North Dakota State University
CROP & PEST REPORT

NDSU EXTENSION

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entomology

IPM CROP SURVEY STARTS

We are pleased to introduced the 2023 NDSU and UMN Extension IPM scouts and insect trappers:

- **Regan Jones**, central and south-central counties, working out of Carrington REC with Greg Endres
- **Taylor Downing**, southwest and west central counties, working out of Dickinson REC with Chris Augustin
- **Alexius Holter and Sawyer Goodwin**, north central counties, working out of NCREC in Minot with Shana Forster
- **Scott Roseth and Samantha Turnquist**, northwest counties, working out of Williston REC with Charlie Lim
- **Tommy Crompton**, southeast and east central counties, working out of NDSU campus, Fargo with Janet Knodel, Patrick Beauzay, Andrew Friskop and Sam Markell.
- **Nancy Feil and Natalie Eversvik**, northeast counties, working out of Langdon REC with Anitha Chirumamilla, Scott Knoke (Benson County Extension Office) and Katelyn Landeis (Grand Forks Extension Office).

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

- **Amelia Landsverk**, Norman, Mahnomen, Clay, Becker, Wilkin, Otter Tail Counties, working out of Moorhead with Anthony Hanson, Regional Educator, IPM / Extension
- **Katie Olson**, Kittson, Roseau, Lake of the Woods, Marshall, Pennington, Red Lake, Polk Counties, working out of Crookston with Angie Peltier, Regional Educator, Crops / Extension

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

Janet J. Knodel
Extension Entomologist

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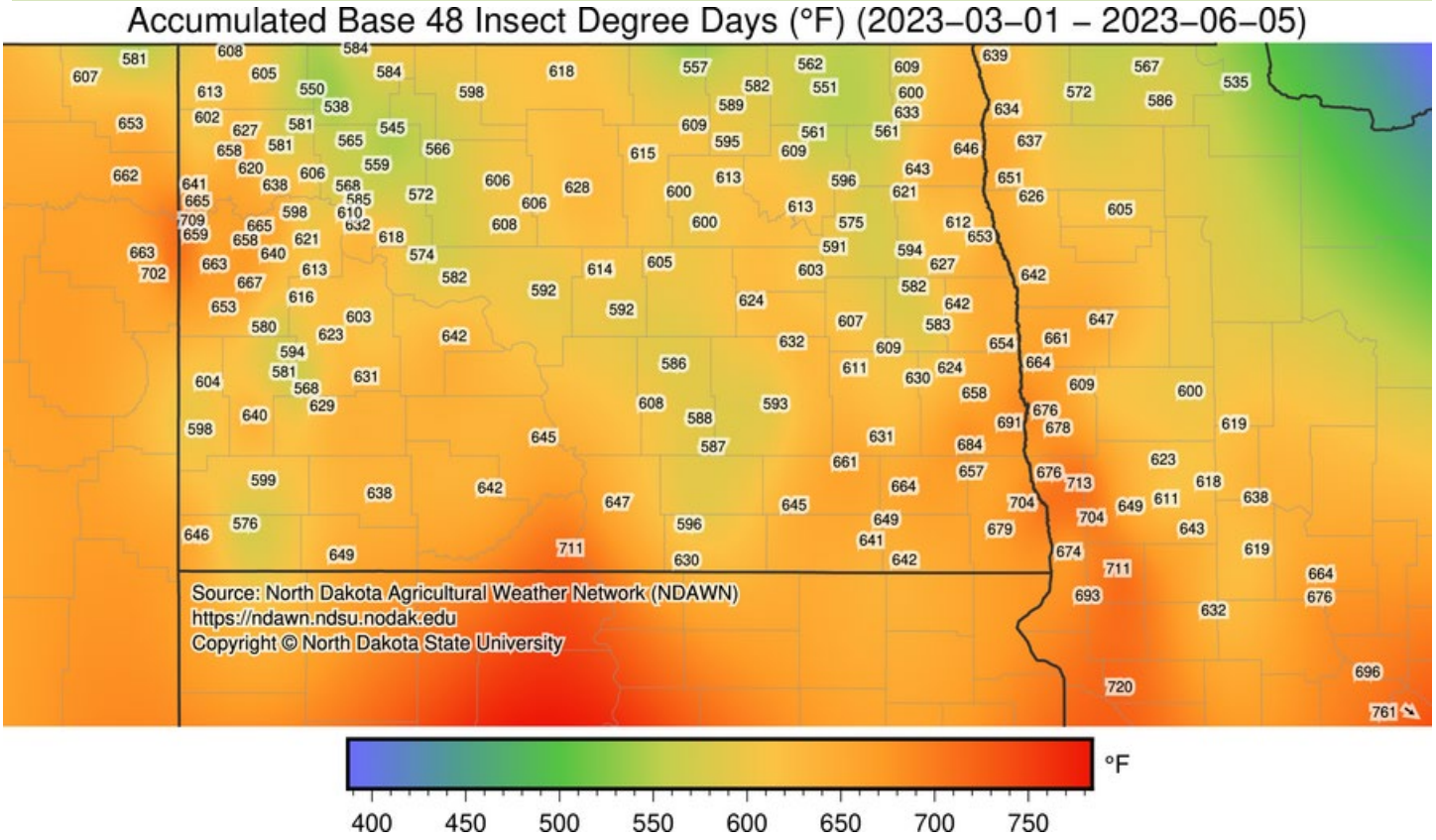
ALFALFA WEEVIL DEGREE DAY UPDATE

According to field reports and the degree day model for alfalfa weevil (base of 48 degrees F (NDAWN insect degree day map - Fig. 1), North Dakota has accrued between 550 - 700 accumulated degree days (ADD). This indicates that alfalfa weevil larvae are at the mature 4th instar larvae stage at 595-813 ADD. The pupation stage (non-feeding stage) occurs at about 814 ADD where the weevil transforms into the adult. Most weevil larvae will be in the pupal stage by next week and alfalfa will no longer be at risk from alfalfa weevil.

Many alfalfa fields are being cutting now since the hot temperatures near mid-80°F to 90° has pushed crop growth and development. After the first cutting has been harvested, check regrowth under windrows for active larval feeding on foliage. If 8 or more larvae per square foot are found or regrowth is slow due to severe larval feeding, treatment is recommended.

Figure 1. Current Alfalfa Weevil Degree-Day Accumulations (base 48°F) as June 6, 2023 (Source: NDAWN)



CANOLA FLEA BEETLE FEEDING FRENZY

Most canola fields need to be scouted to ensure that their insecticide seed treatments are still working to control flea beetles and prevent feeding injury. These fields would be early planted fields where canola has been emerged for 10-14 days or more. In some areas of canola production like Northeast North Dakota, the insecticide toxins are not being taken up readily since the seedling canola plant is not actively growing due to the dry and hot conditions. In these cases, a rescue foliar insecticide is recommended to help protect the plants from severe feeding injury caused by flea beetles (E.T. = 25% defoliation). Once the canola reaches the 4-6 leaf stage, it will be able to tolerate the flea beetle feeding pressure better. Flea beetle activity should start to decline in 2 weeks due to natural mortality of spring population.

Flea beetles feeding injury in the untreated check (left) and Helix Vibrance (23 fl oz per cwt) + Lumiderm (9.8 fl oz per cwt) seed treatment (right) plus a foliar rescue treatment of Brigade (2.6 fl oz per acre) applied at 10 days after emergence. Note more uniform plant stand and larger plants in seed treatment. Soil cracks indicate the extreme dry and hot conditions increasing flea beetle pressure and decreasing plant growth. (P. Beauzay)

COLORADO POTATO BEETLES EMERGED

This beetle is the most common and destructive leaf feeding pest of potato. Both adults and larvae feed on foliage. The adult is ⅜ inch long, with oval body and a yellow-brown with 5 black stripes on each wing cover. The larvae are ⅛ to ⅜ inch long, brick red to light orange in color. Eggs are laid on the underside of leaves in clusters of 10 to 30 and are orange when ready to hatch. In North Dakota, overwintered beetles emerge from May to June. The first-generation larvae are present in the fields from June through July. Beetles from these larvae appear in fields in July, feeding and laying eggs for a second generation.

Colorado potato beetle adult, eggs and young larvae that recently hatched from eggs (J. Knodel)

One of the greatest concerns with management programs for beetles is resistance to insecticides. In North Dakota, resistance to the pyrethroid insecticides has been documented and the use of these compounds should be limited to one application per season. If control failures occur following the application of any product in a field, switch to a different class of insecticides to help reduce the risk of insecticide resistance.

Threshold: The current recommendation is that spraying be initiated at first egg hatch. Best results have been achieved by flagging the first egg masses that can be located, monitoring these daily, and spraying at 15 to 30% hatch. If the

insecticide used is effective but not persistent, a second application with a different mode of action should be made 5 to 10 days later. With this approach, the first-generation beetle larvae should be controlled with one or two applications.

For insecticides registered for control of Colorado potato beetles, please refer to the 2023 North Dakota Field Crop Insect Management Guide.

BLISTER BEETLES

Several species of blister beetles are being observed feeding on alfalfa (preferred crop), soybeans and canola in central and western North Dakota. Due to the high populations of grasshoppers over the last several years, we are seeing more *Epicauta* blister beetles since larvae feed on grasshopper egg pods. Other crops attacked by blister beetles include dry beans, faba beans, potatoes, sugarbeets and others.

Blister beetle feeding injury - defoliation on soybeans (Greg Endres, CREC)

Most species of blister beetle have one generation a year. Adults become active in early to mid-summer and lay eggs in the soil. Eggs hatch in about two weeks into a larva. Larvae overwinter. Adult blister beetles are attracted to blooming fields, where they are ravenous feeders devouring leaves, stems, flowers, and pods. These beetles are mobile and often congregate in certain spots in a field from their gregarious behavior. In some instances, blister beetles feed for a short period of time and then migrate to other plants or fields.

Thresholds for Blister Beetles:

Forage Crops: There is no treatment threshold for blister beetles in alfalfa hay. When they occur in alfalfa and other forage crops where they may be ingested by horses or other livestock, serious illness or even death may result from their poisonous cantharidin toxin in their body fluids. This can cause life-threatening inflammations in horses and livestock. Several management options are available, which can reduce the number of blister beetles found in forage crops, but none will completely eliminate the problem. See blister beetle publication E1002 (below).

Canola: Adult feeding on foliage is typically not significant enough to warrant an insecticide treatment. Treatment is justified when there are 10 adult blister beetles per plant feeding on the flowers or pods. Spot treatment is usually recommended.

Other Field Crops: Blister beetles usually are not economic insect pests of field crops, so there is no established threshold in most field crops. Blister beetles damage crops by eating the foliage, so the established defoliation threshold for other insects in beans [dry edible beans, faba beans and soybeans] is suggested for blister beetle control. Control in bean crops is warranted when 30% of the foliage is destroyed prior to bloom or when 20% of the foliage is destroyed after bloom, pod set or fill.

Gray and black blister beetles (Epicauta spp.) feeding on alfalfa (Greg Endres, CREC)

Follow safe pesticides practices when spraying flowering crops to protect honey bees and pollinators. For more information, see the NDSU Extension publication - ***Blister Beetle Management in Forages and Field Crops E1002 (revised)***.

ARMY CUTWORM MOTHS

Army cutworms overwinter as partially grown larvae in the soil and complete their development in the spring. After pupation, adults emerge from the soil in June and feed on pollen and nectar of trees/flowers. In southwestern North Dakota, army cutworm moths are being observed in high numbers on pines and other trees in Dickinson and Bismarck (Sources: Kurt Froelich and Kelsey Deckert, NDSU Extension). However, army cutworm moths do not harm the trees. They also are night flying moths that are attracted to the city lights.

Army cutworm moth (Kelsey Deckert, Burleigh/Morton Counties)

After a brief feeding period, moths fly to the Rocky Mountains in Montana or other mountainous areas in July and August. Moths feed on the nectar of alpine flowers, and aggregate in large numbers under soil lumps, rocks and stumps during the day. Army cutworm moths serve as an important food source for grizzly bears.

From late August to late October, moths become active and fly back to the Plains to lay eggs in soft soil of freshly cultivated weedy fields or in a wide variety of crops, including alfalfa, barley, canola, field corn, flax, mustard, oats, sugarbeets and wheat. Eggs are laid singly. Each female can lay 1,000 or more eggs. When moisture is adequate in September, eggs hatch in a few days to two weeks, and larvae feed for as long as the weather permits in fall. Larvae remain in the soil during the day and come out at night to climb up on plants to feed on leaves.

For more information, see the NDSU Extension publication – ***The Armyworm and The Army Cutworm E830 (revised)***.

Janet J. Knodel
Extension Entomologist

SUGARBEET ROOT MAGGOT: FLY ACTIVITY PEAKING, BUT UNSETTLED WEATHER COULD PROLONG IT

As was the case in three of the past six years, unseasonably warm weather periods in May of 2023 led to large, atypically early surges in sugarbeet root maggot (SBRM) flight activity at several monitoring sites throughout the Red River Valley. This presents a concerning and threatening scenario for many sugarbeet producers. Planting was delayed in many areas of the Valley this spring, which has resulted in atypically small sugarbeet seedlings in many fields. Despite the delays in sugarbeet planting, the recent periods of extremely warm weather have accelerated SBRM development and emergence from their overwintering sites (i.e., last year's sugarbeet fields), thus leading to small plants that will be vulnerable to attack by SBRM larvae. This scenario could be further exacerbated by continued hot, dry weather which, combined with SBRM feeding injury, can lead to seedling mortality.

The NDSU SBRM model indicates that fly activity in most of the growing area should have reached peaks in the past few days, with the southern Valley peaking between June 3 and 5, and central and northern parts of the growing area

Figure 1. Sugarbeet root maggot larvae on root (M. Boetel, NDSU)

peaking between June 6 and 7. Overall, this year's SBRM fly activity peaks will likely have occurred a little over one week earlier than historical averages.

The unsettled weather pattern the area has been experiencing during the past several days is expected to continue for at least a few more days. This type of weather can inhibit SBRM fly activity, as the insect favors calm, dry conditions for flight, colonization of sugarbeet fields, mating and egg laying. The expected stormy weather could lead to more broadly spread out periods of SBRM fly activity this year. Fields should be monitored closely for at least another week for potential resurgences of the pest.

SBRM fly activity is again being monitored throughout much of the Red River Valley this year in a cooperative effort between NDSU and American Crystal Sugar Company. As observed last year, cumulative fly counts at several sites are quite concerning. Activity remains at high levels in many fields throughout the growing area. Although high SBRM infestations are mostly concentrated in the central and northern Valley, the Sabin/Baker, MN area is also experiencing some of the highest fly densities in the growing area for the second consecutive year. SBRM monitoring sites where the highest fly counts have been recorded thus far are presented in Table 1. Daily and cumulative fly counts from all locations can be viewed online at: https://tinyurl.com/SBRM-FlyCounts.

Table 1. Cumulative sugarbeet root maggot fly counts per field (2 sticky-stakes/field) in selected Red River Valley locations during the 2020 growing season (as of June 5, 2023)

Nearest City	Township	Section	Cumulative Fly Count (per 2 Stakes)
Voss	Walsh Centre	29	789
Crystal	Elora	5	761
Sabin	Elmwood	12	698
Thompson	Walle	27	686
Ada	Green Meadow	33	658
Donaldson	Springbrook	20	565
East Grand Forks	Huntsville	9	536
Veseleyville	Ops	4	526
Reynolds	Belmont	18	507
Ada	Lockhart	10	500
Crookston	Fairfax	22	499
St. Thomas	St. Thomas North	15	472
Argyle	Alma	17	452
Stephen	Wanger	4	434
Oslo	Turtle River	8	425
Auburn	Farmington	13	424

Postemergence SBRM Control. Growers in high-risk areas for damaging SBRM infestations who have not yet made a postemergence insecticide application should do so as soon as possible, as the window for effective performance is closing. This is especially important in cases where there was no at-plant insecticidal protection or where the at-plant protection involved wither an insecticidal seed treatment, a planting-time liquid insecticide, or a low to moderate rate of a granular insecticide. Fields in which heavy rainfalls (≥ 3 inches) occurred within two to three days after at-plant or postemergence insecticides were applied also could require additional postemergence protection.

The best control option this time will be a sprayable liquid insecticide application, which can either be applied by ground-based equipment or aircraft. Postemergence liquid insecticides perform best if applied close to (within 2-3 days of peak fly; either on, before or after peak). Treated fields should be monitored closely during the next few days for fly activity persistence or resurgences. Some fields could require retreatment if subsequent infestations reach or exceed 0.5 flies per plant.

For more information on controlling the sugarbeet root maggot or other insect pests in sugarbeet, 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

WINTER WHEAT SCAB RISK UPDATE

There are varying reports of winter wheat growth stages in the state ranging from boot stage to heading. In the coming days, we will be approaching the flowering growth stages and some may consider applying a fungicide to offset the damage caused by Fusarium head blight (scab). The best way to manage scab in winter wheat (and all small grains) is using an integrated strategy focused on the use of a moderately resistant variety and a well-timed fungicide. Information related to variety susceptibility can be found in the North Dakota Hard Red Winter Wheat Variety Trial Guide (NDSU Extension A1196-22). There are several fungicides rated as having good efficacy (50 to 60% suppression) and include Caramba, Proline, Prosaro, Prosaro Pro, Miravis Ace, and Sphaerex, whereas Folicur (generics) are rated as fair (20-25% suppression). The Crop Protection Network publication "Fungicide Efficacy for Control of Wheat Diseases" (CPN-3002-W) can be used to compare efficacy differences among fungicides in wheat. The best time to apply any of the effective scab fungicides in winter wheat is from early flowering (Feekes 10.51) and up to seven days later (Figure 1).

Figure 1. The orange box highlights the best time to make a fungicide application in hard red winter wheat. The wheat spikes in the highlighted box range from early-flowering (yellow flowers center of head) and up to seven days after flower initiation (a few white flowers still attached to spike).

The more popular question will be "Should I spray my winter wheat for scab?" First, scab is driven by warm temperatures and prolonged periods of high humidity. These environmental factors are needed for both pathogen development (think fungal fruiting structures that release spores) and infection of the wheat spike. Some areas of the state have experienced several days of high winds, hot temperatures, and very low relative humidity. These type of conditions would drastically lower scab risk. However, spotty thunderstorms and higher levels of humidity have also been experienced in the state. In this situation, scab risk will be elevated. The next seven days look to be unpredictable in terms of rain and humidity. The combination of these factors make it difficult for blanketed statements on scab risk at this point in the growing season.

As of June 6, the scab risk models available at NDSU (https://www.ag.ndsu.edu/cropdisease) and the US Wheat and Barley Scab Initiative (https://www.wheatscab.psu.edu/), indicate low scab risk for winter wheat. Based on conversations with county agents, there are significant differences in rainfall totals, and field conditions vary across very short distances (less than one mile) that may not be reflected in the models. Therefore, please use the models as a guide to estimate scab risk, but also take into account personal observations of winter wheat fields. One final factor that must be considered is the condition and yield potential of the winter wheat crop. I will provide more updates as we monitor the weather conditions over the next 7 to 10 days.

Andrew Friskop
Extension Plant Pathology, Cereal Crops

plant science

CROP YIELD POTENTIAL

Although the 2023 growing season had a late start, the warm weather has accelerated crop emergence and development. Canola, soybean, dry bean, and sunflower are all at 5-year average growth stages. In order to look at some crop yield trends, I compiled North Dakota's canola, soybean, pinto bean and sunflower yield data as reported by the National Agricultural Statistics Service. The dots in the graphs represent the average farm yields obtained in North Dakota. The red line is the trend line based on the data presented.

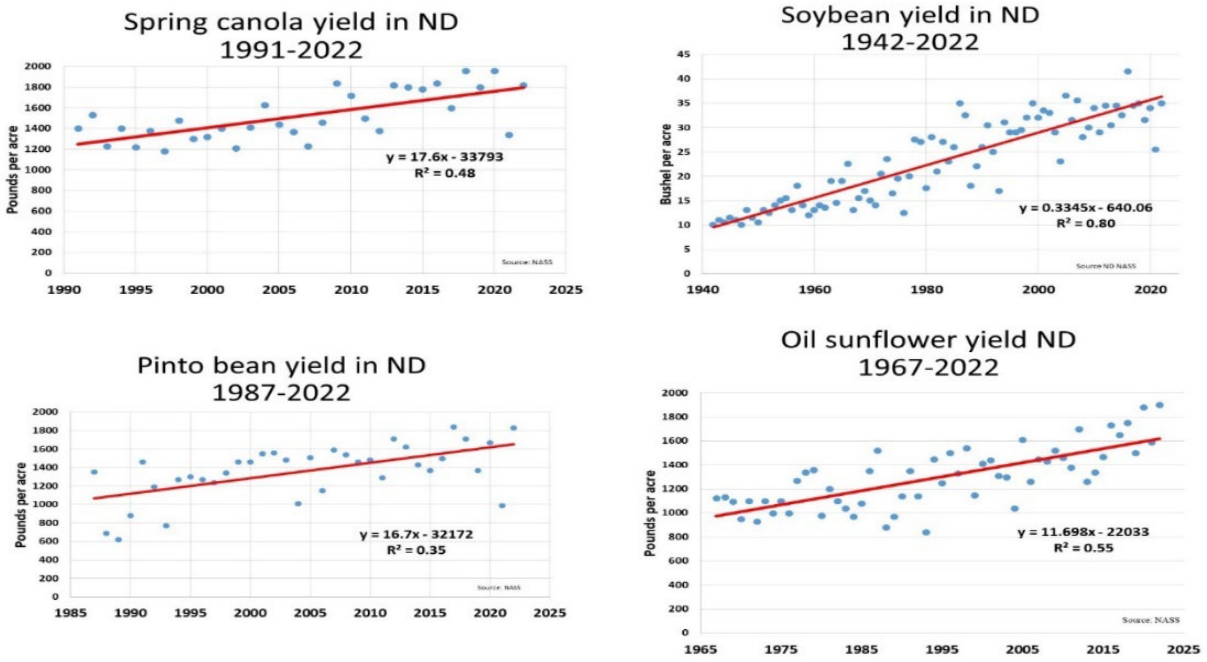


Figure 1. Average North Dakota farm canola, soybean, pinto and sunflower yields per acre, and trend lines. Source: North Dakota National Agricuultural Statistics Service.

Based on the regression equations the annual yield gain was 17.5, 16.7 and 11.7 pounds per acre for canola, pinto bean and sunflower, respectivley (Table 1). The soybean annual yield gain was 0.3 bushel per acre.

Table 1. Average North Dakota state yield by crop for the period 1991-2022, yield gain per year, and predicted yield for 2023 based on the regression equations in Figure 1.

Crop	Average yield	Yield gain per year	Trend line yield 2023
Canola	1534 (1991-2022)	17.5 pounds per acre	1812 pounds per acre
Soybean	31.3 (1991-2022)	0.3 bushel per acre	36.6 bushels per acre
Pinto Bean	1419 (1991-2022)	16.7 pounds per acre	1612 pounds per acre
Oil Sunflower	1435 (1991-2022)	11.7 pounds per acre	1632 pounds per acre

Source: based on regression equations from Figure 1 with data from National Agricultural Statistics Service.

Annual yield increases are due to better genetics, improved crop management, and increased period between last frost in the spring and first frost in the fall, benefitting some crops. The trend line yields predicted for 2023 provide an estimate of expected yield. Weather conditions and crop management during the season will greatly influence what yields will actually be obtained.

Hans Kandel
Extension Agronomist Broadleaf Crops

soils

WHERE DID THE WIND BLOW MY SOIL?

Given that early 1900's soil surveys of counties or regions in North Dakota indicate general loss of feet of topsoil due mostly to wind erosion, the question arises 'Where did it go?'
The logical answer is 'mostly away'. Although there are 'pachic' soils within landscapes (soils usually at hill footslopes that accumulate topsoil over time), the depth of the pachic horizons and their extent by no means come close to equaling soil loss over the past 140 years.

Let's examine a 1-inch soil loss from a quarter section of land (this happened several times during the past 5 years to many conventional till fields in the state). Six inches of soil in an acre weighs about 2,000,000 pounds. One inch of soil per acre therefore weighs 333,333 pounds. So, 160 acres of 1-inch topsoil loss equals 53,333,333 pounds, or 26,666 tons. Let's say that in the ditch, there is one foot of topsoil deposited 10 feet across for ¼ mile. This is 52,800 cubic feet of soil. At 92 pounds per cubic foot, this is 2,429 tons. You dredge out the 2,429 tons, spread it over about 10 acres, and all is good, right? The soil lost from your quarter section remains at 26,666 less 2,429 = 24,238 tons.
Some might have gone to the neighbors.

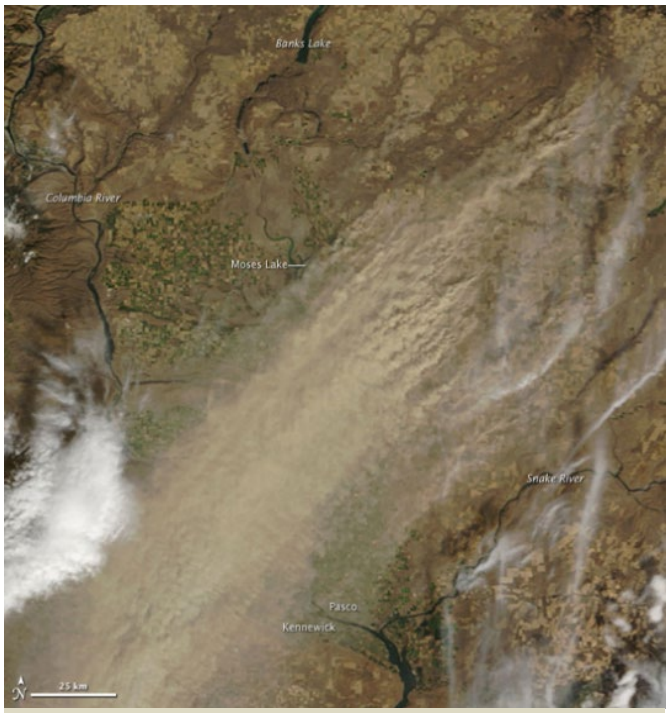
The following image is of county road employees clearing off blown in soil from a field next door. They hauled out 30 truckloads of soil (about 240 tons).

However, the great load of soil goes far up into the air. From satellite, it is possible to track dust storms, such as one in the Washington State Palouse country several years ago.

A Bismarck Tribune newspaper story chronicling a two-day April dust storm in 1934 stated that airplane pilots encountered dust up to 14,000 feet.

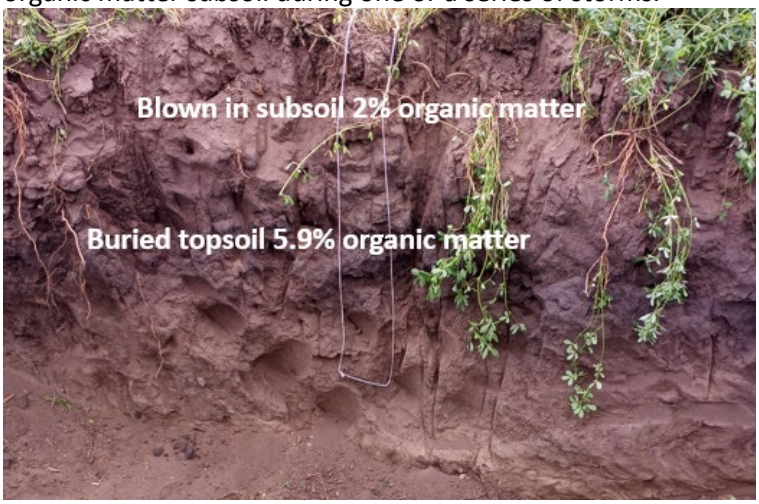
For perspective, let's say that 1,000,000 acres lost 1 inch of topsoil during a dust storm in the conventionally tilled soils in central/eastern North Dakota one day.

The total surface of the earth is 126 billion acres. If the topsoil lost in the dust storm event fell evenly over the earth, the depth of deposition per acre would be about 0.000008 inches, or 0.0002 mm. Hardly noticeable. Its weight per acre would be 2.6 pounds dust. Annually, the dust that settles on the earth surface from all sources is about 176 pounds per acre. Although the topsoil lost in a dust storm event means a lot to the farmers trying to sustain productive acres, it's impact on the earth's surface is minimal.



NASA image of dust storm moving soil more than 100 miles from its source in the Palouse region and off the picture.

Finally, when archaeologist try to find relics, what do they do? They dig. Because after a few thousand years, the dust that settles over areas can be deep. Not much in a single year usually, but added over time, the soil lost in North Dakota fields contributes to the buried depth of earth surface. I write usually, because near Inkster, a soil pit made for a 4-H/FFA Land Judging Competition a couple years ago revealed that a dust storm had buried the original 5.9% organic matter topsoil on the north side of a slight ridge with over a foot of 2% organic matter subsoil during one or a series of storms.



TOPDRESSING WHEN IT'S DRY

The weather lately has made it difficult to schedule top-dress N application to the many acres of small grains/canola that were drilled in with little to no preplant N due to weather and custom applicator delays. The question now is how whether the application be scheduled before a rain, or just applied whenever it can be done. The weather is so hit or miss, that trying to schedule an application of urea right before a rain would be require astounding luck. However, if the small grains have emerged and they are tillering or later, it is important to apply the N regardless of the weather. The humidity in the mornings has been very high, and there has been sufficient dew in most of the state that small grain roots are close to the surface and the plants are self-irrigating. If the urea is treated with NBPT at the proper rate, there is no reason on these advanced small grains, or canola in the rosette stage for the N not to be applied. Corn and row crops should be side-dressed in the state by V8 so that high yield decisions are made by the corn and it is not starved for N at a time with rows on the ear and other components of yield are determined. Row-crops are best side-dressed by the use of coulter-applied UAN or anhydrous ammonia. Urea can be applied over the top, but it should be treated with NBPT and rates should be less than 60 pounds of N per acre to avoid burning in the whorl.

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weeds

LESS WIND, BUT CHALLENGING SPRAY CONDITIONS REMAIN

With crop and weed growth progressing rapidly in response to warmer-than-average temperatures, spray season is upon is. Several county agents and REC-based specialists reported incredibly windy conditions a couple of weeks ago, and I was curious how NDAWN weather data could be summarized to reflect the suitability of spray conditions. Such analyses could provide valuable benchmark information for pesticide applicators.

Figures 1 and 2 reflect an example analysis of NDAWN hourly wind data for the last two weeks. I assumed the following, which reflect label restrictions for over-the-top dicamba applications:

- Optimal wind conditions = wind speeds between 3 and 10 mph
- 1 full day = the number of hours between 1 hour after sunrise and 2 hours before sunset (i.e. no spraying allowed outside these times)

For last week across the NDAWN network (5/28 - 6/3, **Figure 1**), the median number of days with optimal wind conditions for spraying was 4.1. Much of ND had between 4.0 and 5.5 days with optimal wind conditions, although areas in NW, NE, and SE ND experienced slightly less favorable conditions.

Last week's conditions were a considerable improvement over the prior week (5/21 - 5/27, Figure 2), where the median number of days with optimal wind conditions for spraying was 2.5. Most of ND had fewer than 3.0 days with optimal wind conditions for spraying, and much of NE and SE ND had fewer than 2.0 such days.

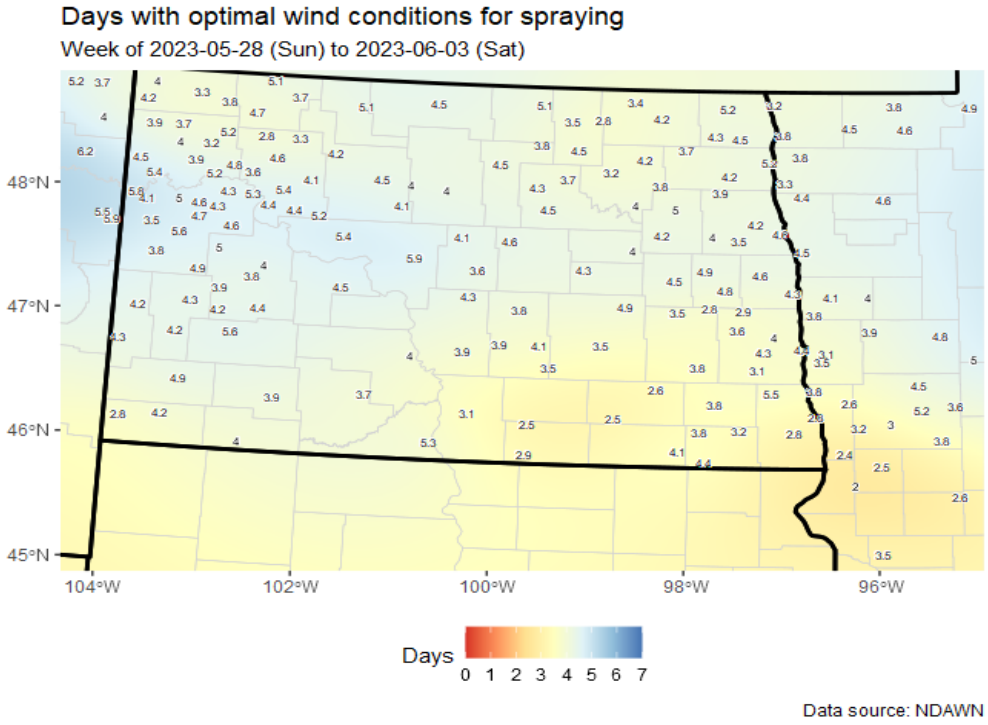

Figure 1. Estimated number of days with optimal wind conditions for spraying at NDAWN

Why does this matter?
I'm hoping to investigate the possibility of an Extension publication that leverages the NDAWN dataset to develop valuable benchmarking information for applicators. This is a trial run for the types of analyses that are possible, and also illustrates a meaningful weather shift that has occurred over the past few weeks.

What can you do about it?
While you obviously cannot control the wind, you can configure your sprayer to minimize drift. Follow the recommendations on page 86 of the ***2023 North Dakota Weed Control Guide***.

What else should you watch for?

- **Precipitation**. Refer to the minimum rain-free intervals on page 81 of the ***2023 North Dakota Weed Control Guide***.
- **Temperature**. The state has been in a prolonged pattern of well above-average temperatures. Be aware of the potential consequences of high temperatures for herbicide applications: increased volatility of certain herbicide active ingredients, increased activity of certain herbicide active ingredients, and potential for increased crop injury.
- **Delta T**. Relatively low values (< 3.6) indicate marginal spraying conditions due to relatively high moisture content in the air. Evaporation is limited under these conditions, resulting in fine droplets having a greater tendency to drift. These conditions could also indicate dew or excessive wetness on plant surfaces, which could reduce herbicide effectiveness. Relatively high values (> 18 for MEDIUM and FINE spray qualities, > 21.6 for COARSE or larger spray qualities) indicate that evaporation rates are so great that pesticide applications are no longer recommended. For more details, see page 133 of the 2023 North Dakota Weed Control Guide or the Delta T supplement to the 2021 guide.
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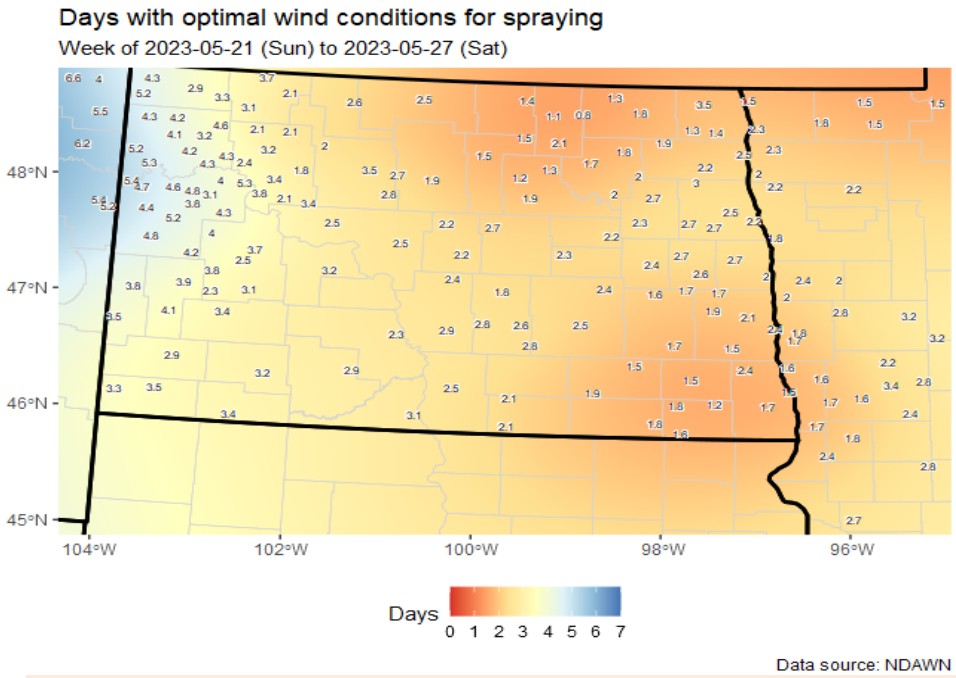


Figure 2. Estimated number of days with optimal wind conditions for spraying at NDAWN stations during the week of May 21 to May 27, 2023.

Rob Proulx
Extension Agriculture Technology Systems Specialist

around the state

NORTH CENTRAL ND

The region has been a bit dry in the past week with hit-and-miss showers. The top 2 inches of the soil are dry and it can play a challenge for seed germination. Several operations are under way at the same time in the field, which add more challenge for farmers to seed and control weeds at the best timing. At the NCREC, 0.02" of rain was observed since last Monday (May 30th). The following are precipitation observations across the area as noted by local NDAWN stations from May 30th through June 6th: Bottineau: 1.01"; Garrison: 0.29"; Karlsruhe: 0.47"; Mohall: 0.13"; Plaza: 0.13"; and Rugby: 0.47".

Canola flee beetle are observed in the field and also some grasshoppers' nymphs are being reported in the area. IPM Scouting Team is in the North Central fields starting this week. NDSU IPM Scout program is very helpful to monitor crops insects and diseases across the state.

Spring wheat is found in a wide range of stages in the region, but mostly are in the 2-3 leaf stage to tillering. Canola stage is found ranging from seedling to rosette (2.1 to 2.3) stages. Flax is found in stages 1 to 3. Corn is ranging from V1-V2 stage. Soybeans are found in VC to V2 stages.

Leo Bortolon
Extension Cropping Systems Specialist
NDSU North Central Research Extension Center

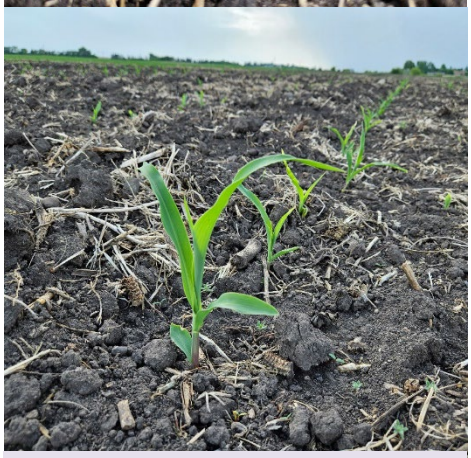
NORTHEAST ND

Much of the NE region received some relief from drought with spotty showers ranging from none to too much rain of up to 2.5 inches. The spots that received more than an inch had standing water in the fields. Small grains plantings are 100% done with many fields emerging. Growth stages ranged from emerging to jointing stages depending on the date of planting. Growers are wrapping up planting and moving on to activities like weed control and soybean rolling. Broad leaf crops and corn are progressing at a rapid pace with the high temperatures. Early emerged canola is actively growing

Barley at 3 leaf stage at the Langdon Research Extension Center
Photo: Anitha Chirumamilla

Field Peas in Cavalier County
Photo: Anitha Chirumamilla

reaching two leaf stage. In certain areas, seed treatments are wearing off due to heavy flea beetle pressure needing rescue foliar applications. Alfalfa stands are looking good and majority of the fields are heading towards their first cut.



Emerging canola and corn at 2-3 leaf stage in Ramsey County
Photos: Lindsay Overmyer, Extension Agent, Ramsey County

Fields sitting in water due to heavy rains.
Photo: Farmer, Walsh County

Anitha Chirumamilla
Extension Cropping Systems Specialist
Langdon Research Extension Center

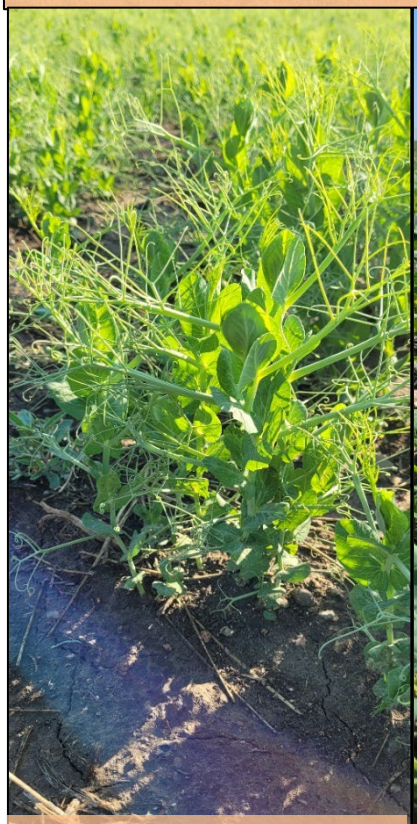
NORTHWEST ND

Temperatures in the northwest are finally starting to get hot. In the past days three days (June 4 to 6), highest daytime temperatures are now in the high 80ºFs to low 90sºF and lowest night time temperatures are now in the low to mid 60sºF. Bare soil temperatures at the 4" depth is now in the mid 70sºF to low 80sºF. There were scattered rain showers and thunderstorm in the northwestern counties but majority of the areas did not receive rainfall. From June 1 to 6, ndawn weather stations located in Hofflund, Ross, Portal, and Fortuna recorded total rainfalls of 1.08", 0.9", 0.49"and 1.20", respectively, however in the same time line, little to no rainfall were recorded in other ndawn weather stations such as in Pioneer, Alexander, Crosby, Bowbells, and Crane Creek.

The farm landscapes are now dotted with emerged broadleaf crops anywhere from emerged to 3 leaf in canola, cotyledon to 3rd trifoliate in soybean, emerged to V3 in corn, emerged to 7th node in field peas, emerged to 4th multifoliate leaf in chickpea, emerged to V5 in lentil, and from 1st tiller to joints starting to form in our small grain crops. First of the many harvest of alfalfa for hay has started. We are also now seeing large numbers of tiny grasshopper nymphs (up to 0.5" long bodies) in grass crops that are moving to emerged broadleaf crops. We've also seen increased activity of herbicide applications post emerge to small grains to control grass and broadleaf weeds alike.

Alfalfa freshly cut for hay in McKenzie County.

A half-inch long grasshopper nymph found in spring wheat.



Field pea in Mountrail County

Canola field in Williams County

A farmer busy spraying timely herbicide in spring wheat.

Charlemagne "Charlie" Lim
Extension Cropping Systems Specialist
NDSU Williston Research Extension Center

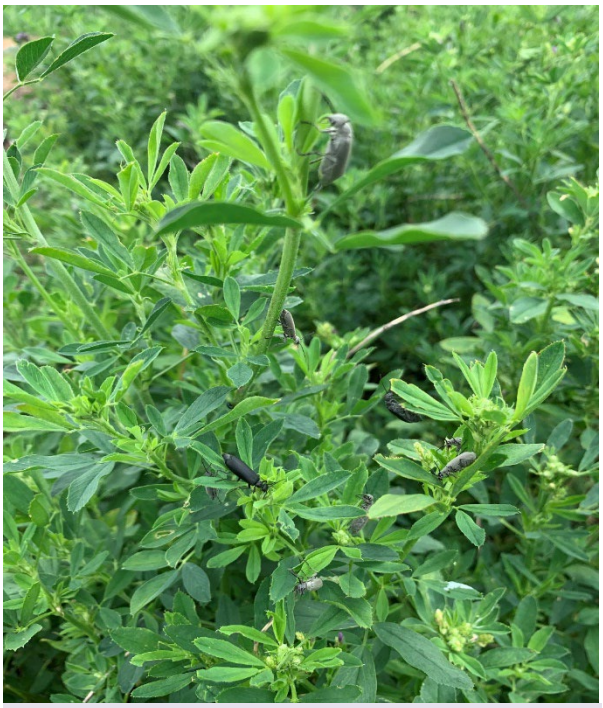
SOUTH-CENTRAL/SOUTHEAST ND

According to NDAWN, rain received in this region during May 1 to June 5 ranges from 2.3 inches (Brampton and Streeter) to 5.3 inches (Lisbon), with the Carrington Research Extension Center (CREC) receiving 5.1 inches. Though generally adequate subsoil moisture is present in the region, topsoil moisture seems highly variable (dry to excess) due to scattered and localized thunderstorms received during recent weeks.

Estimated row crop planting progress in the region: grain corn essentially complete; majority of soybean, dry bean and sunflower acres planted.

At the CREC, alfalfa has begun flowering. Winter rye is flowering and winter wheat is near heading. Early May planted barley and spring wheat are in the 5- to 6-leaf (jointing) stages. Mid-May planted corn is in the 4-5 leaf stage. Leaves and ear shoots are forming as well as rows per ear being determined. Emerged soybean range from VC (unifoliate leaf) to V3 (three trifoliate leaves).

Winter rye at anthesis.



Blister beetles feeding on alfalfa.

Weeds are abundant and rapidly growing like our crops. Flea beetles and associated plant damage continue to be commonly found in canola. Blister beetles are present in legumes at the CREC including alfalfa, fababean and soybean. Tan spot is readily found, including on flag leaves, in CREC winter wheat that is growing in spring wheat residue.

Upcoming agronomy field event at CREC: Crop Management Field School, June 29.
https://www.ndsu.edu/agriculture/ag-hub/events/crop-management-field-school

Greg Endres
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weather

WEATHER FORECAST

We've been in a stagnant pattern due to a persistent upper level high pressure ridge parked over the northern plains. At the surface, daytime highs have been above normal each day, generally in the upper 80s to low 90s (Figure 1). Dew point temperatures also have been high (Figure 2).

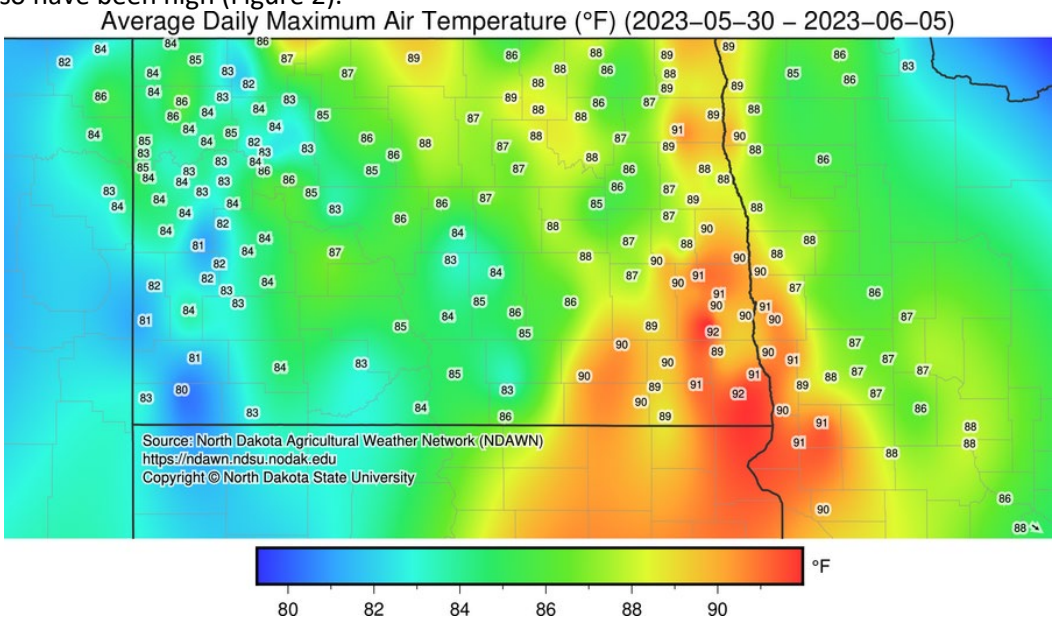

Figure 1. Average daily maximum air temperatures from May 30 through June 5 at NDAWN stations.

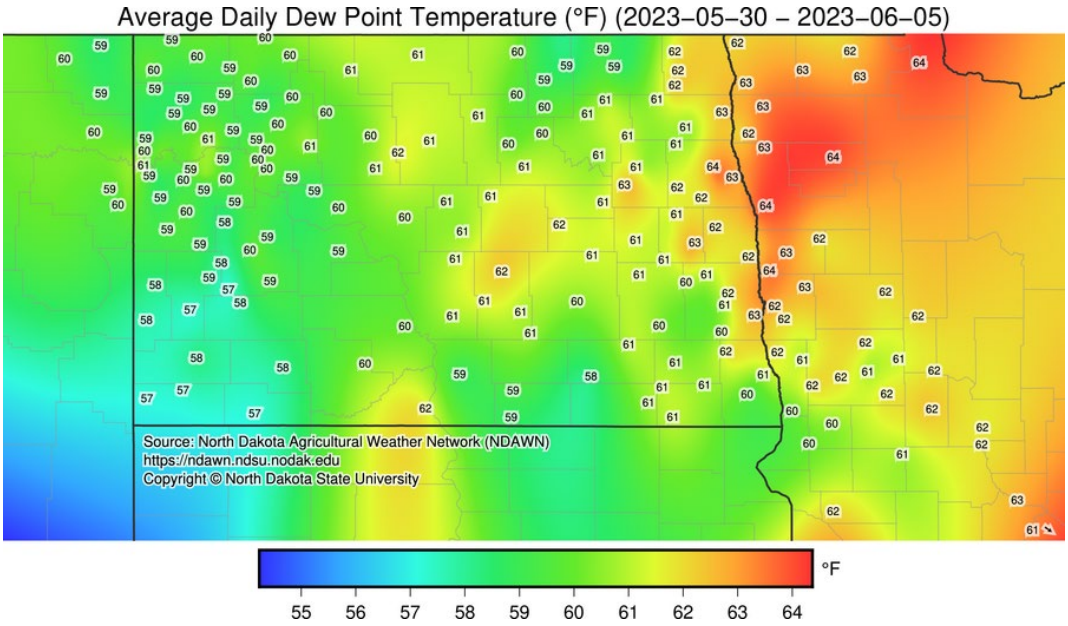

Figure 2. Average daily dew point temperatures from May 30 through June 5 at NDAWN stations.

Daytime heating of humid air resulted in convective 'pop up' thunderstorms developing across ND late in the afternoon each day. These storms have had very light mid and upper level winds to steer them in any direction, or to sustain them for long, so they've been relatively stationary and short-lived. Some of the storms produced heavy rainfall, with radar-indicated amounts of over 3 inches. Strong wind gusts of close to 50 mph have also been reported with some of these storms as they collapsed. An interesting feature I've seen on Doppler radar has been outflow boundaries associated with collapsing storms. Several storms topped out at over 40,000 feet, including a storm near my home on Tuesday evening that reached 47,000 feet. As the storms collapsed, the downward rush of air hit the ground and spread outwards, visible on Doppler radar as thin bow-shaped lines (Figure 3).

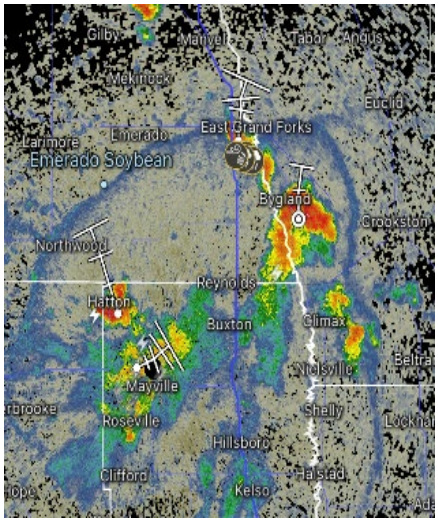

Figure 3. Outflow boundaries from storms near Fargo on June 5.

Unless you were underneath one of those soaking rains, it looks like soil moisture conditions became drier over the past week. Figures 4 and 5 show the 7-day change in volumetric soil moisture at the 4 inch and 8 inch depths, respectively, for the week through June 5. Soil moisture is optimum to deficient at the 4 inch and 8 inch depths across the state (Figures 6 and 7).

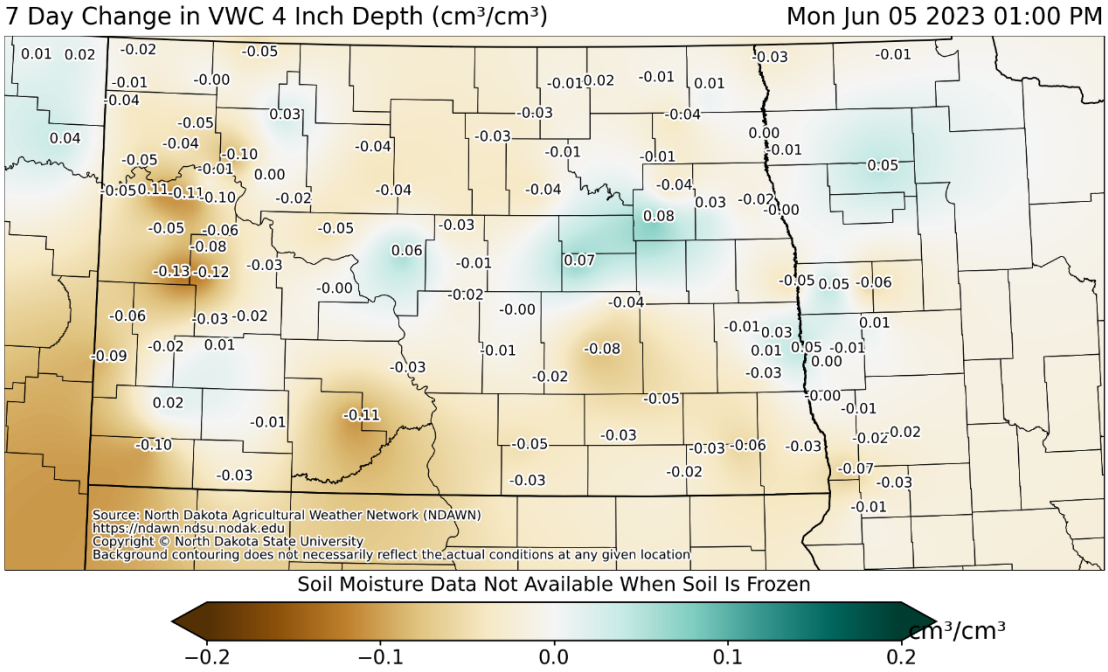

Figure 4. 7 day change in soil volumetric water content at 4-inch depth ending June 5 at NDAWN stations.

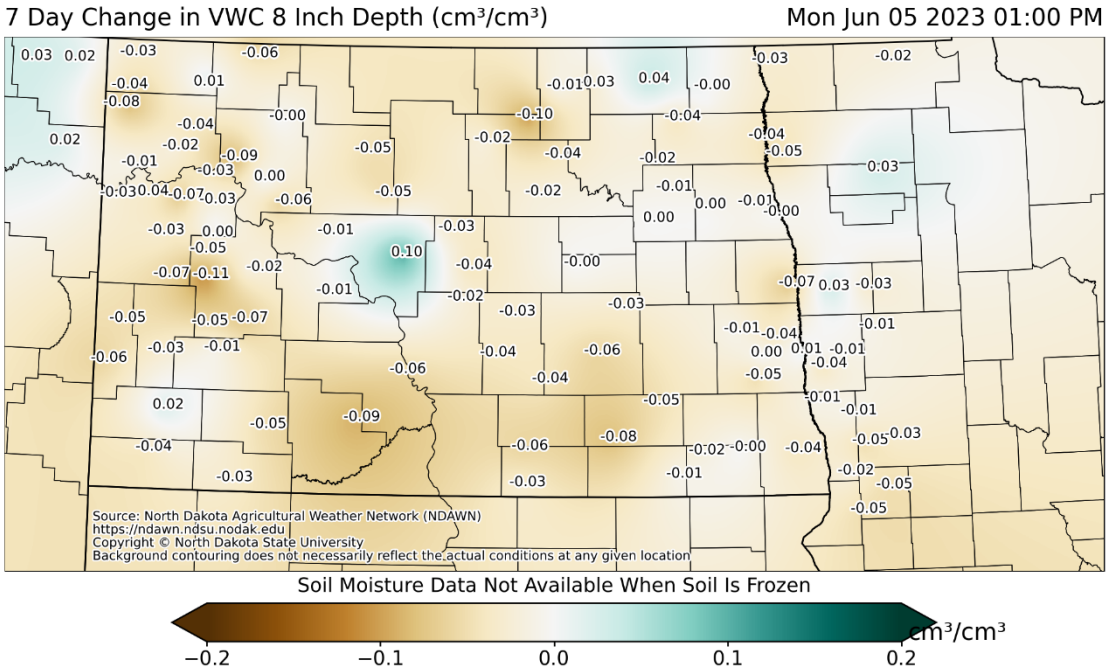

Figure 5. 7 day change in soil volumetric water content at 8-inch depth ending June 5 at NDAWN stations.

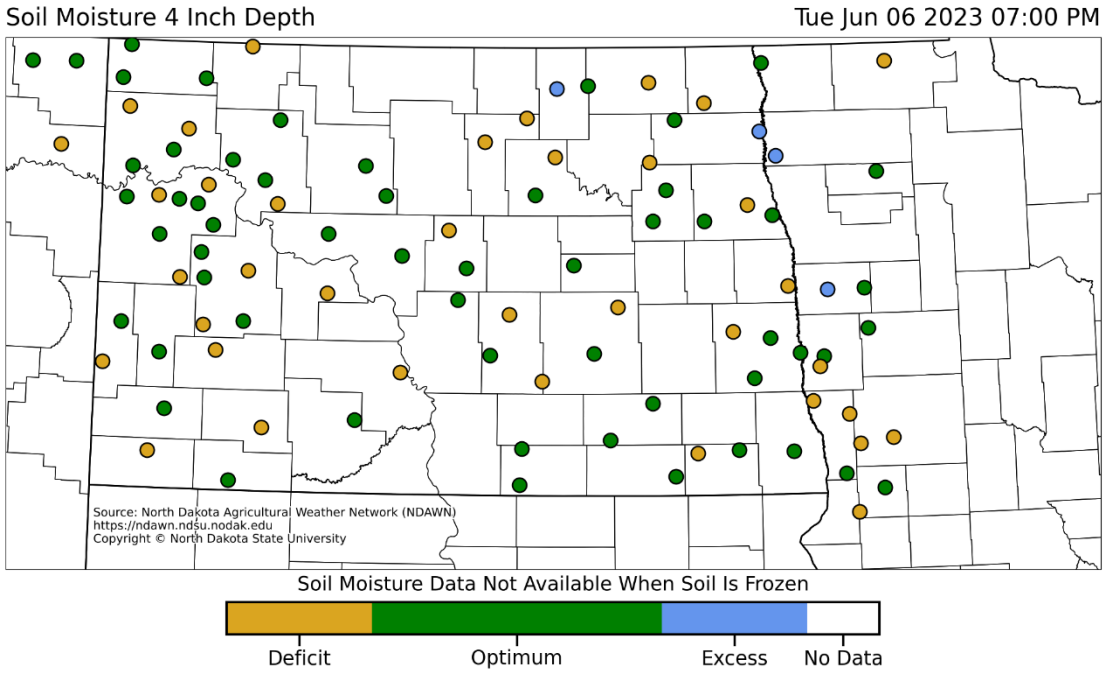

Figure 6. Soil moisture at 4-inch depth as of 7:00 p.m. on Tuesday, June 6 at NDAWN stations.

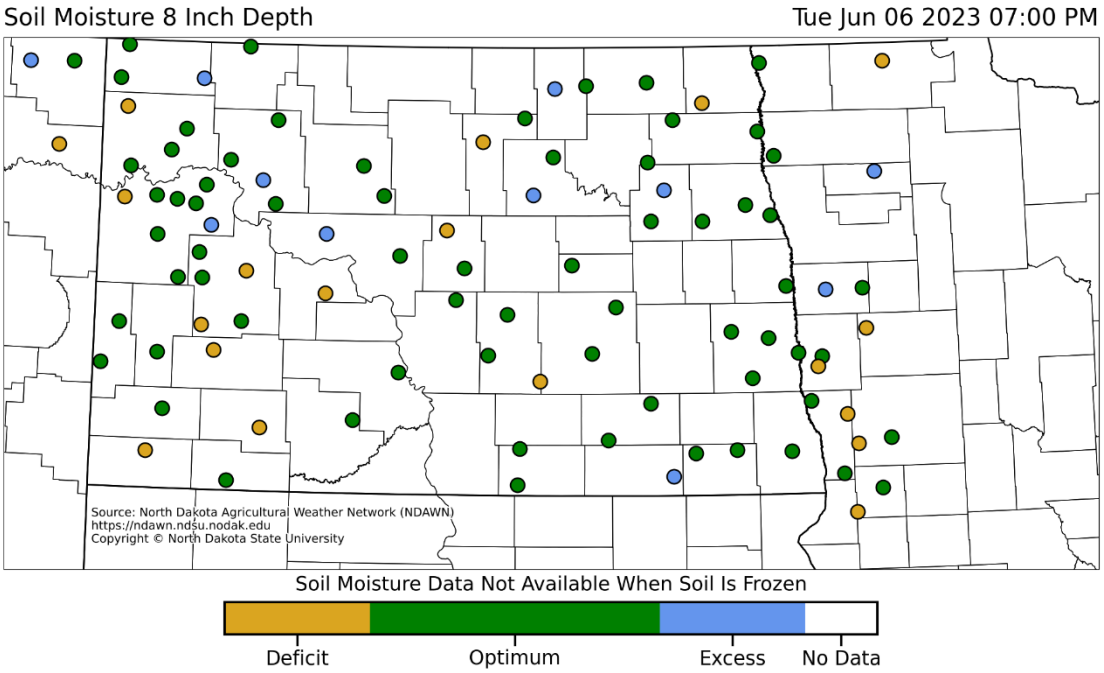

Figure 7. Soil moisture at 8-inch depth as of 7:00 p.m. on Tuesday, June 6 at NDAWN stations.

Outlook for the Week Ahead

The same stagnant pattern will persist through at least Friday, so expect more of the same - hot and humid with a chance of thunderstorms each day. Again, mid and upper-level winds will be weak, but an isolated severe thunderstorm or two can't be ruled out. Small hail and gusty winds will be the main threats. Going into the weekend, it looks like the upper level high will shift westwards and bring cooler temperatures and dry conditions to our region into early next week. The 6-10 day temperature and precipitation outlooks call for above normal temperatures and near normal precipitation (Figures 8 and 9).

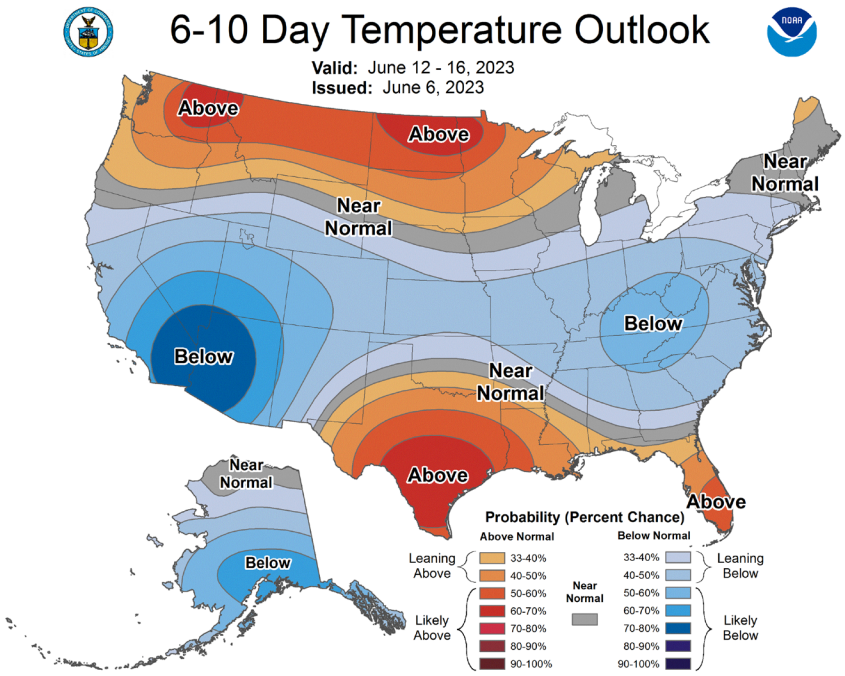

Figure 8. Temperature outlook for the continental United States and Alaska from June 12 - June 16.

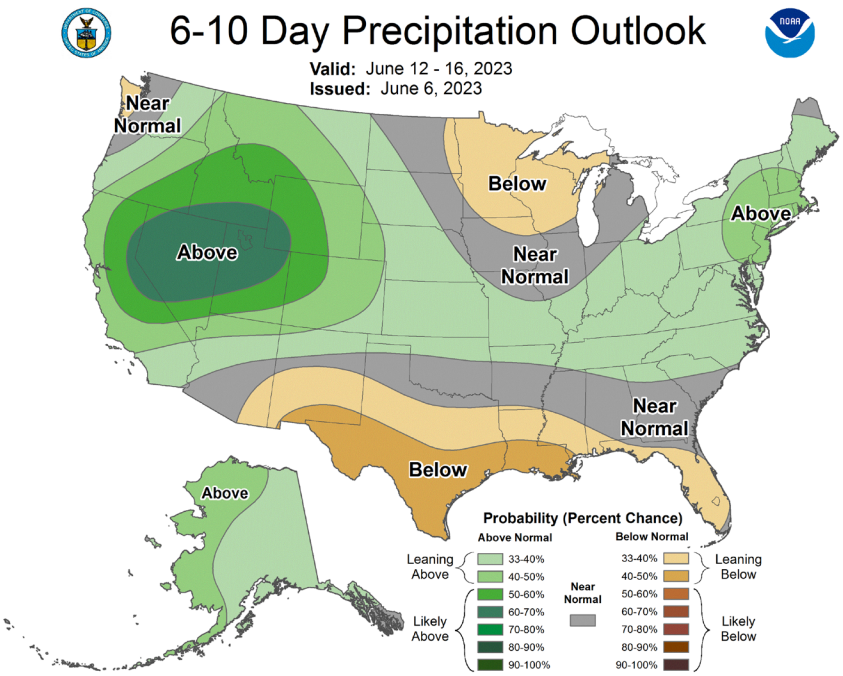

Figure 8. Precipitation outlook for the continental United States and Alaska from June 12 - June 16.

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