

North Dakota State University CROP & PEST REPORT

NDSU

EXTENSION

No. 10

July 1, 2021

Inside this Issue...

NDSU Field Days For 2021.....	1
Scout Hay for Blister Beetles.....	2
Collect Leafy Spurge Flea Beetles .	4
Cereal Aphids on Wheat Heads	4
European Corn Borer Trapping Network.....	5
Check Soybean Nodulation	6
Reduced Risk of White Mold.....	7
Fusarium Yellows in Sugarbeet Fields.....	8
Disease Observations in Wheat ..	10
Project Safe Send Waste Pesticide Collection Dates and Location	12
Grazing and Haying Restrictions for Herbicides.....	13
<i>THEM!</i> -- Controlling Nuisance Outdoor Ants around the Home	13
Around the State	14
North Central ND	14
Northeast ND	16
Northwest ND	16
South-Central/Southeast ND	17
Southwest ND	17
Weather Forecast.....	19

NDSU FIELD DAYS FOR 2021

The following is a list of 2021 annual Field Days events. Please visit the Research Extension Center and Agronomy Seed Farm websites for more details. Hope to see you there in person!



July 13 - Hettinger Research Extension Center

(5-7 p.m. MDT followed by supper)

July 14 - Dickinson Research Extension Center

(9 a.m. start MDT)

July 14 & 15 - Williston Research Extension Center

July 14: dryland tour - Williston Research Extension Center *(4-7 p.m.)*

July 15: irrigated tour - Nesson Research & Development farm,
located 23 miles E of Williston on #1804 *(8:30 a.m.-12 noon)*

July 19 - Agronomy Seed Farm Casselton

(5 p.m. start)

July 20 - Carrington Research Extension Center

(9 a.m.-3 p.m.)

July 21 - North Central Research Extension Center

(tentatively 9 a.m.-12 noon)

July 22 - Langdon Research Extension Center

(8 a.m.-1 p.m.)

July 27 - Central Grasslands Research Extension Center

(10 a.m. - 3 p.m.)

entomology

SCOUT HAY FOR BLISTER BEETLES

Several blister beetle species feed on alfalfa, including: ash-gray blister beetle (*Epicauta fabricii*); black blister beetle (*E. pensylvanica*) and striped blister beetle (*E. vittata*). Adult blister beetles are easy to recognize due to their large size ($\frac{1}{2}$ to $1\frac{1}{2}$ inch), soft bodies, short wing covers, long legs and a neck-like appearance between head and prothorax.

Most blister beetle species have one generation per year. Adults become active in early to mid-summer and females lay eggs in the soil. Eggs hatch in about two weeks into larvae called triungulins. *Epicauta* larva are beneficial insects and are effective predators of grasshopper eggs. Blister beetles overwinter in soil as larvae. Blister beetles tend to be more numerous when grasshopper populations are high, usually during drought years like 2021. Adult blister beetles are attracted to blooming alfalfa fields and weeds (goldenrods, dandelions). Adults are active June through September and will feed on nectar, pollen, and devour leaves, stems and flowers. **Due to the drought, blister beetles are causing a lot of feeding injury to alfalfa by destroying the growing point of the stem so the plant will not continue to grow.**

Blister beetles produce a poison called cantharidin, which is toxic to people and livestock, especially horses. Cantharidin oil is released when beetles are crushed and even dead beetles have high levels of the toxin that does not weaken. It is highly toxic and irritates the gastrointestinal and urinary tracts, which can lead to death in horses. It is estimated that about 30 to 50 striped blister beetles could be potentially lethal to horses. Fewer beetles cause sores or blisters on tongue and mouth, colic, diarrhea, bloody feces, depression, elevated temperatures, increased heart rate and breathing rates and dehydration. Poisoned horses often place their muzzle in water without drinking.

Hay infested with blister beetles is a big concern for hay producers and livestock owners, especially horse owners. Cattle and sheep can also be poisoned. Levels of toxicity to beef cattle has not been identified. The amount of cantharidin produced by blister beetles varies by species (see Table), and male blister beetles produce higher amounts than female blister beetles. So, it is hard to predict how many blister beetles are needed to kill an animal. If you suspect cantharidin poisoning, contact your veterinarian immediately. Unfortunately, cantharidin has no cure except supportive care including mineral oil, intravenous fluid therapy, activated charcoal, and anesthetics.



Ash-gray blister beetle (M. Berti, NDSU)



Damaged growing point of alfalfa from blister beetle feeding (P. Beauzay, NDSU)

Relative toxicity to horses of three common blister beetle species. Number of blister beetles expected to kill a horse weighing:			
Blister Beetle species	275 lbs	550 lbs	825 lbs
Black blister beetle	550	1100	1700
Spotted blister beetle	175	345	520
Threestriped blister beetle	40	80	120

Source: Capinera et al. 1985. J. Econ. Entomol. 75: 1052-55.

Scouting: Blister beetles are difficult to scout for since they are mobile and gregarious, and often congregate in field edges or certain spots in a field with flowering weeds. In some instances, blister beetles feed for a short period of time and then migrate to other areas of the field or to new fields. After the alfalfa is cut, they often move out into blooming canola and other blooming field crops. Blister beetles also have been observed in soybeans this year.

Integrated Pest Management:

Prior to harvest:

- Scout closely for blister beetles, swarms or defoliation immediately prior to harvest. If large populations of blister beetles are observed, producers should not harvest until beetles have moved out of field or an insecticide may be applied. There is no treatment threshold for blister beetles in alfalfa hay. If insecticides are used, read label directions for rates, pre-harvest intervals, restrictions and precautions. Fields should not be treated at peak bloom to avoid bee kill. Insecticides approved for blister beetle in alfalfa are listed in the [2021 North Dakota Field Crop Insect Management Guide E1143](#).
- Hay fields adjacent to rangeland pastures are at higher risk for blister beetle infestations due to typically higher grasshopper populations in rangeland pastures.
- Control blooming weed hosts near or in alfalfa field.
- Cut alfalfa early at 10% bloom. Blooming alfalfa attracts blister beetles into the field.

At harvest:

- Fields should be rechecked 24 hours prior to cutting to ensure that new swarms of blister beetles have not re-infested the fields.
- Use equipment without hay conditioners or crimpers that may crush blister beetles, thus contaminating hay, and increase numbers of blister beetles located underneath the windrow. Even tractor tires can crush blister beetles in hay when turning equipment around. Cut hay with a sickle bar or rotary mower that allows blister beetles to move out of hay after cutting. If large numbers of blister beetles are observed in spots during harvesting, stop tractor and allow blister beetles to move out of the way or go around them.
- Raking may dislodge dead beetles from hay.
- Scout harvested hay and underneath windrows closely for blister beetles and allow blister beetles to move out of drying hay before baling. Turning the windrow may be helpful to get blister beetles to move out.
- If blister beetles are suspected in harvested hay, either don't feed the hay or provide alternative feeds/hay for livestock. Don't force livestock to eat hay contaminated with blister beetles.
- Chemical control is generally not recommended at harvest, because dead beetles could be incorporated into cured hay instead of falling onto the ground. Remember, dead blister beetles still have a toxic level of cantharidin to livestock.
- Grinding hay only dilutes the cantharidin toxin when the hay is mixed into a final ration.
- Cantharidin concentration in hay can be measured by certain labs including the [Texas A&M Veterinary Medical Diagnostic Lab](#) - <https://tvmdl.tamu.edu/tests/cantharidin-lc-ms/>



Ash-gray blister beetle in hay field, Slope County (S. Hewson, NDSU Ext. Agent, Slope County)

[Karl Hoppe](#)

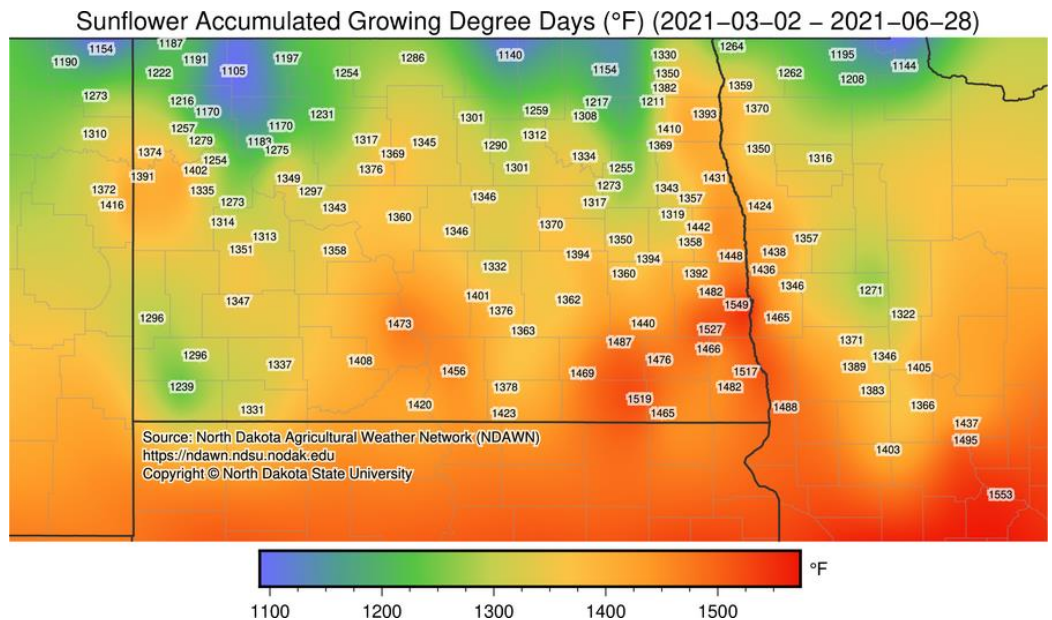
Extension Livestock Specialist, Carrington Research Extension Center

[Janet J. Knodel](#)

Extension Entomologist

COLLECT LEAFY SPURGE FLEA BEETLES

The accumulated growing degree days (AGDD) for sunflower (base of 44 F) are used as a guide to determine when to begin collecting for adult flea beetles. **Flea beetles should be collected between 1,200 and 1,600 AGDD using the sunflower GDD model from NDAWN.** Adult flea beetles can be collected with sweep nets. Due to the warmer than normal spring, emergence of leafy spurge flea beetles will be earlier this year. Most areas of North Dakota have accumulated enough growing degree days (GDD) for collecting for adult leafy spurge flea beetles. Use the [sunflower degree days/growth stage application](https://ndawn.ndsu.nodak.edu/sunflower-degree-days/growth-stage-application) on NDAWN website. Enter “2021-03-01” for the planting date and select “degree day” for map type.

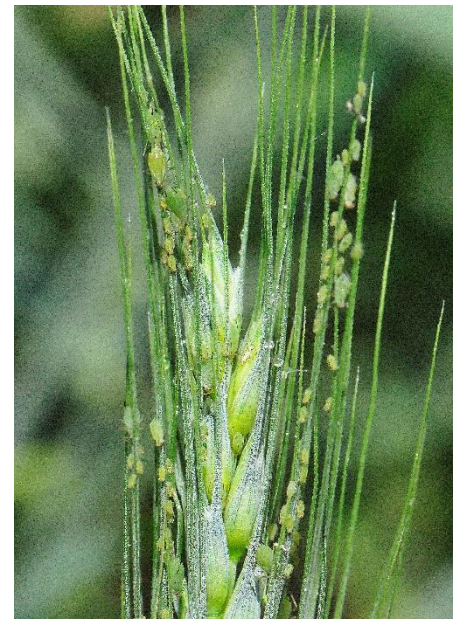


Please see last week's article in the [Crop & Pest Report #9 \(June 24, 2021\)](#) for more information.

CEREAL APHIDS ON WHEAT HEADS

Low numbers of English grain aphids, 30-50 aphids per head, are being observed on wheat heads in eastern ND. Producers are concerned about the impacts of aphid head-feeding on yield. However, the wheat crop is maturing quickly, in flowering to dough stages, due to the drought and heat pushing the crop. This will help mitigate any negative yield impacts from the aphids. Research indicates that cereal aphids will not cause any yield loss after the heading stage (Zadoks 59 and Feekes 10.5), but seed weight can be slightly reduced if very large numbers of aphids on heads. Research on the relationship between seed weight and aphid densities was a flat line for flowering and dough stages indicating that as aphid populations increased to 2,000 aphid days there was little reduction in seed weight. In contrast to an earlier crop stage, boot, there was a slight decrease in seed weight as aphid density increased. Research on cereal aphid infestations during the later stages of wheat and on drought-stressed wheat is limited in the Great Plains.

While scouting, it was easy to find predators such as, lady beetles, aphid lions, syrphid fly larvae, and aphids parasitized by wasps (called mummies), which play a major role in reducing aphid populations (see photos on next page). One adult lady beetle consumes about 300 aphids per day, and larvae about 30-50 aphids per day. One lacewing larva consumes about 200+ aphids per week, and one syrphid fly larva about 400 aphids during its development. When natural enemies are present in large numbers, and the crop is well developed, farmers are discouraged from spraying fields.



English grain aphids on wheat head and awns (P. Beauzay)



Adult (left) and larva (middle) lady beetle and parasitized aphid mummy (right) attacking cereal aphids on wheat head (P. Beauzay, NDSU)

[Janet J. Knodel](#)

Extension Entomologist

EUROPEAN CORN BORER TRAPPING NETWORK

A trapping network is being monitored for the Z- and E-races of European corn borer in corn fields of ND. A modified Hartstack trap is being used for trapping ECB moths in grassy field ditches. Last week, we detected our first trap catch for the Z-ECB moths in Ransom County near Shenford and Shelton. Next week, we will discuss field scouting for ECB moths in corn fields. Thanks to the ND Corn Council for support.

Area	County	Nearest town	Race	June 18-24	June 25-July 1	July 2-8	July 9-15	July 16-22	July 23-29
EC	Barnes	Cuba	Z	0					
EC	Barnes	Cuba	E	0					
EC	Cass	Casselton	Z	0					
EC	Cass	Casselton	E	0					
EC	Cass	Kindred	Z	0					
EC	Cass	Kindred	E	0					
EC	Griggs	Cooperstown	Z	0					
EC	Griggs	Cooperstown	E	0					
EC	Steele	Finley	Z	0					
EC	Steele	Finley	E	0					
EC	Traill	Alton	Z	0					
EC	Traill	Alton	E	0					
NC	Ward	Minot	Z	0					
NC	Ward	Minot	E	0					
NE	Grand Forks	Gilby/Mcanna	Z	0					
NE	Grand Forks	Gilby/Mcanna	E	0					
NE	Nelson	Lakota	Z	0					
NE	Nelson	Lakota	E	0					
SE	Ransom	Shenford	Z	28					
SE	Ransom	Shenford	E	0					
SE	Ransom	Sheldon	Z	3					
SE	Ransom	Sheldon	E	0					
SE	Richland	Colfax	Z	0					
SE	Richland	Colfax	E	0					
SE	Richland	Antelope	Z	0					
SE	Richland	Antelope	E	0					
Total # of Z =				31					
Total # of E =				0					



[Veronica Calles-Torrez](#)
Post-doctoral Scientist

[Janet J. Knodel](#)
Extension Entomologist



CHECK SOYBEAN NODULATION

A good time to evaluate soybean plant nodulation is in the soybean vegetative growth stage, after the second or third trifoliolate leaf has emerged (Figure 1). Use a spade to dig up a number of plants being sure not to damage the root systems. Use a small bucket of water to wash the roots of soil so you can observe the roots properly. When digging up the soybean plants, the nodules should be readily visible. Inspect the nodules by cutting them open, and they should have a pink to red color on the inside if they are healthy. Important factors that affect nodulation are the viability of the inoculum (the number of rhizobium bacteria that were placed on or near the seed), and/or available soil-borne bacteria specific to soybean from previously grown soybean. The viability of the soybean inoculum depends on storage time (shelf life of the inoculum), storage conditions (hot conditions will kill bacteria), and handling of seed before and during seeding. Inoculum is easily killed by direct sunlight. Therefore it is important to check nodulation of the soybean plants to ensure adequate inoculation.

Nodulation may be limited if dry conditions or saturated soils follow soybean planting. Nodules can also be limited by high levels of available soil N, which leads to lower nodule production. Other stress factors that may lead to low nodulation include: drought, hail damaged plants, root diseases, iron deficiency chlorosis (IDC) symptoms early in the growing season, high salt levels in the soil, and other plant stressing conditions.

If the soybean plants do not have nodules and there are N deficiency symptoms, a “rescue” treatment of N fertilizer may provide the nitrogen needed by the plant. However, in most cases with normal nodulation (Figure 2), there is no need to apply N fertilizer as the plant can biologically fix the required N. For more information about [nodulation](#) and rescue treatment see the [soybean soil fertility publication](#) SF1164.




Figure 1. Early season nodulation.



Figure 2. Abundant nodulation on soybean root in the late vegetative stage.

[Hans Kandel](#)

Extension Agronomist Broadleaf Crops



plant pathology

REDUCED RISK OF WHITE MOLD

Prolonged dry and hot conditions reduce the likelihood of white mold occurring, yet alone causing significant yield loss. Additionally, thinner stands and poorer crop development reduces the favorable microclimate that white mold thrives in. While there are a range of crop conditions and recent localized rainfall in the state, we are generally looking at a reduced risk of white mold in 2021.

However, weather patterns *can* change and I have learned to never count white mold out, so a quick review of white mold is warranted. The short story is: *All broadleaf crops are susceptible, but only at (or after) bloom, and the disease is most severe when it's cool and wet. Fungicides can help manage white mold, but are most valuable when there is disease risk.*

But that needs a little more explanation...

All broadleaf crops are susceptible,

When the environmental conditions are favorable, white mold can occur on all broadleaf crops. We have the most consistent problems with white mold on sunflower, dry edible bean and canola, but yield loss certainly can occur in soybeans, pulse crops and many others.

but only at (or after) bloom,

White mold most frequently infects a crop by first establishing itself on floral tissue. Spores land on the florets, produce fuzzy white mycelium (mold) and invade the healthy green tissue from there. It's why nearly all fungicide recommendations include application in the early bloom growth stages of our crops. It's also why we are laser-beam focused on environmental conditions during bloom.



Infection radiating from infected floret on sunflower leaf.

and the disease is most severe when it's cool and wet.

The spores that infect the crops are dispersed from small mushrooms (apothecia) that emerge on the overwinter structure of the pathogen (sclerotia). However, these small mushrooms do not germinate unless there is adequate soil moisture. A rule of thumb is at least 1-2 inches of rain 1-2 weeks *before bloom*. For those spores to cause infection, they need prolonged wet conditions, preferably at cool temperatures (60s-70s are optimal), *during bloom*. Anything that makes the canopy stay wet longer, such as a lush canopy or close proximity to a shelterbelt, makes the microclimate more favorable for infection and disease development. What does white mold dislike most (?) – prolonged dry soil conditions, infrequent rain, high temperatures, thin canopies.

Fungicides can help manage white mold,

Fungicides in most broadleaf crops (sunflower is an exception) can help reduce the incidence, severity and yield loss caused by white mold. For more information on timing, droplets and links to efficacy information, I refer you back to a [crop and pest report article from last year](#).

but are most valuable when there is disease risk.

Every field is different. Some fields always seem to have white mold problems while it's a rare event in others. As far as the environment is concerned, a couple erratic thunderstorms can move the field from low to high risk quickly. And since nobody want to add an input into a field if there is a low chance of return, it's important to evaluate the disease risk in each field.

A pair of helpful tools to determine risk are the Canola Risk Map and Risk Calculator, which was developed by the Canola Pathology Program with support from the Northern Canola Growers Association. However, these tools take into account conditions conducive for white mold that broadly apply to all crops in bloom. The tools are available at NDSU (<https://www.ag.ndsu.edu/sclerotinia/riskmap.html>) or through the Northern Canola Growers Association (<https://www.northerncanola.com/growers/Forecast-Maps/>), the Minnesota Canola Council (<http://www.mncanola.org/maps.php>), and the NDSU canola pathology program websites (<https://www.ag.ndsu.edu/sclerotinia/>).

[Sam Markell](#)

Extension Plant Pathologist, Broad-leaf Crops

FUSARIUM YELLOWS IN SUGARBEET FIELDS

Fusarium yellows have been identified in several fields in the Sidney factory district. The major *Fusarium* species found in sugarbeet are *F. oxysporum* and *securum*. Typical symptoms are easily seen when plants are at the 4- to 6-leaf stage and older. Yellowing, leaf wrinkling, and necrosis are common foliar symptoms starting on the oldest leaves (Figure 1). Outer surface of roots are healthy but the vascular system of the root is blocked and discolored (Figures 2 and 3). In areas with high inoculum density and favorable environmental conditions, *Fusarium* infection will kill young plants. In areas where the disease is less severe, plants will survive but roots will be smaller, may be sprangled, and with typically low sugar content. There is no fungicide that is currently available that will cure this disease. Growers are encouraged to record fields with Fusarium and plant varieties that are highly resistant to Fusarium (Figure 4) the next time an infected field is planted with sugarbeet.

(See figures on next page)



Figure 1. Typical symptoms of Fusarium yellows on an 8- to 10-leaf plant – necrosis starting on oldest leaves followed by similar symptoms on younger inner leaves



Figure 2. Longitudinal section of Fusarium infected sugarbeet root showing vascular discoloration starting from the root tip moving upwards.



Figure 3. Cross section of Fusarium infected sugarbeet root showing vascular discoloration and 'woodiness'



Figure 4. Fusarium resistant sugarbeet variety in an infected nursery

[Mohamed Khan](#)

Extension Sugarbeet Specialist
NDSU & U of MN
701-231-8596

DISEASE OBSERVATIONS IN WHEAT

Current Observations

The dry weather and low humidity have drastically lowered disease occurrence in wheat and barley. The hard working IPM scouts in the past two weeks have reported tan spot in less than 2% of the wheat fields (Figure 1). Loose smut (seed-borne) disease has been reported from a few fields and this disease can be observed in both dry and wet years.

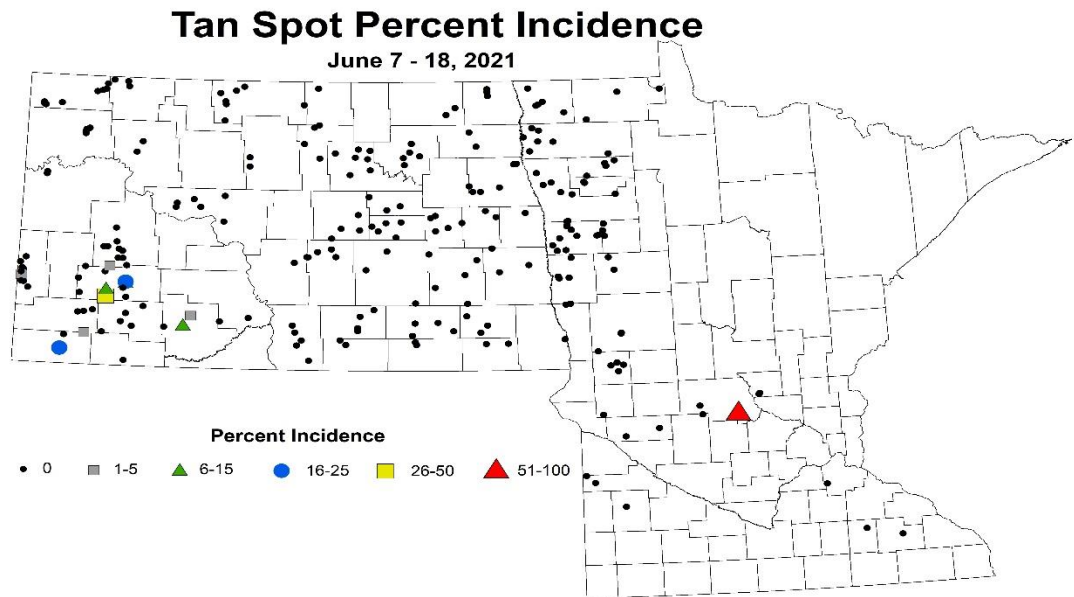


Figure 1. Prevalence of tan spot in wheat fields scouted for June 7-18, 2021.

I had the chance to visit a few research locations last week and scouted for foliar diseases in variety trials. At the Agronomy Seed Farm, I found one leaf rust pustule and a few tan spot lesions in a winter wheat variety trial. Both of these diseases were found in a plot near a shelterbelt of trees (higher humidity and better chance of dew). I spent another 20 minutes looking for rust (and other diseases) and struggled to find disease in the other variety strip plot trials.

Scab risk remains low for soon to be heading or flowering small grains in the entire state. I am expecting scab risk to remain low for at least seven days as hot and dry weather is forecasted through the Fourth of July weekend.

Future Observations

Reports of aphids in the fields may lead to future reports of barley yellow dwarf (BYD). One of the primary symptoms of BYD is yellowing/purpling/reddening of the flag leaf tip towards the stem of the plant. Yield loss to BYD is greatest when infection occurs early in plant growth development. Given that the crop is further ahead this year, field wide occurrence of BYD will be rare.

I am expecting that reports of bacterial leaf streak (BLS) may increase in the next week, due to severe thunderstorms that help initiate new infections. Early symptoms of BLS include linear streaks of water-soaking



Figure 2. Symptoms of barley yellow dwarf on flag leaves of hard red spring wheat.

(Figure 3) that eventually turn yellow and brown. Compared to the previous two growing seasons, field reports of BLS will likely be much lower this year.



Figure 3. Early BLS symptoms in wheat. Note water-soaking in linear streaks on the wheat plant (Photo: LeAnn Lux).

Root rots (Fusarium root, crown and foot rot; common root rot) of small grains are more common during years of moisture and temperature stress. Most infections occur early in the season and take advantage of a weakened plant leading to plant death. Small pockets of dead (white) plants are one of the first things to scout for in a field (Figure 4). On infected plants, the entire plant will be white, have an empty head, have a poorly developed root system (easily pulled out of ground), and likely have lesions on the crown, subcrown internode and/or roots.



Figure 4. Root rot of wheat. Note small pocket of dead plants (white heads) with a poorly developed root system with discolorations on the crown and roots

[Andrew Friskop](#)

Extension Plant Pathology, Cereal Crops



PROJECT SAFE SEND WASTE PESTICIDE COLLECTION DATES AND LOCATION

Farmers, ranchers, pesticide dealers and applicators, government agencies and homeowners should bring unusable pesticides to any of the 12 Project Safe Send collections in July.

It is a safe, simple and non-regulatory program that helps people easily and legally get rid of unusable pesticides at no charge.

The program accepts old, unusable or banned pesticides, including herbicides, insecticides, rodenticides and fungicides. Project Safe Send is funded through product registration fees paid by pesticide manufacturers.

Check your storage areas for any unusable pesticides and safely set them aside for Project Safe Send. If the containers are deteriorating or leaking, pack them in larger containers with absorbent materials. Free heavy-duty plastic bags are available from the North Dakota Department of Agriculture if needed.

People with more than 1,000 pounds of pesticides should pre-register one week prior to delivery. No other pre-registration is required. **New for 2021: a maximum of 5,000 pounds of pesticides per participant will be accepted.** Each participant is limited to one shuttle. Pesticide rinse water and empty containers are no longer accepted.

To pre-register, obtain plastic bags or for more information, contact Jerry Sauter at the North Dakota Department of Agriculture at 701-328-2980 or jdsauter@nd.gov.

The collections will run from 8 a.m. to noon local time at the North Dakota Department of Transportation facilities in the following cities:

July 7	Langdon	10424 Hwy 5
July 8	Devils Lake	1905 Schwan Ave NW
July 9	Larimore	1524 Towner Ave
July 13	Bismarck	218 S Airport Rd
July 14	Dickinson	1700 3rd Ave W St 101
July 15	Hettinger	121 1st St N
July 16	Ashley	520 7th St SW
July 20	Harvey	501 Jackson Ave
July 21	Minot	1305 Hwy 2 Bypass E
July 22	Tioga	425 2nd St SE
July 27	Valley City	1524 8th Ave SW
July 28	Wyndmere	7775 Hwy 18

[Andrew A. Thostenson](#)
Pesticide Program Specialist

GRAZING AND HAYING RESTRICTIONS FOR HERBICIDES

Last week's Crop and Pest featured a thorough article on considerations for haying or grazing small grain crops. One supplemental addition to that article is the consideration for time interval between herbicide application and grazing or haying the crop. I realize that many of the small grain fields getting turned into feed may not have received a herbicide, but for those that did, we need to follow the proper time interval from application to "harvest". Pages 109-112 in the 2021 North Dakota Weed Control Guide lists the grazing and haying intervals for many of our herbicides (<https://www.ag.ndsu.edu/weeds/weed-control-guides/2021%20nd-weed-control-guide-1/2021-nd-weed-control-guide>).

For your convenience, those four pages can be found at the end of this issue of the Crop and Pest Report.

[Joe Ikley](#)

Extension Weed Specialist



THEM! -- CONTROLLING NUISANCE OUTDOOR ANTS AROUND THE HOME

Ants in your lawn? Ants in your kitchen? Ants in your pants? Don't despair! NDSU Extension Entomology has received several calls about nuisance outdoor ants this summer, which isn't surprising given our dry conditions. So far, all complaints have involved ants in the genus *Lasius*, including 'turfgrass ant' and 'cornfield ant.' Both species are common and nest along gravel driveways, cracks in cement drives and walkways, between patio paver stones, and in lawns where the soil is exposed. They make small, crater-shaped mounds which are easily visible (see photo). They eat other insects and arthropods, and have an affinity for sweets. Ants can be seen tending aphids for their honeydew. Foraging workers sometimes enter homes in search of food, and if they find an indoor food source, the workers will leave chemical trails for other workers to follow. Food found either indoors or outdoors, is brought back to the nest to feed the colony. This behavior makes the use of ant baits an effective control measure.



To keep ants from entering the home, make sure the kitchen is clean and no attractive food, like a honey container, is left out for the ants to find. Use a mild vinegar solution to wipe down kitchen surfaces to remove ant chemical trails. Make sure doors, windows and other potential entry points are in good repair. Seal cracks and crevices where ants can enter.

Outdoors, these species rarely cause actual injury to turfgrass itself. The best strategy for lawns is to water regularly and mow at a height of three to four inches to encourage grass growth and discourage ant nesting. For chemical control of outdoor-nesting-ants, outdoor baits are the best option. Foraging workers find the bait, bring it back to feed the colony, and thus poison the entire nest including the queen. Several brands are available to homeowners in either liquid or granular formulations. Most liquid baits contain boric acid (borax) which acts as a stomach poison. Follow the instructions on the label for bait station use and placement. Outdoor liquid baits are best for treating smaller areas. Some granular bait formulations contain hydramethylnon, which inhibits metabolism. Granular baits can be used to treat larger areas, but are rather expensive and should not be watered, as water will break down the bait more quickly than it normally would. When using baits, do not use any other insecticides around the baits because the ants will be inhibited from getting to the bait. It may take up to a week before you start to see results when using baits. It may seem at first that it would be easier to control the giant nuclear-irradiated mutant ants from the 1954 sci-fi thriller *THEM!*, but be patient - baits work well and you won't have to use a flamethrower.

Other insecticide options include broad spectrum granules, which can be applied as a barrier around the home or as a lawn application, depending on the product. Keep in mind that broad-spectrum insecticides may have negative consequences for non-target, beneficial insects such as ground-nesting bees, so please try the non-chemical and baits first, and only use a broad-spectrum lawn application as a last resort. Barrier sprays also can be made to prevent ants from entering the home. When using any pesticide, **be sure to read, understand and follow the directions on the label.**

[Patrick Beauzay](#)

Research Specialist, Extension Entomology



AROUND THE STATE

NORTH CENTRAL ND

Rain was a welcome site over the weekend with some areas getting some decent amounts of rainfall. Some discussion with growers in the western Renville County area observed over two inches of rain. However, some regions missed out on the higher amounts of rainfall. Here are some quick precipitation reports as observed by area NDAWN stations over the last week (beginning June 21st): Minot: 0.30" (NCREC: 0.37"); Bottineau: 0.41"; Garrison: 0.45"; Karlsruhe: 0.21"; Mohall: 1.13"; Plaza: 0.11"; and Rugby: 0.93". Additionally, the bare soil temperature at the NCREC is observed at 73 degrees F.

Crop disease remain relatively low at this time. Canola, were highly impacted from canola flea beetle earlier in the season, is now reaching a stage where the plant is growing enough to overcome previous damage observed a few weeks ago, however, the crop staging is a little bit delayed. NCREC canola field sites are showing lower populations of canola flea beetle as overwintering adults begin to die off. Wheat midge continues to be observed in the North Central region, however, numbers remain low. Please keep in mind, trapping by the NDSU IPM network is not connected to economic thresholds, rather, it is suggestive that scouting should be underway in the region. The Wheat Midge forecast application on NDAWN, suggests we could be reaching peak emergence soon. Grasshoppers are being observed in the region as well. Alexius Holter, the North Central IPM Scout, has yet to find numbers above threshold, however, some growers are finding localized areas with higher populations. Finally, blister beetle is being reported in western North Dakota alfalfa field sites. Please refer to Dr. Knodel's article on blister beetles in today's Crop & Pest Report.

Many small grains continue to progress rapidly with the warmer temperatures. Area field sites are observed in the heading stages with some varieties beginning to flower (Figure 1). Canola fields are uneven, ranging from the 4th leaf stage to flowering, even within the same field site. Soybean stages vary from the V2-V6 leaf stage with very few nodules in fields with low surface residue. Field pea in the region are already flowering. As we look forward, a drier and warmer forecast seems to be part of the seven-day forecast.

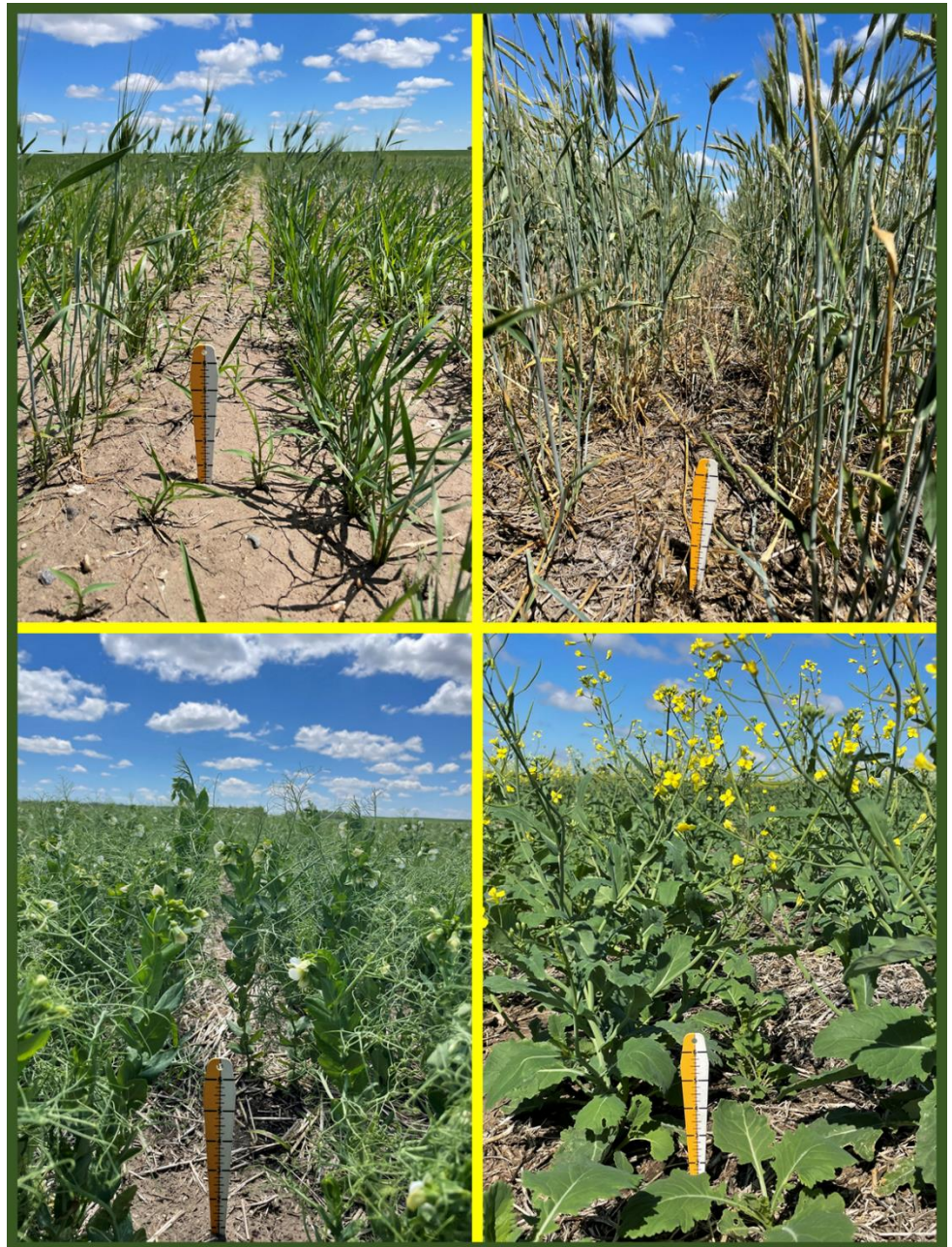


Figure 1. From the top left clockwise: uneven spring wheat due to drought; rye; canola; field pea.

[TJ Prochaska](#)

Extension Crop Protection Specialist
NDSU North Central Research Extension Center

[Leo Bortolon](#)

Extension Cropping Systems Specialist
NDSU North Central Research Extension Center

NORTHEAST ND

Crops are looking much better all over the region with the weekend rains ranging from 0.1 to 2.0 inches. Small grains are turning to look decent with majority of them at heading stage. Canola is moving along very well with majority of the fields reaching bolting and flowering stages. Some late planted canola is still getting hit by flea beetles. Soybeans, dry beans and sugar beets are looking good and are reaching the stage of closing rows. Corn is advancing very well. Potatoes look good. Field peas are flowering and are looking very good. Herbicide sprayings are about done. Very quiet on the disease issues. Loose smut in wheat has been reported in the area. Wheat midge adults are emerging following rain showers with some hot spots in Benson county (1500midges/trap). Grasshoppers are starting to become a problem. Spider mites are showing up along the field edges in soybeans. Blister beetles are being reported in alfalfa, soybean and canola crops. Haying is wrapping up on first cutting. Young alfalfa stands are still producing well, while older stands are not. Concerns of either winter forage shortage, or grazing shortage potential is looming especially with the lack of pastures. Ranchers are relying on annual forage crops. Water quality for livestock continues to be poor with more sampling and checks going on. TDS (total dissolved solids) levels are climbing but ok, sulfates are more of a concern. Deer and Richardson ground squirrels causing damage to crops and gardens have been reported.

[Anitha Chirumamilla](#)

Extension Agent Cavalier County

NORTHWEST ND

Temperatures the past week were a little more moderate with highs in the 70's with the exception of Tuesday and Wednesday when highs were in the upper 80's and low 90's across most of the Northwest. Unfortunately the cool weather brought with it only a little rain late last week and over the weekend. Most of Williams and McKenzie Counties received 0.1"-0.25" or less. Parts of Divide and Burke Counties got a little more with 0.5-1.0". The 7-day forecast is calling for hot temperatures with highs in the 90's and possible triple digits for some places on July 4th. There are no strong chances of rain in the forecast, though some small pop-up showers are possible with the heat.

Crop development continues to be pushed by the dry conditions. Canola is starting to flower and so is flax. In the WREC variety trials, pea is flowering at 8-14" tall and lentil is flowering at 6-8" tall. Small grains are flag leaf emerged to heading with a few varieties just starting to flower with a few anthers showing. Small grains on station are short with spring wheat heading out and starting to flower at 14-16" tall. The oats and barley are short, too, with most varieties 16" or less. Soybean development is well behind normal in most places due to drought conditions with fields at V1-V3. Driving around a little the past week, I saw many fields of flowering canola with soil still visible between the rows indicating that plants are smaller with less vegetative growth than normal. The same is true for soybean as I haven't yet seen a field getting close to row closure. The high temperatures in the coming week are likely to stress the small grains as they head out and begin to flower.

[Clair Keene](#)

Extension Cropping Systems Specialist
NDSU Williston Research Extension Center

SOUTH-CENTRAL/SOUTHEAST ND

According to NDAWN, the region's June 1-28 rainfall ranges from 0.7 inch (Linton) to 5.7 inches (Marion). During the past week, daily water use by wheat averaged 0.2-0.25 inch, and corn and soybean averaged 0.15-0.2 inch per day. The region will continue to need weekly substantial rains to have satisfactory row crop yield.

Winter rye is in the dough stage and starting to turn color. Most spring-seeded small grain range from beginning to head to kernel-milk stage. The high daytime temperatures forecast for the balance of this week will further erode yield potential by reducing seed set and weight. Corn generally is in the 7- to 9-leaf stages. Row crops and cool-season broadleaf crops (canola and flax) have definitely benefitted from the past week's rains.

Upcoming crop tours planned by the Carrington REC:

*Tri-county off-station: July 1; Wishek area; 6:30 p.m.

*Barnes County off-station: July 7; Dazey area; time 6:30 p.m.

*Field Day: July 20; 9:30 a.m.



Past Tri-county crop tour near Wishek.

[Greg Endres](#)

Extension Cropping Systems Specialist
NDSU Carrington Research Extension Center

SOUTHWEST ND

Heat and dry weather are pushing small grains in the region to abort tillers. There continues to be variability both across the region in drought stress and within fields on maturity and yield potential. There are pockets where wheat is 6 inches tall and headed out and within many fields there are plants headed out and flowering with some still in the boot. Secondary factors such as salinity, acidity, weed pressure, herbicide issues, root diseases and viruses are coming together with drought stress for troublesome situations. Blister beetles have been present in alfalfa for many in the region, please refer to Dr. Knodel's article for more information on blister beetle management. According to NDAWN, from June 1st to June 29th Dickinson received 1.10 inch, Beach 0.70, Amidon 0.77, Bowman 1.20, Hettinger 0.51, Mott 2.15, Carson 2.62, Mandan 1.64, Hazen 2.32, and Dunn 1.54. Be sure to use the NDAWN small grain disease forecasting model at <https://www.ag.ndsu.edu/cropdisease/small-grain-disease-forecasting-model-homepage> for disease risk assessments. Be mindful of your cultivar disease susceptibility and if you are noticing significant dews or rainfall in the forecast when making decisions. Take care to have a plan in place for soil sampling this fall, take note of areas in the field that may need to be sampled into separate zones. Coming up on Wednesday July 14th from 8am-12pm

mountain time we will have our agronomy field day at the NDSU DREC. Following a lunch provided by the Dickinson Chamber of Commerce Ag Committee we will have a soil sampling workshop from 1-4pm. CEU's have been requested for CCA's.

EXTENDING KNOWLEDGE >> CHANGING LIVES

2021 Agronomy Field Day

NDSU Dickinson Research Extension Center

FIELD DAY TOPICS	SPEAKERS
Registration starts at 8 a.m. (Mountain Time) Introduction to the Dickinson REC 2021 Agronomy Projects and Soil pH Overview Weather, Soil, Disease and Interactions Combine Cleanout, Weeds and Factors Impacting Control Resistance and Issues of Concern in Broadleaf Crops Current and Emerging Markets	Chris Augustin Ryan Buetow Dave Franzen and Andrew Friskop Joe Ikley and Caleb Dalley Sam Markell and TJ Prochaska Dave Ripplinger

Soil Sampling Workshop

After lunch join NDSU experts Ryan Buetow, Dr. Chris Augustin, Dr. Leo Bortolon, Dr. Dave Franzen, Doug Landblom and John Breker from AGVISE, for a soil sampling workshop. Held from 1 to 4 p.m., the workshop will cover impacts of season and weather on sampling decisions, biological benchmark testing, ND trends and the value of zone testing, along with an exercise on sampling for stratified acidity and using a pH probe.

For more information contact Ryan Buetow at 701-456-1106 or check our website <https://www.ag.ndsu.edu/DickinsonREC>

Wednesday

July 14, 2021

Agronomy Field Day

8 a.m. to 12 p.m.

Soil Sampling Workshop 1 to 4 p.m.

All times Mountain

NDSU Dickinson REC

1041 State Ave

Dickinson, ND 58601

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[Ryan Buetow](#)

Extension Cropping Systems Specialist
NDSU Dickinson Research Extension Center

**WEATHER FORECAST****The July 1 to July 7, 2021 Weather Summary and Outlook**

Temperatures were close to average if taken as a whole with most stations anywhere from a couple of degrees below average to a couple of degrees above average across the North Dakota Agricultural Weather Network (Figure 1). Last week in this weather summary I had mentioned that if the ridge of high pressure aloft that was attributing to the high heat in the Pacific Northwest were to move into the northern plains, it would probably hold off until the Independence Day weekend. It seems likely that a piece of that heat ridge will build over the region this weekend, with the warmest days being on Friday through Sunday. Monday a few areas may cool down a bit, then next Tuesday and Wednesday all locations are expected to be much cooler. That transition to cooler temperatures next week would also be our best opportunities for rain during this forecast period.

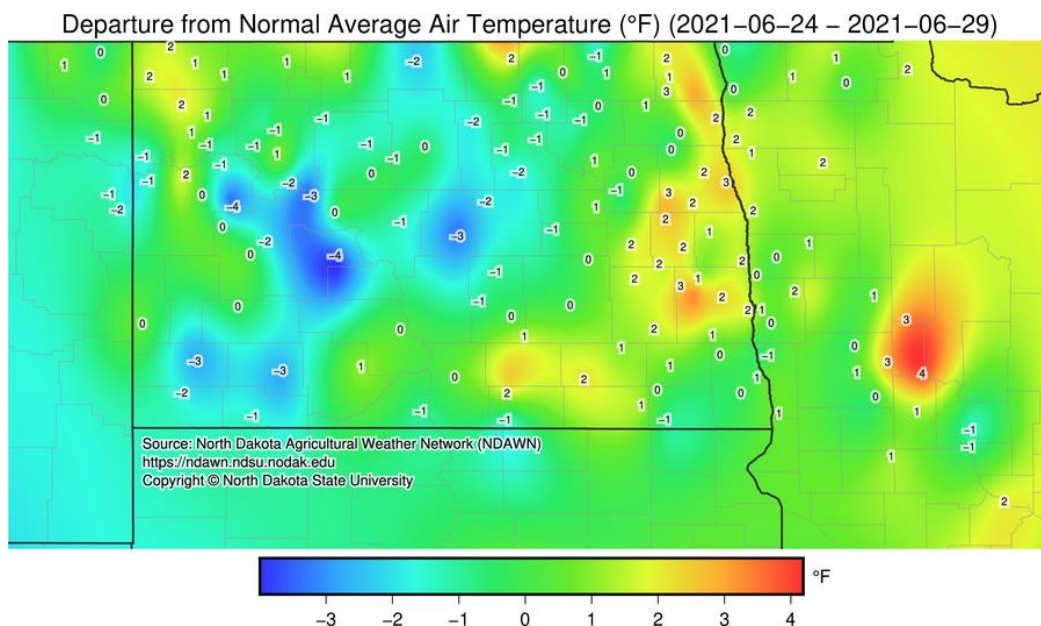


Figure 1. Temperature departures from average at selected NDAWN for the period of June 24 through June 29, 2021

A slow-moving pocket of rain moved from central to northeastern North Dakota last Friday for the most widespread rain during the past week. Several other days recorded some scattered thunderstorms. Total rain from June 24-29, 2021 can be found in Figure 2.

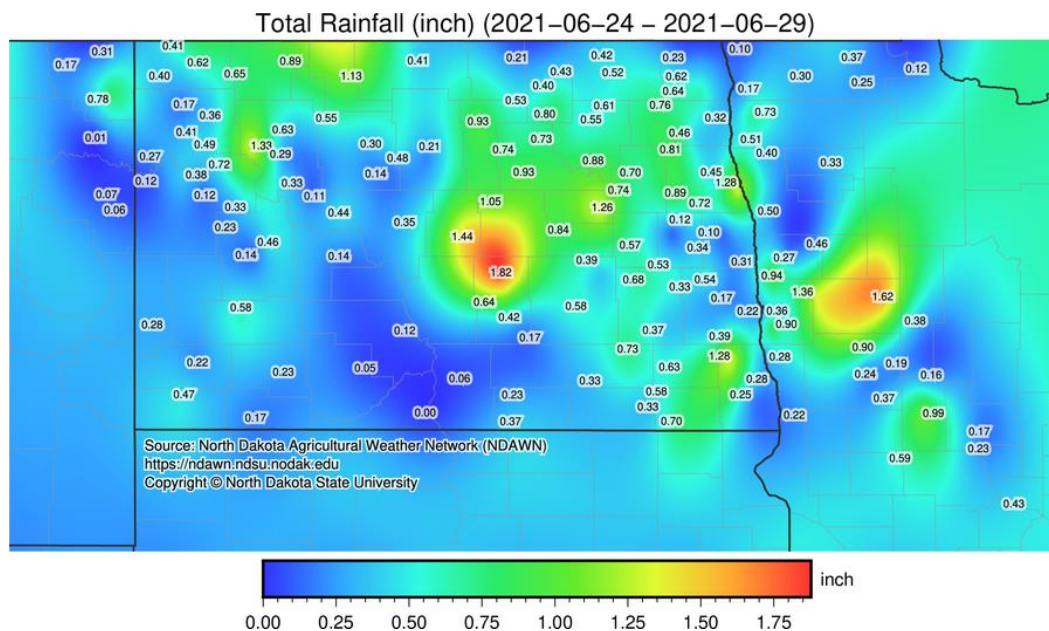


Figure 2. Total rainfall for the period of June 24 through June 29, 2021 at selected NDAWN weather stations

Starting this week, I will give an estimated number of hours with relative humidity above 85% because row closer is now occurring with many crops increasing the disease risk. Very few hours of high humidity are expected through the weekend. Most of the hours in Figure 3 are expected to occur next Monday through Wednesday (July 5-7) associated with a slow-moving frontal passage that will bring potential for rain and higher humidity levels.

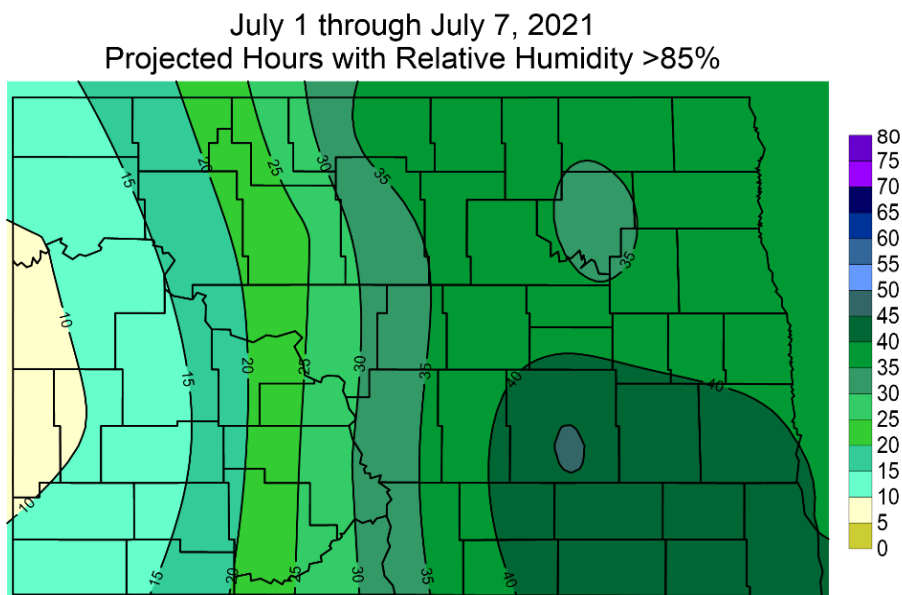


Figure 3. Estimated number of hours with Relative Humidity above 85% from July 1 through July 7, 2021

The projected growing degree days (GDDs) base 32°, 44° and 50° for the period of July 1 through July 7, 2021 can be found in Figure 4. A reminder, that GDDs for most crops do not give credit for temperatures above 86°. In turn, that was the maximum temperature used for these projections. With high temperatures in the 90s for several days this period, most of the differences in Figure 4 are associated with minimum temperatures through Monday and the differences in maximums and minimums thereafter when the temperatures are expected to be noticeably lower.

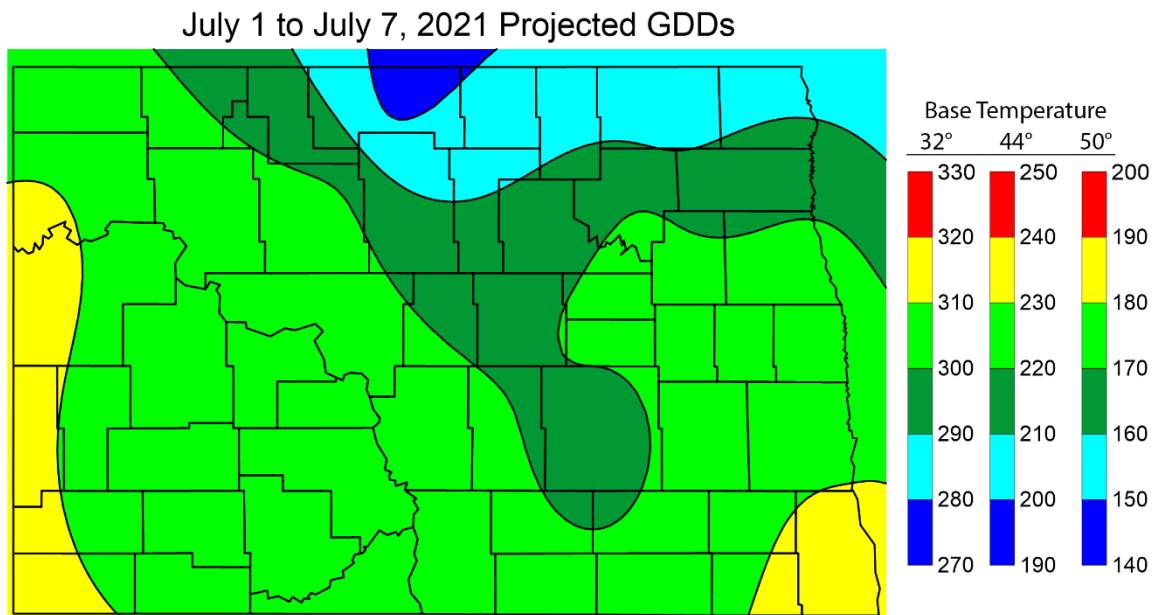


Figure 4. Projected Growing Degree Days, Base 32°, 44° and 50° for the period of July 1 to July 7, 2021

Using May 1 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>

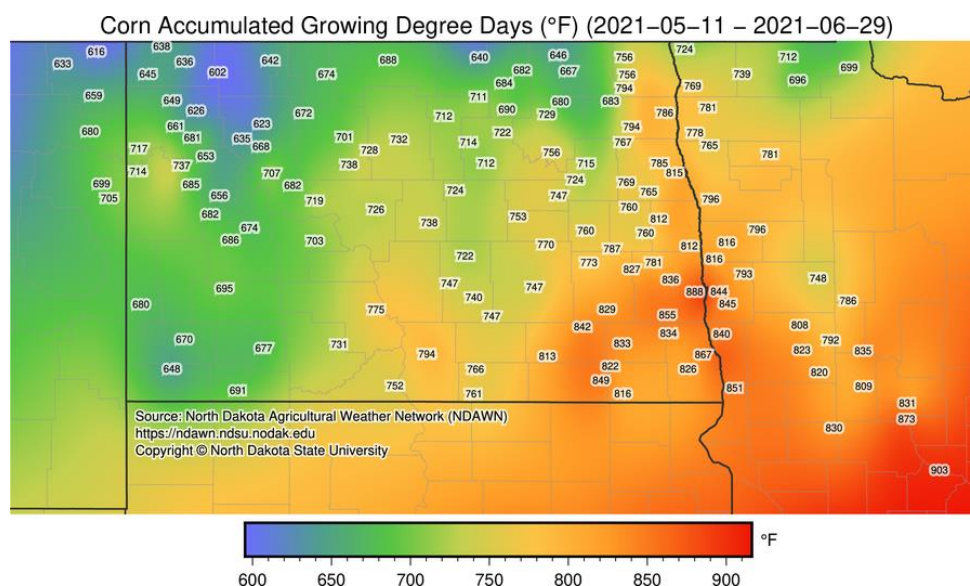


Figure 5. Accumulated Growing Degree Days for Wheat (Base 32°) since May 1, 2021

Using May 10 as a planting date, accumulated growing degree days for corn (base temperature 50°) 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>.

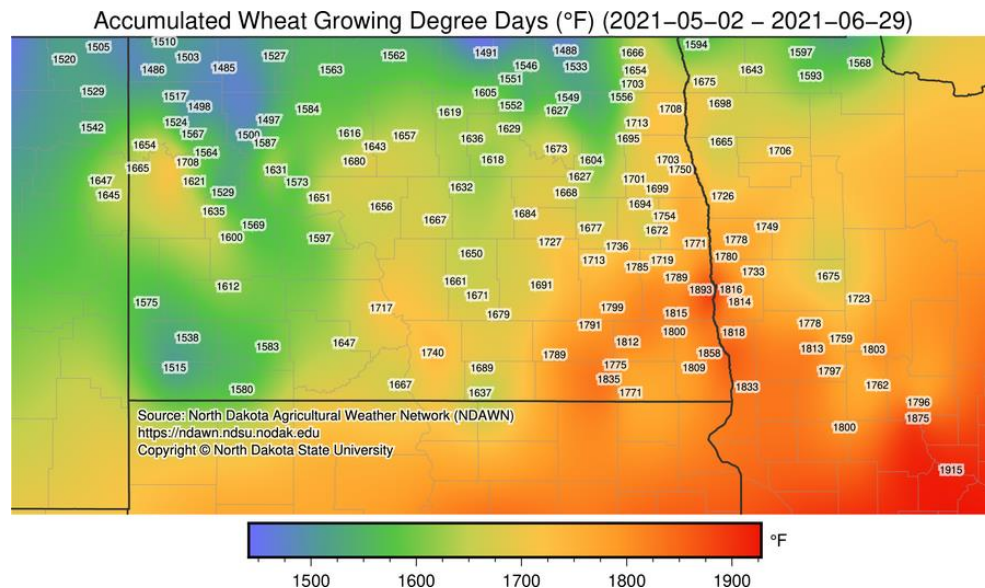


Figure 6. Accumulated Growing Degree Days for Corn (Base 50°) since May 10, 2021

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>

[Daryl Ritchison](#)
Meteorologist

Director of the North Dakota Agricultural Weather Network (NDAWN)

(Z1. Restrictions on Grazing/Feeding/Haying of Crops Treated with Herbicides are located on the next pages.)

**Z1. Restrictions on Grazing/Feeding/Haying of Crops
Treated with Herbicides.**

Herbicide	Crop	Time Interval
DAA = days after application WAA = Weeks after appl.		
Acetochlor	Corn	No restriction
Acuron/Flexi	Corn	45 DAA
Aim	Grasses	No restriction
Anthem	Field corn forage Sweet corn forage Corn grain/stover Soybean	30 DAA 40 DAA 70 DAA Not allowed
Armezon/Pro	Corn	45 DAA
Assure II	Enlist field corn Sugar Beet tops	30 DAA 60 DAA
Atrazine	Corn Roadsides (hay)	21 DAA Not Allowed
Authority Assist/First/MTZ	Soybean	Not Allowed
Authority Elite	Soybean Sunflower Dry pea, chickpea	30 DAA Not Allowed Forage 60, hay 120 DAA
Axial Bold/Star/XL	Wheat & Barley	30 DAA
Balance Flexx	Cover Crop Corn forage	Not Allowed 45 DAA
Basagran	Corn Soybean	12 DAA 30 DAA
Beyond	Clearfield Wheat	No restriction
Boundary	Soybean Soybean post-directed	40 DAA Not Allowed
BroadAxe XC	Soybean Sunflower	30 DAA Not Allowed
Bromoxynil	Alfalfa spring-applied Alfalfa fall-applied Corn CRP Small Grain	30 DAA 60 DAA 30 DAA Not Allowed 45 DAA
Bromoxynil + MCPA	Small Grain	45 DAA
Cadet	Corn grain or stover Field corn forage Sweet corn forage Soybean	70 DAA 30 DAA 40 DAA Not Allowed
Callisto	Corn Oats	45 DAA 30 DAA
Capreno	Corn	45 DAA
Chateau	Alfalfa	25 DAA
Corvus	Corn forage	45 DAA
Curtail	Small Grain	7-14 DAA
Curtail M	Small Grain	45 DAA
Defol 750	Corn Dry Bean Soybean Sunflower	14 DAA Not Allowed Not Allowed 14 DAA

Herbicide	Crop	Time Interval
Dicamba	Corn Small Grain: - Hay harvest - Lactating dairy animals (grazing) - Non-Lactating Animals (grazing)	≥ Milk Stage 37 DAA 7 DAA No Restriction
Diflexx/Duo	Corn	45 DAA
Discover NG	Small Grains	30 DAA
Dual II Magnum	Corn Soybean (PRE) Soybean (POST) Sunflower	30 DAA 30 DAA Not Allowed Not Allowed
Eptam	Alfalfa Dry Bean	14 DAA 45 DAA
Everest 3.0	Wheat	30 DAA
Extreme	RR Soybean	Not Allowed
Far-Go	Small Grain	Not Allowed
Fenoxaprop	Small Grain	60 DAA
Fierce	Soybean	Not Allowed
Flexstar	Soybean	Not Allowed
Goldsky	Small Grain: - Graze - Hay	7 DAA 28 DAA
Halex GT	Corn	45 DAA
Huskie/FX	Small grain	25 DAA
Huskie Complete	Small Grain: -Graze or forage -Cut for hay	25 DAA 30 DAA
Impact	Corn	45 DAA
Laudis	Corn	45 DAA
Liberty	Canola Soybean	Not Allowed Not Allowed
Lumax EZ	Corn	45 DAA
Marvel	Soybean	Not Allowed
Matrix	Corn	30 DAA
MCPA (may vary by label)	Alfalfa Flax Dry Pea Small grain CRP	7 DAA 7 DAA Not Allowed 7 DAA Not allowed
Metribuzin	Alfalfa Alfalfa & Grasses Barley Chickpeas Corn Fallow Grass Establishment Lentil Field Pea Soybean Wheat	28 DAA 42 DAA After maturity 40 DAA 60 DAA Not Allowed 28 DAA 40 DAA 40 DAA 40 DAA 14 DAA
Olympus	Wheat	No restriction

Herbicide	Crop	Time Interval
Orion	Small Grain	7 DAA
Outlook	Corn Cool-season grass Warm-season grass Soybean	40 DAA 60 DAA 30 DAA Not Allowed
Panoflex	Forage	7 DAA
Paraquat	Alfalfa Corn Field Pea Dry Bean Chickpea Faba bean Lentil Soybean Sunflower	42 DAA 7 DAA 7 DAA 7 DAA 7 DAA 7 DAA 7 DAA Not Allowed 7 DAA
Permit	Corn CRP	30 DAA No Restriction
Poast	Alfalfa:Undried Forage Corn Dry Bean Field Pea Flax Lentil Potato Sugar Beet Sunflower Soybean	7 DAA No Restriction No Restriction No Restriction No Restriction Not Allowed Not Allowed No Restriction Processed meal only Only processed meal from seed and hay allowed
Powerflex	Wheat	7 DAA
Prowl	Corn Forage grasses Alfalfa/grass mix Grass Straw Safflower Soybean Sunflower	21 DAA No Restriction 14 DAA No Restriction Not Allowed No Restriction Not Allowed
Pursuit	Alfalfa Soybean	30 DAA Not Allowed
Python	Corn Soybean	45 DAA Not Allowed
Quelex	Small Grain - Graze - Hay	7 DAA 21 DAA
Reflex	Corn Dry Bean Soybean	Not Allowed Not Allowed Not Allowed
Resolve	Corn	30 DAA
Revolin Q	Corn	45 DAA

Herbicide	Crop	Time Interval
Roundup Powermax (Glyphosate)	Alfalfa: - 44 oz/A or less - >44 fl oz - Dormant alfalfa - Spot Treatment RR Alfalfa RR Corn - Preharvest RR Corn - Postharvest CRP (≤ 2 qt/A) Feed Barley & Wheat: - Preharvest - Postharvest Grass Seed Production PP, PRE, Renov ≤ 2 qt PP, PRE, Renov > 2 qt Pastures: PP, PRE, Renov ≤ 2 qt PP, PRE, Renov > 2 qt Spot Treatment Postemergence ≤ 2 qt Soybean preharvest: >22 fl oz ≤ 22 fl oz RR Soybean: -Preharvest (≤ 22 oz) Oilseed crops: -Preharv & Postharv Vines and hay of dry bean, dry pea, chickpea, and lentil Rangeland (≤ 2 qt/A)	36 hours Not allowed 36 hours 3 DAA 5 DAA 7 DAA 7 DAA No Restriction 7 DAA 7 DAA No Restriction 8 WAA No Restriction 8 WAA 7 DAA No Restriction 25 DAA 14 DAA 14 DAA 7 DAA Not allowed No Restriction
Select	Alfalfa Soybean	15 DAA Not Allowed
Sentrallas	Grazing/Forage	7 DAA
Sequence	Corn Legume vegetables Soybean: - PP, PRE - POST Sunflower	30 DAA Not Allowed 30 DAA Not Allowed Not Allowed
Sharpen	Alfalfa/Grass dormant Corn Dry Bean Preharvest Field Pea vines Grass Forage/Pasture Legumes PP, PRE Small Grain straw Soybean Preharvest	28 DAA 80 DAA Not Allowed No Restriction No Restriction 65 DAA No Restriction Not Allowed
Sinate	Corn	60 DAA
Sonalan	Canola Field Pea	Not Allowed Not Allowed

Herbicide	Crop	Time Interval
Sierra	Wheat	30 DAA
Sonic	Soybean	Not Allowed
Spartan/Charge	Forage	Not Allowed
Spartan Elite	Soybean Sunflower Dry pea, chickpea, dry bean	30 DAA Not Allowed Forage 60, hay 120 DAA
Starane Ultra	Small grain Corn, Field Corn, Sweet CRP Grass seed/forage/hay	7 DAA 47 DAA 31 DAA Not Allowed No Restriction
Starane Flex	Small Grain	7 DAA
Starane NXT	Corn Grass Seed Production Small Grain	45 DAA Not Allowed 45 DAA
Stinger	Corn CRP Small Grains - Hay	40 DAA No Restriction 7 DAA Not Allowed
Storm	Soybean	Not Allowed
Supremacy	Small Grain: - Straw	Not Allowed No Restriction
Surveil	Soybean	Not Allowed
Talinor	Small Grain: - Graze/hay - Straw	30 DAA 60 DAA
Targa	Grass Seed Production	Not Allowed
Teammate	Small Grain: - Graze - Hay	7 DAA 28 DAA
Thistrol	Field Pea	Not Allowed
Travallas	Grazing/Forage Hay	7 DAA 30 DAA
Treflan	Alfalfa	21 DAA
Ultra Blazer	Soybean	Not Allowed
Valor	Soybean Wheat: >5" height	Not Allowed No Restriction
Varisto	Soybean	30 DAA
Varro/Luxxur	Wheat: - Graze - Hay	7 DAA 30 DAA
Verdict	Corn Soybean	80 DAA Not Allowed
Warrant	Corn Soybean Sugarbeet	40 DAA Not Allowed 70 DAA
Widematch	Corn Small Grain	47 DAA 7 DAA
Wolverine Advanced	Wheat, Barley -straw	25 DAA 57-60 DAA
Xtendimax	Xtend Soybean	Permitted
Zidua	Wheat	7 DAA

Herbicide	Crop	Time Interval
Zidua Pro	Soybean	Not Allowed
2,4-D (Labels vary)	Soybean Corn Fallow, stubble	Not Allowed 7 DAA 7 DAA
2,4-DB	Alfalfa - Established - Seedling Soybean	30 DAA 60 DAA 60 DAA

Grazing and Haying Restrictions for Herbicides Used in Pasture and Rangeland.

Herbicide ¹	Lactating dairy animals		All animals except lactating dairy animals		
	Before grazing	Before hay harvest	Before Grazing ⁹	Before hay harvest	Removal before slaughter
	----- days after application -----		----- days after application -----		
Amber	0	30	0	30	0
Cimarron Max*	7	-	0	37	30
Cimarron Xtra*	0	0	0	0	0
Crossbow	Next season	Next season	0 ²	14	3
Curtail*	14	7	0	7	7 ³
Dicamba ¹					
Up to 1 pt	7	37	0	0	30
Up to 2 pt	21	51	0	0	30
Up to 4 pt	40	70	0	0	30
Up to 16 pt	60	90	0	0	30
Escort*	0	0	0	0	0
Facet L	No grazing restrictions. Allow 7 days before haying.				
Glyphosate ¹					
Pre/Renovation - < 2.25 lb ae/A	No restriction	No restriction	No restriction	No restriction	No restriction
- > 2.25 lb ae/A	8 weeks	8 weeks	8 weeks	8 weeks	8 weeks
Spot Spray - Bayer ⁶	7	7	7	7	7
- Generics	14	14	14	14	14
Broadcast (8-11 fl oz)	No restriction	No restriction	No restriction	No restriction	No Restriction
Grazone P+D	7	30	0	30	3
Landmaster BW* ⁵	7	30	0	30	3
Method	Do not graze or feed		Do not graze or feed		-
Milestone	0	0	0	0	0
paraquat* ⁴	1 month	1 month	1 month	1 month	0
Perspective	Do not graze or feed		Do not graze or feed		-
Plateau	0	7	0	7	0
Rave	7	0	0	0	0
Spike ⁷	0	1 year	0	1 year	0
Stinger*	0	0	0	0	0
Telar* (<0.3 oz/A)	0	0	0	0	0
Tordon 22K ⁸	14	1 qt =14, <1qt=0	0	1 qt =14, <1qt=0	3
2,4-D/MCPA ¹ (labels vary)	7-14	7-30	0-7	7-30	3-7

*Or generic equivalent.

¹These are from Roundup Powermax label. Check specific label containing the same active ingredients for restrictions and uses.

²One year if more than 1.5 gallons/A is used.

³Withdrawal not needed if 2 weeks or more of time elapsed since application.

⁴Restrictions based on degree of new seedlings established before grazing. Suggested at least 6 inches of grass or legume growth.

⁵No restrictions if 10% or less of the area is treated.

⁶Do not treat more than one-tenth of any given acre at one time with spot or wiper application. Remove livestock before application.

⁷If no more than 20 lb/A is used.

⁸Remove livestock to untreated grass pastures for 7 days before transferring livestock to broadleaf or pasture areas. Removal before slaughter statement only applies to animals grazing treated forage for 2 weeks immediately after application.

⁹Some labels do not specify a grazing restriction.

North Dakota State University
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NDSU Dept. 7660; PO Box 6050
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Janet Knodel
Co-Editor

Entomology
701-231-7915

Plant Sciences
701-231-7971

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Sam Markell
Marcia McMullen
Co-Editors

Plant Pathology
701-231-7056

Weeds
701-231-7972

Ag Engineering
701-231-7261

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