Grasshoppers have been increasing in parts of North Dakota (see IPM map) and infestations are reported in field edges of soybeans, sunflowers and field corn. The recent hot, dry weather favors higher populations of grasshoppers and can lead to hot spots or even localized outbreaks. As cereal grains are dried down and harvested, producers should be aware of grasshopper movements into row crops. According to the USDA NASS North Dakota Crop, Livestock & Weather Report of August 13th, cereal grain harvest progressed with barley at 52% harvested, oats at 41% harvested, spring wheat at 29% harvested, and durum wheat at 9% harvested.

Now is a good time to scout row crops for grasshopper infestation. Early detection is critical for preventing yield loss. Grasshopper damage usually starts in field margins and move into fields. Grasshoppers feed on leaves/pods/kernels, which can be completely destroyed. An economic level of adult grasshoppers is 21-40 per square yard in field margins and 8-14 per square yard in the interior of field.
SCOUT FOR SPIDER MITES IN BEANS

It is not surprising to see spider mites showing up in soybeans and dry beans with the hot dry weather. Mites are small and magnification is required to see them. A quick sampling procedure to determine whether mites are present is to hold a piece of white paper below leaves, then beat them to dislodge the mites. The mites appear as tiny dust specks; however, they will move after being knocked off the leaf. Another method is to pull plants and examine the undersides of the leaves for mites and webbing. Begin from the bottom of plants and move upwards into the canopy. Feeding damage by mites first appears as small yellow spots (stippling). As feeding activity increases, leaves become yellow, bronzed or brown, and eventually shed from the plant. Be sure to scout during full pod (R4) through beginning seed (R5) stages since these crop stages are the most important contributors to soybean yield. Mite infestations typically are first noted near field edges. Soybeans are susceptible to spider mite feeding injury up through R6 crop stage. Cooler temperature and any moisture (or rain) could help slow the mite problem.

Spider Mite Threshold: There is no specific threshold that has been developed for two-spotted spider mite in dry beans or soybeans. Treatment is advised when heavy stippling on lower leaves with some stippling progressing into middle canopy. Mites may be present in middle canopy with scattered colonies in upper canopy. Leaf yellowing is common on lower leaves.

Pest Management: Insecticides registered for spider mites management in dry bean and soybean are listed in the [2018 North Dakota Field Crop Insect Management Guide E1143](https://www.ag.ndsu.edu/pubs/fieldcrop/insect_management/guide). The only pyrethroid that will control spider mites is the active ingredient bifenthrin (Tundra, Sniper, Brigade, Fanfare, Bifenture, etc.) in dry beans and soybeans. Other pyrethroids, such as lambda-cyhalothrin (Warrior, Silencer, etc.), they will cause spider mites to flare up and then you will need to spray again with an organophosphate (OP) insecticide.

Two active ingredients of OP insecticides for control of spider mites are chlorpyrifos and dimethoate. However, chlorpyrifos (Lorsban and generics) is NOT registered for foliar application in dry bean. However, chlorpyrifos is labeled for spider mites in soybeans. Chlorpyrifos resistant spider mites were detected in NW MN, so be sure to re-scout field after application to be sure it worked. Dimethoate will control spider mites in dry beans and soybeans, but has a shorter residual than bifenthrin. We think it’s realistic to expect about a 7 to 10 day residual from bifenthrin (if it is hot, residual may be decreased), a 4 to 7 day residual from chlorpyrifos, and a 3 to 5 day residual from dimethoate. It is extremely important to scout and monitor for recurring spider mite populations after spraying. Check your fields five days after treatment and again at regular intervals to make sure your insecticide is holding. If newly hatched spider mites are observed after 5 days, a second treatment may be necessary with a different insecticide mode of action. For example, if you use bifenthrin (pyrethroid) for the first application, use a non-pyrethroid product, such as dimethoate or chlorpyrifos (OP), for the second application. Agri-Mek SC (active ingredient abamectin) is also registered for spider mite control in soybeans and dry beans.

Complete coverage is important for spider mite control. Use high water volumes 15-20 GPA via ground and 3-5 GPA via air, and high pressure to penetrate foliage (40 psi).

Check out the NDSU Extension YouTube video on pest management of two-spotted spider mites in soybeans. Early detection of leaf injury symptoms, such as stippling and leaf discoloration, is important to prevent crop damage from spider mites and facilitate rescue treatments. Proper scouting techniques, action thresholds and pesticide selection for managing spider mites are discussed.
SOYBEAN APHIDS STILL LOW

Hot weather has decreased the risk of economic soybean aphid infestations, and soybeans are maturing quickly. The crop stages of soybean ranged from R4 (full pod set) through R6 (full seed set) crop stages, so in some areas we are at the R6 (full seed set) crop stage where there is minimum impact on yield from soybean aphid feeding injury. It looks like most soybean fields escaped damage from soybean aphids in ND! Good news for soybean producers.

Continue to scout for soybean aphid populations, especially in any late-planted soybeans.
RED SUNFLOWER SEED WEEVIL HIGH

Continue to scout for red sunflower seed weevil. The majority of sunflowers are blooming, >90% (Source: USDA NASS North Dakota Crop, Livestock & Weather Report - August 13, 2018). Hot weather has pushed many sunflower pass the susceptible crop stage, R5.7 (70% of the face of sunflower head with florets), for egg laying by female red sunflower seed weevils. Hot spots for seed weevil are in southwestern, north central and south central ND (Source: ND IPM Survey Program). See the past issue in Crop & Pest Report from July 26, 2018 for scouting/threshold information.

WHEAT STEM SAWFLY IN NC ND

I’ve had several other calls on wheat lodging from wheat stem sawfly in Berthold area in Ward County (Andrew Green, NDSU Wheat breeder), Mohall area in Renville County and Souris area in Bottineau County. The dry conditions in these areas probably aggravated the wheat stem sawfly problem. The best strategy is to swath wheat if more than 15% of stems are infested with wheat stem sawfly larvae. Producers should swath sawfly-infested wheat as soon as kernel moisture drops below 40% to save infested stems before they lodge. Lodging occurs at 30-35% moisture in infested sawfly stems. This requires field surveys to determine infestation levels. Infested stems have a reddish-brown spot below the second or third node. Examine 50 consecutive stems in a drill row from at least two sites (one near the field margin, another near the center). Determine the percent of stems infested at each site. If producers decide to swath grain, use a high swathing height to conserve the parasitoids that attack wheat stem sawfly. Research from Montana State University has shown that taller residue (at least the lower ⅓ of the plant) is better for conserving the parasitoids. If 10 to 15% of the crop was cut by sawfly during the current field season, a solid-stemmed variety of wheat is recommended for the upcoming field season. I would recommend a high-yielding, solid-stemmed (sawfly resistant) variety like Mott, or one of the Canadian or Montana varieties (see NDSU Extension Integrated Pest Management of Wheat Stem Sawfly in ND for listing of solid-stemmed varieties).

Insecticides DO NOT work for control of adults and are a waste of time and money. Insecticides actually make the situation worst since broad-spectrum insecticides kill the beneficial wasps that attack and decrease populations of wheat stem sawfly. These parasitic wasps have a moderate parasitism rate, >30% in ND.

Crop rotation to non-host crops (oats, flax, sunflower, canola, pulse crops, soybeans, legumes, and to a lesser extent barley, rye) will break the insect’s life cycle and help reduce populations of wheat stem sawfly.

Janet J. Knodel
Extension Entomologist
NDSU EXTENSION COVER CROP FIELD DAY

The North Dakota State University Extension Service will be having a field day on August 28 focusing on the benefits of cover crops in the farming system, including utilization of cover crops as forage. The full day of educational sessions and tours will be held at the Coteau des Prairies Lodge (near Rutland), 9953 141st Ave. SE in Havana, beginning at 9:00 a.m. and ending at 3:00 p.m.

Participants will visit the field research and demonstration plots on a nearby farm. Field stops will highlight nutrient release from previous cover crop in this year’s corn, cover crop selection on land with residual herbicide and weed control options, bio-strip till with radish following wheat harvest, and practices to effectively manage soil moisture.

Cover crop use is becoming more common in the Dakotas, but cover crop incorporation such as winter camelina and rye in corn and soybean in North Dakota is still a newer concept. Other cover crops with potential in the farming systems are also being tested at various locations in North Dakota.

Participating in this educational event field will provide growers an opportunity to learn about the research near Rutland and to see how cover crops have a place on a working farm when grown on a large-field scale. Interacting with other participants is also a great way to gain insights in the utilization of cover crops and building the soil quality. The afternoon educational sessions will include information on alternative uses for cover crops including forage opportunities and fine tuning cover crop management in soybean and corn.

Lunch is provided, and registration is highly encouraged on the NDSU Soil Health webpage, under the events tab, NDSU.edu/soilhealth.

This field day is part of the outreach effort associated with a grant the U.S. Department of Agriculture (NIFA) awarded to North Dakota Agricultural Experiment Station scientists. The grant is being used to study how cover crops can increase the resilience and productivity of crops such as corn and soybeans, improve soil health, and land use efficiency. More information about the research and preliminary results can be accessed at the project’s web site at https://www.cropsyscap.org/

Abbey Wick
NDSU Extension Soil Health Specialist

Hans Kandel
Extension Agronomist Broadleaf Crops
WATER USE IN CORN AND LATE-SEASON DROUGHT STRESS

For much of this growing season conditions were favorable for corn growth and up until recently it looked like we were going to produce a record or near-record crop in North Dakota. Because of the lack of recent rainfall, however, corn is starting to be stressed. Figure 1 shows the current water deficit levels for the corn crop in various parts of the state. Corn grown in red and orange colored zones very likely already are showing some symptoms of water stress. When water becomes limiting to plants the stomata close, reducing the availability of carbon dioxide within leaf, increasing the temperature of the leaf tissue, reducing photosynthesis, thereby slowing plant growth, though usually hastening crop development (meaning less biomass production and yield because of both a lower rate as well as a shorter duration of growth). The first symptoms of drought stress is leaf curling of the upper leaves. This will be followed by yellowing of lower leaves and firing of leaves along the edges. Green leaves can recover their productivity once stress has been alleviated, but desiccated leaves will not contribute to further growth.

Figure 1. Water deficit for this year’s corn crop, assuming a May 1 planting, NDAWN.

The impact of drought on corn yield varies considerably depending on its timing, severity and duration. There is little impact of short periods of drought on corn growth during early vegetative stages while the greatest losses occur during pollination (Table 1). Most of the corn crop in North Dakota is probably in the milk to dough stages. Crops in these stages are somewhat less sensitive to drought than crops during pollination. Nevertheless, yield losses can be substantial if drought persists over any length of time. Newer hybrids may be somewhat more productive when stressed than indicated in the table.

Corn is a very water use efficient crop, but it is also a heavy water user. Depending on where in the state, estimated corn crop water use (using NDAWN data) for the past seven days was between 1.2 inches and 1.8 inches. Soils have the capacity to hold up to 10 inches of available moisture in the top four feet, though most will hold less (See Table 2). Unfortunately, most of the stored moisture has been depleted, as noted by the negative water balances exceeding what can be stored in the soil (Figure 1). Obviously additional rainfall is urgently needed if we are to realize the yield potential that was established earlier this growing season.

During grain filling, plants under stress are able to translocate carbohydrates stored in the stem and in leaf tissue to the grain. This helps increase grain yield beyond what might otherwise be expected. Because of the movement
of carbohydrates from stalks, it is common for plants stressed during grain filling to have weak stalks. For drought stressed fields, this may be a consideration when deciding when to harvest and which fields to harvest first.

<table>
<thead>
<tr>
<th>Growth stage</th>
<th>Water use (inches per day)</th>
<th>Average % yield loss per day of stress</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 leaf to 8 leaf</td>
<td>0.10</td>
<td>---</td>
</tr>
<tr>
<td>8 leaf to 12 leaf</td>
<td>0.18</td>
<td>---</td>
</tr>
<tr>
<td>12 leaf to 16 leaf</td>
<td>0.21</td>
<td>3.0</td>
</tr>
<tr>
<td>16 leaf to tasseling</td>
<td>0.33</td>
<td>3.2</td>
</tr>
<tr>
<td>Pollination (R1)</td>
<td>0.33</td>
<td>6.8</td>
</tr>
<tr>
<td>Blister (R2)</td>
<td>0.33</td>
<td>4.2</td>
</tr>
<tr>
<td>Milk (R3)</td>
<td>0.26</td>
<td>4.2</td>
</tr>
<tr>
<td>Dough (R4)</td>
<td>0.26</td>
<td>4.0</td>
</tr>
<tr>
<td>Dent (R5)</td>
<td>0.26</td>
<td>3.0</td>
</tr>
</tbody>
</table>

Table 1. Estimated water use and effect of water stress on corn of differing growth stages. Adapted from Lauer, 2006, (http://corn.agronomy.wisc.edu/AA/A042.aspx).

<table>
<thead>
<tr>
<th>Soil type</th>
<th>Water holding capacity (inches of water per foot of soil depth)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coarse sand</td>
<td>0.25-0.75</td>
</tr>
<tr>
<td>Loamy sand</td>
<td>1.10-1.20</td>
</tr>
<tr>
<td>Fine sandy loam</td>
<td>1.50-2.00</td>
</tr>
<tr>
<td>Silt Loam</td>
<td>2.00-2.50</td>
</tr>
<tr>
<td>Silty clay loam</td>
<td>1.80-2.00</td>
</tr>
<tr>
<td>Silty clay</td>
<td>1.50-1.70</td>
</tr>
<tr>
<td>Clay</td>
<td>1.20-1.50</td>
</tr>
</tbody>
</table>

Table 2. Range of water holding capacity for different soil types.  

SOYBEAN CYST NEMATODE SAMPLING PROGRAM WILL BEGIN AT THE END OF THE MONTH.

The North Dakota Soybean Council and NDSU Extension Service are operating the SCN soil testing program again this season. The program began in 2013, and since its creation, over 3,000 soil samples have been tested for SCN.

In the next week, pre-labeled SCN soil testing bags will be sent to each ND Extension county office in the state. Each grower can pick up as many as three bags, fill the sample bag with soil, provide site information, send the bag to the partner lab (Agvise) and results are mailed to you. The North Dakota Soybean Council will cover SCN laboratory fees on these pre-labeled bags only. This year, 2,000 SCN soil test bags will be available on a first come first serve basis.

In addition, NDSU will use egg levels and geospatial positions of samples to create a map of SCN in North Dakota. This map helps growers know where SCN is occurring and moving. Importantly, NDSU does not have access to any personal information – just the egg level and geospatial data to generate a map.

Joel Ransom  
Extension Agronomist for Cereal Crops

plant pathology

SOYBEAN CYST NEMATODE SAMPLING PROGRAM WILL BEGIN AT THE END OF THE MONTH.
SCN can cause high levels of yield loss in soybeans, even before above ground symptoms are present. Effective management tools are available and soil sampling to detect SCN is the first step in management. We encourage everyone to make time to sample at the end of the season.

Detailed information about the program, sampling strategy, current distribution maps information about the danger that SCN poses to yield will be provided in the next issue of the NDSU Crop and Pest Report (August 30th).

Sam Markell
Extension Plant Pathologist, Broad-leaf Crops

ERGOT BEING REPORTED IN WHEAT

The wheat harvest is in full swing and reports of ergot have been received from south central, east central and central North Dakota. Below, I will review some of the commonly asked questions with the disease.

What causes ergot and how does it infect wheat?
Ergot is a fungal disease primarily caused by Claviceps purpurea. The pathogen has a very broad host range with reports of it infecting over 400 grass species including barley, durum, rye, spring wheat, winter wheat, quackgrass, and brome grass. The pathogen survives as hard-bodied fungal structures called sclerotia or ergot bodies. These sclerotia germinate in the spring giving rise to stroma (mushroom-like) that release hundreds of thousands spores during the growing season. Infection in wheat (or other small grains) occurs when spores land on flowers in the early stages of flowering; prior to the visual appearance of the yellow anthers on the center of the head. The spores will land on the stigma of the wheat flower and replace the developing kernel with strands of mycelial (fungal) growth. Successful infection will produce “honeydew” and will be visible prior to flowering (Figure 1). The sugary and sticky honeydew contains asexual spores that are often carried by insects to infect the flowers of other potential host plants/crops. Eventually, the fungal strands will replace the developing wheat kernel, harden and turn into a black-purple sclerotia (Figure 2). The sclerotia can be harvested with the grain or will fall to the soil and overwinter.

What conditions favor ergot?
All literature indicates cool and wet weather during wheat flowering favors sclerotia germination and infection. However, the definition of cool weather is loosely defined in literature. Our experience suggests that ergot is more apparent when temperatures are in the 70’s with ample moisture (dew or rain). Historical accounts of ergot epidemics in North Dakota in the 1920s suggest that prolonged periods of moisture in late June into early July were a major influencer of disease incidence.

Why are there strict thresholds for ergot?
Ergot sclerotia contain toxic alkaloids that can cause harmful effects in both humans and cattle. In humans, the alkaloids will reduce blood flow to limbs resulting in gangrenous symptoms. It also can cause hallucinations and has been linked to the Salem Witchcraft Trials, the weakening of Julius Caesar’s troops and the death of Russian soldiers in the late 1920’s. Livestock fed ergot sclerotia can

Figure 1. Honeydew caused by infection of the ergot pathogen. This sign will be observed right before yellow flowers are visible in wheat (Photo: Grant Mehring – WestBred Technical Product Manager)
develop gangrene symptoms of ears, hooves and tails. The alkaloids can also cause abortions and reduce mammary gland development. Therefore, ergoty seed lots should not be fed to livestock.

Management of ergot

1. Crop Rotation – Rotating a broadleaf or corn on a field with ergot will reduce the amount of in-field inoculum. The ergot will survive on the soil surface for about one year, so not providing an available host will reduce the chance of pathogen survival.

2. Tillage – Burying sclerotia at least one-inch into the soil will prevent the stromas (mushrooms) from reaching the soil surface and releasing spores.

3. Mowing or Preventing Grassy Weeds from Heading – Grassy weeds in field margins such as quackgrass or bromegrass will head and flower prior to the small grain crop. Preventing these grasses from heading will reduce the formation of ergot bodies and reduce the risk of spores being carried into small grain fields.

4. Use Ergot Free Seed – The use of ergot free seed will reduce the amount of in-field inoculum.

5. Host Resistance – To our knowledge, there are no small grain varieties with resistance to ergot. However, small grains that have a shorter flowering window are less susceptible. For example, rye tends to be the most susceptible small grain as the flowering process and opening of florets can extend several weeks in field. Observations of ergot in variety trials tend to relate to time of heading and flowering. In other words, varieties that were heading during a conducive time for ergot had a higher incidence than those that escaped the infection window. Other factors that prolong floret openings (cool weather, physiological components or copper deficiency) will increase the risk for ergot as well.
6. Fungicides – Foliar fungicides at heading have not been shown to be effective in managing ergot. Seed treatment fungicides on ergoty seed lots have been shown to delay and disrupt germination of sclerotia. Studies conducted overseas suggest that triazoles (FRAC 3) have reduced viability of sclerotia.

7. Harvesting Strategy – Due to the strict threshold level in wheat (< 0.05% by weight), it is important to scout fields for present of ergot. Often times, ergot incidence will be higher along field margins bordering a road ditch or section line where grassy weed hosts are present. If you notice a higher level along a field edge, keep that grain source separate from the rest of the field.

8. Cleaning an Ergoty Seed Lot – Cleaning using gravity-type or color sorters can help reduce (not eliminate) the amount of ergot sclerotia in a seed lot. Ergot sclerotia tend to be lighter and less dense allowing for the removal of these structures.

Andrew Friskop  
Extension Plant Pathology, Cereal Crops

Joel Ransom  
Extension Agronomist for Cereal Crops

soils

THE COMPLEXITY OF NITROGEN

My project with Abbey Wick includes a cover crop site NE of Gardner. Within it is corn after cover crop or not, soybean after cover crop or not, and spring wheat with cover crop or not that we harvested just last Thursday. The spring wheat followed soybean, so one would expect and I think we received a nitrogen credit. Also, the residual nitrate-N this spring was just under 60 lb/acre. Granted, the wheat variety was a lower protein spring wheat, but even so, the 200 lb/acre N rate treatment made 13.8% protein. The yields were in the mid-70 bu/acre range. It took over 300 lb N/acre for the variety to make 13.8% protein! What?(!)

The ND spring wheat N calculator rate for a 2-yr-into no-till field in eastern ND with high yield potential and residual N of about 50 lb/acre after soybean is about 155 lb N/acre. In our study, the yield of 155 lb N/acre would again be over 70 bu/acre, and the protein for the 160 lb N/acre treatment was about 13.5%.

I received a call a couple days ago from a farmer in eastern ND and my calculator scenario above was almost identical to his results. He asked me what he should have done to get greater protein. I asked him if he was really willing to apply another 100 lb N/acre (cost about $40/acre more roughly) and he told me of course not. If it had rained (which it didn’t- pretty dry in NE ND all season), the wheat would have been on the ground. Exactly!

When it’s dry as its been this season in most of the state (but with decent early season rain, thankfully), the efficiency of any N applied and the release of N from the soil is extremely low. If the season had supported a higher yield, the efficiency of N available would have been much higher and yield would have been higher, and maybe even more protein if there had been July rain. This year it took far more N per bushel (and per protein gain) than in a ‘normal’ year, whatever that is. That’s why N rate and yield are not linked.

Dave Franzen  
Extension Soil Specialist  
701-799-2565
WHAT'S THAT GRASS?

There is a new player in North Dakota. At least I can’t find reference to it having been here before. The name is woolly cupgrass (*Eriochloa villosa*), also called hairy cupgrass. The plant was identified in wheat fields in Richland and Cass counties as the seed heads reached above the wheat canopy late in the season. Density and distribution in the field suggest the plant has been here for a couple years. The plant is considered by some as invasive because it has the potential to quickly dominate the plant community.

The inflorescence gets purple coloration as the plant and seed mature. A rather unique feature is that two rows of seeds develop along one side of each rachis branch of the inflorescence. The rachis and base of each seed is quite hairy, or woolly, which is noted when seeds are shed. The plant has a hairy ligule, but the most distinguishing feature of the seedling is a prominent crinkle/crimp/tight wave of one leaf margin, especially near the base of the leaf.

The plant can grow in a wide range of soil types and conditions. While a majority of seeds will germinate in the warmer part of spring, woolly cupgrass germination extends well into the summer. This allows establishment after POST herbicides have been applied.

My only experience with this weed was in class and contests when I was in school so we will work with it in the greenhouse this winter to gain better confidence in herbicide options. Not many cereal herbicide labels include this weed, but this could be because it has not been present in typical wheat production areas — until now. Please pay closer attention to fields this fall for presence of this weed and start managing its distribution with harvest scheduling and equipment sanitation.

Kirk Howatt
Weed Control in Cereals and Oilseeds

*Images of woolly cupgrass (upper left) inflorescence with two rows of seed per rachis branch, (upper right) woolly appearance after seed drop, (lower left) seed dimensions, and (lower right) crinkled margin on near side of leaf.*
DOES WATERHEMP OUTCROSS WITH POWELL AMARANTH OR REDROOT PIGWEED?

Academicians teach agriculturalists to identify pigweed species by the presence or absence of hair on leaves and stem. Redroot and Powell pigweed have very small fine hairs throughout the plant. There are no hairs on waterhemp and stem and leaf surfaces are smooth. Identification based on presence or absence of hairs is qualitative; yes or no, are there hairs on the plant.

There are occasions when Agriculturalists will identify plant samples with a few hairs leading to confusion in identification. Conversation ultimately leads to the question, is hybridization between waterhemp, redroot pigweed and Powell amaranth possible? The implication of this question is important, since glyphosate resistant waterhemp is rapidly advancing north and west from watersheds representing the confluence of the Bois de Sioux and Ottertail rivers and the beginning of the Red River in southern Richland and northern Travers counties in North Dakota and Minnesota. This has initiated speculation as to the potential transfer of this resistance trait among other Amaranthus species, like redroot pigweed and Powell amaranth, common in Minnesota and North Dakota.

Waterhemp plants are either male or female (dioecious). Thus, male plants produce only pollen, while female plants produce only seed. This type of biology leads to cross-pollination, or the fertilization of female plants with pollen from one or more male plants. Cross-pollination can greatly increase the genetic diversity of a population, and with genetic diversity comes a wide range of morphological and biological characteristics. Redroot pigweed and Powell amaranth plants have male and female flowers on the same plant (monoecious).

The literature usually focuses on waterhemp and smooth pigweed, another Amaranth species that is monoecious like Powell amaranth and redroot pigweed. Research has determined that hybridization is possible BUT in only one direction, from smooth pigweed to waterhemp and not from waterhemp to smooth pigweed. Thus, it may be difficult for smooth pigweed (or possibly redroot pigweed or Powell amaranth) to acquire herbicide resistance from waterhemp despite the species' cohabitation. By contrast, waterhemp probably has acquired genetic material from smooth pigweed, which may explain how waterhemp has been able to adapt to fields far removed from its origins in the floodplains along the Mississippi, Missouri and Ohio rivers in southern Illinois, Missouri and northern Tennessee.
PIGWEED IDENTIFICATION USING FLOWERING STRUCTURE

Pigweed (Amaranthus species) are in full flower. I thought it might be a good idea to refresh weed identification skills based on characteristics of the flowering structure.

Redroot pigweed. Flowering structure is highly branched with male and female flowers on the same plant. Branches of flowering structure usual are very compact, usually less than 2-inches long and thicker than a pencil. Redroot pigweed is very common across Minnesota and North Dakota.

Powell amaranth. Flowering structure is branched, but less than redroot pigweed. Branches of the flowering structure are usually 4 to 8 inches long and thicker than a pencil. Male and female flowers are on the same plant. At first glance, Powell amaranth will remind you of those pictures of Palmer amaranth from other states. Powell amaranth is common in North Dakota and northwest and north central Minnesota but less common in southern and west central Minnesota.
**Waterhemp.**
Flowering structure are open and located near the top of the plant and at the tips of branches. There are male and female waterhemp plants. Males shed pollen while females produce seed. Male plants tend to have a flowering structure with a dominant central branch while female plants are highly branched with branches of proportional size. Waterhemp is abundant in North Dakota, especially east of US281.
Palmer amaranth.
Like waterhemp, each plant is either male or female. The male flowering structure feels soft and sheds pollen, while female flowering structure feels prickly and contains seed. The branches of Palmer amaranth are very long, often up to 24 inches in length. We currently have not identified Palmer amaranth in North Dakota.
AROUND THE STATE

NORTH CENTRAL ND
The Minot NDAWN station has been replaced with brand new, state of the art equipment and is now equipped with the new inversion sensor technology. Log-on and give it a try.

Pulse and small grain harvest is advancing fairly quickly. Canola has begun to be swathed in many parts of the region, especially from Ward to Renville Counties. Over the past week, my summer crew and I completed the canola survey. Results from that will likely be known later in the year. We will begin working wheat midge survey’s across much of the North Central and Northwestern parts of North Dakota next week and continuing for the next several weeks.

Although delayed from the eastern regions of the state, the late summer flea beetle populations began to rise fairly quickly over the past five days. This generation rarely leads to any economic damage. However, take a note of populations you may see in the field – this may help you plan for the spring season next year.

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

NORTHWEST ND
Harvest started in earnest last week with most growers starting with lentils and pea. Small grain harvest has begun and many fields of spring wheat, durum, and barley are ready for harvest. Canola and flax won’t be far behind, but depending on planting date, may spend a little longer in the field. Temperatures soared into the 100’s late last week and over the weekend, hastening the dry down of mature crops. However, temperatures fell off on Monday with highs only in the upper 60’s for most of NW ND and a few scattered showers that stopped harvesting. Less than 0.1” fell in most places, so growers are back to harvesting today. Highs in the upper 80’s to mid 90’s are predicted for the rest of the week with only very small chances of rain, so harvesting should be able to continue uninterrupted.

Clair Keene
Extension Cropping Systems Specialist
NDSU Williston Research Extension Center

NORTHEAST ND
Canola swathing is happening across the region. Sunflowers have wilting petals. Small grains harvest is full gear across the region. I’ve seen a few fields already chiseled plowed. With the early harvest, we have a great window to utilize cover crops this year. However, we will need rain to germinate the cover crops. Since most farmers rotate away from small grains, an alternate option of leaving the volunteer grain to grow will provide cover crop functions of cover for erosion and keep a living soil biosphere.

Rainfall is needed across the region. Large cracks are showing up in clay dominant soil. Soybeans are wilting especially in the drought pocket in NE Cavalier and northern Pembina counties. Some dry bean fields have nearly lost all their leaves. The corn has been coping fairly well. Corn is still hovering around 300 growing degree days above normal.

Lesley Lubenow
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SOUTH CENTRAL

The region has received one-half inch or less rainfall during August. The current dry and warm period has been good for early season small grain harvest and haying but rough on corn and especially soybean yield potential. Harvest is essentially complete with winter cereals, field pea and barley. The Carrington REC has some preliminary variety trial data for these crops: [www.ag.ndsu.edu/varietytrials/carrington-rec/2018-trial-results](http://www.ag.ndsu.edu/varietytrials/carrington-rec/2018-trial-results).

Spring wheat acreage is about half harvested. Ergot is present in spring wheat throughout the south-central region (see Andrew Friskop’s article).

Early planted corn is in the dough to dent stages (R4-5), which puts the crop about a month away from maturity. Soybean generally are in the R5-6 growth stages (seed development). It continues to be common for soybean fields to show ‘gray’ areas from moisture and heat stress, while some fields have areas being pushed to maturity, showing plant yellowing and leaf drop (see pictures). Early maturing dry bean varieties are at maturity (R9 stage).

Upcoming Carrington REC crop tours:
* Row Crop - corn, dry bean and soybean (CREC): August 23; 4 p.m.

SOUTHWEST ND

Peas, barley, and some spring wheat have been harvested in the region. Canola is nearing maturity. Sunflowers in the region range from the R-5 to R-6 growth stages. According to NDAWN, from August 1st through August 14th Dickinson has received 0.02 inch of rain. Over the same period, Beach received 0.05 inch and Hettinger received 0.22 inch. Corn and soybeans are showing drought stress across most of the region. Earlier this growing season corn and even soybeans were looking great, with rains across the region missing many over the past month; yields will suffer without rain in the near future.

Moisture-stressed soybean fields in northern Stutsman County

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