North Dakota State University
CROP & PEST REPORT
NDSU EXTENSION

No. 4 June 1, 2023

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entomology

ALFALFA WEEVIL SCOUTING UPDATE

Figure 1. Mature alfalfa weevil larvae (J. Knodel)

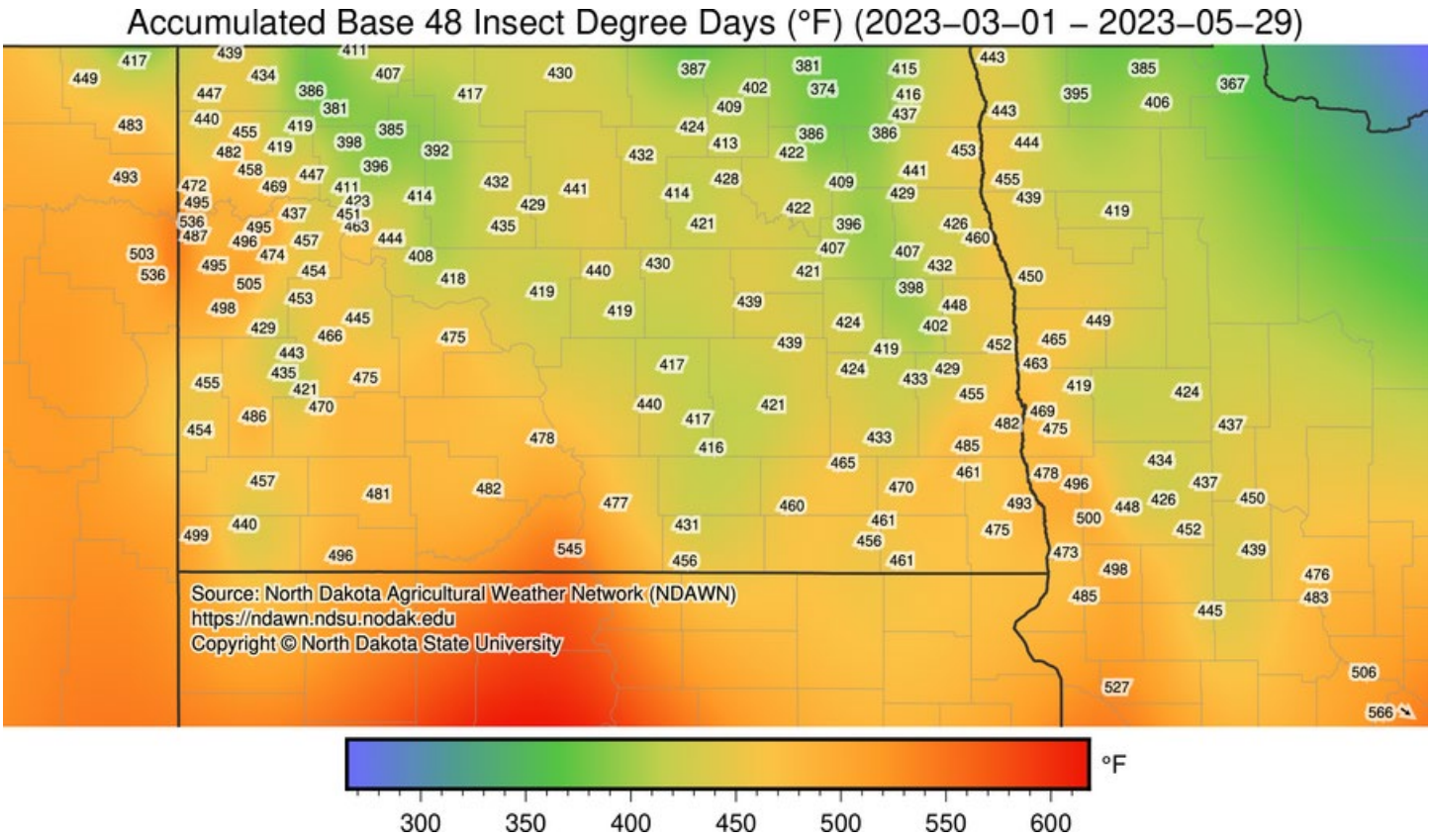
Alfalfa weevil adults and larvae (Fig. 1) can be observed in alfalfa fields. According to the degree day model for alfalfa weevil (base of 48 degrees F- (NDAWN insect degree day map - see next page, Fig. 2), North Dakota has accrued between 380 accumulated degree days (ADD) in the north and 500 ADD in the south. The ADD indicates that larvae are between the 2nd instar and the 3rd instar in development (Table 1). The 3rd and 4th instar larvae do most of the heavy feeding activity - skeletonized leaves and even crown injury. The recent heat near mid-80°F to 90°F is pushing insect development as well as alfalfa growth in areas with adequate moisture.

Table 1. Approximate degree day (DD) requirements for alfalfa weevil development using 48 F as the base developmental temperature.

Life Stage	DD Required to Complete Life Stage	Accumu-lated DD	Typical Feeding Activity
Egg hatch begins	300	300	
1st instar development	71	371	Light
2nd instar development	67	438	Light
3rd instar development	66	504	Heavy
4th instar development	91	595	Heavy
Pupation	219	814	
Adult emergence	—	>814	

For scouting, fields should be scouted in an “M” pattern with a minimum of five sampling sites per field. The **30-stems sampling method** is easy to do and accurate for estimating alfalfa weevil densities and damage to alfalfa. Select a minimum of 30 stems and cut them off at the base. Invert the cut

Figure 2. Current Alfalfa Weevil Degree-Day Accumulations (base 48°F) as of May 29, 2023 (Source: NDAWN)



stems into the 5-gallon pail and vigorously beat the plants in the pail to dislodge the larvae. At each sampling site in field, count and record 1) the number of stems sampled, 2) the total number of larvae counted and 3) the height of the alfalfa at the sampling sites. When finished, total the numbers of larvae found and divide by the total number of stems sampled to calculate an average number of larvae per stem for the entire field. Also calculate average plant height for the field. **The economic threshold is based on the average number of larvae per stem sampled in the field using the 30-stem sampling method, plant growth stage (height), insecticide cost and crop market value.** These economic thresholds apply prior to the first cutting only (Table 2, next page).

Alfalfa cutting typically occurs soon after alfalfa reaches the early bud stage. At this time, continued feeding by larvae may not be great enough to warrant the cost of insecticide application. Early cutting is recommended when alfalfa has reached 50 percent budding and alfalfa weevil larvae have reached the economic threshold.

If economic alfalfa weevil infestations are observed, early cutting (hay) is one of the best strategies for mitigating alfalfa weevil damage.

After the first cutting has been harvested, be sure to scout for larvae under the windrows. Larvae that escaped the first cutting tend to move under the windrows for shelter and will feed in these locations.

Check regrowth for larval feeding. If eight or more larvae per square foot are found or regrowth is delayed due to feeding, treatment is recommended.

Pyrethroid insecticide resistance has recently been observed in alfalfa weevils in the western states (Montana). If you observe any poor field performance using an insecticide for alfalfa weevil control in North Dakota, please report it to your local county extension office and/or NDSU Extension Entomology.

Table 2. Recommended economic thresholds for third- and fourth-instar alfalfa weevil larvae in North Dakota prior to the first cutting.

Plant Growth Stage (Height)	Treatment Cost	Crop Value ($/ton)						Management Decision
		$50	$75	$100	$125	$150	$175	
		Number of Alfalfa Weevil Larvae per Stem						
50% bud or greater								Cut early
Early bud (>20 inches)	$7/acre	4.0	2.7	2.0	1.6	1.3	1.2	Cut early, or use a short PHI/PGI product
	$8/acre	4.6	3.1	2.3	1.8	1.5	1.3	
	$9/acre	5.2	3.5	2.6	2.1	1.7	1.5	
	$10/acre	5.8	3.8	2.9	2.3	1.9	1.6	
	$11/acre	6.3	4.2	3.2	2.5	2.1	1.8	
	$12/acre	6.9	4.6	3.5	2.8	2.3	2.0	
Late vegetative (16 to 20 inches)	$7/acre	3.8	2.4	1.8	1.4	1.1	0.9	Use a short to mid-PHI/PGI product
	$8/acre	4.4	2.8	2.1	1.6	1.3	1.1	
	$9/acre	4.9	3.2	2.4	1.8	1.5	1.2	
	$10/acre	5.5	3.6	2.6	2.1	1.7	1.4	
	$11/acre	6.1	4.0	2.9	2.3	1.9	1.6	
	$12/acre	6.7	4.4	3.2	2.5	2.1	1.7	
Midvegetative (10 to 15 inches)	$7/acre	3.6	2.2	1.5	1.1	0.9	0.7	Use a long-residual product
	$8/acre	4.1	2.6	1.8	1.4	1.1	0.8	
	$9/acre	4.7	3.0	2.1	1.6	1.2	1.0	
	$10/acre	5.3	3.4	2.4	1.8	1.4	1.2	
	$11/acre	5.9	3.7	2.7	2.1	1.6	1.3	
	$12/acre	6.4	4.1	3.0	2.3	1.8	1.5	

Janet J. Knodel
Extension Entomologist

SUGARBEET ROOT MAGGOT: LATE-PLANTED FIELDS AND EARLY FLY ACTIVITY CREATE PERFECT STORM

Unseasonably high temperatures during the past several days have resulted in some early and relatively high sugarbeet root maggot (SBRM) fly activity for this stage of the growing season. The expected continuation of unseasonably warm weather is expected to further hasten development of overwintered SBRM larvae in the soil of last year's sugarbeet fields and accelerate adult fly emergence rates in the coming week. This extended warm period will likely result in SBRM fly activity peaking about one week earlier than normal throughout most of the growing area.

Figure 1. Sugarbeet root maggot fly on seedling.

Peak fly activity typically coincides with the first rain-free, warm (about 80°F), low-wind (≤ 10 mph) day at the accumulation of 650 degree-day (DD) units. Temperatures throughout the Valley are expected to easily exceed 80° through most of the next 7-10 days, so other conditions (e.g., wind, rain) will dictate when actual peaks in SBRM fly activity occur. Although those additional factors prohibit prediction of exact fly activity peak dates, DD accumulations and the extended weather forecast suggest that activity will accelerate rapidly and peak in the next few days in the southern Valley. Fly activity in the central RRV is expected to peak between June 4 and 6, and peaks in the northern Valley are anticipated to occur around June 6. However, in light of the somewhat unusually early onset to fly activity this year, it is difficult to predict how long the activity will persist. Therefore, growers and crop advisors should carefully monitor this situation for the next few weeks.

Table 1. Predicted timing of high SBRM fly activity periods and peak fly activity in the Red River Valley based on current and anticipated degree-day (DD) accumulations

Location	Total DD (as of May 30	High Fly Activity Period	Maximum Likelihood Peak Fly Date*
Fargo, ND	532	June 1-5 (+80°F, dry, and low winds)	June 3
Ada, MN	504	June 3-7 (+80°F, dry, and low winds)	June 5
Grand Forks, ND	491	June 3-8 (+80°F, dry, and low winds)	June 5
St. Thomas, ND	468	June 4-9 (+80°F, dry, and low winds)	June 6

*Maximum likelihood for peak fly activity is based on extended weather forecasts for wind speed, air temperature, and precipitation. Peak fly in current-year beets usually coincides with the first rain-free, calm/low-wind day to reach 80°F after 650 DD are accumulated.

Concerns. The early fly emergence and flight activity are somewhat alarming because many fields were planted atypically late, which will result in the plants in many fields being atypically small when SBRM larvae begin feeding. Fields that were treated with a planting-time granular insecticide will likely have a good base of protection because most of the active ingredient from those applications should be present when larval feeding injury begins. Conversely, these early infestations could be especially damaging in later-planted fields that were not treated with a planting-time insecticide. This underscores the need to be vigilant about monitoring fly activity within individual fields.

Postemergence SBRM Control. In high-risk areas for damaging SBRM infestations, or in areas where exceptionally high fly activity develops, growers should be ready to apply a postemergence insecticide for additive protection, especially if their at-plant insect management approach involved any of the following practices: 1) no at-plant insecticide; 2) a granular insecticide at a low to moderate rate; 3) a planting-time liquid insecticide; or 4) an insecticidal seed treatment.

Postemergence insecticide options for root maggot control include both granular and sprayable liquid products. Postemergence granular insecticides perform best if applied at least five days ahead of peak fly activity, but work just as

well if applied over two weeks ahead of peak fly. Sprayable liquid insecticide applications, which can either be applied by ground-based equipment or aircraft, perform best if applied 2-3 days ahead of peak fly, but subsequent flare-ups in fly activity can necessitate an additional application. Consider retreatment of a field if fly activity resumes and reaches or exceeds 0.5 flies per plant. NOTE: if choosing to apply a sprayable liquid insecticide for postemergence SBRM control, review the product label restrictions to determine if/when a second application can be made.

Fly activity is being monitored at about 100 commercial field sites throughout the RRV by NDSU and American Crystal Sugar Company personnel. Fly counts from that effort will be posted online at: https://tinyurl.com/SBRM-FlyCounts. For more information, consult the "Insect Control" section of this year's Sugarbeet Production Guide. Always remember to READ, UNDERSTAND, and FOLLOW the label of your insecticide product – it's the law.

Mark Boetel
Research & Extension Entomologist

plant pathology

SPOTS ON WHEAT LEAVES: A DISEASE OR NOT A DISEASE?

The month of May has brought both freezing and hot temperatures. Although wheat is a resilient crop, you may start noticing unusual spots on wheat leaves given the extremes in environmental conditions. Now is a good time to determine if the spots you see in wheat are caused by a pathogen or abiotic (non-living) cause.

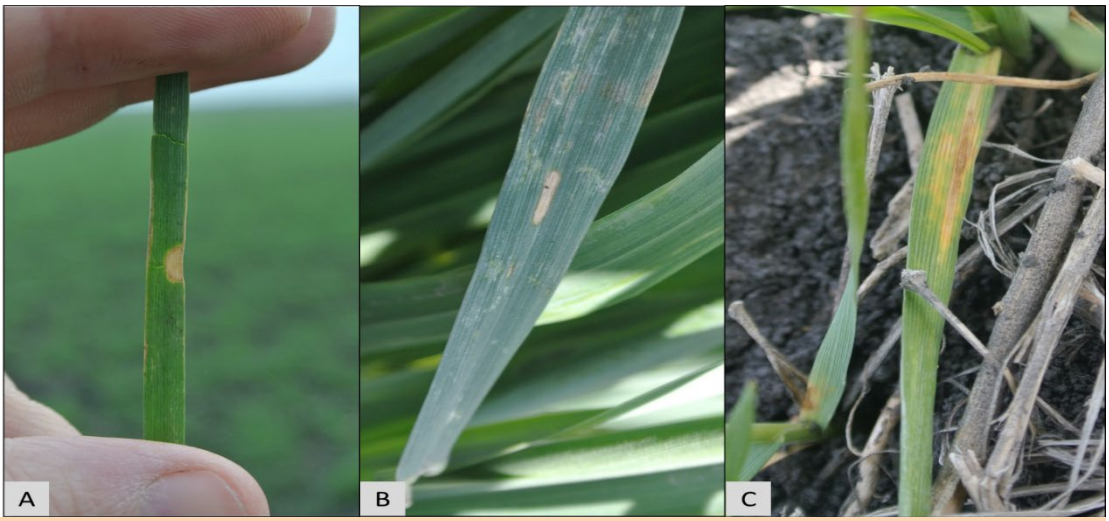


Figure 1. Three images depicting different types of abiotic leaf spots in wheat. (A) Lesion caused by heat canker where hot soil temperatures at the soil line burned leaf tissue; (B) Unknown cause of the leaf lesion, but is bleached and papery in appearance and not a leaf disease; (C) Lesion is very irregular in shape with no distinct characteristics a leaf disease.

Last week I wrote an article about assessing fungal leaf spot risk in wheat and reviewed the corners of the disease triangle (host, pathogen and environments). Those same concepts can also be used to determine if spots are not caused by pathogens. Pathologists will often use the term abiotic leaf spots to describe leaf injury best explained by non-living causes. One of the primary causes of abiotic leaf spots in wheat is environmental conditions. These type of

leaf spots can be found on single plant, in a certain area of a field (high spot or low spot), or can be found throughout an entire field. Examples of abiotic leaf spots in wheat can be found in Figure 1. Heat canker (Figure 1A) will likely be observed this year due to the recent high temperatures and windy conditions over the past week. The abiotic leaf spot in Figure 1B does not have the characteristics of a fungal leaf spot as the lesion has a bleached center with a papery texture. The abiotic leaf spot in 1C can be confused with a fungal leaf spot, but the lesions are too irregular and the field history does not fit the profile of a fungal leaf spot at this point in the growing season (ie: conventional tillage following last year's soybean).

We can also observe abiotic leaf spots on plants with fungal leaf spots such as tan spot (Figure 2). Although it can be difficult to distinguish between fungal leaf spots and abiotic leaf spots, make sure to look closely at the characteristics of the lesions (ie: shape, color and distribution) and have knowledge on the field history, environmental conditions, plant protection spray used, and level of susceptibility in the host. All of these will help narrow the field diagnosis of symptomatic plants.

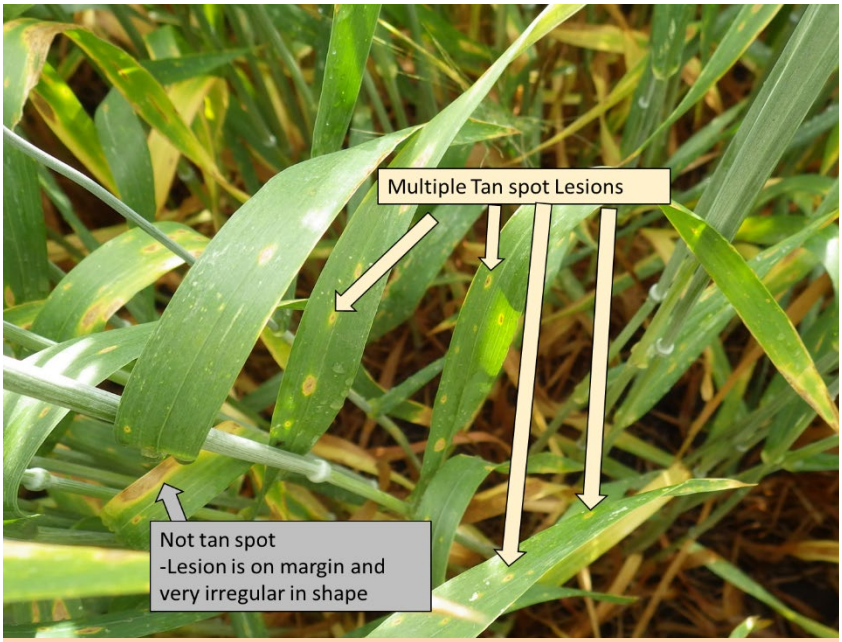


Figure 2. The lower portion of a wheat canopy at the heading growth stage. Notice the presence of multiple tan spot lesions (ellipsoid shape, with tan center and yellow halos) and a few abiotic leaf spots.

NDSU EXTENSION PEST MANAGEMENT APP – UNDERGOING MAINTENANCE

The NDSU Extension Pest Management App, which houses information for the NDSU Extension Weed Control Guide, Insect Management Guide and Plant Disease Management Guide, will not be useable for the next six months. The app is undergoing maintenance to improve design, security, and information retention. However, to help with the transition, a web-based version of the app is expected to be operational in the next four weeks and the link will be provided when available.

Andrew Friskop
Extension Plant Pathology, Cereal Crops

plant science

COUNTING SOYBEAN PLANTS

With the warm weather and warm soils, soybean plants will emerge quickly after seeding. Early during the growing season is a good time to evaluate emergence and plant population. The minimum stand for soybean in North Dakota is approximately 75,000 plants per acre, which is about 50% of the recommended stand. The minimum stand will have approximately 1.7 plants per square foot. A yield reduction of 10-20% from the anticipated yield of a timely planted soybean field is expected in a field with 50% of the normal stand. Usually, soybean stands will not be uniform throughout the field. There will be areas with higher or lower plant counts.

In solid seeded soybean, one method to estimate plant population is using a perfectly circular hula-hoop, with a known diameter. The hoop should be tossed randomly at five different locations in the field and plants should be counted within the hoop. The area of a hoop is calculated by the formula: Area = πr^2, where r is the radius (or half the diameter of the hoop) and π (pi) = 3.142. For instance, with a hoop diameter of 34 inches the area covered by the hoop is 3.142 x 17^2 = 908 square inch / 144 = 6.3 square feet. If the average number of plants in this hoop is 14, the population estimate can be calculated to be 14/6.3 (area of the hoop in square feet) x 43,560 = 96,800 plants per acre.

Soybeans can compensate for low populations by additional branching, setting more pods per plant, filling more seeds per pod and increased seed size. The plants in low population environments may have branches lower on the stem. Those branches might break before or during harvest, thus increasing the potential for greater harvest losses. In addition, some of the pods will develop lower on the plant. Extra care and efforts during harvesting can reduce this harvest issue problem.

For information about replanting or late planting crops, see NDSU Extension publication A934 at **https://www.ndsu.edu/agriculture/ag-hub/publications/replanting-or-late-planting-crops**.

Photo: Count soybean plants in the hula-hoop to estimate the plant population.

Hans Kandel
Extension Agronomist Broadleaf Crops
Soil Science Professor

weeds

PREEMERGENCE HERBICIDE CONSIDERATIONS IN 2023

April was cold, but quickly gave way to a very warm May. As planting has progressed, both crops and weeds are emerging and growing rapidly, often in the absence of a timely rainfall to incorporate preemergence herbicides. Here are a few considerations regarding preemergence herbicides this year:

Lack of incorporating ("activating") rainfall

Conventional wisdom says we ideally want 0.5 to 1 inch of rain within the first week of applying a preemergence herbicide for proper incorporation to control weeds. The goal is to receive enough precipitation for the herbicide to be present in the soil water solution, and be available for root or shoot absorption by weeds. Many folks are observing weed emergence, since there is still adequate moisture at weed seed germination depths, and thus are concerned the preemergence herbicide "did not work". The short answer is that although conditions are certainly not ideal for maximum performance from preemergence herbicides, they will still provide some benefit. This is important for weeds with a long germination window, like waterhemp, that will continue to germinate throughout the season. Many common preemergence herbicides are relatively stable on the soil surface, and will be incorporated whenever adequate rainfall arrives. However, it is also important to realize that in many cases the first flush (or first several flushes) of weeds may not be controlled by the applied herbicides that have not been incorporated. Thus, postemergence herbicides may be needed sooner rather than later in some fields as these weeds that escaped a preemergence herbicide will be growing quickly. Some herbicides will have "reach back" and can control weeds that have emerged prior to an incorporating rainfall (primarily corn herbicides like atrazine and Group 27 herbicides, though others can have reach back). Others can remain idle on the soil surface until incorporation. One question I receive annually is: what is the environmental fate of Group 15 herbicides in dry environments? I recently compiled this table using technical information from the WSSA Herbicide Handbook.

Table 1. Comparison of chemical properties of commonly used Group 15 herbicides.

Active ingredient	Trade name	Photosensitivity/UV Loss	Water Solubility	Half-life	Primary degradation
Acetochlor	Harness, etc (Not Warrant/encapsulated)	Negligible losses	223 mg/L	10-20 days	Microbial
Dimethenamid-P	Outlook	Little impact	1174 mg/L	20-38 days	Microbial
S-metolachlor	Dual Magnum, etc	Major contributor, particularly under prolonged lack of rainfall. Half-life of 8 days on soil surface	488 mg/L	30-50 days (if incorporated)	UV on surface, Microbial if incorporated
Pyroxasulfone	Zidua	Negligible losses	3.49 mg/L	16-26 days	Microbial

Crops emerging quickly

The other thing to pay attention to this year is how quickly crops are emerging. For example, soybeans we planted in weed control trials in Fargo on May 22 were emerging by May 27. Corn planted on May 22 was emerging by May 28. Once crops are out of the ground, many preemergence options are no longer available due to crop injury concerns. Most corn products can be applied preemergence through early postemergence, which allows for a wider window of application. There are a few exceptions (i.e., saflufenacil (Sharpen/Verdict)), so be sure to check your product of choice before application. In soybean, products containing flumioxazin (Valor, etc), sulfentrazone (Spartan/Authority, etc), saflufenacil (Sharpen, Verdict, Zidua PRO), or metribuzin cannot be applied once crops are emerging due to severe injury from foliar absorption. Sulfentrazone is also utilized heavily in later planted crops like dry bean and sunflower, and it is important these crops are also not emerged at application.

Joe Ikley
Extension Weed Specialist

diagnostic lab

LONE STAR TICK DETECTED IN FARGO

On May 27, a client submitted an image of an adult male lone star tick (Figure 1) found in her yard in Fargo, North Dakota. The adult female lone star tick (Figure 2) is more easily recognizable by the single white spot in the center of the back. Both sexes are about the size of American dog ticks (Figures 3 and 4), but differ in having much longer palps (mouthparts), in addition to differences in markings.

The range of the lone star tick has expanded greatly in the last 30 years. Once a problem limited to the southeastern US, its range has expanded northwards and now occurs from the New England states west to North Dakota. The North Dakota Department of Health & Human Services tracks occurrences of deer ticks, dog ticks, and lone star ticks in North Dakota. Please visit their Tick Surveillance website for more information.

Figure 1. Male lone star tick. Photo submitted to NDSU Extension.

Figure 2. Female lone star tick. Image credit: CDC, Bugwood.org

Lone star ticks are aggressive biters and can vector several tick-borne illnesses, including ehrlichiosis, Heartland and Bourbon virus diseases, southern tick-associated illness (STARI), and tularemia. Additionally, bites from lone star ticks can lead to alpha-gal syndrome (AGS), which is an allergy to red meat and products made from red meat. The allergy can be life-threatening due to anaphylaxis, though this is rare. For more information on ticks and tick-borne diseases, please visit the Centers for Disease Control and Prevention tick webpages.

Figure 3. Male American dog tick. Image credit: Susan Ellis, USDA APHIS PPQ, Bugwood.org

Figure 4. Female American dog tick. Image credit: Susan Ellis, USDA APHIS PPQ, Bugwood.org

Patrick Beauzay
NDSU Extension Entomology

NORTHEAST ND

The NE region continues to remain dry in many areas with soil moisture in the top 2-4 inches ranging between 8-15%. Scattered showers over the weekend were variable within the region as well as within counties. Most of the region did not get relief from the rain, while certain spots had too much rain triggering temporary flash floods. Small grains, field peas, sugarbeets, and corn plantings are nearly completed. Canola plantings have been delayed due to dry conditions. Dry soils combined with blowing winds lead to soil erosion creating dust clouds in many areas. Plantings might continue for another week to ten days and the focus will switch to postemergence herbicide applications. Small grain emergence and stands appear to be even across the region ranging from 2-4 leaf stage, depending on the planting date. Lack of soil moisture combined with high temperatures might hurt the yield potential of spring wheat approaching tillering stage. Early planted soybeans, corn and canola are emerging. Alfalfa stands are generally good, reaching about 19 inches tall and nearing bud stage. No alfalfa weevils have been reported. Salt precipitation is prevalent in areas of many fields. Emerged weeds such as waterhemp and lambsquarters are growing fast with the heat.

Barley field trials at the Langdon Research Extension Center
Photo: Anitha Chirumamilla

Emerging canola seedlings
Photo: Anitha Chirumamilla

Lambsquarters seedling
Photo: Anitha Chirumamilla

Dust clouds on Hwy 5 in Cavalier County due to blowing winds

Anitha Chirumamilla
Extension Cropping Systems Specialist
Langdon Research Extension Center

NORTHWEST ND


Barnyard grass (flat stem and no ligule) producing one tiller in a lentil field with wheat stubble.


Redroot pigweed and pigeon grasses in between rows of spring wheat with 2-3 tillers.


Cheatgrass aka downy brome already heading. Herbicide application at this stage will not completely prevent seed production. Fall followed by spring herbicide treatments are the most effective control strategy for this winter annual weed.

Due to rain showers and thunderstorms last week, the northwestern counties were fortunate to receive rain. As per NDAWN weather data, total rainfall in the past seven days (May 24 to May 30) ranged from 0.02 inches in Portal in Burke County to 2.54 inches in the Banks in McKenzie County. Most of the rain fell over the weekend, which came at the right time, after most of the farm operations, such as planting, fertilizer application, weed burndown, and putting down preemergence herbicides were done. Rain events were scattered, and the majority were more localized to the central western part of the state. Parts of Williams and McKenzie Counties received more precipitation compared to the other areas in the northwest region.

Most of the fields in the northwest have been planted. Crops such as peas, chickpeas and lentils, are growing well. Although many areas have crops emerged, thanks to rain events in the past two weeks, most of the acres have yet to see crops emerge. Corn has emerged in irrigated acres. Small grain crops that are up are anywhere from one leaf to 2-3 tillers. I see that some farmers have started postemergence herbicide applications in early planted small grains. Just as the crop plants are happy about the rain, so are the weeds. Rain coupled with warming temperatures have favored yellow and green foxtail emergence in high numbers. I also have seen a lot of barnyard grass come up after each rain event. Cheatgrass or downy brome have produced seed heads, and redroot pigweed is common now as day and nighttime temperatures increased. Yesterday (May 30), the temperature in Williston reached 84°F at around 5 pm.

Charlemagne “Charlie” Lim
Extension Cropping Systems Specialist
NDSU Williston Research Extension Center

SOUTH-CENTRAL/SOUTHEAST ND

According to NDAWN, rain received in this region during May 1-29 ranges from 1.5 inches (Finley) to 4.8 inches (Jamestown and Steele), with the Carrington Research Extension Center (CREC) receiving 3.8 inches. Though generally adequate soil moisture is present in the region, topsoil moisture is marginal in areas among several eastern and southern counties.

V3 stage corn planted May 12 (picture taken May 30). Note development of nodal root system (above knife blade).

At the CREC, alfalfa has reached 30 inches in height and is in the bud stage. Winter wheat is at the 2-joint growth stage. Early-May planted barley and spring wheat are in the 4- to 5-leaf stages. Currently, NDAWN is accurately predicting cereal crop growth stages using growing degree day (gdd) units – 143 and 82 gdd units are required for adding a leaf with spring wheat and corn, respectively.

Mid-May planted corn is in the V3 (3 leaf) stage. Leaves and ear shoots that the plant will eventually produce are being formed at this time. The first set (whorl) of nodal (primary) roots began elongation during V1 and additional sets develop at above nodes on the stem. The nodal root system becomes the major supplier of water and nutrients to the plant by V6.

Estimated row crop planting progress in the region: corn is nearing completion, soybean approximately 50%, and dry bean and sunflower about 25%.

Greg Endres
Extension Cropping Systems Specialist
NDSU Carrington Research Extension Center

weather

WEATHER FORECAST
The Week in Review

Average daily air temperatures were much above normal statewide during the past week (Figure 1), especially in eastern ND and western MN. A persistent high-pressure ridge to our east, coupled with low humidity, contributed to higher temperatures and strong south winds which resulted in an increased fire risk in this area over the Memorial Day weekend. Daily high temperatures were generally in the low to mid 80s west and mid to upper 80s east, with a few 90+ temperatures along the Red River. Rainfall for the past week (Figure 2) was heaviest in western ND and isolated areas in north-central and south-central ND, and there were reports of 1" to 1.25" diameter hail from Golden Valley County north through Williams County on May 25.

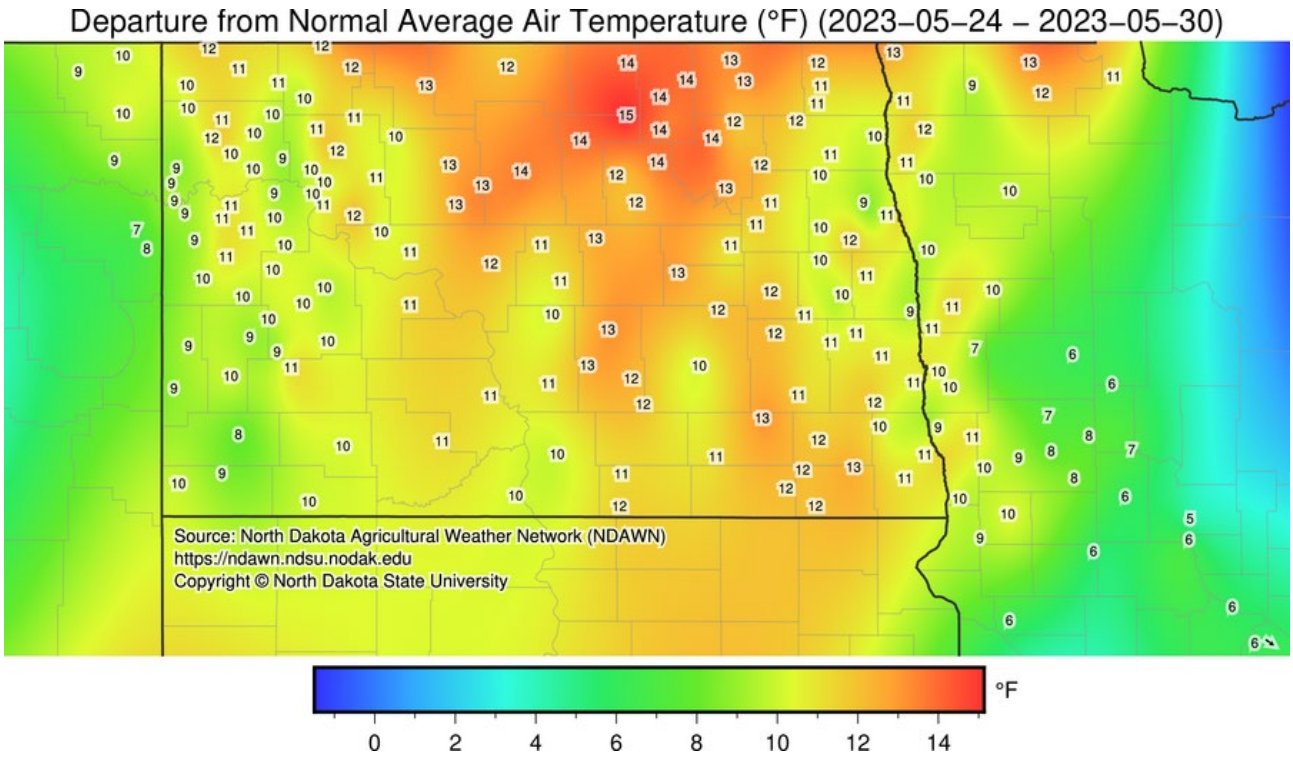


Figure 1. Average daily air temperature from May 24 through May 30 at NDAWN stations.

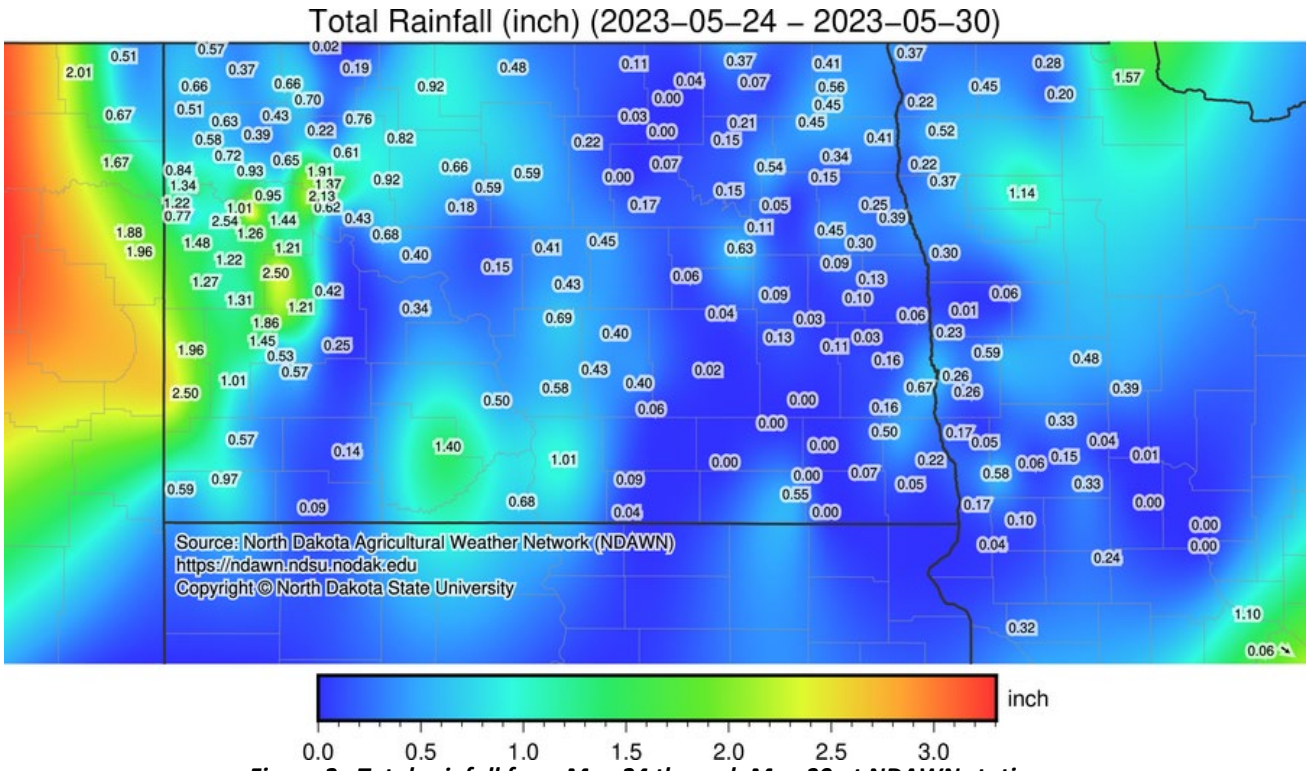


Figure 2. Total rainfall from May 24 through May 30 at NDAWN stations.

Soil moisture at the 4-inch and 8-inch depths (Figures 3 and 4) show mostly optimum to deficit conditions at reporting NDAWN stations. Keep in mind that these readings are at NDAWN station sites and may not reflect soil moisture at your specific locations. As our crops grow and take up soil moisture, we will need to keep a close eye on soil moisture as conditions can change rapidly. Due to the lack of rainfall in northeastern ND, the counties of Pembina, Cavalier, Towner, and the northern portions of Ramsey and Walsh Counties are now in D0 (abnormally dry) drought conditions. We'll see what conditions are when the new drought monitor is released late this morning. I'd like to again encourage our readers to participate in the Condition Monitoring Observer Reports (CMOR) system. Reports can be submitted using your desktop or laptop computer or through a smart device app. The website provides a training video and a factsheet on how to use the app. Reports should be submitted by noon each Monday. And I again encourage our readers to become CoCoRaHS weather observers. Public drought condition reporting is critical for drought monitors, especially during the growing season when conditions can change rapidly.

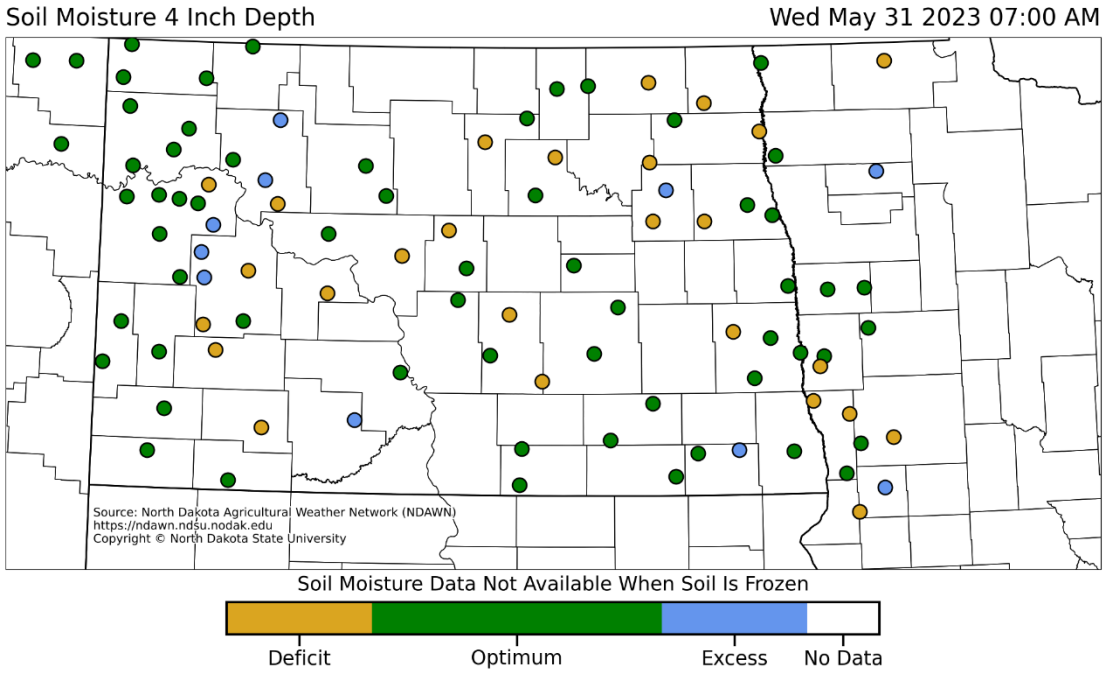


Figure 3. Soil moisture at 4-inch depth at 7:00 a.m. CDT on Wednesday May 31, 2023 at NDAWN stations.

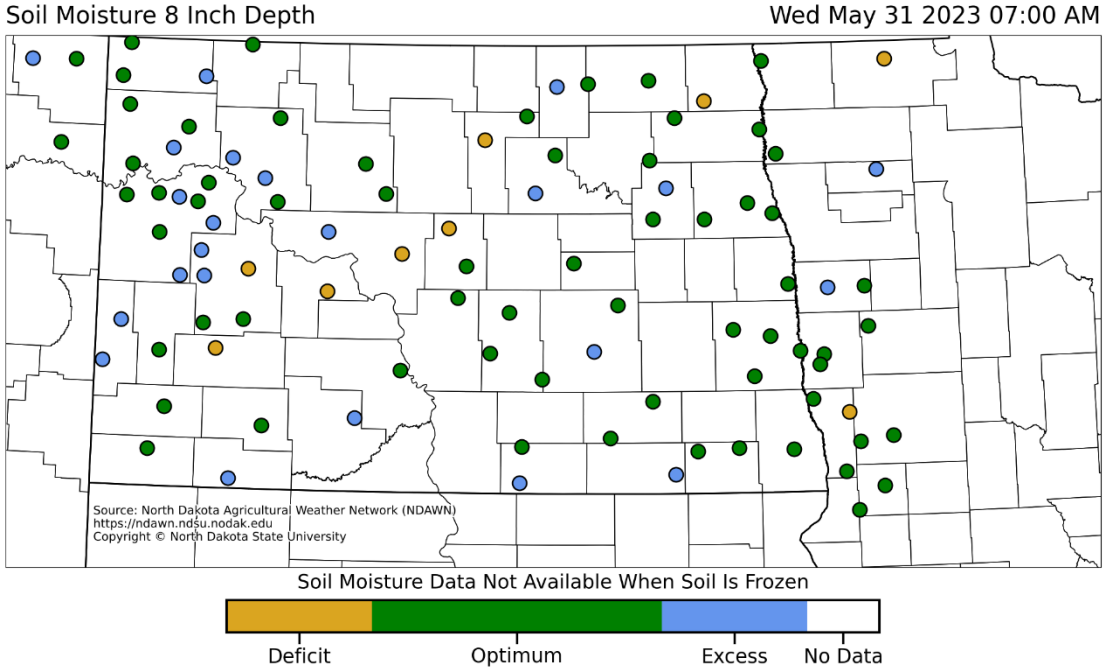


Figure 4. Soil moisture at 8-inch depth at 7:00 a.m. CDT on Wednesday May 31, 2023 at NDAWN stations.

The Month in Review

Average daily air temperatures for the month of May were above normal across the state (Figure 5). Total rainfall for May (Figure 6) shows anywhere from 2 to 6 inches received across most of the state, except in the northeast where totals were less than 1 inch. May rainfall departure from normal in inches and as percent of normal are shown in Figures 7 and 8, respectively.

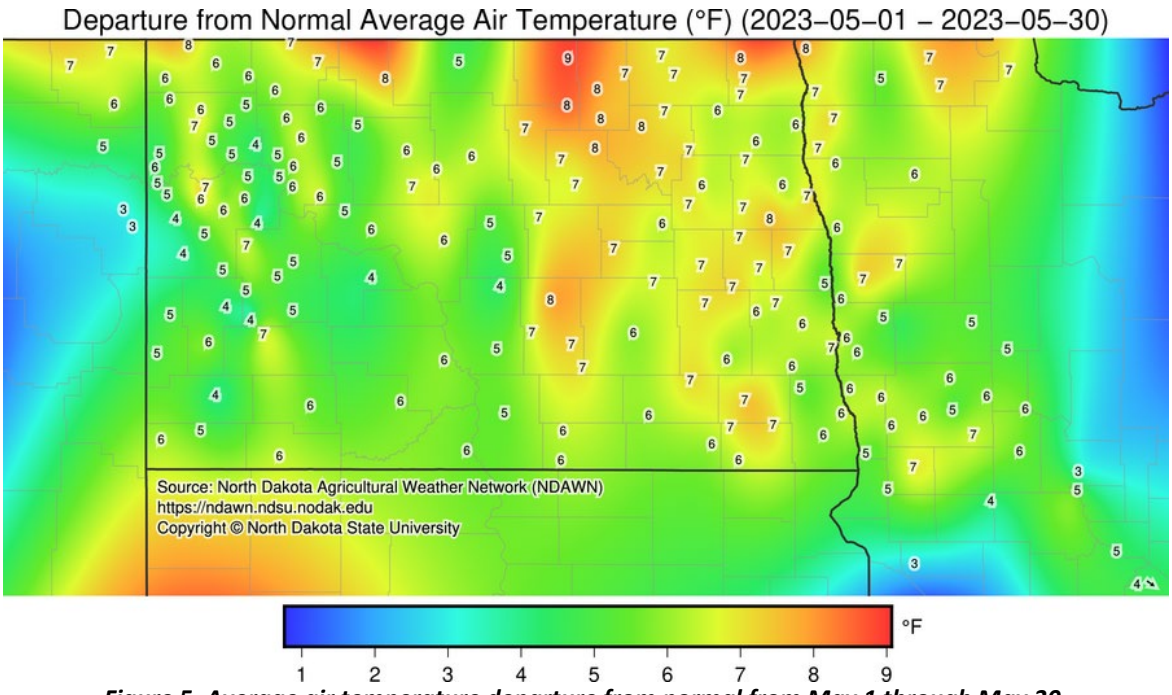


Figure 5. Average air temperature departure from normal from May 1 through May 30.

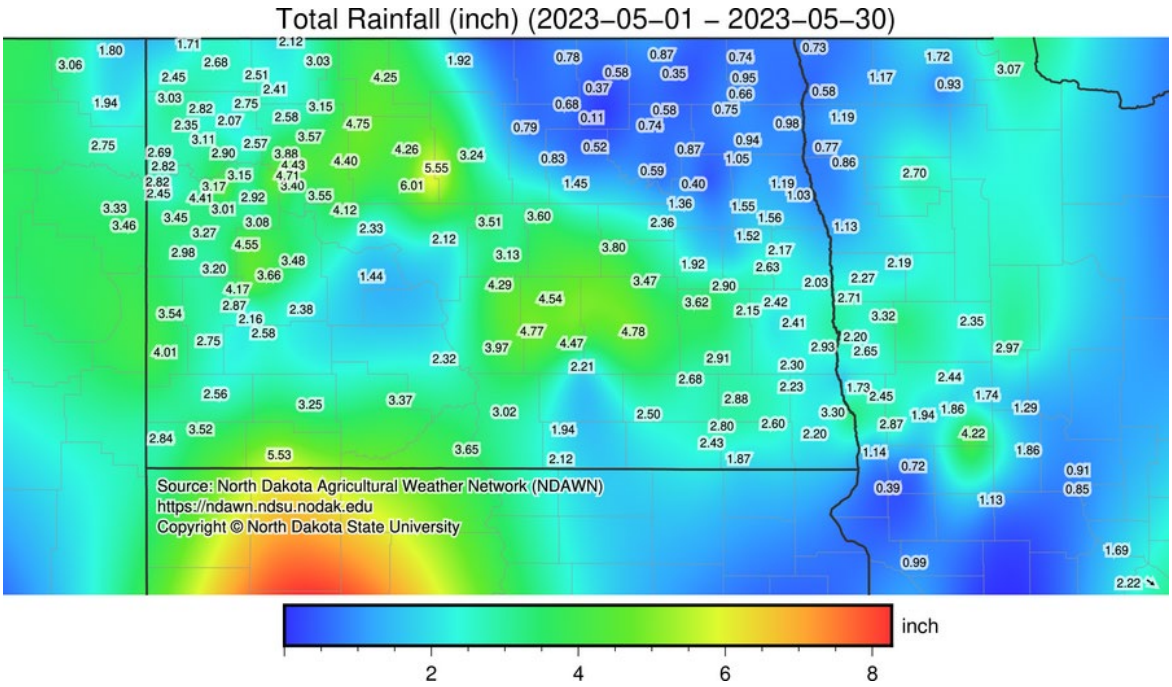


Figure 6. Total rainfall from May 1 through May 30.

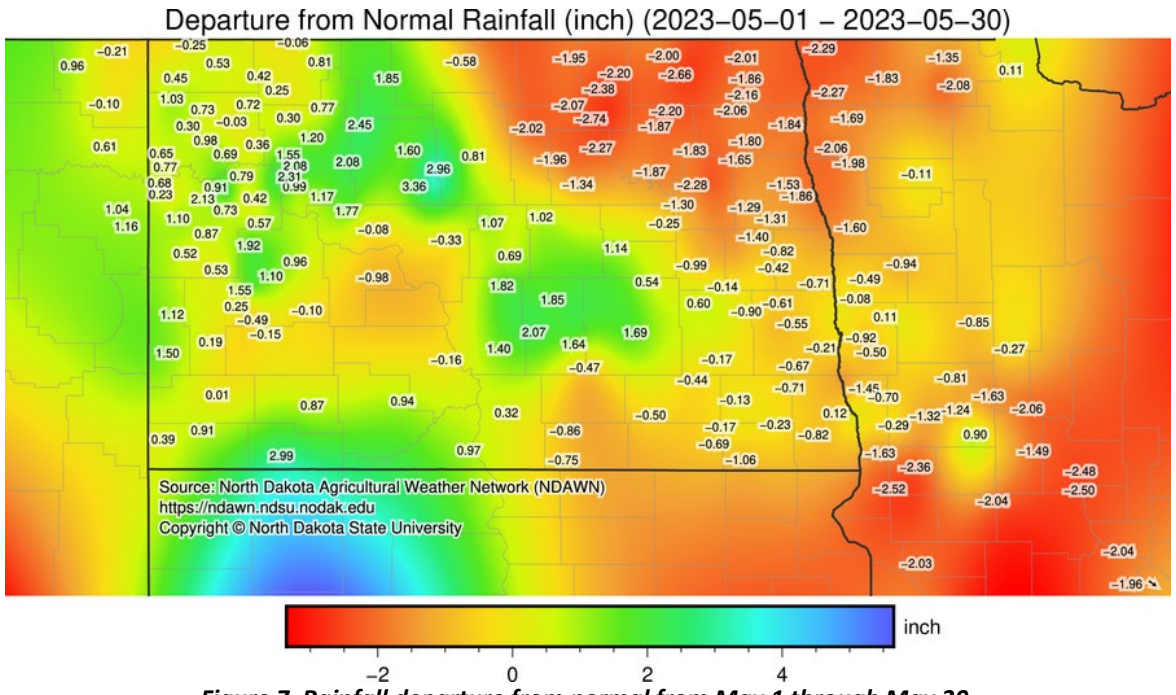


Figure 7. Rainfall departure from normal from May 1 through May 30.

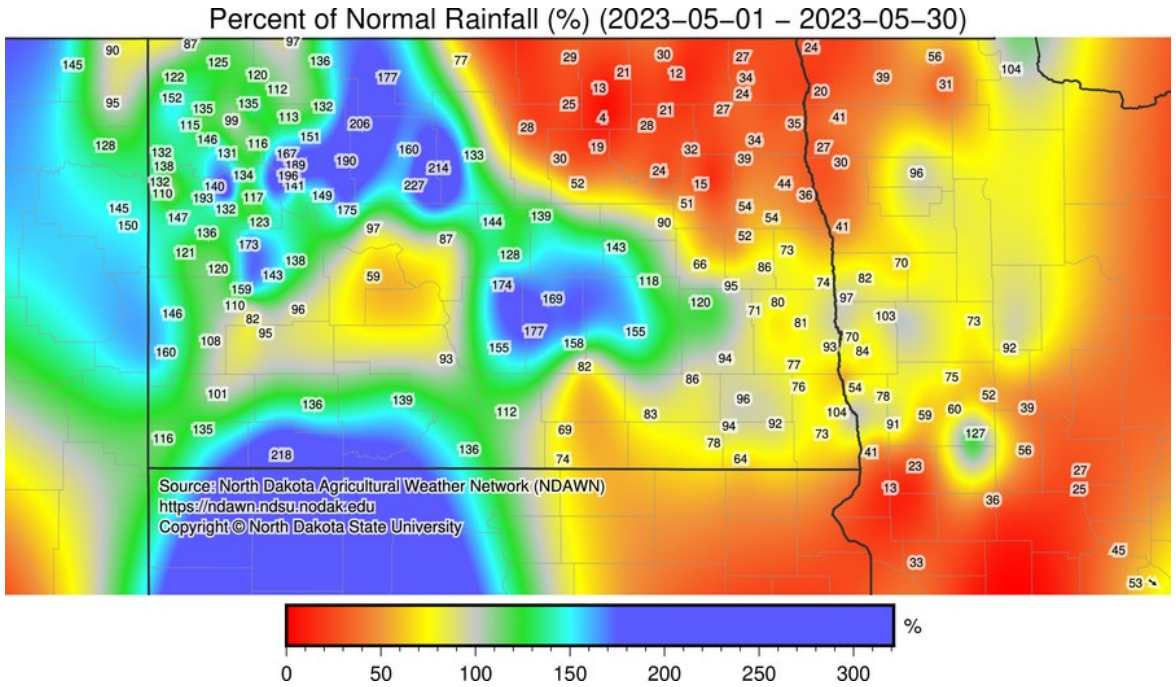


Figure 8. Percent of normal rainfall from May 1 through May 30.

Accumulated growing degree days (GDD) departures from normal for wheat using base 32°F and corn using base 50°F are shown in Figures 9 and 10. Keep in mind that we're using April 20 as the starting date for wheat and May 1 for corn. For the most accurate GDD accumulations for your crops and your locations, use the main NDAWN website. Go to 'Applications', select your crop GDD model, select the nearest NDAWN station from the station list, select any departures from normal, 5-year average, or compare with a previous year, enter your planting date, and select 'Get Table'. The resulting table will give you daily GDD and accumulated DD, plus any departures and previous year comparisons you selected.

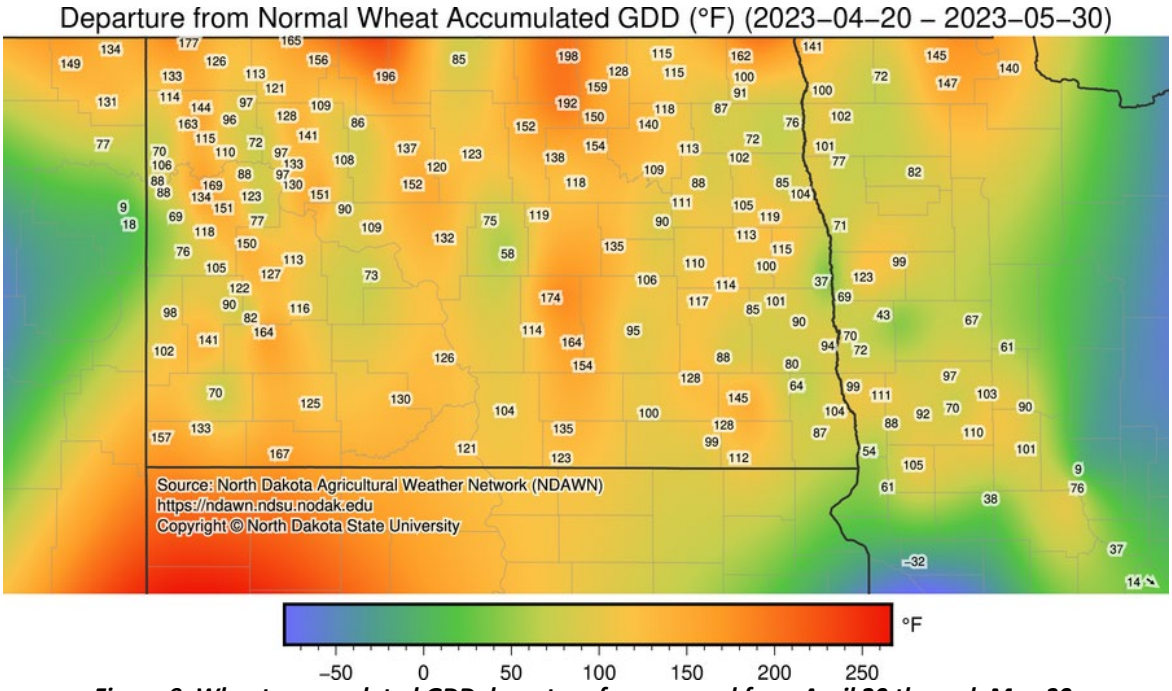


Figure 9. Wheat accumulated GDD departure from normal from April 20 through May 30.

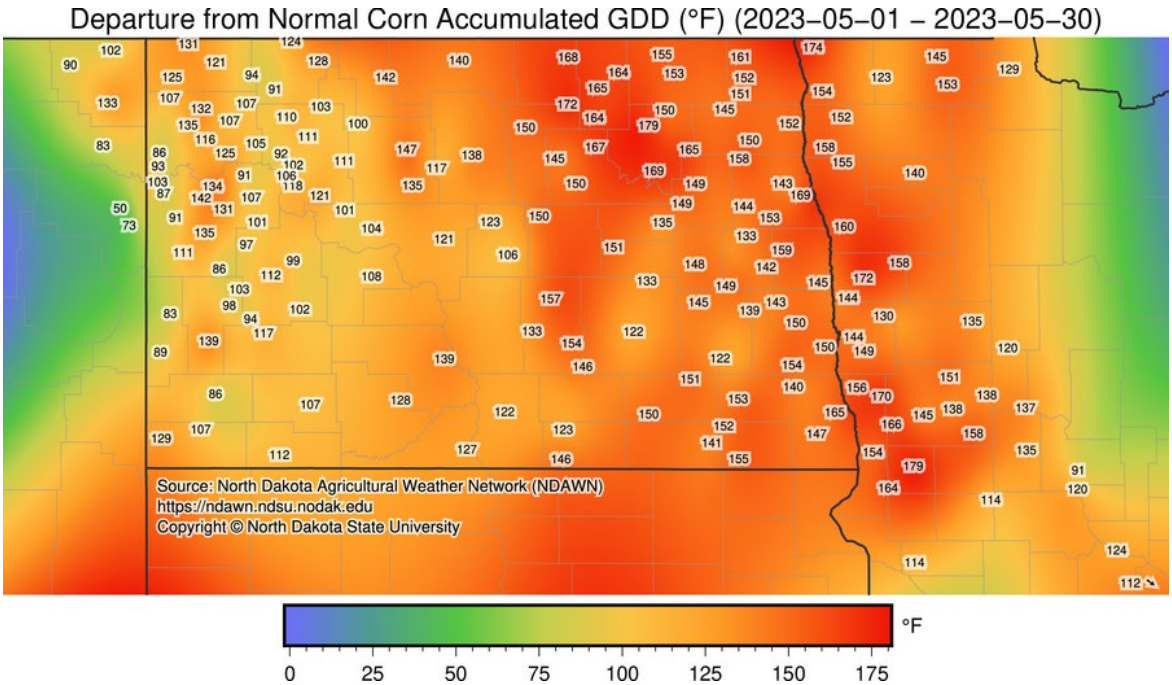


Figure 10. Corn accumulated GDD departure from normal from April 20 through May 30.

The Week Ahead

A weak mid-level trough within a continuing southwesterly flow is expected to move across our region this afternoon. The trough, coupled with daytime heating and dewpoints in the upper 50s to low 60s, will trigger afternoon and evening showers and thunderstorms. Mid- and upper-level wind shear is weak, so the threat of severe thunderstorms is low. However, isolated severe storms can't be ruled out, with small hail and gusty winds being the main threats. This pattern

will continue at least through the weekend, with precipitation chances each day. The 7-day precipitation forecast is shown in Figure 11. Temperatures will continue above normal at least into early next week, with highs in the mid to upper 80s west and possibly low 90s east. The 6-to-10-day outlooks favor above normal temperatures (Figure 12) and normal precipitation (Figure 13).

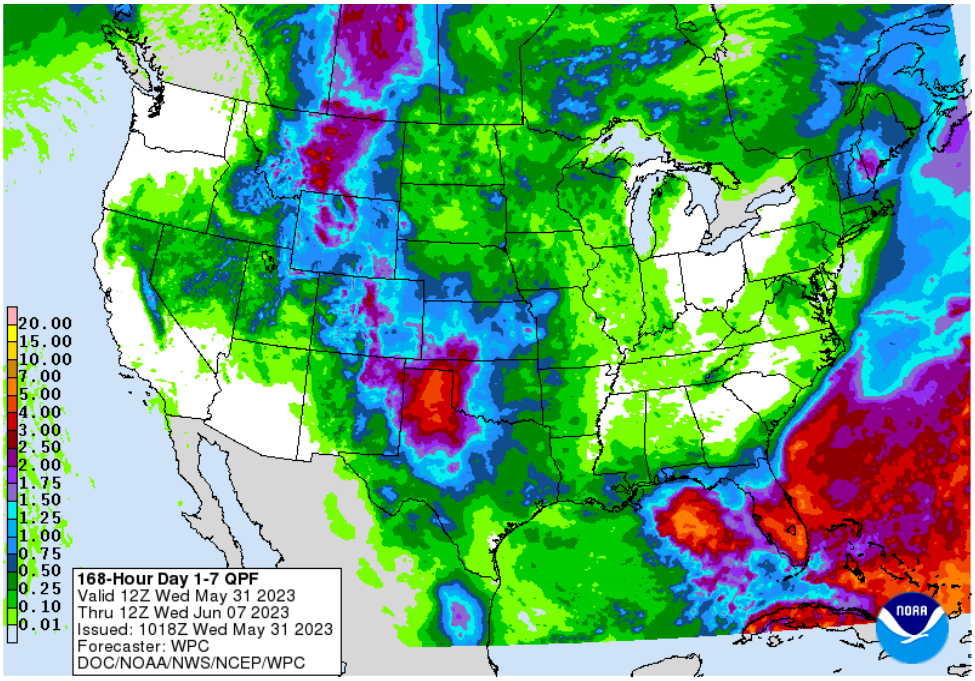


Figure 11. Precipitation potential for the continental United States from 7:00 a.m. CDT May 31 through 7:00 a.m. CDT June 7.

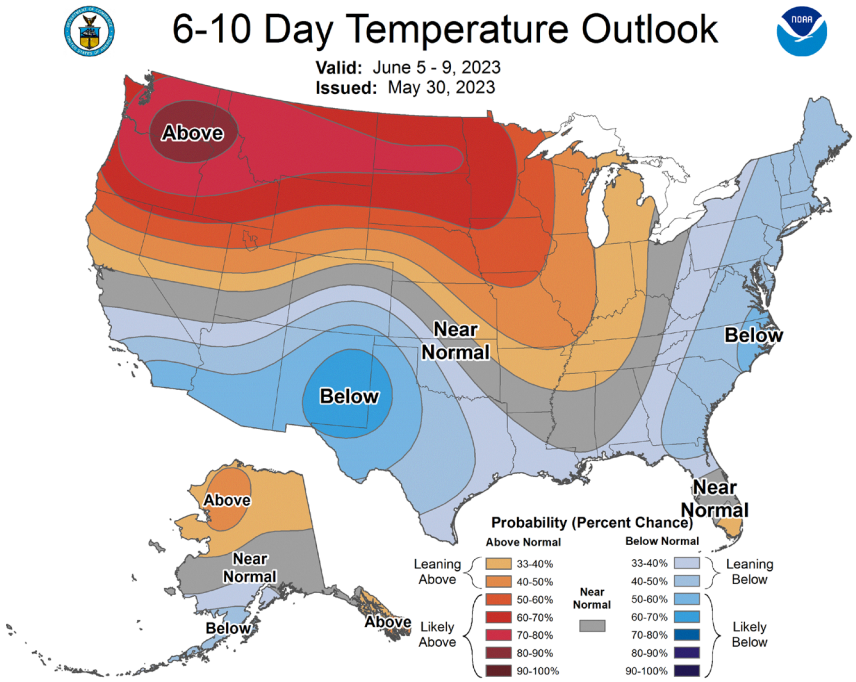


Figure 12. Temperature outlook from June 5 through June 9 for the continental United States and Alaska.

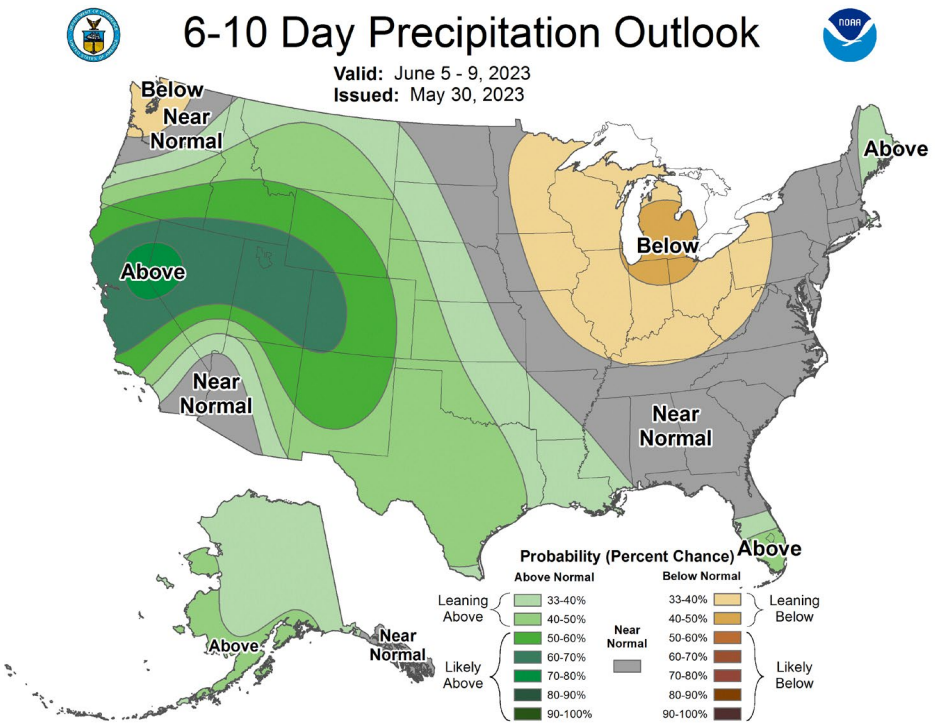


Figure 13. Precipitation outlook from June 5 through June 9 for the continental United States and Alaska.

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