

No. 07 May 21, 2026

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ALFALFA WEEVIL: DEGREE DAY UPDATE AND THRESHOLDS

Identification of alfalfa weevil adults and larvae is the first step towards effective pest management.

Adult weevil (Figure 1): Brown with a darker brown stripe in the center of the back, about ¼ inch long, with elbowed, clubbed antennae and a blunt snout.



Figure 1. Adult alfalfa weevil (Patrick Beauzay)



Figure 2. Mature alfalfa weevil larvae (Janet Knodel)

Larva:

Mature larvae (Figure 2) are about ½ inch with a black head capsule and a wrinkled green body with a white stripe running lengthwise along the top.

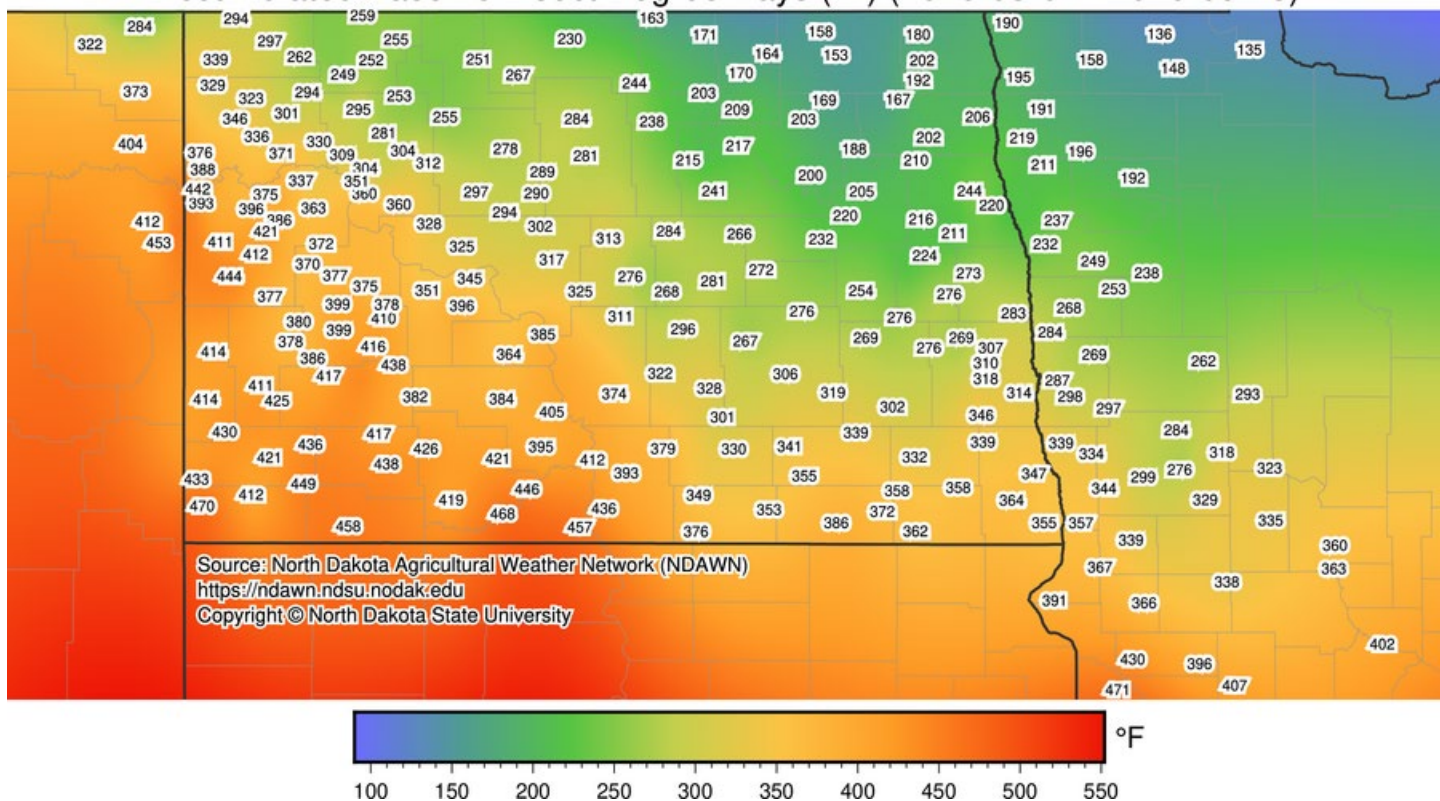
Table 1. Approximate degree day (DD) requirements for alfalfa weevil development using 48 F as the base developmental temperature.

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

The model assumes no overwintering egg survival.

Alfalfa weevil development has been delayed with the recent cool weather. The degree-day model (Table 1, above) forecasts the time to begin scouting after egg hatch (300 ADD) and when 3rd- and 4th-instar larvae (503-595 ADD) are present, potentially causing heavy foliage-feeding. In the North Dakota alfalfa weevil degree day map (below), most of the northern half of the state is still too cold for egg hatch, except in the northwest region near the Montana border. In the southwest region, early instar larvae are present

Accumulated Base 48 Insect Degree Days (°F) (2026-03-01 - 2026-05-18)



Alfalfa weevil management. Plant height, estimated yield, crop market value, management costs and plant injury based on the number of larvae per stem are important factors for decision-making. Threshold numbers in Table 2 (on next page) are the average number of larvae per stem sampled in the field using the **30-stem sampling method** (described in last week's [Crop & Pest Report #6, May 14](#)). These economic thresholds apply only to the first alfalfa cutting.

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

Early cutting is an effective cultural control when alfalfa has reached 50% budding and alfalfa weevil larvae have reached the economic threshold. At this time, continued larval feeding may not justify the cost of insecticide application.

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

After the first cutting has been harvested, be sure to **scout for larvae under the windrows**. Larvae that escaped the first cutting tend to move under the windrows for shelter and feeding on the regrowth and crowns (Figure 3, next page).

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

Plant Growth Stage (Height)	Treatment Cost	Crop Value (\$/ton)									Management Decision
		\$50	\$75	\$100	\$125	\$150	\$175	\$200	\$225	\$250	
		Number of Alfalfa Weevil Larvae per Stem									
50% bud or greater											Cut early
Early bud (>20 inches)	\$7/acre	4.0	2.7	2.0	1.6	1.3	1.2	1.0	0.9	0.8	Cut early, or use a short PHI/PGI product
	\$8/acre	4.6	3.1	2.3	1.8	1.5	1.3	1.2	1.0	0.9	
	\$9/acre	5.2	3.5	2.6	2.1	1.7	1.5	1.3	1.2	1.0	
	\$10/acre	5.8	3.8	2.9	2.3	1.9	1.6	1.4	1.3	1.2	
	\$11/acre	6.3	4.2	3.2	2.5	2.1	1.8	1.6	1.4	1.3	
	\$12/acre	6.9	4.6	3.5	2.8	2.3	2.0	1.7	1.5	1.4	
	\$13/acre	7.5	5.0	3.7	3.0	2.5	2.1	1.9	1.7	1.5	
	\$14/acre	8.1	5.4	4.0	3.2	2.7	2.3	2.0	1.8	1.6	
	\$15/acre	8.6	5.8	4.3	3.5	2.9	2.5	2.2	1.9	1.7	
\$16/acre	9.2	6.1	4.6	3.7	3.1	2.6	2.3	2.0	1.8		
Late vegetative (16 to 20 inches)	\$7/acre	3.8	2.4	1.8	1.4	1.1	0.9	0.8	0.7	0.6	Use a short to mid-PHI/PGI product
	\$8/acre	4.4	2.8	2.1	1.6	1.3	1.1	0.9	0.8	0.7	
	\$9/acre	4.9	3.2	2.4	1.8	1.5	1.2	1.1	0.9	0.8	
	\$10/acre	5.5	3.6	2.6	2.1	1.7	1.4	1.2	1.0	0.9	
	\$11/acre	6.1	4.0	2.9	2.3	1.9	1.6	1.3	1.2	1.0	
	\$12/acre	6.7	4.4	3.2	2.5	2.1	1.7	1.5	1.3	1.1	
	\$13/acre	7.2	4.8	3.5	2.8	2.3	1.9	1.6	1.4	1.3	
	\$14/acre	7.8	5.1	3.8	3.0	2.4	2.1	1.8	1.6	1.4	
	\$15/acre	8.4	5.5	4.1	3.2	2.6	2.2	1.9	1.7	1.5	
\$16/acre	9.0	5.9	4.4	3.4	2.8	2.4	2.1	1.8	1.6		
Midvegetative (10 to 15 inches)	\$7/acre	3.6	2.2	1.5	1.1	0.9	0.7	0.5	0.4	0.3	Use a long-residual product
	\$8/acre	4.1	2.6	1.8	1.4	1.1	0.8	0.7	0.5	0.4	
	\$9/acre	4.7	3.0	2.1	1.6	1.2	1.0	0.8	0.7	0.6	
	\$10/acre	5.3	3.4	2.4	1.8	1.4	1.2	1.0	0.8	0.7	
	\$11/acre	5.9	3.7	2.7	2.1	1.6	1.3	1.1	0.9	0.8	
	\$12/acre	6.4	4.1	3.0	2.3	1.8	1.5	1.2	1.1	0.9	
	\$13/acre	7.0	4.5	3.3	2.5	2.0	1.7	1.4	1.2	1.0	
	\$14/acre	7.6	4.9	3.6	2.7	2.2	1.8	1.5	1.3	1.1	
	\$15/acre	8.2	5.3	3.8	3.0	2.4	2.0	1.7	1.4	1.2	
\$16/acre	8.7	5.7	4.1	3.2	2.6	2.2	1.8	1.6	1.4		

For more information, see the NDSU [Extension Integrated Pest Management of Alfalfa Weevil in North Dakota](#) (E1676, Revised March 2026). Stay tuned for additional degree day updates on Alfalfa Weevil in the *Crop & Pest Report*.



Figure 3. Alfalfa weevil larval feeding injury underneath the windrows (brown defoliated strips) (NDSU Extension)

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plant pathology

FEATURED MATCHUP:**NDSU Plant Pathologists Vs. Abiotic Factors****Players to Watch:**

- Excess soil moisture
- Cold or variable soil temperatures
- Soil compaction
- Drought stress
- Wind damage and sandblasting
- Hail damage
- Frost injury
-

Scouting Report:

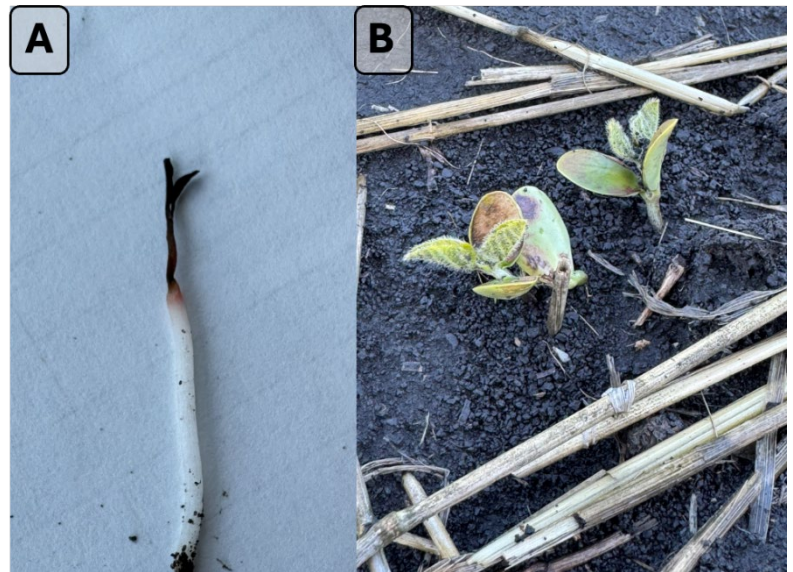
- Abiotic stress does not directly cause infectious disease, but it can weaken plants and make them more vulnerable to pathogens.
- Stressful environments, especially early in the season, can slow germination, reduce root growth, damage leaf tissue, and limit the plant's ability to defend itself.
- Symptoms may appear early as poor emergence, seedling death, stunting, or stand reduction.
- Later in the season, symptoms may include yellowing, wilting, leaf tearing, bruised tissue, dead growing points, root discoloration, or premature plant death.
- Injury from wind, hail, frost, or sandblasting can sometimes be mistaken for herbicide injury or disease. Any damage to plant tissue can also serve as an entry point for plant pathogens.

Opponents Gameplan:

- **Wet soils** reduce oxygen around roots and favor water-loving pathogens such as Pythium and Phytophthora.
- **Cold soils** slow germination and emergence, extending the time that seeds and seedlings are vulnerable to infection.
- **Compacted soils** restrict root growth, reduce drainage, and increase plant stress, which can worsen root rot and seedling disease problems.
- **Drought stress** limits root function and plant defense, often increasing the severity of diseases associated with stressed plants.
- **Wind, hail, or sandblasting** tears or scrapes leaf and stem tissue, leaving plants ragged, shredded, or scarred.
- **Frost** damages young or tender tissue, slows growth, and may cause water-soaked, darkened, or dead leaf tissue.
-

Opponents Strengths:

- Abiotic injury can show up suddenly after a weather event.
- Symptoms often overlap with disease, herbicide injury, nutrient deficiencies, or insect damage.



Examples of abiotic factors affecting seedlings: Wind-damaged sugar beet seedling with damage restricted to above the soil line (A). Soybeans with frost damage on their cotyledons (B).

- Wet, cold, compacted, or drought-stressed soils can impact several crops, including soybean, corn, dry bean, sunflower, and small grains.
- Field patterns are often associated with low areas, hilltops, sandy areas, compacted zones, wheel tracks, field edges, or areas exposed to strong winds.
-

Opponents Weaknesses:

- Planting into fit soil conditions rather than planting strictly by the calendar
- Avoiding field work when soils are too wet to avoid compaction
- Improving drainage in problem areas
- Using high-quality seed and appropriate fungicide seed treatments when early-season disease risk is elevated
- Selecting varieties or hybrids with good agronomics and disease packages
- Scouting several days after frost, hail, or wind events before making final stand or replant decisions
- Using field pattern, symptom distribution, and diagnostic testing to separate abiotic injury from disease
-

Trick Play to Watch:

- Abiotic stress can look like disease, and disease can look like abiotic stress. Wind, sandblasting, hail, and frost can create dramatic symptoms that appear quickly, while many infectious diseases develop more slowly. However, injured plants may still become infected if pathogens are present and weather conditions favor disease. When scouting, look first at the field pattern, recent weather events, crop growth stage, and whether symptoms are uniform or patchy. When in doubt, dig plants, and consider submitting samples for diagnosis at the NDSU Plant Diagnostic Lab.

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THE WEATHER THAT IS OCCURRING AND THE LEAF SPOTS WE MAY BE OBSERVING

Like everyone else at the morning coffee gathering or in the farm shop, plant pathologists are also very interested in the weather. Cold to freezing temperatures, high winds, rain, and a potential 'warm-up' next week have described May 2026. These conditions may lead to abiotic (non-infectious) spots in small grains. As you begin to look at emerged small grain fields, it is important to mentally keep track on the number of leaves that were available when the greatest

weather stress occurred. It is likely that these same leaves may start to develop abiotic spots. Here are some leaf observations that may be observed on small grains in the coming weeks.

Color banding

Color banding is most noticeable on newly emerged wheat plants that experienced a drastic temperature shift (warm daytime temperatures to cold nighttime temperatures). The most common symptoms are yellow to purple bands along the coleoptile giving the wheat a colorful appearance (Figure 1). Wheat will not be negatively affected by this symptom and will develop normally.



Figure 1. Color banding on wheat seedlings. Note the purple and yellow bands surrounded by healthy green leaf tissue.

Abiotic Leaf Spots

There are a variety of leaf spots that can be caused by the environment that do not impact plant development. Physiological brown spot of barley commonly occurs during extreme shifts in daytime and nighttime temperatures (Figure 2). Brown to yellow abiotic spots can occur on the oldest wheat leaves that have experienced the most amount of weather stress (Figure 3). Although these can be confused with other leaf diseases, it is important to use all the disease triangle information to help support a diagnosis. For example, if you noticed random lesions on the oldest small grain leaf, in a conventional tilled production system, following a broadleaf crop, that has experienced extreme shifts in weather, the lesions are probably not going to be caused by a fungal pathogen.



Figure 2. Physiological brown spot of barley. Symptoms will be localized on the oldest leaves and only on the leaf tissue that was available at the time of the weather stress.



Figure 3. Abiotic leaf spot on four-leaf wheat. Lesion is found only on the oldest leaf, during a season when May temperatures fluctuated with occasional high-wind days.

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FIELD CONDITIONS REPORT

Last week’s USDA-NASS Crop Progress report, released on May 11, indicated that only 16% of the expected soybean acreage had been planted in North Dakota. However, favorable soil moisture and temperature conditions during the past two weeks allowed producers to make rapid planting progress across much of the state, despite persistent high winds and blowing dust. These windy conditions have accelerated soil drying, particularly in western North Dakota, where early signs of drought stress are beginning to appear (Figure 1). In contrast, eastern areas of the state received timely rainfall that should help support germination and early emergence of newly planted crops. Temperature conditions, however, have been less favorable. Since May 10, few growing degree days (GDDs) have accumulated (Figure 2), and very little heat has been gained during the last several days.

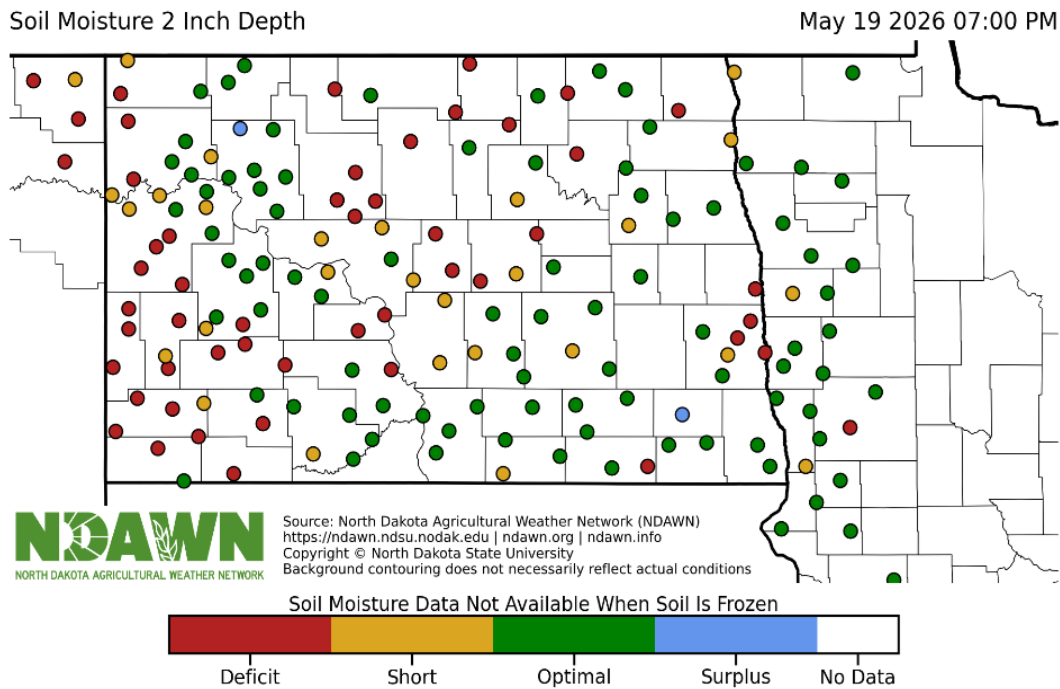


Figure 1. Soil moisture at 2-inch depth reported by [NDAWN | Soil](#)

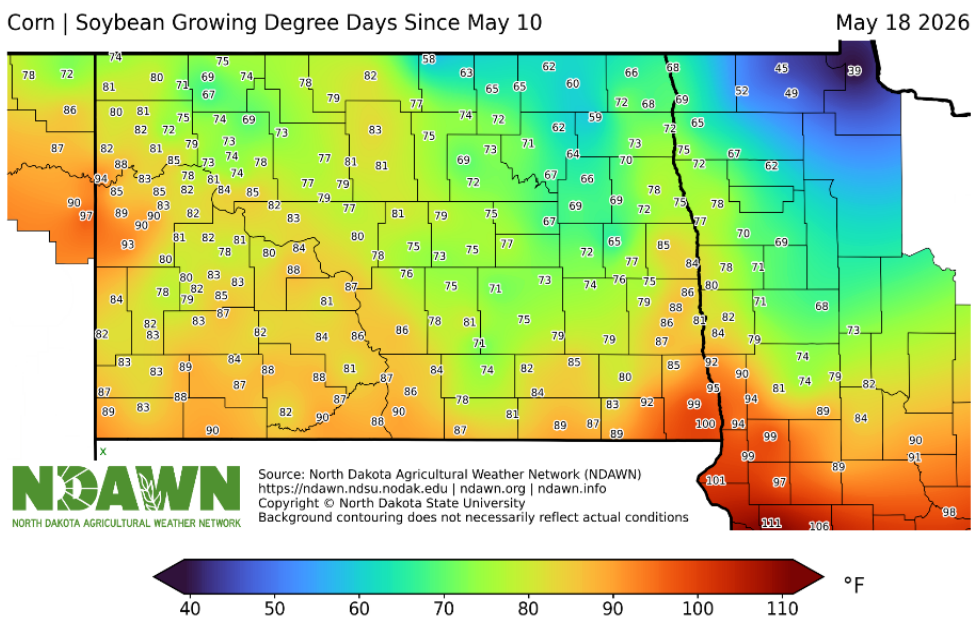


Figure 2. Growing Degree Days accumulated since May 10, reported by [NDAWN | Agriculture](#)

Crops require minimum, or base, temperatures before growth can occur. When temperatures remain below these thresholds, seedlings essentially “sit still,” becoming more vulnerable to diseases and other stress factors (Table 1).

Table 1. Recommended minimum soil temperatures for planting in North Dakota

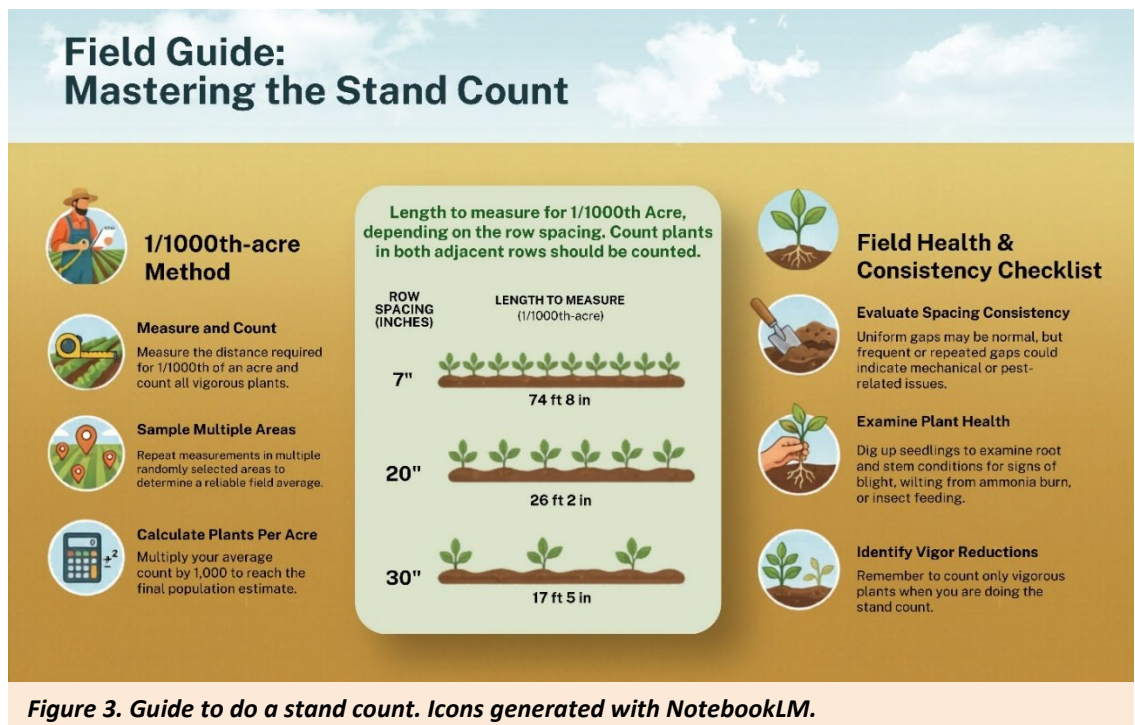
Crop	Min. Soil Temp (°F)	Optimal Soil Temp (°F)	NDSU Data Source (Link)
Canola	38	45 – 50	Canola Production Field Guide
Field Peas	40	50 – 60	Field Pea Production Guide
Flax	45	50 – 55	Flax Production in ND
Sunflowers	45	50+	NDSU Sunflower Production Guide
Soybeans	50	60 – 70	Soybean Production Field Guide

In addition to cool conditions, concerns are increasing about late frost injury to seeds and emerging seedlings. Soybean seeds begin absorbing water (imbibition) within hours of planting, with most water uptake completed within 24 to 30 hours. During this critical period, soil temperatures at seed depth should ideally remain above approximately 45°F. Cold rain or rapidly dropping soil temperatures immediately after planting can result in imbibitional chilling injury, leading to uneven emergence, reduced vigor, or seedling damage.

Growers should now closely monitor fields for emergence issues associated with blowing residue, continued dry conditions, and frost injury (Figure 3).

Fortunately, soybeans are a remarkably resilient crop. Plants damaged above the cotyledonary node often survive and can compensate for reduced populations by developing axillary branches that help fill canopy gaps and increase pod production. Even if one cotyledon is lost, the plant can usually continue to develop normally. However, plants with damage below the cotyledonary node, including destruction of both cotyledons or the apical meristem, are unlikely to recover and should be considered dead.

In most situations, replanting should be considered only when final stands fall below approximately 50% of the target population, emergence is highly uneven, or gaps larger than one square foot are common throughout the field. When poor stands are localized, “repair planting” may be a more economical option than replanting the entire field. This strategy involves selectively filling thin or bare areas to improve stand uniformity while minimizing additional costs.



It is also important to remember that poor emergence can leave the canopy open longer into the season, increasing the risk of weed competition and insect pressure. At the same time, later-planted soybeans with healthy, uniform stands can only **sometimes** outperform early-planted fields with severely reduced populations. Therefore, replant decisions should always be based on whether the expected yield benefit outweighs the additional costs associated with seed, fuel, labor, and possible crop insurance implications.

Want to know more about replanting? Check these publications:

<https://bugwoodcloud.org/resource/files/30385.pdf>
[Replanting or Late Planting Crops | NDSU Agriculture](#)

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NDSU Broadleaf Agronomist

BLOWING SOIL AFFECTS FORAGE AS WELL AS CROPS

Winds that hit North Dakota the week of May 14-15 were horrific. A tremendous amount of soil was moved by the wind, and the effects of which will be felt for many days to come. Fields of alfalfa and other types of established forages acted as a depository or a “catch” for a lot of blowing soil, especially if the field was adjacent to crop ground. Depending on the depth of soil deposited, it can cause issues for plant health, forage quality if harvested for hay, and harvesting equipment wear and tear.

In the case of alfalfa, due to below normal cool temperatures and lack of precipitation, much of the established alfalfa is in the ±3-6” height range. If a couple of inches of soil has been deposited on the alfalfa, chances are good that the alfalfa will be able to survive and push up through the soil cover. If there has been a heavy deposit of soil on top of the alfalfa crown, buds, and new leaf growth, there is a chance that the alfalfa may become smothered. In areas where heavy

deposits of soil have occurred on top of the alfalfa, keep an eye out for re-emergence of the alfalfa. Uncover a few areas and check the condition of the alfalfa plants, looking for signs of re-growth. If a portion of the field appears to be lost due to being smothered, consider seeding an annual forage in the area to make up for production lost and keep soil in place.

For grasses, the effects can be the same. Light soil deposits, and the grasses have a good chance of pushing through. Heavy deposits and grasses may be smothered. Regardless, expect a period of recovery that will set production back. One thing that is working in favor of the forage, soil that has been deposited from the wind is loose, which improves the chance of forages pushing through. This differs from soil deposited from flooding, which can be packed with crust formation following drying, which impedes growth. In areas where soil has blown in, some yield loss may be incurred due to plants being sandblasted by blowing soil. Another unknown is the possible effect of herbicide transfer with blowing soil onto forages. This effect, if any, may take some time to appear.

Deposits of soil in the field will also hinder hay harvest. Raise the cutter height to avoid cutting through deposited soil. Soil that makes it way into hay can show up in a forage test as an increase in ash content. Ash is measured as the total mineral content of forage and is the naturally occurring mineral content (calcium, phosphorus, potassium) of forage. This naturally occurring ash in plants is referred to as internal ash, and on average, grasses will contain 6% internal ash, and alfalfa around 8%. External ash



Wind-blown soil deposited on an alfalfa field from the May 2026 wind storm

is basically dirt that finds its way into hay primarily through harvesting and raking. This year, with wind-deposited soil, there is a good chance that some of this soil will find its way into hay. External ash content in hay provides no additional nutritional value and reduces nutrient absorption by the animal.

To reduce the amount of soil making its way into hay, raise the cutting height to try to get above deposited soil. Research has shown that using a sidebar rake reduces the ash content of hay compared to a wheel rake. As always, test forage for nutrient content.

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A NOTE ON NITRATES

If you remember back to the [May 22nd, 2025 Crop & Pest article](#) “*Is my nitrogen leaching?*” you may recall a discussion on how and why nitrate-N is able to leach in our soils and the conditions which favor leaching. Any process which causes nutrients to leave our field, and thus not be available to crops, carries with it both financial and environmental costs. With N fertilizer prices well above the five-year average, urea averaging \$0.94/lb N, economic losses are top-of-mind for farmers this spring. In areas of the state where soil moisture levels are high and tile drains are running, there is also concern about the amount of nitrate being removed from field and reaching surface water.

Soil nitrate-N going into the 2026 crop year

To oversimplify the N cycle, soil nitrate-N originates from two main sources: what we apply as fertilizer and what becomes available through mineralization (think soybean N credits). Coming into the 2026 crop year, approximately 10% of fields in North Dakota and adjoining regions had greater than 100 lb/ac of nitrate-N (Figure 1; Check out the [AGVISE Soil Test Summary 2025](#) for more information). While high nitrate-N levels can be a good thing going into spring—think of it as money in the bank—is only agronomically useful if it stays in the field!

For those who applied fall N last year or those spreading this spring, one fortunate condition of the unfortunately cool spring is we are likely not losing much our applied fertilizer to nitrate leaching. Remember, ammonia most readily converts to nitrate when temperatures are above 50°F, which as of writing this article we are only on the cusp of for most of the state... So, if we are seeing losses of nitrate-N in our tile water, it is likely originating from this residual N pool.

Nitrate-N concentration in spring tile water?

In spring, nitrate-N concentrations in tile drainage water often spike due to snowmelt and early-season rainfall moving residual soil nitrate through the soil profile into tile drains. In corn–soybean systems, concentrations near or above the drinking water standard (10 mg/L) are commonly reported. Although a single concentration measurement provides useful information, producers should evaluate multiple samples collected across different days and flow conditions, because nitrate losses (loads) from a field depend on both nitrate concentration and tile flow volume.

Coping with losses of nitrate-N in tile drainage

Residual nitrate variability following corn in 2024 & 2025

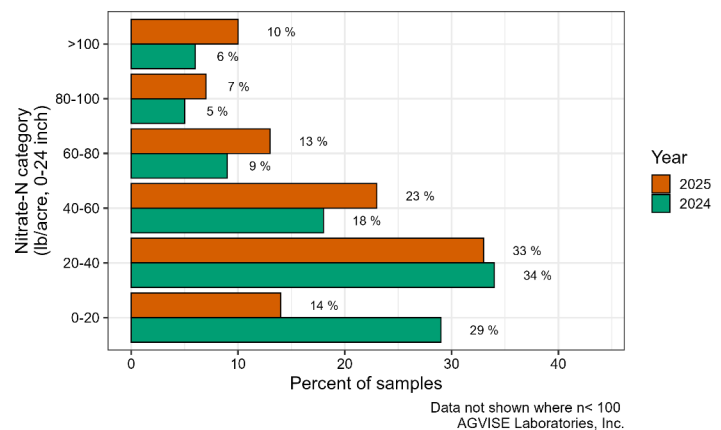


Figure 1: Soil nitrate-N levels following corn in 2024 and 2025 in North Dakota, northern South Dakota, western Minnesota, and southern Manitoba. Figure from AGVISE Laboratories.

In no uncertain terms, the impact of the nitrate-N from tile drainage on surface water and the greater environment is something we should all be concerned with. Preventing nitrate-N from reaching surface water, whether through saturated buffer strips, drainage water retention, or other practices, makes good environmental sense. However, this is an agronomic newsletter, so we will focus on agronomic issues (and solutions). If your soil sampled last fall (you did, right?) and noted high nitrate-N levels in fields which spent this spring wet and tile lines running, it would be worth pulling another sample to compare it to what the results were last spring.

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EARLY SEASON WEEDS: THE GOOD, THE BAD, AND THE UGLY

Spring has finally sprung for most areas of the state. As I'm writing this on the evening of May 19, many counties are facing a freeze warning. While this could be detrimental to some emerged crops, it won't bother the weeds enough for our liking. In several past years, we've had emerged waterhemp get hit with this late May frost and I rate the frost as poor to fair if it were a herbicide. We have yet to observe waterhemp emergence in southeastern ND, though I suspect some seedlings could be found if one looked hard enough. Most other weeds have made their presence known, even if growth stages are slower than past years. Now is as good a time as any to dust off some reminders on early season weeds. I prefer analogies to Westerns, so we'll go with the Good, the Bad, and the Ugly. However, my colleagues in plant pathology are using sports metaphors this year, so I'll also assign a team name to each weed.

The Good

Many folks would classify the following weeds as native/naturalized wildflowers, and I can't say they're wrong. These weeds often flower and complete their life cycle before we plant our crops. They are all currently flowering, about to flower, or already senescing. They are often found in abundance, as they seem to be filling a niche of utilizing soil resources in between annual crop life cycles. Most field prep activities will control the following plants. For our sports metaphor, these are the teams that never really threaten for a title:

Fairy candelabra (*Androsace occidentalis*)

Fairy candelabra is a small winter or spring annual plant in the primrose family. It is often found at high densities in fields in April and May. However, this plant will stay relatively small and will die off as the temperatures warm up. Typical seedbed preparation in both conventional and no-till will control this plant. Even if no control measures are taken, fairy candelabra will not be competitive with crops since these plants are currently nearing the end of their life cycle.

Lots of flair, but not much threat. The Savannah Bananas.

Yellow whitlow-grass (*Draba nemorosa*)

This weed is sometimes called yellow whitlow-wort. It is a native winter or spring annual plant in the mustard family. Yellow whitlow-grass germinates in the fall or early spring like many winter annuals and rarely grows more than 4 to 5 inches tall. It will produce clusters of small, yellow, 4-petal flowers that form into small seed pods at maturity in the late spring/early summer. There is a similar species, simply known as whitlow-grass (*Draba verna*), which has white flowers instead of yellow flowers. Both whitlow-grasses are most often confused with fairy candelabra because of the similar small appearance and unique life cycle. In some cases, whitlow-grasses are confused with horseweed, but horseweed will not flower until July or August, and whitlow-grass will be dead and gone by then.



Flowering yellow whitlow-grass
(picture credit: Ian Horner)



Mature fairy candelabra pulled from a flower bed.



Flowering whitlow-grass (Picture credit: Erin Hill)

Looks like a professional team, but doesn't pose a threat. The Washington Generals.

Waterpod (*Ellisia nyctelea*)

Waterpod is another weed that is showing up across the landscape this year. Though the leaf structure may remind some of common ragweed or biennial wormwood, waterpod plants are much larger and more advanced than either of those two weeds at this stage in the growing season. Waterpod will be flowering and producing seed soon and will complete its life cycle as we near the summer solstice. Like the other weeds in the Good category, typical seedbed preparation will control waterpod.

Looks threatening, but is actually harmless. The Cleveland Browns.



Waterpod in a bare spot in a no-till field.

The Bad

These are a couple of winter annual weeds in the mustard family that are ubiquitous across the state. Their life cycle is a few weeks longer than the previous 3 weeds, so they will often cause early season competition with crops if not controlled prior to crop emergence. Though these plants are very common, their rosettes and white flowers can often be confused with other winter annual weeds. With the rainfall patterns of last fall, there are several dozen winter annual weeds that we can find in fields across the state that are currently bolting from their rosettes and about to flower.

Shepherd's purse (*Capsella bursa-pastoris*)

Shepherd's purse is a small winter annual flowering plant in the mustard family (Brassicaceae). Originating in Europe, it was introduced into North America favoring colder climates and cultivated ground. Shepherd's purse is known for its heart/triangular shaped flat seed pods resembling a purse, that are found on a bolted stem that is attached to a rosette of lobed leaves. It can grow from 0.5 to 1.5 feet tall with small white flowers.

An icon that hasn't threatened anyone lately. The New York Yankees.



Rosette and bolting leaves of shepherd's purse.



Field pennycress flowers and leaves.

Field pennycress (*Thlaspi arvense*)

Field pennycress is a member of the mustard family (Brassicaceae). It can be found in agricultural lands and roadsides in a wide range of soil types and environmental conditions. Field pennycress is a winter annual broadleaf, herbaceous plant that begins as a basal rosette with slender taproot systems. Stems from the basal rosette are hairless and usually simple but can be freely branched towards the top. When growing in unfavorable conditions, the stem remains unbranched and may reach only a few inches in height, but in fertile soils with little competition, the main stem may grow up to 32 inches.

Ubiquitous and you can't escape it. Peaked in the 90's. The Dallas Cowboys

The Ugly

These are the weeds that will be highly competitive with crops and will persist through most, if not all, of the crop's life cycle. These weeds don't need much introduction, but there can be some confusion with their ID this time of year. Failure to properly ID and control these weeds now can lead to an ugly cropping year.

Kochia (*Bassia scoparia*)

Kochia often germinates in very dense mats consisting of numerous individual plants. These mats often appear to be dull green due to kochia's leaf color. Young kochia seedlings are very densely hairy and will often be described as "puffballs" due to the dense hairs. Kochia cotyledons are linear. Leaves are linear to lanceolate and taper to a point.



A mat of seedling kochia. Note the linear cotyledons and densely hairy leaves that are linear and taper to a point.

We all hated it a decade ago, then it became okayish, now it's annoying again. The New England Patriots.

Horseweed (*Erigeron canadensis*)

Most of our horseweed will germinate in the fall, then overwinter as a rosette, and begin to bolt in the spring. These rosettes are now bolting, but are rarely misidentified. However, the rainfall patterns this spring have enabled several flushes of spring-emerging horseweed, that can be confused with kochia. Unlike kochia, horseweed seedlings will rarely be found growing in dense mats. Horseweed cotyledons are oval shaped and easily distinguished from kochia cotyledons. Young leaves are oval shaped and become more linear as the plant matures. Most horseweed leaf margins are toothed or lobed.

Some years we forget about it. Other years it kicks everyone's butt. The UConn men's basketball team.



Seedling horseweed plants. Note oval cotyledons and oval to linear shaped leaves.



Rosette of narrowleaf hawksbeard. (Picture Credit: Brian Jenks)

Narrowleaf hawksbeard (*Crepis tectorum*)

Narrowleaf hawksbeard is in the Asteraceae (composite) family. It grows 2 to 3 feet tall from a taproot, with milky sap found throughout the plant. Yellow flower heads are 1/2 to 3/4 inches in diameter resembling a dandelion or sowthistle flower. Fall rosette stage Narrowleaf hawksbeard can look somewhat similar to dandelion, however, hawksbeard leaf lobes protrude straight out rather than toward the center of the plant like dandelion

Dominates the west, but can't quite take over the countryside. Gonzaga men's basketball team.

[Joe Ikley](#)

Extension Weed Specialist



UNDERSTANDING THE SYMPTOMS OF STRESS

Before those involved in the field of agriculture can do much about managing stress, they have to know when they are experiencing it. Much of the time, people do not know or give attention to what is going on in their bodies, their thoughts or feelings, or their relationships with others. They may also deal with stress in unhealthy ways.

Stress Symptoms as Warning Signals

Through avoidance or other unhealthy approaches to stress, you attempt to screen out any unpleasant, uncomfortable stress alarms. *But stress symptoms are early warning signs like a flashing red light on the dashboard of your car when the engine is having trouble or overheating. If you ignore it long enough, the engine will break down.*

Stress symptoms can include:

- Breathing more quickly
- Rapidly beating heart
- Clenched teeth
- Aching neck and shoulders
- Sweating hands and feet
- Churning stomach
- Dropping interest in partner, friends
- Feeling highly anxious, depressed

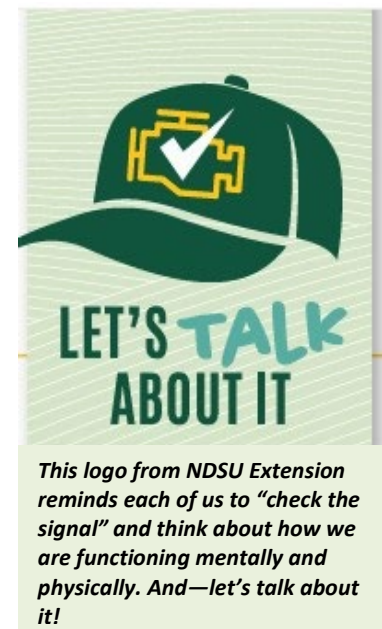
Don't Ignore Stress Warning Signs!

These and other stress symptoms are all red lights flashing on your body's dashboard and warning you that trouble could lie ahead. If you ignore your body's physical signals of stress and strain too long, you invite real problems – high blood pressure, declining health, accident proneness, depression or other mental health issues, or heart disease.

It is important that you recognize early warning signals of stress in your body, your actions, your emotional life and your relationships with others. Review the “self-check” items for each area two or three times a day (before meals, etc.). A link below to a resource on this topic can help you give yourself a “daily stress check-up.”

Access Helpful Resources

To learn more about available resources to assist in managing stress in agriculture, read the NDSU Extension publication FS283, “Stress Symptoms” – link: [Farm Stress Fact Sheet: Stress Symptoms | NDSU Agriculture](#)



If you or someone you know is in need of mental health support, call or text the **9-8-8 Suicide and Crisis Lifeline**, or chat at <https://988lifeline.org>.

Contact your NDSU Extension county office or search the Web for *NDSU Extension farm stress* for more resources on wellness in agriculture.

[Sean Brotherson](#)
Extension Family Science Specialist

Adriana Drusini (adriana.drusini@ndsu.edu)
Extension Farm and Ranch Stress Program Coordinator



TENT CATERpillARS ON TREES AND SHRUBS

We're already seeing damage from tent caterpillars in eastern North Dakota and western Minnesota. Tent caterpillars eat foliage and, in the worst cases, can defoliate entire trees like this chokecherry.

Eastern tent caterpillar (*Malacosoma americanum*) is the damaging agent on this chokecherry. These insects feed on leaves during the day but return to the communal nests in branch crotches at night. These nests provide a great place to apply control efforts. Some trees attacked by the eastern tent caterpillar include chokecherry, pin cherry, and occasionally other hardwood species. The easiest method of control is to remove the nests and destroy them. The bacterial-based pesticide *Bacillus thuringiensis var. kurstaki* (Btk) is effective against young larvae, while pyrethrins or synthetic insecticides are needed for older larvae. Do not use a blowtorch on the nest, as that will also damage the tree.



Chokecherry shrub entirely defoliated by eastern tent caterpillars. If the shrub was otherwise healthy before this infestation, it will send out new leaves and should recover quickly. If the shrub was defoliated last year or has other pest problems, it could become stressed.

Forest tent caterpillars (*Malacosoma disstria*) are another defoliator found throughout North Dakota. These insects appear at about the same time as the eastern tent caterpillar, but have a much broader host range and do not form communal nests in trees. We've seen them on linden, ash, apple, oak, maple, lilac, rose and other deciduous trees and

shrubs. Populations of this insect cycle up and down, so some areas are experiencing large outbreaks right now, while other areas have very little pest pressure.

Control measures for the forest tent caterpillar are the same as those for the eastern tent caterpillar. For small infestations, the larvae can easily be picked off the tree and destroyed. Other insecticides available to homeowners (listed as active ingredients) include acephate, azadirachtin, carbaryl, esfenvalerate, malathion, permethrin, spinosad, and other insecticides registered for trees. *Always read, understand and follow the insecticide label directions.*

The caterpillars will complete their feeding in mid-to-late June, so control measures should be applied as soon as possible.

[Joe Zeleznik](#)

Extension Forester

[Janet J. Knodel](#)

Extension Entomologist



Close-up of an eastern tent caterpillar. Note the single, solid white line down the middle of its back. Photo by Pat Beauzay.



Forest tent caterpillar feeding on a rose bush. These insects don't actually produce tents; instead, they form large masses of larvae that congregate on tree stems. The keyhole-shaped markings on the back are the key identifier for forest tent caterpillars.

horticulture

CLOVER MITE INVASION

Clover mites are tiny (about the size of a pinhead), reddish-brown mites with an elongated first pair of legs. They can become a nuisance, invading houses, especially in the spring and sometimes in the fall. These mites are so tiny that they can crawl into cracks around windows, doors or the house foundation. Homeowners can often find a few to thousands of clover mites on the sunny side of the house near windows or doors. If crushed, they leave blood-red spots on house siding or walls. They feed on grasses and clovers, sucking their sap. Fortunately, clover mites do not bite humans or animals, nor do they damage the house or its furnishings. Clover mites will not survive or reproduce inside your home because they will die from dehydration within a few days.



Clover mite on stem (Rayanne Lehman, Pennsylvania Department of Agriculture, Bugwood.org)

UGA1123015

A vacuum cleaner or damp wipes can remove a small number of clover mites. However, if you see many clover mites in the grass (lawn) or on the house siding every year, try to alter conditions that favor them, such as limiting lawn fertilizers and avoiding overwatering. The best way to prevent clover mites from invading the home is to create a 2-foot-wide physical barrier of bare soil or pea gravel around the home. Landscape rocks do not deter clover mites.

Apply a barrier spray of a residual insecticide/miticide labeled for 'residential use,' two feet out from the siding and two feet up from the ground. Pay particular attention to doors and window sills, especially ground-level window wells. An example of an insecticide effective against mites is Ortho Home Defense, which contains the active ingredient bifenthrin. Be sure to read, understand and follow all label directions.

Disclaimer: Mention of any insecticide does not imply endorsement of any product nor discrimination against any other products not mentioned by the university or the author.

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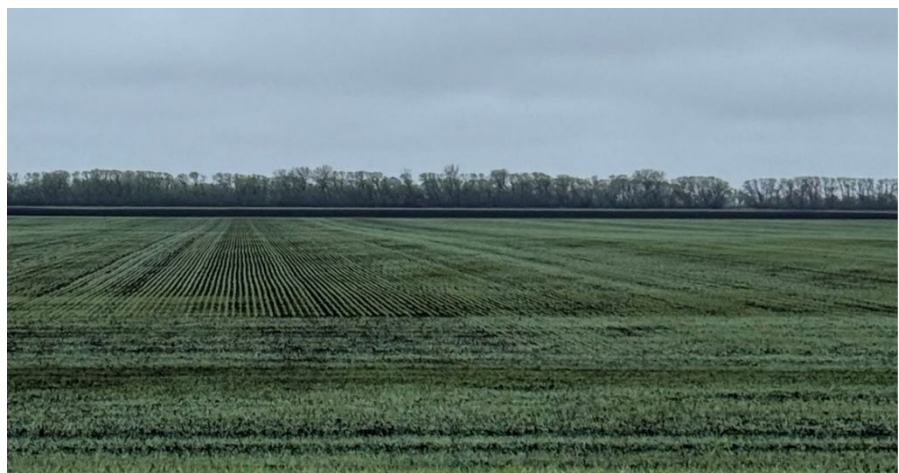


AROUND THE STATE

NORTHEAST ND

Farmers across the region are facing significant challenges with spring field operations due to difficult weather conditions, including periods of rain followed by cold temperatures, heavy winds, delayed planting, and equipment breakdowns. Planting activity peaked last week, although progress varied considerably throughout the region. Most small grain and sugarbeet plantings were completed in Pembina, Walsh, and Grand Forks counties, while farmers in Ramsey, Cavalier, Towner, Rolette, Pierce, and Benson counties continued seeding throughout the week despite dry and windy conditions.

Emergence of small grains has generally looked good; however, heavy winds likely caused some stand damage. Severe sandblasting was reported in emerged wheat fields, shredding foliage in some areas. Strong winds on Thursday and Friday also resulted in substantial soil erosion across the region, with dust clouds reducing road visibility and ditches filling with eroded soil. Reports from



Spring wheat emerging in Pembina County. Photo: Alissa Sharp, ANR Agent, Pembina

Pembina County indicate that a significant number of sugarbeet acres may require replanting due to wind damage. In addition, two trees were blown down at the Langdon Research Center.

Weekend rainfall brought relief to many producers concerned about dry topsoil conditions, although excessive rainfall in some locations created overly wet field conditions. Farmers have also begun planting soybeans, field peas, and canola.



[Anitha Chirumamilla](#)
Extension Cropping Systems Specialist
Langdon Research Extension Center

SOUTH-CENTRAL/SOUTHEAST ND

Planting progressed quickly last week with all farmers planting something and some farmers having completed planting all their crops. All of the region received much needed rainfall, however the driest part of the region, Sheridan County, received the least rainfall of the region.

The two biggest problems this past week in most of the region were wind erosion and wind and sand blasting damage to emerged plants.

The dry soil surface in parts of most fields across the region allowed soil to blow very easily in the last two weeks. Maximum wind gusts this past week occurred May 12, 14, and/or 15th, depending upon the location in the region. Thursday, May 14th was the day the most soil particles were in the air across the region at least north of Interstate 94. Figure 1 shows how much soil was in the air Thursday evening just north of Cooperstown. Figure 2 shows a large area of a wheat field having wind and sand blasting damage in Griggs County and Figure 3 shows how severe individual plant damage was to wind and sandblasting in a different Griggs County field going back over a two week period.

Soils are drying out on the surface and planting progress moved quickly last week with most areas of the region working 7 days of the week. However, there are still areas of the region, particularly in the eastern half where frost is still coming out of the soil and tractors and fertilizer spreaders are getting stuck yet.

Approximately 81% of the small grains have been planted in the region with Burleigh, Emmons, LaMoure, Richland, Sargent, and Sheridan Counties reporting nearly all small grain acreage planted. Eddy County likely has the least small grains planted at only 20%. The earliest planted hard red spring wheat has begun emerging with the region averaging 26% of the crop emerged compared to last year at 38%. Emergence is looking great and uniform with the earliest planted small grains as seen in Figure 2 having 1.5-leaf hard red spring wheat already. However, small grains planted later across the region, particularly on the western end of the region is emerging non-uniformly, with some stands poor to fair due to cold soil temperatures and dry surface soils. In the eastern part of the region tillage of wet soils also created a cloddy and poor seed bed causing non-uniform wheat emergence as seen in Figure 3.



Figure 1: Enormous amounts of soil particles in the air looking north from Cooperstown on May 14, 2026 in the evening.



Figure 2: A large area of a hard red spring wheat field showing wind and/or sand-blasting injury from the wind this past week.

Nearly all sugarbeets have been planted in the region with only about 25% emerged.

About 40% of the canola has been planted so far in the region with the western part of the region nearly completely planted compared to last year in which most canola was planted already. The average emergence is about 7% so far.

Most dry peas have been planted across the region and a high percentage have emerged already.

Corn planting across the region for farmers varies from 0 to 100% of their farms planted due to the cold weather mostly, but also some dry soil. The average corn acreage planted in the region so far is about 32% compared to 62% in 2025 with nothing emerged according to most people compared to 6% emerged in 2025 by this time. The eastern, southern, and western parts of the region have the most corn planted at this time and some farmers have the planting of corn.

Soybean planting in the region ranges from 5 to 60% with some farmers having completed planting already. The average amount of soybean acreage planted at this time in the regions is about 18% compared to 37% in 2025 with nothing emerged compared to 1% emerged in the region in 2025.

Flax planting has started already out west. No other crops have been planted in the region at this time compared to sunflower having been planted in Burleigh County in 2025 by this time.

The first major challenge in the region is the overall soil surface moisture continues to decline across the region due to limited rainfall, with a few exceptions. In the western part of the region, particularly the northwest part of Sheridan, Burleigh, Emmons, Kidder, and Ransom Counties, these counties have the driest surface and subsoil. Subsoil moisture is declining as well in Burleigh, Emmons, Kidder, LaMoure, Logan, and Sheridan Counties. Based upon 47 of the NDAWN stations in the region I look at, the Skogmo and Tappen NDAWN stations are the driest right now at the 4-inch and 39-inch soil moisture being 5% and 9.5%, respectively, at the Skogmo location and 8.1 and 6.4%, respectively at the Tappen location. If soils are being tilled to prepare a seedbed where soil moisture is limited, be sure to plant the field shortly after tillage and make sure the seed is planted as deep as possible based upon the crop to allow good soil to seed contact. Adjust press wheel pressure to preserve soil moisture for seeds to germinate.

The second major challenge again this week in the region, is the 4-inch bare soil temperature across the region continuing to delay corn and soybean planting for some farmers. The daily average soil temperature for May 5th to May 11th for the 47 NDAWN stations ranged from 45 degrees Fahrenheit at Bremen to 57 degrees Fahrenheit at Livona. The average of the 47 NDAWN stations was 50 degrees Fahrenheit, 9 degrees Fahrenheit greater than April and early May, which is about normal for this period based upon the Cooperstown NDAWN station. At 8:00 AM May 12, 2026, the average soil temperature for the region was only 48.5 degrees Fahrenheit which is below the normal for this time of year. Bremen, Cooperstown, Hope, McHenry, Mooreton, and Pickardville NDAWN stations had a weekly average soil temperature below 50 degrees yet, which is not warm enough to germinate corn and soybean seeds.

The third major challenge this week continues to be the expansion of visual soil salinity due to the lack of rainfall to push the salts deeper in the soils and the horizontal capillary movement of salt water away from the highest saline areas of the field to drier and lower salt content areas of the field.



Figure 3: Severely damage hard red spring wheat plants in a field showing wind and/or sand-blasting injury from with over the past three weeks.

Another challenge this past week were the strong winds causing tilled soils to blow and reduce the chances to apply preemergence herbicides necessary to control weeds in all crops. Figure 4 shows an overview of hard red spring wheat damage from wind and sandblasting on a sand ridge. Figure 5 shows the hard red spring wheat damage up close from the wind and sandblasting and the amount of soil moved in this area of the field.

The average daily high temperature for May 5th to May 11th ranged from 55 degrees Fahrenheit at Finley and McHenry NDAWN stations to 64 degrees Fahrenheit at the Strasburg NDAWN stations with an average of the 59 degrees Fahrenheit, 8 degrees Fahrenheit warmer than reported last week, but based



Figure 4: A normal soybean, a soybean cut off from wind and/or sand-blasting, and a non-germinated soybean seed blown out of a dry seedbed from the same Emmons County soybean field. Photo taken by Craig Serr and submitted by Nancy Deis, NDSU



Figure 5: Non-uniform hard red spring wheat emergence due to dry, wet, and high saline soils and cold soil temperatures.

upon historical records for Cooperstown this is 4.4 degrees Fahrenheit BELOW the normal. The average daily low temperature for May 5th to May 11th ranged from 27 degrees Fahrenheit at the Harvey, Oakes, Pickardville, and Zeeland NDAWN stations to 34 degrees Fahrenheit at the Wirch NDAWN station with an average for the 47 stations of 30 degrees Fahrenheit, only 2 degrees Fahrenheit warmer than the April average. Based upon historical records for Cooperstown the average daily low temperature for May 5th to 11th was a whopping 7.7 degrees Fahrenheit BELOW the normal average weekly low temperature! This average daily low temperature for the week was tied for the seventh coldest for this period for Cooperstown.



Figure 6: Hard red spring wheat planted in mid-April at the first tiller stage of development.

The total rainfall for May 5th to the 11th ranged from 0 inch at Carrington, Courtenay, Marion, Pickardville, Steele, Streeter, Tappen, Wing, and Wishek NDAWN stations to 0.14 inch at the Finley NDAWN station with a regional average of only 0.04 inch! Based upon historical records for Cooperstown, the total rainfall for May 5th to the 11th was 0.51 inch below normal.

Please stay safe and have a great rest of your week!

[Jeff Stachler](#)
Griggs County Extension Agent

SOUTHWEST ND

Dear CPR readers. Starting this week, I will expand my Around the State reports to include observations from a broader portion of western North Dakota and provide a more comprehensive regional update.

We finally received some much-needed moisture during the last 7 days, with precipitation totals ranging from 0 inches in southwestern Bowman County to more than an inch in Mountrail County. Even though this rainfall was very welcome, it was far from enough to resolve the ongoing moisture deficit issues across western North Dakota. The rain also came with cooler temperatures and cloudy conditions that will likely slow field activities and crop development for a few days. Additional rainfall is forecast this week, and it will certainly be welcomed.



Figure 1. Blowing topsoil following high winds in McHenry County, ND. Photo credit: Kathryn Slavick, NDSU Extension ANR Agent.

Last week's windstorm caused significant damage across parts of the region, with the northwestern corner of the state being among the hardest hit and wind gusts reaching up to 76 mph. Blowing topsoil was reported across much of western North Dakota (Figure 1). In Divide and Golden Valley counties, reports indicated that the residue layer in some no-till fields was completely blown away, with some areas losing up to 2 inches of topsoil. As a consequence, shallow-seeded crops such as canola that were just emerging were sandblasted or had seeds blown into ditches, which will likely impact crop stands. Before making replant decisions, producers should wait a few days and then perform stand counts to properly assess losses and determine the best course of action.

One of the questions I have received following the windstorm concerns was what may happen to residual herbicides applied before the event. As with many agronomic questions, the answer is: it depends. As discussed in a previous CPR article, residual herbicides require an activation window, usually within 10 to 20 days after application. If rainfall does not occur during that period, the herbicide may not become activated and could instead undergo photodegradation, reducing its effectiveness.

In areas where soil losses reached up to 2 inches of topsoil, even herbicides that had already been incorporated by rainfall may have been lost along with the displaced soil. Another concern involves areas where soil containing residual herbicides was deposited. In those cases, herbicide activity will depend on whether enough moisture was available to activate the product after deposition.

In any case, producers should continue monitoring weather conditions and scout fields for signs of herbicide injury or weed escapes. In fields where soil containing residual herbicides was removed, earlier weed scouting and a more robust POST herbicide program, potentially including sequential POST applications, may be necessary depending on weed pressure.

Regarding crop progress, reports from Oliver County indicate that corn planting has been delayed by 8 to 10 days due to cool soil temperatures, and crop emergence has been slow. In Stark County, planting of small grains and canola is complete, with corn planting nearly complete. Most small grains have emerged, with some fields reaching the one- to two-leaf stage. Similarly, in McHenry County, planting of small grains and canola is complete, and producers are now shifting focus to corn and soybean planting. In McKenzie County, small grains are just beginning to emerge, and there are reports of increased flax acreage this year as producers adjust to higher input costs and lower commodity prices.

[Victor Gomes](#)

Extension Cropping Systems Specialist
NDSU Dickinson Research and Extension Center



WEATHER FORECAST

The May 21 to May 27, 2026 Weather Summary and Outlook

On Tuesday, May 19, much of central and western North Dakota recorded either a frost (36°) or a freeze (32°). Yesterday, Wednesday, May 20, many parts of central and eastern North Dakota, including northwestern Minnesota record a frost or a freeze (Figure 1). It is very likely these will be the last freezing temperatures of the season.

Today's Minimum Temperature (°F)

May 20 2026 08:06 AM

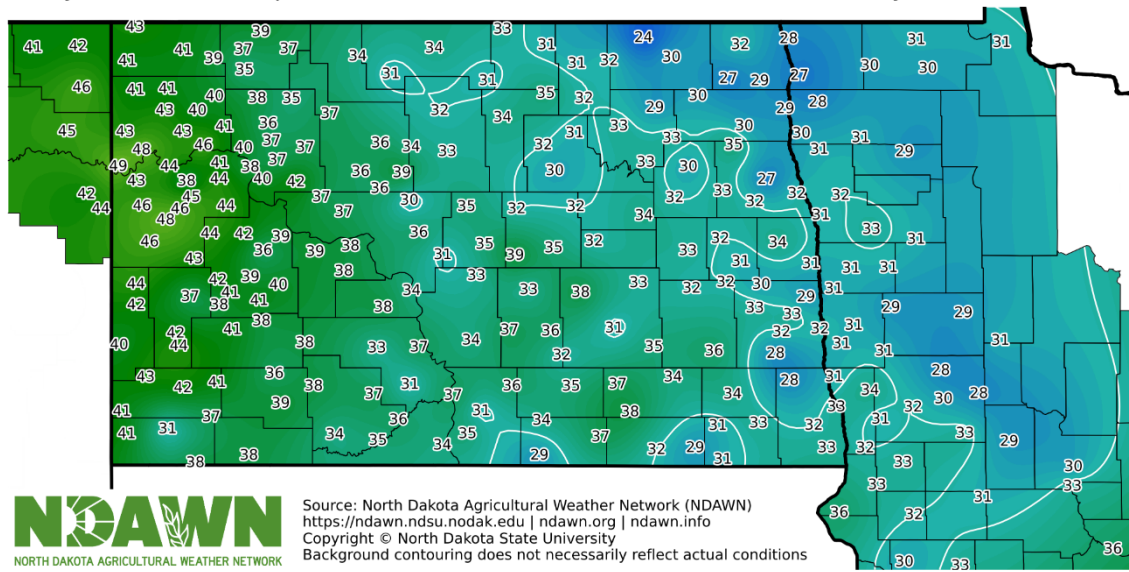


Figure 1. Minimum temperatures at NDAWN stations on May 20, 2026

The freezing temperatures this week were not climatologically unusual, yet a good 10 days later than average especially in the southern part of North Dakota. The cold weather this week was a continuation of an over all cold period that has been fairly persistent over the past month. Much of North Dakota and northwestern Minnesota have averaged anywhere from 2° to 5° below average in the past 30 days (Figure 2).

Departure from Normal Temperature - Past 30 Days (°F) May 19 2026

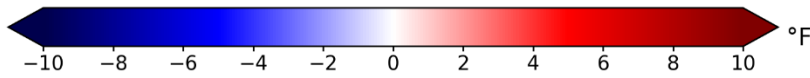
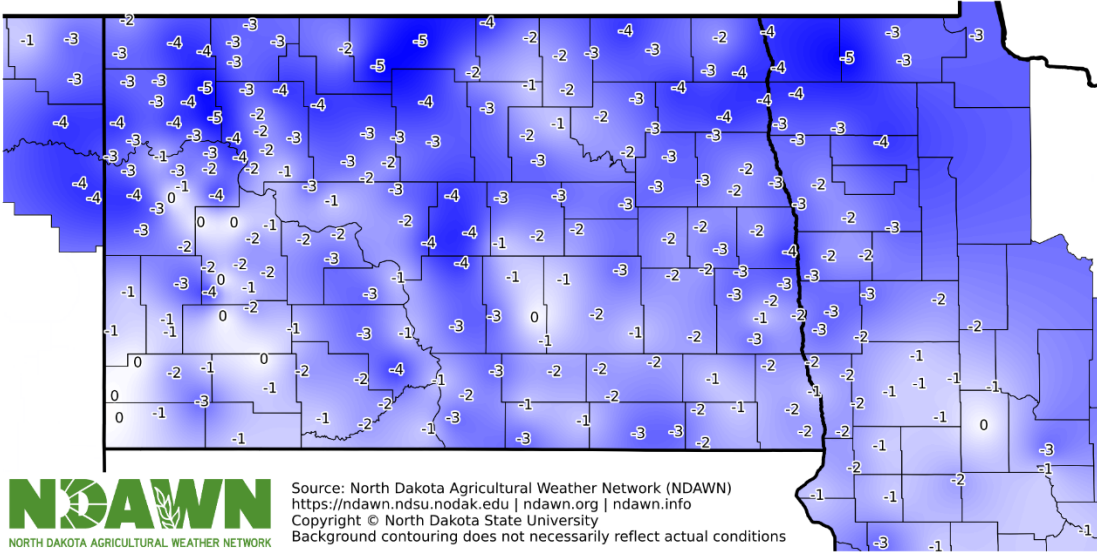


Figure 2. Departure from Average Temperature for the Period of April 20 through May 19, 2026

The cold temperatures in recent days have also dropped soil temperatures back below 50°, especially at night into the morning hours (Figure 3). Although diurnal changes did bring temperatures above 50° at times in the afternoon, the over all average was below 50°. With warmer temperatures coming, expect soil temperatures to average closer to 60° or warmer by the end of this forecast period.

Soil Temperature 4 Inch Bare Soil (°F) May 20 2026 09:11 AM

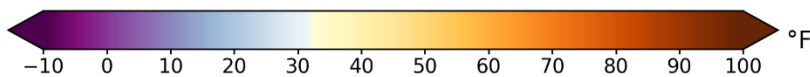
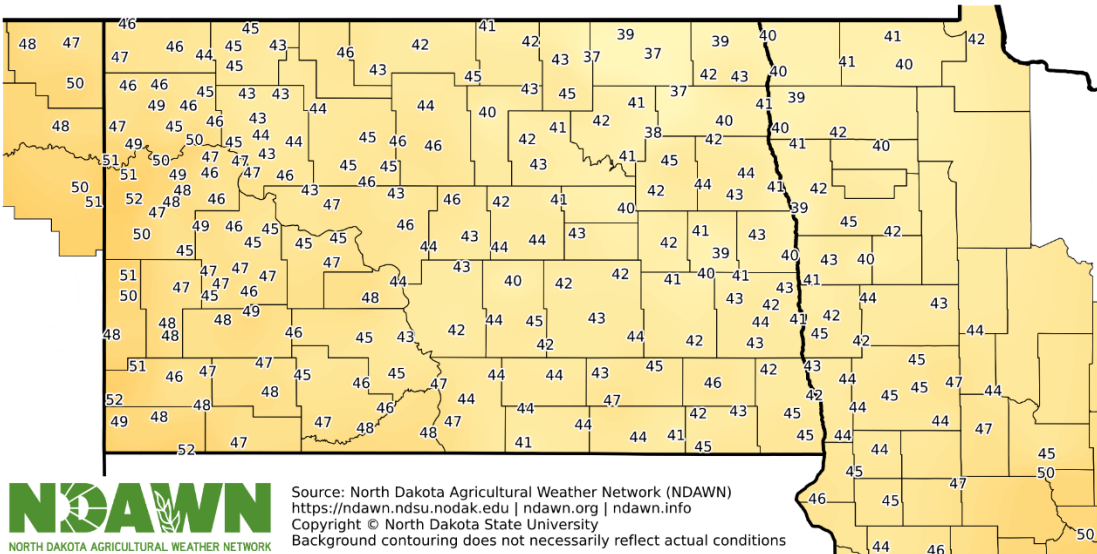


Figure 3. Soil Temperatures at a 4 Inch Depth at NDAWN Stations around 9:00 AM on May 20, 2026.

Figures 4 and 5 and shows the forecasted growing degree days (GDDs) for base 32° (wheat) and base 50°F (corn and soybeans) during this forecast period. Above average temperatures are expected, especially next week across the northern plains. Plus, with additional rainfall in many areas in the next few days should enhance germination and crop growth in the next week. These warmer than average temperatures are expected to continue into early June to perhaps even mid-June. If you attended any of my public appearances this past winter you may recall I was forecasting a slightly warmer than average summer and most areas recording less than average precipitation. There are still indications that suggest after a cold spring, a warmer summer, per average, will allow crops to catch up after a late planting.

Growing Degree Days (Base 32) Forecast May 21 - May 27 2026

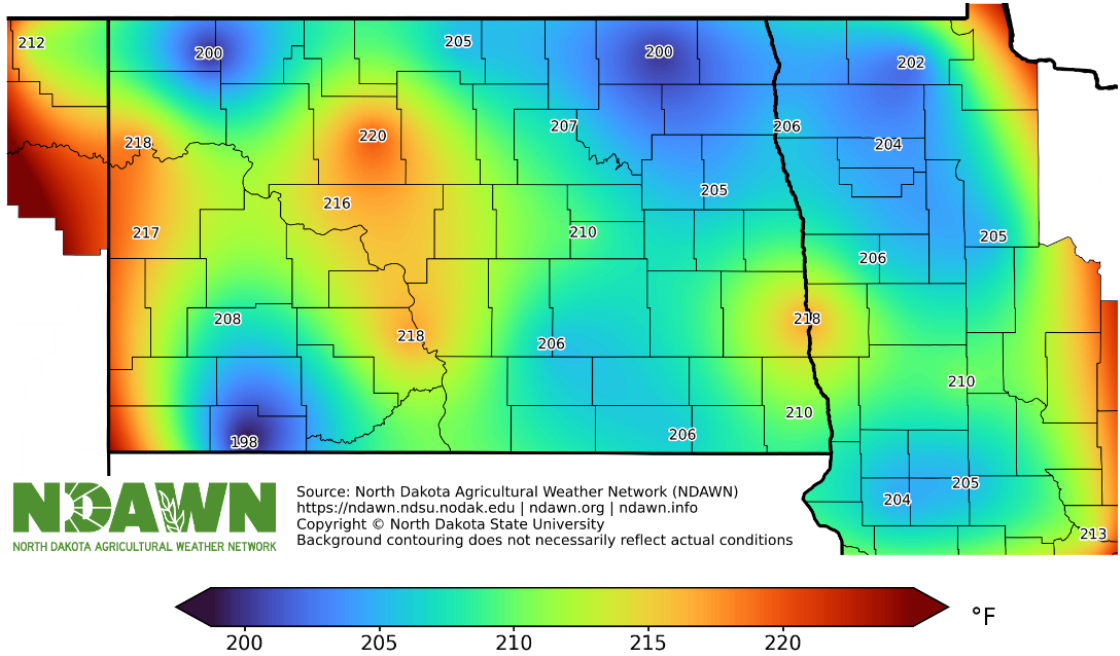
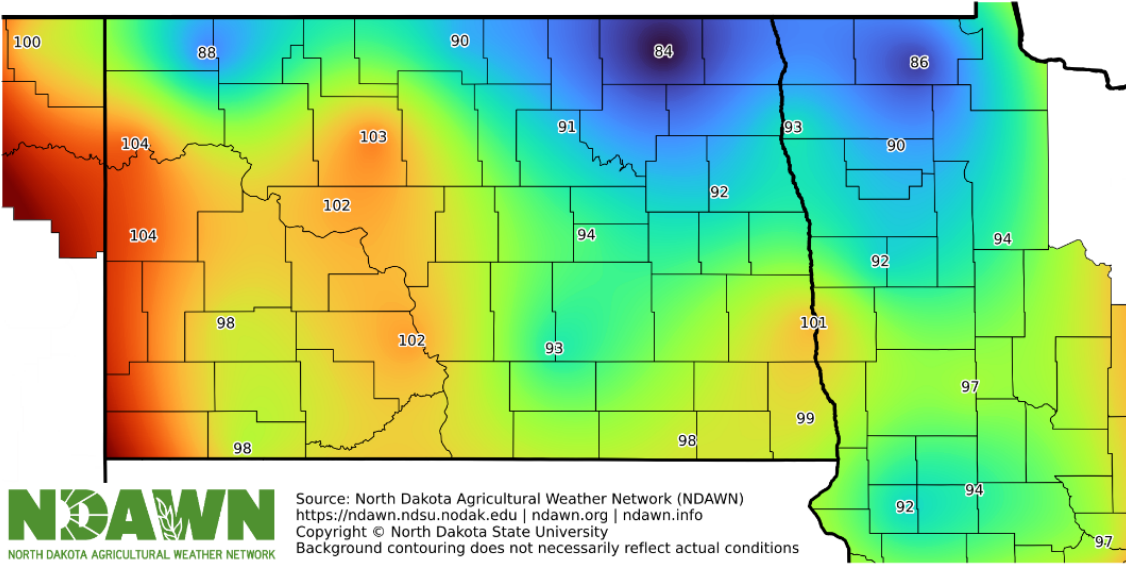


Figure 4. Estimated growing degree days base 32° for the Period of May 21 to May 27, 2026

Growing Degree Days (Base 50) Forecast

May 21 - May 27 2026



Source: North Dakota Agricultural Weather Network (NDAWN)
https://ndawn.ndsu.nodak.edu | ndawn.org | ndawn.info
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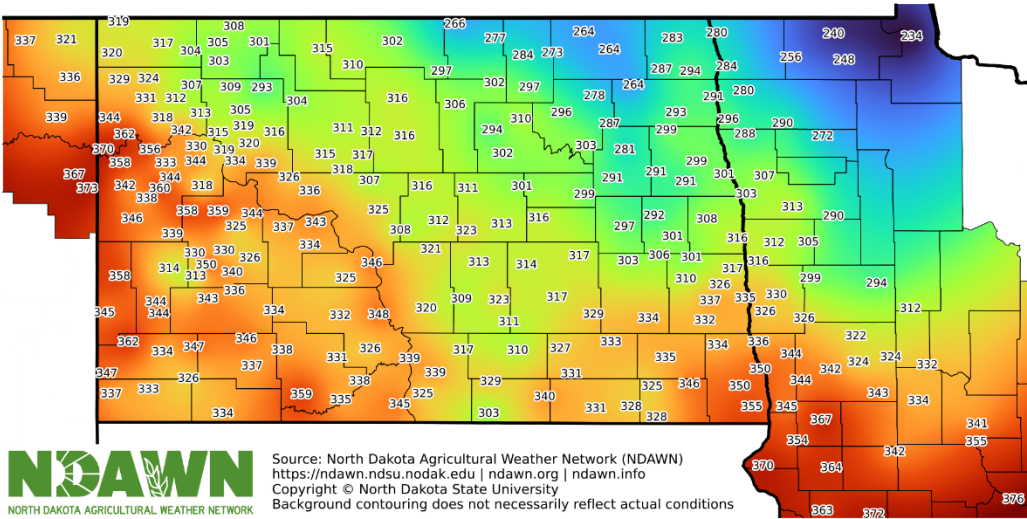
Figure 5. Estimated growing degree days base 50° for the Period of May 21 to May 27, 2026

Using May 1 as a planting date, the accumulated growing degree days for wheat (base temperature 32°) is given in Figure 6. You can calculate wheat growing degree days based on your exact planting date(s) here:

<https://ndawn.ndsu.nodak.edu/wheat-growing-degree-days.html>

Wheat Growing Degree Days Since May 1

May 19 2026



Source: North Dakota Agricultural Weather Network (NDAWN)
https://ndawn.ndsu.nodak.edu | ndawn.org | ndawn.info
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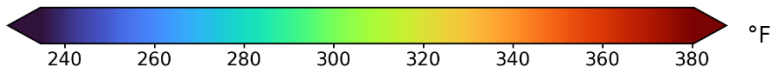


Figure 6. Wheat Growing Degree Days (Base 32°) for the Period of May 1 through May 19, 2026

Using May 10 as a planting date, the accumulated growing degree days for corn (base temperature 50°) is given in Figure 7. You can calculate corn growing degree days based on your exact planting date(s) here: <https://ndawn.ndsu.nodak.edu/corn-growing-degree-days.html>.

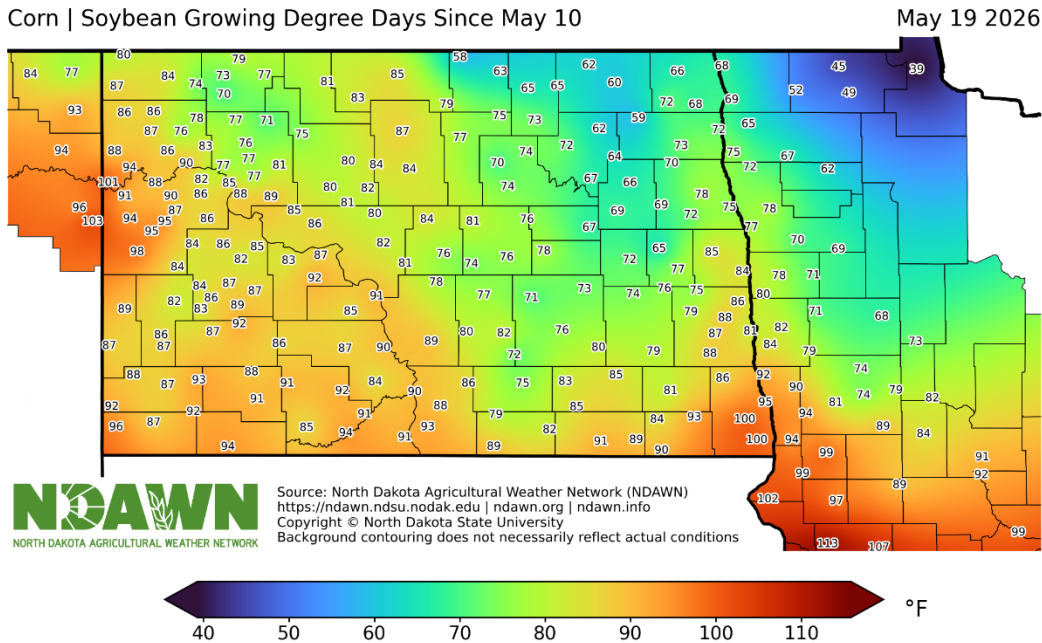


Figure 7. Corn Growing Degree Days (Base 50°) for the Period of May 10 through May 19, 2025

Soybeans also use base 50° like corn, but NDAWN has a special tool for soybeans that, based on your planting date and cultivar, can estimate maturity dates based on average temperatures, as well as give you GDDs based on the planting date(s) you set. That tool can be found here: <https://ndawn.ndsu.nodak.edu/soybean-growing-degree-days.html>

[Daryl Ritchison](#)
 Meteorologist

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This publication is supported in part by the National Institute of Food and Agriculture, Crop Protection and Pest Management - Extension Implementation Program, award number 2024-70006-43752.