2018 Insect Thresholds for Sunflowers

The USDA NASS reports that 28% of the sunflowers were blooming in North Dakota as of July 23rd, compared to only 14% last year (USDA NASS News Release).

Red sunflower seed weevil:
Red sunflower seed weevils (RSSW) are emerging and will fly to the nearest flowering sunflowers. Low numbers of RSSWs are present in sunflower fields from southeast ND (Cass County) and southwest ND (Grant County). Please send me your reports, including locality and numbers, when you start finding more.

Identification: RSSW are small (¼ inch long) weevils with a snout and reddish-orange.

Scouting: When sampling, use the X pattern and begin counting at least 75 to 100 feet into the field to avoid field margin effects. Count the number of RSSW adults on 5 plants at 5 sites for a total of 25 plants. Scout for adults in the early blooming sunflower fields when the yellow ray petals are just beginning to show. RSSW is attracted to early blooming sunflowers, as females must imbibe pollen before laying eggs. A NDSU YouTube video is available on Scouting for Red Sunflower Seed Weevil in Sunflowers.

Scouting should continue until the economic threshold is reached or most plants have reached 70% pollen shed. At 70% pollen shed, plants are no longer susceptible for egg laying or significant damage. On older flowering plants (after R5.7), larvae of RSSW (and banded sunflower moth larvae) will be feeding inside the seeds and protected from the insecticide. By then, much of the feeding damage has already occurred.

2018 RSSW Threshold
Oilseed sunflower at 17.5 cents per lb:
18,000 – 22,000 plants per acre
$8 - $10 insecticide cost per acre
4 - 6 weevils per head

Confection sunflowers:
1 weevil per head
Banded sunflower moth (BSM):

**Identification:** Banded sunflower moth can be identified by its small size (¼ inch long), and its forewings with a triangular, dark brown band across the middle of the wing.

**Scouting:** When sampling, use the W pattern and begin counting at least 75 to 100 feet into the field to avoid field margin effects. Count moths on 20 plants at 5 sampling sites to obtain the total number of moths per 100 plants. When scouting during the day (late morning to early afternoon), the moths remain quiet, resting on upper or lower leaves of sunflower plants or other neighboring broadleaf plants like soybeans. Look for the moth fluttering from plant to plant when disturbed.

Trap counts for BSM from the NDSU IPM Survey insect trapping network indicate that banded sunflower moth increased this past week, probably a peak emergence. Scouting is key now, and it should be conducted from the late bud stage (R3) through early flowering. If treatment is warranted, it should be delayed and applied at the R5.1 sunflower plant growth stage (when 10% of head area has disk flowers that are flowering). At R5.1, most BSM eggs have hatched and young larvae are feeding on the florets on the face of the sunflower head.

**2018 BSM Threshold**
- **Oilseed sunflower** at 17.5 cents per lb: 18,000 – 22,000 plants per acre, $8 or $10 insecticide cost per acre, 1 adult moth per 100 plants
- **Confection sunflowers** at 23 cents per lb: <1 moth per 100 plants

Sunflower moth:

Sunflower moth migrates to North Dakota from states to our south. Because of the migratory nature, it is usually not a major problem for sunflower production in North Dakota. However, recent low trap catches of the sunflower moths were observed at trap sites in Cass, Foster and Renville Counties (Source: NDSU IPM Survey insect trapping network). All traps catches were <7 moths per trap per week, so the infestation is considered non-economic (so far).

**Identification:** The adult moth is about ¾ inch long, grayish-tan and has a cigar-shaped appearance when at rest.

**Scouting:** Moths move into fields during early bloom. They deposit eggs on the face of the flower. Damage is caused by the larval feeding on seeds and tunneling in heads. Using the same scouting method as described for BSM, walk a W pattern in the field and count moths on 20 plants at 5 sampling sites and calculate an average number of moths per
5 plants. Since female moths lay eggs on the face of sunflower heads, insecticide should be applied during early flowering (R5.1 - R5.3).

**Lygus bug:**
- **Identification:** Lygus bug is primarily an insect pest concern in confection sunflowers only. Adults are small, cryptically colored insects with a distinctive yellow triangle or “V” on the wings, and are 0.2 inch in length. They vary in color from pale green to dark brown. Lygus bugs insert their mouthparts into developing sunflower seeds and inject a toxic saliva into the seed causing a brown to black spot called “kernel brown spot.”
- **Scouting:** Count the number of Lygus bug adults on 5 plants at 5 sites for a total of 25 plants. Scout for Lygus bugs during flowering. Sunflowers are susceptible from feeding injury during flowering through seed hardening.

**Insecticide spray timing for most sunflower seed-feeding insect pests:**
- Once the decision to treat has been made, it is critical to time the spray application correctly to get effective management of all sunflower head insects, including RSSW, BSM, sunflower moth and Lygus bug (for confection sunflowers only).
- The best sunflower plant stage to treat for all these head-infesting insect pests is when the majority of the plants are in the early flowering R5.1 growth stage (when pollen shed on 10% of the outer rim of the sunflower head).
- Scheduling an airplane may take a week or more if ag pilots are busy spraying, so we recommend planning for your insecticide application when only 30% of the plants in a field reached the R5.1 growth stage. If it’s hot, flowering will progress more rapidly and one week may not be enough lead time. Getting the timing right in this situation is difficult - but making arrangements when 5-10% of plants are at R5.1 may be more prudent. Last year at Casselton, sunflower progressed from 1% at R5.1 to 50% at R5.1 in just a few days. Insecticides should be targeted at the adult RSSWs to prevent egg laying; at the adult and early larval stages of BSM and sunflower moth; and at the adult or nymph stages of Lygus bug.
- Please see the [2018 ND Field Crop Insect Management Guide](#) for insecticides registered in sunflower.

**EUROPEAN CORN BORER TRAP UPDATE**
- Trap catches of the univoltine Iowa (or Z-race) of European corn borer (ECB) decreased this past week. Univoltine ECBs were captured in only 3 of the 10 trap sites in eastern ND. Last week probably was the peak emergence for the univoltine ECB. Field reports indicate that egg masses and young larvae are present in field corn in SE ND. Therefore, scouting in conventional field corn for egg masses and larvae number is critical now. If ECB populations are above thresholds, an insecticide will need to be applied; however, insecticides only provide about 75-80% control of ECB. Field scouting and trapping can help with proper timing of insecticide applications. Insecticide need be applied before the 3rd instar ECB larva (length of larva is about the size of a dime) bores
into the stalk, about 7-10 days after egg hatch, depending on temperatures. See last week’s Crop & Pest Report article for ECB scouting and threshold. Maps of the ECB trapping results are posted weekly on the IPM website.

**SCOUT FOR POTATO LEAFHOPPERS**

Each year potato leafhoppers migrate into ND on winds from the southeastern United States. Last week, low populations of potato leafhopper nymphs (immature stage) were reported on soybeans near Jamestown. Potato leafhoppers feed on dry bean, alfalfa, potatoes as well as soybeans. Foliage becomes dwarfed, crinkled and curled. The adult is about ¾ inch, wedge-shaped and pale green. Nymphs are wingless, green, and feed on the underside of the leaf.

Scout for leafhoppers in early morning and examine the undersides of leaves for adults and nymphs. Adults are very active, jumping or flying when disturbed. Both adults and nymphs run backwards or sideways rapidly.

<table>
<thead>
<tr>
<th>Potato Leafhopper Thresholds</th>
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</thead>
<tbody>
<tr>
<td><strong>Soybean:</strong></td>
</tr>
<tr>
<td>Vegetative stages - 5 leafhoppers (adults + nymphs) per plant</td>
</tr>
<tr>
<td>Early bloom and later - 9 leafhoppers (adults + nymphs) per plant</td>
</tr>
<tr>
<td><strong>Dry bean:</strong></td>
</tr>
<tr>
<td>All stages after unifoliate - 1 leafhopper per trifoliate</td>
</tr>
<tr>
<td><strong>Potato:</strong></td>
</tr>
<tr>
<td>3rd Trifoliate to Bud Stage - 5 adults per row foot or 1 nymph per 10 leaflets</td>
</tr>
<tr>
<td><strong>Alfalfa:</strong></td>
</tr>
<tr>
<td>12-14 inch stem height - 200 leafhoppers/100 sweeps</td>
</tr>
</tbody>
</table>

**SOYBEAN APHID NUMBERS CONTINUED LOW**

Soybean aphid numbers continued to be low in ND. However, south central Minnesota is seeing increasing populations of soybean aphids. The soybean crop is advancing fast, so this will decrease the risk of economic populations of soybean aphid developing in soybeans before the R6 (full seed set) crop stage. The IPM Survey and other field reports on soybean aphid counts are still low, about 0-29% of plants in field infested and an average of <1 aphid per plant in ND. So, stay tuned for more reports. Maps are posted weekly on the NDSU IPM website.

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**Soybean Aphids Incidence**

July 9 - July 20, 2018

Percentage of plants infested with more than one aphid

- 0
- 1-25
- >75
- 26-50

**Soybean Aphids**

July 9 - July 20, 2018

Average Number of Aphids per plant

- 0
- 1-40
- >250
- 41-150

Janet J. Knodel
Extension Entomologist
TILE DRAINAGE

Over the last decade or so, tile drainage has become more common in North Dakota and Northwest Minnesota. The adoption of this subsurface drainage technology in the region is partly due to increased heavy rainfall events since 1993, higher input cost, and therefore higher risk in farming. Tile drainage tends to increase crop yield and reduces yield variability from season to season. Another benefit of tile drainage is that it allows soils to warm-up and dry out faster in the spring. Fields with intermittent wet spots will dry out more uniformly. Spring field operations on tiled fields will most likely be possible at an earlier date than fields without tile drainage.

In the spring of this year, some farmers were unable to plant their crops in a timely fashion due to the wet conditions. Heavy rainfall in certain parts of North Dakota also prevented crop management to take place at the most appropriate time. Increased annual rainfall also has caused salinity to become a problem in many fields due to rising water tables. Saline areas are often observed as large unproductive areas due to the increase in salt concentration in the soil profile, especially near road ditches. If there is an appropriate outlet (ditch or stream), tile drainage is a management practice that can control and reduce salinity in wet soils.

Tile drainage is useful in many soil textures. Tile installation in sandier soils is typically deep and widely spaced, but may need sock filters around the pipe to prevent soil particles from entering the tile. Clay soils can also be drained but require tile to be placed shallower and closer together. In a Fargo clay, a common tile design might be at a depth of 3 feet with a spacing of 40 feet, whereas tile spacing for an Ulen fine sandy loam would be around 100 feet and 4 feet deep. Soils, where shrinking/swelling clays or peat predominate, or sodicity is present, may need special designs with regard to tile drainage. Fields with a minimum slope can still be subsurface drained if minimum grades of 0.05 to 0.1% are maintained for tile laterals. A tile line at 0.1% grade has 1 foot of fall per thousand feet.

In many parts of the US, a typical tile drainage system has an outlet where water can drain freely (by gravity) into a surface ditch. With limited slope or fields that do not allow for a gravity outlet, pumped outlets are useful if a surface waterway exists to discharge the drainage water (photo 1). A pumped outlet or

Photo 1: Tile sump and outlet near cornfield.
"lift station" provides the lift required to get the drainage water from the elevation of the tile, to the ground surface and into the receiving waterway. Pumped outlets may require electricity (photo 2) and installation will add to the initial investment and operation/maintenance costs of the drainage system. However, pumps have proven to be economically feasible in many situations. A pumped outlet station includes sump, pump, and discharge pipe. Important design features include size and shape of sump and capacity of the pump.

Self-installation is an option; however, the most important benefits of using a tile installer is experience and familiarity with design procedures and standards of tile drainage systems. Depth, grade, pipe size, and field layout are all extremely important in the tile drainage design and will determine the quality and performance of your system. Tile not properly installed may not work as anticipated. It usually takes time to design a system, obtain permits and materials. Fall and early winter, until the ground freezes, are usually good times to install tile.
LODGING IN SMALL GRAINS

In many areas of North Dakota, small grains are shorter than normal this season due to warm temperatures during vegetative development. Though shorter plants tend to be less prone to lodging, there are areas where lodging has occurred as a result of the intense storms that have recently passed through the region. The following are a few questions and answers about lodging:

What causes lodging?
Lodging occurs when plants are unable to stay upright due to the pressure of wind and the weight of rain on the leaves and spikes. Lodging that occurs early in the growth of the plant is often referred to as root lodging since the bending of the plant occurs at its base. Once plants approach maturity and become brittle, stem lodging can also occur when the stem bends or breaks further up the plant.

What is the yield loss associated with lodged plants?
Lodged plants that are still green and that are actively photosynthesizing have less green tissue exposed to the sun. This effectively reduces the rate of photosynthesis. Some research has shown that there is a 1% yield loss for every day that the plant is lodged while still green. Yield losses in mature plants are associated with combine losses. Lodged fields also take longer to combine. When rained on, kernels in lodged mature plants can lose quality which might result in a discount at the elevator.

Will lodged plants straighten themselves?
Lodged plants that are still green may regain all or some of their vertical height. This occurs as cells in the shaded portion of the stem elongate. As an example of this potential, the lodged plots pictured above recovered fully within 10 days of when this picture was taken. Plants that have previously lodged will be more prone to lodge again if conditions are favorable for lodging. As plants approach maturity, their stem cells are done elongating and the mature plants won’t return to the upright position ideal for harvesting.

What factors are associated with lodging? Weather is the main driver of lodging. High winds, particularly when coupled with rain, are the cause of lodging. Variety choice can play a key role in the amount of lodging. Shorter varieties tend to be the most resistant to lodging. There are important exceptions to this rule, however (i.e. it is possible that a relatively tall plant with strong straw can resist lodging even when shorter plants have already lodged). Therefore, it is important to carefully consider the lodging score when selecting a variety and not just plant height. High plant populations tend to result in more lodging. Varieties that are prone to lodging should not be planted in higher populations than recommended. Stems that are crowded close together tend to be smaller and these plants will often have a less extensive root system. Excessive nitrogen can also predispose a crop to lodging. In our plot work this year, if there was any lodging at a location, it was fairly easy to pick out plots that had seeding rates greater than 1.4 million seeds, or that had received more than the recommended nitrogen rate.

Joel Ransom
Extension Agronomist for Cereal Crops
HERBICIDE INJURY IN POTATOES
Throughout this year I have visited some fields with herbicide injury. Herbicide injury in potatoes seems to be increasing in North America. Recent herbicide problems have been a result of carryover in the soil or from off-target movement of herbicide being applied to a nearby area. Herbicide injury in potato not only can reduce yield, but potato quality often is compromised. Contact herbicides can disrupt the growth of potato plants, causing potatoes to become malformed. Systemic herbicides will travel to the growing points - the newest leaf grow and the tubers. When most herbicide residues are found in the tuber they cannot be sold for food or feed. These translocating herbicides stored in seed potato tubers can also cause negative effects when the seed tubers are planted the following growing season. Common herbicides types that translocate causing problems in potato are glyphosate, plant growth regulators and ALS-inhibiting herbicides. If you suspect herbicide injury in your potatoes it is important to follow the instructions of the article Documentation for Suspected Herbicide Drift Damage and follow the instructions found in the previously published article You Have Crop Damage from a Pesticide Misapplication, Now What? (07/19/18).

Image 1. Glyphosate damage on potato from off-site movement. Notice the yellowing of the upper leaves.

(See Image on next page also)
Image 2. Plant growth regulator damage on potato. Notice the cupping, curling and twisting of the leaves.

Andy Robinson
NDSU/U of M Extension Potato Agronomist
DRY EDIBLE BEAN RUST

Frequent dews and moderate-warm temperatures provide a favorable environment for dry edible bean rust. Rust is capable of causing yield loss, especially when it first occurs in the early to middle of the growing season. However, rust can be managed with fungicides and scouting for the disease is encouraged.

**Signs and Symptoms.** Dry bean rust is usually first found on the lower leaves of bean plants in ‘hot spots’, which are clusters of plants with relatively severe damage (Figure 1). Hot spots are often small (a few feet to several yards in diameter) and can occur anywhere in a field, but they are more common near shelter belts or last year’s residue. Rust is usually first observed on the upper sides of the leaves and appear as dusty cinnamon-brown pustules that may be surrounded by a small yellow halo (Figure 2). Pustules on the undersides of the leaves may appear more robust and lack the yellow halo (Figure 3).

**Figure 1. Close up of a rust hot spot in dry edible beans**

**Figure 2. Dusty cinnamon-brown rust pustules the upper side of a dry edible bean leaf**
Management. Dry edible bean rust can cause significant yield loss when the disease occurs early in the growing season and conditions remain conducive for infection and spread. A hot-spot can turn into a full-blowen epidemic in just a couple weeks. The best timing for a fungicide application to manage rust is shortly after it is first found. QoI fungicides [strobilurins: FRAC 11] (Headline, Quadris and generics, Aproach, etc.), DMI fungicides [Triazole: FRAC 3] (Proline, Quash, tebuconazole generics, etc.) and mixtures containing these products (Priaxor, Propulse, etc.) have been the most efficacious in our trials. Fungicides with other modes of action, some of which are more commonly applied for white mold (Endura, T-methyl, etc..), have still reduced disease severity but often not as much as QoI and DMI chemistries. Exceptions have occurred.

SUNFLOWER RUST
Sunflower rust is favored by frequent dews and moderate to warm temperature, and growers are encouraged to scout for sunflower rust as sunflowers approach bloom. Confection-type sunflowers are particularly sensitive to rust, but oilseeds can be susceptible to the disease as well. Yield and quality losses can be very high if an epidemic develops early in the season.

Signs and Symptoms.
Sunflower rust is commonly first observed near shelter belts, near last year’s sunflower residue or near wild/volunteer sunflowers. Pustules are cinnamon-brown and dusty, often first found on the leaves in the lower canopy (Figure 1). If an epidemic occurs, pustules may be found on stems, petioles and leaves.
Management of Sunflower Rust.

**Timing.** If rust reaches approximately **1% severity on the upper four fully expanded leaves at or before bloom (R5)** a fungicide should be considered (Figure 2-3). At R6 or later (after bloom) fungicide applications have not had impact on yield in our trials.

**Efficacy.** DMI fungicides [FRAC 3: Triazole] (tebuconazole, etc..), QoI fungicides [strobilurins: FRAC 11: Strobilurins Headline, Quadris, Aproach) and fungicides containing those modes of actions are among the most effective on rust in our trials.

*Figure 2. Approximately 1% rust severity on a fully expanded sunflower leaf*

*Figure 3. Sunflower rust severity assessment diagram; 1% severity in red*
MECHANICAL WEED CONTROL: MOWING, HOEING AND PULLING

Rows have closed in most soybean, dry bean and sugarbeet fields. Weed control looks mostly good, but there are places where weed escapes are pushing through the canopy. Schedule time to mow, hoe or pull weeds to prevent them from making seed and continue to actively manage weed populations in ditches and along field edges. Weeds along field edges, especially in areas with drown out, have less competition from crop and are actively growing and will produce seed to add to the weed seed bank.

Why mow weeds in ditches and along field perimeters? There are several good reasons. First weeds along field perimeters might introduce species diversity into cultivated fields since new or different weeds often migrate from undisturbed ditches into cultivated fields. Weeds are bad enough, but weeds representing different species are even worse. Second, weeds especially along the edges of fields potentially are biotypes selected for resistance to herbicides since they often receive only a partial herbicide dose when they are sprayed. Finally, mowing along the field perimeter reduces the number of weed seeds that may eventually find their way into cultivated fields.

Manage weeds along the outside of the field perimeter by mowing weeds shortly after they begin to flower and by mowing regularly in August and September to ensure there is no regrowth. Mow weeds as close to the crop as possible or perhaps one row into the crop if necessary to eliminate weeds. Don’t forget about areas of the field with reduced stand. Managing weeds in wet spots, salt pockets, or other areas with reduced crop stand is important at preventing weed seed production and the addition of new seeds to the seedbank.

Why are weed escapes important to manage, especially if there are only a few weeds in fields? A few weed escapes such as waterhemp in soybean or sugarbeet probably will not rob yield. However, escapes produce a tremendous amount of seed. Waterhemp growing in areas of the field without crop competition can produce greater than 500,000 seeds per plant (fewer under competitive environments) and seed remains viable from 4 to 6 years. Applying herbicide to waterhemp near flowering is not recommended because this practice does not significantly reduce the amount of seed waterhemp plants produce.

Finally, there is great urgency to remove weeds once they begin to flower. Researchers at the University of Illinois examined the number of days for female waterhemp plants to produce viable seed after the flowers were pollinated. Female waterhemp plants were pollinated for 24 hours and then separated from the male plants in the Illinois study. Branches from female plants were harvested at various intervals after pollination and placed under either warm (86 degrees Fahrenheit) or cold (−4 degrees Fahrenheit) conditions for 48 hours, then stored at room temperature. Researchers then measured germination to determine how soon after pollination seeds were viable. They found seeds stored for 48 hours under warm conditions were viable 7 to 9 days after pollination; seeds stored under cold conditions were viable 11 days after pollination.

(continued on next page)
Carry a plastic garbage bag to physically remove weeds from the field. Why go through the effort to pull weeds if they still can produce viable seed? Remove weeds from fields and either allow them to dry and then burn or ensile to eliminate opportunity for viable seed.

Regrowth at different growing points after mowing. In time, this waterhem plant will produce multiple seed heads and viable seed before frost.

Tom Peters
Extension Sugarbeet Agronomist
NDSU & U of MN

around the state

NORTH CENTRAL ND

Over the past two weeks, successful field days have occurred in Rugby, Minot, Mohall, and Garrison. Thanks to all the participants and growers who attended each of those days across the North Central region of the state.

As small grain harvest, especially with winter wheat, continues to approach – calls into the office appear to be more directed to pulse crops. Pulse growers continue to monitor for pea aphid and chickpea growers continue to
monitor for Ascochyta in the area, with some control measures being taken. Wheat midge numbers continue to fluctuate, but they remain well below the peak numbers observed a few weeks ago.

Over the past week, rain reports were as follows: Berthold 0.31”, Bottineau 0.00”, Crosby 0.12”, Garrison 0.13”, and Rugby 0.00” of precipitation. Soil temperatures (bare) appear to be holding steady at most NDAWN stations in the North Central region (Berthold 73˚F, Bottineau - 70˚F; Garrison - 72˚F; Rugby - 71˚F). Please be advised that the Minot NDAWN station has not been accurate the past couple weeks. If using the disease forecast models – I would refer you to the next closest NDAWN station for forecast information.

As we look to the month of August – the Good Bugs Workshop will be offered once again. In this full-day short course, participants will learn about supporting beneficial insects that provide pest control. Conservation biological control is a science-based pest management strategy that seeks to encourage beneficial insects back into cropping systems for natural pest control, ultimately rewarding farmers with economically-viable pest management systems. Participants will learn how common farm practices can impact beneficial insects and how to assess and create farm habitat for beneficial insects.

One session will be offered in Larimore, ND, at the Larimore Dam Rec Area and Campground on August 15th. The second will be hosted at the NDSU Carrington Research Extension Center on August 16th. For registration or questions on the event, please contact TJ Prochaska at travis.prochaska@ndsu.edu or connect with him at the NCREC by calling 701.857.7682. Registrations received by August 1st will receive the early bird pricing of $25. All registrations accepted after August 1st will $40. These workshops are approved for 6 CEUs in Pest Management (NDCCA).

TJ Prochaska
Extension Cropping Systems Specialist
NDSU North Central Research Extension Center

NORTHEAST ND

Small grains are moving towards the finish line in southern and valley areas of my region. Some local wheat yield estimates are in the 50 to 60 bu/acre range. Sporadic scab can be found in wheat heads. Corn and soybeans look excellent. We are still hovering around 300 GDD above average for corn seeded on May 1st and over 400 GDD above average in the Rolla area. Dry bean fungicide applications for white mold are occurring. Continue scouting for clubroot in canola. If clubroot fields are known within 1 to 2 miles of your field, consider selecting a clubroot resistant variety in the future. My IPM scout has not found soybean aphids yet, however they are moving closer to our region. Banded sunflower moths are in the region, laying their eggs on sunflower heads. Scout fields for eggs or adults, using IPM recommendations.

Ask questions about micronutrients or other “new-to-you” products to be used at this time of year. In my experience, product experimenting is very tempting in low price years as farmers wish for a few more bushels. However, it’s better to save a dollar than spend a dollar without a sound reason. Follow IPM recommendations. Ask questions to evaluate current yield risk and product efficacy. If you try something new, leave an untreated area to compare results.

Lesley Lubenow
Area Extension Specialist/Agronomy
NDSU Langdon Research Extension Center
SOUTH-CENTRAL

The region’s NDAWN station data indicate rain during July 1-23 ranged from 0.5 inch (Harvey) to 7.4 inches (Oakes), with the Carrington REC (CREC) receiving 2.5 inches. While soil moisture is generally adequate, our crops are using significant moisture. For example, NDAWN data indicates that corn which emerged on May 15 used about 0.2 inch of water per day during July 17-23.

Harvest has begun for winter cereals, and barley fields are at maturity, with harvest soon to start. Field pea and HRS wheat are nearing or are at physiological maturity. Corn planted during the first week of May is in the blister stage (R2). Based on NDAWN growing degree day units (GDDU) accumulated from May 1 planting date through July 23, the region’s corn has accumulated 1340 GDDUs (Wishke) to 1550 GDDUs (Oakes), which continues to be 1-2 weeks ahead of the long-term average for the same period. Soybean and dry bean are in pod to early seed development stages. Yellow is beginning to show in sunflower fields (R5 stage).

Incidence of wheat stem maggot damage is up, and scab levels are low for the southeast quadrant of ND. See NDSU IPM website for crop survey data: www.ag.ndsu.edu/ndipm. Bacterial disease in dry bean (see picture) and corn (Goss’ Wilt) plus potential for white mold in bean crops continue to threaten dry bean seed yield and quality.

SOUTHWEST ND

According to NDAWN, Dickinson has received 0.69 inch of rainfall from July 16th to July 23rd with most of that falling on July 21st with 0.68 inch. Over the same period, 0.88 inch was observed in Hettinger and 0.15 inch in Mott. Winter wheat fields are beginning to be harvested and in some areas barley and other spring seeded small grains are turning color. In the past week, fields of yellow and blue spotted the landscape in parts of the region with canola and flax finishing flowering. Hay continues to be cut and baled. Hay crop in the region is looking good this year.
WEATHER FORECAST
The July 26 through August 1, 2018 Weather Summary and Outlook

The past seven days was the first week with widespread below average temperatures being recorded at North Dakota Agricultural Weather Network (NDAWN) stations, in over two months (Figure 1). There will be a warm up for a few days next week, but the cool air expected through the weekend will probably be enough to keep the temperatures at or below average for this forecast period.

All NDAWN station recorded at least some rain during the past seven days (Figure 2). The heaviest rain occurred in southeastern North Dakota into west central Minnesota, rain that was associated with a slow moving upper-level low pressure system last Thursday.

Figure 1. Temperature Departure from Average for the Period of July 18 through July 24, 2018

Figure 2. 2018 Total Rain for the period of July 18 through July 24, 2018
The cooler weather in place this week will last through the weekend. Precipitation looks to be widely scattered during this forecast period with Friday night into Saturday looking to be the time frame with the most widespread precipitation. The odds are that many locations will record little or no precipitation through the middle of next week. The main change in this period will be the trend toward much warmer temperatures next week, especially Tuesday and Wednesday. It will feel like summer for a few days, but beyond that, another period of cooler weather is expected as we move into August. My projected growing degree days (GDDs) base 32°, 44° and 50° for the period of July 26 through August 1 is presented in Figure 3.

![Figure 3. Projected Growing Degree Days for the period of July 26 through August 1, 2018](image)

The projected number of hours with relative humidity (RH) at five feet above the surface is presented in Figure 4. There will be more hours with high RH today through the weekend then there will be next week, but with the increase in temperatures expected after the weekend, the risk of disease would be higher after the weekend than before.

![Figure 4. Projected Hours with Relative Humidity (RH) above 85% for the period of July 26 through August 1, 2018](image)
Using May 5 as a planting date, the accumulated wheat growing degree days (Based 32°) through July 24, 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

![Accumulated Wheat Growing Degree Days from May 5 through July 24, 2018](image1)

**Figure 5. Accumulated Wheat Growing Degree Days from May 5 through July 24, 2018**

Using May 10 as a planting date, the corn accumulated growing degree days (Base 50°) through July 24, 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

![Corn Accumulated Growing Degree Days from May 10 through July 24, 2018](image2)

**Figure 6. Accumulated Corn Growing Degree Days from May 10 through July 24, 2018**
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