

No. 12

July 25, 2024

Inside this Issue...

2024 NDSU Annual Field Days.....	1
Soybean Aphid Scouting	2
Cereal Aphids Increase.....	4
Hessian Fly in Wheat.....	4
Update on Soybean White Mold ..	7
What's Rotting My Soybean Stems?	7
Cool and Wet Weather Impact Weeds.....	9
Around the State.....	10
Northeast ND	10
South-Central/Southeast ND	13
Southwest ND	14
Weather Forecast.....	14



2024 NDSU ANNUAL FIELD DAYS

The field days are open to the public.

July 30 - NDSU Horticulture Research and Demonstration Gardens

3 to 6 p.m. at the NDSU Horticulture Research and Demonstration Gardens.

The gardens are located on the NDSU campus at the corner of 18th Street and 12 Avenue North in Fargo, North Dakota. Free parking is available on the north side of the garden. Overflow parking will be diverted to the lot adjacent to the new Peltier Complex on 18th Street N.

The event will feature walking tours of the annual and perennial flower gardens, the NDSU Historic Daylily Garden, Children's Insect Activity, Leaf cutter bees, turfgrasses & trees for ND, preserving garden fruits and vegetables, fruit and vegetable research plot tour, and more.

[August 1 - NDSU Oakes Irrigation Field Day](#)

The tour starts at 9 a.m. Topics include:

- Potato breeding updates – Asunta Thompson, potato breeder
- Robotic weeding solutions and monitoring – Evans Wiafe, graduate student
- Soybean disease under high moisture conditions – Wade Webster, soybean pathology specialist
- White mold management in soybeans – Michael Wunsch, CREC research plant pathologist
- Dry bean variety update – Juan Osorno, dry bean breeder
- Organic matter matters – Carlos Pires, soil fertility specialist

[News Release: Oaks Irrigation Field Day Set](#)



SOYBEAN APHID SCOUTING

Soybean aphids are slowly increasing in southeastern area of North Dakota due to warmer and more favorable weather in low 80sF and moderate humidity. Other field reports include soybean aphids occurring north of east Grand Forks area. As mentioned last week, soybean aphids are usually a late season insect pest. Late-planted soybeans could be at increased risk from soybean aphids.

IPM scouts observed sub-economic populations of soybean aphids in 15% of the fields scouted last week in North Dakota. Positive counties were Barnes, Cass, Griggs and Richland counties. The incidence ranged from 0 to 75 percent and an average of 0 to 36 soybean aphids per plant. Unfortunately, few natural enemies are being observed, probably due to very low populations of aphids during the past drought years.

Scouting is critical now. Scout by walking a W-pattern in the field, select five locations and count the number of aphids per plant on 10 plants during late vegetative through R5 (beginning seed) to assess aphid populations. Soybean aphids can be found on the undersides of leaves in the upper canopy (new leaf growth). Typically, insecticide treatments occur from late July to mid-August when soybean aphids reach the economic threshold.

Economic Threshold:

R1 (beginning of flowering) to R5 (beginning seed)
Average of 250 or greater aphids/plant, 80% of plants scouted infested and when populations are actively increasing in field

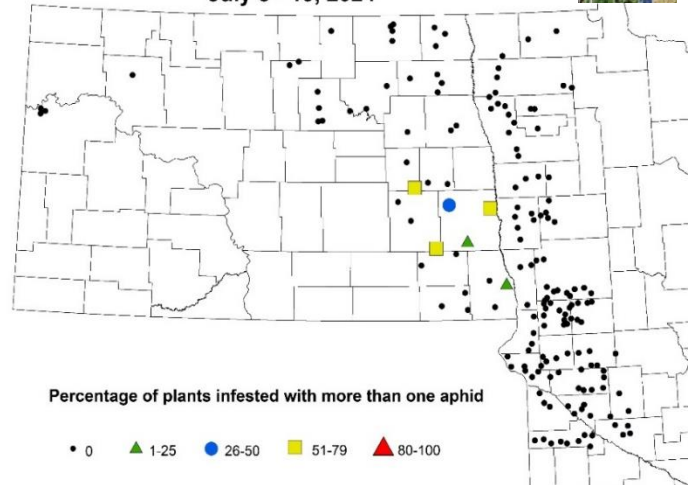
At the R6 (full seed), no treatment necessary. Research trials throughout the north central states have not demonstrated a yield benefit to treating soybean for soybean aphids at the R6 and later stages. Typically, insecticide treatments occur from late July to mid-August before soybeans reach R6.

Soybean aphids with pyrethroid resistance were first documented in North Dakota in 2017. For pest management, growers should assume that most of our soybean aphid populations in eastern North Dakota, especially the Red River Valley area are resistant to pyrethroids, and use other insecticide mode of action for aphid control. To reduce development of insecticide resistance in soybean aphids, Extension Entomology suggests:

- Scout fields regularly.
- Use the Economic Threshold to aid in decision-making, prevent unnecessary insecticide applications and conserve natural enemies.
- Rotate mode of action (or IRAC group) if more than one application is necessary in a season.
- Do not use the same mode of action (or insecticide class) repeatedly year after year.
- Avoid using the lowest rate of insecticide on label. Use high rates.
- Do not use premix insecticides containing two pyrethroid active ingredients, because these premixes could promote further development of resistance to pyrethroids.

Soybean Aphids Incidence

July 8 - 19, 2024



In our soybean aphid insecticide trial last year, we tested six **pyrethroids**: Baythroid XL (beta-cyfluthrin), Brigade (bifenthrin), Warrior II (lambda-cyhalothrin), Mustang Maxx (zeta-cypermethrin), Asana XL (esfenvalerate), Hero (bifenthrin + zeta-cypermethrin), five **pyrethroid + aphid-specific premixes**: Leverage 360 (beta-cyfluthrin + imidacloprid), Skyraider (bifenthrin + imidacloprid), Endigo ZC (lambda-cyhalothrin + thiamethoxam), Ridgeback (bifenthrin + sufoxaflor), Renestra (alpha-cypermethrin + afidopyropen); four **aphid-specific insecticides**: Belay (clothianidin), Transform WG (sulfoxamines), Sivanto Prime (flupyradifurone), Sefina (afidopyropen) and one **organophosphate** Acephate.

All tested products gave some control of soybean aphids and had significantly fewer aphids per plant than the untreated check (Figure 1). Acephate and all pyrethroids alone, with the exception of Asana XL (esfenvalerate), had significantly more aphids per plant compared to the aphid-specific insecticides and the pyrethroid/aphid-specific premixes across all sampling dates. These data indicate that the soybean aphid population at Casselton had a moderate level of pyrethroid resistance, and resistance was observed in all pyrethroids except esfenvalerate. Residual data also indicates that all foliar insecticides tested had a long residual of 21 days. The P-value for yield was not significant. Soybean aphid numbers did not reach economic threshold, so we did not expect to see any yield differences due to soybean aphid feeding injury. Numerically, grain yield for the untreated check came out in the middle of the pack and was not significantly different from any other treatment.

If soybean aphids are the only economic pest in your soybean fields, consider using an aphid-specific product only. These products are effective and are gentler on beneficial insects than broad spectrum pyrethroids or organophosphates. Pyrethroid+aphid-specific premixes should be used only when soybean aphids AND another pest such as grasshoppers, bean leaf beetle, or foliage feeding caterpillars are also present at economic levels.

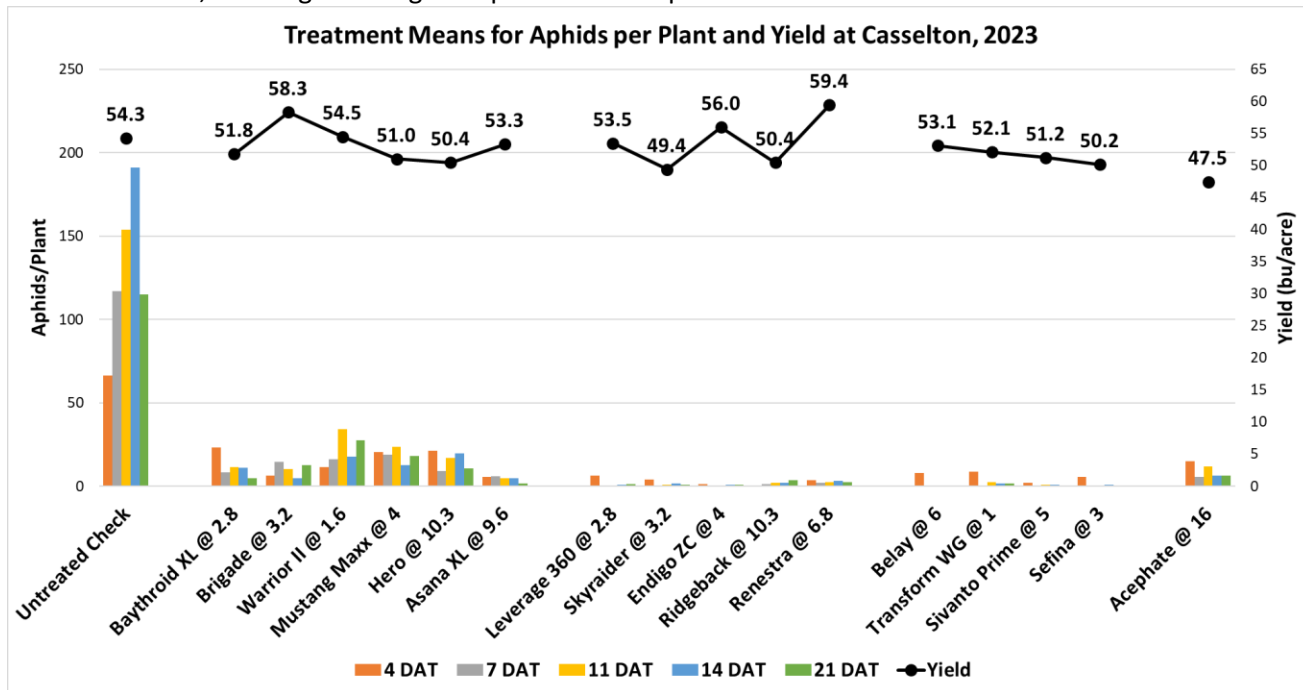


Figure 1. Treatment means for soybean aphids per plant at 4, 7, 11, 14 and 21 days after treatment (DAT), and grain yield at Casselton.

Thanks for support from the North Dakota Soybean Council and chemical companies. Disclaimer: Mention of insecticides does not imply any discrimination against any product not tested by the authors or the university.

[Janet J. Knodel](#)

Extension Entomologist

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State IPM Coordinator & Research Specialist

CEREAL APHIDS INCREASE

Cereal aphid populations have increased recently in the north central and northeast area of North Dakota. Aphid populations grow rapidly under moderate (80sF) temperatures. **Cereal grain fields need to be scouted for aphids.** The later planted fields are at greatest risk, and will attract most aphids.

Scout fields from stem elongation and continue up to the early dough stage of wheat. The English grain aphid is the most common aphid seen in small grains on heads. The bird cherry oat aphid feeds primarily on leaves in the lower part of the small grain plant. Aphids can vector barley yellow dwarf virus (BYDV) with their piercing-sucking mouthparts (see photograph of BYDV in Around the State section). When aphid populations are high, the disease can spread quickly through small grain fields.

To protect small grains from yield loss due to aphid feeding, the following economic thresholds are provided on the average number of aphids per stem based on different crop.

Economic Thresholds for Small Grain Aphids in Wheat, Barley or Oats

- Vegetative through head emergence - 4 aphids per stem
- Complete heading through the end of anthesis - 4-7 aphids per stem
- End of anthesis through medium milk - 8-12 aphids per stem
- Medium milk through early dough - >12 aphids per stem



Cereal aphids on wheat heads, leaves and stems at NCREC, Minot (Chris Asmundson, NCREC)

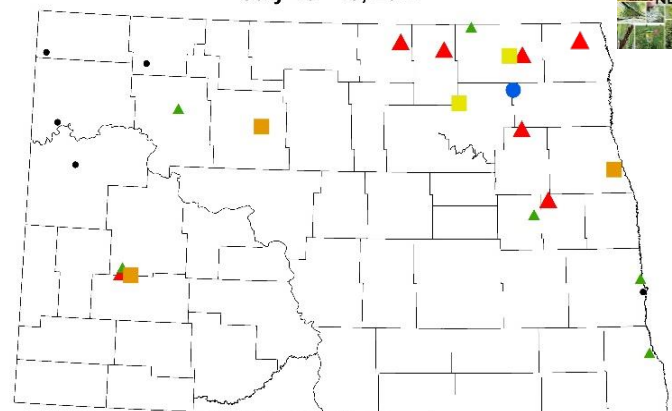
HESSIAN FLY IN WHEAT

Hessian fly has been a minor insect pest of wheat throughout North Dakota since the 1900s. It can be found wherever wheat is grown. Occasionally, it can become pest problem, especially when weather is wet in May through June like 2024.

The adult Hessian fly is a small ⅓ inch dark fly that somewhat resembles mosquito. The 2024 pheromone trapping network for Hessian fly adults (see IPM map) shows some hot spots with high populations in the northeast (184-1215 flies/trap/week) and east central areas and more moderate populations in the north central and southwest areas of North Dakota. The second generation of adults are emerging now. Please send in any other reports of Hessian fly.

Hessian Fly Trapping Network

July 15 - 19, 2024



Number of Hessian flies per trap per week

- 0 ▲ 1 - 9 ● 10 - 24 ■ 25 - 49 ■ 50 - 99 ▲ > 99





Hessian fly trap bottom collected last week from a wheat field; circle shows an example of Hessian fly
Photo courtesy: Anitha Chirumamilla, LREC

Hessian fly overwinters as a maggot or prepupa in winter wheat, volunteer grain, small grain cover crops and wheat stubble. Overwintering maggots pupate and emerge as adult flies from April to May (first generation), infesting spring planted wheat. A second generation of adults emerge in late July into August and lay eggs higher up on the wheat stems near the first or second nodes. Maggots emerge and feed on plant, pupate (flaxseed stage), and then emerge as adult flies for the third flight and overwintering generation in early fall (late August into September). These flies lay eggs for the overwintering generation in winter wheat, volunteer wheat or small grain cover crops (rye).



Flaxseed pupa stage of Hessian fly.
Photo courtesy of Nic Otto, grower.

Damage symptoms include dead or stunted yellowing seedlings for the first generation and then for the second generation lodged wheat at the first or second node with a small 'flaxseed' pupa inside the leaves on stem. The second generation causes the most crop damage with lodged stems (difficult to harvest), lower yield and test weight.

The following IPM strategies are used to manage and "break the life cycle" of Hessian fly:

- ✓ **"Fly free" planting dates for fall cereal planting:** Planting winter wheat and small grain cover crops will act as a green bridge link for Hessian fly and allow it to survive from one season to the next. Delaying fall planting dates reduces the risk of infestations. Due to our warming climate, fall "fly free" planting dates of winter wheat / cover crops should be moved to a later date. **Based on the past literature, the suggested "fly free" planting dates for North Dakota and Minnesota (source: J. Wiersma, UMN) are: north – after September 15; and south – after October 1.**
- ✓ **Crop Rotation:** Rotate wheat with non-susceptible host crops (oats, canola, corn, flax, soybean, and sunflower). If planting a small grain cover crop, use oats or triticale instead of wheat, barley or rye since they are less favorable to Hessian fly egg-laying and feeding.

- ✓ **Destroy volunteer wheat:** Destruction of volunteer wheat in fall and spring breaks the life cycle of Hessian fly by eliminating its host plant for emerging flies to lay eggs.
- ✓ **Physical:** Hessian fly is a weak flyer. So, relocating wheat fields as far away as possible from previous years infested fields can mitigate Hessian fly populations and wheat damage.
- ✓ **Resistant varieties:** Although wheat varieties have been developed with a single gene resistance for Hessian fly, the fly has adapted and quickly developed resistance. All resistant varieties are no longer effective on the Northern Great Plains Hessian fly populations (Anderson and Harris 2019).
- ✓ **Chemical control:** Imidacloprid and thiamethoxam are registered as active ingredients for use at planting time treatment or as a seed treatment on wheat. Warrior II is also labeled as a foliar application when adults emerge. However, population levels of this pest would rarely warrant the need for such treatments in North Dakota, and timing of application is problematic due to the difficulty of scouting for adult flies and their wide emergence window.



Lodged wheat field due to hessian fly infestation in Cavalier County


Photo courtesy: Anitha Chirumamilla, LREC

[Janet J. Knodel](#)

Extension Entomologist

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Extension Cropping Systems Specialist, Langdon Research Extension Center



plant pathology

UPDATE ON SOYBEAN WHITE MOLD

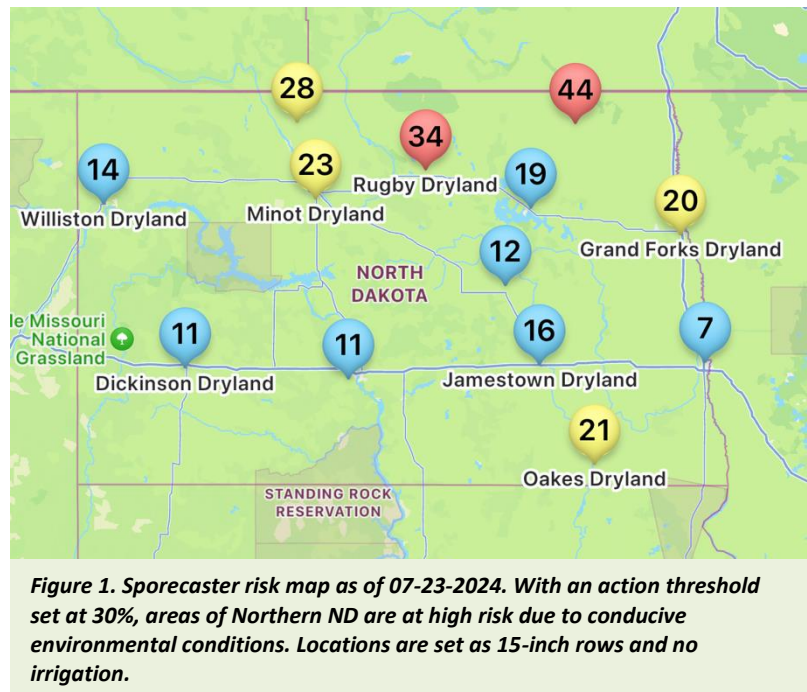
As discussed last week, soybeans across the Midwest are currently flowering. This flowering period is also the susceptibility window for white mold infection. With intermittent rainfall events still occurring across the state this past week and relatively mild summer temperatures, the white mold fungus is expected to be highly active.

As discussed in last week's [Crop and Pest Report #11](#) on the management of white mold, fungicide applications can be a highly effective tool for management. To aid in the decision of making fungicide applications, one tool called Sporecaster is available to farmers of the state. Please refer to [Crop and Pest Report #2](#) for further details on Sporecaster.

At the moment, the Northern regions of the state are currently under high risk for white mold development, while other pockets around the state are under moderate risk as of July 23rd (Fig. 1). I must note that Sporecaster was originally developed by the University of Wisconsin-Madison from data around the Great Lakes region. However, this tool has not yet been fully validated in North Dakota, and current research efforts aim to ensure that this tool will be accurate in the environments of the Upper Great Plains. Preliminary work from 2023 demonstrated that the action threshold under dry land conditions should be reduced to 30%. This tool should be used as a guide for risk, but you should pay close attention to recent local weather patterns, whether your crop has reached canopy closure, and the current growth stage your crop is at before making any management decisions.

WHAT'S ROTTING MY SOYBEAN STEMS?

Soybeans are progressing across the state at the moment. As we shift from the vegetative growth stages to the reproductive, a new panel of diseases start to show up. As mentioned last week, white mold risk is present at the moment due to conducive conditions. However, another stem disease that is often not discussed in as great of detail is Brown Stem Rot, or commonly called BSR. This disease is considered a northern disease because of the cool environmental conditions needed for its development.



BSR is caused by a fungal pathogen called, *Cadophora gregata*, which survives in the soil. However, it does not survive well without heavy soybean residue. This pathogen infects young soybean seedlings when conditions are wet and cool, which is indicative of the 2024 growing season. Being a latent pathogen, meaning the pathogen can infect plants for multiple weeks prior to disease development, BSR does not appear until the reproductive growth stages, typically when pods begin forming.

But what does BSR look like? Plants will begin to prematurely wilt without any external symptoms appearing on the stems. However, as the name suggests there must be brown colored rotting appearing in the stem, right? Yes! But we have to first split the stem lengthwise. As we open up the soybean stem, we will begin to see a rotting within the center most portion of that stem called the pith, the organ that helps to move nutrients around the plant (**Fig. 1**). Most often this rotting will be most pronounced around one of the stem nodes and radiating up and down from that point. BSR can also, but not always, be associated with a foliar symptom called interveinal chlorosis (**Fig. 2**). This means that the space between the leaf veins begin to turn yellow, and under severe cases this leaf tissue can turn brown and dry out.



Figure 1. Healthy soybean with white pith on the left and a soybean with brown stem rot on the right.



Figure 2. Soybean field with foliar symptoms of brown stem rot. Note the yellowing of leaf tissue and the development of the interveinal chlorosis on the right-hand side. (Credit for image of right is Crop Protection Network).

This symptomology can also be found due to a few other diseases as well. In Southern Minnesota and the “I” states, interveinal chlorosis is often seen with sudden death syndrome or SDS. While SDS has been reported in North Dakota in two independent and geographically distinct incidents, this is most likely not a cause for concern at the moment. Interveinal chlorosis has also been seen with plants infected with stem canker and white mold, but this rotting of the pit tissue is not seen with these two diseases.

The management of BSR has historically been well managed due to genetic resistance which has been common in most varieties. However, recently BSR has appeared frequently in the northern soybean growing states. BSR resistance has also been found to break-down when plants are stressed from soybean cyst nematode (SCN) which is commonly found in Eastern North Dakota and Western Minnesota soybean fields. On a positive note, BSR resistance has been found to be present in most varieties with a PI88788 background. But soybean varieties derived from other sources of SCN resistance, such as Peking or Hartwig, do not appear to have this same positive effect on BSR resistance.

Being a pathogen that struggles to overwinter, BSR can also be managed effectively by rotating to non-host crops which include most crops grown in the Northern Great Plains including corn, small-grains, and sunflower. Therefore, if severe infections do occur, rotating out of soybeans for a two to three years will greatly help reduce risk of disease in the following years.

While BSR has not historically been one of the greatest disease issues of soybeans across North Dakota, this disease can lead to losses that are avoidable if issues are known. If you suspect seeing samples of BSR, we recommend sending samples into the NDSU Plant Diagnostic Laboratory.

[Wade Webster](#)

Extension Plant Pathology, Soybean



COOL AND WET WEATHER IMPACT WEEDS

I usually begin my extension presentations by discussing weed biology including emergence dates, duration of emergence, flowering dates, seed production, and seed longevity in soil. For example, kochia and common lambsquarters are the first weeds to emergence in late March/ early April in eastern North Dakota and western Minnesota as compared to waterhemp that usually emergences in early to mid-May. Understanding duration of emergence is equally helpful since some weeds like common ragweed emerge early but rapidly return to dormancy when soil temperatures are in the 80s.

Everything has been turned on its side in 2024. A crop consultant messaged me last week that common ragweed was still emerging. The week of July 14! Further, weeds less common in our area are plentiful in 2024, probably in response to cool and wet conditions. For example, giant ragweed, barnyardgrass, and bur cucumber have been reported in addition to the usual summer annuals like waterhemp. Weeds that we have been all but forgotten like Pennsylvania smartweed have been found in producers' fields. Finally, weeds actively researched by Stephen Miller and John Nalewaja, NDSU weed science royalty, have reemerged and

are plentiful in small grains fields in northeast North Dakota and northwest Minnesota due to cool and wet conditions and herbicide resistance with group 1 and group 2 herbicides.

How do we process it all? What does it all mean? So, what do we do about it? Weeds are incredibly durable and find a way to succeed in an ever-changing environment. Likewise, our management strategies must also be ever-changing, adjusted in response to the environment and external threats such as weed resistance. In northeast North Dakota, small grains are an important early season crop drilled in rows spaced 6-inch apart and highly competitive with weeds making it uniquely different than row crops in the sequence like dry bean, soybean, or sugarbeet. Yes, we can control wild oat in other crops but weed management programs in those crops places more stress on herbicides for control of waterhemp or kochia, two important glyphosate resistant weeds. Decisions about crops, herbicides, tillage, and other cultural practices are a strategy that must be carefully considered as they are more important than ever.



Wild oat in a wheat field near Bathgate, ND. July 2024

[Tom Peters](#)

Extension Sugarbeet Agronomist
NDSU & U of MN



AROUND THE STATE

NORTHEAST ND

Thunder storms on Monday with hail going through some areas damaged several crops in the east of Cavalier and west of Pembina counties. Crops are advancing rapidly taking advantage of the moisture and heat units. Small grains are at heading and grain development stages with some early planted fields turning color. Corn is behind development in some areas which are 4-5 leaves away from tasseling. Corn in Grand Forks is at tasseling stage. Soybeans, field pea and canola are at flowering and pod development stages. Dry beans and sunflowers are behind in their growth approaching flowering. Small grain diseases like bacterial leaf streak, stripe rust, barley yellow dwarf, scab and ergot are being reported from several counties.

Late sown small grains are seeing increased populations of cereal aphids and they will remain susceptible to aphid damage until they reach soft dough stage. Soybean aphids are increasing in numbers as well as in distribution. More fields have been reported of having aphids compared to last week. However, the populations tend to be below threshold



Barley yellow dwarf virus affected wheat field. Photo: Farmer, Towner County



Black chaff (Bacterial leaf streak on wheat head). Photo: McKenna Schneider, IPM Scout, LREC



Ergot in wheat. Photo: McKenna Schneider, IPM Scout, LREC



Cereal aphids on wheat head and leaves and leaves. Photo: McKenna Schneider, IPM Scout, LREC



Soybeans flowering in Cavalier County. Photo: Anitha Chirumamilla, LREC



Corn six leaves away from tasseling in Ramsey County. Photo: Lindsay Overmyer, ANR Agent Ramsey County



Dry beans in Ramsey County. Photo: Lindsay Overmyer, ANR Agent Ramsey County

[Anitha Chirumamilla](#)

Extension Cropping Systems Specialist
Langdon Research Extension Center

SOUTH-CENTRAL/SOUTHEAST ND

The region received the least rainfall so far for the season in the past week! Rainfall ranged from 0 inch at least at 5 locations in the region to 1.01 inches near Streeter in Stutsman County this past week with an approximate average for the region of only 0.19 inch! Only locations in Burleigh, McIntosh, and Stutsman Counties received greater than 0.49 inch of rainfall over the past week! At the Carrington REC, between May 14th and July 7th, there has never been more than three consecutive days without rain. Temperatures were above normal in most of the region in the past week, which is much welcomed.

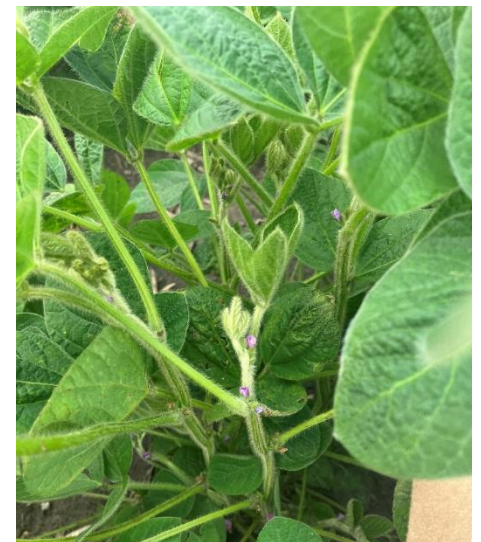
Hard red spring wheat development ranges from near heading through the hard dough stage with color changing to lighter colors. Yields for hard red spring wheat should be above average and pushing record yields in some parts of the region, however fusarium head blight may cause great losses in grain quality if DON levels become too high. Weed control in wheat is looking really good in most parts of the region other than grasses, which continue to increase in sticking over the wheat canopy.

Corn in most parts of the region is beginning to tassel, but most has not started. As of July 23rd, corn growing degree days are ranging from 1051 GDD's at Robinson in Kidder County, 175 GDD's greater than last week and 24 GDD's greater than the normal, but 130 GDD's and 251 GDD's below the 5-year average and 2023, respectively to 1252 GDD's at Mooreton in Richland County, 6 GDD's, 113 GDD's, and 212 GDD's below the normal, 5-year average, and 2023, respectively! Based upon the short-term forecast, I suspect most corn will reach maturity, but it will be wetter than normal at harvest time. Corn conditions improved immensely across most of the region with the above normal temperatures last week and no disease showing up at the moment. Weed control in corn continues looking good across most of the region.

Soybean and dry beans conditions improved again this past week with the above average temperatures, but there are certainly drown out areas of fields. In some cases, over 20% of crop stands have been lost within a field in this region due to the excessive rain. Most soybeans in the region have begun flowering with the majority at the late R1 (beginning bloom) stage. Soybeans in some fields are at the late R2 (full flower) as pods are becoming visible at the bottom of the plants and canopy closer is occurring. Phytophthora root rot is becoming more prevalent across the region and there is concern for white mold in the region. Weed control in soybeans continues being highly variable with some fields nearly perfect where multiple preemergence herbicide sites of action herbicides and properly timed postemergence herbicides have been applied to poor control due to no preemergence herbicides and the inability to apply postemergence herbicides timely along with weeds surviving vertical tillage prior to planting. Weed control will not be perfect in all dry bean fields as well, but some are very clean.



Height of most advanced soybeans in the region.



More advanced soybean stage at late R2 (full flower with pods starting to form at the base of the plant).

[Jeff Stachler](#)

Griggs County Extension Agent

SOUTHWEST ND

Dry conditions in Southwest North Dakota persist, with very little precipitation recorded over the last 7 days. The highest rainfall was registered in Golden Valley County at the Sentinel Butte station (0.53 inches). According to the National Integrated Drought Information System (NIDIS), the forecast indicates continued dry conditions over the next 7 days. These dry conditions, coupled with warm days, have been challenging for field crops.

In terms of crop progress, winter wheat fields are approaching harvest, while spring wheat fields range from heading to late milk stages. Canola fields are podding and filling grain. Soybeans continue blooming, with some fields entering the pod development stage. Field peas are maturing and will be ready to harvest soon.

Some insect populations have been increasing steadily in our area, especially Hessian fly and banded sunflower moth. Other than that, most insect pests of economic interest remain fairly low. Diseases in small grains are appearing in larger numbers, with scab being of particular concern.

[Victor Gomes](#)

Extension Cropping Systems Specialist
Dickinson Research and Extension Center

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

High pressure ridging dominated last week's weather pattern. Rainfall this past week (Figure 1) was sparse across the state, especially in the western half of the state. The heaviest precipitation fell across the Devils Lake basin, central North Dakota, and west central Minnesota. Thunderstorms, some of them severe, occurred in northeastern North Dakota on the evening of July 22 as a short wave skirted the eastern side of the high pressure ridge. This resulted in uplift of hot, humid air during the afternoon and evening. Thunderstorms waned after sunset as daytime heating was lost. Two-inch hail was reported from Pembina County in the Walhalla area, and there were several reports of one-inch hail in the Devils Lake basin and west central Minnesota. Average air temperatures trended near normal across the state, with higher than normal temperatures in western North Dakota (Figure 2). High temperatures ranged from the low to mid-80s F east to low 90s west.

Total Rainfall Past 7 Days (in)

Jul 24 2024 08:36 AM

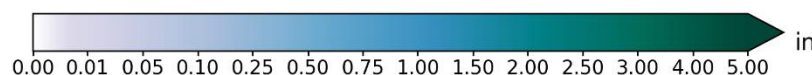
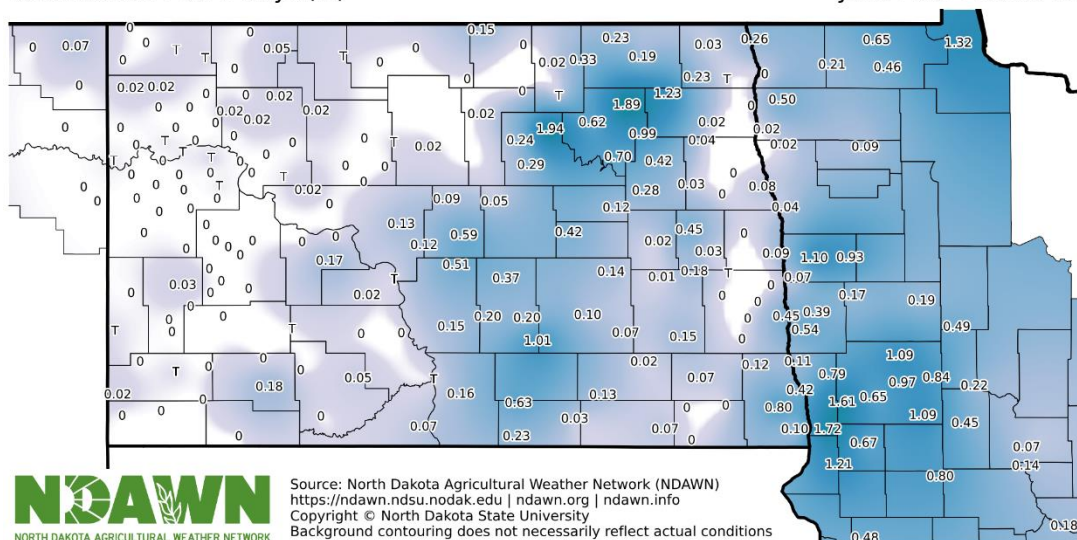


Figure 1. Seven-day rainfall totals ending at 8:36 AM, July 24.

Departure from Normal Average Air Temperature (°F) (2024-07-17 - 2024-07-23)

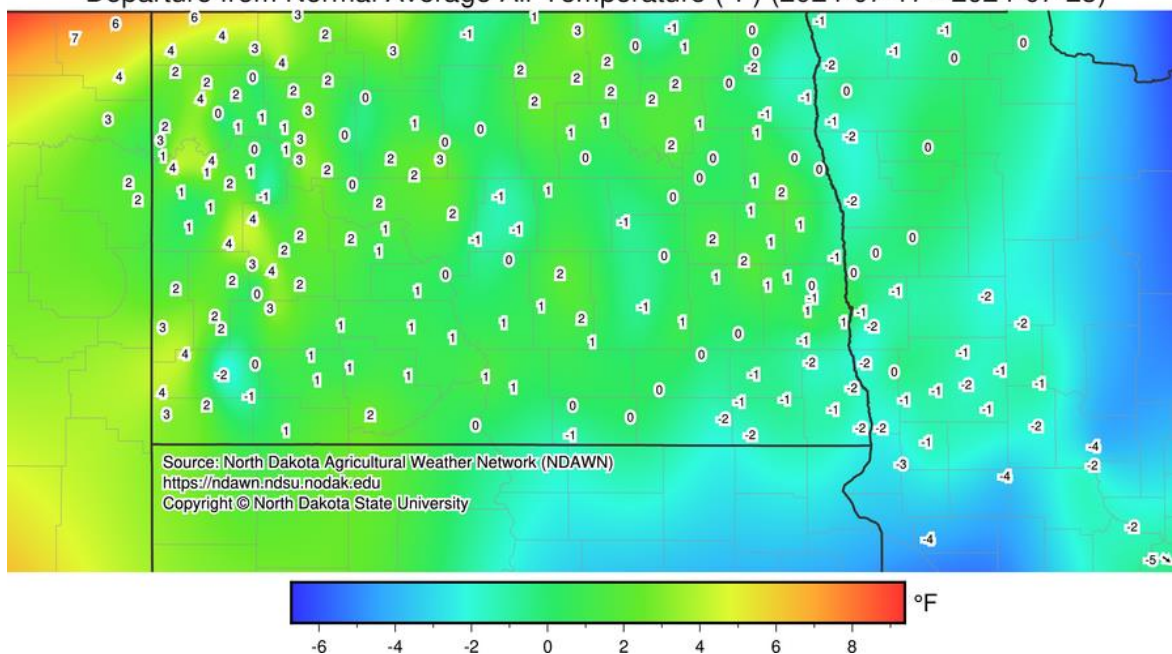


Figure 2. Average air temperature departure from normal from July 17 to July 23.

Many NDAWN stations are indicating soil moisture deficits at the 4-inch and 8-inch depths (Figures 3 and 4), except in areas that received recent rainfall. Volumetric water content (VWC) at the 4-inch depth (Figure 5) and 8-inch depth (not pictured, but similar values to 4-inch depth) has decreased slightly over the past week. Keep in mind that the soil moisture sensors at the NDAWN station may not reflect actual soil moisture conditions in crops and pastures. We'll need to keep an eye on soil moisture, especially in western North Dakota as the weather pattern looks to remain stable for at least the next ten days. Please visit the [NDAWN INFO website](https://ndawn.org) for precipitation, current temperatures, soil conditions, degree day forecasts and more.

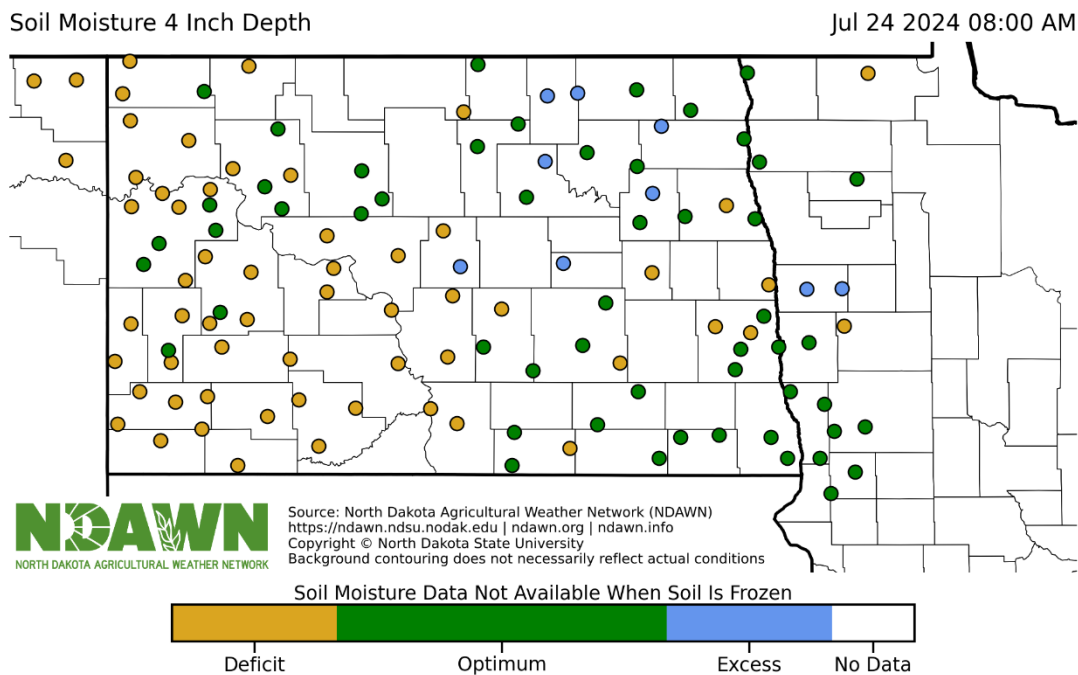


Figure 3. Soil moisture at 4-inch depth as of 8:00 AM, July 24.

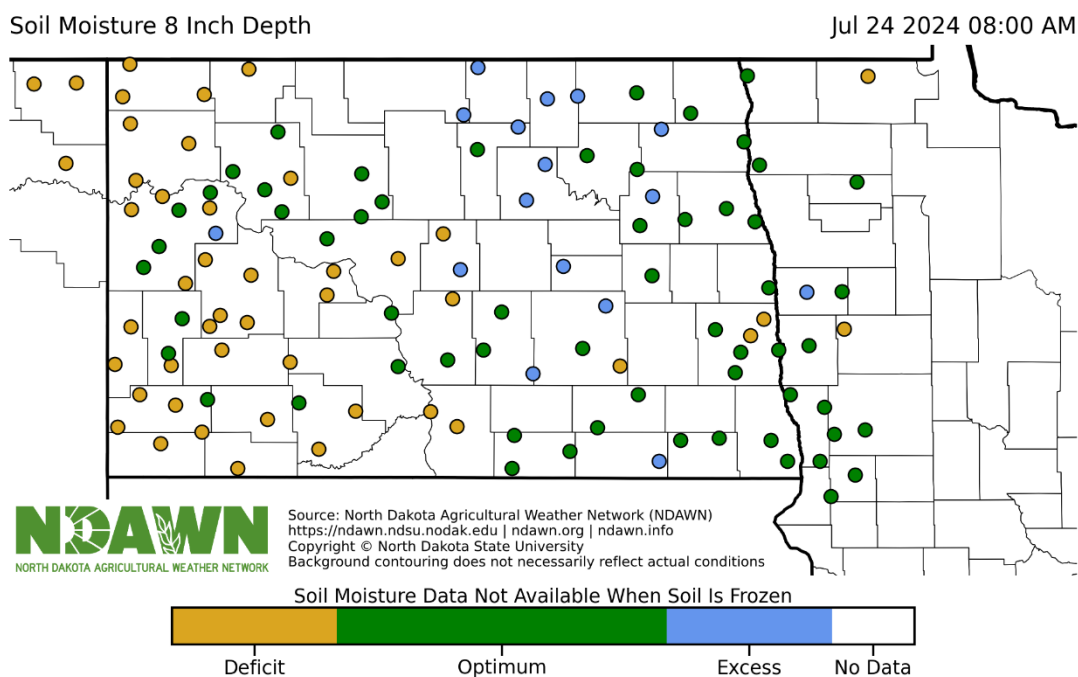


Figure 4. Soil moisture at 8-inch depth as of 8:00 AM, July 24.

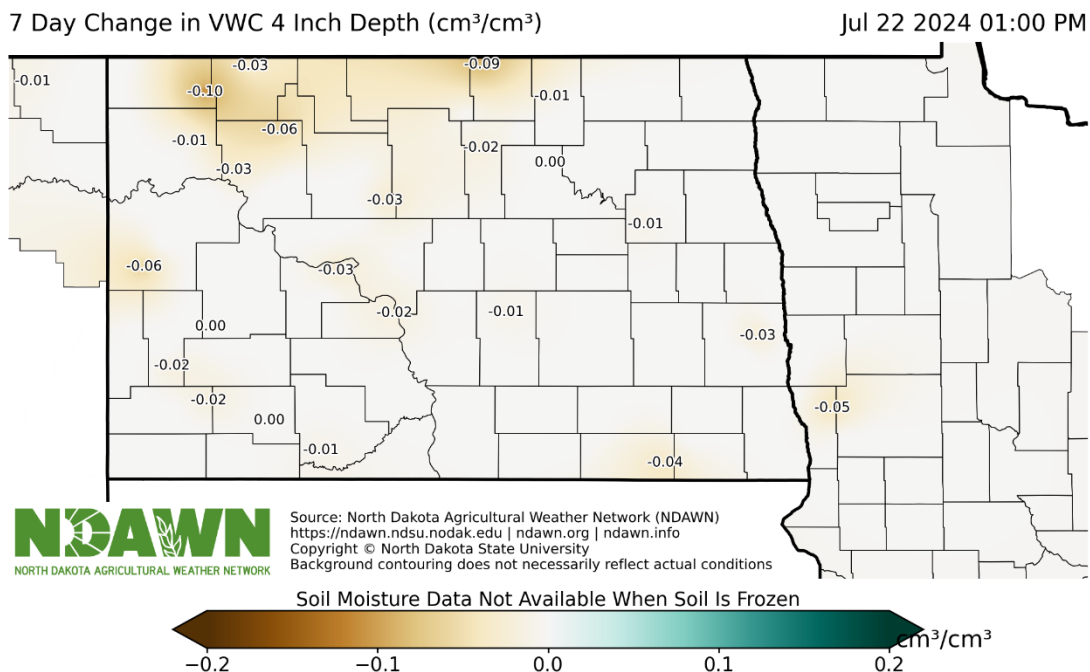


Figure 5. Change in volumetric water content over the seven day period ending at 1:00 PM, July 22.

Forecast for the Week Ahead

High pressure ridging over eastern Montana and western North Dakota, which brought temperatures in the upper 90s F to low 100s F across this area, will give way to a southwesterly flow aloft from Friday through Sunday. This will bring cooler temperatures and daily chances of rainfall from southwest to northeast across North Dakota. Ridging returns on Monday, with high temperatures back into the upper 80s to low 90s F east, and upper 90s F west. Predicted rainfall is depicted in Figure 6. For the next six to 10 days, temperatures look to be above normal (Figure 7), while rainfall looks to be near to slightly below normal (Figure 8).

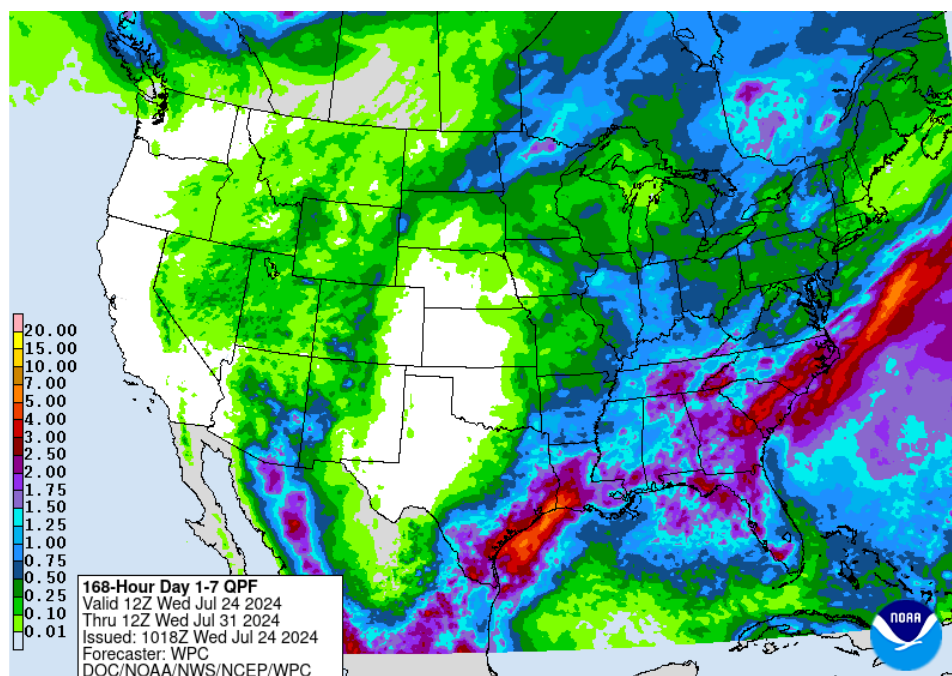


Figure 6. Precipitation forecast for the continental United States from 7:00 a.m. July 24 through 7:00 a.m. July 31.

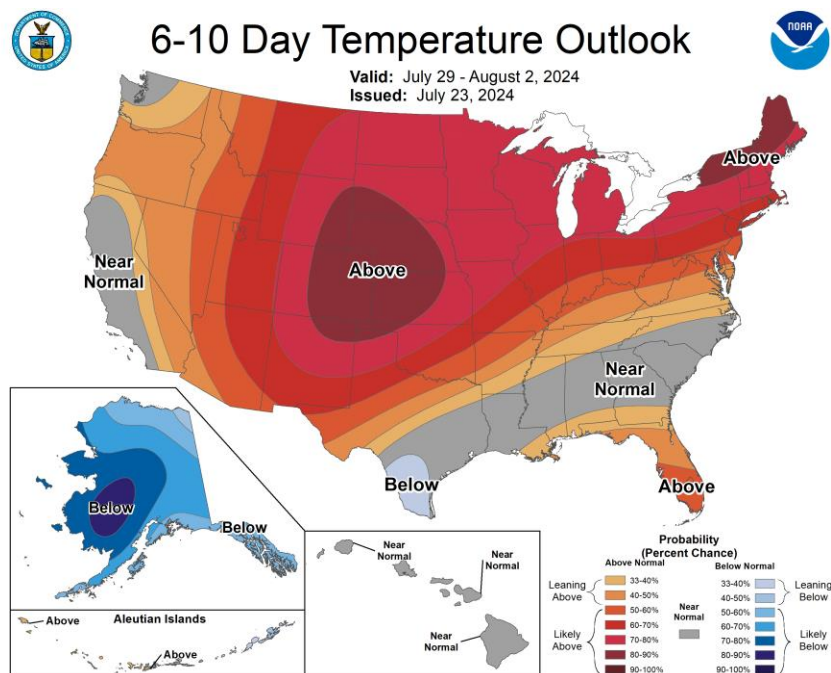


Figure 7. Temperature outlook for the United States from July 29 through August 2.

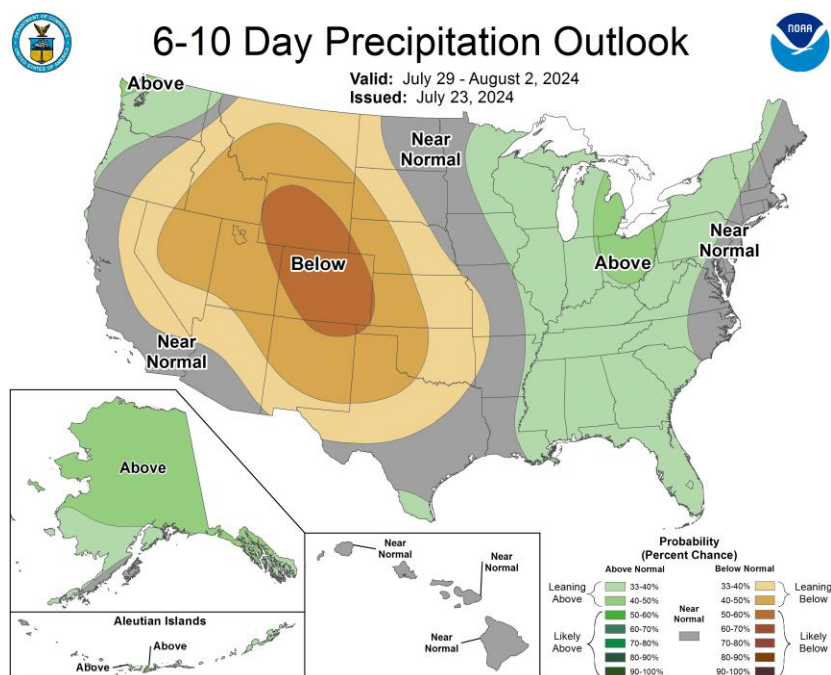


Figure 8. Precipitation outlook for the United States from July 29 through August 2.

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