North Dakota State University
CROP & PEST REPORT

NDSU EXTENSION

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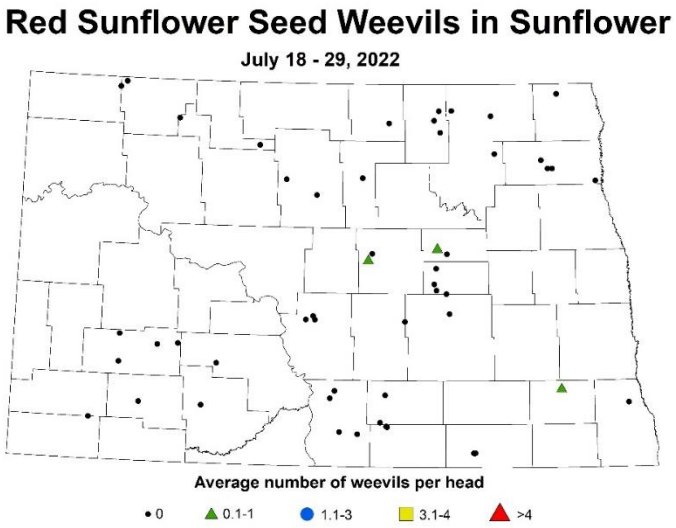
Inside this Issue...

Insecticide Application Timing for Red Sunflower Seed Weevil....1
IPM Insect Trapping Update 3
Wheat Midge Update.....4
Aphid Update 4
Braconid Wasp Cocoons Common 5
Managing Cercospora Leaf Spot of Sugarbeet in 2022.....6
Fusarium Head Blight (Scab) Reported from Fields.....8
Consider Winter Wheat this Year .8
NDSU Breeding Programs using Unmanned Aerial Vehicle (UAV) and Robots 10
Around the State.....11
North Central ND 11
Northeast ND 14
Northwest ND 15
South-Central/Southeast ND 16
Southwest ND 18
Weather Forecast.....19

Entomology

INSECTICIDE APPLICATION TIMING FOR RED SUNFLOWER SEED WEEVIL

IPM scouts observed low number of red sunflower seed weevils, an average of 1 weevil per head, in sunflower buds this past week in central and southeastern ND (see map below). Sunflowers were planted later this year, from early to mid-June. Most sunflower fields are still in the late vegetative to R3 (bud >1 inch from leaf) crop stages. **Routine weevil scouting should start in the late R4 through the R5.7 (late flowering)** stages**.** With hot temperatures, sunflowers can move quickly through the susceptible flowering stages, reducing flowering time to less than 7-10 days.



When is the best timing for insecticide applications for seed-infesting insect pests like red sunflower seed weevil? Sunflower plant stage is critical when timing an insecticide application. Both bloom and flowering describe the sunflower plant when yellow ray petals are showing and pollen is being shed. It is important to distinguish between the percentage of the field in bloom from the percentage of individual plants in bloom. A field with 50 percent of the plants in bloom indicates that half of the plants are shedding pollen and the other half of the plants are in the bud stage. However, the individual plants in bloom will probably not all be at the same stage of bloom. Some plants may have just started to shed pollen (R5.1) and others may be at the end of pollen shed (R5.9). A plant in the 40 percent bloom stage would have 40 percent of the head shedding pollen (R5.4). This would be a ring of opened florets comprising about 25 percent of the head radius. The remaining 75 percent of the florets would be unopened.

The ideal plant stage to treat for red sunflower seed weevils is when most plants in the field are at 40 percent pollen shed (R5.4). However, we recommend that treatment be considered when more than 50% of the plants in the field are just beginning to show yellow ray petals (R5.0) to 30 percent of the head shedding pollen (R5.3) and the rest of the plants in the field are still in the bud stage. This difference between the ideal plant stage (R5.4) to treat and the earlier plant stage (just beginning pollen shed, R5.1) is based, in part, on the fact that aerial applicators have a busy schedule, and may not be able to spray on time due to adverse weather. Treating at the early bloom stage should allow growers a sufficient buffer of time to have their fields treated at the proper time. **Growers must be aware, however, that if weevil populations are high and/or spraying is done too early, a re-infestation may occur and a second insecticide application may be necessary.**

Sunflower head moth on sunflower head at R5.4

Although insecticides applied to sunflower at the bud stage will kill weevils, treatments at that stage are not economical or effective because (1) seeds have not developed to a stage suitable for oviposition, (2) eggs within the female weevil are not mature, and (3) adult weevil emergence is still continuing. Sunflower normally reaches the bud stage in late July at which time only about 30 percent of the weevils in the soil have pupated and emerged. Most weevils emerge from the soil by the first week of August. If growers were to spray bud stage sunflower in mid to late July, a second spray may be necessary as more weevils continue to emerge.

Due to poor performance and reported field failures with pyrethroid insecticides for control of red sunflower seed weevils over the past years, especially in South Dakota (NSA funded research – Drs. Varenhorst and Knodel), we are recommending that sunflower growers use the high labeled rate of their selected insecticide to mitigate further insecticide failure issues. With chlorpyriphos (Lorsban and generics) no longer available for use on any field crops, **sunflower growers only have one option for red sunflower seed weevil control – the pyrethroid (3A) insecticides. Based on research data, we recommend caution when using lambda-cyhalothrin (Warrior II and generics) and zeta-cypermethrin (Mustang Max)** since 71% and 83% of the fields sampled in SD were found to have reduced susceptibility for weevil control in 2021, respectively. This may be due in part to the effects of high temperature on pyrethroid insecticides. Temperatures above 90°F can shorten the residual activity of pyrethroids. Lambda-cyhalothrin and zeta-cypermethrin are more sensitive to high temperatures than esfenvalerate (Asana XL). Although carbaryl (Sevin XLR Plus) is registered in sunflowers, red sunflower seed weevil is not listed on the label and the label states that applications are not allowed on any flowering crop due to high toxicity to bees. We are continuing to test red sunflower seed weevil populations in SD and ND to further examine the pyrethroid insecticide efficacy. Thanks to the National Sunflower Association for funding.

Chlorpyrifos Alternatives for RSSW

- Pyrethroids, 3A – beta-cyfluthrin (Baythroid XL), cyfluthrin (Tombstone), deltamethrin (Delta Gold), esfenvalerate (Asana XL), lambda-cyhalothrin (Warrior II, generics), zeta-cypermethrin (Mustang Maxx)

Disclaimer: Mention of any insecticides does not imply endorsement of one product versus another nor discrimination against any product not mentioned by the authors or universities.

IPM INSECT TRAPPING UPDATE

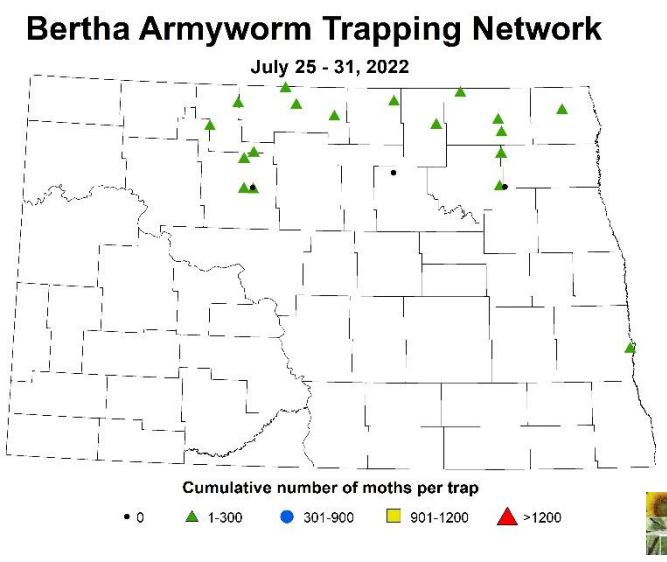
We will be posting and reporting weekly trapping results for insect pests of wheat, canola and sunflower on the NDSU Extension ***IPM website*** and in the ***Crop & Pest Report***.

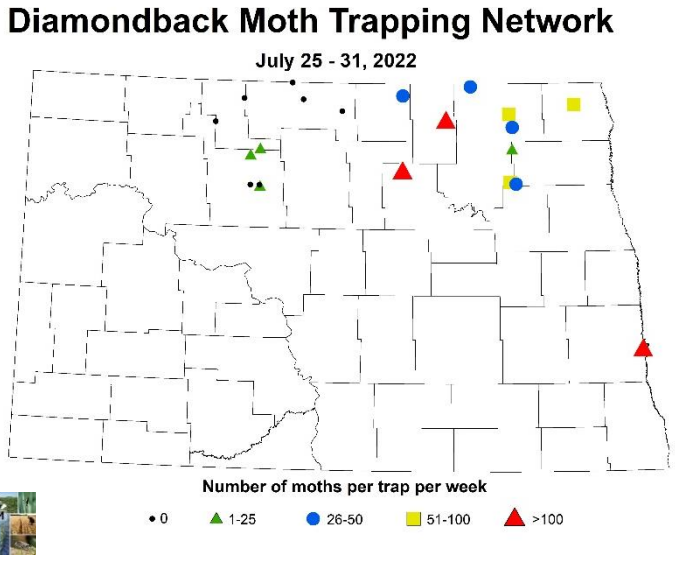
Wheat: Pheromone traps for true armyworm and black cutworm continue to be **low for both species** at 18 trap sites in 18 counties. True armyworm trap capture decreased to a total of only 19 moths at five sites compared to a total of 69 moths at six sites for last week. Black cutworm traps captured a total of 6 moths at three sites compared to a total of 8 moths at two sites last week. See maps on IPM website. Wheat growth stage ranged from early flowering to soft dough.

Canola:
IPM Crop Scouts have placed pheromone traps out for bertha armyworm and diamondback moth at 21 trap sites in 12 counties, mainly in northern canola growing areas (Table 1). Canola growth stages ranged from early to late flowering.

Trap catches for **bertha armyworm** continue to be low, <10 moths per trap per week, with 86% of the trap sites capturing moths. Bertha armyworm threshold for scouting is based on the cumulative number of moths captured over the season, which are low, below 300 cumulative moths per season (non-economic). See scouting article for bertha armyworm larvae in canola, in the past *Crop & Pest Report* #11, July 14.

Trap catches for **diamondback moths** continued to increase for the second week in a row with a total of 924 moths compared to a total of 416 moths last week. Moths were captured at 71% of the trap sites, mainly in eastern ND. **When diamondback moth trap catches are above 100 moths per trap per week, canola fields should be scouted for larvae.** See past scouting article for diamondback moth larvae in canola in the past *Crop & Pest Report* #11, July 14.





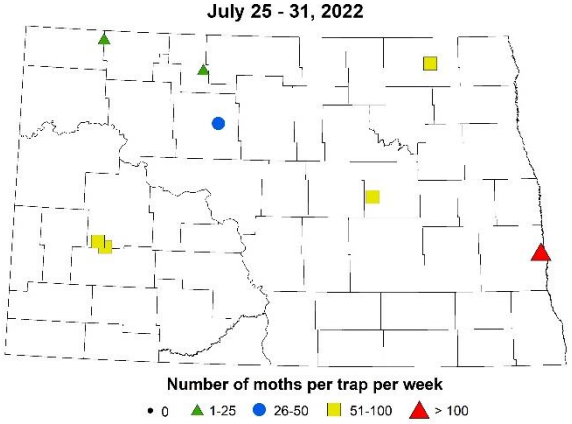
Sunflower:
IPM Crop Scouts have placed pheromone traps out for banded sunflower moth, Arthuri sunflower moth and sunflower head moth at 8 trap sites in 7 counties. Sunflower growth stage ranged from late vegetative to R2 (bud <1 inch from leaf).

Banded sunflower moth increased, with a total of 587 moths captured compared to a total of 371 moths captured last week. Trap catches ranged from 1-176 moths captured per site at all of the 8 sites. See maps on next page.
Arthuri sunflower moth was captured at 5 trap sites and trap catches ranged from 1-24 moths per trap per week.
Sunflower head moth was not captured at any trap site last week.

Banded Sunflower Moth Trapping Network

Cochylis hospes

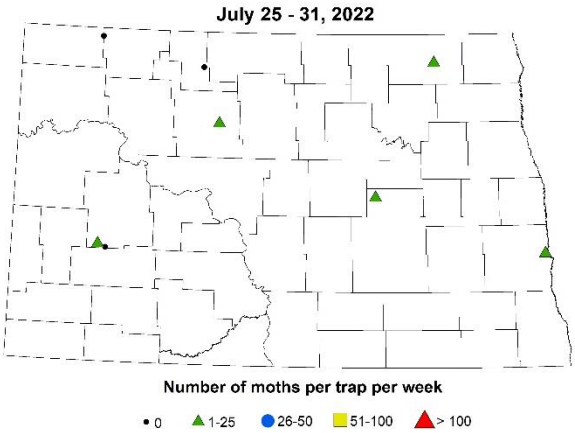
July 25 - 31, 2022



Arthuri Sunflower Moth Trapping Network

Cochylis Arthuri

July 25 - 31, 2022



WHEAT MIDGE UPDATE

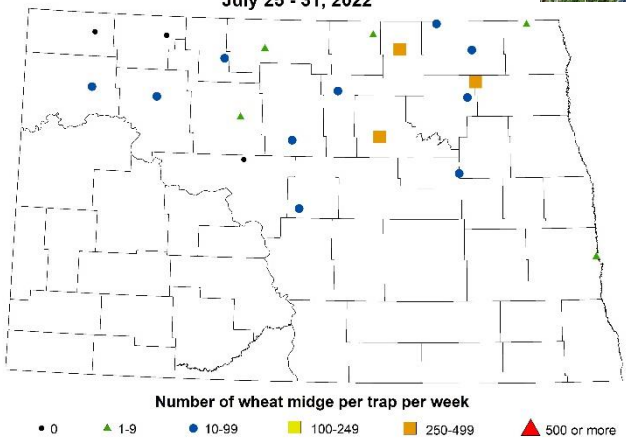
Wheat midge numbers continue to decline with a total of 1608 wheat midge captured compared to a total of 3662 last week. Three trap sites had high trap catches of over 300 wheat midge per trap per week in Benson, Towner and Walsh Counties this past week. Only the late planted wheat is still susceptible to wheat midge infestation in the heading to mid-flowering stages.

Parasitic wasps were observed at 38% of the trap sites in 8 different counties.

For information on wheat midge scouting and thresholds, see the *Crop & Pest Report* #11, July 14.
Also, see recent trapping map results on the PestWeb website, Montana State University.

Wheat Midge Trapping Network

July 25 - 31, 2022



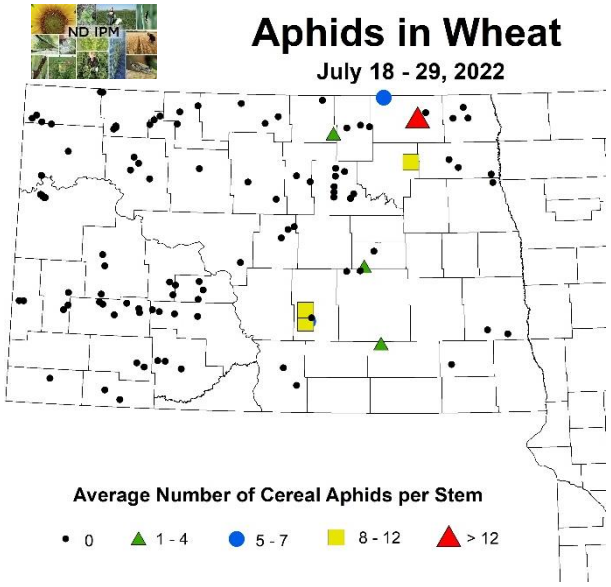
APHID UPDATE

Cereal aphids were sporadic and only a few wheat fields were observed infested with cereal aphids in the northeast and central areas of ND last week. However, aphid infestations were not economic in the 69 wheat fields scouted by the IPM Crop Scouts.

Continue to scouting wheat fields from stem elongation and continue up to the early dough stage of wheat. Wheat crop stages ranged from inflorescence emergence to hard dough.

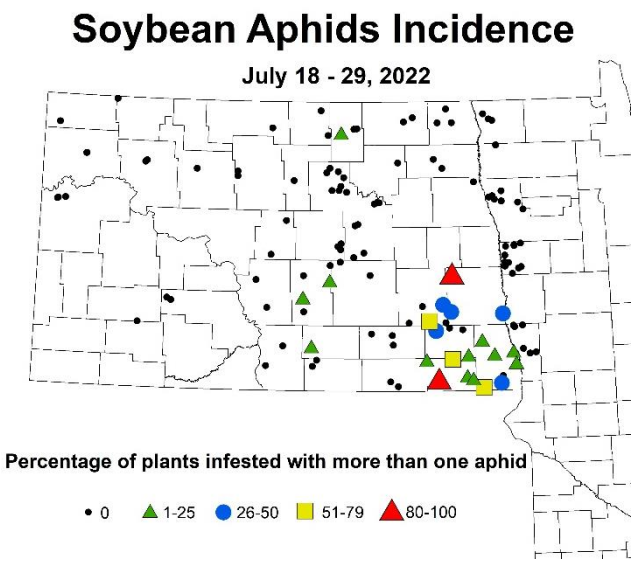
Aphids in Wheat

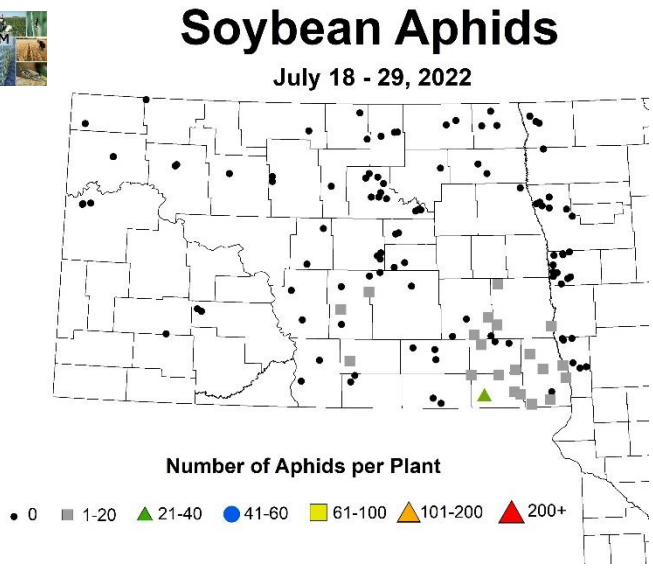
July 18 - 29, 2022



Soybean aphids also were sporadic with infestation detected in 17% of the 72 soybean fields scouted by the IPM Crop Scouts. Incidence of plants infested by soybean aphids ranged from 5% to 95% and the average number of aphids per plant ranged from 1-33 aphids per plant. No fields were above the economic threshold yet. Most positive soybean fields were present in southeastern and central areas of ND. Soybean crop stages ranged from R1 (beginning bloom) to R4 (full pod).

If soybean aphids reach economic threshold levels of 250 aphids per plant on 80% of the plants, avoid using pyrethroid insecticides, Group 3A, in areas where pyrethroid-resistant soybean aphids occur including *Cavalier, Pembina, Walsh, Nelson, Grand Forks, Steele, Traill, Barnes and Cass Counties*.





BRACONID WASP COCOONS COMMON

There have been many questions on what these cocoons (pictured on right) are on your crops and whether it is a friend or foe? These cocoons have been observed on wheat/barley awns and on soybean leaves.

Braconid wasp cocoons on head (Jason Crop Consulting)

Braconid wasp cocoons on head (Ryan Buetow, DREC)

They are cocoons of a parasitic wasp and a 'good' beneficial insect in the family Braconidae. These tiny parasitic wasps (or parasitoids) lay multiple eggs on the body of caterpillars, such as armyworms or loopers. Eggs hatch into tiny larvae, and they eat the insides of the caterpillar, thus killing it. Parasitism by the braconid wasps often causes the caterpillar to crawl to the tip of the plant. Mature larvae of the wasp emerge in large numbers from the dead caterpillar and then spin these cocoons outside the caterpillar body on plant parts like awns of cereal crops. A braconid wasp will eventually emerge from each cocoon and search out more caterpillars to attack and kill.

Janet J. Knodel, Extension Entomologist

plant pathology

MANAGING CERCOSPORA LEAF SPOT OF SUGARBEET IN 2022

How is the sugarbeet crop progressing?

The sugarbeet crop is making good progress considering its late planting and unfavorable warm and windy conditions at early crop growth that led to some replanting in late June into July. Overall, plant population is lower than our target of 175 to 200 plants per 100 feet of row. However, effective pest control and a favorable growing environment – that is, 75 to 85F day temperature and a good weekly rainfall – should result in a fair to good crop yield.

What is the major pest growers should be managing at this time?

The most important pathogen to manage at this time is *Cercospora beticola* that causes Cercospora leaf spot. The fungal pathogen requires day temperature of 77 to 90° F and the presence of moisture on the leaves for eight or more hours to cause infection. Typically, the microclimate required for *C. beticola* infection occurs after the rows are closed. In our current research trials where we use artificial inoculation, we observed first symptoms, but only on a conventional susceptible variety **(Figure 1**), on July 29, which is later than most years.

Are there some varieties that have not shown symptoms of Cercospora Leaf Spot?

Correct. In 2021, CR+ varieties that are more tolerant/resistant to Cercospora became available for commercial use. Currently, about 45 to 50% of Southern

Figure 1. Cercospora leaf spot lesions were observed on a susceptible variety in an inoculated field trial near Foxhome, MN.

Figure 2. CR+ variety in inoculated trial was free of Cercospora leaf spots on August 1.

Minnesota Beet Sugar Cooperative's acres have CR+ varieties; Minn-Dak Farmers Cooperative producers planted about 90 to 95% of their acreage to CR+; and there is about 15% of American Crystal Sugar Company acreage with a CR+ variety. In inoculated research trials near Foxhome in Minnesota and at Prosper in North Dakota, we have not yet, as of August 1, observed Cercospora leaf spot symptoms on the CR+ varieties **(Figure 2).**

What can you tell us about CR+ varieties?

Breeders and researchers at the KWS SAAT SE seed company, with headquarters in Germany, developed CR+ varieties. In very simplistic terms, German and American breeders and researchers incorporated a dominant resistant gene into commercial sugarbeet varieties that provided dominant resistance to *Cercospora beticola*. In the laboratory, greenhouse and field research trials, we have observed that CR+ varieties are not immune to the fungus, so they do become infected under favorable environmental conditions. However, in the laboratory, the infection process is slower than in a susceptible variety. In artificial inoculation field trials, first symptoms take much, much longer to develop in CR+ varieties.

Will you need fungicides to help manage Cercospora leaf spot in sugarbeet?

Yes. We are conducting field trials to determine the best time to apply fungicide mixtures to manage disease severity and to prevent or delay the pathogen from overcoming the host's resistance.

How should growers control Cercospora leaf spot this season?

For susceptible varieties, fungicide applications should start at initial symptom or disease onset, and subsequent applications (at 14 or more days interval) applied based on favorable daily infection value (DIV > 7) and disease severity. If fields are not scouted for disease symptoms, fungicides will be required at 10 to 14 day intervals to control the pathogen. Disease control using fungicides on susceptible varieties can be poor to ineffective during seasons with heavy and regular rainfall.

For CR+ varieties, fungicide applications should start at initial symptom or disease onset and subsequent applications based on favorable daily infection value (DIV > 7) and disease severity. If fields are not scouted for disease symptoms, fungicides may be required at 21 to 28 day intervals to control the pathogen. Research is ongoing to determine the minimum interval required for fungicide intervention for CR+ varieties. The use of CR+ varieties coupled with fungicides provided acceptable recoverable sucrose in season with heavy and regular rainfall.

The use of CR+ varieties should help to reduce the population of *C. beticola*, and over time, reduce fungicide applications by 25 to 50%.

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FUSARIUM HEAD BLIGHT (SCAB) REPORTED FROM FIELDS

Fusarium head blight has been reported in wheat and barley fields by NDSU ANR Extension agents and the NDSU IPM scouts **(Figures 1 and 2)**. Last week, the IPM scouts visited 37 wheat fields that were between milk stages to hard dough stage, and 10 barley fields that were kernel watery ripe to dough stages in development. Of these fields, the scouts recorded Fusarium head blight in six wheat fields and four barley fields. Although Fusarium head blight was recorded, severity and incidence within a field was low. As a reminder, Fusarium head blight symptoms on wheat include premature bleaching of wheat heads (sometimes a single floret to an entire head). For barley, symptoms include brown water-soaked spikelets. Symptoms are most noticeable 14-21 days after early-flowering in wheat or 14-21 days after full head in barley.

Figure 1. Hard red spring wheat with Fusarium head blight symptoms. Note premature whitening on wheat heads.

Figure 2. Two-row barley with Fusarium head blight symptoms. Note brown water-soaked appearance barley heads.

Andrew Friskop
Extension Plant Pathology, Cereal Crops

plant science

CONSIDER WINTER WHEAT THIS YEAR

There is increased interest in planting winter wheat this year and for good reason. With many prevent plant acres in the state, good soil moisture heading into the end of the growing season, severe drought in much of the Southern Plains, and higher wheat prices than we've been accustomed to the last few years, 2022 is shaping up to be favorable for

growing winter wheat. In addition to the positive market conditions, consider the other benefits of including winter wheat on your farm: living cover over the winter to hold soil in place and prevent it from blowing, competition with winter annual weeds that emerge late in the fall or early in the spring, and spreading out the work load of harvest next year.

When choosing a winter wheat variety, pay attention to winter hardiness ratings as well as yield to ensure your selection has the best possible chance of surviving a North Dakota winter. The recommended seeding dates for winter wheat are September 1-15 north of ND Highway 200 and September 15-30 in the southern half of the state. Planting too early increases the risk of wheat streak mosaic virus and may reduce winter survival.

If you are interested in trying a new public variety, consider ND Noreen, the first release from the newly re-established NDSU Hard Red Winter Wheat breeding program. Noreen has excellent winter hardiness and good straw strength. In the 2021 small plot trials, Noreen yielded 119 bushels per acre at Casselton and 27 bushels per acre at Hettinger. When grown for foundation seed production at Casselton in 2021, Noreen yielded 98 bushels per acre over 25 acres. To purchase foundation seed or for information on certified seed of Noreen, contact Brian Otteson at the Agronomy Seed Farm. Brian can be reached at 701-347-4743.

The table below presents agronomic, milling, and baking characteristics of selected hard red winter wheat varieties. Milling and baking values were evaluated from samples at 3 locations (Casselton, Dickinson, and Minot) in 2021.

	Straw	Winter	2021 Yield		Test	Protein	1000	Falling	Milling	Loaf
Variety	Strength[1]	Hardiness[2]	Casselton	Hettinger	Weight	12% mb	kwt[3]	number[4]	extraction[5]	volume[6]
			(bu/a)		(lb/bu)	(%)	(g)	(sec)	(%)	(cc)
Draper	NA	NA	122.7	29.4	61.5	14.0	27.8	423	73.2	1062
Ideal	4	4	116.6	25.5	62.1	13.8	29.6	444	72.0	1025
Jerry	5	3	115.9	28	60.6	14.3	32.5	455	75.8	987
ND Noreen	4	3	119.4	27.5	63.2	14.4	34.0	415	72.0	1048
Northern	4	5	126.7	31.6	61.4	14.0	30.9	474	75.5	1075
SD Andes	NA	NA	122.9	30.3	62.3	14.0	32.4	460	72.7	1060
SY Monument	4	3	115.1	30.4	59.7	13.6	31.2	396	73.5	928
SY Wolf	3	6	107.8	25.9	61.8	14.0	31.2	414	72.1	998
WB4309	NA	NA	119.1	32.7	60.9	13.9	29.2	433	72.5	973
WB4462	4	4	110.3	30.5	60.2	14.4	34.1	445	71.9	925
Winner	NA	NA	120.3	30.8	61.5	14.0	32.8	454	70.0	1008
Mean			117.9	29.3	61.4	14.0	31.4	437.5	72.8	1008.2

[1]Straw strength: 1 = strongest, 9 = weakest.

[2]Relative winter hardiness rating: 1 = excellent, 10 = no survival.

[3]kwt: Estimated weight of 1,000 seeds based on 10 g sample. Used to approximate seed size.

[4]Falling number: Expressed in seconds at 14% moisture basis. Low falling number indicates sprout damage.

[5]Milling extraction: Percent of milled flour recovered from cleaned and tempered wheat. A high percentage is desirable.

[6]Loaf volume: Volume of a pup loaf of bread expressed in cubic centimeters. A high volume is desirable.

Clair Keene
Extension Agronomist Small Grains and Corn

NDSU BREEDING PROGRAMS USING UNMANNED AERIAL VEHICLE (UAV) AND ROBOTS

NDSU crop breeding programs are of critical importance as they focus on developing improved varieties specifically adapted for our growing region. A released variety combines many of the desirable traits of economic importance for a specific crop. However, plant breeding is a multi-year long-term effort requiring multiple steps including hundreds of crosses annually, evaluations at multiple locations, and selection of superior genetic material. This breeding pipeline is a cumbersome and tedious effort to find a breeding line with all desired traits. Nonetheless, the contributions of plant breeding to crop productivity are widely demonstrated.

Figure 1. Research assistant utilizing a UAV with sensors to observe the soybean canopy.

Plant breeders are constantly looking for methods and tools to improve selection efficiency (cost, time, effort, etc.). Integrating methods/tools as basic genetics, genomics, agronomy, physiology, and pathology/entomology, among others, have improved the selection process. Marker Assisted Selection (MAS), high throughput genotyping, and evolving genomic tools allow breeders to track some specific genes of economic importance within the breeding pipeline. The current bottleneck for efficient selection in a breeding program is the need to manually measure all these traits of interest in thousands of lines (and across multiple locations). This is technically known as phenotyping. One major area of effort known as high throughput phenotyping involves improving the capacity to measure phenotype traits in a high throughput manner (many samples in a short time), with the goal of improving the accuracy and efficiency of trait measurements.

Thanks to a Precision Agriculture grant from within the North Dakota Agricultural Experiment Station, a multidisciplinary group of NDSU personnel (breeders, Agricultural and Biosystems Engineering faculty, postdocs, and students) are working on the potential application of precision agriculture tools into their breeding programs. In dry beans for example, the goal is to use an **Unmanned Aerial Vehicle (UAV)** to regularly collect data over breeding trials for traits such as emergence, plant height, canopy closure, days to maturity, and foliar diseases, among others **(Figures 1 and 2)**. The pea breeding project is testing the utility of a UAV for assessing foliar damage in dry pea caused by Fusarium wilt under field conditions. Similar efforts are underway within the potato breeding program. The soybean program is collecting UAV obtained data of progeny row canopy closing rates as a predictor of yield.

Figure 2. Research assistant operating a robot in a soybean breeding trial.

In addition, a field robot, driving under the canopy of the crop, is used to measure traits that are difficult to detect with UAVs (e.g. pod-related traits, such as pod count per plant and stem thickness).

Another use for robots is to measure the "under-canopy" temperature in potatoes, which may be correlated with disease incidence.

Robot and UAV data are used to generate preliminary correlations with the data manually recorded in those same trials. Data from multiple locations and years are needed to develop robust prediction algorithms.

Project objectives:

a. Determine if collected high throughput phenotyping data is biologically meaningful (e.g., highly heritable) and estimate correlations among data routinely collected manually within each breeding program and data collected using UAVs and the robots.
b. Test prediction algorithms for selected traits that show high levels of correlation and accuracy.
c. Assess and compare relative efficiency (e.g., time, cost, and effort) of high throughput phenotyping vs manual data measurement.

Findings of this research may also have application in other agricultural management practices in large-scale crop production, like models based on aerial observations predicting when and where to apply disease management and yield estimates during the season.

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Extension Agronomist Broadleaf Crops

Paulo Flores
Assistant Professor, Agricultural & Biosystems Eng.

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Graduate Research Assistant

Juan Osorno
Dry Bean Breeder

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AROUND THE STATE

NORTH CENTRAL ND

Warmer weather has dominated the scene for much of north central North Dakota with some hit and miss showers and thunderstorms over the last week. At the NCREC, 0.87" of rain was observed since last Monday (July 25th). The following are precipitation observations across the area as noted by local NDAWN stations from July 25th through August 1st: Bottineau: 0.01"; Garrison: 1.09"; Karlsruhe: 0.58"; Mohall: 0.05"; Plaza: 0.13"; and Rugby: 0.41". Bare soil temperatures of 72°F were observed on the morning of August 1st.

Calls into the NCREC Crop Protection office are beginning to diminish. Really, two topics continue to be of concern:

(1) The continuous movement of grasshoppers this past growing season has kept growers scouting regularly. That scouting protocol is proving important this growing season to area growers.

(2) The use of fungicide on area small grains that are in the early flowering stage. Many growers are electing to take that step to prevent scab in area small grain fields. Personally, I have not received many calls indicating they have found scab at their respective sites. However, I have come across a location or two in fields between Minot and Rugby where some minor instances of scab are being observed.

Crops **(Figure 1)** are still being observed in a wide range of growth stages. Spring wheat fields planted early April (before the blizzard) are expected to be harvested in a couple of weeks. Winter wheat is expected to be harvested later this week in our REC in Minot. We received some calls last week about hail damaged crops North of Minot, around Mohall in Renville County. Some crops were completely destroyed by hail **(Figure 2).**

Figure 1. From top Left, clockwise: Sunflowers in two different stages; canola, spring wheat; corn.

Figure 2. Spring wheat (top photos) and soybeans (bottom photos) damaged by hail in Renville county. (Photo credit: BETHANY GATES, NDSU Extension Agent, Renville County).

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

Crops are doing well overall in the NE region, except for in Griggs County, which is dry. It is projected that around 3% of the land in Griggs County will produce little to nothing because of drought conditions.

Small grains are ranging from heading to turning color. Fungicide sprayings for scab are still occurring as the crop stages are widely variable in terms of development, depending on the date of planting.

Occurrence of ergot is reported in barley trials at the Langdon Research Extension Center **(Figure 1)**. Bacterial leaf streak **(Figure 2)** and black chaff (**Figure 3)** symptoms are becoming prominent on wheat and barley in some areas. Also, high levels of Septoria leaf blotch in spring wheat varietal trials have been reported from Pembina County.

Soybeans are heading to pod development stages. Not many foliar diseases were noted in soybeans, except for reports of bacterial spots in some fields.

Most of the canola is flowering, and some fields are at pod development stages. Fungicide sprayings for white mold are occurring.

Field peas range from flowering to pod and seed development stages.

Sunflowers are reaching R3-R4 stages and flax is flowering.

Grasshoppers are still a concern in certain areas where they are chewing up heads and pods. Soybean aphid

Figure 1: Ergot infected barley spikes with "honey dew" (left) and ergot sclerotia protruding from the spike (right). (Venkat Chapara, Plant Pathologist, LREC)

Figure 2: Bacterial Leaf Streak in spring wheat in Grand Forks County (Katelyn Landeis, ANR Extension Agent, Grand Forks County)

and cereal aphid numbers continue to rise, but the majority of the fields have aphid numbers that are well below threshold levels.

Figure 3: Black Chaff symptoms on wheat head glumes and awns. Photos: Nancy Feil, NE IPM Scout

Anitha Chirumamilla
Extension Cropping Systems Specialist
Langdon Research Extension Center

NORTHWEST ND

In the past week precipitation has been sporadic in the northwest ND. Most areas in the northwest counties received little rainfall and moisture is much needed. Rain events mostly happened over the weekend through Monday. From July 26th to August 1st NDAWN stations recorded total rainfalls of 0.56 – 0.79" in Burke County, 0.07 – 0.63" in Divide County, 0 – 0.13" in McKenzie County, 0.26 – 0.58" in Mountrail County, and 0 – 0.28" in Williams County.

Crop stages: Most winter wheat fields are awaiting harvest. Most field peas are mature, and harvesting has started in a few areas. Canola crops are at the 4.4 to 5.1 stage and most of the spring small grains are at complete head emergence to beginning of flowering. Corn fields are at VT to R1, sunflowers mostly at the R2 to R3 stages, soybeans are in V8 to R4 stages, lentils are at R2 to R5. Flax fields are at late flower to green capsules formed, sugar beets are at 18- to 21-leaf, and safflowers are at flowering.

As I drove on county roads across the five northwest counties, I've noticed a lot of root rot damage in lentils. Scott Roseth, our IPM scout based at the Williston REC also had something to say about other crop diseases this year in the northwest counties, "During this growing season, I've noticed a greater number of diseases than in the past season. With the wheat crop I've seen an increased number of fields with Tan Spot and Bacteria Leaf Streak. Also, with harvest right around the corner, I'm starting to see Scab in the wheat and durum fields.", Scott said.

Kochia, Russian thistle, wild sunflower, and field bindweed are the most noticeable weeds in crop fields, along field edges, and on roadsides. Kochia dominates the most, by a long shot. Early scouting in and around the field can help us locate smaller weeds and be more effective with our control measures as compared to when weeds are larger. Control methods (i.e. chemical spraying, mowing down, etc.) for weeds as large as those shown below **(Figure 1),** may not be effective at this point, but if they are left to set seeds, these seeds can replenish the soil seed bank and will be bigger problem in the years to come. The tumble mechanism of seed dispersal and the outcrossing nature of kochia and Russian thistle make them more likely to dominate a field and possibly develop resistance to an herbicide site of action in a shorter time than may occur with some other weeds.

Figure 1. Russian thistle along field pea edge (A) and kochia in open wheat canopy and field edge (B).

Charlemagne "Charlie" Lim
Extension Weed Specialist
Williston Research Extension Center

Scott Roseth
Integrated Pest Management Scout
Williston Research Extension Center

SOUTH-CENTRAL/SOUTHEAST ND

According to NDAWN, the region's rainfall during May 1-Aug 1 ranged from 6.7 inches (Robinson; Kidder County) to 13.8 inches (McHenry; Eddy County), with the Carrington REC receiving 11 inches and Oakes irrigation research site at 10 inches. Long-term average precipitation during this 3-month period is 10.2 inches at Carrington and 10.8 inches at

Oakes. The region received 0.7 inch (Marion; Lamoure County) to 3 inches (Zeeland; McIntosh County) during July. The region's average daily water use by corn and soybean plants emerged May 31 ranged from 0.2-0.25 inch during the past week (July 26-Aug 1). Current (Aug 1) accumulated growing degree days for May 15 planted corn ranges from about -150 units (Denhoff; Sheridan County) to +150 units (Pillsbury; Barnes County) compared to the long-term average for the period.

Harvest continues with winter cereals. May-planted barley and spring wheat are fast-approaching or are at physiological maturity **(Figure 1**). The region's corn generally ranges from tassel to blister (VT-R2) stages. Soybean planted mid-May to early June are in the pod to seed development (R3-5) stages **(Figure 2)**. These stages through R6 involve the most critical period for having minimal stress in order to maintain yield potential. Timely-planted dry bean are in flowering to advanced seed development (R1-R6) stages. The region's sunflower generally are in the pre-bloom (≤R4) stages, but fields will soon be showing yellow (R5 stage).

Figure 1. Spring wheat drill strips planted May 25 at CREC.

Figure 2. Maturity group 0.3 soybean in the R5 stage (early seed development) planted May 18 at the CREC.]

Weed management activities primarily are scouting fields for weed escapes or late-emerging plants, with emphasis on pigweed species – waterhemp and Palmer amaranth. Also, herbicide options should be considered for preharvest weed control. Small grain fields generally appear to be staying relatively free of foliar disease; white mold may soon be appearing in susceptible broadleaf crop fields. Grasshoppers currently are our most common economic insect pest.

Upcoming Carrington REC crop tours:
*Corn (Fingal) - August 31, 8 a.m.
*Row Crop (CREC) - September 1.

Greg Endres
Extension Cropping Systems Specialist
NDSU Carrington Research Extension Center

SOUTHWEST ND

Some areas in the region have hit a dry spell and row crops such as sunflowers, corn, and soybeans could use more moisture. According to NDAWN, Dickinson received 5.1 inch of rain, Hettinger 2.63, Beach 3.29, Amidon 4.43, and Mott had 2.97 inches in the month of July. Many producers have been busy cutting and baling hay in the region. Winter wheat, peas, and barley are maturing and being harvested. Many sunflower fields are beginning or nearing flowering and red sunflower seed weevil presence is increasing. Grasshoppers continue to be a concern.

Continue to be on the lookout for surface soil acidity in no-till fields. If you can visibly see issue areas in fields **(Figure 1)**, find a way to form zones within your field for lime applications this fall. There are many factors that can cause stunting and stand loss, including moisture related issues, compaction, salinity, wireworms, disease, herbicide carryover, along with low pH. Be sure to dig around in these areas and get your soil tested to improve input efficiency down the road.

Figure 1. Sunflower field north of Dickinson, ND on August 2nd, 2022. Area with reduced stand tested extremely acidic in the 0-3" range. Issues with plant growth, herbicide breakdown, nutrient tie-up, and microbial activity begin to arise below pH of 5.5.

Ryan Buetow
Extension Cropping Systems Specialist
NDSU Dickinson Research Extension Center

weather

WEATHER FORECAST

The August 4 to August 10, 2022 Weather Summary and Outlook

Now that August has arrived, two-thirds of meteorological summer is behind us. The first two months of summer have been mostly dry, with a high percentage of North Dakota into northwestern Minnesota recording below average rainfall **(Figure 1).** Not shown in graphical form here, but the last two months have been warmer than average, with most NDAWN (North Dakota Agricultural Weather Network) stations being 1° to 2° above the current 30 year average for temperatures. In comparison to last year, it has been a bit wetter and a bit cooler, but by historical standards, it has been another dry and warm summer to this point.

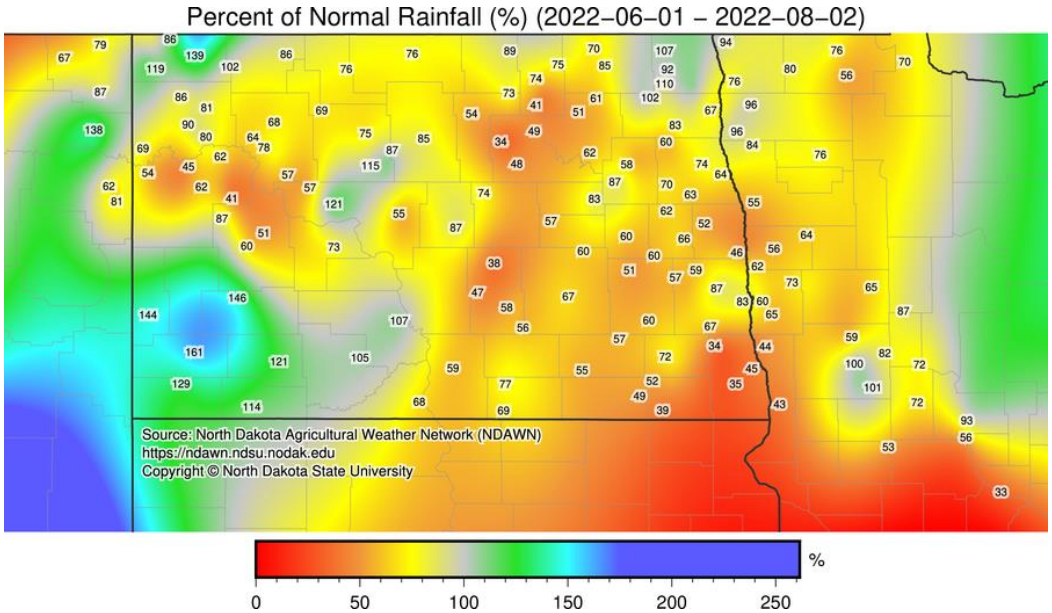

Figure 1. Percentage of Average Rainfall from June 1, 2022 through August 2, 2022 at Selected NDAWN Stations

After a cool start last week, the temperatures warmed up in most areas this weekend into earlier this week **(Figure 2**). There was surprisingly a significant amount of cloud cover on several days that did temper the high temperature potential. The reason for the cloud cover is North Dakota has been on the edge of a "bubble" of heat just to our south. Cloud cover and sometimes storms tend to move along the edges of these "heat domes". It appears we will continue to be in a similar pattern over the next week, meaning some days will be well above average and other days more seasonal. This pattern of more above than below average days looks to be continuing beyond this forecast period.

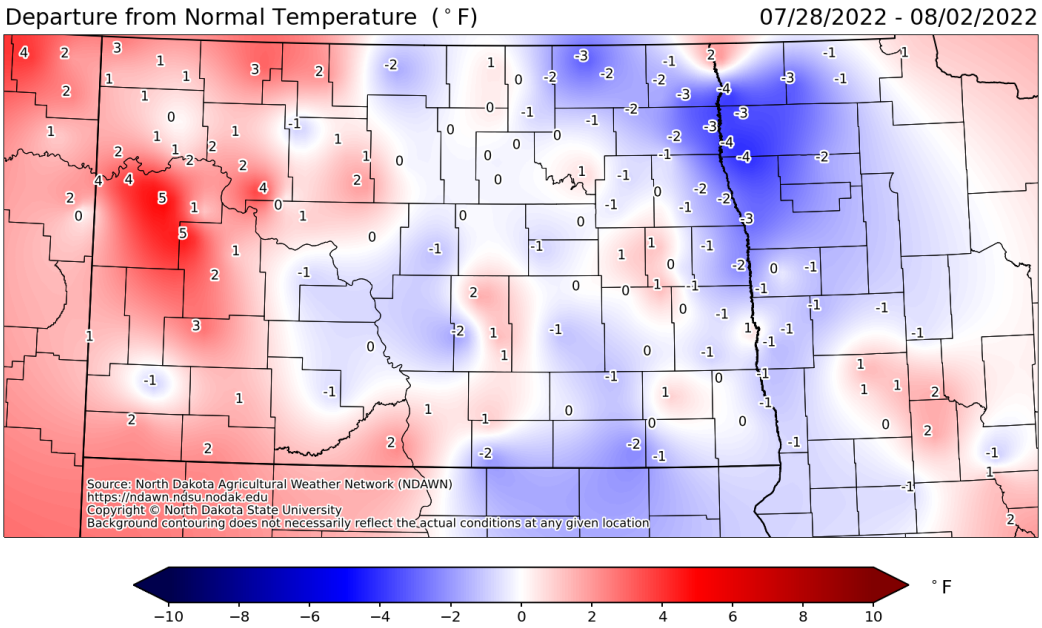

Figure 2. Departure from Normal Temperature at NDAWN Stations for the Period of July 28 through August 2, 2022

Usually, temperature transitions from warmer to cooler are associated with thunderstorms this time of year. Granted there was some stormy weather, but much of the region seemed to experience more clouds without rain than with rain in the past week **(Figure 3)**. These next 7 days will be yet another period of hit and miss storms and my suspicion is some areas will record little or no precipitation once again.

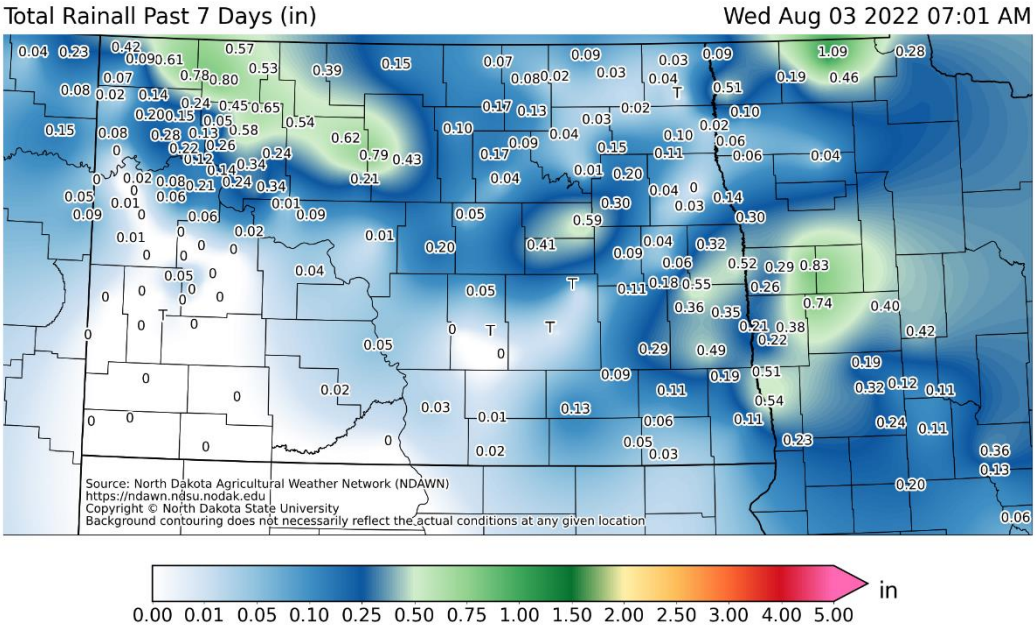

Figure 3. Total rainfall for the 168-hour period ending at 7:00 AM on August 3, 2022 at NDAWN stations

Figures 4 and 5 below are forecasted Growing Degree Days (GDDs) base 32° (wheat and small grains) and 50° (corn and soybeans) for this forecast period.

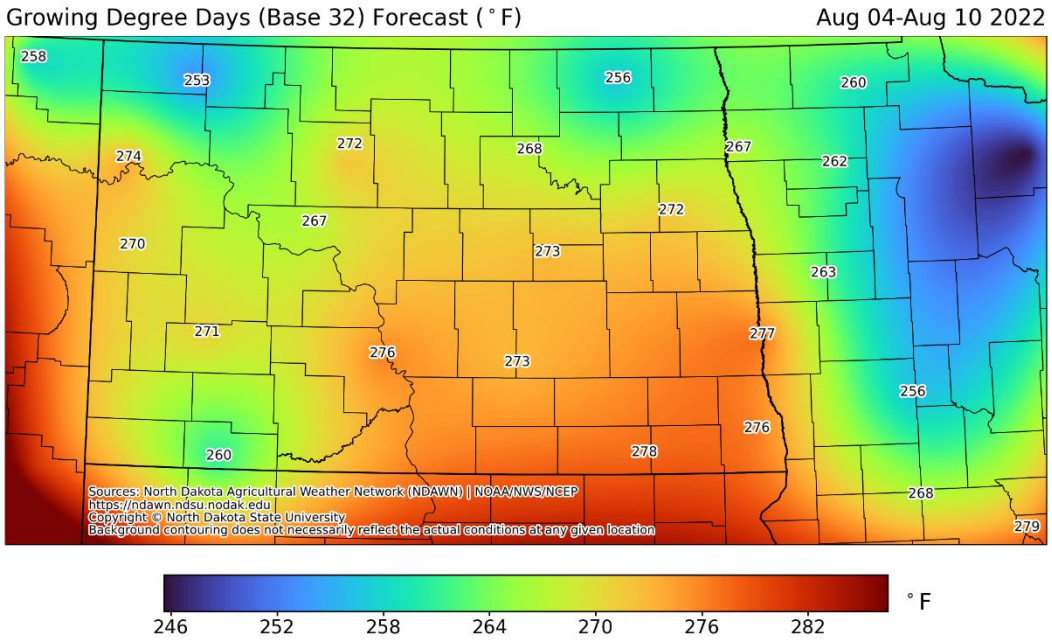

Figure 4. Estimated growing degree days base 32° for the period of August 4 to August 10, 2022.

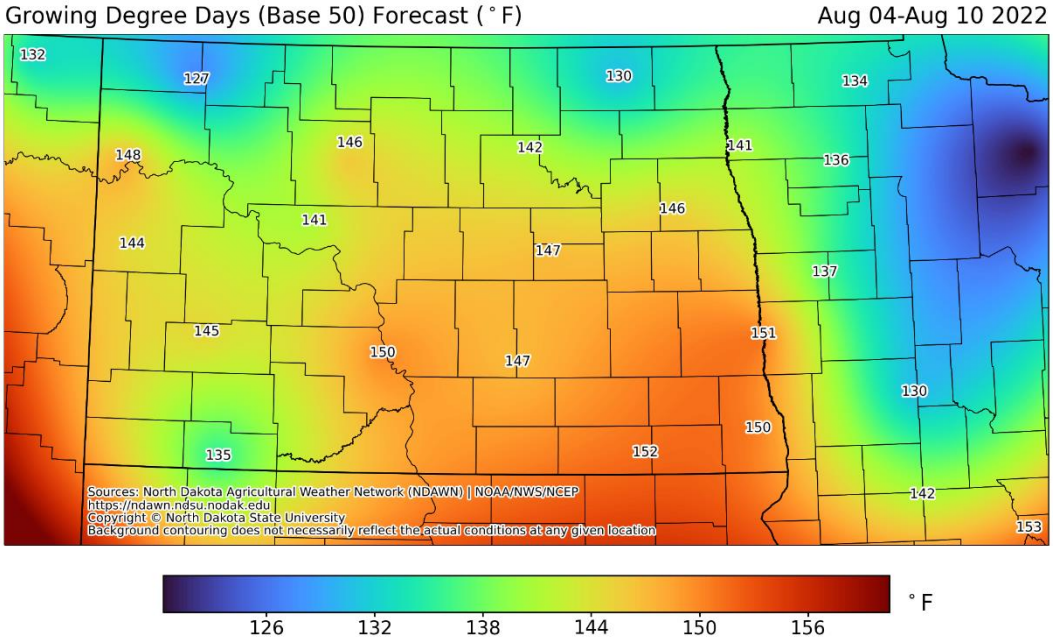

Figure 5. Estimated growing degree days base 50° for the period of August 4 to August 10, 2022.

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 on the NDAWN Website.

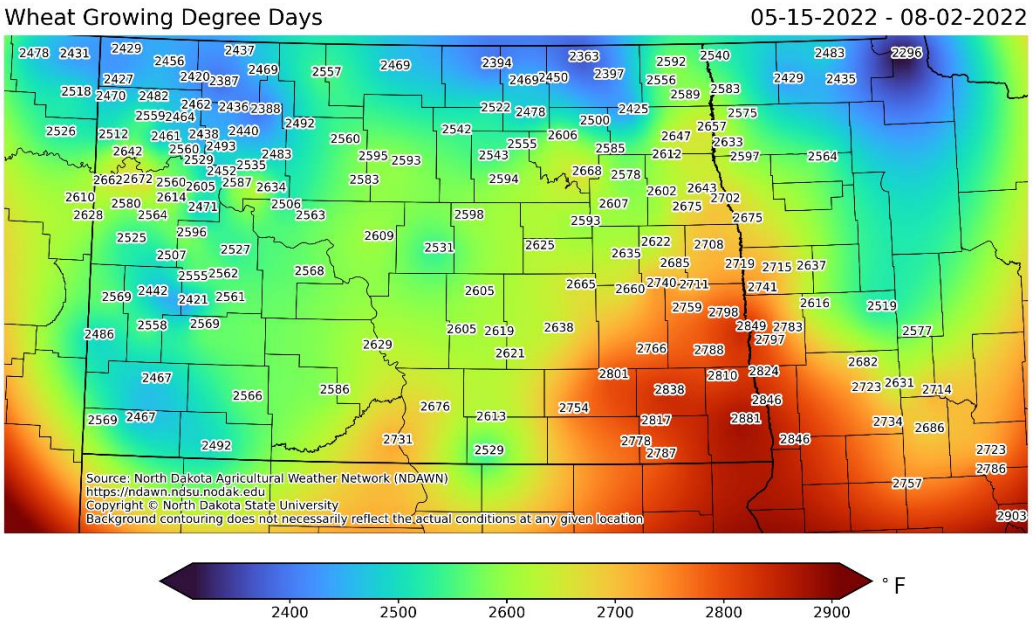

Figure 6. Wheat Growing Degree Days (Base 32°) for the period of May 15 through August 2, 2022.

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 on the NDAWN Website.

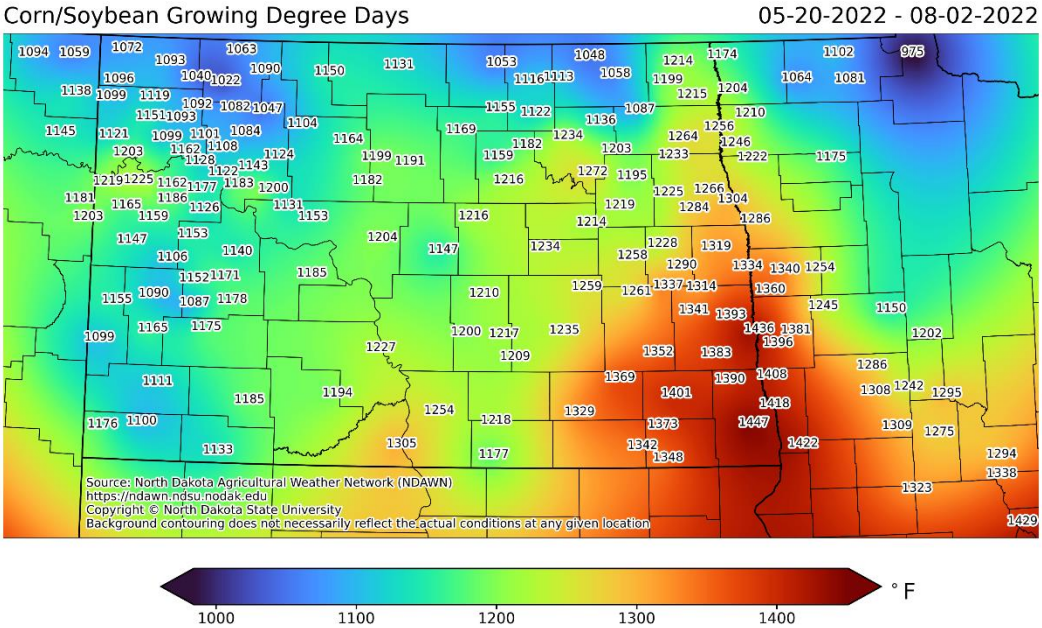

Figure 7. Corn Growing Degree Days (Base 50°) for the period of May 20 through August 2, 2022.

Soybeans also use base 50° like corn, but NDAWN has a special tool for soybeans that, based on your planting date and cultivar, can estimate maturity dates based on average temperatures, as well as give you GDDs based on the planting date(s) you set. That tool can be found on the NDAWN Website.

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