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**NDSU FIELD DAYS SET**

**NDSU Field Days provide an opportunity for farmers, ranchers and others to hear about the latest research and practices in animal science, agronomy and horticulture.**

The North Dakota State University Research Extension Centers' annual field days are set. The events take place at the Research Extension Center sites across the state and feature speakers, presentations and tours covering a diverse array of topics. The field days are open to the public.

The dates and locations for the field days are:

- July 10 – Central Grasslands Research Extension Center – Streeter (10 a.m.-3 p.m. CDT)
- July 11 – Hettinger Research Extension Center (5-7 p.m. MDT followed by supper)
- July 12 and 13 – Dickinson Research Extension Center
  - July 12 – Livestock tour at Manning Ranch (9 a.m.-noon MDT followed by lunch)
  - July 13 – Horticulture tour (9 a.m.-noon MDT followed by lunch), agronomy tour (1:30-5 p.m.)
- July 12 and 13 – Williston Research Extension Center
  - July 12 – Main site agronomy and horticulture (4-8 p.m. CDT)
  - July 13 – Irrigated tour – Nesson Valley Irrigation Research and Development farm, located 23 miles east of Williston on Highway 1804 (8:30 a.m.-Noon CDT)
- July 17 – Agronomy Seed Farm – Casselton (5 p.m. CDT agronomy, 7 p.m. supper)
- July 18 – Carrington Research Extension Center – Carrington (9:15 a.m.-3:30 p.m. CDT)
- July 19 – North Central Research Extension Center – Minot (8:30 a.m.-Noon CDT)
- July 20 – Langdon Research Extension Center – Langdon (8:45 a.m.-Noon CDT)
- July 25 – Horticulture Research and Demonstration Gardens – Fargo (3-7 p.m. CDT plants, local foods and outdoor spaces)
- Aug. 3 – Carrington Research Extension Center’s Oakes Irrigation Research Site – Oakes (8:30 a.m.-noon CDT followed by lunch)
- Sept. 9 – NDSU Research Arboretum – Amenia (12:30 p.m.)



# entomology

## BEAN LEAF BEETLE ACTIVE IN SOYBEANS

Bean leaf beetle has been slowly increasing in North Dakota along with the higher acres of soybean. Last year, we saw the distribution of bean leaf beetle expand from southeastern North Dakota to east central, central, south central, and north central North Dakota. IPM Scouts found bean leaf beetles causing defoliation in Walsh County at 25% defoliation and Cass County at 2% defoliation. Bean leaf beetles also can be an insect pest problem of dry edible beans.

Bean leaf beetle is about  $\frac{1}{4}$  inch long and can vary in color from yellow-green to reddish-brown. Adults may have four to no black spots, and a black border on the edge of wing covers. There is always a black triangle behind the thorax. Adults emerge from overwintering sites and move into bean fields as the seedlings emerge. Insecticide seed treatments frequently used on soybeans provide good protection against the overwintered adults. Beetles cause defoliation creating characteristic circular holes in leaves.



*Bean leaf beetle - Yellow-green on left and reddish-brown on right (James Kalisch, UNE-Lincoln)*



*Bean leaf beetle and defoliation (Jessica Halverson, NDSU)*

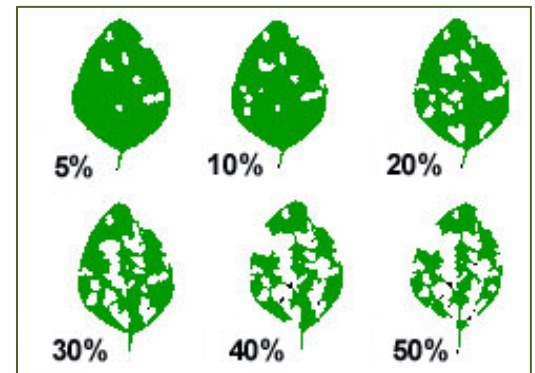


*Bean leaf beetle causing severe defoliation (>50%) on dry bean (Bryan Hanson, NDSU)*

The white larvae develop in the soil, feeding on the roots and nodules. New adults emerging in July feed on foliage and pods. **This is another important time to scout for bean leaf beetle.** The injury to pods can cause secondary infections by viruses, fungi and bacteria, causing rotting and discoloration. If large numbers of beetles are present during the R6 growth stage, watch for pod feeding or clipping and be aggressive with an insecticide treatment.

A sweep net is used to determine if bean leaf beetles are present since they are secretive and hard to visually observe in fields. **In soybeans, treatment thresholds are based on numbers of beetles, when three to seven beetles per sweep are found, or are based on foliar defoliation levels and different crop stages (see table below).**

Economic Thresholds for Bean Leaf Beetle Defoliation in Soybeans	
Crop Stage	% Defoliation
vegetative stages to R2 (full bloom)	30%
R3 (beginning pod) to R5 (beginning seed set)	10%
R6 (full seed set)	15%
R7 (maturity).	No treatment necessary



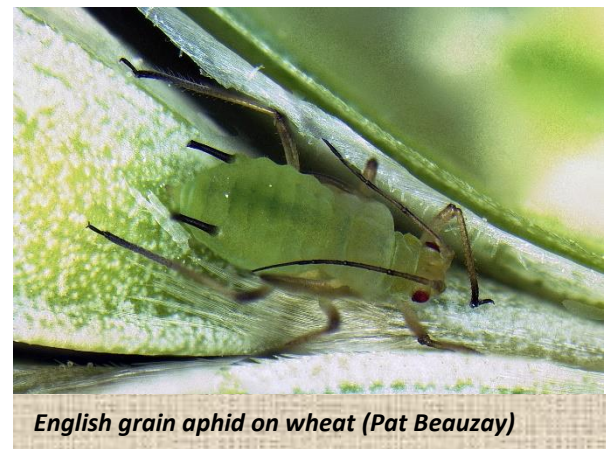
**In dry beans, the treatment threshold is recommended when 40% to 70% defoliation is present.**

See the NDSU Extension publications on [Common Arthropod Pests of Soybeans in North Dakota](#) (E2005, Dec. 2020) and [Common Arthropod Pests of Dry Beans in North Dakota](#) (E2023, June 2021) for more identification information.

**CEREAL APHIDS IN ND WHEAT**

IPM scouts found the first cereal aphids in wheat this past week. Cereal aphids were observed at non-economic populations in Cass County in the southeast and Stark County in the southwest (see map next page).

Scouting is critical to monitor aphid populations, from **stem elongation through the early dough stage** of wheat and other cereal grains. Predators of aphids, such as lady beetle adults and larvae, and lacewing larvae, are good indicators that aphids may be present in fields. Seeing large amounts of honeydew or sooty mold growth also are good indicators that aphids are present.

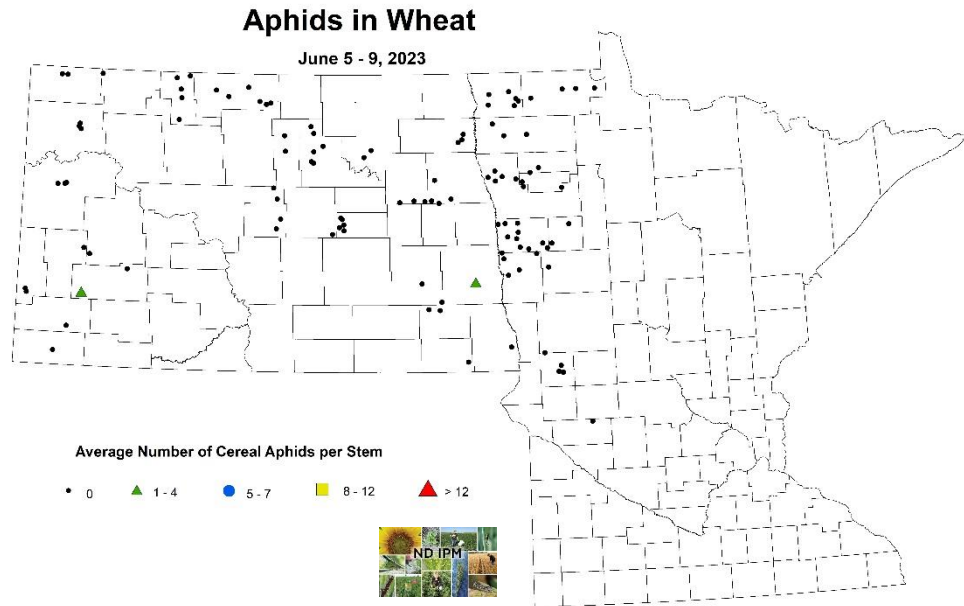


*English grain aphid on wheat (Pat Beauzay)*

The **greatest risk of yield loss from aphid feeding is from vegetative through heading stages.** However, economic loss also can occur through the early dough stage. Beyond early dough, yield loss is unlikely to occur.

Aphid populations at or above the thresholds (below) during these growth stages may result in economic injury to plants. To protect small grains from yield loss due to aphid feeding, we recommend the following growth stage thresholds listed in table (on right).

Economic Thresholds for Cereal Aphids in Grain Crops	
Crop Stage	# Aphids per Stem
vegetative through head emergence	4
complete heading through the end of anthesis	4-7
end of anthesis through medium milk	8-12
medium milk through early dough	>12



**SCOUT FOR PEA APHIDS IN PULSE CROPS**

Pea aphids are small, about 1/8 inch long, and pale to dark green with reddish eyes. Pea aphids have multiple generations per year and overwinter as eggs in alfalfa, clover or vetch. In the spring, nymphs hatch from eggs and appear similar to the wingless adult but are smaller. Nymphs molt four times and mature into adults in 10 to 14 days.

Pea aphids can reproduce rapidly when temperatures are around 65F and relative humidity is near 80%. Infestations can originate from local alfalfa fields, and often move out of recently cut alfalfa fields to pulse crop fields. Pea aphids also can migrate into North Dakota or Montana from the southern states.



*Pea aphids clustered on plant tip of field pea (Janet Knodel)*



*Pea aphids (Patrick Beauzay)*

**Scouting** for pea aphids in pulse crops is conducted using either a sweep net or examining the number of aphids per plant tip when 50 to 75 percent of the crop is flowering. Take 180-degree sweeps using a 15-inch sweep net or check at least five 8-inch plant tips from four different locations in the field. Population estimates should be calculated by averaging counts taken from four separate areas of the field.

**Crop Damage:** Aphids suck the sap from plants and may vector viral diseases. Populations of only ten aphids per plant can cause economic damage, especially if plants are heat stressed. Pulse crops are especially susceptible to aphid infestations in the flowering and early pod stages. **Aphid feeding on peas in the flowering and early pod stage can result in lower yields due to less seed formation and smaller seed size.** Protein content and other quality issues do not appear to be affected. Aphid populations are often kept low by heavy rains or by

beneficial insects (parasitoid wasps) and predators, such as lady beetles and lacewings. Early seeding also can reduce damage caused by pea aphids.

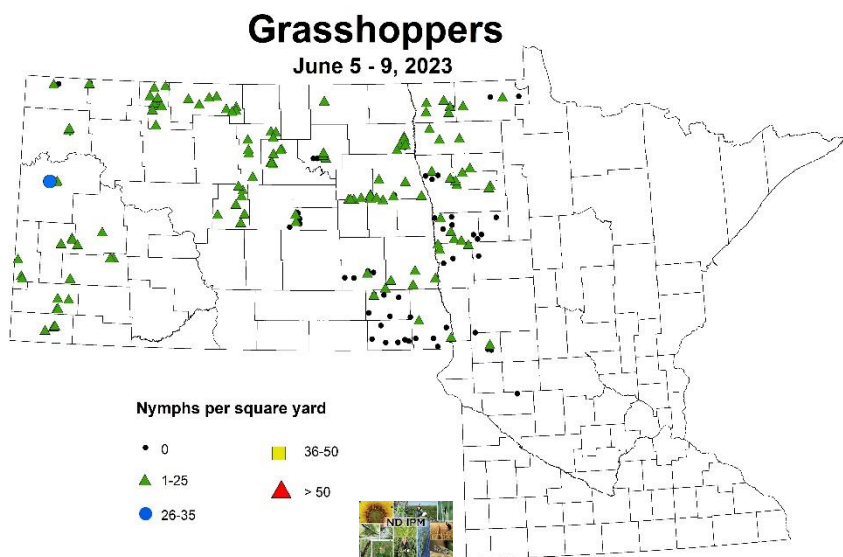
Economic Thresholds (E.T.) for Pea Aphids in Pulse Crops	
Pulse Crop	# Pea Aphids
Field pea – # aphids on plant tips	2-3 aphids per 8-inch plant tip
Field pea – sweep net	9-12 aphids per sweep (or 90 to 120 aphids per 10 sweeps)
Lentils	30 to 40 aphids per sweep and when few natural enemies are present
Chickpea	No recommended E.T.

If the economic threshold is exceeded, a single application of insecticide when 50% of plants have produced some young pods will protect the crop against yield loss and be cost-effective. Control at the early pod stage provides protection through the pod formation and elongation stages, which are very sensitive to aphid damage. Cultivars of field peas may also vary in their tolerance to feeding by pea aphids, thus economic injury levels may differ between cultivars. Managing pea aphid is complicated because it is a vector of several important and injurious viruses affecting pea and lentil, such as *Pea seedborne mosaic*, *pea enation mosaic virus* and *bean leaf roll virus*.

Please refer to the NDSU Extension [2023 North Dakota Field Crop Insect Management Guide E1143](#) for insecticides registered in pulse crops.

**CONTINUE TO SCOUT FOR GRASSHOPPERS**

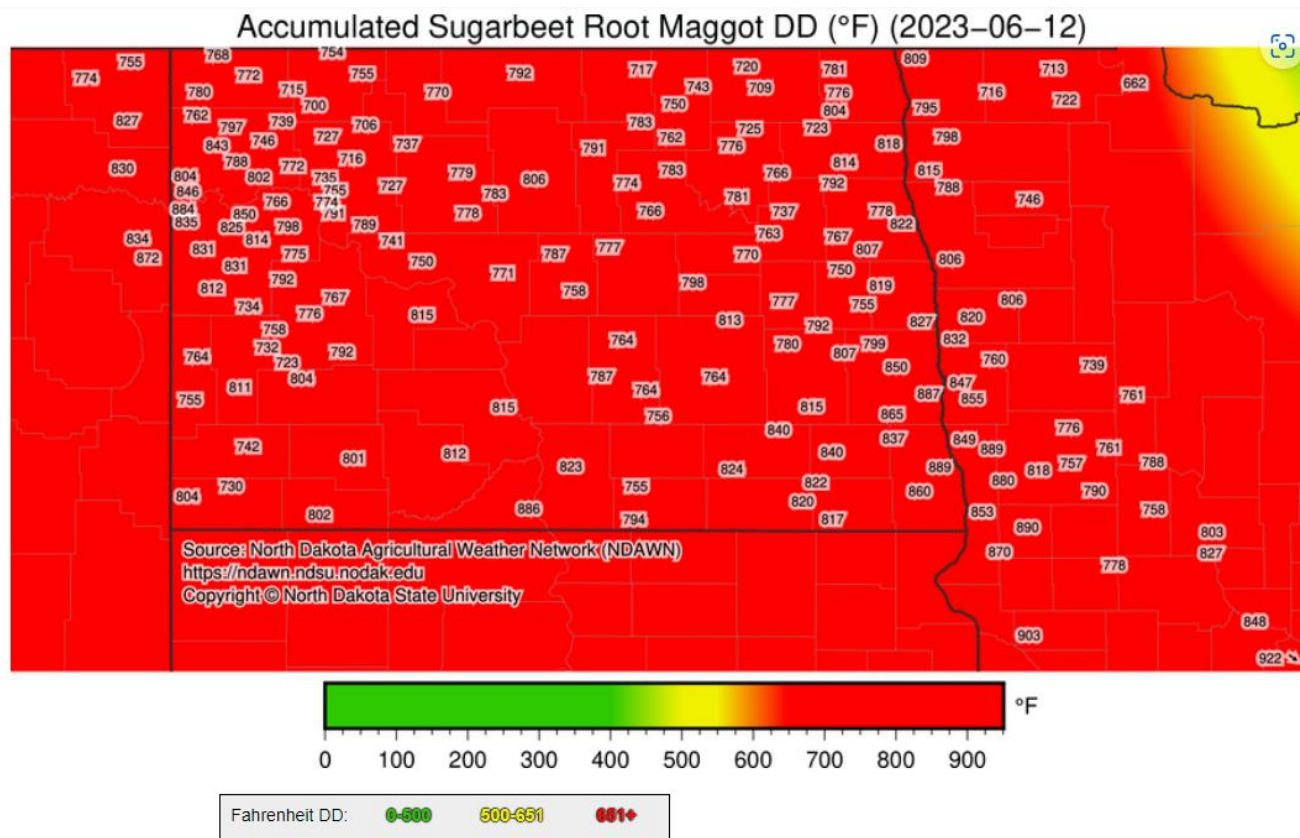
Grasshoppers were commonly observed in many crop fields across the state last week. IPM Scouts observed non-economic numbers of nymphs per square yard in 71 percent of the fields scouted, with McKenzie County having the highest number of grasshoppers. It is important to be vigilant in scouting for grasshoppers throughout the summer until harvest. With high numbers of grasshopper egg load in the fall and good weather conditions (hot and dry) for grasshopper survival this spring and early summer, we are expecting to have **high populations of grasshoppers to deal with in field crops again**, similar to 2022. Most field crop grasshoppers are still in the nymph (immature) stage and peak egg hatch usually occurs during mid- to late June. See past issue of the [CPR #3, May 25, 2023](#) for grasshopper forecast.



[Janet J. Knodel](#)  
Extension Entomologist

**SUGARBEET ROOT MAGGOT: FLY ACTIVITY DROPPING, WATCH OUT FOR RESURGENCE**

Sugarbeet root maggot (SBRM) fly activity has begun to recede in much of the Red River Valley in the past few days. Data from the SBRM monitoring project suggests that peaks in fly activity occurred between June 3 and 7, with southern reaches of the Valley peaking early within that interval, and northern areas peaking a few days later. The NDSU Root Maggot Model also suggests that peaks should have passed in most locations within the insect's range (Fig. 1).



**Figure 1: Accumulated SBRM degree-day units (Courtesy: NDAWN)**

Root maggot fly activity remains at considerably high levels at several locations at this point and, surprisingly, some of the highest fly activity is continuing in the Sabin/Baker, MN area. In addition to that area, other locations experiencing severe infestations include the following (in descending order of cumulative fly counts to date) Voss, Ada, St. Thomas, Crookston, Reynolds, Crystal, East Grand Forks, Thompson, Auburn, Oakwood, Bowsmont, Cavalier, Oslo, Veseleyville, and Donaldson.

Some of the persistent fly activity at this time is, in part, due to the unsettled, windy weather that began near the end of last week and continued through the weekend. Those conditions tend to keep flies down in more sheltered microsites, such as on the ground, in the plant canopy, and in field margins. When windy or rainy conditions persist, the fly infestation actually present in a field may not always be accurately estimated by sticky-stake traps. Although the ongoing hotspots are a concern, fly activity should continue dropping over the course of the next few days.

**Things to watch for.** First, it is concerning that many sugarbeet fields are far behind normal this year as a result of being planted atypically late, because the quick warmup and persistent hot weather during the month of May led to SBRM populations emerging about one week earlier than normal. This has created a near worst-case scenario for growers in

those areas. In many cases, postemergence rescue insecticide applications were made later than optimal because flies were emerging and entering fields before growers could shift efforts from planting operations to preparation of post insecticide application equipment. Plants in such fields are likely beginning to show stress from SBRM larval feeding injury, especially those in which no insecticide or a moderately performing product (e.g., an insecticidal seed treatment or an at-plant liquid material) was used for planting-time protection.

Second, a close watch should be maintained on fields in areas where at least moderate fly activity was occurring during the past two weeks. Either sustained fly activity or a resurgence could possibly require an additional insecticide application. This would especially be the case in fields that lack at-plant protection, but a return to extremely high fly activity in protected fields could also warrant another insecticide application in previously treated fields.

**Control Recommendation.** NDSU research suggests that postemergence liquid insecticides are the best option for SBRM control at this time. Sugarbeet fields that have already received a postemergence insecticide, especially if the product was a liquid formulation, may require retreatment if subsequent infestations reach or exceed 0.5 flies per plant. This is not a formalized threshold, but rather a guideline to assist with making control decisions. **Foliar liquid insecticide applications made after this weekend (June 16-18) are unlikely to be economically justifiable, unless fly densities in a field reach 0.5/flyes per plant.**

For more guidance on postemergence control strategies, 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



#### **DISEASE LEVELS VERY LOW IN SMALL GRAINS IN NORTH DAKOTA**

The NDSU IPM Scouts had a successful week visiting wheat and barley fields in North Dakota. A total of 111 wheat fields and 10 barley fields were surveyed last week for the presence of diseases. No diseases were reported from any of the fields visited. Growth stage reports for both barley and hard red spring wheat ranged from seedling to tillering stages of development. Off-campus specialists at the NDSU Research Extension Centers also indicate a very low occurrence of disease in small grains. Over the past 7 days, relative humidity values and periods of prolonged leaf wetness have been sporadic, which helps explain the low levels of disease in certain areas of the state (Table 1).

**Table 1.** Infection period risk for the tan spot pathogen in wheat at various NDAWN locations in North Dakota. Information obtained from the NDSU Small Grain Disease Forecasting Model.

Location	Favorable Days for Tan Spot (Yes = Infection likely)					
	6/12	6/11	6/10	6/9	6/8	6/7
Bottineau	Yes	No	No	Yes	No	No
Cavalier	No	No	Yes	No	Yes	Yes
Dunn	Yes	Yes	No	Yes	Yes	Yes
Fargo	No	No	Yes	No	No	No
Grafton	No	No	No	Yes	Yes	Yes
Hettinger	No	Yes	Yes	No	Yes	Yes
Williston	No	No	No	No	No	No
Wishek	No	Yes	Yes	Yes	Yes	No

[Andrew Friskop](#)

Extension Plant Pathology, Cereal Crops



### EARLY VEGETATIVE GROWTH AND DEVELOPMENT IN SOYBEANS

The above ground growing points of the soybean plant are located at the top of the plant, and dormant buds in the leaf axis. The tender growing points are easily damaged if hail takes place during the early growing season. Regrowth will not occur if the hail cuts the stem below the cotyledons, as the lowest growing points are located in the cotyledon leaf axils. However, if the plant is not too severely damaged above the cotyledon, it is possible for the plant to regrow from the axillary buds. The plant stems may be damaged or bruised by hail stones without killing the plant. Damaged and bruised stems often weaken the plant at these spots resulting in lodging if the stem tissue cannot support the weight of the plant later in the season. Plant stands are often reduced due to the hail damage. Nevertheless, if there are still enough evenly distributed plants left, the crop can still produce reasonable yields with a favorable remaining growing season.

Nodule formation (Photo 1) can begin as early as V1 (first trifoliolate leaf), with N fixation typically initiating by about the V2 stage (two trifoliolate leaves). Soils supply additional N from mineralization of soil organic N to help plants during early growth.





*Photo 1. Nodulation on young soybean plant.*

Iron deficiency chlorosis (IDC) can occur in soybean plants as early as the V2 leaf stage. Plant size and leaf area begin to increase rapidly by the time the plant has 4 or 5 trifoliolate leaves (stage V4 or V5), with a Leaf Area Index (LAI) of about one. A large portion of dry matter produced by the plant goes into leaves during the vegetative growth period, which increases in leaf area and plant dry weight.

The addition of each leaf during the vegetative phase means the addition of another node on the stem; each node has a leaf attached, and a can have a raceme – a short branch where flowers and pods form. Plant height increases as nodes are added. The length of each internode is determined by the genetics (variety), temperature, and moisture, but node number per plant is more important for yield than plant height.

Plants at lower populations form more branches, each with leaves and the capacity to form pods and add yield. Branch formation give plants with more space, additional leaf area and the capacity to support more growth. This capacity helps to neutralize loss of plants or leaves during vegetative growth. Although the ideal is for leaf area and plant dry weight to continue to increase during the vegetative growth without interruption, research has shown that loss in leaf area during this period typically has little or no effect on yield potential, if conditions are favorable to allow regrowth after the damage occurs.

Adapted from the Science for Success publication: “The Soybean Growth Cycle: Important Risks, Management and Misconceptions.” The publication can be found at <https://soybeans.ces.ncsu.edu/science-for-success/>

[Hans Kandel](#)

Extension Agronomist Broadleaf Crops



## soils

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### POSSIBLE CHLORIDE DEFICIENCY FOUND ON SPRING WHEAT AND WINTER WHEAT

Physiological leaf spotting can be a symptom of chloride deficiency in wheat. In northeast North Dakota, a field of spring wheat and a field of winter wheat have been found with physiological leaf spotting; leaf spotting not related to pesticide



*Winter wheat showing physiological leaf spotting at heading, near Langdon, ND*

application or disease. Confirmation of chloride deficiency can be made with a soil sample to 2 feet in depth under these plants. If a chloride problem, I would anticipate a soil test chloride value of less than 10 pounds per acre. Also, in the flag leaf stage, taking flag leaves from the 'bad' area and comparing it to an area with no symptoms, a 'good' area, would further confirm the cause. If it is a chloride deficiency, application of 10 pounds 0-0-60, containing 50% chloride, followed by rainfall would result in some yield recovery. Since the yield increase from chloride comes from an increase in kernel size, there is still opportunity for yield improvement if application of Cl is followed soon by rainfall. A yield increase from 4 to 8 bushels per acre would be expected based on other favorable yield components, including heads per unit area and kernels per head.

[Dave Franzen](#)

Extension Soil Specialist  
701-799-2565



## weeds

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### GROWTH STAGE CUTOFFS FOR HERBICIDE APPLICATIONS IN SMALL GRAINS AND CORN

Crops are growing rapidly this year given our warm conditions. In particular, small grains and corn are progressing more rapidly than normal and seem to be clipping through vegetative growth stages every few days. Some of our corn research fields are progressing from planting to V4/11-inch corn in about 18 days. Given the rapid development of our crops, it is important to keep in mind certain height or growth stage cutoffs for many of the herbicides used in these crops.

Small grains:

Page 16 in the 2023 North Dakota Weed Control Guide has a helpful chart detailing the growth stage timings that many popular herbicides can be applied.



Corn:

If we go off of growth stage restrictions, we start losing many popular options once we reach V5 to V6 corn (5 to 6 visible leaf collars). If we base our staging on height, then some of the earliest cutoff timings are 8-inch corn for broadcast applications of 2,4-D, and any atrazine must be applied before corn reaches 12-inches in height. If corn is 12 inches or taller, the atrazine must be left out of the tank. Many premix herbicides also have a cutoff of 11-inches which is driven by the Group 15 (acetochlor) product in the premix. Keep in mind that the cutoff for many products is based on growth stage or corn height, whichever comes first. There are plenty of options available to apply to later growth stages, but be sure to know the cutoff for your product of choice. See the “When to Apply” column on pages 22 through 26 in the 2023 NDSU Weed Control guide for height and growth stage restrictions of postemergence herbicides in corn.

[Joe Ikley](#)

Extension Weed Specialist



#### EMERALD ASH BORER UPDATE – JUNE 2023

In February 2023, Emerald Ash Borer (EAB) was found in Moorhead and Dilworth, Minnesota, just across the Red River from Fargo. EAB still has not been found in North Dakota, though this is the closest find to North Dakota to date. Previously, EAB had been found in Winnipeg, MB (2017), Sioux Falls, SD (2018) and Sauk Centre, MN (2019). Following the find in Moorhead, a survey was completed in Fargo to search for EAB. Though 27 suspect trees were identified, none actually had EAB.

Symptoms and signs of an EAB infestation are somewhat generic, similar to those from other pests. There is generally dieback in the tree crown, followed by watersprouts or ‘suckers’ growing directly from the main stem of the tree. These symptoms, though, could be caused by a number of different insects, diseases, or environmental issues. Instead, the key identifiers for EAB are subtle or very difficult to see. These include bark splits, D-shaped exit holes of the adults, and serpentine larval galleries. More information on identifying EAB is available in the NDSU Extension publications – *Emerald Ash Borer: Biology and Integrated Pest Management in North Dakota E1634* (<https://www.ndsu.edu/agriculture/extension/publications/emerald-ash-borer-biology-and-integrated-pest-management-north-dakota>) and *Insects Frequently Confused with Emerald Ash Borer in North Dakota E1604* (<https://www.ndsu.edu/agriculture/extension/publications/insects-frequently-confused-emerald-ash-borer-north-dakota>).



Effective chemical insecticide treatments are available for EAB, though we don't recommend them unless EAB has been found within 15 miles of your location. More information is available in the document listed above.

We expect that the local spread of EAB will be somewhat slow in our northern prairie climate. Nevertheless, we believe that the infestation in Moorhead/Dilworth has been there for at least five years before the insect was found. Regionally, EAB will likely move long distances via infested firewood. **Please do not move firewood, when going camping or traveling to a lake cabin.** Instead, purchase firewood locally and remember to 'Buy it where you burn it.'

Many people are searching for EAB in North Dakota, including ND Department of Agriculture employees, ND Forest Service personnel as well as those of us with NDSU Extension. Please contact your local city forester or an employee of one of these organizations if you have a tree that you suspect might be infested with EAB. The ND Department of Agriculture has created a handy online form for reporting a suspect ash tree, available via the QR code shown below.



*Link to ND Department of Agriculture's 'Report a Suspect Ash Tree' for emerald ash borer online form.*

[Joe Zeleznik](#)  
NDSU Extension Forester

[Janet J. Knodel](#)  
Extension Entomologist



# around the state

**NORTHEAST ND**

Conditions appear to be dry in many areas of the NE region. Rains over the last week continued the pattern of scattered showers bringing relief to some and nothing to many. Late planted big seeded crops are struggling with uneven emergence due to limited soil moisture conditions. Crops that have emerged are growing fast due to warm weather making them more susceptible to moisture stress in the absence of precipitation. Small grains are looking very good,



ranging from emergence to jointing stages. Winter wheat has headed out. Chloride deficiency in a winter wheat field has been reported from Pembina County. Recommendations for alleviating chloride deficiency symptoms are discussed in the soils section of this crop and pest report by Dr. Dave Franzen.

Corn, soybeans, dry beans, flax, field peas, sugarbeets, potatoes, and sunflowers are progressing well. IDC symptoms are showing up in soybeans after rain showers. The NE region IPM scout reported a soybean field with up to 25% defoliation from bean leaf beetles, which is not very common in our region. Canola flea beetles are still actively feeding in Cavalier County and the seed treatments are wearing off. Growers are resorting to rescue foliar treatments to protect their canola. Alfalfa is at the bloom stage and in many areas first cuttings have been taken. Grasshoppers continue to emerge and hot spots are developing in some areas.

*Spring wheat showing tillers in Cavalier County*



*Flea beetles still feeding on emerged and 4-leaf stage canola in Cavalier County Photo: Anitha Chirumamilla*



*Winter wheat showing chloride deficiency symptoms. Photos: Venkat Chapara, Plant Pathologist, LREC*



Soybeans showing IDC symptoms  
Photo: Nancy Feil, NE Region IPM Scout



*Bean leaf beetle feeding on soybeans in Walsh County Photo: Nancy Feil, NE Region IPM Scout*

[Anitha Chirumamilla](#)

Extension Cropping Systems Specialist  
Langdon Research Extension Center

**NORTHWEST ND**

Soils in most of the northwest still have moisture underneath the top soil, but with hot weather conditions in the past week the soils are starting to get dry. Fortunately, the winds have been calm and for the most part, postemergence herbicide applications in small grains and broadleaf crops have gone smoothly. Although I've seen only one instance of injury symptoms in canola planted next to a wheat field. The injury symptoms, as exhibited by twisting and branching of stems and petioles and the cupping of leaves, was probably caused by a Group 4 active such as fluroxypyr, clopyralid, and halauxifen, contained in premixes of herbicides commonly used in wheat, premixes such as WideARmatch, Huskie FX, and Starane Ultra/Flex. It may have volatilized and drifted downwind into the canola field. Another active would be dicamba (applied before wheat reaches 6-leaf) since we know some of growers in our area use dicamba to specifically control kochia in their wheat fields, and maybe to lessen the burden of previously mentioned herbicides extensively used for broadleaf weed control in wheat. It is important to keep in mind that when a synthetic auxin herbicide (Group 4s) unintentionally moves into a susceptible crop, even trace amounts, it could cause injury and at times results in some yield loss, depending on crop susceptibility level and growth stage at time of exposure. For example, a [one-one thousandth \(1/1000\) of dicamba exposure at V2 has been shown to cause three-bushel average yield loss in non-dicamba tolerant soybean](#). Probably the best example would be the extensive dicamba-related drift events a few years back that resulted in millions of acres of injury in non-dicamba tolerant soybean and cotton major growing areas in the nation. Herbicide volatility potential, wind speed and direction, outside air temperature or time of day, all play a role for an herbicide to potentially drift. Growth stages of small grains in the northwest are all across the board. Most wheat fields may still have a few weeks left to put down herbicides over the top. NDSU Extension has a great publication about when would be the right time and what would be the right way to apply pesticides using an indicator called Delta T. What it is, how to use, and where to find it can be found [here](#). The latest ND weed control guide briefly discusses Delta T and air temperature inversions on page 133 and this is also discussed in the Extension publication [AE1876](#). As the weather may only get hotter, these publications will help make decisions when applying pesticides.

We had reports of injury in lentil in the past few days. I was able to visit at least four grower fields showing chlorosis and necrosis and thinner stands in some spots in the field. The degree of injury is much more pronounced in coarse soils compared to fine soils. The most likely culprit is the group 14 (PPO) herbicide Sharpen (active is saflufenacil). Sharpen can be absorbed through the roots of lentil seedlings and transported to its target enzyme - the protoporphyrinogen IX oxidase (PPO) in the leaf chloroplasts. Sharpen inhibits this enzyme and chlorophyll production stops due to build up of reactive oxygen species that tear down cell membranes, leading to leakage of cell components and eventual cell death. Advanced symptoms appear as burning on the outer edges of affected leaves.

The potential for Sharpen to injure lentil is increased with high pH, low organic matter, and coarse soils, all of which makes the active become more available in the soil solution for root absorption. The opposite happens in low pH, high organic matter, and heavy soils. Only a lower rate of Sharpen (up to 0.75 pints) is labeled for use in front of lentil due to its sensitivity compared to other crops. In the event of torrential rains a few days after application, Sharpen in the soil in general becomes more available and the potential for injury increases. Although precipitation is needed to get Sharpen activated, the label prohibits application if cold and/or wet (stressful conditions) are predicted to happen within a week of application. However, in the dry west growers will take as much rain and do as much field operations as weather and field conditions allow. Williston REC had three torrential rain events of up to 0.65 inches each time, from Mid-May to present. In this time frame, most of the Sharpen has been applied (in tankmix with glyphosate as burndown) and lentils have been planted in the fields right before or within a few days of the torrential rains, and we've seen injury in our lentil research plots. The good news is that lentils will come out of the injury and the label says yield will not be impacted at labeled rates. However, with no rain and the drier (stressful) conditions in the few past days these conditions may not help a speedy lentil recovery especially on coarse fields. The northwest needs a few rain showers here and there to help lentil come out of injury, but until that happens the recovery may be slower.



Most of the crops in the northwest are growing well. Crop stages are highly varied across the northwest counties with crops at early vegetative growth to crops starting to produce reproductive structures. The most advanced stage I've seen in crops was the start of flowering for canola and field peas, heads starting to come out in small grains, 12-13 nodes in lentil, 14 to 17 inches tall flax, 4-leaf sunflower and safflower, and about V7-8 in irrigated corn. Grasshoppers, even though still at nymph stage, are starting to take an economic toll in our grass crops and moving rapidly into our broadleaf crops.



*Twisting of stems/petioles and leaf cupping in canola situated next to a wheat field, possibly due to drift of a group 4 herbicide.*



*Field pea producing flowers at the Williston REC in Williams County.*



*Injured lentil due to Sharpen (saflufenacil) on a field with coarse soil.*



*Injured lentil on the right and lentil with very little injury on the left. Roots of both are healthy and intact.*



*Lentil on a fine soil that was treated with 0.6 pints of Sharpen (in tankmix with 32 oz of Roundup) preemergence. No Valor (flumioxazin) was applied last fall. Torrential rain and cold weather followed within a week of Sharpen application. Severe injury is seen on the left edge of the field as this was once a temporary road and the soil used to cover the field edge is rocky and coarse.*

[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 to June 12 ranged from 2.4 inches (Streeter) to 5.6 inches (Lisbon), with the Carrington Research Extension Center (CREC) receiving 5.2 inches. Though generally adequate subsoil moisture is present, replenishing topsoil moisture would be welcome across the region. During June 6-12, average daily water use (date of plant emergence in parenthesis): spring wheat (May 15) was 0.2 inch; and corn (May 25) and soybean (June 1) was less than 0.1 inch.

Cash crop planting is nearly complete; planting of warm-season forages will continue.



*Corn planted on May 12 at CREC at the 7-leaf stage (picture taken June 12).*

At the CREC, growth stages for winter cereals: winter rye - flowering to early seed development, and winter wheat - heading to flowering. Early May planted barley is in the boot to early heading stages and spring wheat has fully extended flag leaves. Mid-May planted corn has reached the 7-leaf stage. At this time, nodal roots are the dominant root system; leaves and ear shoots are formed; rows per ear determined; and growing point is above ground. Soybean and dry bean planted during the fourth week of May have several trifoliate leaves.

**NDSU Extension to host crop management field school at Carrington**

Crop advisers are invited to attend NDSU Extension's annual crop management field school set for Thursday, June 29, at 9 a.m. at the CREC.

Participants will receive updates on crop pest and soil management recommendations using hands-on training in field demonstration plots and research trials.

Field sessions include:

- Weed identification – Identify about 60 living weed exhibits, plus receive brief reviews on selected weed biology and control.
- Herbicide site-of-action – Identify herbicide classes by examining crop and weed injury symptoms.
- Late-season wheat disease – Review identification of foliar and head diseases, and management strategies.
- Soil – Review soil sampling and analysis procedures to manage saline and sodic soils.

Preregistration is required and 50 participants will be accepted on a first-come, first-served basis. Participants will receive reference materials, refreshments and a noon meal. Certified crop advisers will receive 4.5 continuing education units in crop pest and soil management.

For more details and preregistration information, use the website: <https://www.ndsu.edu/agriculture/ag-hub/events/crop-management-field-school>

or contact the CREC at 701-652-2951. A completed preregistration form and \$100 fee are required by June 26.

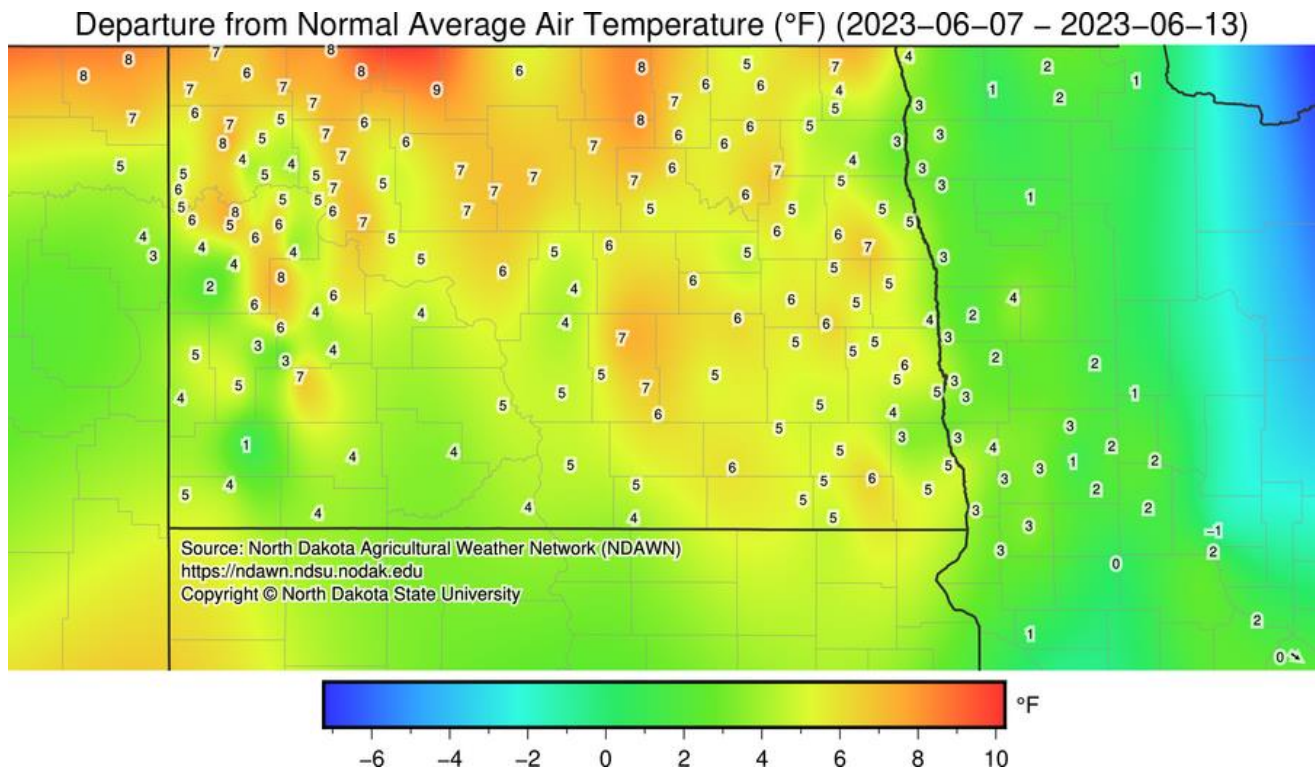
[Greg Endres](#)

Extension Cropping Systems Specialist  
NDSU Carrington Research Extension Center



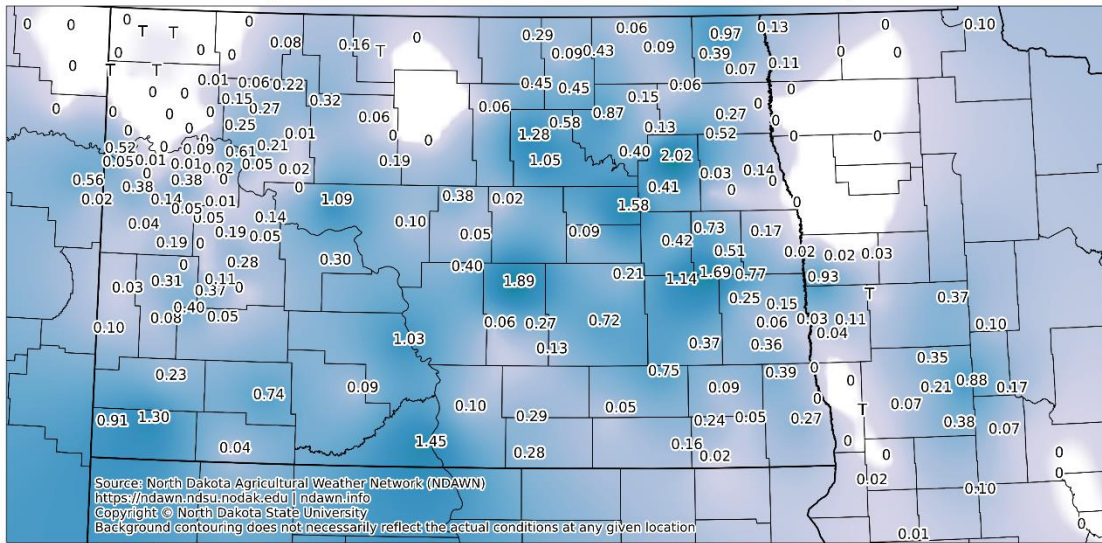
**WEATHER FORECAST**  
**The Week in Review**

Average daily temperatures trended above normal for the past week (Figure 1). While there were pockets of 1-inch+ rainfall over the past week (Figure 2), we tended to be below normal for rainfall across the state (Figure 3).



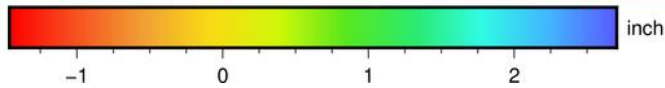
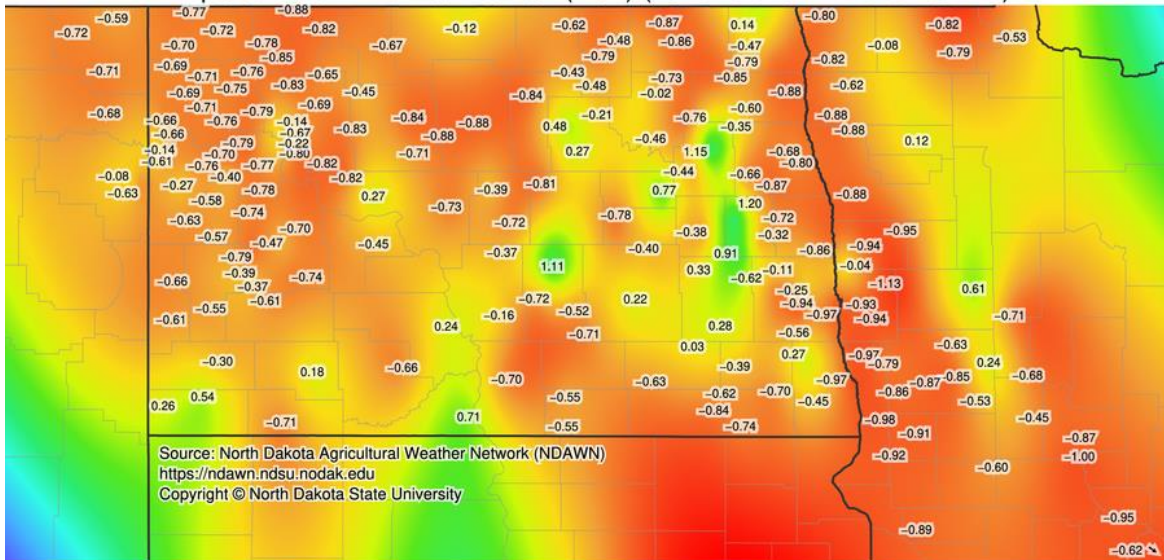
**Figure 1. Average air temperature departure from normal from June 7 through June 13.**

Total Rainfall Past 7 Days (in) Wed Jun 14 2023 07:41 AM



**Figure 2. Total rainfall for the past week through 7:41 a.m. on June 14.**

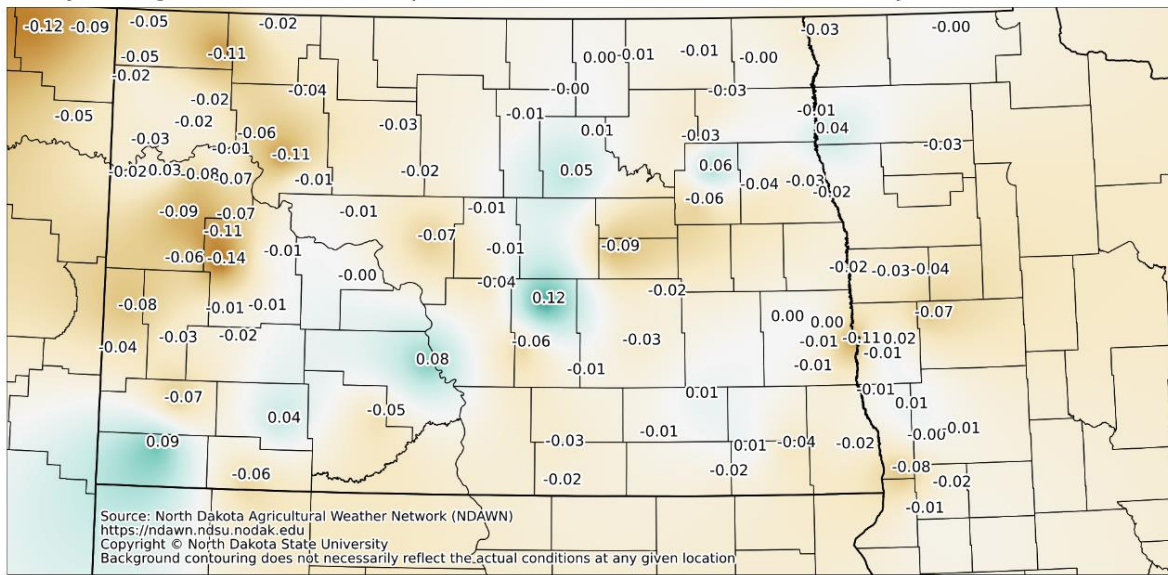
Departure from Normal Rainfall (inch) (2023-06-07 – 2023-06-13)



**Figure 3. Rainfall departure from normal from June 7 through June 13.**

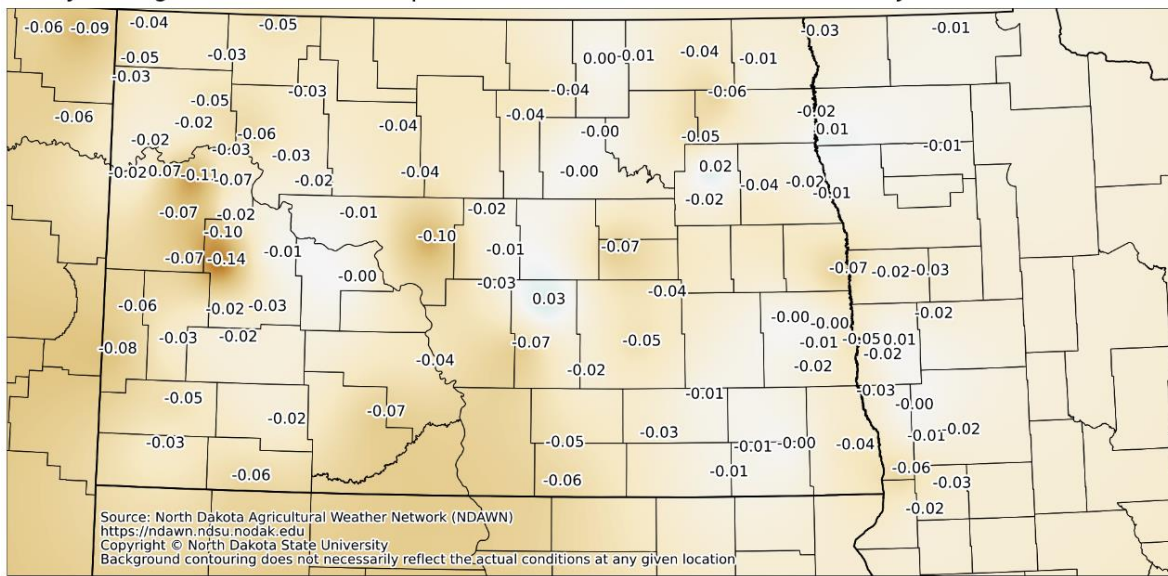
Soil volumetric water content (VWC) at the 4-inch (Figure 4) and 8-inch (Figure 5) depths continues to decrease across the state, except in those areas that were fortunate enough to pick up some rainfall. Keep in mind that these values are from specific NDAWN sites, and may not reflect conditions at your locations. Generally, soil moisture at the 4-inch and 8-inch depths is deficient across most of the state (Figures 6 and 7).

7 Day Change in VWC 4 Inch Depth (cm<sup>3</sup>/cm<sup>3</sup>) Mon Jun 12 2023 01:00 PM

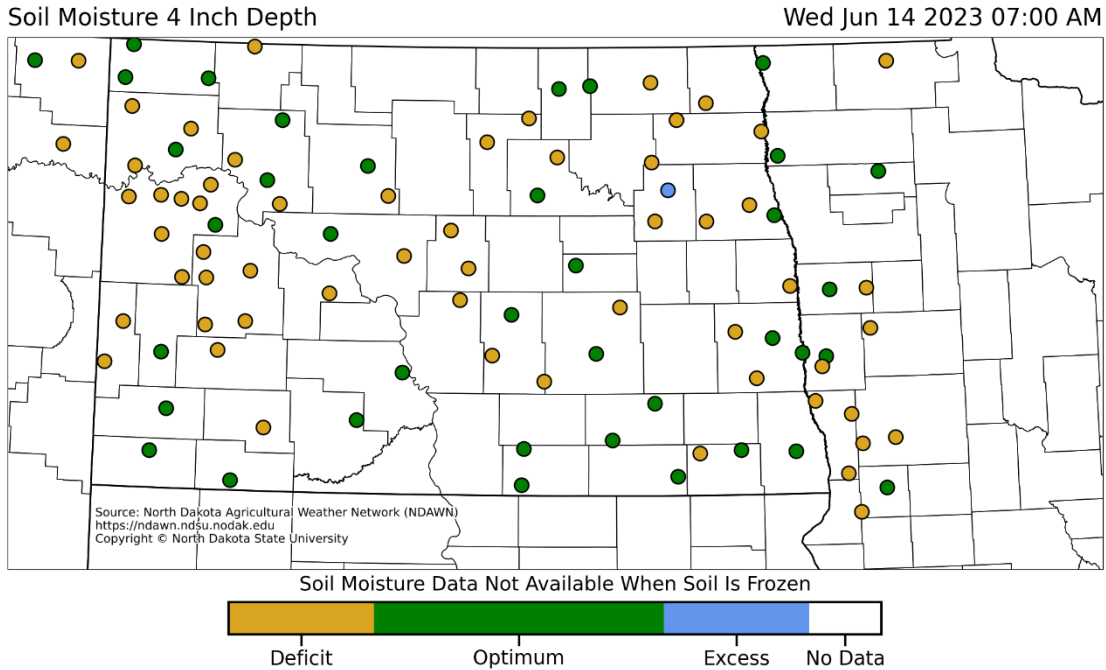


**Figure 4. Seven-day change in soil VWC at the 4-inch depth.**

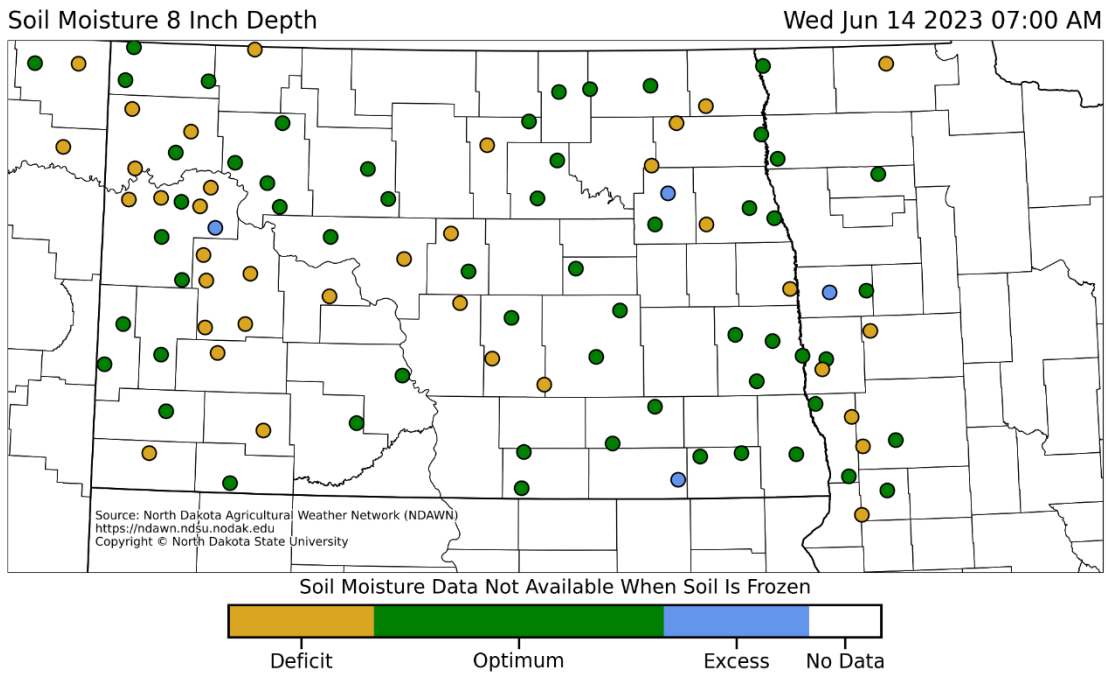
7 Day Change in VWC 8 Inch Depth (cm<sup>3</sup>/cm<sup>3</sup>) Mon Jun 12 2023 01:00 PM



**Figure 5. Seven-day change in soil VWC at the 8-inch depth.**



**Figure 6. Soil moisture conditions at the 4-inch depth as of 7:00 a.m. June 14.**

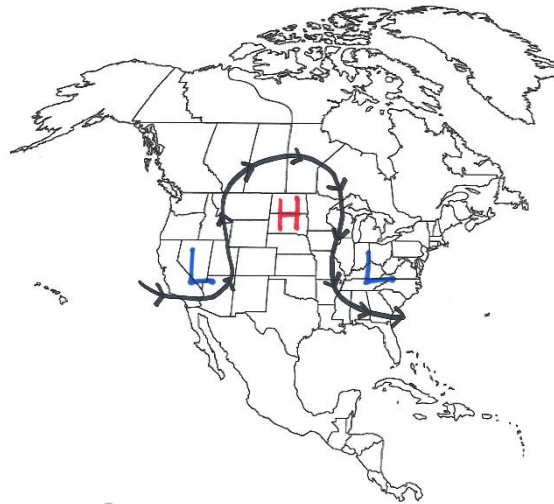


**Figure 7. Soil moisture conditions at the 8-inch depth as of 7:00 a.m. June 14.**

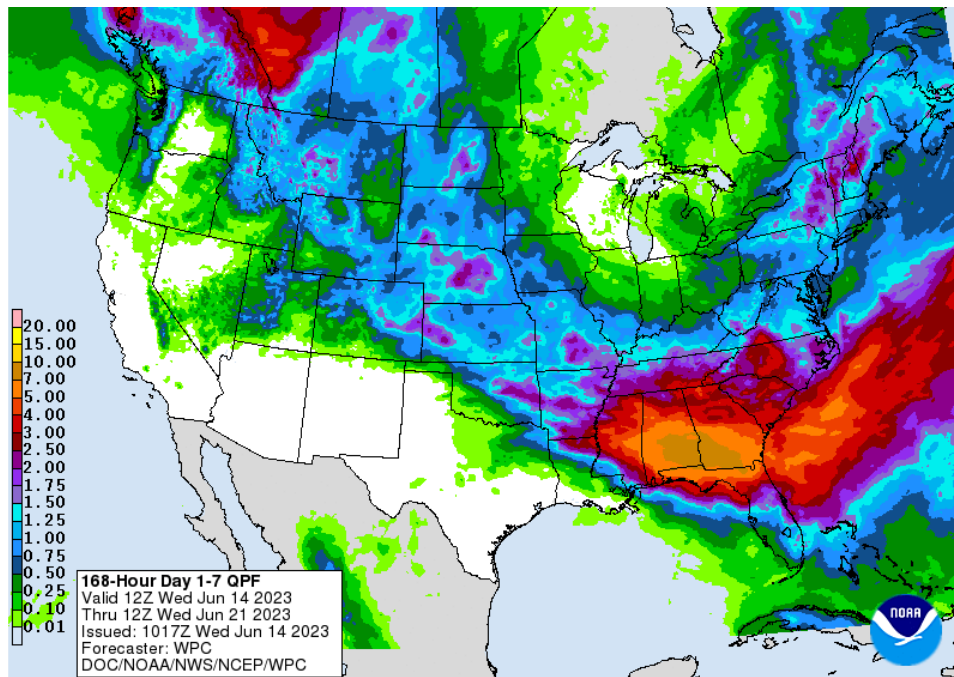
### The Week Ahead

We’ve been in a rather stagnant weather pattern over the past couple of weeks due to mid- and upper-level high pressure ridging over the northern Great Plains, with low pressure troughs to our west and east. Meteorologists refer to this persistent pattern as an “Omega Block” due to the shape of the jet stream around the high pressure resembling the Greek letter omega (Figure 8). This general pattern will persist into early next week. There will be chances of isolated convective showers and thunderstorms each day, but mid- and upper-level wind shear will be weak so the threat of

severe weather is low. The 7-day precipitation forecast (Figure 9) shows the potential for widespread 1-inch accumulations, but the bulk of this is forecast for the middle of next week as a much stronger low-pressure trough is expected to move in from the southwestern U.S. The 6-to-10-day outlooks call for above normal temperatures (Figure 10) and near to above normal precipitation (Figure 11).



**Figure 8. Illustration of the Omega Block pattern.**



**Figure 9. Precipitation potential for the continental U.S. from 7:00 a.m. June 14 through 7:00 a.m. June 21.**



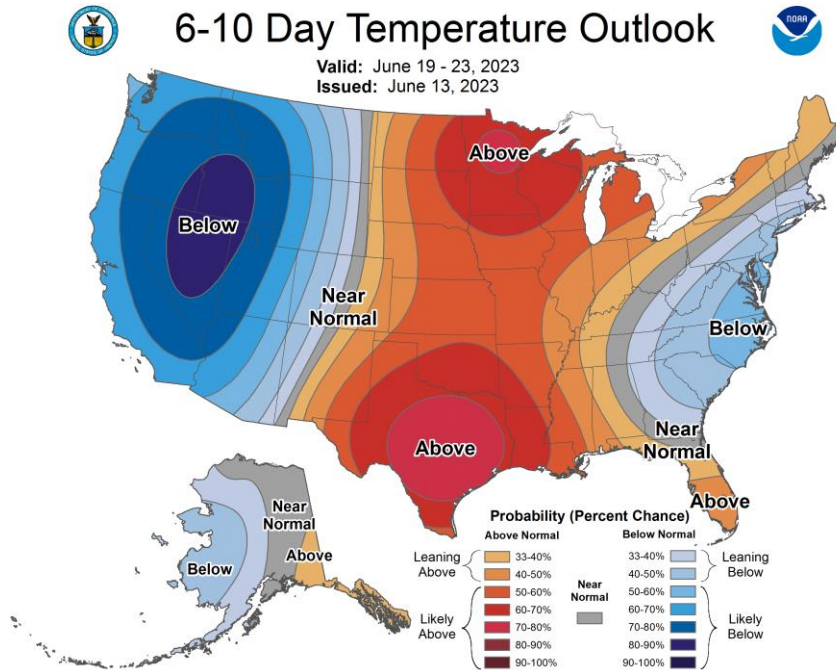


Figure 10. Temperature outlook for the continental U.S. and Alaska for June 19 through June 23.

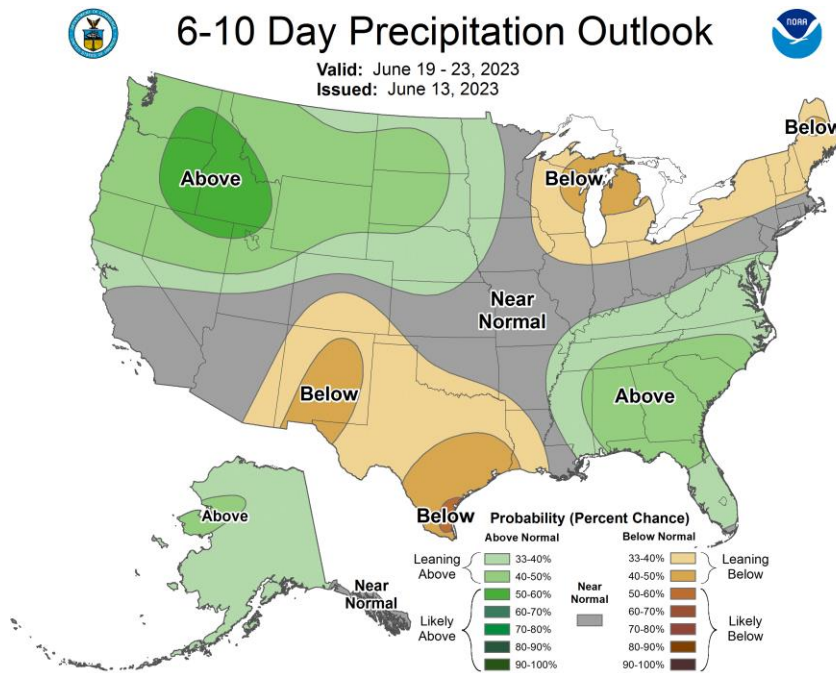


Figure 11. Precipitation outlook for the continental U.S. and Alaska for June 19 through June 23.

[Patrick Beauzay](#)  
 State IPM Coordinator  
 Research Specialist, Extension Entomology

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