VIRTUAL FIELD DAYS

Following is a tentative list of 2020 Annual Field Days events. Due to the COVID-19 pandemic, 2020 REC field days primarily will be virtual. Most will have prerecorded videos go live on their scheduled field day date, some will have a live Zoom on their date (registration required) and some will have both. A few live events will happen for small groups of people with preregistration required. Please visit the Research Extension Center and Agronomy Seed Farm websites for more details.

July 7 - Hettinger Research Extension Center
July 8 - Dickinson Research Extension Center
July 8 - Williston Research Extension Center
July 13 - Agronomy Seed Farm, Casselton (5 p.m.)
July 14 - Carrington Research Extension Center
July 15 - North Central Research Extension Center, Minot (includes pulse crops and canola field day)
July 16 - Langdon Research Extension Center (9:00 a.m.)
July 28 - Central Grasslands Research Extension Center, Streeter (10 a.m.)

Other:
Aug. 4 - Oakes Irrigation Research Site: Robert Titus Research Farm
Aug. 27 - Carrington Research Extension Center Row Crop Day
SUNFLOWER INSECT TRAPPING UPDATE

The first trap catches for banded sunflower moth (BSM) and Arthur sunflower moth (ASM) occurred this past week. Sunflowers are growing fast. At the trapping field sites, the crop stages ranged from V5 to R1 (terminal bud at top of plant forms a miniature floral head).

Trap catches for BSM were low and observed at only 2 trap sites in Cass (16 moths) and Hettinger (1 moth) counties (see map; Source: NDSU IPM Crop Survey insect trapping network). Only one ASM was captured only at the Golden Valley trap site. For sunflower moth, one moth per trap was captured at trap sites in Foster and Renville Counties this past week.

Scouting for BSM and ASM: BSM is a small (¼ inch long), straw yellow moth with a triangular, dark brown band crossing through the middle of the forewing (Figure 1). ASM is similar to BSM in size but, it is a whitish-gray moth with a broken brown and gray band on the forewings.

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. Yellow square has the 2020 Economic Threshold for BSM and ASM combined. Please see the revised Banded Sunflower Moth E823 (2019) Extension publication for more information.
WHEAT MIDGE UPDATE

High temperatures continue to push insect development! The current accumulated degree days for wheat midge range from 1493 to 1764 in northern North Dakota, indicating that about 50-90 percent of females have emerged (see map). If you are in a dry area, emergence could be delayed or even delayed until next year. Scouting for wheat midge is critical for wheat in the heading to early flowering stages, the susceptible crop stages. Please see Crop and Pest Report (Issue 8) for more information on scouting and map for wheat midge risk.

Figure 1. Comparison of different insecticide application timings based on wheat crop stages for control of wheat midge, Devils Lake.

If you scout fields and find wheat midge is above the Economic Threshold (hard red spring wheat = one or more wheat midge for every four or five heads; durum wheat = one or more wheat midge for every seven or eight wheat heads), and wheat is at the late heading to early flowering crop stages, insecticides can be effective for reducing the adults and larvae (Figure 1). Insecticides applied at 30% heading were not effective in reducing wheat midge populations (Figure 1) and growers should wait about 4 days before an insecticide application. Insecticides applied at late flowering (>50% flowering) also are not recommended (Figure 1) since most of the larvae are protected within the glumes and wheat is no longer attractive to the adult wheat midge for egg laying. In addition, parasitic wasps emerge after the wheat midge and a late flowering insecticide application will have a negative impact on their populations, reducing natural biological control of wheat midge.
The optimal timing for insecticide application is recommended at dusk because female adults are most active in the top of the crop canopy. Apply in a minimum of 3 to 5 gallons of water per acre for aerial applications and 10 gallons of water per acre for ground applications. Insecticides labeled for wheat midge can be tanked-mixed with fungicides for Fusarium head blight (or scab) control during early flowering.

**SCOUT FOR EUROPEAN CORN BORER MOTHS**

Traps catches increased this past week for the univoltine Z-race ECB moth (see map below). Crop stages were V8 to V12. Weekly maps of the trapping results for European corn borer moths are posted on the [IPM website](http://ipm.nodak.edu). The degree days for ECB also have increased to 1000-1187 accumulated degree days (ADD) compared to 800-980 ADD last week (see map on next page). **This indicates that the univoltine ECB moths are 50-75% emerged, so now is a good time to start scouting for ECB in non-Bt field corn.**

Corn should be monitored weekly for corn borers **at least five weeks** once plants exceed an extended leaf height of 17 inches. Inspect plants for the presence of egg masses, whorl feeding, and active larvae.
See Table (on the next page) for the Economic Threshold for corn borer per plant based on crop value and control costs. If we use an expected yield of 150 bu per acre and the current price of corn at U.S. $3.26 per bu, we would have U.S. $489 per acre for the value of corn crop. The yellow highlighted box indicates the E.T. or the number of corn borer larvae per plant, depending on the control costs.

<table>
<thead>
<tr>
<th>Control Costs2 ($/acre)</th>
<th>Value of Corn Crop1 ($/acre)</th>
<th>200</th>
<th>250</th>
<th>300</th>
<th>350</th>
<th>400</th>
<th>450</th>
<th>500</th>
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<td>6</td>
<td>0.75</td>
<td>0.60</td>
<td>0.50</td>
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<td>7</td>
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<td>0.70</td>
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<td>0.75</td>
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<td>10</td>
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<td>13</td>
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<td>14</td>
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<tr>
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<tr>
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<td>0.89</td>
<td>0.80</td>
<td>0.73</td>
<td>0.68</td>
<td></td>
</tr>
</tbody>
</table>

1. Crop value = expected yield (bu/acre) x projected price ($/bu)
2. Control costs = insecticide price ($/acre) + application costs ($/acre)

MYSTERY INSECT
This insect was found feeding in terminal of sunflower. Is it a pest?

Answer: This is the sunflower bud moth, which feeds on cultivated and wild sunflowers. Growers and agronomists often see the larval feeding injury first – deformed heads or stalks with black frass near the entrance hole. Sunflower bud moth have 2 generations per year. The first generation of adult moths emerges from late May through mid-June and the second generation in July and August. The first generation can occasionally cause yield loss in sunflowers when larvae bore into the developing buds and populations are high. Most years, the sunflower bud moth is not economic in sunflowers. There are no developed IPM scouting or management strategies.
MALFORMATION OF POTATO TUBERS FROM BIOTIC AND ABIOTIC STRESSES

A handful of situations have been in question regarding potato tuber development as affected by different situations. During the early to mid-bulking stage of tuber development, plant stresses are concerning. Hot temperatures (> 85 °F) are not favorable for potato plants and can lead to tubers becoming misshapen, chaining of tubers, little tubers and/or heat runners (Image 1). Exposure to herbicides from drift, inversions, tank contamination or other means can cause injury to the plants and disrupt tuber growth. When injury occurs early in the bulking period, the fissures on the tuber can develop into large cracks by the end of the growing season (Image 2). Another type of injury observed is necrotic spots on leaves from application of fertilizer or other products with high salt concentrations (Image 3). Similar injury can occur from contact herbicides. Biotic and abiotic stresses can result in no damage to significant tuber injury, depending on the severity of the issue and subsequent growing conditions. The best management practice in these conditions are to reduce stresses as much as possible by maintaining sufficient water, nutrition and disease protection.


Image 2. Plant growth regulator caused cracking in tuber.


Andy Robinson
NDSU/U of M Extension Potato Agronomist
USING FUNGICIDES TO CONTROL CERCOSPORA LEAF SPOT ON SUGARBEET

Cercospora leaf spot (CLS) (Figure 1) is the most damaging and economically important foliar disease of sugarbeet in North Dakota and Minnesota. The causal agent of CLS is the fungus *Cercospora beticola* which is most severe in warm weather (day temperature of 77 to 90° F and night temperature above 60° F) and in the presence of moisture from rain or dew on the leaves for 8 or more hours. The fungus destroys the leaves which are the photosynthetic factories responsible for producing the sugar in the tap roots of the plants. The longer and more severe the infestation, the greater the reduction in tonnage, and lower sugar concentration and recoverable sucrose. Roots of CLS infected plants have higher impurities which increases processing costs and delays the sugar extraction process. Growers typically manage CLS by integrating rotation with non-hosts crops including corn, soybean, wheat, and barley, planting CLS tolerant varieties, planting away from a previously infected crop, and applying fungicides in a timely manner.

What are the fungicide options for 2020?

Current warm and wet conditions in most areas are favorable for *C. beticola* infection and rapid disease development. Because of the high overwintering population of *C. beticola*, the first fungicide application should be made soon after row closure or when the first lesion is observed in the factory district. Symptoms typically appear first in fields close to waterways, shelterbelts, last year’s sugarbeet fields, and near corn fields. The lesions are first present on the oldest and lowermost sugarbeet leaves close to the ground.

The best way to control CLS during the growing season is to apply effective fungicides in a timely manner. For ground application, apply fungicides in 15 to 20 gallons of water per acre at 75-100 psi pressure; aerial applicators should use 3 to 5 gallons of water per acre for best results.

Since 2016, *C. beticola* have developed widespread resistance to fungicides which are quinone outside inhibitors (QoI) including Headline, Priaxor, Gem and Quadris and reduced sensitivity to triazole fungicides including Eminent, Inspire XT, Proline, Topguard, and Enable. As such, QoI and triazole fungicides, when used alone do not provide effective control of CLS (Figure 2). Over the past three years, triphenyltin hydroxide (TPTH) fungicides (Supertin and Agritin) have consistently provided effective control of CLS (Figure 3). Tin and triazole fungicides are the mainstay of our program and these should always be mixed with other chemistries including ethylenebisdithiocarbamates (EBDCs) such as mancozeb and penticozeb, copper fungicides, and Topsin can be used in areas where CLS is not very severe. In the northern Red River Valley where CLS is not severe, the mixture of TPTH and Topsin (Figure 4) can be used early in the season for effective and economical control of CLS. Other mixtures which will work well in the northern Red River Valley includes mixtures of TPTH + Manzate / Badge SC + Manzate / TPTH + Badge SC (Figure 5) which are mainly multisite fungicides that can help to reduce the population of *C. beticola* that are resistant to QoIs and triazoles. In areas where CLS is severe, growers should budget for six applications – three where TPTH is mixed with either a copper product or an EBDC, and three where triazoles are mixed with either a copper product or an EBDC. The mixture of Proline (triazole) and Manzate (EBDC) (Figure 6), and the mixture of Inspire XT (triazole) and Badge (Copper) (Figure 7), each provided effective control of CLS. Growers also have the option of using a mixture of copper and an EBDC for effective CLS control (Figure 8). The use of fungicide mixtures in a rotation program, starting at first symptoms and continuing at 12 to 14 day intervals until mid-September will provide effective control of CLS. Please should consult your agriculturists for the best recommendations for your specific growing districts based on the fungal population known sensitivity to different fungicides.

(Figures on the next three pages)
Figure 1. Cercospora beticola kills the oldest and most productive leaves first resulting in re-growth of new leaves that lead to low tonnage and a 2 to 3% reduction in sugar concentration.

Figure 2. A. (Left) Picture of 4-middle rows of a plot sprayed with Priaxor, and B. (Right) Picture, Eminent, two of our most widely used fungicides, showed poor control of CLS because of fungicide resistance.
Figure 3. Plot treated with triphenyltin hydroxide resulted in effective control of CLS.

Figure 4. Picture of a mixture of TPTH and Topsin provided effective control of CLS.

Figure 5. Plot treated with fungicide mixtures (TPTH + Manzate/Bagde SC + Manzate/TPTH + Badge SC/Bagde SC + Manzate) in a rotation program.

Figure 6. Plot treated with Proline (triazole) and Manzate (EBDC) provided effective control of CLS.
Figure 7. Plot treated with Inspire XT (triazole) and Badge (Copper) provided effective control of CLS.

Figure 8. Plot treated with Manzate (EBDC) + Badge Sc (Copper) provided effective control of CLS.

Figure 9. Plot treated with mixtures of fungicides and used in a rotation program provided effective CLS control.
NOW IS A GOOD TIME TO LOOK FOR SCN

Soybean Cyst Nematode (SCN) is the most serious disease of soybeans in eastern North Dakota, and the first signs of SCN are now appearing in fields.

In the spring, juvenile nematodes (microscopic worms) emerge from eggs, and begin a new SCN life cycle. The juvenile SCN females enter the roots of a host (soybean and dry edible bean), feed, and enlarge dramatically until they rupture the root. It typically takes four to six weeks before you can see the cysts. The cysts are white to cream colored, very small, but can be seen with an unaided eye or small magnifying glass.

These photos were taken on July 6, 2020 near Casselton. The SCN cysts are relatively easy to see against black soil, and very small, white to cream colored, and appear lemon shaped with magnification (Figure 1). They are much smaller than the similarly colored nodule (Figure 2). Eventually these cysts will turn darker in color and be more difficult to see. Each cyst contains 100-200 eggs, and the life cycle will likely repeat 1-2 more times this growing season.

There are two reasons you might consider taking a look for SCN in your fields right now. First, if you do not know if you have SCN, you might be able to detect it now. To be clear, fall soil sampling is a better way to detect SCN, but looking in your fields right now is fast and easy. Secondly, if you are actively managing SCN in your field, you may be able to determine how well your management tools are working. For example, if you planted a resistant variety and roots are profusely covered with cysts, the resistance is not as effective as it should be.

To scout for SCN, I recommend going to areas of a field most likely to be infected (or known to be infected). Because SCN moves with soil, this is likely the field entrance, low spots, along shelterbelts, etc. Also, an area with chronically low yields can be a good place to scout. Use a shovel to carefully dig up plants and gently remove soil from the roots; a bucket of water may help. Examine the roots under good light and consider using a hand lens.

SCN generally does not cause above-ground symptoms unless very significant yield loss is occurring, and when they do occur, they do not appear until later in the season (August-September). Consequently, the yellowing soybean you may see now are more likely from other causes, and examining the roots is the best way to visually scout for SCN.

Sam Markell
Extension Plant Pathologist, Broad-leaf Crops
FUSARIUM HEAD BLIGHT RISK UPDATE

Both the national model and NDSU model have a moderate to high level of scab risk for susceptible varieties across a large portion of the state (Figure 1). Scab risk for moderately susceptible varieties is moderate to high for areas on the eastern quarter of the state and for small pockets in northwest ND (Figure 2). Conversations with growers, agronomists and consultants suggest there is a wide range of crop stages in the state, so continue to monitor growth stages in the fields and apply a fungicide if warranted.

Figure 1. Fusarium head blight risk for susceptible varieties according to the national Fusarium Risk Tool.

Figure 2. Fusarium head blight risk for moderately susceptible varieties according to the national Fusarium Risk Tool.
COMMONLY ASKED FUSARIUM HEAD BLIGHT (FHB) QUESTIONS

During the last week, I have received questions pertaining to Fusarium head blight and would like to summarize some of the most commonly asked questions.

**Question**: I have been dry all year and received my first rain since May. What is my scab risk?

**Answer**: The *Fusarium* pathogen needs to be “activated” with prolonged periods of moisture before it releases spores from inoculum sources (ie: corn residue). Therefore, a rain event does not automatically increase scab risk in a field. It is important to monitor environmental conditions prior to and throughout the heading and flowering growth stages to assess scab risk.

**Question**: What is the best time to apply a fungicide in barley?

**Answer**: Research conducted at NDSU suggests the best time to apply a fungicide for barley is at full-head and up to seven days after full-head has occurred (Figure 1). When a fungicide is applied shortly after the boot stage when awns first become visible, fungicide coverage becomes an issue. The fungicides used for FHB are not fully systemic and will protect plant tissue that has been covered with a fungicide. When applied too early, the flag leaf sheath may act as a barrier to getting good coverage on a barley head.

![Figure 1. Barley plants at different growth stages. In this image, the best time to apply a fungicide for FHB has been highlighted by an orange box.](image)

**Question**: Do both ground and aerial applications work for FHB?

**Answer**: Yes. Both ground and aerial applications work for management of FHB. For ground applications, water volumes should be between 10-20 gallons per acre. For aerial applications, it is recommended to have 4-5 gallons per acre.

**Question**: Will a FHB fungicide application help protect the flag leaf?

**Answer**: The fungicides commonly used for FHB will provide suppression of fungal leaf diseases. However, they will not eradicate or cure fungal lesions that have already appeared on the flag leaf.
PEA AND LENTIL ROOT ROT DIAGNOSIS AND RESOURCES

Growers should be on the lookout for root rot symptoms in their pea and lentil fields. Compared to healthy plants, those affected by root rot have a degraded root system, brown to black in color, with fewer lateral roots and nodules (Figure 1). In fields with a long-term history (10+ years) of close rotations of peas and lentils (pea-x-lentil-x), root rot may be severe. As the disease progresses, or plants become drought or nutrient stressed, above ground symptoms of yellowing, stunting and wilting become apparent. Yellowing typically begins from the ground up.

If you find symptoms consistent with root rot, identification of the causal agent will drive future management strategies. The presence of *Aphanomyces euteiches* causing *Aphanomyces* root rot in peas and lentils will require longer rotations (6-8) away from both peas and lentils. In the latest episode of the Growing Pulse Crops podcast series, farmer Lavern Johnson from Divide County, ND discusses how close rotations of peas and lentils over the years has resulted in unmanageable levels of root rot in his fields. 

https://www.growingpulsecrops.com/episode/seed-treatments-root-rots

Prevention through lengthening of crop rotations is critical to the long-term management of root rot.

The Dry Pea and Lentil Root Rot Management Guide recently published by NDSU Extension provides greater detail on the pathogens that cause root rot in these crops and resources on submitting samples for diagnosis (Figure 2).


The Pulse Crop Working Group, with support from the North Central IPM Center, produced the Growing Pulse Crops podcast series and the NDSU Dry Pea and Lentil Root Rot Management Guide.

Fig 1. Lentil root rot. Healthier roots are on the left, severely diseased roots on the right.

Fig 2. Dry Pea and Lentil Root Rot Management Guide

Audrey Kalil
Plant Pathologist
NDSU Williston Research Extension Center
PRODUCER’S OPTIONS FOR PREVENT PLANT ACRES

Due to the ongoing saturated soil conditions, there will be considerable number of acres, which will be prevented planting in 2020. Overall, 2020 prevent plant projection for North Dakota is about one million acres. If producers are not able to plant their regular crops by the final planting dates, they will have the following four options.

Planting Insured Crops after the Final Planting Date
Producers can still plant regular insured crops during the late planting period, which is generally 15 to 25 days after the final planting date depending upon the crop and County. However, after the final planting date, crop insurance yield or revenue protection guarantees will be reduced one percent for each day. If we use spring wheat as an example and our “Proven Yield History” is 50 bushels per acre, at 70% crop insurance coverage, there will be a yield guarantee of 35 bushels per acre. That will mean losing one-percent of 35 bushels per day, if wheat is planted after the final planting date and during the late planting period. In addition, planting after the final planting dates may result in reduced yields and quality and higher expenses for controlling disease or weed pressure. There will be no coverage if regular crops are planted after the late planting period.

Not Plant a Cover Crop on Prevent Plant Acres and Get Full Prevent Plant Payments
Producers can get full prevent plant payments without planting cover crops on their prevent plant acres. However, they will need to control weeds and leave decent residue on soil surface to prevent blowing of topsoil. That means controlling weeds with tillage is not an option. For more accuracy, please consult your local FSA offices and Crop Insurance agents. Generally, prevent plant guarantee is 50-60% of the crop insurance yield or revenue guarantees with an option of increasing it 5% more by paying higher premiums. That will mean that if crop insurance guaranteed yield for spring wheat is 35 bushels per acre if planted before the “Final Planting Date”, full prevent plant yield guarantee at 60% coverage will be 21 bushels per acre. Prevent plant coverage is reduced compared to regular crop insurance coverage as there will be savings for not buying seed, fertilizer and fuel etc. Overall, prevent plant payments do provide producers some revenue during hard times, however, in most years, planting and harvesting regular crops is more profitable. So the strategy should be to take advantage of the prevent plant program and adopt practices, which reduce the chances of prevent plant acres in 2021. If left bare, chances of 2020 prevent plant acres going into prevent planting again in 2021 are much greater compared to planting an affordable cover crop mix that not only uses the excess moisture in 2020 and improve soil health but can also generate some much needed revenue.
Plant a Cover Crop and Get Full Prevent Plant Payments

If the idea is to reduce the chances of 2020 prevent plant acres going into prevented planting again in 2021, improve soil health and generate some income by harvesting the cover crop mix on or after November 1st, producers can spend up to $15-20 (or less) for a cover crop mix along with getting the full prevent plant payments. Yes, they do not have to spend money for planting a cover crops, however, planting an affordable and simple cover crop mix can prove essential for improving long-term soil health and farm profitability. Sometimes it may not even cost that much if producers have some spare barley/oats and field pea seed in their bins. Planting 30 pounds each of barley and peas per acre will provide a nice mix of a high carbon crop with a legume. Below are some general mixes for reducing erosion and improving soil health on non-saline-sodic and saline-sodic areas.

<table>
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<tr>
<th>Crop</th>
<th>Full Seeding Rate on Its own per acre</th>
<th>Percent of Crop in the mix</th>
<th>Seeding Rate per acre in the Mix</th>
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<td>General Three-way Mix for using Excess Moisture, Reducing Erosion and Building Soil Health (non-saline-sodic areas):</td>
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<tr>
<td>Oats/Barley</td>
<td>60 pounds</td>
<td>34%</td>
<td>20.4 pounds</td>
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<tr>
<td>Chickling Vetch</td>
<td>18 pounds</td>
<td>33%</td>
<td>5.94 pounds</td>
</tr>
<tr>
<td>Radish</td>
<td>3 pounds</td>
<td>33%</td>
<td>0.99 pounds</td>
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<tr>
<td>Note: Radishes are a better option for a root crop than turnips if grazing is not an option. However, if planted before July 15th, radish can go to seed. Wild Buck Wheat also have a chance of going to seed if planted before July 15th. Also, if Clubroot of canola is a consideration, sugarbeet should be planted instead of radish or any other brassica.</td>
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<td>General Four-way Mix for using Excess Moisture, Reducing Erosion and Building Soil Health (non-saline-sodic areas):</td>
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<tr>
<td>Barley</td>
<td>60 pounds</td>
<td>25%</td>
<td>15 pounds</td>
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<tr>
<td>Sorghum/Sudangrass</td>
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<tr>
<td>Field Peas</td>
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<tr>
<td>Sugarbeet</td>
<td>8 pounds</td>
<td>43%</td>
<td>3.44 pounds</td>
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<td>Note: Dr. Marisol Berti’s recommends 10 pounds of maximum seeding rate for Peas per acre.</td>
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<td>Sugarbeet</td>
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</tr>
<tr>
<td>General Four-way Mix for using Excess Moisture, Reducing Erosion and Building Soil Health (saline-sodic areas):</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Barley</td>
<td>60 pounds</td>
<td>20%</td>
<td>12 pounds</td>
</tr>
<tr>
<td>Oats</td>
<td>60 pounds</td>
<td>20%</td>
<td>12 pounds</td>
</tr>
<tr>
<td>Sweet Clover</td>
<td>12 pounds</td>
<td>20%</td>
<td>2.4 pounds</td>
</tr>
<tr>
<td>Sugarbeet</td>
<td>8 pounds</td>
<td>40%</td>
<td>3.2 pounds</td>
</tr>
<tr>
<td>Note: please consult a livestock specialist regarding livestock bleeding issues related to Sweet Clover.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Plant a Cover Crop to Hay or Graze and Get reduced Prevent Plant Payments

If there is an opportunity to generate decent revenue by haying and/or grazing the cover crop, producers can legally harvest the cover crops before November 1st and still get 35% of the “Guaranteed Prevent Plant Coverage”. That will mean that if full prevent plant coverage was 21 bushels per acre and cover crop was harvested before November 1st, producers are still guaranteed 7.35 bushels of spring wheat per acre. So it is a matter of deciding how much revenue could be generated by harvesting the cover crop to make up for losing 13.65 bushels of wheat per acre. However, in order to harvest cover crops before November 1st and still get the 35% prevent plant payment, cover crops need to be planted after the late planting period. In northeast, the final planting date for planting wheat is June 5th. If we add 25 days of late planting period, producers can plant cover crops on the acres where they could not plant wheat on July 1st, can hay, graze, bale or cut for silage before November 1st and claim 35% of the prevent plant payment. If planted this
early during the growing-season, one can hay/graze that cover crop in mid to late August and can hay/graze the regrowth again in late-September or early-October. If producers can make up for losing 65% of the prevent plant coverage and make some additional profits along with still getting 35% of the prevent plant payments, haying/grazing twice in one-season can do wonders for soil health. Below are some of the general cover crop mixes for haying and grazing.

<table>
<thead>
<tr>
<th>Crop</th>
<th>Full Seeding Rate on Its own per acre</th>
<th>Percent of Crop in the mix</th>
<th>Seeding Rate per acre in the Mix</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Four-way Mix</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forage Barley</td>
<td>60 pounds</td>
<td>25%</td>
<td>15 pounds</td>
</tr>
<tr>
<td>Forage Oats</td>
<td>60 pounds</td>
<td>25%</td>
<td>15 pounds</td>
</tr>
<tr>
<td>Chickpeas</td>
<td>40 pounds</td>
<td>30%</td>
<td>12 pounds</td>
</tr>
<tr>
<td>Turnip</td>
<td>3 pounds</td>
<td>20%</td>
<td>0.6 pounds</td>
</tr>
<tr>
<td>Note: If Clubroot of canola is a consideration, mixing brassicas in the mix like turnips should be avoided and could be replaced with sugarbeets.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>General Five-way Mix</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forage Barley</td>
<td>60 pounds</td>
<td>25%</td>
<td>15 pounds</td>
</tr>
<tr>
<td>Forage Oats</td>
<td>60 pounds</td>
<td>25%</td>
<td>15 pounds</td>
</tr>
<tr>
<td>Forage Peas</td>
<td>60 pounds</td>
<td>23%</td>
<td>13.8 pounds</td>
</tr>
<tr>
<td>Turnip</td>
<td>3 pounds</td>
<td>20%</td>
<td>0.6 pounds</td>
</tr>
<tr>
<td>Sorghum Sudangrass</td>
<td>30 pounds</td>
<td>7%</td>
<td>2.1 pounds</td>
</tr>
</tbody>
</table>

Other important points to consider while selecting a cover crop mixes:

- Harvesting cover crops here means harvesting for hay, grazing, silage, haylage and baleage and not for grain.
- In order to balance the C:N ratios for faster decomposition of the crop residue, each mix includes either a legume or a green broadleaf.
- Try to add cereals and legumes with broadleaf species for mycorrhizal engagement as broadleaf do not form a relationship with mycorrhizal fungi.
- Flax has very good mycorrhizal relationship, however, if grazed, too much flax seed can create problem for livestock.
- For best results, inoculate legumes before planting. Legumes will use soil N before they start forming nodules so initially they are heavy soil N users. If N has been already applied on PP acres, legumes can use up that N.
- Last year, foxtail millet seed was found contaminated with palmer amaranth. Sorghum Sudan can not only replace millet as a warm season crop but it will use more water. However, sorghum can suppress the growth of other crops.
- Sorghum Sudangrass is not frost tolerant so should be avoided in early frost areas. Also, since it suppresses growth of other plants so irrespective of the percent in the mix, do not add more than 2 pounds per acre in the mix.
- Out of the Sorghum Sudangrass and Sudangrass (for example Piper variety), Sorghum Sudangrass uses more soil moisture and produce more biomass. In addition, Sorghum Sudangrass will be taller than Sudangrass.
- At 2 pounds of Sorghum Sudangrass seeding rate per acre, producers do not need to chop the residue and it will breakdown on its own.
- If sunflower is added to the mix, do not add more than 1-2 pounds per acre as it also suppress the growth of other plants.
- At 3 pounds of Sugarbeet seeding rate per acre, producers do not need to chop the tops off and beets will breakdown on their own.
If vetches go to seed then it will be difficult to get rid of them and they can become a problematic weed.

If tilled, turnips and radish do not breakdown well.

Best time to plant camelina is during September 1 to first week of October. If planted before September 1st, it will lose its winter-hardiness.

Planting corn into a cover crop, which overwinter will create nutrient competition resulting in yield loses. However, if cover crops are planted in strips instead of entire fields, corn can be planted in-between the strips.

Legume or broadleaf cover crops inter-seeded in 30 inch corn rows generally do not do well. However, if inter-seeded in-between 60 inch corn rows have a higher chance of flourishing.

For specific questions, please contact your County Extension agent.

Naeem Kalwar
Extension Soil Health Specialist

HOW MUCH DEFOLIATION CAN MY TREE HANDLE?

Each year we watch the deciduous trees in our communities, forests, parks, and yards set new leaves to help them produce energy during the hospitable months of our region. These leaves are important energy producing organs that help trees grow and produce new leaves, shoots, seeds and fruits. Often times we find insects eating the leaves of our trees and their feeding damage can be evident and extensive. This begs the question; will my tree recover?

Nearly all plant species have insects that feed on them and one strategy of defense that plants have is compensatory growth. Plants can usually grow new leaves to replace those that are lost in order to recover from a defoliation event. Many insect defoliator pests of our region have one or two generations per year, however we have different insect pests that are problematic throughout the season.

How much defoliation can my tree handle?

If your trees are healthy and have lost less than half of their leaves, they have a good chance of recovering. Healthy trees that lose half of their leaves for 2-3 years in a row will still likely recover, but repeated defoliation events greater than half for more than three consecutive years may make your tree susceptible to other diseases or weather events.

Trees store starch in their vascular system, so they have resources available for later in their life (either during the same year or a following year). They use these reserves to produce new leaves after every winter and after defoliation events. With early season defoliators like tent caterpillars, trees have enough time to replace these leaves and continue to grow. Midseason defoliators cause the most stress on trees, because the tree has less time to replace the leaves and less time to recover. Late season defoliators like fall webworm do not place as much stress on trees, because the defoliation occurs just a few weeks before leaves drop in autumn.

Adult defoliators are best controlled with insecticides when they first become active and start feeding or laying eggs. Insect larval defoliators like caterpillars and sawflies that have only one generation per year can be controlled with a single application of product before the insects are one inch long. Insecticides like Spinosad, a natural-occurring soil bacterium, work better at controlling these larvae, because they are safer and conserve natural enemies that eat other tree insect pests, such as scale insects and other piercing-sucking foliage pests (aphids).

Alexander Knudson
Entomological Diagnostician
AROUND THE STATE

NORTH CENTRAL ND

Severe weather impacted parts of the region once again this week with some heavy rain, strong winds, and hail. Here are the observed reports of precipitation throughout the area for the last week (week starting June 28th): Minot: 2.22”; Bottineau: 2.76”; Garrison: 4.52”; Karlsruhe: 1.88”; Mohall: 2.52”; Plaza: 3.90”; and Rugby: 1.45”. Bare soil temperatures at the NCREC was observed at 82°F as of July 6th.

Precipitation kept many growers out of the fields last week. Before some of the heavy rainfall arrived, some growers were making fungicide applications. That included some of my research at the NCREC. A combination of the humidity and precipitation led me to make a few flag leaf fungicide applications. I also spoke to a couple growers who were experiencing a random hotspot for grasshoppers in the area. Continue to be scouting for any possible disease and insect issues that could be arising.

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

NORTHWEST ND

Scattered thunderstorms and isolated rain showers passed through NW ND last week with rain on June 30th-July 1st and again July 3rd and 5th. Rainfall totals mid-week were 0.1-0.3” and the storms over the holiday weekend ranged from trace amounts up to 0.5”. Scattered areas of strong winds and some hail were reported from the early morning storms on July 5th, but I haven’t heard any reports of widespread crop damage. The rain will help crops filling grain but the area is still at a significant deficit for rainfall for the season. Predicted highs for the coming week are in the 80’s with upper 80’s likely through the weekend.

Crop progress report: early-planted small grains are filling grain and are in the milk stages while late planted fields are flowering. Peas have pods, lentils are flowering with flat pods at lower nodes, and chickpea is flowering to early pod. Canola is still flowering though many fields are now past peak flower and flax is starting to flower. Those with later planted small grains are advised to keep an eye on flowering progress and consider making a fungicide application if high humidity conditions persist. Chickpea growers are advised to scout their fields for Ascochyta blight and make fungicide applications as needed to keep the disease in check. The rain and high humidity of last week provided excellent conditions for Ascochyta development and spread.

The Williston REC will have a virtual field day on July 8th available for viewing. Recordings will stay on our website, so you can view at your leisure if you can’t make it on the 8th. In-person field days have been cancelled due to the COVID-19 pandemic. Please watch the videos of interest to you and we hope to see you all in-person next year.

Clair Keene
Extension Cropping Systems Specialist
NDSU Williston Research Extension Center
SOUTH-CENTRAL/SOUTHEAST ND

According to NDAWN, the region’s rainfall during May 1-July 6 ranges from 2.2 inches (Robinson) to 11.0 inches (Oakes), with the Carrington Research Extension Center (CREC) receiving 2.9 inches. Corn and soybean average daily water use during July 1-6 was 0.25 to 0.3 inches. The accumulated growing degree day units for corn translate into 1-2 leaves ahead of the long-term average for the current growing period.

Winter rye is nearing or at maturity and winter wheat is in the dough stage. Barley and spring wheat seeded late April also are in the dough stages. Late-April planted corn has 10-11 leaves and is rapidly gaining height. Advanced soybean is at full flower to early pod development stages (R2-3). Dry bean and sunflower are entering the reproductive growth stage. Haying of grasslands and road ditches is a common activity for livestock producers.

SOUTHWEST ND

Over this past weekend storms have brought more moisture to the region, but with this moisture there have also been pockets of hail. Unfortunately, our low pH HRSW variety trial was mowed down by the great white combine. With recent rains the small grains are beginning to shoot up new tillers, some varieties more than others. If moisture continues, desiccation may be needed. If you weren’t able to make it to our field day be sure to find videos from our field day and other stations on the NDSU Extension YouTube page.
WEATHER FORECAST

The July 9 to July 16, 2020 Weather Summary and Outlook

There were many thunderstorm clusters in the region this past week. Rainfall totals from July 2 through July 7, 2020 is presented in Figure 1.

Because of deadlines, the precipitation from Wednesday, July 8 is presented in Figure 2. The thunderstorms Tuesday night into Wednesday morning also produced strong wind with gusts over 70 mph in some locations.
Temperatures were well above average during the past week (Figure 3). This week will continue the trend of recording above average temperatures in most locations, but it is not expected to be as warm as it has been the last couple of weeks.

Figure 3. Departure from Average Temperature during the period of July 2 to July 7, 2020 at selected NDAWN stations.

There has been much talk in social media and other sources of a heat wave projected for the Midwest. Although that is probably true, I do not expect it to get into North Dakota. Most of the extreme heat will remain near and south of Interstate 90. Therefore, in southern South Dakota, southern Minnesota with the worst of the heat probably in Nebraska and Iowa. These next 7 days look a bit cooler than this past week in most locations. Because of the higher heat will remain to our south, what will probably occur over North Dakota and northwestern Minnesota is a situation often called “ridge runners”. Thunderstorms will form on the edge of the heat dome, which is the area served by the North Dakota Agricultural Weather Network (NDAWN) and although I expect slightly less frequency of storms, there will still be 2 or 3 waves of thunderstorms with severe weather passing through the region in the next week. With a slightly different pattern and slightly less moisture, the number of hours in the next week with relative humidity over 85% should be lower than what was experienced recently. Areas that do get the higher rain totals and are already wet will need to be alert for higher relative humidity levels than is shown in Figure 4.

Figure 4. Number of Hours forecasted with Relative Humidity above 85% for the period of July 9 through July 15, 2020
The projected growing degree days (GDDs) base 32°, 44° and 50° for the period of July 9 through July 15, 2020 can be found in Figure 5.

![Projected Growing Degree Days for the period of July 9 to July 15, 2020](image)

Using May 1 as a planting date, accumulated growing degree days for wheat (base temperature 32°) is given in Figure 6. 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)

![Accumulated Wheat Growing Degree Days (°F) (2020–05–02 – 2020–07–07)](image)

Using May 20 as a planting date, accumulated growing degree days for corn (base temperature 50°) is given in Figure 7. 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)
Soybeans also use base 50° like corn, but NDAWN has a special tool for soybeans that based on your planting date and cultivar can estimate maturity dates based on average temperatures, as well as give you GDDs based on your planting date(s) you set. 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)

Daryl Ritchison
Meteorologist
Director of the North Dakota Agricultural Weather Network