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# entomology

## WIREWORM CONTROL OPTIONS

Wireworms are a resurging pest problem in North Dakota, particularly west of the Missouri River in areas with no-till and continuous small grain production, and tight rotations with small grains and other crops. Since soil temperatures are above 50°F now, wireworms are starting to chew on roots. They go through several larval growth stages over several years - thus, there are always multiple ages present, such as small young larvae and larger mature larvae. Wireworms prefer grasses and grass crops, but will feed on the roots and seedlings of other crops when their preferred host plants are not present. Stand loss in sunflowers and other row crops, even under light to moderate wireworm pressure, can be substantial due to the fact that sunflowers are seeded at low rates and because attacked seedlings usually die.



**Wireworms (Patrick Beauzay, NDSU Extension)**



**Stand loss caused by wireworms (Patrick Beauzay, NDSU Extension)**

Systemic neonicotinoid seed treatments, such as thiamethoxam, do not cause significant wireworm mortality. Rather, wireworms that ingest a neonicotinoid will become moribund (sick) and stop feeding for a while. A seedling may live or die depending on the timing and extent of feeding injury. Germinating seedlings are most vulnerable. Seedlings that do survive may exhibit delayed growth and will ultimately produce little or no seed.

Pyrethroids also do not cause enough mortality to reduce overall wireworm populations. Pyrethroids work like a repellent to foraging wireworm larvae. Seedling root growth within the in-furrow application zone is protected, but a seedling is still susceptible to wireworms attacking from above the root zone.

**Sunflower Wireworm Project:** NDSU Extension Entomology has tested thiamethoxam insecticide seed treatment and in-furrow pyrethroid products and rates in an effort to find the best control measures for sunflower producers. Our research demonstrated 15% to 30% stand reduction when using thiamethoxam compared to 40% to 60% stand reduction using no insecticide seed treatment or in-furrow insecticide. However, in dry years such as 2021, seed treatment performance was poor. In 2021, stand loss when using thiamethoxam was not different from the untreated check - both sustained 40% stand loss. This is likely due to insufficient soil moisture during germination. Neonicotinoids require adequate soil moisture to dissolve the chemical from the seed coat so that it can be taken up by the roots and translocated throughout the seedling. Using a neonicotinoid seed treatment during years with adequate soil moisture will give some systemic protection against stand loss.

At present, two pyrethroid active ingredients are labeled for in-furrow use in sunflowers: bifenthrin (Capture LFR, Capture 3RIVE 3D, Ethos XB, Ethos 3D) and zeta-cypermethrin (Mustang Maxx). In years with adequate soil moisture, in-furrow pyrethroids had slightly better stands compared with thiamethoxam, but the differences were not significant. Nor did we find significant differences between low (4 fl oz/acre) and mid (8 fl oz/acre) rates of bifenthrin and the single labeled rate (4 fl oz/acre) of zeta-cypermethrin. In 2021, in-furrow pyrethroid use resulted in significantly less stand reduction (about 20%) compared to 40% stand loss using thiamethoxam alone.

In most years, combining an in-furrow pyrethroid with a thiamethoxam seed treatment did not improve stand significantly compared to using either thiamethoxam or an in-furrow pyrethroid alone. During dry years however, using a pyrethroid in combination with thiamethoxam significantly improved stand compared to thiamethoxam alone.

Sunflowers can tolerate seedling stand losses of up to 25% with only a 5% yield loss. In our studies, we did not find significant yield losses between in-furrow pyrethroids and thiamethoxam seed treatments. However, yield losses in affected areas may be greater due to root feeding injury on surviving plants and lower competition against weeds. Thanks to support from the National Sunflower Association.



***Sunflower seedling injured and killed by a wireworm (Patrick Beauzay, NDSU Extension).***

**In summary, we recommend the following practices to minimize stand loss and reduce wireworm populations.**

- Know your fields - sample for wireworms to identify and monitor problem areas.
- Increase seeding rate by 10% - 15% in problem areas to compensate for wireworm stand loss.
- Control weeds, especially grasses and volunteer grain, to reduce attractiveness to egg-laying female beetles.
- Use a seed treatment - in fact, it's likely that your purchased seed will include thiamethoxam or another neonicotinoid seed treatment in the seed treatment package along with fungicides.
- For sunflower, consider using a low to mid-rate of bifenthrin, especially if conditions are dry at planting time.



- Include a small grain crop in your rotation plan, and use broflanilide seed treatment in the small grain crop. **Broflanilide (Terraxa, Terraxa F4)** is a new product registered for use in small grains that provides good wireworm control and results in significant wireworm mortality. Broflanilide is a Group 30 (meta-diamides) insecticide, and is not systemic. The idea here is that including broflanilide in the crop rotation will reduce wireworm populations long-term.

[Patrick Beauzay](#)

Research Specialist

[Janet J. Knodel](#)

Extension Entomologist

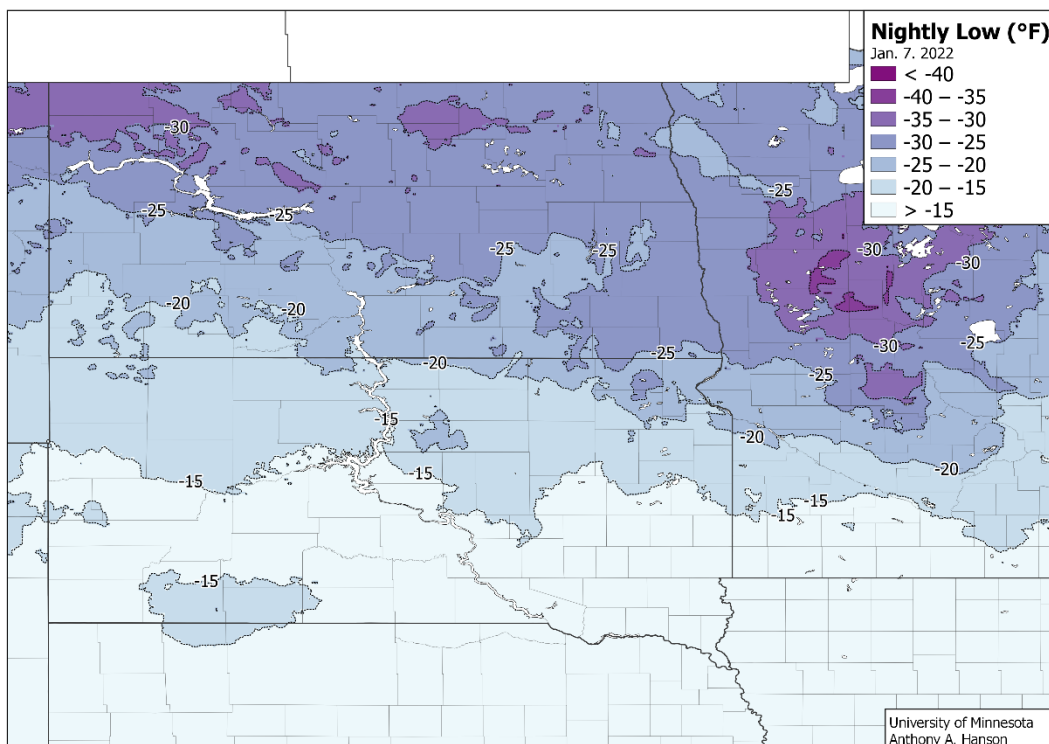
### SOYBEAN APHID - OVERWINTERING MORTALITY

Soybean aphids overwinter as eggs on the buds of buckthorn (*Rhamnus* spp.) in shelterbelt area close to fields, and are sensitive to air temperatures and not wind chills. Research has shown that eggs will freeze to death at temperatures between -25 to -35°F. In North Dakota, lows below -25°F were observed on January 7, 2022, mainly in the northern half and Red River Valley areas (Fig. 1). For soybean aphid eggs, a few areas in northern North Dakota had >50% projected cold mortality (see orange to red on Fig. 2). However, most of the Red River Valley where soybean aphid is most common had 25-50% projected cold mortality (yellow on Fig. 2) to 10-25% projected cold mortality (light green on Fig. 2). Soybean aphid is uncommon west of the Missouri River where projected cold mortality was <5%.

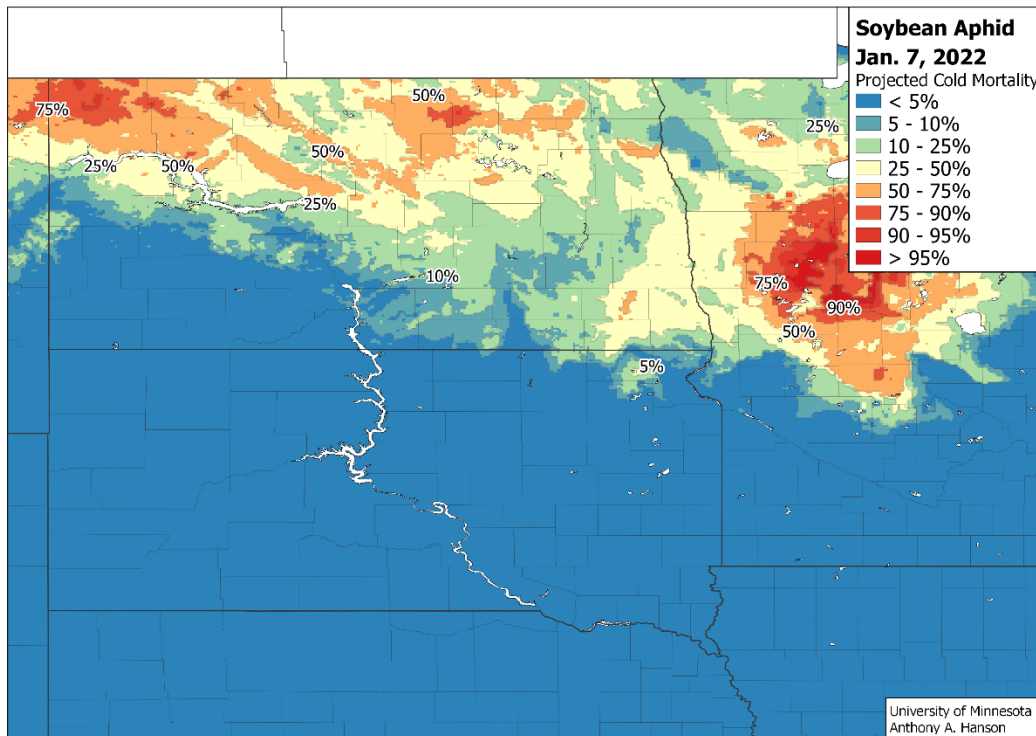
While super cold winter temperatures can sometimes help reduce insect pest populations, it usually is not 100% effective. Overall, soybean aphid eggs are very winter hardy and can survive extended periods of very cold temperatures. Soybean aphids have two other biological factors that favor their survival – reproduction rate and mobility. In the summer, soybean aphids reproduce asexually (or parthenogenic) on soybean, meaning that females give birth to live young without mating and all young are female. These young females are able to reproduce within seven days or less, resulting in rapid population increases when environmental conditions are right. Soybean aphids also are mobile and can migrate in large numbers into North Dakota from the southern states like southern Minnesota, Iowa, and South Dakota. Regular routine scouting is always important regardless of the projected overwintering mortality.

Thanks to Dr. Anthony Hanson, University of Minnesota's Extension Educator, at Morris WCROC, for the maps. For the Minnesota forecast on overwintering soybean aphid survival, please read Dr. Hanson's article:

<https://wcroc.cfans.umn.edu/about-us/wcroc-news/cold-winter-soybean-aphid>



**Figure 1.**  
**Lows on Jan.**  
**7, 2022.**  
**U.S. National**  
**Phenology**  
**Network**



**Figure 2.**  
Predicted  
soybean  
aphid cold-  
exposure  
mortality on  
Jan. 7, 2022.

## REVISED SOYBEAN APHID PUB

**Management of Insecticide-resistant Soybean Aphids** (E1878 Revised, 2022) was revised due to the recent loss of chlorpyrifos (Lorsban and generics). Insecticide with new modes of action also were added to the pub including Transform WG (sulfoxaflor, Group 4C), Sivanto Prime (flupyradifurane, Group 4B) and Sefina (afidopyropen, Group 9D). This multistate extension publication summarizes the development of insecticide resistance in soybean aphids in the upper Midwest and how to manage insecticide resistance using an Integrated Pest Management approach.

Thanks to the North Central Soybean Research Program for support.

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Extension Entomologist


E1878 (Revised, 2022)

### Management of Insecticide-resistant Soybean Aphids

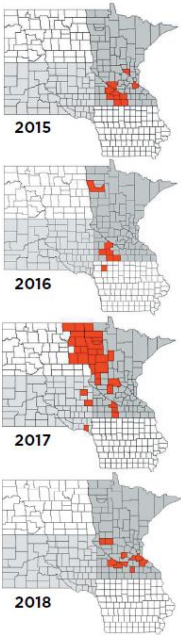
Robert Koch, University of Minnesota  
Erin Hodgson, Iowa State University  
Janet Knodel, North Dakota State University  
Adam Varenhorst, South Dakota State University

Soybean aphids, *Aphis glycines*, (Figure 1) are the most significant insect pest of soybean in Minnesota, Iowa, North Dakota and South Dakota. Development of insecticide resistance in this pest creates new challenges for effective soybean pest management and profitable soybean production.

Resistance is defined as a decrease in susceptibility of a pest population to an insecticide that may result in failures when the product is used according to label recommendations for that pest. Failures of certain pyrethroid insecticides for management of some soybean aphid populations have been observed in commercial fields (Figure 2), and resistance to bifenthrin and lambda-cyhalothrin has been documented through small-plot research, laboratory bioassays and molecular research. Because of the mobility of winged soybean aphids, the challenges posed by insecticide-resistant populations of the pest could spread to soybean fields in other parts of the region.



**Figure 1.** Soybean aphids infesting a soybean leaf. (Photo courtesy of R. Koch, University of Minnesota)



**Figure 2.** Counties with reported failures of pyrethroids for control of soybean aphid. Red-shaded counties indicate those from which Extension entomologists received reports of failures. (Maps courtesy of B. Potter, University of Minnesota)

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April 2022

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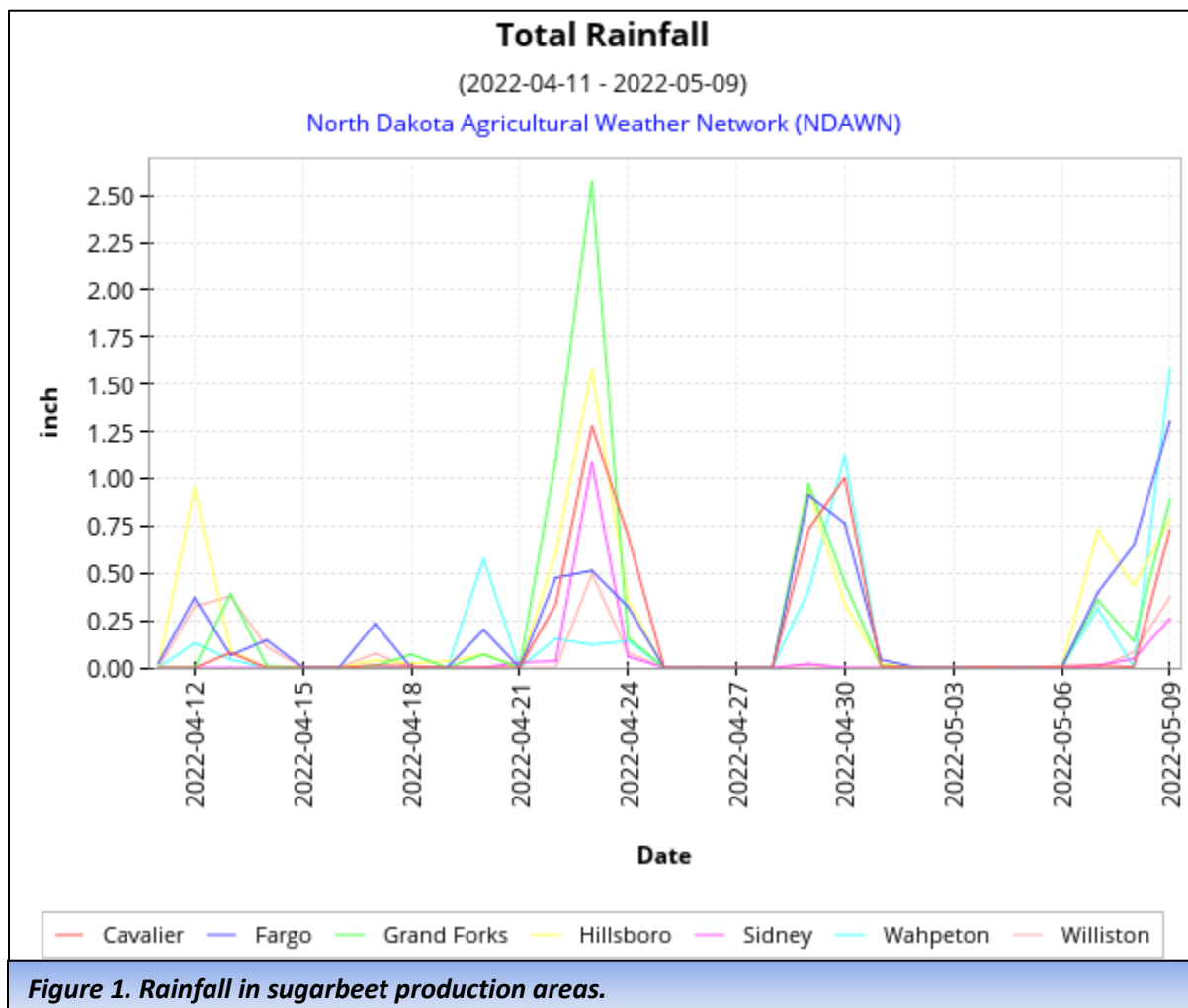


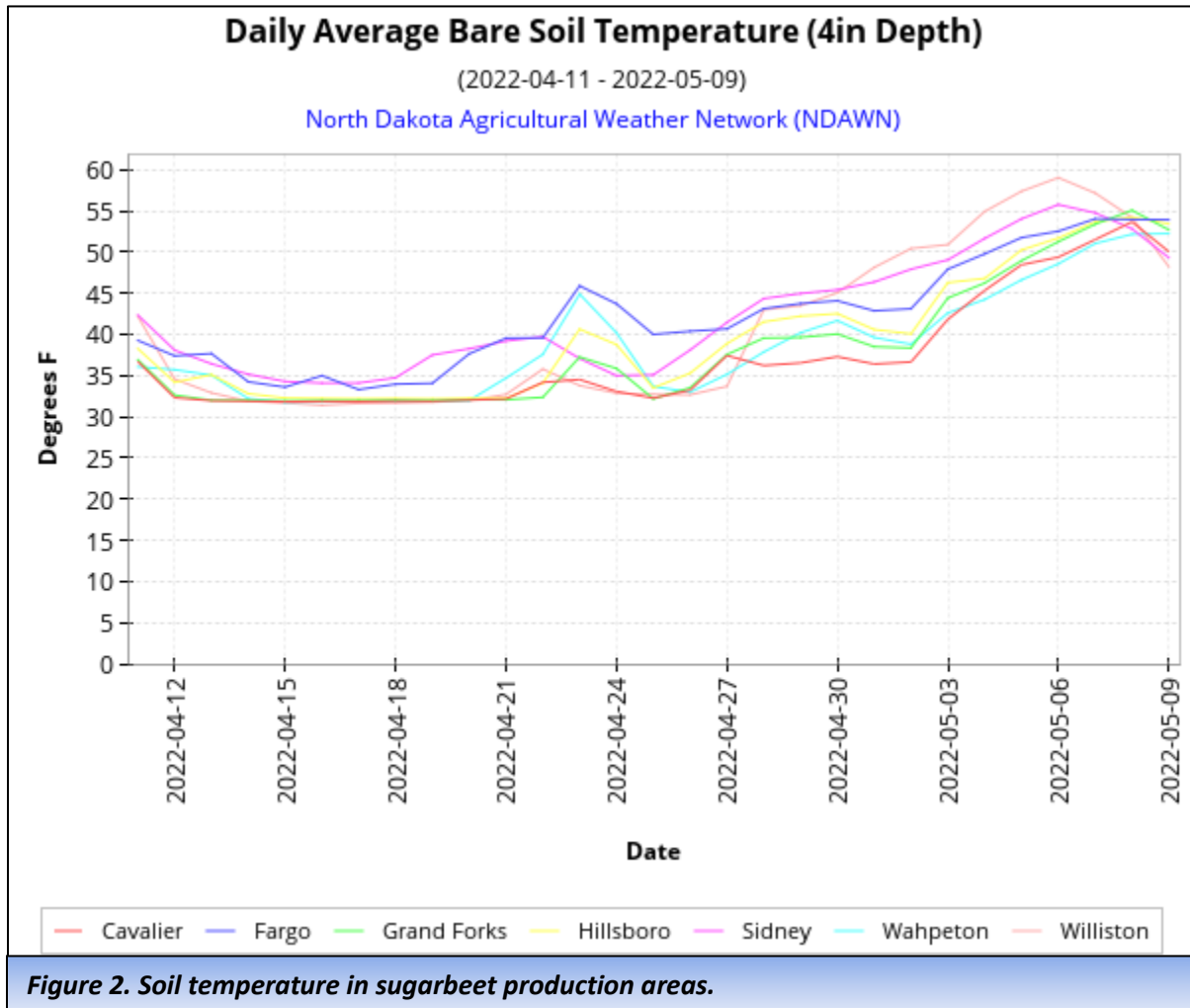
### WET FIELD CONDITIONS DELAY SUGARBEET PLANTING

After a long, dry spell, sugarbeet fields in eastern North Dakota through Minnesota received 4.6 to 7.2 inches of rainfall since April 11 when planting typically starts (Figure 1). Growers in western North Dakota and Sidney, Montana received 1.93 and 1.55 inch of rainfall, respectively, over the same period. Wet and sodden field conditions in most production areas have delayed sugarbeet planting.

Daily average soil temperature increased from the mid-30s in early April and was trending towards 50°F until the rains came again during the past week (Figure 2). The weather forecast indicates a warming trend for the next week that should result in average soil temperature of 60°F.

What will adequate moisture and warm soils mean for sugarbeet germination and emergence? It will mean rapid and uniform germination and emergence; the higher the temperature, the faster the emergence (Figure 3). As such, I encourage all our producers to be patient and start planting when field conditions become favorable. Aim for about 175 to 215 plants per 100 foot of 22-inch rows to utilize the nitrogen applied and the available moisture for high tonnage and quality.





**Figure 3. Impact of soil temperature on sugarbeet emergence in the presence of adequate moisture.**

Soil Temperature (°F)	Days to Emergence
38-45	21 days or more
45-52	10-21 days
52-60	7-12 days
60-70	5-7 days

You can easily obtain soil temperature and all you need to know for sugarbeet production by downloading and using the “Sugarbeet Production Guide” App available for free download at: <https://apps.apple.com/us/app/sugarbeet-production-guide/id1369831563> or the 2022 Sugarbeet Production Guide at: <https://www.ndsu.edu/agriculture/ag-hub/publications/2022-sugarbeet-production-guide>

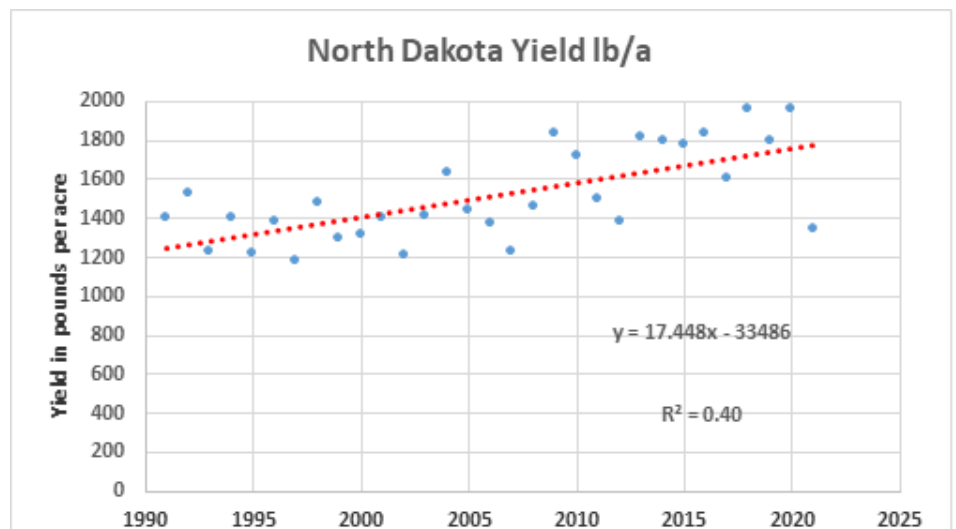
Best wishes for a safe planting season.

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Extension Sugarbeet Specialist  
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## CANOLA

The average North Dakota canola yield for the last ten growing seasons was 1,728 pounds per acre. Based on the March National Agricultural Statistics Service report, North Dakota producers are planning to seed close to 1.76 million canola acres. On average the annual canola yield increase, from 1990 to 2021, has been 17.5 pounds per acre per year (Figure 1). This increase is due to better genetics and management. The yield for each individual year varies based on the environmental conditions. Late planting or limited available moisture during the growing season may reduce the yield potential. For instance, drought reduced yield in 2021 (Figure 1).



**Figure 1. Average North Dakota canola farm yield as reported by the NASS.**

Based on the trend line, the average North Dakota farm yield for 2022 is estimated at 1,794 pounds per acre. If planting in 2022 will be delayed, the yield could be lower.

Some key management suggestions for getting high canola yields:

- Plant canola hybrid that have shown high yield potential in [University](#) and company trials. These trials should be at several locations in your respective growing region.
- Field selection is critical to obtain high yields. Canola best follows cereal grains in a rotation. Avoid crops such as sunflower, dry beans, and soybean in close rotation with canola, as all these crops are susceptible to white mold (*Sclerotinia*). Also select fields that are free of troublesome weed problems.
- Plant seed that has a high germination percent with high seedling vigor. Planting seed treated with both an insecticide and fungicides for seedling protection is recommended.



- Plant canola into a firm seedbed and at a uniform depth. Seeding depths recommended are  $\frac{3}{4}$  to 1 inch. A stand of 6 to 8 established plants per square foot is a good target to get optimum yields, with row spacings narrower than 12 inches. A minimum stand of 3-4 plants per square foot just will not provide the higher potential yields that can be obtained with higher plant populations.
- Canola is a crop that responds well to fertilizer applied. Both nitrogen and sulfur are the key nutrients for high yields. Use [recommended](#) fertilizer rates.
- [Control weeds](#) early if possible since a lot of weed competition early in the season can reduce yields very quickly.
- Monitor for any flea beetle pressure and other pest problems early in the growth and development stages of canola (especially during the first three weeks after emergence). Be prepared to apply an [insecticide](#) if the seed treatment does not hold long enough or the insect pressure is too great.
- As canola gets near the bud stage or early bloom, start monitoring the [NDSU Canola Disease Risk map](#) site for Sclerotinia stem rot (white mold) potential. Have a plan to get the correct fungicide applied should the risk be high.
- For additional production information see the [Canola production](#) publication



*Canola research plots at Langdon, ND.*

## FIELD PEA

Field pea (*Pisum sativum* L.), a native of southwest Asia, was among the first crops brought under cultivation by man. The green- and yellow-seeded varieties are used for human consumption as dry split field pea. Field peas are used as protein concentrates for human consumption, in soups, for livestock and peas are popular pigeon feeds. In North Dakota pea yields can equal yields obtained by hard red spring wheat.

Field pea may be grown as a forage crop, for hay, pasture or silage. Field pea grown in a mixture with oat, barley or triticale yields more dry matter per acre than a straight pea crop. A mixture of 2/3 field pea and 1/3 oat can be seeded with alfalfa or clover as a companion crop. Harvest is recommended when field pea is in full bloom and oat is in the late boot stage.

Field pea stems grow to a length of 2 to 4 feet. A leaf consists of one to three pairs of leaflets with a terminal, branched tendril. Field pea is of the indeterminate (climbing) type or determinate (bush or dwarf) type. Flowers are reddish-purple or white. Pods are about three inches long and can contain four to nine seeds.

A cool growing season is necessary for optimum pea yields (a mean temperature of 55 degrees to 65 degrees F). Hot weather during flowering may result in reduced seed set. Field pea requires the same length of growing season as wheat. On average, it requires 60 days from planting until bloom and the crop matures in 95 to 100 days



The moisture requirement for field pea is similar to that for cereal grains. Field pea can be grown on a wide range of soil types, but in any soil, there must be good drainage, as field pea does not tolerate soggy or saturated conditions. Field pea is capable of utilizing bacterially fixed atmospheric nitrogen. The specific bacterial association for nitrogen fixation in field pea and lentils is with the bacterium *Rhizobium leguminosarium*. If field pea is to be grown in a field for the first time, or peas have not been grown recently, inoculation of the seed with the proper *Rhizobium* prior to planting may increase nodulation. Pea seed germination rate increases with increasing temperature. Seed treatment with a fungicide can significantly improve emergence.

Pea growers need to carefully monitor the crop as it nears maturity in order to harvest on a timely basis. Harvest time is especially important if the crop is to be marketed as seed, or to meet contract specifications for human food or specialty feed markets.

Short-vine and semi-leafless pea varieties have characteristics that are adaptable to straight harvesting compared to varieties with indeterminate and prostrate-vine growth.

For more production information see the 'Pulse Crop Production [Field Guide](#)' for North Dakota and for variety information see the 'North Dakota variety trial results and [selection guide](#)'.



*Semi-leafless dry pea variety with flowers and developing pods, mid-summer in North Dakota.*

[Hans Kandel](#)

Extension Agronomist Broadleaf Crops

## NAVY BEAN YIELD RESPONSE TO ROWS SPACING AND PLANT POPULATION

Navy dry edible bean (*Phaseolus vulgaris* L.) is the fourth most commonly grown market class in North Dakota and Minnesota (12.6% of total bean acres), based on the 2021 Northharvest bean [grower survey](#). North Dakota State University's current [recommendation](#) is to establish 90,000 – 115,000 navy bean plants per acre but the 2021 survey indicates 66% of growers planted at a seeding rate of 110,000 to 129,000 seeds per acre. Also, the survey indicates 68% of navy bean growers use rows 21-25 inches wide.

A study in Carrington, North Dakota with navy bean conducted in 1999-2000 indicated no seed yield response among small-seeded bean planting rates of 90,000, 105,000, and 120,000 pure live seeds (PLS) per acre, and yield increased in one of two years with 7- versus 30-inch rows. A North Dakota study reexamined the interaction of navy bean row spacing and plant population to identify potential navy bean seed yield increase with narrow rows and higher plant populations. 'Avalanche' navy bean was planted in 14-, 21- and 28-inch rows at 100,000, 125,000 and 150,000 PLS per acre at Carrington in 2014 and 2016-17.

Navy bean seed yield, averaged across three site-years at Carrington, was statistically different with the two-factor interaction (Table 1). Averaged across three years and rows, plant population was 92,600, 116,800 and 139,800 plants per acre with the low to high planting rates, respectively. Highest yield was achieved at 2,790 and 2,660 lb. per acre with 14-inch rows and the high and medium plant populations, respectively. The combination of 14-inch rows and plant populations of greater than 115,000 plants per acre increased yield 24% to 28% compared to 28-inch rows with slightly more than 90,000 plants per acre.

**Table 1. Navy bean seed yield among row spacings and plant populations, Carrington, 2014 and 2016-17 (3 site-years).**

Row spacing	Plant population		
	92,600	116,800	139,800
Inches	Seed yield in pounds per acre		
14	2580 bc <sup>1</sup>	<b>2660 ab</b>	<b>2790 a</b>
21	2470 cd	2340 d	2340 d
28	2010 e	2070 e	2120 e
LSD (0.10)	----- 180 -----		

<sup>1</sup>Means with no similar letters are significantly different.

Among the three plant populations, navy bean seed yield increased 10% to 23% with 21-inch rows compared to 28-inch rows. Within 21- and 28-inch rows, yield did not increase with increased plant populations. For more information see the April 2022 revised Extension publication [Black and Navy bean](#) response to row spacing and population.

The study results support current navy bean grower trends of reducing row width and increasing plant populations, and indicates a need to revise NDSU recommendations for navy bean plant establishment.



**SUGARBEET PRODUCER CONVERSATIONS THE FIRST HALF OF MAY**

My unofficial tally indicates 20,000 planted acres or approximately 3% of projected 2022 sugarbeet acres as of May 10. The 2021 crop was largely planted before May 10 and I was writing about the lack of rainfall to incorporate herbicides into soil one year ago. Each season is different and with it brings a unique set of questions from our stakeholders. The following are a summary.

***Q1. Are there new sugarbeet herbicides in 2022?***

**A1.** The products used to control weeds in 2021 will be the same products in 2022. Two modifications are a Stinger HL, a 5-pound gallon formulation compared to 3-pound gallon with Stinger. Second, PowerMax3 is a 4.80 pound ae (acid equivalent) gallon formulation compared to 4.50 pound ae gallon formulation with PowerMax.

***Q2. How does planting in mid-May change weed management compared to planting in mid-April?***

**A2.** We might control early emerging kochia and common lambsquarters with tillage in mid-April but the pigweeds will emerge immediately following soil disturbance and planting in mid- and late-May. Thus, soil residual herbicides must be used at planting, either preplant or preemergence.

***Q3. Is rainfall or tillage best to incorporate ethofumesate?***

**A3.** I prefer rainfall but rainfall needs to be timely, especially since waterhemp will germinate and emerge following tillage due to later than normal planting in 2022. Tillage must be shallow since waterhemp germinates from the surface to 1-inch. Use ethofumesate at a minimum of 4 pint per acre, if you intend to incorporate with tillage equipment.

***Q4. Many acres were sown with fall-seeded cover crops in 2021, mostly winter rye. Our intention was to plant into the rye but actively manage the rye and terminate after stooling and before it reached 4- to 6-inch tall. We intended to terminate in mid-May (now). How does late plant change our plans?***

**A4.** Actively manage rye. Many producers seeded at approximately 10 lb per acre, so the rye has not become sod. However, rye may affect sugarbeet planting, especially seed placement. Be prepared to terminate rye before plant if rain continues.

***Q5. Producers reported dry soil on the surface and tilled their fields in preparation for planting. However, tillage brings up moist/muddy soil creating an undesirable seedbed. Any suggestions?***

**A5.** Shallow tillage using a narrow shovel may break the surface crust and enable further drying without carrying wet soil/mud to the surface. A vertical tillage tool or a multi-weeder may be another solution.

***Q6. Many producers have suggested vertical tillage tools to shallow incorporate ethofumesate into soil before plant. Are there any watch outs?***

**A6.** Spring tillage removes weeds so that planting can be done in a weed-free seed bed. Shovels without sweeps or vertical tillage tools may not control early emerging weeds like kochia or common lambsquarters. Scout your fields and be prepared to use glyphosate products before the 2-lf stage.

[Tom Peters](#)

Extension Sugarbeet Agronomist  
NDSU & U of MN





## LATE WET SPRING SOIL/FERTILIZER CONSIDERATIONS

The spring is late and wet. No news there. The following are soil considerations before racing to the field.

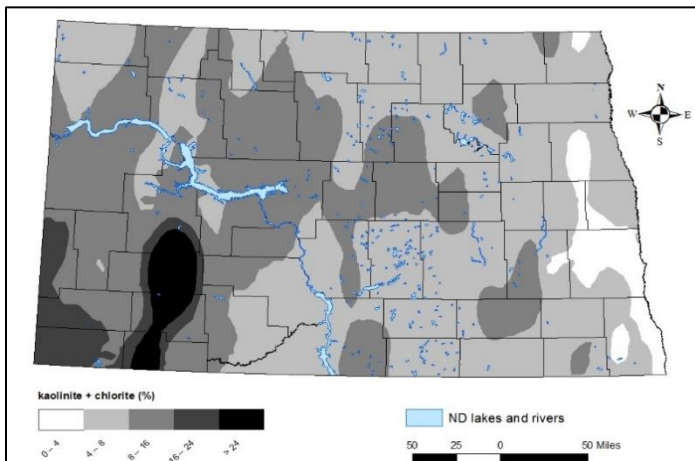
### West-river:

Most of the soils west of the Missouri River, with the exception of a remnant glaciated strip roughly 30 miles west/south of the river have a high amount of kaolinitic clay. Especially in sandier soils, such as those south of Dickinson, traffic over wetter than normal soils will probably result in hard to alleviate compaction. Kaolinitic clay is non-forgiving and the illite clays that dominate the rest of the clay fraction are only moderately forgiving. The small amount of smectitic clays that have shrink and swell properties will probably not be enough to help alleviate any compaction from hasty traffic this spring.

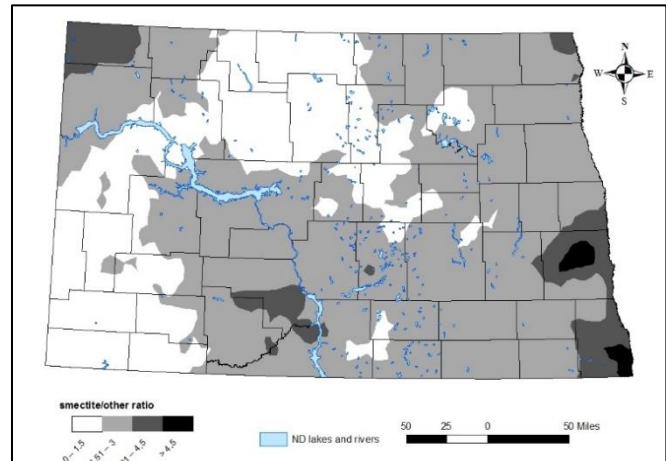
Fields west-river that are long-term no-till will maintain their superior aggregation and trafficability as long as the fields are not entered too soon.

For more information on clay types see NDSU Ext. Circ.

[https://www.ndsu.edu/fileadmin/soils.del/pdfs/Clay\\_Mineralogy\\_2018.pdf](https://www.ndsu.edu/fileadmin/soils.del/pdfs/Clay_Mineralogy_2018.pdf)



*General map of % of total clay that is the non-forgiving clays kaolinite and chlorite in ND. One sample south of Dickinson near the airport had 75% of the clay as kaolinite in the survey.*



*Map of ratio of Smectite to 'Other' clays in ND. The areas in white have low amounts of smectite relative to illite and kaolinite, therefore more patience should be practiced before spring field work to avoid yield-depressing compaction that might last more than this season.*

### Central Region:

The white area in the smectite to other ratio map is higher in illite due to the old footprint of the glacial Souris River. These soils are more easily compacted than those in the more colored regions. Tilling/planting when the surface few inches are dry to just moist will help to reduce compaction this spring and reduce the need for deeper tillage this fall. Long-term no-till farmers should have little problem with compaction in this region if the crops are not 'mudded in'.

**Valley Region:**

Except for the sandy region from Colfax west to Lisbon (Sheyenne Delta), this region is high in smectitic clays. It is possible to produce severe compaction if the crop is mudded in, then the weather turns dry (2012); but if mudded in, a half-inch rain shortly afterwards will mellow the soil greatly so that the crop will not suffer. Trying to decide whether to mud a crop in within the Valley is a 'crap shoot'. The odds are usually in your favor of not having lingering effects, but there are some years when mudding a crop in has severe consequences for that year. In terms of long-term effects, a wetting and drying cycle is far more effective in removing compaction compared to a freeze-thaw cycle, at least below 6 inches in depth.

The Sheyenne Delta soils are not as forgiving as the rest of the Valley, so some patience should be practiced to avoid ruts during tillage/planting. Also, the water table is naturally high, and more so this spring. Therefore, planning to sidedress the corn would be a good strategy, as significant denitrification and N loss is possible with even modest rainfall from now on into the season if only preplant N were applied. Anhydrous, UAN, urea can all work. UAN sidedressed with a coulter is more efficient in a wet season as it doesn't bring up much before 2 inches as anhydrous ammonia would, it wouldn't need NBPT to slow urease activity like urea would.

[Dave Franzen](#)

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**NATIONAL AGRICULTURE GENOTYPING CENTER TO OFFER PIGWEED RESISTANCE SCREENING**

The National Agricultural Genotyping Center will have a commercial assay available this year to test for PPO-inhibitor (Group 14) resistance in waterhemp and Palmer amaranth. They test for the most common mechanism of PPO-inhibitor resistance, which is the test that was used to confirm resistance in 7 counties in ND this winter. The test will be available for \$75 per sample to anyone who wishes to submit samples. It is important to note that other mechanisms of PPO-inhibitor resistance are known in waterhemp and Palmer amaranth, but will not be tested for due to increased costs associated with those tests. It is also important to point out that this assay will NOT detect PPO-inhibitor resistance in monoecious pigweeds (redroot pigweed, smooth pigweed, Powell amaranth). The test will come back as inconclusive if a monoecious pigweed is submitted.

Please follow these steps for sample collection and submission for testing:

1. Wear gloves or use paper towels when collecting plant material. This limits contamination issues caused by direct contact of plant material with bare hands. When sampling from multiple plants, be sure to change gloves or use fresh towels between collections to limit accidental contamination between the independent samples.
2. Place 2 to 3 leaves from a single plant into an envelope or paper bag. If the leaf is wet, dry prior to placement or wrap in a dry paper towel to wick up moisture.
  - a. Make sure only leaves from the same plant are packaged together.
  - b. Small plants or seedlings (less than 3 inches) ideally should be sent as whole plants, removing as much soil and moisture as possible before placing inside the bag. If the plant/soil is very wet, place inside a plastic bag prior to packaging in paper bag or envelope.

3. Once plant materials are packaged, clearly label each individual envelope/bag with a permanent marker for identification. The identification (ID) label on the sample bag needs to match the Specimen ID # listed on the Submission Form.
4. Complete and print off the [Submission Form](#) found on the NAGC website.
5. All shipments must be accompanied by a Submission Form. Send samples and completed Submission Form to the lab as soon as possible after collection. **Testing of samples will not begin without a completed Submission Form.** Please do not place the Submission Form inside a container that contains the plant material, rather place the Submission Form inside the shipping box/envelope, but outside of the sample container.
6. If the sample cannot be sent the same day, it should be kept at room temperature. Samples should be **stored for no more than 1 to 2 days** and **PREFERABLY SHIPPED OVERNIGHT** to ensure samples arrive in good condition. Degraded samples cannot be tested.

Questions regarding sampling and shipping procedures can be addressed by contacting the National Agricultural Genotyping Center Laboratory at 701-239-1451.

Ship Samples To:  
National Agricultural Genotyping Center  
1616 Albrecht Blvd N  
Fargo, ND 58102

#### **DON'T SKIP PREEMERGENCE HERBICIDES IN 2022**

Spring 2022 has been about as polar opposite to spring 2021 as it can get in North Dakota. Last year, many no-till fields did not receive a burndown application due to the absence of weeds, and folks in the eastern part of the state were incorporating many preemergence herbicides due to concerns over adequate rainfall for herbicide activation. Weeds are back with a vengeance this spring. Winter annual weeds can be found in most fields, kochia has emerged and survived several blizzards and freeze events, and more summer annuals like green foxtail and waterhemp will soon join the fray. Of most concern to me, is this short planting window we now face. While there is great temptation to plant 24/7 whenever fields are finally fit, we need to be conscience of the fact that a preemergence residual herbicide is often the best tool we have for problematic weeds like kochia, waterhemp, foxtail, and wild oats.

We have noted increasing cases of herbicide resistance to the aforementioned weeds over the past several years. The latest confirmation is PPO-inhibitor (Group 14) resistant waterhemp in 7 counties in North Dakota. Kochia should be on the minds of most folks due to the challenges with kochia control in 2021. This article serves as a reminder that we should make sure to take the time and apply a preemergence herbicide in fields with a history of herbicide resistant weeds. In many areas, we have issues controlling foxtail (pigeongrass) and wild oats with postemergence herbicides in any crop that we cannot spray glyphosate postemergence. Waterhemp and kochia have become difficult to control in many crops, but especially broadleaf crops, including soybean. We have many premix and tank-mix options that can be applied preemergence or preplant incorporated to control these weeds in most crops grown in the state.

Of note for those who plant Xtend or Xtendflex soybean in order to use approved postemergence dicamba products, there is the looming June 30 cutoff date for those herbicides. Given the scrutiny these products face, I would not count on an extension of that cutoff date this growing season (though weirder things have happened). Preemergence herbicides will provide residual control of our problematic broadleaf herbicides, will delay the emergence and development of these weeds, and will delay the time it takes for weeds to grow to 4 inches, thus widening the window of application to effectively control these weeds with dicamba, or other postemergence herbicides. The last



thing we want is for our backs to be against a hard cutoff date, or a challenging weather window to apply effective postemergence herbicides for weed control. Ensuring a preemergence program is applied is a vital first step to effective weed control in 2022.

[Joe Ikley](#)

Extension Weed Specialist



### WINTER INJURY ON SPRUCE TREES

We've received several reports recently of spruce trees showing browning needles, but often without a specific pattern to the damage. A number of potential causes have been identified. Biological problems have included Valsa canker (formerly Cytospora canker) of spruce, an insect called spruce bud scale, and one of the needlecast diseases. Other pests such as spider mites or pine needle scale may play a part in the damage to certain trees, though we haven't specifically seen them on any given tree yet. Environmental problems such as the recent drought and the challenging winter have exacerbated the problem.

Multiple pests can be found on a given tree and it's often impossible to tease out how much damage was caused by a specific pest or environmental problem. Therefore, treatment recommendations are difficult to make. Nevertheless, there are some general recommendations.

For trees that have lost most of their needles, they're likely to not recover no matter what we do. For those trees that retain most of their needles, we need to make sure that we keep the trees otherwise healthy. This spring's snow and rain will go a long way towards alleviating the drought stress that the trees are suffering. For trees that are in drought-affected areas of the state, they should be irrigated. A long, slow soaking is better than multiple, brief additions of water. Move the hose around, as the tree's roots extend in all directions from the stem. The roots go out far beyond the drip line of the tree crown, extending to as far as four or five times the height of the tree. The ground should be moist, not saturated, after watering.

This summer, scout for pests such as insects and diseases, and be prepared to treat them as appropriate. Scouting is important because treatment timing is critical to be effective. Spraying for a pest at the wrong time of year is ineffective and is a waste of both time and money.

More information on the needlecast diseases of spruce – Stigmina and Rhizosphaera – is available in NDSU Extension publication F1680. Information on many other pest problems of spruce trees is available in publication F1818.



*This spruce shows symptoms of both Valsa canker (upper left) and one of the needlecast diseases (lower right). Valsa will kill entire branches, all-at-once. Needlecast diseases kill the older, interior needles, resulting in only one or two years' worth of needles at the end of a branch. A healthy spruce branch should retain 3 to 7 years of needles.*

[Joe Zeleznik](#)

NDSU Extension Forestry Specialist

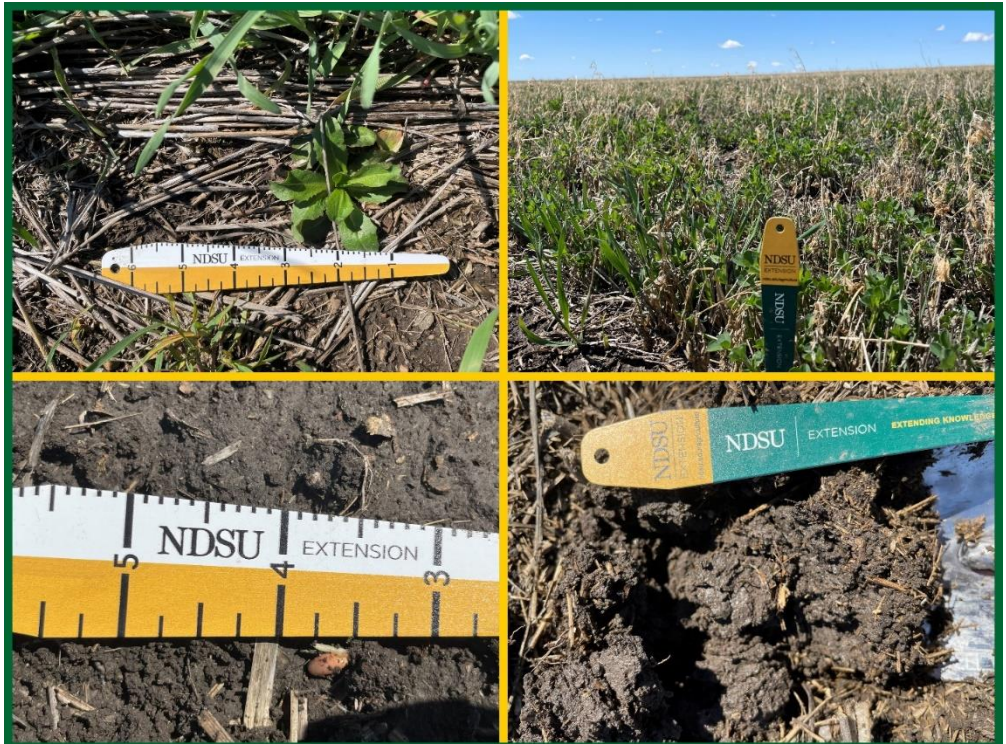


# around the state

## AROUND THE STATE

### NORTH CENTRAL ND

An active May continues to be the trend over the last two weeks. During that time, the NCREC received about 1.32" of rainfall (since April 26<sup>th</sup>). This has really limited farm activity in the North Central region. Some counties in the region observed more significant amounts of precipitation. Additionally, hail was observed in some areas including the Minot metropolitan this last weekend. However, last week the agronomy team was able to begin planting, however, moisture has since paused that activity as well. At this time, minimal planting activity has been observed across the area. Weeds are growing in the areas planted recently, and spraying activity is limited because of the wet soils that prevents trafficability. Nutrient application is also delayed in the area due to excessive soil moisture conditions. There are very few areas planted in the region, which are mostly small grains.



**Figure 1. From top left, clockwise: Weed (Prickly lettuce) in oat field; alfalfa field; soil with high moisture in the top 3 inches; spring wheat seedling starting to germinate.**

[TJ Prochaska](#)

Extension Crop Protection Specialist  
NDSU North Central Research Extension Center

[Leo Bortolon](#)

Extension Cropping Systems Specialist  
NDSU North Central Research Extension Center



**SOUTH-CENTRAL/SOUTHEAST ND**

According to NDAWN, the region's rain during April through May 9 ranged from 2.7 inches (Harvey) to 8.7 inches (Brampton), with areas east of Hwy 281 generally receiving 6-8 inches. Topsoil temperatures currently are in the low 50s.

The Carrington REC was able to begin planting a limited number of crop trials on May 6. Winter cereal (rye and wheat) trials and seed-production fields generally have very good stands with tillering plants. See May 10 photo of winter wheat variety trial at Carrington REC. Alfalfa plants have reached up to 6-inch height with regrowth.



***Winter wheat variety trial at Carrington REC (May 10).***

**Phosphorus (P) starter fertilizer for corn**

NDSU Extension publication 'Corn Response to P Starter Fertilizer in North Dakota' was revised in April. A summary of results from research trials conducted at the Carrington REC during 2007-21 on loam soils with 2.6-3.8% organic matter and soil P generally 8 ppm or less:

- Corn grain yield was similar with band and in-furrow applied 10-34-0 (2.5-6 gpa), and starter fertilizer increased yield 4-6%, compared with the untreated check.
- Yield was similar between the 3- and 6-gpa rates of in-furrow-applied 10-34-0.
- Yield did not improve with a split application of 10-34-0 using band plus in-furrow placement, compared with similar rates of only band- or in-furrow-applied fertilizer.
- Deep-band (5 to 6 inches deep, fall or spring placed) or deep-band plus in-furrow-applied 10-34-0 had similar yield as the planting-time band-applied fertilizer.
- Yield was similar between in-furrow-applied 10-34-0 and the low-salt fertilizer 6-24-6.
- Yield was similar between in-furrow- and soil-surface-applied 10-34-0 (followed with rain occurring 3-5 days later).

The publication is available at the following website:

<https://www.ndsu.edu/agriculture/extension/publications/corn-response-phosphorus-starter-fertilizer-north-dakota>.

Also, refer to 'Soil Fertility Recommendations for Corn': <https://www.ndsu.edu/agriculture/extension/publications/soil-fertility-recommendations-corn>

**Greg Endres**

Extension Cropping Systems Specialist  
NDSU Carrington Research Extension Center



**SOUTHWEST ND**

It feels like it's been years since it has been this green on this side of the state. Planting continues to push on in areas that are dry enough. Monday May 9<sup>th</sup> brought more rain with Dickinson receiving 0.22 inch, Hettinger 0.34, Bowman 0.27, Beach 0.26, Hazen 0.59, and Mandan with 0.81. Most of the snow is gone, where large drifts once loomed there are now a few areas along ditches and section lines with a small clump of snow remaining. Across the southwest, fields have received anywhere from 3-6 inches of moisture since April 1<sup>st</sup>.

Fieldwork will continue over the next few weeks, no one is complaining about being behind schedule in our region. Everything from small grains, canola, pulses, corn, soybean, and even sunflowers and more are being planted now. Field trials continue to be planted here at the Dickinson REC. The cooler weather has limited much for weed growth with bare soil temps in the 30s until late April, however a flush will be popping up soon as the soil temperature continues to rise. According to NDAWN the average bare soil temp in Dickinson reached 53°F on May 2<sup>nd</sup> and reached 61°F on May 6<sup>th</sup>.

There aren't many acres of winter wheat, however the stands that I've seen appear to have minimal winter kill and are looking great. Most pastures are greening up nicely. Remember to fertilize alfalfa and hay grass fields to maximize forage yields this summer. With each harvest, nutrients are removed from the field, be sure to soil sample before calculating fertilizer rates. Rates can be found in the North Dakota Fertilizer Recommendation Tables and Equations. Forage/hay grasses are on Table 13. <https://www.ag.ndsu.edu/publications/crops/north-dakota-fertilizer-recommendation-tables-and-equations>

If hay field stands have been greatly reduced due to years of heavy management or from drought, consider replanting. An annual forage such as forage oats, barley, peas, millet, sorghum, or a mix will likely produce better short term production before replanting to a perennial. Do not attempt to plant new alfalfa into alfalfa residue, due to autotoxicity the stand will be greatly reduced. Be aware of your soil pH before planting a legume as acid soils will reduce N fixation.

[Ryan Buetow](#)

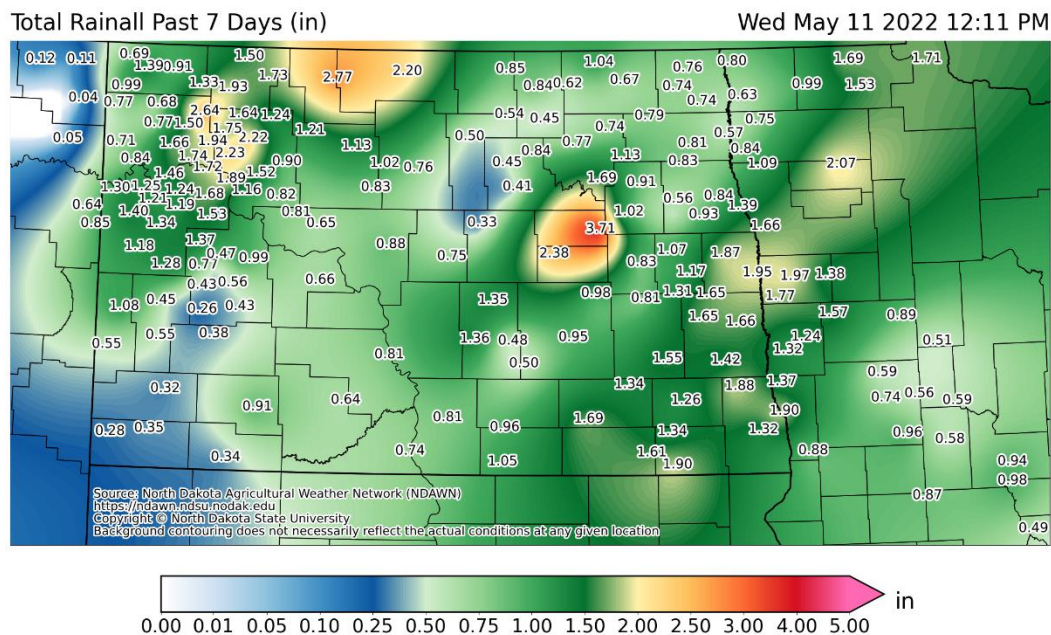
Extension Cropping Systems Specialist  
NDSU Dickinson Research Extension Center



## WEATHER FORECAST

## The May 12 to May 18, 2022 Weather Summary and Outlook

More rain likely occurred overnight with more expected today (Thursday, May 12). With some severe weather also anticipated that will mean some localized heavy pockets of rain. This will continue to delay any opportunity to begin planting in 2022 for most areas. This past week all NDAWN (North Dakota Agricultural Weather Network) stations recorded some rain with many areas in eastern North Dakota into northwestern Minnesota recording over 1 inch (Figure 1).



**Figure 1. Total rainfall for the 168-hour period ending at 12:11 PM on May 11, 2022 at NDAWN stations**

Once the storm over the region today (Thursday) moves out most areas should record minimal rain through the middle of next week. There will be shower activity during some afternoons, but no big rains are expected. The key to drying off may come at the end of next week as there may be one last bigger, widespread rain event until the pattern shifts more permanently as we end the month of May.

Figures 2 and 3 are forecasted estimates of Growing Degree Days base 32° and 50°. Because of the rain and cooler temperatures behind this storm, most days will record below average temperatures this period.

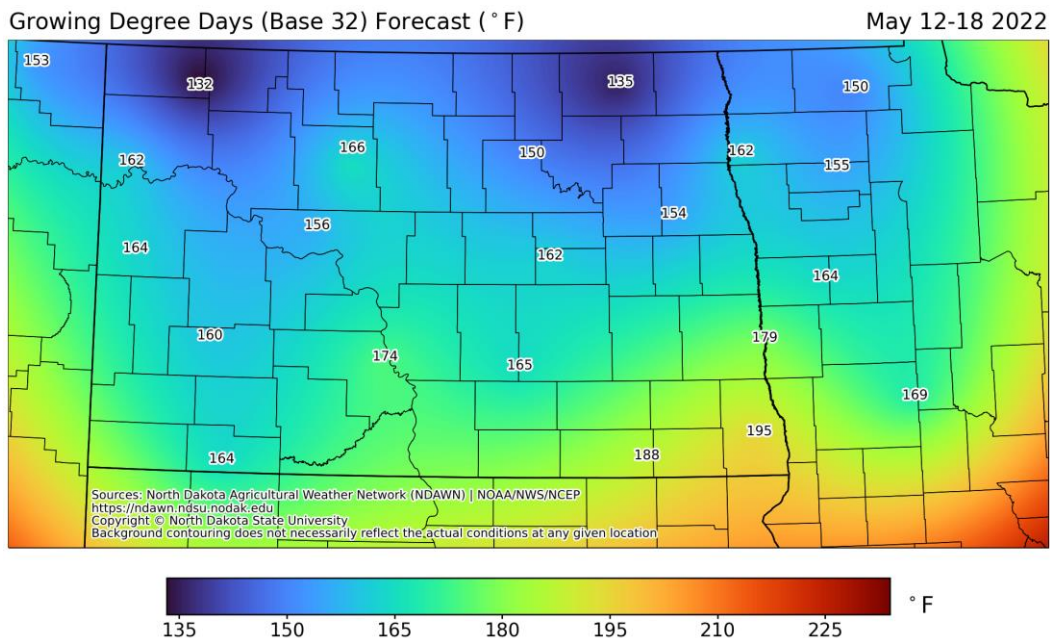


Figure 2. Estimated growing degree days base 32° for the period of May 12 to May 18, 2022.

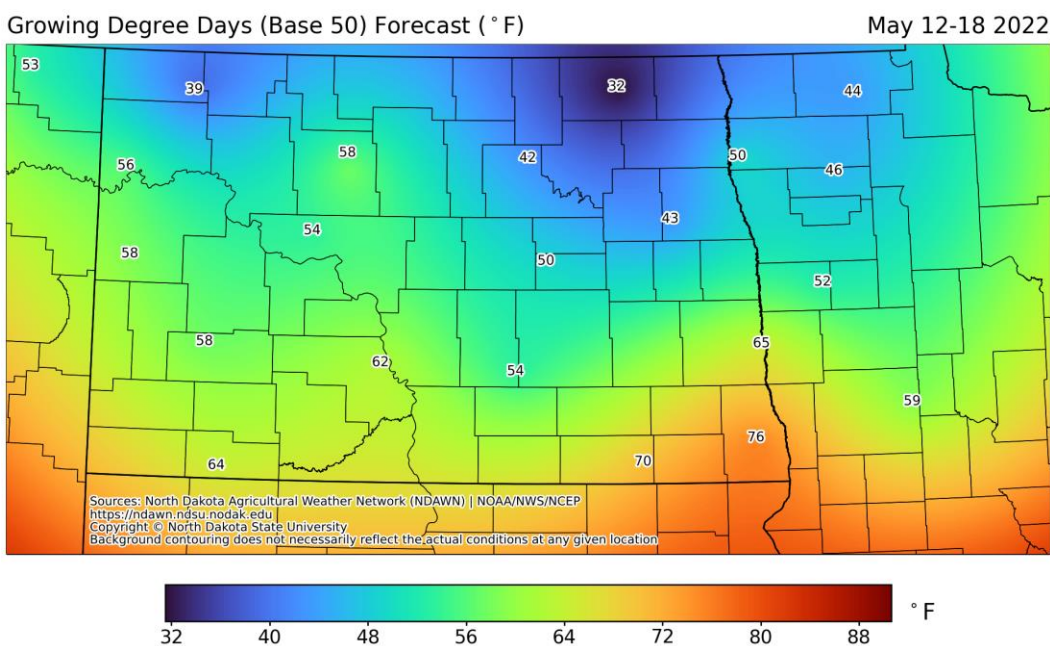


Figure 3. Estimated growing degree days base 50° for the period of May 12 to May 18, 2022.

Soil temperatures at 4 inches have reached the 50° range across the region. During the afternoon temperatures get even warmer, but we have reached that point in the season when even near sunrise, the soil temperatures just below the surface are still around that 50° level in most parts of the region (Figure 4).

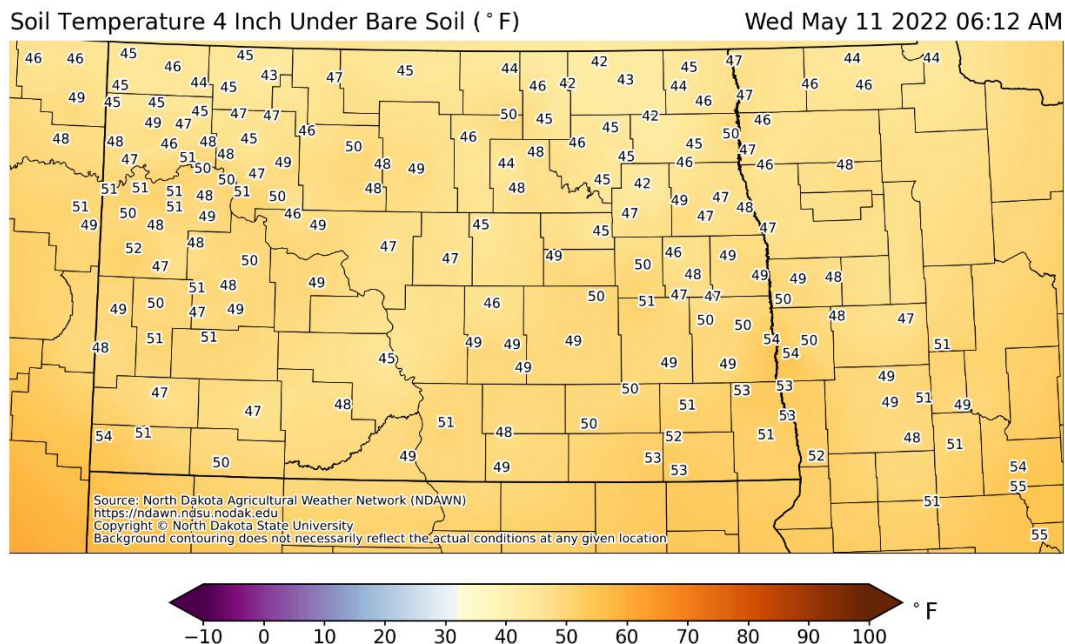


Figure 4. Soil temperatures at 4" depth under bare soil at NDAWN stations near sunrise on May 11, 2022.

For the many of you that have asked, yes, I still see many reasons why this summer will turn dry. It will be unlikely that we are as warm as 2021, but above average temperatures are still expected as well.

[Daryl Ritchison](#)

Meteorologist

Director of the North Dakota Agricultural Weather Network (NDAWN)



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