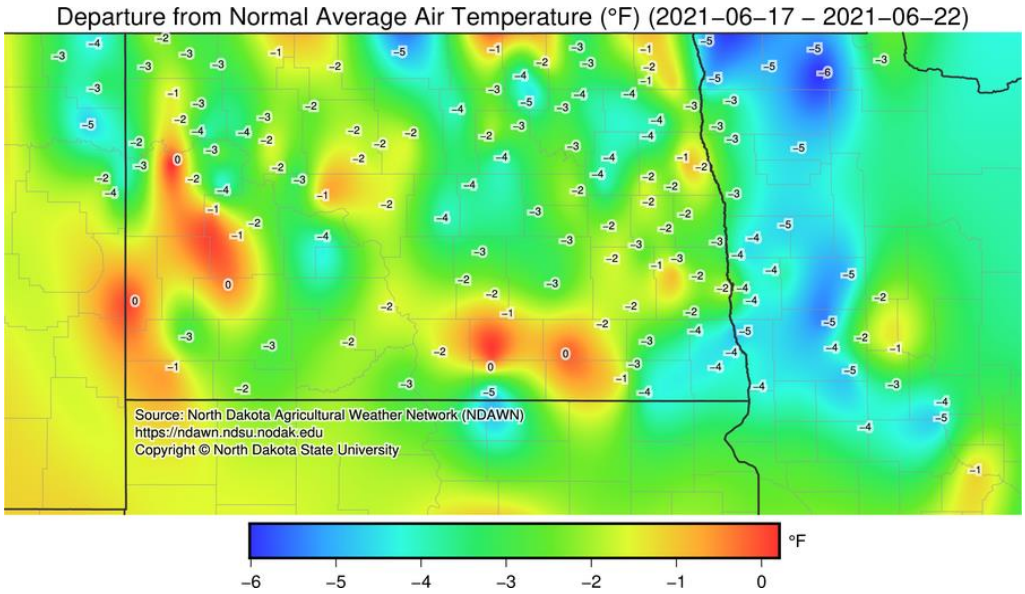


***Figure 2. Departure from average temperature at selected NDAWN weather stations from June 17 through June 22, 2021***

Yesterday (Wednesday) was likely the hottest day the region will experience in the short term. During this next week a ridge of high pressure aloft will build over the Pacific Northwest. This will mean North Dakota and northwestern Minnesota will continue to have the upper-level wind blow in from the northwest or even the north at times. This is expected to keep temperatures near seasonal averages for the next several days. The big question is will that "bubble" of heat push into the Northern Plains next week? If it does, it would probably be later next week into perhaps the Independence Day weekend period. There should be some rain Friday in especially southwestern North Dakota and some hit and miss activity over the weekend. Yet, the overall pattern does not look to be conducive anytime soon to a more widespread event like was recorded last weekend.

The projected growing degree days (GDDs) base 50°, 44° and 32° for the period of June 24 through June 30, 2021 can be found in Figure 3.

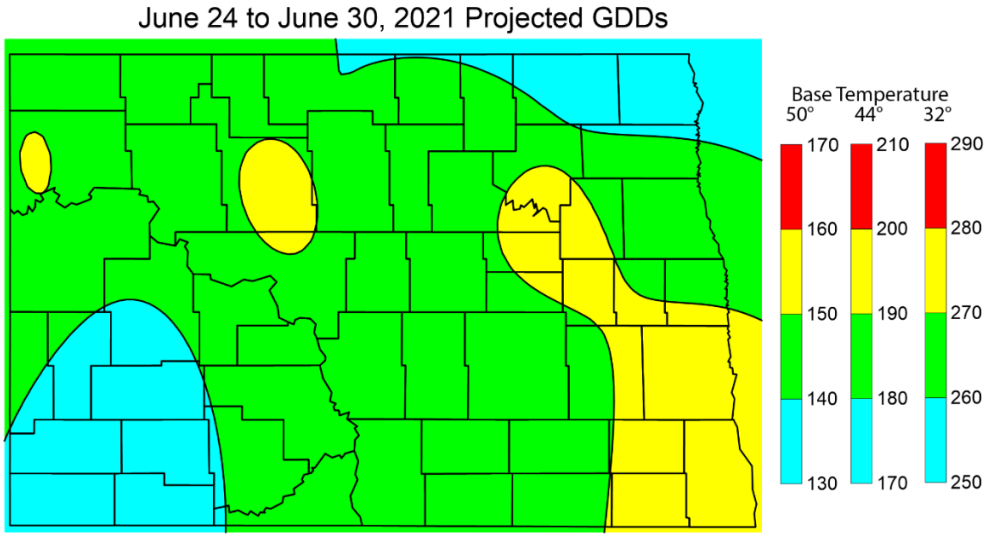


***Figure 3. Projected Growing Degree Days, Base 32°,44° and 50° for the period of June 24 to June 30, 2021***

Using May 1 as a planting date, accumulated growing degree days for wheat (base temperature 32°) is given in Figure 4. 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

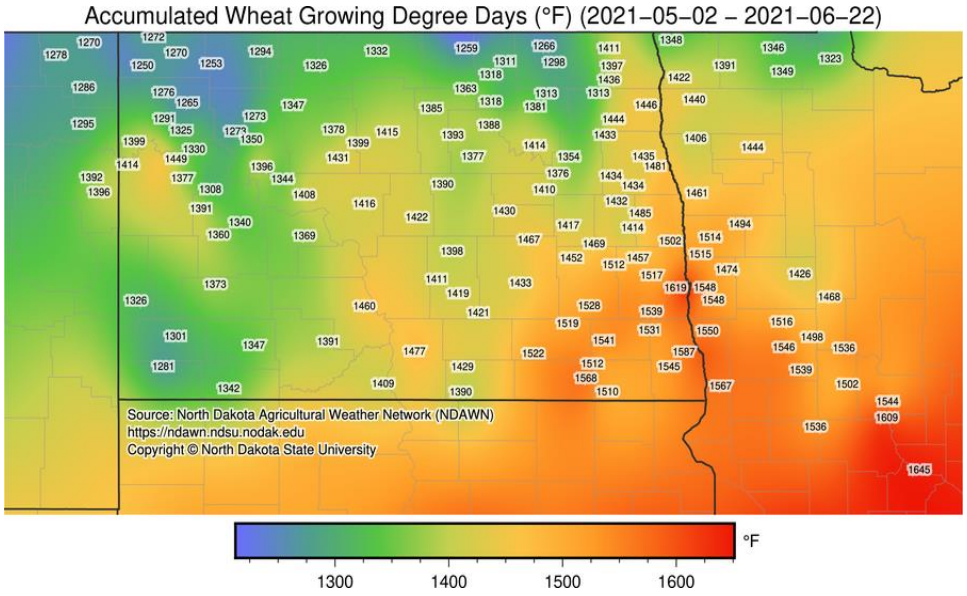


***Figure 4. Accumulated Growing Degree Days for Wheat (Base 32°) since May 1, 2021***

Using May 10 as a planting date, accumulated growing degree days for corn (base temperature 50°) is given in Figure 5. 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.

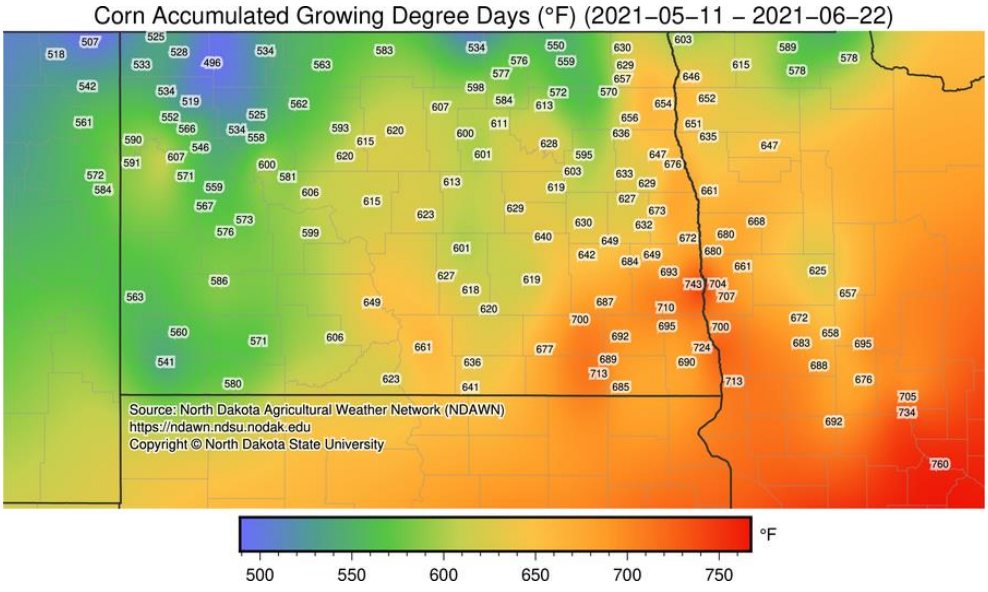


***Figure 5. Accumulated Growing Degree Days for Corn (Base 50°) since May 10, 2021***

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 your 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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