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entomology

IPM CROP SURVEY STARTS IN ND AND MN

For the 2022 Integrated Pest Management (IPM) Crop Survey, six scouts and two insect trappers were hired in North Dakota and one to three scouts in Minnesota! Field scouts in North Dakota will survey for major diseases and insect pests on wheat, barley, sunflower and soybean. Minnesota scouts will survey mainly wheat, barley and soybean. Two webinar trainings will be

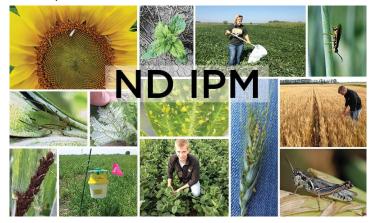


Michaela Halvorson, former NDSU IPM Scout, checks insect trap in sunflower field (Knodel)

conducted this week to discuss pest identification and scouting protocols for each crop.

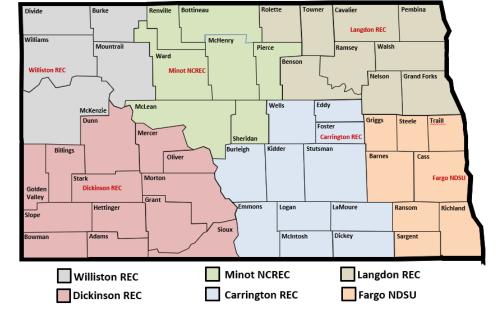
The purpose of the survey program is to monitor for economic pests that negatively affect crop yields. Timely pest alerts will be provided for producers, crop consultants and agronomists to assist with pest management. Some of the scouting data also is used to support export of our crop commodities. GPS coordinates are recorded with pest data, and ArcView maps will be created to show incidence and severity of pests in North Dakota. Maps are posted weekly on the NDSU IPM web page (usually by Wednesday of each week). https://www.ag.ndsu.edu/ndipm (Please note IPM website will be changing)

Important pest activity will also be summarized for the NDSU Extension Crop and Pest Report and social media.



The NDSU IPM scouts are:

- Carrie Nichols, central and southcentral counties, working out of Carrington REC with Greg Endres
- Breanna Hosman, southwest and west central counties, working out of Dickinson REC with Ryan Buetow
- Alexius Holter and Riley Racine, north central counties, working out of NCREC in Minot with Travis Prochaska



IPM Scouting Areas

- Scott Roseth, northwest counties, working out of Williston REC with Charlie Lim
- **Tommy Crompton**, southeast and east central counties, working out of NDSU campus, Fargo with Janet Knodel, Patrick Beauzay, Andrew Friskop and Sam Markell.
- Nancy Feil and Raelyn Klindt, northeast counties, working out of Langdon REC with Anitha Chirumamilla (Cavalier County Extension Office), Scott Knoke (Benson County Extension Office) and Katelyn Landeis (Grand Forks Extension Office).

The IPM scouts working for the University of Minnesota Extension are:

- Ashley Jansen, Norman, Mahnomen, Clay, Becker, Wilkin, Otter Tail Counties, working out of Moorhead with Anthony Hanson, Regional Educator, IPM / Extension
- Vacant (still looking for an interested person who likes field work), Kittson, Roseau, Lake of the Woods, Marshall, Pennington, Red Lake, Polk Counties, working out of Crookston with Angie Peltier, Regional Educator, Crops / Extension
- Vacant (still looking for an interested person who like field work), central and southern counties, working
 out of Morris with Jared Goplen, Regional Educator, Crops / Extension

This work is supported in part by the Crop Protection and Pest Management Program [grant no. 2021-70006-35330] from the USDA National Institute of Food and Agriculture, and the North Dakota Department of Agriculture.

Janet J. Knodel
Extension Entomologist

Patrick Beauzay
State IPM Coordinator
Research Specialist

Andrew Friskop
Extension Plant Pathologist
Cereal Crops

Sam Markell
Extension Plant Pathologist
Broadleaf Crops



FUNGICIDE QUESTIONS IN WHEAT AND RYE

Winter Wheat and Spring Wheat

The decision to apply an early season fungicide to winter wheat is fast approaching. Although not as frequently observed, some of the earliest planted spring wheat in the state is at late-tillering stage and may receive a fungicide in the next 10 days. The cool wet weather in the state has provided favorable conditions for tan spot and Stagonospora leaf blotch and several infection periods have occurred in the past two weeks (as indicated by the NDSU Small Grain Disease Forecasting website). If you are considering a fungicide application, there is a great resource pertaining to fungicide selection found on the Crop Protection Network's website:

Fungicide Efficacy for Control of Wheat Diseases

The publication is the result of a multi-state effort that presents efficacy of fungicides on wheat diseases in the US. Specifically, the publication provides the Fungicide Resistance Action Committee (FRAC) group(s), active ingredient(s), trade name, rate range, and level of efficacy for eight wheat diseases.

One of the most common questions pertaining to a fungicide at tillering pertains to yield response (or yield protection). First, remember the fungicide will only protect leaves made available at the time of application and will not provide season-long protection. Also, the observed yield response from an early-season fungicide application depends on several factors. These include the amount of disease resistance in the variety planted, environmental factors, and agronomic practices. Each year I update a data set that observes the yield trends from a fungicide application at tillering under diverse field environments. In table 1, I have summarized the data from 85 small plot trials and categorized them into four disease risk environments. Disease risk environments were determined using information pertaining to variety resistance, previous crop, tillage practices, dew periods, rainfall, and timing of disease onset. You will notice the yield response from an early-season fungicide (regardless of fungicide used) protects more yield under higher disease risks. For example, let's assume we have a 55 bu/a wheat crop. In a very low disease environment, the yield response is less than 0.01 bu/A. However, in a moderate to high disease risk environment, the yield response would range from 2.3 to 2.5 bu/a.

Table 1. Yield response from a fungicide applied at tillering in four disease risk environments. Disease risk environments were categorized by the factors of variety resistance, previous crop, tillage practices, dew periods, rainfall and timing of disease onset.

	Disease Risk			
Factors	Very Low	Low	Moderate	High
Variety Resistance	Moderately Resistant	Moderately Resistant	Susceptible	Susceptible
Previous Crop	Broadleaf	Broadleaf	Wheat	Wheat
Tillage Practices	Conventional	Conventional	Conventional	Minimal
Dew Periods	Infrequent dews	Sporadic dews	Frequent dews	Frequent dews
Rainfall	Below average	Below Average	Average	Above Average
Disease Onset	No Foliar Disease Detected	Lower Canopy at Flowering Stages	Lower Canopy at Boot Stage	Detected at Jointing
YIELD RESPONSE	0.001%	1.7%	4.6%	4.2%

Winter Rye

I have received reports of winter rye starting to head in the state and I have had a few conversations about protecting the rye crop from Fusarium head blight (FHB) and foliar diseases. Winter rye is susceptible to Fusarium head blight, but we have limited information pertaining to variety susceptibility in rye varieties commonly planted in North Dakota. Using scab risk model estimates intended for wheat, most of the state is in low to moderate risk for FHB. It is likely that risk will increase for some areas of the state in the coming week as a result of recent rain events. Fungicides can be effective for managing both leaf diseases and Fusarium head blight in rye. Field research conducted at the University of Kentucky on rye have found that single applications of Caramba or Miravis Ace made at early-anthesis or five days after early-anthesis provided significant suppression of both FHB and leaf diseases (data available at:

Rye Crop and Disease Management in Kentucky Report on 2018-2019

Rye Crop and Disease Management in Kentucky 2019-2020

A final note about fungicides in rye. Remember that not all FHB fungicides labeled in wheat are labeled in rye and applicators need to follow directions on the label.

Andrew Friskop
Extension Plant Pathology, Cereal Crops



LATE PLANTING SOYBEAN

Soybean varieties In North Dakota are group 00 (double zero), 0 (zero), or 1. These groups are divided by decimal places to indicate the maturity ratings within a group. For example, a 0.5 maturity rating is a mid-group 0 variety, whereas a 0.9 is a late group 0 variety, and will take more days to reach physiological maturity. Early seeding dates are recommended for growers across all regions in North Dakota. However, due to wet and cool conditions not all soybean fields have been seeded at this time.

CROP & PEST REPORT

An NDSU study evaluated the influence of variety maturity rating on soybean yield when planted from May to late into July. Experiments were conducted at Prosper and Lisbon for two seasons, and Carrington during one season. Three varieties were used with maturity ratings of 00.9, 0.7 and 1.4.

Typically, when a crop has fewer total growing days in the field, the yields decline. Figure 1 provides the relative yield of three varieties with different maturity ratings and six planting dates, expressed in percent. The average yield for the three cultivars for May 23rd was set at 100 percent and all other yields are expressed as a percent. Yields declined with later planting of soybean. The latest maturing cultivar had the highest yield when planted early. After the June 11 planting the late maturing cultivar yielded lower than earlier maturing cultivars.



Figure 1. Soybean yield expressed as a percent of the mean of the cultivars planted on May 23^{rd.} Data averaged across five environments in eastern North Dakota.

Another NDSU study at Langdon, during 2018 and 2020, evaluated the influence of maturity rating on soybean yield when planted from May to mid-June. Three varieties were used with maturity ratings of 00.5, 00.9 and 0.1. Figure 2 provides the relative yield of the three varieties and six planting dates averaged across two years, expressed in percent. The average yield for the three varieties for the May 22nd planting date was set at 100 percent and all other yields are expressed as a percent. Yields declined with later planting of soybean. The latest maturing cultivar (0.1) had the highest yield when planted early. After the May 22nd planting date, the late maturing cultivar yielded lower than earlier maturing cultivars.

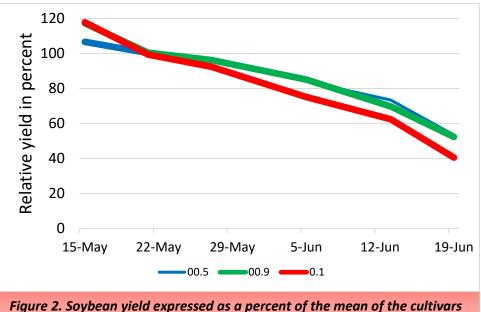


Figure 2. Soybean yield expressed as a percent of the mean of the cultivars planted on May 22nd. Data averaged across 2018 and 2020 at Langdon, North Dakota.

Soybean is an oil seed crop. When planting is delayed the oil content of the soybean seed declined for both the central and northern North Dakota locations.

Conclusion

The interaction of planting date by maturity rating of soybean varieties, indicated that yield decreased as planting was delayed further into the growing season and that earlier maturing varieties did better when planted later in the season compared to a later maturing variety.

Sources

- -Research by E. Sweep and B. Johnson [Seeding Date, Maturity Rating, and Location Influence on Soybean (*Glycine max*. L. (Merr)) Performance and Phenology in Eastern North Dakota].
- -Langdon REC Annual research report No 93, December 2018, pages 50-51.
- -Langdon REC Annual research report No 95, December 2020, pages 47-48.

Hans Kandel
Extension Agronomist Broadleaf Crops



SPRING IS HERE, AS ARE SOME YELLOW FLOWERS

There has been a big planting push over the last week across the whole state. This has resulted in minimal questions about annual weed control in crops. While there may be a lag in questions about weed ID and control in our fields, we have noticed several of our perennial weed foes are thriving in the landscape. The areas around campus have taken on a familiar yellow glow, so we figured this is a good time for a refresher on two perennial weeds that cause annual problems. Dr. Quincy Law, Invasive and Noxious Weed research, offers the following advice.

Initiated by the warmer temperatures and longer days, the crabapple trees and lilac bushes are in full bloom around campus. The notorious yellow flowers of leafy spurge (*Euphorbia esula*) and dandelion (*Taraxacum officinale*) are out, too. These yellow flowers catch your eye and make the plants more noticeable.

Leafy spurge is one of North Dakota's 13 noxious weeds, and, according to North Dakota Century Code (§ 4.1-47-02), "Each person shall do all things necessary and proper to control the spread of noxious weeds." The timeliness of this article is that the true flower growth stage of leafy spurge is the optimal application window for many herbicides. This is largely true for the active ingredients and tank mixes that include: dicamba, picloram, quinclorac, and saflufenacil. True flower stage is not the optimal timing for all herbicides, as aminocyclopyrachlor should be applied prior to flowering, and imazapic should be applied in late summer or early fall. However, when tank-mixing imazapic + picloram + 2,4-D, the true flower stage should be targeted. For additional guidance, consult the North Dakota Weed Control Guide (W253-22), and always follow the herbicide label.

Leafy spurge flowers are inconspicuous, and it is actually the yellow bracts that are showy. Thus, to hit the optimal application timing, it is important to inspect the flower to ensure it is indeed a true flower and not just bracts. Below are two photos of leafy spurge taken at the same site in Fargo, ND on May 27th. The photo on the left is not yet a true flower, whereas the leafy spurge on the right has begun the true flower stage.



Image 1. Leafy spurge that has not yet flowered (left), and leafy spurge that has begun to flower (right).

While writing about yellow flowers, I am compelled to discuss dandelions and share a tidbit of my previous research. During a turfgrass mowing height and nitrogen fertility experiment, I noticed that the experimental treatments likely influenced the prevalence of dandelions. When I counted the number of dandelions per plot, both mowing height and nitrogen fertility had treatments that were different from one another. After three years (and with no chemical control), plots mown at 3 and 4 inches had fewer dandelion plants than those mown at 2 inches. Additionally, plots receiving more than 3.3 lb N per 1000 ft² per year had fewer dandelion plants than the non-fertilized check. As seen in the photo below, a decreasing number of dandelion blooms were observed as nitrogen fertility increased.

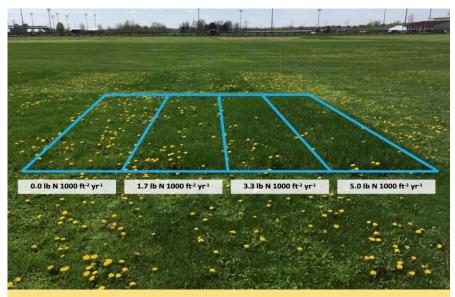


Image 2. Dandelion blooms as influenced by three years of nitrogen fertility treatments in Kentucky bluegrass turf mown at 4 inches.

There are a few things to note, however. First, 3.3 lb N per 1000 ft² is a high rate of nitrogen and was implemented for research purposes. Follow NDSU Extension recommendations for turfgrass nitrogen fertility. Second, not all nutrients are the same. For example, potassium fertilization will actually increase dandelion prevalence. This and previous research demonstrate that a competitive turf sward (lawn) can combat weeds, even without herbicides.

Quincy Law
Invasive and Noxious Weeds

Joe Ikley
Extension Weed Specialist

WHAT SHOULD I DO IF I HAVE WATERHEMP ESCAPES IN SUGARBEET?

Producers are mailing images of waterhemp escapes in sugarbeet. This pigweed is very small now, but it is clearly waterhemp. What are options for control?

You must act now. Small waterhemp grow very quickly and become large waterhemp, further reducing control options and interfering with sugarbeet root yield. I have stated for years that Stinger (clopyralid) does not control waterhemp. STINGER DOES NOT CONTROL WATERHEMP. However, we observed some evidence of Stinger helping waterhemp control from glyphosate in the Moorhead factory district in 2020. Fields were sprayed with ethofumesate PRE and followed by PowerMax + etho + Stinger EPOST. We repeated the treatment in the greenhouse and observed similar activity from Stinger mixtures with PowerMax and ethofumesate on small waterhemp.

Stinger mixed with PowerMax improved control of waterhemp which was less than 1-inch tall, by 20% and 26%, 12 and 25 DAT, respectively (Figure 1). The advantage was much reduced once waterhemp reached 1- to 2-inch tall, only improving control by 5% and 14%, 12 and 25 DAT.

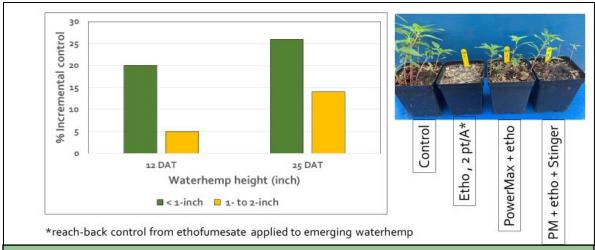


Figure 1. Improved waterhemp control from Stinger (3 fl oz/A) mixtures with PowerMax and ethofumesate

COMMON RAGWEED IN SUGARBEET

Probably the most frequent weed I have observed in fields in 2022 is common ragweed. Common ragweed can be a serious production challenge in multiple crops including sugarbeet if not properly managed.

Our 'go-to' program for common ragweed control in sugarbeet is Stinger HL (clopyralid). Stinger HL is mixed with glyphosate and non-ionic surfactant and ammonium sulfate for common ragweed control or Stinger HL mixed with glyphosate, a chloroacetamide herbicide and ethofumesate plus ammonium sulfate and high surfactant methylate seed oil (HSMOC) for common ragweed and waterhemp control.

Two considerations. First, make sure you are accounting for the appropriate clopyralid formulation as there is Stinger and Stinger HL. Second, don't skimp on the Stinger rate. We have observed excellent sugarbeet safety for years with clopyralid, especially on small sugarbeet. We recommend Stinger at 3 to 4 fl oz/A (Stinger HL at 1.8 to 2.4 fl oz) on common ragweed less than 2-inch tall (or wide). Plan for a repeat application after 14 days if common ragweed is greater than 2-inch or if Stinger is applied at 3 fl oz/A (Stinger HL at 1.8 fl oz) rate.

Tom Peters
Extension Sugarbeet Agronomist
NDSU & U of MN



NORTH CENTRAL ND

The past week we had little precipitation in the region which allowed some farmers to continue to plant. The rainfall observed over the weekend will continue impacting the ability of farmers to enter in the field for planting. At the NCREC, 0.06" of rain has been observed since last Monday (May 23rd). The following are precipitation observations across the area as noted by local NDAWN stations from May 23rd through May 31st: Bottineau: 0.03"; Garrison: 0.05"; Karlsruhe: 0.05"; Mohall: 0.75"; Plaza: 0.12"; and Rugby: 0.01".

Weeds are growing fast in the region and kochia is again the predominant weed. Some farmers are reporting that herbicide fall application was not enough to control kochia this year. Given the concentrated rainfall last fall in October (2.87 inches in Minot) coupled with the moisture from the blizzard plus the concentrated rainfall in April (2.44 inches in Minot), these moisture events could have played a role in reduced herbicide efficacy for kochia this year in the region. On the other hand, the use of cover crop such as winter rye may reduce weed pressure (Figure 1).



Figure 1. Kochia control with fall herbicide application without winter rye (left) and with winter rye (right).

TJ Prochaska

Extension Crop Protection Specialist NDSU North Central Research Extension Center Leo Bortolon

Extension Cropping Systems Specialist NDSU North Central Research Extension Center

NORTHEAST ND

The northeast region once again got pounded with rain, ranging from a low of 0.72 inches to a high of 2.57 inches over the weekend. Producers made good use of the week between showers and achieved great progress in their planting efforts. More than 50% of the acres have been planted in many counties that include small grains, dry beans, canola, soybeans, corn and sunflowers. There has been a significant progress in sugarbeet acres that got planted after last week too. The rest of the plantings will be pushed back a few days again due to these wet conditions. Growers are getting anxious as the final planting dates of crop insurance have passed or are nearing for crops such as corn, spring wheat, barley and canola in some areas. However, producers are willing to push the planting season to June 15th considering the high market prices.

The NDAWN stations at Langdon and Wales recorded a rainfall of 1.97 and 2.57 inches respectively since yesterday. Several of the research trials and foundation seed acres have been planted at the Langdon Research Extension Center (Figure 1). Canola flea beetles, both striped and Crucifer, have been spotted around shelterbelts in the Langdon area (Figure 2). Plenty of volunteer canola can be found in the fields for flea beetles to feed on. Grasshoppers have not been observed yet. Alfalfa stands are looking very good.



Figure 1. Research trials at the Langdon Research Extension Center



Figure 2. The Striped and Crucifer flea beetles feeding on a canola seedling.

Anitha Chirumamilla

Extension Cropping Systems Specialist Langdon Research Extension Center

SOUTH-CENTRAL/SOUTHEAST ND

According to NDAWN, the region's rainfall during May 1-30 ranges from 1.4 inches (Harvey) to 6.3 inches (McHenry), with most areas receiving 2-4 inches including 4.6 inches at the Carrington REC. Significant crop acres were planted last week but the Memorial Day rain may have stopped additional small grain and corn planting for the season. When adequate soil conditions are present again, soybean, dry bean and sunflower planting will continue but prevented plant acres will take a larger cut of the overall crop acreage.

Winter rye is beginning to head and winter wheat is jointing. Emerged spring-seeded small grain and other cool-season crop stands generally have adequate densities. The NDAWN tool (https://ndawn.ndsu.nodak.edu// and choose 'Applications') can quite accurately predict wheat and corn plant emergence from planting date: about 180 growing degree day units (GDDU) for spring wheat and 120 GDDU for corn.

Low incidence of tan spot is present in the Carrington REC's winter wheat. Abundant topsoil moisture and warm soil temperatures are providing the environment for abundant weed emergence. North Dakota state noxious weeds beginning to flower include houndstongue and leafy spurge.



Figure 1. Winter rye head emergence in Carrington REC variety trial.



Figure 2. Spring wheat seeded at Carrington REC on May 23 (pictures taken May 31)

Greg Endres

Extension Cropping Systems Specialist NDSU Carrington Research Extension Center

SOUTHWEST ND

With scattered showers spread across the past couple of weeks there are some farmers further along than others, however, a majority of the region is planted. According to NDAWN, rainfall totals from May 16th to May 30th showed that Dickinson received 0.95 inches, Hettinger 1.00, Bowman 0.55, Beach 1.20, Mott 0.91, and Mandan with 0.88 inches of precipitation. For those fields that were planted a few weeks ago we are seeing emerged crops of sunflower, canola, pulses, and small grains. This is paired with crops just getting in or not yet planted. Weed control continues when the weather allows. We've had several windy days, but there have been open windows of favorable conditions for herbicide application.

CROP & PEST REPORT

Ryan Buetow

Extension Cropping Systems Specialist NDSU Dickinson Research Extension Center



WEATHER FORECAST

The June 2 to June 8, 2022 Weather Summary and Outlook

As was expected, rainfall these past 7 days was widespread and locally heavy. Parts of central North Dakota were mostly missed, but elsewhere 1" plus rain was common with some localized heavy rain in excess of 2.5 inches being recorded (Figure 1). Most areas will see little if any rain until early next week with no big storms foreseen during this forecast period.

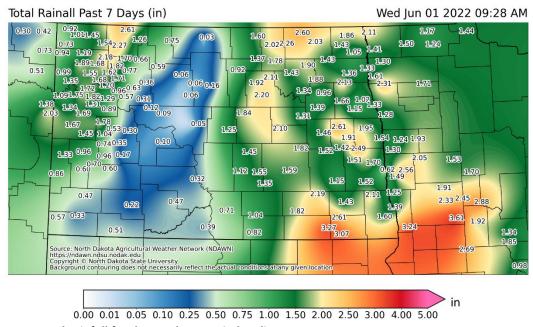


Figure 1. Total rainfall for the 168-hour period ending near 9:30 AM on June 1, 2022 at NDAWN stations

The Memorial Day weekend rain pushed most of the region to above average precipitation for the month (Figure 2). Even through May 29, only about 50% of the state of North Dakota recorded near or even below average rain for the month, but the widespread heavier rain on Memorial Day pushed a high percentage of the state to above or well above normal for May. June 1 marks the first day of summer for climatological statistics. Thus, the rain on the last few days of May moved Fargo into the Top 10 wettest springs on record (March 1 through May 31). Fargo's official weather site ended up recording the 9th wettest spring on record and Grand Forks (UND records) ended up with the 3rd wettest spring on record.

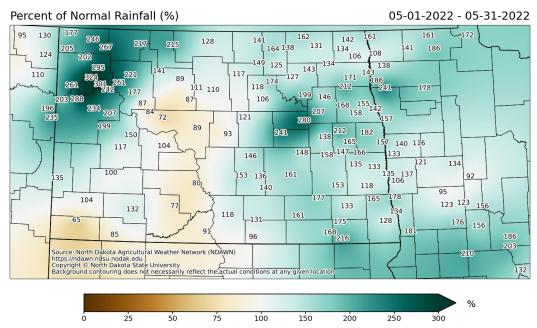


Figure 2. Percent of Average Precipitation for May, 2022 at NDAWN stations.

Temperatures this past week were near or even a bit above average. The data from yesterday, June 1 was not included in Figure 3. If June 1 had been included, most locations would have had temperatures closer to average. These next 7 days will be mostly below average. These below average temperatures will mean minimums in the 30s or 40s on most mornings. Plus, there may be a risk of frost on some mornings, with northern North Dakota areas the most prone.

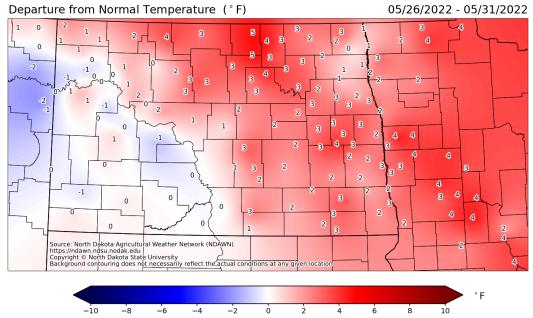


Figure 3. Departure from Normal temperature at NDAWN stations for the period of May 26-31, 2022

Figures 4 and 5 below are forecasted estimates of Growing Degree Days (GDDs) base 32° (wheat and small grains) and 50° (Corn and Soybeans). The number of GDDs in the next week should be noticably below average.

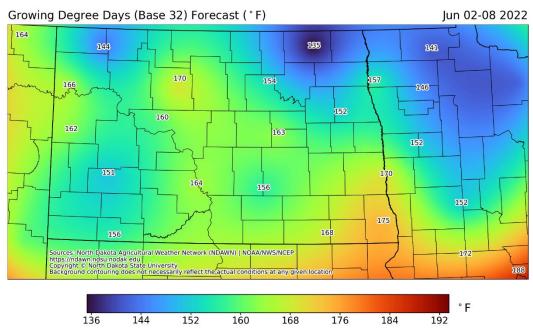


Figure 4. Estimated growing degree days base 32° for the period of June 2 to June 8, 2022.

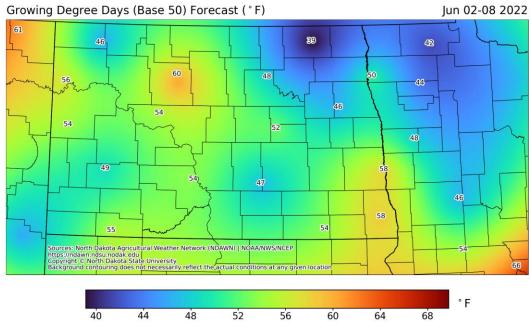


Figure 5. Estimated growing degree days base 50° for the period of June 2 to June 8, 2022.

Using May 15 as a planting date, the accumulated growing degree days for wheat (base temperature 32°) are given in Figure 6. 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

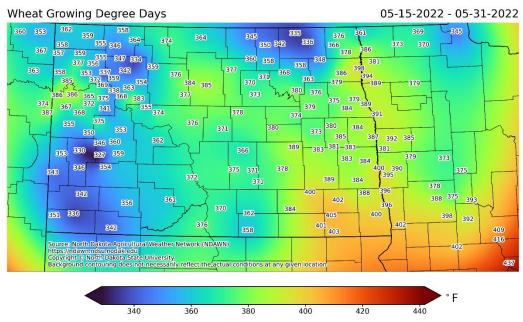


Figure 6. Wheat Growing Degree Days (Base 32°) for the period of May 15 through May 31, 2022.

Using May 20 as a planting date, the accumulated growing degree days for corn (base temperature 50°) are given in Figure 7. 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.

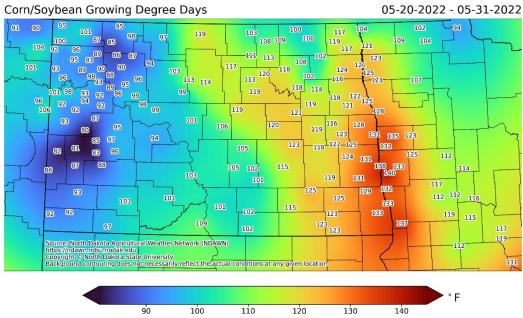


Figure 7. Corn Growing Degree Days (Base 50°) for the period of May 20 through May 31, 2022.

Daryl Ritchison

Meteorologist

Director of the North Dakota Agricultural Weather Network (NDAWN)

North Dakota State University

CROP & PEST REPORT

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NDSU Crop and Pest Report

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