Scout for Diamondback Moth and Bertha Armyworm in Canola...

The diamondback moth migrates into ND and usually arrives in late May or early June in North Dakota. The complete life cycle takes about 32 days from egg to adult. There are several generations during a single growing season, so all different life stages (eggs, larvae, pupae, adults) can be found in the field at the same time.

The adult is small, about ½-inch long, drab brown in color and, at rest, the forewings of the male moth form three diamonds - hence the name diamondback moth. Females lay up to 160 eggs during the night. Eggs hatch in five to six days into pale yellowish-green caterpillars with a forked posterior end. The newly emerged larvae burrow into the leaf and mine the leaf for several days to a week. Then, the larvae exit the leaf and feed externally for another 7 to 14 days. When disturbed, the larvae thrash backwards violently and often drop from the plant on a strand of silk. The larvae pupate for 5 to 15 days in a white net-like cocoon attached to the leaves, stems or pods.

Larvae feed on the leaves, buds, flowers, seed pods, the green outer layer of the stems, and occasionally, the developing seeds. As leaves wilt and drop in late July to early August, larvae will feed on the stem, pods, and developing seeds. Damaged pods will not fill completely and may shatter. Severely damaged pods appear whitish in contrast to the normal yellowing and browning of ripening undamaged pods.
Scout fields for diamondback moth larvae by beating plants to dislodge the larvae into white buckets. After beating plants, count larvae in the bucket or dangling from plants on a silk thread. Again, check several locations per field. For the early flowering stage, insecticide applications may be justified at larval densities of 10 to 15 larvae per square foot. The action threshold for canola at the pod stage is an average of 20 larvae per square foot.

The best pest management strategies to avoid yield losses from diamondback moth include early field scouting for larvae, and judicious use of insecticides only when fields are above thresholds. For more information, consult the NDSU Extension publication on *Diamondback moth in Canola: Biology and Integrated Pest Management E1346 (revised)*.

**Bertha armyworm:** The adult moth is about 1½ inches long and mainly grayish-black with a silvery-whitish kidney-shaped spot and with a silvery-whitish fringe on each forewing. Moths emerge from the overwintering pupae in mid-late June and emergence continues through early August. These night fliers are particularly attracted to blooming canola fields for their nectar and egg laying sites. Eggs are laid on the lower side of leaves in clusters of 50-500 eggs in a honeycomb pattern and hatch in about one week. The emerging larvae (1/10th of an inch) are usually green in color. Mature larvae are about 1½ inch long and vary in color from green to brown to velvety black. Larvae often hide underneath leaf litter and clumps of soil during the day, which makes them difficult to see. Larvae develop for six weeks and then drop to the ground in mid to late August to pupate. There is only one generation per year.

As the canola plant drops its leaves, the mature larvae (>½ inch) begin to feed directly on the pods which causes economic yield losses and premature shattering. Feeding injury by the mature larvae also accounts for 80 to 90 percent of the plant material consumed during a larva’s life. Mature larvae will even continue to feed on pods in the swath. Fortunately, populations are kept low during most years due to natural environmental factors like harsh winters and the presence of biological control agents (diseases and parasites).

**Thresholds would be 18 to 22 larvae per square yard, if leaf feeding is the extent of the damage observed.** The key to controlling bertha armyworm is:

- Early detection of young larvae about ½ inch long in canola fields by regular scouting.
- Determining if fields are above economic thresholds for larvae.
- Fields above the economic threshold level should be sprayed once the hatch is complete and just before larvae move to the pods. Apply a well-timed insecticide in late evening when larvae are actively feeding.
- Use high volumes of water for good coverage of the dense canola canopy.

For more information, consult the NDSU Extension publication on *Bertha armyworm in Canola: Biology and Integrated Pest Management E1347 (revised)*.

Please see the NDSU Extension E1143 2019 ND Field Crop Insect Management Guide for insecticides registered in canola. Please remember that blooming canola is attractive to bees, so insecticides should be applied in the late evening (preferred by honey bee keepers) or early morning to minimize negative effects of an insecticide on bees.
SUNFLOWER INSECT UPDATE

According to the most recent IPM Crop Survey, sunflowers were in the R3 to R5.6 crop stages in ND. **Early flowering is the most important time to scout fields for economic populations of seed-feeding insect pests including sunflower moth, banded / Arthur’s sunflower moth and red sunflower seed weevil.** Continue to scout fields for insect pests until sunflowers reach R5.8 to R6.

Insect trapping for **sunflower moth** indicates that high numbers of moths migrated into ND during the last two weeks, just in time for female moths to lay eggs on the face of the sunflower. High trap catches are present in the central and north central areas of ND. See past Crop & Pest Report (Issue 12) article on scouting and E.T. for sunflower moths.

2019 Sunflower Moth Threshold

**Trap threshold:**
28 moths per trap per week

**Field scouting threshold:**
1-2 moths per 5 plants
Banded sunflower moth trap catches peaked last week in most areas of ND with the highest trap catch at Renville County followed by Cass and Cavalier Counties. Trap catches for Arthuri sunflower moths are high in the northern tier of ND, but are usually lower numbers than the banded sunflower moth. See past Crop & Pest Report (Issue 12) article on scouting and E.T. for banded / Arthuri sunflower moths.

Economic populations of red sunflower seed weevils are being observed in the earliest blooming sunflower fields, especially in field edges. The ½ inch long reddish-orange weevils are especially abundant in the north central area of ND (see map). The last Crop & Pest Report (Issue 13) has an article on scouting and E.T. for the red sunflower seed weevil.

NO SOYBEAN APHIDS
The most common insect pest problems in soybeans reported the last couple of weeks were some remaining pockets of thistle caterpillars and grasshoppers (nymphs and adults) causing leaf defoliation during flower to pod development. The Economic Threshold (E.T.) is 20% defoliation for all foliage-feeding caterpillars. The E.T. for grasshoppers uses a count per square yard: 8-14 adults per square yard in field and 30-45 nymphs per square yard in field. No soybean aphids were reported.
Although increasing population of soybean aphids are being observed in southeastern MN, soybean aphid counts continue to be zero to very low in ND. Besides the late start to soybean aphids this year, the recent weather conditions are just not suitable for fast reproduction (78-83F, moderate humidity are optimal). The IPM Crop Scouts observed 0-14% of plants in field infested and an average of <0.1 aphid per plant in ND (see map below). About 93 percent of the fields scouted had no soybean aphids present in ND. The pie chart map shows the proportion of plants observed by different aphid densities. If the pie chart shows mainly orange to red, this indicates those fields have more plants that are getting closer to the economic threshold of 250 aphid per plant. Maps are posted weekly on the NDSU IPM website.

Janet J. Knodel  
Extension Entomologist

plant science

NDSU 2019 SOYBEAN IDC SCORES POSTED

Selecting a soybean variety with tolerance to iron-deficiency chlorosis (IDC) is the most important management decision producers can make in avoiding or reducing the negative yield effect of chlorosis. IDC has been prevalent in many soybean fields in eastern North Dakota and northwestern Minnesota during the 2019 growing season. During the early summer of 2019, the NDSU soybean breeding program tested around 250 Roundup Ready, Xtend, and Enlist soybean varieties, as well as 38 conventional and Liberty Link varieties for IDC tolerance. The test results are available at https://www.ag.ndsu.edu/varietytrials/soybean.
The results are based on field studies conducted at two locations with a history of IDC. Visual ratings were made on a 1 to 5 scale, with 1 representing no chlorosis and 5 being the most severe chlorosis. Ratings were taken twice, at two different growth stages.

Soybean varieties have genetic differences for the expression of IDC symptoms, and some have tolerance to IDC. No soybean variety is immune to the chlorosis, but large differences in yellowing and subsequent plant stunting occur between the most tolerant and most susceptible varieties.

Although most soils in North Dakota have adequate iron, under certain conditions such as high carbonates, high pH, excess moisture, cool temperatures or high nitrate content, soybean plants are unable to take up sufficient iron amounts from the soil. This often results in soybean fields with yellowing and reduced plant growth. Growers are encouraged to strongly consider IDC tolerance when selecting soybean varieties for the 2020 growing season.

Ted Helms
NDSU Soybean Breeder

Hans Kandel
Extension Agronomist Broadleaf Crops
TIPS FOR PLANTING WINTER WHEAT AND WINTER RYE (FOR GRAIN)

Winter wheat plantings have been less than 100,000 acres for the past few years. This may partially be due to its price relative to spring wheat and weather-related factors that made it difficult to plant during the recommended planting period. Nevertheless, winter wheat may be a good fit in some situations as it can spread out the workload, provide important green cover this fall and early next spring, and often has a yield advantage over spring wheat. Winter rye acreage, on the other hand, increased substantially this past year, with more than 60,000 acres planted. Some of this was as a cover crop, but of the 60,000 acres planted, it is estimated that half of those acres will be harvested for grain/seed. Given the massive amount of prevented plant acres this year in the Midwest, the demand for rye seed this fall will likely be substantial. The recommendations for establishing winter rye and winter wheat are similar. Rye tends to be more winter hardy than winter wheat, so some of the issues related to snow cover are less critical for its survival than winter wheat. The following are recommended practices for establishing winter wheat and winter rye:

1- When possible plant winter wheat and rye into standing stubble. Survival of these crops during the winter is enhanced when they are covered with snow during the coldest months of the year. Standing crop residues can effectively retain snow. Tall, erect flax and canola stubble works best, but any erect stubble that retains snow is recommended. Planting winter wheat into wheat stubble is not ideal for disease reasons, but if disease management is planned, wheat stubble can be an acceptable residue. Winter wheat and winter rye can be established on ground that was not planted this season. However, if the winter is open there is greater risk of winter kill when not planted into residue. Since rye is more winter hardy that winter wheat, it is probably a better option when planting on prevent plant acres as far as winter survival is concerned. If you are not planting into a standing residue, plant the most winter-hardy varieties of winter wheat. Refer to the North Dakota Winter Wheat Selection Guide (A1196-16) for information on winter hardiness. Availability of certified seed may be somewhat limited due to small winter wheat acreage. Refer to the seed guides in North Dakota http://www.nd.gov/seed/field_directory/ and South Dakota https://www.sdsstate.edu/sites/default/files/2017-08/2017%20WinterWheat%20Directory.pdf to source certified seed. For rye, certified seed was produced only for ND Dylan in North Dakota. Winter wheat variety trial results from 2018 are summarized in the A1196-18 and can be found at https://www.ag.ndsu.edu/varietytrials. Yield trial results are also available for rye, but finding seed of most of the varieties tested may be difficult (see https://www.ag.ndsu.edu/publications/crops/north-dakota-barley-oat-and-rye-variety-trial-results-for-2018-and-selection-guide).

2- Plant in September: The optimum planting date for the northern half of the state is September 1-15 and for the southern half, September 15-30. In recent years, plantings during the first ten days of October have largely been successful. The last practical date will depend on the weather, but there must be enough moisture and growing degree days so that the seed can germinate and the seedling vernalize by spring. Larger seedlings will over winter better than smaller ones. Target the earlier portion of the recommended planting date range if planting into bare, fallow ground. Since some of the ground where rye (and perhaps winter wheat) will be planted is currently bare, I have been asked, how early can rye be planted? Rye that is planted now should survive the winter and produce a crop next spring. Since rye requires vernalization in order to flower, it will remain in a vegetative state until spring. There may be some increase in risk of rye becoming infected with wheat streak mosaic virus when planted early (in August), however. The wheat curl mites that vector this virus are more active when temperatures are warm. Therefore, strive to break the green bridge when planting early, meaning control any grasses and volunteer small grains at least two weeks before planting.

3- Plant 1 to 1.5 inches deep: Adequate moisture for establishing winter wheat is often a concern as the soil profile is usually depleted of moisture in the fall (this will not likely be the case in prevent plant acres). If there is little or no moisture in the soil’s surface, planting shallow (1 to 1.5 inches deep) and waiting for rain is recommended. Furthermore, these relatively shallow planting depths allow for faster emergence when temperatures are rapidly declining.

4- Seed about a million seeds per acre. This applies to both winter wheat and winter rye for grain. Generally, a seeding rate of 900,000 to 1.2 million viable seed per acre is adequate. The higher seeding rate may be appropriate if planting late or when planting into poor seedbeds. Since winter cereals tends to tiller more profusely than
spring cereals, 1.2 million seeds per acre is the upper end of the recommended seeding rate. Excessively high seeding rates can result in more lodging by harvest time, particularly if you are using a taller variety. Lodging can be a problem for rye!

Joel Ransom
Extension Agronomist, Small Grains and Corn

LENTIL ROOT ROT
Lentil fields in northwest ND were scouted for root rot from May through July by the NDSU pulse scout (Nicole Stanhope, WREC). Fields were evaluated for above-ground symptoms of root rot including yellowing of the foliage (chlorosis) and wilting, at five sites within the field. Out of the 22 fields assessed, 64% of lentil fields exhibited above ground symptoms consistent with root rot. These fields were monitored over the course of the growing season, and above-ground symptoms were most visible mid-July following a significant rain event, when most of the fields evaluated were at the R5 growth stage (Fig 1A). However, mild root rot symptoms were observed on roots as early as mid-June (Fig 1B).

Fig 1. A) Root rot incidence in lentil fields July 12 – 26th. B) Root rot symptoms observed on lentils mid-June. Black arrows indicate golden-brown discoloration.
Abiotic factors including water logging and compaction can result in above ground yellowing as well, however samples were collected in association with above ground field symptoms (**Fig 2A**) and root necrosis (blackening/death) was observed (**Fig 2B**).

Where growers observed significant root rot in their fields, rotation away from pea or lentil is recommended. Growers should submit samples to the North Dakota State University Plant Diagnostic Lab to determine the pathogen responsible for disease. If Aphanomyces is present at high levels, rotation of 6-8 years may be necessary before a reduction in symptoms is obtained. At this time, there is no genetic resistance to Aphanomyces root rot in pea or lentil and none of the seed treatments registered for lentil in North Dakota are effective against this pathogen.

This work was supported by the Northern Pulse Growers Association.

**Audrey Kalil**  
Plant Pathologist  
NDSU WREC

**Julie Pasche**  
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LATE-SEASON HEAD DISEASES OF WHEAT AND HARVEST CONSIDERATIONS

A pending wheat harvest provides an opportunity to diagnose late-season head diseases. The most common diseases that may be observed this year at harvest are Fusarium head blight, ergot, black chaff and sooty mold. In some cases, multiple diseases may occur on one head. Here are some diagnostic tips and harvest considerations for these head diseases.

Fusarium head blight (scab)

Field Diagnosis Tips

The best time to look for scab is during the dough stages of development in wheat. Infected spikes will have premature bleaching on a portion or the entire head. When the crop approaches maturity, there are a few things that can be observed on Fusarium infected heads. Signs of the pathogen are the best indicator of scab and include pink to orange colored fungal growth (Figure 1A) on infected spikelets. Infected spikelets will often have kernels that are shriveled, light and appear lifeless (Figures 1B).

Harvest Considerations

In severe FHB-stricken wheat fields, adjusting the combine fan speed may help blow out additional lightweight severely infected kernels. However, if there was a late infection by the Fusarium pathogen, the kernel’s weight may not be impacted, but deoxynivalenol/vomitoxin (DON/VOM) can still be a concern. If you suspect FHB damage, do not mix the grain from fields that were planted at different times or with different varieties until they have been tested for DON levels as these practices can result in large differences in DON. For more information on handling small grains with DON/VOM please review (https://www.ag.ndsu.edu/publications/crops/plant-disease-management-deoxynivalenol-don-in-small-grains-1).
Ergot

Field Diagnosis Tips

Last season presented some problems with ergot in spring wheat and rye. Although we have received some reports of ergot, it has been localized near field edges or near grassy weeds in field margins. The most diagnostic sign of the ergot pathogen are ergot bodies. Ergot bodies (sclerotia) are black-purple, hard, irregular shaped, and are noticed in a mature wheat field (Figure 2).

Harvest Considerations

Now is a great time to look for ergot incidence in field. Most problems with ergot will be greater along field margins. If severe, mark the most impacted areas and harvest separately. Again, keeping sound grain separated from contaminated grain will help avoid problems at the point of sale. Ergot bodies tend to resemble the weight of a wheat kernel and are likely not impacted by combine fan speed. For more information on ergot, please review (https://www.ag.ndsu.edu/publications/crops/ergot-in-small-grains/pp1904.pdf)
Black Chaff

Field Diagnosis Tips
Black chaff is simply the bacterial leaf streak pathogen that has infected a wheat spike. Infected spikes will appear discolored and have discolorations on glumes and awns. Discolorations associated with black chaff will not “rub off” and will be embedded in leaf tissue. Fields with high levels of bacterial leaf streak may have black chaff symptoms.

![Figure 3. As a wheat spike with black chaff matures, the discolorations will remain on the florets and awns. This discoloration may also appear shiny.](image)

Harvest Considerations
The pathogen responsible for bacterial leaf streak and black chaff can survive on seed, but survival efficiency is low. More research is needed document the survival of the bacterium in seed storage conditions.
Sooty Mold

Field Diagnosis Tips
Sooty mold is the name given to saprophytic fungi that colonize dead tissue. On wheat spikes that have prematurely died, saprophytic fungi, often black to green in color, will colonize the spikes giving them a dirty appearance (Figure 4).

Harvest Considerations
Sooty mold may contribute to a dirty harvest and rarely impacts seed quality.
SOIL SAMPLING SEASON BEGINS FOR 2020 CROP YEAR

With the beginning of winter wheat, rye and some spring wheat harvest, it is time to consider soil sampling for the 2019 crop year. The following are important to consider:

1. Sampling time

   For soil nitrate there is no perfect, stable time to soil sample. Some years past, I reviewed NDSU research into the effect of sampling time on soil nitrate values from August through April the following year and found that some values decreased, some stayed the same, and some increased, depending on site sampled. There was no relationship between trend and rainfall. Any time is as good as any other time. Some of you have noticed that NDSU N recommendations carry a ‘plus or minus 30 lb./acre rate’ to final recommendations. The ‘fuzz’ around the nitrate test with time is part of it. However, it is very important to have a soil test value on which to base an N rate. If you do not have a value or zone values for a specific field (each field has a ‘personality’ of soil fertility), then what you have is a not-very-educated guess.

   Also, for P, soil pH, EC, CCE, OM, zinc and chloride, anytime is a good time to sample. I would sample for P and soil pH (and K) in an untilled field whenever possible, so the 0-6 inch sample core is consistent. Achieving consistent core depth in a tilled field is very difficult, and in some cases, impossible.

   Soil test K values vary through the season. Work in Illinois, and now work at NDSU shows that highest K values are in early spring. As the season progresses, K values decrease, achieving their lowest values in August through mid-September, then the values tend to increase until freeze-up. Variation appears to be less in moist seasons and in illitic-dominated soils. Sampling anytime for K is okay, but note when K sampling was last conducted, and then sample the same time of year the next time K is important. The soil test K values vary slowly with K fertilization, so probably every two years is good enough, although I would not argue with anyone wanting to sample every year.

2. What crops should have nitrate sampling?

   Traditionally, all crops that are N-rate yield dependent (small grains, corn, sugarbeets, potato, sunflower, canola, flax, dry bean) require a soil test for nitrate-N. However, based on the high residual nitrate values before soybean in some years, I would also consider a nitrate soil test before soybean in the eastern 50 miles of the state in IDC country. High soil nitrate (greater than 50 lb N per acre) can increase the severity of IDC in soybean and a grower needs to know if it is present.

3. How to sample

   The days of a composite soil test should be over. There is enough equipment around owned by farmers or their suppliers that knowing how a field varies in fertility from boundary to boundary is manageable and economically advantageous. Zone sampling should be the rule in this state. The only part of a field where a grid of 1 sample per acre should be used is the area where high rates of manure have been applied within the past 20 years. A 2.5 acre grid is not a substitute for a good zone sampling and a 2.5 acre grid will not identify the fertility patterns within most fields. It ‘works’ in Iowa and other Corn Belt states because most of their P and K variability has the same fertilizer recommendation; it’s all in the high range. In this state, variability is much greater, and the variability is in soil test ranges requiring different rates.

4. Sampling in low pH soils

   The number of acres in North Dakota with soil pH values near or below 5 continues to increase, particularly in no-till fields that have had N applied to or near the surface for many years. When sampling these fields, zone sampling should be the method, and it is important to sample the 0-2 inch depth and the 2-6 inch depth for pH. Application of liming materials such as beet lime should go onto the soil surface, and knowledge of pH with depth will not only provide information on whether a surface application will be effective, but the farmer can track pH progress after lime application. Ongoing research at the Dickinson and North Central R&E Centers so far indicate that surface lime
application is effective in overcoming aluminum (Al) toxicity. This agrees with previous studies in the US. It may also be
wise to analyze for base saturation using the cation addition method for cation exchange capacity, as magnesium (Mg)
values may be low in some soils. If Mg values are low, a beet lime or another calcitic liming source like city water
treatment lime would only help the pH, but it might result in a Mg deficiency down the road.

5. Trends of Organic Matter Following Movement to No-Till

I smile when I read that a farmer increased organic matter a full point one or two years after transition to no-till.
This is not possible unless substantial rates of manure have been applied. What usually has happened is that whoever is
taking the soil sample pushes the soil probe through the no-till residue, which is not really organic matter, and the
residue becomes part of the soil sample result. Growers transitioning to no-till must insist that their soil sample people
get out of the truck, kick the residue aside and then sample the cleared area with a 0-6 inch core. That will provide a real
analysis of the real organic matter. One percent organic matter in 6 inches of soil weighs about 20,000 pounds/acre. The
conversion from organic matter to organic carbon using NRCS figures is a factor of 0.58, so the organic C in 6 inches of
soil is 11,600 pounds/acre. The C/N ratio of organic matter is about 10:1, so the N in 1% organic matter is 11,600/10, or
1,160 pounds. Therefore, it is not reasonable to think that a few years of no-till and a cover crop will result in that much
C AND N becoming part of the soil; in a decade perhaps, but not in a few years. One farm that I follow has been in no-till
for over 40 years, and the farmer started using cover crops about 20 years ago. The organic matter on some of his fields
has increased from about 3% to well over 6% today.

UNWANTED PESTICIDE RESIDUES IN FOOD

Pesticide residues are found in most of the food that we purchase from the grocery store. However, only rarely are they found in enough quantity to pose a significant risk to consumers. That is because a pesticide use cannot be approved until it has been demonstrated to not exceed a maximum residue limit. The best way to avoid crossing over the limit is to follow the directions for use statements regarding application rate and the Pre-
Harvest Interval (PHI) on the label.

This year, all pesticide users are experiencing unprecedented scrutiny by consumers. Especially regarding food that contains glyphosate herbicide. This is because, over the past couple of years, people have heard through the popular press, trial lawyer advertisements, and social media, that glyphosate causes cancer. This has led to multi-million dollar lawsuits against the developer of glyphosate, Bayer (formerly Monsanto). Unfortunately, that means the mere presence of glyphosate residue in food has a chilling effect on consumers. Therefore:

a) Applicators need to be very mindful and scrupulous in following label restrictions.
b) If a pesticide is applied by a customer applicator, it is essential that the PHI of all pesticides, not just glyphosate, be communicated to the farmer.
c) Farmers should consult with the buyer(s) of the crop to make sure the pesticide residues, if any, do not exceed levels that would endanger the marketability of the crop. This is not a pesticide regulation issue or a food safety issue, but rather, a market decision between the seller and the buyer.

Finally, the 2019 growing season has been unusual in that most of the crops were put in very late, so pesticide applications went on much later than one would normally expect. Moreover, frequent rainfall further delayed applications. That means that complying with the PHI specified on the label may present more of a challenge this year. In sum, adhere to the label instructions and consult with buyer(s) to avoid problems.

Andrew A. Thostenson
AROUND THE STATE

NORTH CENTRAL ND

Up and down temperatures have ruled the area over the past few weeks. Hit and miss storms have brought moisture to the area - the following are area NDAWN observations for the past two weeks: Minot 0.91”; Rugby 0.26”; Bottineau 0.17”; Rolla 0.20”; Plaza 1.10”; Mohall 0.38”; and Garrison 1.55”.

The North Central IPM scout was finding some downy mildew in sunflowers in rural Bottineau County. Sunflower seed weevil observations are spotty – scouting should continue. The common sunflower moths (Sunflower Moth, Banded Sunflower Moth, and Arthuri Sunflower Moth) are still being detected along the Canadian border. Disease observations are down, likely due to maturity. Grasshopper and small grain aphid numbers are falling as well in the area. Pea harvest is well underway with some progress being made to small grains. Few canola fields have been swathed, but swathing will likely gear up in the short term.

TJ Prochaska
Extension Crop Protection Specialist
NDSU North Central Research Extension Center

NORTHWEST ND

Cool, cloudy, and rainy weather has marked the last few days in Northwest ND after a warm start to August. Thundershowers, many of them quite strong, moved through much of the region on Saturday and again Sunday overnight into Monday. Rainfall totals of the last 3 days recorded by NDAWN stations were 0.7” at Williston, 2.1” at Crosby, 0.5” at Watford City, and 1.1” at Bowbells. While the rain is needed to help recharge soil moisture, it came as harvest was just getting started. The weather forecast predicts we start drying out today and warming up through next week. Sunny skies will be welcome as harvest starts in earnest.

Here at the Williston REC, we harvested winter wheat and pea variety trials late last week. Some spring wheat and lentils are now ready for harvest, but we are waiting for things to dry out before getting back in the field. Canola is ripening with mostly yellow seeds and a few brown, flax has brown capsules and green stems, and soybean is at about full pod. Even though the rain is not helping the small grains at this point, it will be good for the soybean. Chickpea finally started to turn color last week after an extended growing season, so it will be interesting to see how long recent rains prolong dry down.

On September 11 in Watford City, there will be a fall weed control meeting to discuss narrowleaf hawksbeard and horseweed (also known as marestail) control. The meeting will be in the Yellowstone Room of the McKenzie County Courthouse and runs 9:30 am to noon Central with a lunch following. Speakers include Devan Leo, McKenzie County Ag Extension Agent; Clair Keene, WREC Extension Agronomist; Brian Jenks, NCREC weed scientist; and Mike Jenks, Helena Agronomist. If you have questions about the meeting, please call the McKenzie County Extension office at 701-444-3451.

Clair Keene
Extension Cropping Systems Specialist
NDSU Williston Research Extension Center
NORTHEAST ND

Small grains and field pea harvest is in progress. Inadequate rainfall has hurt soybean yield potential. Rainfall over the region on Monday and Tuesday was welcomed albeit late for soybean yield recovery. We have areas that are very dry notably in Pembina and Walsh Counties.

We have found soybean aphids in Grand Forks and Towner counties. Grasshoppers remain high. Outbreaks of diamondback moth have been found in Cavalier County. They are tricky to scout due to their cryptic (hidden) nature. Pull plants out of the ground to look for larva by beating the plants onto a white surface. Multiple generations exist in the field, so if you just see cocoons, you may have missed the larvae.

Diamondback cocoons and evidence of larva feeding on canola stems.

SOUTH-CENTRAL/SOUTHEAST ND

Based on NDAWN, the region’s total rainfall May 1 through August 12 ranged from 8.8 inches (Harvey) to 17.0 inches (Robinson), and the Carrington REC received 10.1 inches. During the current month (August 1-12), rainfall ranged from 0.7 inch (Edgeley) to 3.8 inches (Robinson). The region’s corn growing degree day units (GDDU) accumulated from May 20 to August 12 range from 1290 (Robinson) to 1490 (Brampton and Oakes). This range is -165 to +50 GDDU, depending on location, compared to the long-term average for the period.

Winter cereals, barley and field pea harvest continues while spring wheat is next in line. First-half of May planted corn is in the milk to dough stages (R3-4) and soybean has developing seeds (R5 stage). Dry bean is in the seed-formation stages (R6-7). Sunflower are in the bloom to ray-petal drop stages (R5-6).

Row crop tour August 29 at Carrington REC

Farmers, crop advisers and agricultural industry representatives are invited to view field research trials and receive production recommendations on corn, soybeans and dry edible beans at the annual row crop field tour on Thursday, Aug. 29, at the Carrington Research Extension Center.
Registration begins at 4 p.m. with exhibits of Palmer amaranth and other pigweed species, and refreshments will be served. The tour begins promptly at 4:30 and includes:
* Late-season corn and soybean plant development and management
* Soybean variety selection tips
* Research update on cover crops for soybeans and dry beans, with emphasis on winter rye
* White mold management in soybeans: impact of soybean plant susceptibility and maturity; and spray droplet size, sprayer boom height and application methods for fungicide efficacy
* White mold management in dry beans: impact of fungicide spray droplet size, and row spacing and seeding rate
* Multi-cropping with corn

A supper will follow the tour sponsored by N.D. Corn Utilization Council, N.D. Soybean Council and Northarvest Bean Growers Association. Continuing education credits in crop and pest management will be available for certified crop advisers.

For more information about the tour, call the Carrington center at 701-652-2951 or visit https://www.ag.ndsu.edu/CarringtonREC.

Greg Endres
Extension Cropping Systems Specialist
NDSU Carrington Research Extension Center

SOUTHWEST ND
There are pockets in the region that have received large amounts of rainfall and there are pockets in the region that could use some moisture for row crops. According to NDAWN from August 1st to August 12th, Dickinson has received 2.60 inches, Beach 0.91 inch, Hettinger 2.66 inches, and Mott with 1.63 inches. Cool and wet conditions along with the later planting date this spring has delayed harvest for most.

Sunflowers are blooming - now would be the time to take a great Instagram picture and to check for red sunflower seed weevils. Remember that gray sunflower seed weevils and red weevils have different thresholds and management; be sure to distinguish the two. Row crops are looking great; soybeans on station are looking excellent so far. If growing soybeans now would be a good time to check for good nodulation, especially on ground new to soybeans. When breaking open the nodules you should see a pinkish red color inside. If you are not finding nodules and the plants have a light green/yellowish tint there may have been an issue with the rhizobium inoculant and you may need to consider applying N. If there are no nodules and the plant is lush and green, there may have been enough residual N that the plant did not need the rhizobia. Peas and barley are being harvested in the region and canola is close to maturity. There are pockets of disease pressure on small grains throughout the region with the wet conditions. Those that were able to get a timely fungicide application should hopefully see a good return from their decision; however, there are diseases that fungicide would not prevent, such as ergot, throughout the region. Be sure to harvest and store the
outside passes separately if high numbers of ergot sclerotia are in the field, since ergot is more likely along the field edges.

Now would be a good time to line up some cover crops to keep the field covered after harvest. With the wet conditions it will be vital, especially in fields with a history of salinity, to keep the soil covered with a living root throughout the fall. Volunteer small grain technically does the job too, but it could potentially be a host for WSMV.

Left: nodules growing along a soybean root Right: inside of a working soybean root nodule should be pinkish red.
The month of August so far has recorded temperatures generally below average. The first week of August was mostly above average but this past week was well below normal bringing the first half of the month cooler than average for most areas.

The cool temperatures in the past several days were mostly associated with the abundant cloud cover associated with periods of rain. Certainly not all areas, but much of the North Dakota Agricultural Weather Network (NDAWN) has recorded between one to three inches of rain during the first two weeks of the month (Figure 2). This is well above average for the period (Figure 3) and much of western North Dakota has already recorded above average rain for the month, with many more chances of rain in the near future.
Temperatures are expected to slowly warm up in the next couple of days until another cold front sweeps across the northern plains this weekend. The warmest day in the short term will likely be Saturday for everyone, except the northwest corner of North Dakota, before a cold front comes in and cools the region off significantly for Sunday. There will be some rain/thunderstorms in the area today (Thursday) as the warmer air moves in, then another round of thunderstorms Saturday/Saturday night as that cold front moves through. Then another surge of warm air is expected early next week with yet another threat of storms by the middle of next week. In other words, there will be some
noticeable ups and downs to the temperatures in the next week and those changes will come with rain and thunderstorms. Of course, amounts are going to vary, but the odds favor almost all locations recording rain in the next week, with potential of rain amounts exceeding 1 inch in many areas.

The warm periods and the cool periods will probably offset each other, with overall temperatures near average in the next week. My projected growing degree days (GDDs) for the next seven days for Base 50°, 44° and 32° is presented in Figure 4.

August 15 through August 21, 2019 Projected GDDs

![Projected Growing Degree Days for the period of August 1, 2019 through August 7, 2019](image)

*Figure 4. Projected Growing Degree Days for the period of August 1, 2019 through August 7, 2019*

Using May 5 as a planting date, accumulated growing degree days for wheat (base temperature 32°) is given in Figure 5. You can calculate wheat growing degree days based on your exact planting date(s) here: [https://ndawn.ndsu.nodak.edu/wheat-growing-degree-days.html](https://ndawn.ndsu.nodak.edu/wheat-growing-degree-days.html)
Figure 5. Accumulated Growing Degree Days for Wheat since May 5, 2019

Using May 15 as a planting date, accumulated growing degree days for corn (base temperature 50°F) is given in Figure 6. You can calculate corn growing degree days based on your exact planting date(s) here: [https://ndawn.ndsu.nodak.edu/corn-growing-degree-days.html](https://ndawn.ndsu.nodak.edu/corn-growing-degree-days.html).

Figure 6. Accumulated Growing Degree Days for Corn since May 15, 2019
Soybeans also use base 50° like corn, but NDAWN has a special tool for soybeans that is based on your planting date and cultivar relative maturity dates. Based on average temperatures for your closest NDAWN station, the tool gives you GDDs based on your planting date(s) and cultivar maturity information you provide. That tool can be found here: [https://ndawn.ndsu.nodak.edu/soybean-growing-degree-days.html](https://ndawn.ndsu.nodak.edu/soybean-growing-degree-days.html)

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