

# entomology

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## CANOLA FLEA BEETLES STILL HUNGRY!

As reported in the May 24<sup>th</sup> issue of the [Crop & Pest Report](#), **field monitoring for flea beetles and their feeding injury (defoliation, pitting in cotyledons/true leaves) is crucial when populations can increase rapidly with warm, calm and sunny days.** Field reports from northeast and north central areas of North Dakota indicate that flea beetles are aggressively feeding on canola. In some instances, fields were completely destroyed from flea beetle feeding injury and will be need to be reseeded. Residual on the insecticide seed treatments is no longer effective against these late emerging flea beetles, so scouting for these hot spots is essential. Beetles will be actively feeding for two more weeks and then start to decline by late June.

**For foliar insecticide applications, the action threshold is when an average of 20-25% defoliation on the cotyledons and/or first true leaves, and beetles are actively feeding in field.** Foliar treatments must be made quickly, if defoliation exceeds 20-25%. Under high beetle densities, a delay of one to two days can result in the loss of an entire field. Apply insecticides during the sunny, warm part of the day when beetles are active. Canola plants that have reached the 4- to 6-leaf vegetative growth stage or beyond can tolerate more feeding injury.

Pyrethroid insecticides (a.i. bifenthrin, deltamethrin, gamma-cyhalothrin, zeta-cypermethrin) provide good control of flea beetles and a 7-10 day residual at the high-labeled rate. If it is hot (above 85°F), pyrethroid insecticides break down faster and are not as efficacious controlling insect pests. So, insecticide application may need to be applied early in the morning or in the evening when it's hot. Insecticides registered for flea beetle management in canola are listed in the [2018 North Dakota Field Crop Insect Management Guide E1143](#).

For more information, please consult the NDSU Extension fact sheet [Integrated Pest Management of Flea Beetles in Canola E1234 \(revised\)](#).



**Flea beetle feeding injury at 50% defoliation.**  
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## SCOUT FOR CUTWORMS

Cutworm damage is starting to show up in the emerging field crops. Cutworm larvae are difficult to scout for since they feed at night-and hide underneath clumps of soil during the day. With the warm temperatures, cutworms are feeding more. Scouting for cutworms is good insurance to prevent plant stand loss and maybe yield loss. This week, dingy cutworms were found reducing soybean plant stands to the point of needing to reseed the entire 40-acre field located in southeastern Cass County.

Cutworms generally have one generation a year. Dingy cutworms overwinter as partially mature larvae (or caterpillars) and then larva develop into a pupa (or resting non-feeding stage) in mid- to late June. The adult moth emerges from the puparium in July and moths lay eggs in late August into the fall. Eggs hatch into larvae that feed in the fall before

burrowing deeper into the soil to overwinter. Most of the dingy cutworms observed in the 40-acre soybean field were quite large,  $>\frac{3}{4}$  inch, and the size of a pencil in width. The next life stage, pupa, were also being found in the soil. So, it may be too late for effective insecticide control when the majority of the larvae are mature (1½ inch for dingy cutworm) and/or pupating.



*Soybean field with plant stand damage from cutworms.  
(Adam Spelhaug, Peterson Farms Seed)*



*Mature dingy cutworm larva. (Adam Spelhaug, Peterson Farms Seed)*



*Cutworm pupa. (Whitney Cranshaw, Colorado State University, Bugwood.org)*

For damage, cutworms will cut young plants and defoliate leaves (climbing cutworms). Cut plants can be found drying up and lying on the soil surface. As damage continues, fields will have bare areas where plants have disappeared, often in the same plant row as the cutworm moves down the row feeding on consecutive plants. In a severe infestation, the entire field can be destroyed.

Scout fields regularly by looking for freshly damaged (cut off) plants, dig two or more inches down around the cut off plant, and search for cutworms (larvae). When disturbed, cutworms curl up into a 'C-shape.' Row crops, such as soybean, canola, lentils and sunflowers, are more susceptible to cutworm damage than small grains, because cut plants do not grow back (grains compensate by tillering). If a foliar insecticide treatment is warranted, an evening application is best since cutworms actively feed at night.

Action thresholds for cutworms in different field crops are:

- Alfalfa – 4 to 5 or more per square foot (new stands – only 2/sq ft)
- Canola – 1 per square foot
- Corn – 3-6% of the plants are cut and small larvae (<3/4 inch) present
- Peas / Lentils – 2 to 3 cutworms per square meter
- Small grain – 4 to 5 cutworms per square foot
- Soybean – 1 cutworm per 3 feet of row or 20% of plants are cut
- Sugarbeet – 4-5% cutting of seedlings or 3-5 larvae per square foot
- Sunflower – 1 per square foot or 25-30% of plants cut

For insecticides registered for cutworm control, please consult the [2018 North Dakota Field Crop Insect Management Guide E1143](#).

[Janet J. Knodel](#)

Extension Entomologist

### SUGARBEET ROOT MAGGOT: PEAK FLY IS HERE!

Sugarbeet root maggot (SBRM) flight activity began substantially earlier than average this year; however, recent cool and wet weather has resulted in a few day of relatively low activity throughout much of the Valley. The very unusual spring weather (persistent cold in April, followed by periods of extremely warm temperatures in May) that has occurred thus far makes 2018 a nearly unprecedented year with regard to predicting peak fly activity.

Peak fly activity typically coincides with the first rain-free, warm (about 80°F), low-wind ( $\leq 10$  mph) day at the accumulation of 650 degree-day (DD) units. The current forecast for four representative RRV locations is presented in Table 1.

According to SBRM degree-day (DD) accumulations, fly activity levels in the central and far southern reaches of the insect's range within the Red River Valley (RRV) should have already peaked. Tuesday's stormy weather and the subsequent windy conditions on Wednesday suggest that, both the Grand Forks/Thompson/Reynolds areas, as well as the Grafton, St. Thomas, and Cavalier areas, will probably peak Thursday, June 7; however, activity will probably not abruptly cease in these areas, due to anticipated windy conditions on Friday.

**Table 1. Degree-day (DD) based predictions for timing of high SBRM fly activity periods and peak fly activity in the Red River Valley**

Location	Total DD (as of June 5)	High Fly Activity Period	Maximum Likelihood Peak Fly Date*
Fargo, ND		May 31-June 1 (low activity expected)	Peak reached
Ada, MN		June 3-4 (+80°F, dry, and low winds)	Peak reached
Grand Forks, ND	667	June 6-8 (+80°F, dry, and low winds)	June 7
St. Thomas, ND	654	June 9-10 (+80°F, dry, and low winds)	June 7

\*Maximum likelihood for peak fly activity is based on extended weather forecasts for wind speed, air temperature, and precipitation.

Peak fly in current-year beets usually coincides with the first rain-free, calm/low-wind day to reach 80°F after 650 DD are accumulated.

**Root maggot fly counts.** The highest numbers of SBRM flies captured on sticky stake traps has occurred in rural East Grand Forks (Sullivan TWP), Grand Forks (Grand Forks TWP), St. Thomas (S. St. Thomas TWP), and Thompson (Brenna TWP). Moderately high activity has also been observed near Auburn, Bathgate, and Crookston. Growers in areas of high activity should be ready to apply additive postemergence insecticide applications if fly activity in their areas increases (or resurges) to at least 45 flies per sticky stake or 0.5 flies per plant within a field. Fly counts from the [NDSU trapping network can be viewed online](#). NOTE: fly counts for each field are cumulative totals from 2 stakes.

**Postemergence SBRM Control.** Growers in high-risk areas for damaging SBRM infestations should plan on applying a postemergence insecticide for additive protection, especially if an insecticidal seed treatment or a low to



moderate rate of a granular insecticide was used at planting. Fields in which heavy rainfalls ( $\geq 3$  inches) occurred within two to three days after at-plant or postemergence insecticides were applied also may need additional postemergence protection.

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

**IMPORTANT:** If a chlorpyrifos-containing liquid spray (e.g., Lorsban 4E, Lorsban Advanced, or any generic chlorpyrifos product) is applied, 10 days must pass before another chlorpyrifos liquid can be made to the same field. If retreatment is necessary within 10 days of the initial chlorpyrifos application, an insecticide containing a different active ingredient must be used. For more information, consult the "Insect Control" section of this year's [Sugarbeet Production Guide](#). Always remember to READ, UNDERSTAND, and FOLLOW the label of your insecticide product – it's the law.

[Mark Boetel](#)

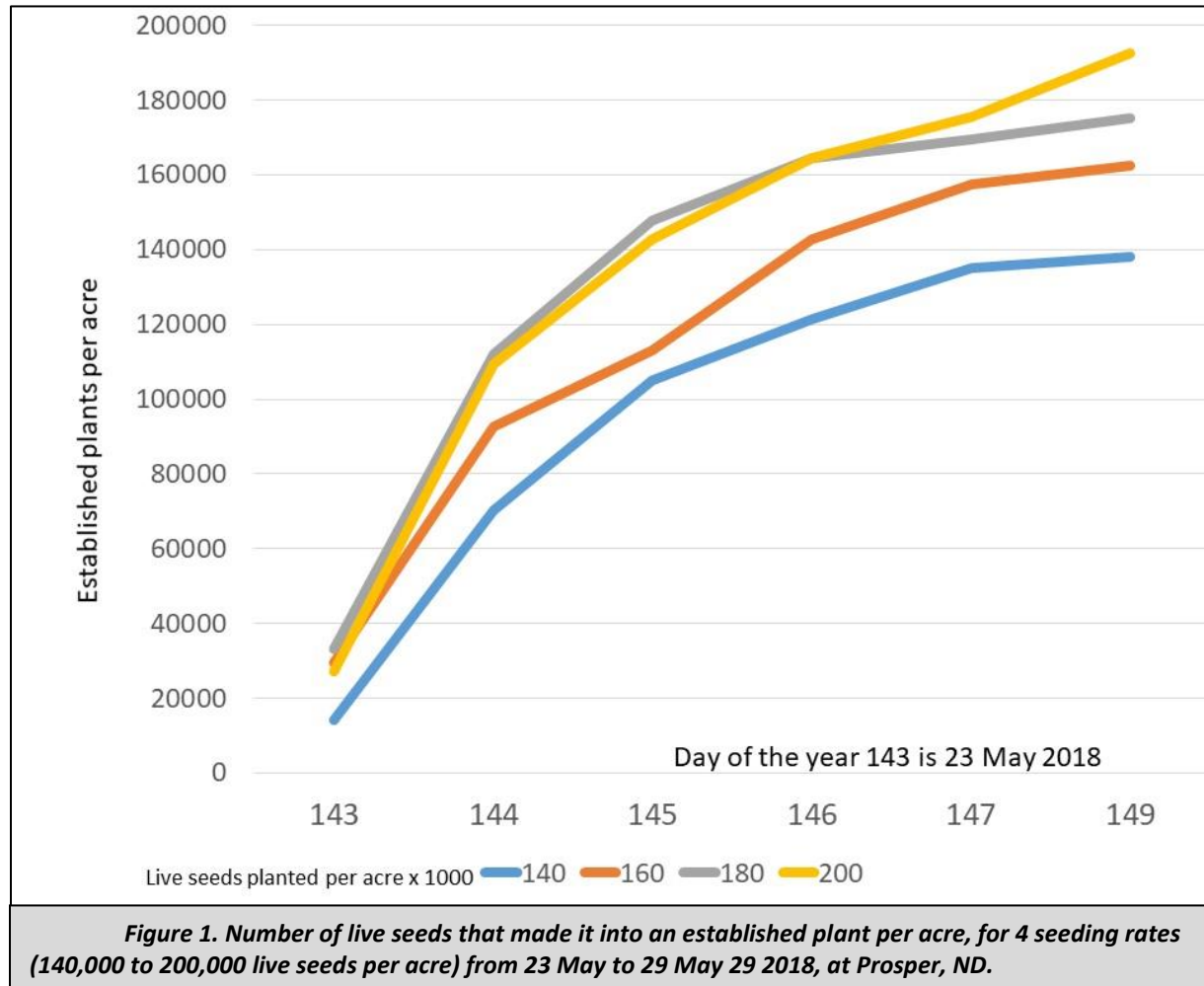
Research & Extension Entomologist



#### SOYBEAN ESTABLISHMENT

To maximize yield in North Dakota production fields, NDSU recommends an established soybean plant density of 150,000 plants per acre, regardless of row spacing. At a fixed seeding rate, row spacing influences the plant spacing within each row. The seeding rates that will provide the recommended plant population will vary by factors such as seed germination percent, management practices, and planting conditions. Based on previous research, NDSU recommends to increase the seeding rate in order to achieve the desired plant population (150,000). Various factors influence how many seeds will make it into established plants, for instance not all seeds germinate. The seed metering system of grain drills must be adjusted carefully to avoid seed damage, which may reduce the ability of the seed to germinate. In addition, planting soybean seeds deeper than two inches or in a soil with tendencies of crusting may result in poor or slow emergence.

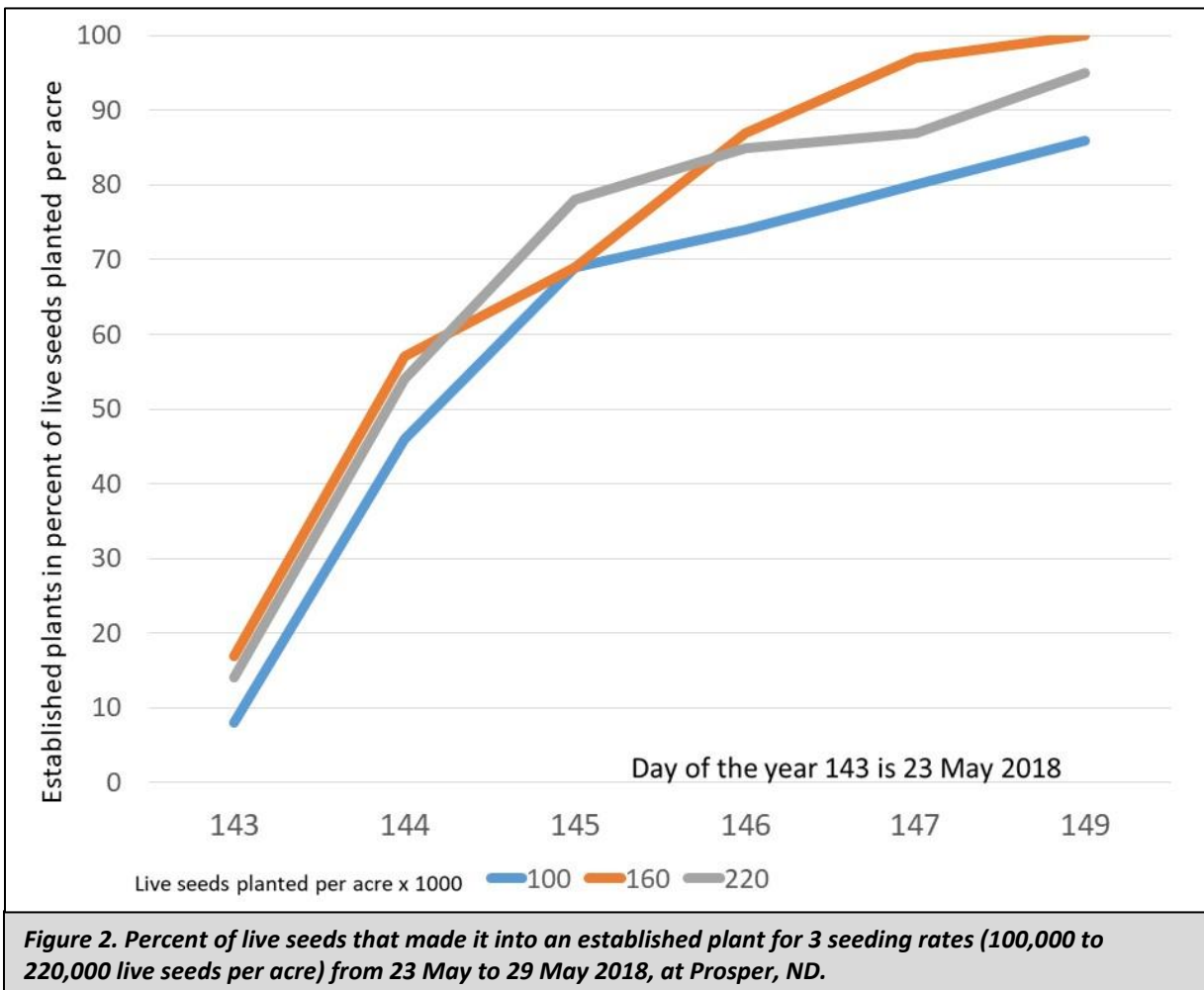
This year we evaluated how quickly the plant establishment phase took place, for a range of seeding rates. Figure 1 indicates there is some variability in the rate of plant establishment based on seeding rate. This year with good soil moisture and high air and soil temperatures, it took approximately 8 days to progress from the first plants emerged to maximum plant establishment.



The 2018 spring provided near ideal conditions just after planting. The percent of live seeds developing in an established plant varied from 86%, 100%, to 95%, for the 100,000, 160,000 (Photo 1), and 220,000 live seeds planted per acre (Figure 2). Across all seeding rates in the 2018 trial, with near ideal growing conditions, we observed 95% plant establishment. This is higher than during previous studies. Farmers and consultants are encouraged to scout soybean fields, take stand counts, and determine what the established plants are as a percent of the seeds planted. If the number of established plants is low compared with the seeding rate, it would be important to evaluate why that might be and use this knowledge to increase seeding rates and improve plant establishment in 2019.



**Photo 1. Plants were counted in one meter of row to estimate the plant population. This plot was seeded with 160,000 live seeds per acre in rows 12 inches apart.**



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## EMERGENCE UNIFORMITY IN CORN

Now is a good time to evaluate the uniformity in emergence of the corn crop. Uniformity in emergence in corn is important as corn seedlings do not compete well with other plants, including other corn plants. Corn seedlings that emerge more than a week later than neighboring seedlings will not “catch up” and will yield much less than if they emerged at the same time. In extreme cases, they will not produce a cob and will act as an expensive weed. Additionally, corn does not compensate as well as many other crops when there are gaps in the row. The optimum scenario for corn is that every seed that is planted emerges on the same day; there are no skips and doubles and that the plant-to-plant spacing is uniform. Even with the best of conditions and equipment, achieving perfect uniformity of emergence is unlikely. The warmer than average May temperatures this year hastened emergence and in many cases reduced



variability in the timing of emergence (cold, stressful conditions seems to accentuate poor uniformity in emergence). Nevertheless, I have still observed instances where poor uniformity will take a toll on yield.

A few years ago, a number of Area and County Extension Agents assessed plant stand uniformity and measured its impact on yield in farmers' fields in North Dakota (the full report of this work is available in the thesis by Lindsey Novak). They found that within a planter width, averaged over all the fields evaluated, the most variable row yielded 9 bu per acre less than the least variable row (Table 1). The most common problem causing the variability was variability in emergence date and not skips and doubles. In fact, doubles were rarely observed.

When measuring the yield loss on a plant basis, skips were the most impactful, followed by plants emerging 11-17 days after the early emerging seedlings (Table 2). Plants next to a skip could add 10% greater yield when compared to normal spacing, but this was much less than the 50% needed to totally compensate for the lost plant. Plants next to late emergers were able to add 5% greater yield, but again, they could not completely compensate for the loss of production by plants emerging later. Though there is no management practice that can ameliorate uneven stands after emergence, determining the cause of poor uniformity can be a useful learning exercise for future years. On average, most farmers will plant 40 crops in their lifetime. Learning from each crop is important to a successful operation (I learned this year not to plant a corn hybrid trial after sugarbeets unless I manage for fallow syndrome!).

When evaluating stand uniformity, expect a few skips that are caused by non-viable seeds (the range in germination for most commercial seeds lots is 90-95%). Doubles can be traced back to a planter problem. Though



**Figure 1. Variability in emergence timing and plant-to-plant spacing observed in 2018.**



**Figure 2. Impact of emergence date and spacing (next to a skip) on cob development. Photo provided by Lindsey Novak.**

doubles generally do not result in a yield reduction (data not shown), they are not an efficient use of seed. Determining what caused poor uniformity in emergence timing may not be easy, but the following are some known causes that should be considered:

- Differences in access to soil moisture by the seeds. Cloddy soils (tilled when too wet), dried or compacted soils (from too much tillage), non-optimal seeding depth, improper press-wheel tension, hairpinning of residues that results in the seed being placed next to crop residue rather than soil, and sidewall compaction are a few potential reasons why seeds have access to differing amounts of moisture during germination. Excessive speed while planting can impact the uniformity in planting depth, especially in the larger planters.
- Soil crusting. Crusting most often results from tilled soils high in silt that received a substantial rain after planting.
- Difference in soil temperature. Small difference in the temperature that the seed encounters can be caused by difference in depth of seeding and the amount of residue that is retained directly above the seed.
- Seed lot vigor. Though it is not common to be overly concerned about the quality of the corn seed that is planted, seed lots with poor vigor can potentially cause variability in emergence timing. This is likely to be a concern only when there has been additional stress during germination, like cold soils.

**Table 1. Average grain yield of selected rows within a planter width. These data were averaged over multiple fields and replications within a field, 2013 and 2014.**

Rows measured	
	(bu/acre)
Most variable <sup>1</sup>	154
Second most variable	155
Second least variable	161
Least variable	163

<sup>1</sup>Variability was measure by the sum of skips, doubles and late emergers.

**Table 2. Yield of a single corn plant with differing neighboring plants or dates of emergence. Data are expressed as a percent of a normally spaced, early emerging plant. Data were collected from multiple location in 2013 and 2014 in North Dakota.**

Plant type	
	(Percent yield of normal)
Next to skip	110
Next to late emerger	105
Emerged 5-10 days late	65
Emerged 11-17 days late	59

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### HEAT STRESS OF EMERGING POTATO PLANTS

The higher than normal temperatures have caused rapid emergence of potato plants but has also caused damage on some potatoes. Many russet-skinned cultivars are sensitive to high temperatures. As a potato stem grows from the seed piece to emerge from the soil, it can encounter a heat layer in the soil. For example, on an 85 °F day with full sunshine, I found the soil temperature to be 110 °F 4-inches below the top of the potato hill in a sandy-loam soil. The rapid change from 50 or 60 °F soil to 110 °F often can disrupt the growing point of the stem. Lately, I have seen many fields that have emerging shoots that are crinkled and sometimes have chlorotic leaves (Image 1). Many people ask me if this is herbicide injury, but this is not the case. Where we have herbicide trials the non-treated plots look exactly like the herbicide-treated plots. When heat stressed plants are dug out of the hill, some of the plants will have a 'candelabra' or splitting of shoots starting part way up the stem. This is likely the case of the apical meristem being shocked from the heat and dies back. When this occurs, the axillary buds will grow causing the multiple shoots (similar to if you pruned a branch and allowed the axillary buds on the stem to regrow). These effects can be attributed to the hot and sunny days that increase the soil temperature. If irrigation is available, water can help cool the soil. The plants typically overcome the crinkled leaves within a week or two after emergence as new leaves emerge.



*Image 1. Heat crinkle of Russet Burbank potato leaves affected by high temperatures.*

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NDSU/U of M Extension Potato Agronomist



## SCLEROTINIA RISK MAP AND RISK CALCULATOR WILL BEGIN JUNE 16<sup>TH</sup>

The first Sclerotinia risk map for the 2018 season will be available on June 16<sup>th</sup>, at three different websites, the [NDSU Canola Pathology program](#), the [Northern Canola Growers Association](#), and the [Minnesota Canola Council](#). The Sclerotinia risk calculator will be available only at the NDSU canola pathology website.

The color coded *Risk Map* is designed to estimate risk of white mold development; low (green), moderate (yellow) and high (red). The adjacent figure illustrates the risk for June 22, 2016 with the traditional color codes and showing the estimated risk for Langdon (Figure 1). Maps will be refreshed on a daily basis

beginning next week and can be observed by clicking on the “Risk Map” button. Clicking on any NDAWN station in the map will show the estimated percentage of risk of disease development for that station. This information will help growers make a more informed spraying decision.

The *Risk Calculator* is an interactive tool that gives more precise risk for a specific field by allowing growers to enter important information about their field (such as crop rotation and disease history) into the forecasting model.

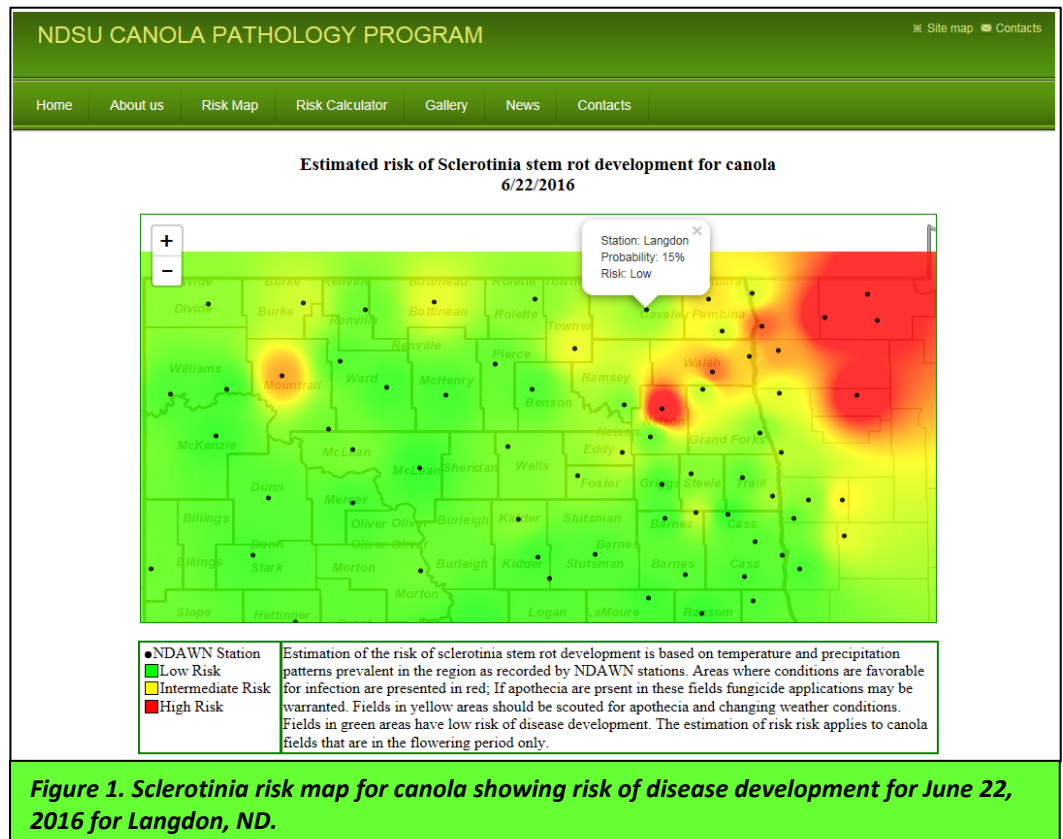
### Questions and Answers

Q. *What conditions favor white mold?*

- A.
- 1) Adequate rainfall before flowering that keeps the soil wet.
  - 2) Cool to moderate temperatures during bloom.
  - 3) Long wet periods (rain/heavy dew/fog) during flowering.
  - 4) Dense canola canopies that create a wet microclimate

Q. *How do the risk map and risk calculator help me?*

- A.
- Both tools help you understand your risk for white mold, which can help you decide whether or not to apply a fungicide. We always encourage growers to make the most informed decisions they can using as much information as possible; these tools can help you make those decisions.



- Q. *When should I start using the risk map and risk calculator?*
- A. The risk map and risk calculator are only applicable when your canola is in bloom. Canola petals are necessary for infection by *Sclerotinia* ascospores to occur. Thus, canola is only susceptible when it is blooming. From colonized petals, the fungus spreads to healthy green tissues and eventually, large yield-robbing lesions will develop on the stem and branches.
- Q. *How does the risk map work?*
- A. The *Sclerotinia* risk map is created from weather data collected from NDAWN weather stations to determine if conditions are favorable for ascospore dispersal and disease development. Green, yellow and red areas signify areas of low, medium and high risk.
- Q. *How does the risk calculator work?*
- A. The *Sclerotinia* risk calculator uses the same data collected from NDAWN, but also takes into account additional data that grower can enter into the site. The additional data adds personalization and precision to *Sclerotinia* risk forecasts and is especially helpful when fields are in areas of intermediate risk.
- Q. *What limitations do the risk map and risk calculator have?*
- A. 1) Canola is only at risk during flowering and consequently the Risk Map and Calculator are only applicable during flowering.  
2) The maps are only as good as the data received from NDAWN, and rainfall is notoriously variable. If you know that your fields have had more (or less) rain than the nearby station your risk may be higher (or lower).
- Q. *Who developed the risk map and risk calculator?*
- A. The tools were developed by NDSU canola pathologist Luis del Rio with funding from the Northern Canola Growers Association.

[Sam Markell](#)

Extension Plant Pathologist, Broad-leaf Crops

[Luis del Rio](#)

Canola Pathologist



#### **NORTH DAKOTA CLAY MINERALOGY CIRCULAR PUBLISHED**

Due to its importance for North Dakota potassium (K) fertilizer recommendations, as well as its importance in future farm tillage decisions, I developed the '[North Dakota Clay Mineralogy Impacts Crop Potassium Nutrition and Tillage Systems' NDSU Extension Circular SF1881](#)' with the assistance of my technician/programmer/GIS guru, Honggang Bu. Thanks to John Breker at Agvise, Scott Murrell with IPNI and Bernie Saini-Eidukat with NDSU Geosciences for their reviews and contributions. There is also an [HTML version](#) that can be accessed better on smart phones through [NDSU Extension Publications](#).

[Dave Franzen](#)

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**FALLOW SYNDROME AFTER SUGARBEET**

In the Grand Forks area and north, there are fields of corn planted into 2017 sugarbeet fields that are experiencing fallow syndrome symptoms (see figure).

Fallow syndrome is so-called because the condition, which is stunting with a purple leaf/stem color especially early in the growing season and subsequent yield loss, was historically seen after black fallow. Mycorrhiza is a symbiotic fungi that extends the effective root system of a supportive plant by means of its root-like hyphae strands. Mycorrhiza is important for corn to gather the phosphorus (P) it requires most efficiently. Black fallow, and the cultivation of non-mycorrhizal crops in the Cruciferae (mustard) and Chenopodiaceae (lambsquarter) plant families result in low mycorrhiza survival into the next crop year. Our Cruciferae crops are canola, mustard, and forage radish. Our Chenopodiaceae family crop is sugar beet. Crops particularly susceptible to fallow syndrome are flax and corn.

Fallow syndrome is not uncommon after sugar beet, but it has been at least 15 years since I have seen symptoms this severe. I think that over that time our May seasons have been relatively cool, and the above-ground corn growth has been suppressed by the temperatures, allowing time for the mycorrhizal populations to increase before rapid demand of P by the corn occurred. This year, our very warm temperatures have increased early demand for P, and that is why I think we see such severe symptoms.

An additional factor for the severity of symptoms is that most P taken up by sugarbeet is returned to the soil during harvest leaf mowing. The leaf tissue rapidly decomposes and much P is returned to the next crop in an organic P form. This year, the northern Valley experienced a series of severe dust storms. Significant soil was lost from many areas, which is also the soil containing much of the organic P from the sugarbeet leaves. In past years, with not as much soil loss, the organic P remaining may have decreased the P deficiency caused by fallow syndrome to corn, while this year much of the organic P probably left the field for places much farther east.

In the future, it would be best for corn growers not to follow sugar beet with corn. I think that some growth drag also occurs with soybean and small grain after sugar beet, but it is small and no symptoms are ever seen. If corn is to be grown, the only remedy is to apply 150 pounds per acre of 11-52-0 (MAP) or equivalent P rates of other fertilizers in a 2X2 inch band. Any safe rate of fertilizer in furrow is not enough to overcome the lack of mycorrhiza and provide early season P nutrition to corn. No P fertilizer was applied at planting in the field pictured.



*Fallow syndrome symptoms in corn (D. Eisinger image).*

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### **SPRAYER CLEANOUT: QUALITY OF THE JOB IS MORE IMPORTANT THAN QUANTITY OF WATER**

I walked several fields last week that were damaged by herbicides that were tank contaminants from a previous job, in a previous field. It's an awful feeling to see crop injury that is often sprayer load dependent and crop injury that changes for the worst from day-to-day. I know growers understand tank contamination as they inform me how many times they rinse the tank as we walk the field. My message today is very simple; it's not about how much water you push through the equipment to clean residues, it's about the detail, including identifying places where herbicide residues will collect in spray equipment.

My first recommendation is the most important – spray equipment should never be left to sit overnight without cleaning. Spray herbicide mixtures on fields and be sure to take time at the completion of the spray job to clean the sprayer, preventing drying and hardening of product residues. Flush the sprayer system with water if the same product mixture is to be used the next day. A more thorough cleaning is required if switching herbicides. At minimum, filling the sprayer with water and running water through the boom will prevent dried deposits from forming. I realize there are exceptions that may not be avoidable. However, mostly bad things happen when spray solution rides in the tank overnight.

Some herbicides are more difficult to clean than others. Some believe the liquid and dry flowable and water-dispersible granules are the most difficult to remove from spray equipment. However, herbicides formulated as solutions may also create challenges since they adhere to plastic tanks or hoses. For example, the growth regulator herbicides (2,4-D, Clarity, Engenia, Stinger) and ALS-inhibiting herbicides (FirstRate, Harmony, Matrix, Pursuit) attach to plastic tanks and rubber hoses and often are removed / cleaned by herbicides in subsequent loads. Glyphosate acts as a 'tank-cleaner's and removes herbicide residues from rubber hoses, strainers or screens that inadvertently causes herbicide damage in future loads.

Review the herbicide label for herbicide specific tank-cleanout procedures and recommended cleaning agents.

The following is a list of considerations one should make depending on spray equipment.

- Poly tanks require more attention when cleaning since herbicide residue can reside in hairline cracks and crevasses in the tank compared to stainless steel tanks. Use a power washer to clean the film that dries and adheres to sidewalls. Don't forget about product that may solidify and accumulate in the sprayer sump.
- Make sure the sprayer is completely drained of any remaining product. Use the boom cleanout option if your machine is so equipped.
- Clean product line strainers and screens and inspect the inside of hoses, searching for cracks or where herbicide residue can accumulate residues.
- Clean irregular surfaces, such as baffles, plumbing fixtures and agitation units, areas where residues accumulate.
- Remove the end caps from the boom plumbing sections and flush with fresh water. These areas tend to trap products and cleaning them is essential.

And of course, water is a good cleaner when used in combination with ammonia, tank-cleaner and/or other commercial products. However, water and tank-cleaners are not a replacement for the time and detail necessary to search for residues

There are some good on-line guides to use. For example, [Removing Herbicide Residues from Agricultural Application Equipment](#), developed by Purdue University.

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## AROUND THE STATE

### NORTH CENTRAL ND

Over the last week, moderate amounts of precipitation was recorded across the area with continued sporadic chances of rain forecasted over the next seven days. Minot received about 0.82", Bottineau 0.45", Crosby 1.84", Garrison 1.76", and Rugby 1.73" of precipitation. Precipitation remains part of the short term forecast. Soil temperatures (bare) continue to rise with most NDAWN stations in the North Central region in the mid-60 degree range (NCREC/Minot 66°F, Bottineau 60°F; Crosby 64°F; Garrison 65°F; Rugby 63°F). Summer-like temperatures appear to be forecasted throughout the next week with temperatures averaging around 80°F. Planting appears to be wrapping up in the region.

Small pockets of Canola Striped and Crucifer Flea Beetle populations are continuing to be observed from Ward County to Renville County, and likely in other parts of the North Central region. As a reminder, scouting should be on-going in canola until the crop reaches the 4<sup>th</sup> to 6<sup>th</sup> leaf stage. Most damage is likely to occur during the first two weeks following crop emergence. Additionally, some samples of cutworm have come into my office at the NCREC. Really from the western parts of the North Central part of North Dakota along with some samples from Northwest North Dakota.

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NDSU North Central Research Extension Center

### NORTHWEST ND

Planting is wrapping up in Northwest ND. There are a few fields still not planted where rain has delayed what for some has already been a late spring. Scattered storms and strong winds moved through the area Thursday, May 31, through Saturday, June 2. The northern tier received the most rain with northern Williams, Divide, and Burke Counties reporting totals of 1" to more than 3". Hail was reported to accompany some storms. Southern Williams and McKenzie Counties got a little less rain, with totals ranging from 1" to 1.5". Warm temperatures returned on Monday and highs are predicted in the 70's and low 80's for the remainder of the week. There is another chance for scattered thunderstorms on Friday. Spring wheat planted at the Williston Research Extension Center is tillering and stands of most crops look good. Crop growth progress is expected to be steady with adequate soil moisture and moderate temperatures. In-crop weed control is now on everyone's to-do list. I have noticed downy brome heading out and narrow leaf hawksbeard flowering at the WREC so the window for controlling many winter annuals is closing quickly.

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Extension Cropping Systems Specialist  
NDSU Williston Research Extension Center



**PULSE CROP SCOUTING UPDATE**

The NDSU pulse scouting program is now in its second week of surveying chickpea, pea and lentil fields for diseases and insect pests in north central and northwest counties. Scouts are surveying fields for Ascochyta, root rot, Fusarium wilt, grey mold, white mold, powdery mildew, bacterial blight, anthracnose (lentils), cut worms, grasshoppers, aphids and pea leaf weevil (peas). Growers interested in participating in this program may still get in touch with myself (northwest counties) or Dr. Travis Prochaska (north central counties) to join.

Thus far we have observed some mild root rot symptoms in McKenzie, Williams and Burke counties (Fig 1).

Full results of the pulse crop scouting will be available starting next week at [www.ag.ndsu.edu/ndipm](http://www.ag.ndsu.edu/ndipm)

Stay tuned!



**Figure 1. Example of mild root rot symptoms on field pea (photo credit: Taheni Gargouri-Jbir)**

[Audrey Kalil](#)

Plant Pathologist

NDSU Williston Research Extension Center

**NORTHEAST ND**

Soaking, needed rainfall fell over most the region in the past 10 days. We still have soybean seeding occurring in the region. Also, have reports along the northern tier of canola being seeded. At the Langdon REC station, our hemp trial is going in this week. Wheat stands are looking very good. Wheat seeded into dry seed beds early can look uneven. We are starting to pick up low percentages of tan spot in the wheat crop. Sugarbeet cover crop is being terminated and growers in high sugarbeet root maggot areas are applying pesticides. For the past two weeks, canola has been contending with flea beetle infestation. A few fields have been destroyed to a level to warrant reseeding. Due to the hot temperatures and an earlier flea beetle peak, early emerged stands were most at risk. The flea beetle numbers are waning, but scout daily until canola is past the 4 leaf stage.

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**SOUTH-CENTRAL**

The region's NDAWN station data indicate rain during the past week (May 30-June 5) ranged from 0.3 inch (Brampton and Oakes) to 2.7 inches (Streeter), with the Carrington REC receiving 1.6 inches. The combination of adequate topsoil moisture and warm soil temperatures is providing an excellent environment for crop establishment and accelerated growth of early planted crops.

Alfalfa is in the early bloom stage and first cutting has begun. Winter wheat is beginning to head and winter rye is flowering. Early seeded (late April) barley and spring wheat are jointing (5- to 6-leaf stages). Corn planted during the first week of May has 4-5 leaves. Soybean planting is essentially complete and dry bean planting should nearly be complete by the end of this week. Mid-May planted soybean is in the first trifoliate stage (V1) and dry bean is also in the first trifoliate stage (V1)

Application of POST herbicides for small grain and corn is in progress – weeds are doing as well as the crops! Currently a low incidence of tan spot is showing in small grain. Corn currently may be showing colors besides green (see picture). Reasons for corn leaf discoloration include wet soils, compacted soils, 'fallow syndrome' (see article on page 12), or low soil nutrient levels.



***Corn plants from untreated check of Carrington REC starter fertilizer trial that has low soil P and Zn levels.***

[Greg Endres](#)

Extension Cropping Systems Specialist  
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**SOUTHWEST ND**

Many have wrapped up sunflower planting in the past week and have been busy spraying. Heavy rain and hail fell across the region on May 31<sup>st</sup> along with heavy winds into the weekend. Rain was highly variable, NDAWN recorded 1.67 inch of rain in Dickinson from May 30<sup>th</sup> to June 5<sup>th</sup> with 1.39 inch falling on May 31<sup>st</sup>. Reports of up to 3 inches of rain falling in the Dickinson area. Down towards Hettinger, NDAWN recorded 0.40 inch over the same period. For some that received heavy rains, soil crusting may be an issue. According to the NDSU Soil Health website, crusting occurs when heavy rain strikes an unprotected soil surface, breaks down aggregates, and turns the top layer of soil into a uniform surface seal. This surface crust can be strong enough to inhibit water infiltration, seed emergence and can lead to increased erosion. For recently seeded fields this crusting could reduce stands due to the seedlings being unable to break through the crust.



*Soil crusting in a wheat field south of Dickinson.*

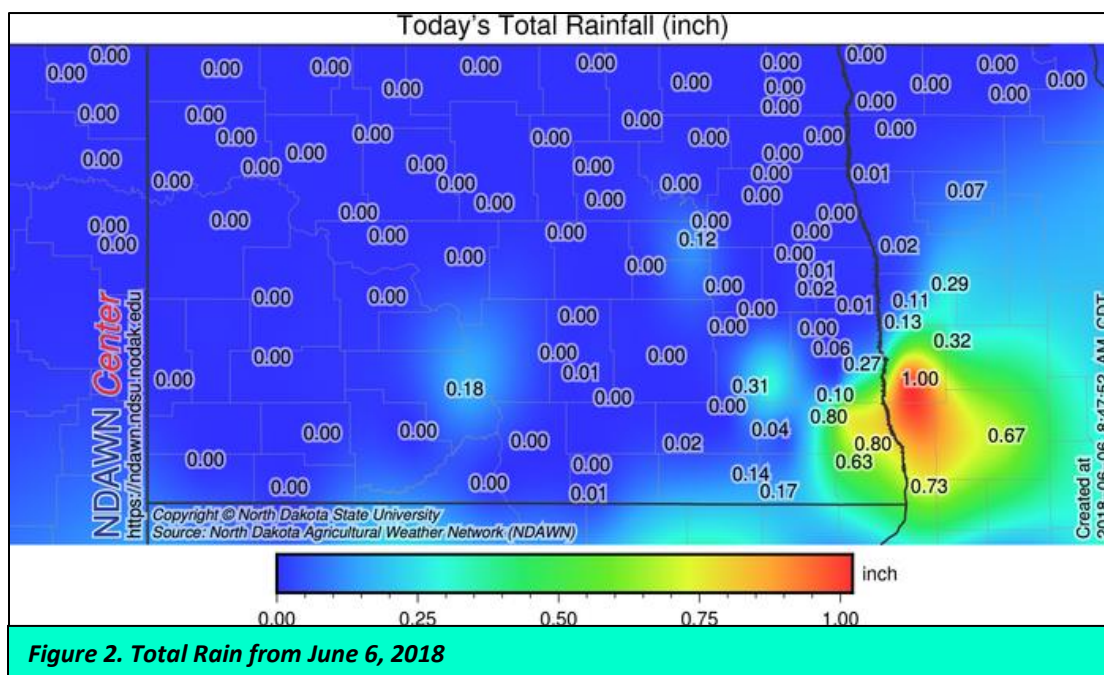
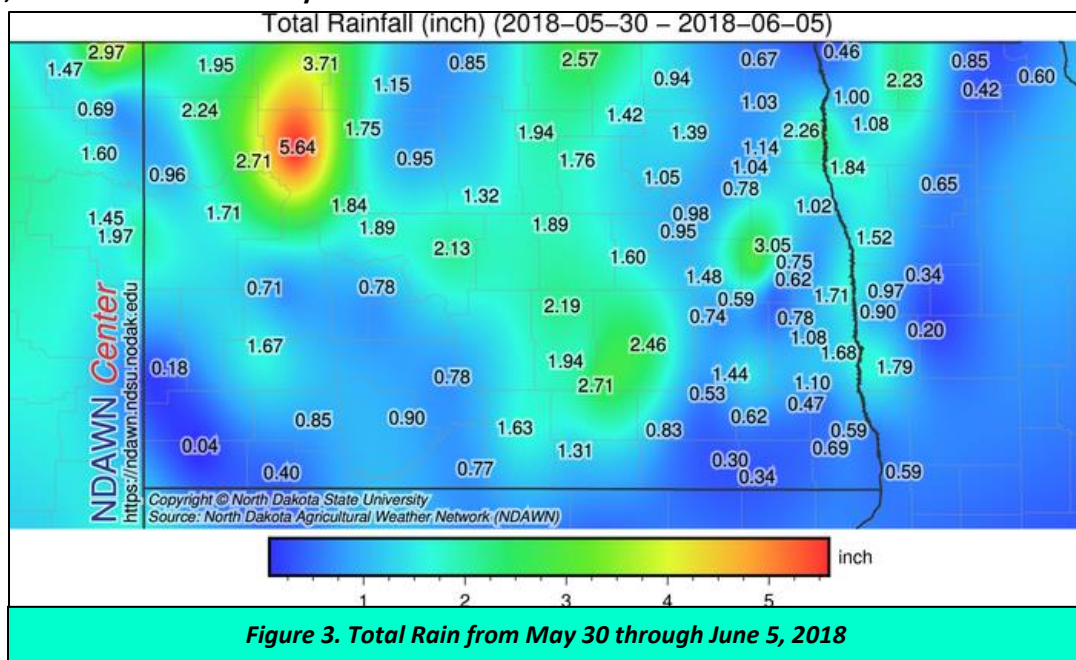
[Ryan Buetow](#)

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**WEATHER FORECAST****The June 7 through June 13, 2018 Weather Summary and Outlook**

This past week brought widespread rain to much of the North Dakota Agricultural Weather Network (NDAWN). One inch or more rain fell across much of the region. Because of deadlines for this writing, the map below does not include what fell yesterday, therefore, I included total rain through noon yesterday (Wednesday) in Figure 2.



Although these past seven days were much cooler than the previous week, temperatures were still well above average, especially in the southern portions of North Dakota (Figure 3). The next seven days looks to be overall cooler than the past week, yet, probably still finishing close to or a bit above average for the time of year.

There will be some scattered thunderstorms that are expected to mainly impact western North Dakota today

(Thursday). All parts of North Dakota into northwestern Minnesota will have chance of rain on Friday, but the most likely area that day looks to be across the southern portion of North Dakota into central Minnesota. A cold front will pass through the region on late Sunday into Monday and with that frontal passage will be yet another chance of thunderstorms, especially on Monday. Before the cold front moves through, Sunday looks to be the warmest day in the next 7 days with some 90s foreseen that day, especially in the central and western portion of North Dakota. With the rain threat on Monday, plus the cooler air coming in behind the cold front, early next week maximums may only reach the 70s. The projected growing degree days (GDDs) base 50°, 44° and 32° for the period of June 7 through June 13, 2018 is presented in Figure 4.

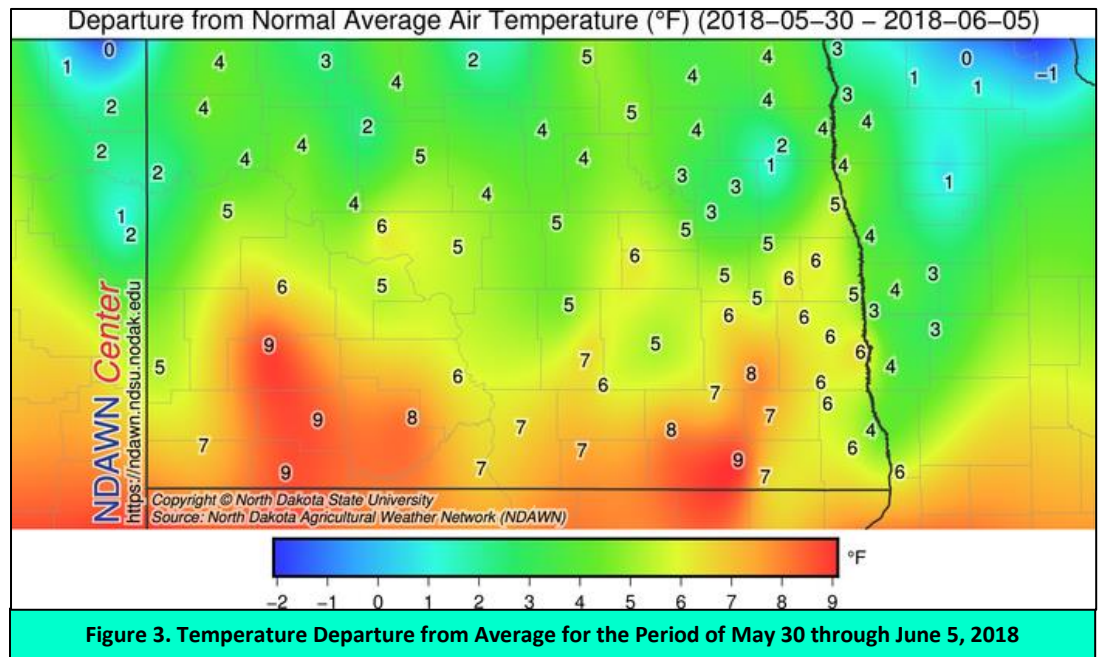


Figure 3. Temperature Departure from Average for the Period of May 30 through June 5, 2018

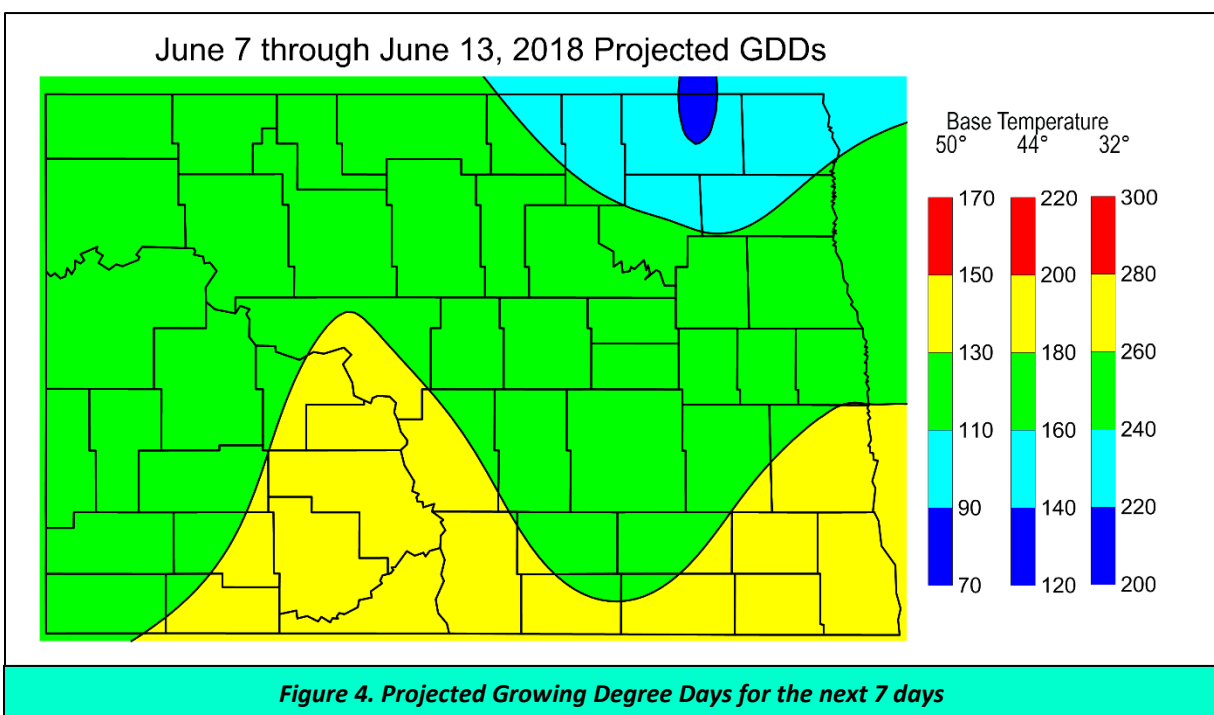
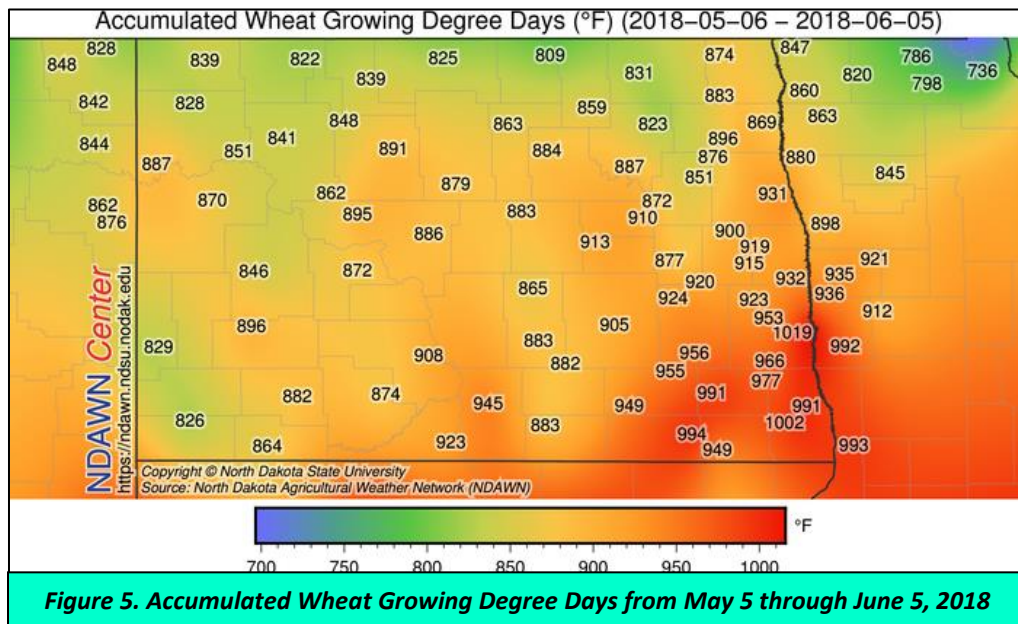


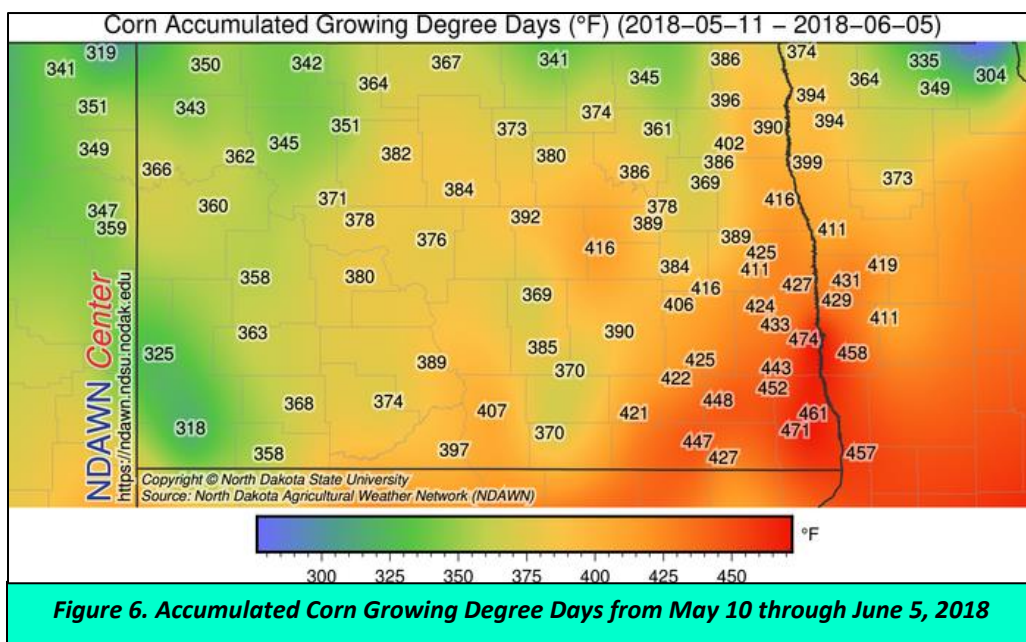
Figure 4. Projected Growing Degree Days for the next 7 days



Using May 5 as a planting date, the accumulated wheat growing degree days (Based 32°) through June 5, 2018 is presented in Figure 5. You can find your exact GDDs for your planting date(s) at: <https://ndawn.ndsu.nodak.edu/wheat-growing-degree-days.html>



Using May 10 as a planting date, the corn accumulated growing degree days through June 5, 2018 is presented in Figure 6. You can find your exact GDDs for your planting date(s) at: <https://ndawn.ndsu.nodak.edu/corn-growing-degree-days.html>



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