MIGRATORY INSECTS

With the recent thunderstorms, it is not surprising that migratory insects will be blown into North Dakota with the southerly winds. Some of these insects are pests that are looking to feed on our emerging field crops. Two insect pests that have been observed at non-economic levels are:

ARMYWORM does not overwinter in ND. Adult moths, also called miller moths, are a light brownish gray moth with a conspicuous white spot about the size of a pinhead on each front wing. When expanded, the wings are about 1½ inches across. However, larvae (caterpillars) do all of the feeding injury to crops. Full-grown larvae are green-brown with a brown head and longitudinal stripes on the sides. They grow to a length of 1½ to 2 inches.

Field scouting for armyworms should be done in field margins, low areas with vigorous plant growth, and areas where plants have lodged. Indications of armyworm feeding include leaf defoliation, worm frass (droppings) around the base of plants, and defoliated leaves in lodged areas of wheat fields. Larvae complete feeding in 3 to 4 weeks, staying in the area where they hatched until they run out of food. If all food is consumed, larvae often move in hordes or “armies,” eating and destroying vegetation as they move.

For proper pest management, it is important to scout and control armyworms while they are small larvae and before extensive feeding damage has resulted. Look for larvae beneath plant debris around the base of plants and on heads of wheat or barley.
Since armyworms feed at night, spray in early evening and use adequate water volume to get the insecticide into the crop canopy (3-5 gallons per acre by air). The economic threshold is **4-5 armyworms per square foot** in wheat or barley.

For more information, see the NDSU Extension publication *The Armyworm and the Army Cutworm E830 (revised).*

**PAINTED LADY BUTTERFLIES** are beautiful butterflies of our pollinator gardens, but the larval stage (caterpillar) can become a pest when large numbers of painted lady butterflies migrate into North Dakota from the southern states. Thistle caterpillars have become a more regular insect pest of sunflower, soybean, dry bean and vegetable plants. Of course, it prefers to feed on Canada thistle as its name implies. However, thistle caterpillar does not control the noxious thistle weed due to its extensive root system. Painted lady butterflies are often attracted to crop fields that are weedy with Canada thistles for egg-laying.

Thistle caterpillars are dark brown or black with yellow stripes on the side of the body, spiny hairs, and are about 1¾ inch long when mature. It feeds on leaves for two to four weeks causing severe defoliation when densities are high. Loose webbing creates a nest in leaves when the caterpillars feed. Black fecal pellets can also be found in the webs. Mature caterpillars pupate, and adult butterflies will emerge in 7 to 10 days. Two generations are typical in North Dakota.

Minnesota Extension Specialists have also reported **CEREAL APHIDS** and **ASTER LEAFHOPPERS** in small grains, but there are no reports of either pest for North Dakota yet.

Janet J. Knodel  
Extension Entomologist
IPM CROP SURVEY STARTS

Six scouts and two insect trapper were hired for the 2020 Integrated Pest Management (IPM) Survey in field crops of North Dakota! A webinar training was conducted on June 3rd to discuss pest identifications and scouting protocols. Field scouts will survey for major diseases and insect pests on wheat, barley, sunflower and soybean. The purpose of the survey program is to monitor for economic pests that negatively affect crop yields. Timely pest alerts will be provided for producers, crop consultants and agronomists to assist with pest management. GPS coordinates are recorded with pest data, and ArcView maps will be created to show incidence and severity of pests in North Dakota. Maps are posted weekly on the NDSU IPM web page (usually by Wednesday of each week).

https://www.ag.ndsu.edu/ndipm

Important pest activity will also be summarized for the NDSU Extension Crop and Pest Report and other social media.

The NDSU IPM scouts are:

- **Sean Nichols**, central and south central counties, working out of Carrington REC with Greg Endres
- **Kia Ward**, southwest and west central counties, working out of Dickinson REC with Ryan Buetow
- **Spencer Furniss and Riley Racine**, north central counties, working out of NCREC in Minot with Travis Prochaska
- **Scott Roseth**, northwest counties, working out of Williston REC with Jerald Bergman
- **Marc Michaelson**, southeast and east central counties, working out of NDSU campus, Fargo with Jan Knodel, Andrew Friskop and Sam Markell.
- **Nancy Feil and Traci Murphy**, northeast counties, working out of Langdon REC with Leslie Lubenow, Anitha Chirumamilla and Benson County Extension Office with Scott Knoke

This work is supported in part by the Crop Protection and Pest Management Program [grant no. 2017-70006-27144] from the USDA National Institute of Food and Agriculture, and the North Dakota Department of Agriculture.

Janet J. Knodel
Extension Entomologist

Andrew Friskop
Extension Plant Pathologist
SUGARBEET ROOT MAGGOT ALERT: FLY ACTIVITY PEAKS EXPECTED NEXT WEEK

The recent periods of hot weather have accelerated the accumulation of sugarbeet root maggot (SBRM) growing degree day (DD) units, and fly activity has increased significantly in the past couple of days throughout much of the Red River Valley (RRV). In a collaborative effort between NDSU and American Crystal Sugar Company, 149 Red River Valley (RRV) field sites are being monitored every Monday, Wednesday, and Friday by using sticky-stake traps (Figure 1).

Current SBRM outbreak areas include the following (in descending order of cumulative fly counts): Thompson, St. Thomas, Bathgate, Warren, East Grand Forks, Buxton, Crookston, Reynolds, Crystal, Auburn, Fisher, Hoople, Cavalier, Ada, Grafton, Argyle, Voss, and Grand Forks. Over 600 flies per site (2-trap total) have been recorded near St. Thomas and Thompson thus far, and at least 100 flies per site have been captured on stakes in the other above-mentioned locations. This is very concerning, as peak fly activity is not expected for another 3 to 6 days in most of the problem areas. Therefore, it is highly likely that many more flies will be emerging and colonizing beet fields in the coming week to 10 days.

Visit here to monitor SBRM fly counts in your area and throughout the RRV. NOTE: this monitoring project provides a general idea of where potential root maggot fly hot spots are developing throughout the growing season; however, it is not a substitute for monitoring specific activity in individual fields.

Peak fly activity typically coincides with the first rain-free, warm (about 80°F), low-wind (< 10 mph) day on or after the accumulation of 650 degree-day (DD) units. Accumulated DD units for all locations within the RRV is presented in Figure 2.
As presented in Table 1, SBRM fly activity will be peaking in the southern Red River Valley late this week. Peaks in the central Valley (Ada/Hillsboro areas) are expected to occur around Saturday, June 13. In the more northerly parts of the Valley, activity peaks are expected on June 16 in the Grand Forks/Crookston areas, and on June 17 in the vicinity of Grafton, St. Thomas, Cavalier, and Bathgate.

**Table 1. Accumulated degree-day (DD) units and peak fly activity predictions for the Red River Valley**

<table>
<thead>
<tr>
<th>Location</th>
<th>Total DD (as of June 8)</th>
<th>High Fly Activity Period</th>
<th>Maximum Likelihood Peak Fly Date*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fargo, ND</td>
<td>627</td>
<td>June 10-12 (+80°F, dry, and low winds)</td>
<td>June 11</td>
</tr>
<tr>
<td>Ada, MN</td>
<td>595</td>
<td>June 12-14 (+80°F, dry, and low winds)</td>
<td>June 13</td>
</tr>
<tr>
<td>Grand Forks, ND</td>
<td>553</td>
<td>June 15-17 (+80°F, dry, and low winds)</td>
<td>June 16</td>
</tr>
<tr>
<td>St. Thomas, ND</td>
<td>529</td>
<td>June 16-18 (+80°F, dry, and low winds)</td>
<td>June 17</td>
</tr>
</tbody>
</table>

*Maximum likelihood for peak fly activity is based on extended weather forecasts for wind speed, air temperature, and precipitation. Peak fly in current-year beets usually coincides with the first rain-free, calm/low-wind day to reach 80°F after 650 DD are accumulated.

**CONTROL:** Growers in hotspots or high-risk areas for SBRM infestation should plan on applying a postemergence insecticide, especially if an insecticidal seed treatment or a low to moderate rate of an at-plant soil insecticide was applied. This is especially the case for late-planted fields, because those plants are atypically small and more vulnerable to attack by root maggot larvae.

Postemergence liquid insecticides work best if applied close to (i.e., 2-3 days before, during, or within 2 days after) peak fly activity. As such, growers expecting to use a liquid spray should monitor fields closely during the next two
weeks for fly infestation buildups. Growers who have already applied a postemergence liquid insecticide and expect to make a second application should rotate with a different mode of action (e.g., if chlorpyrifos was used for the first treatment, rotate to a pyrethroid such as Asana XL or Mustang Maxx for the second treatment.

There is also still time to apply a granular insecticide, as they should be applied at a minimum of 5 days before peak fly. They also work well in moist soils, which are now quite common throughout much of the SBRM problem area.

Monitor local agricultural media sources (radio, Crop & Pest report, and the “Fly Counts” web page (address listed above) for further updates on root maggot control and other insect pest management topics. Remember to always READ, UNDERSTAND, and FOLLOW all label directions and precautions. It is illegal to use a pesticide in a manner inconsistent with its label. For more guidance on postemergence control strategies, consult the “Insect Control” section of this year’s Sugarbeet Production Guide.

Mark Boetel
Research & Extension Entomologist

**Dry Bean Growing in North Dakota**

NDSU authors have revised the “Dry Bean Production Guide” (A1133-20 Figure 1). The publication is intended for agricultural producers growing dry bean as a crop. The text covers basic plant adaptation, crop production, variety and field selection, fertilization, inoculation, seeding, weed control, diseases, insects, rotational benefits and harvesting.

Dry beans is a human food high in protein, phosphorus, zinc, iron, vitamin B1 and fiber, among many other nutritional traits. Dry beans are an important staple food in many areas of the world, especially in Central and South America, and Africa. Pinto is the most important market class in North Dakota, based on acreage and value, followed by navy and black bean. These three market classes account for approximately 95% of the total acres of production. Kidney, pink, small red, cranberry and others are grown on limited acres.

Dry bean plant development has been divided into vegetative (V) and reproductive (R) stages. Vegetative stages are determined by counting the number of trifoliolate leaves (V1 to Vn) on the main stem beginning above the unifoliolate leaf. Reproductive stages are described with pod and seed characters in addition to nodes. At the time of first flower (reproductive stage indicated by R), secondary branching begins in the axis of lower nodes, which will produce secondary groups of flowers and pods. A node is counted when the edges of the leaflets no longer touch.

With hot weather and thunderstorms, hail can occur. The amount of crop damage in dry bean caused by hail will depend on the intensity, size of hail stones and duration, as well as stage of development. The dominant growing point of the dry bean plants is located at the top of the plant where new leaves are emerging. There are also axillary buds in leaf axils that can serve as growing points where new branches can develop. If the top of the plant is damaged, or the stem is cut off above the cotyledonary node, the plant will re-grow from one or more of the axillary buds. Severe hail damage can delay plant maturity. Limited yield reduction will result from hail damage during the early stage of plant development, as there is time available for plant recovery.

Hans Kandel
Extension Agronomist Broadleaf Crops
EARLY SEASON DROUGHT AND HEAT STRESS ON SMALL GRAINS

Rainfall during the past month has been below normal. The abundant rainfall last fall that filled the soil profile has helped to mitigate the effects of these deficits in most of the state. Nevertheless, about a third of the state (primarily in the west) is classified as being under moderate drought conditions. Not surprisingly, last week I received a call from a concerned grower wanting to know the impact of drought stress on small grains during early vegetative development. His crops were particularly hard hit since there were being grown on sandy ground.

Most small grain crops were planted later than normal this season and are still relatively small. Small plants with limited leaf area are not heavy water users. The early planted small grain crops, however, have nearly canopied and during some of the warmer days last week were using nearly a quarter inch of water a day. This rate of transpiration can rapidly deplete soil moisture in the absence of timely rain. Limited water availability to young plants is exacerbated by the fact that their roots systems are still developing and are limited in the amount of soil moisture they can exploit. Therefore, it is not surprising to learn that some field have exhibited symptoms of drought stress. If a plant shows a loss of turgor (wilting) during the early vegetative stages of development its ability to photosynthesize is reduced and yield potential can be impacted. Stress during the pre-jointing stages reduces the number of tillers that are produced and the size of the spikes that do develop. Established tillers may be lost if drought stress intensifies as the plant develops further. Dry soil around the crown reduces the plants ability to develop adventitious roots which are the primary roots for accessing water and nutrients as the plant develops beyond the seedling stage. The literature I reviewed while preparing a response to the concerned grower suggested that severe drought stress (visible wilting) during vegetative stages of development (assuming that it will not persist beyond a week or two) could reduce yields by 25%. The actual losses will depend on the severity and duration of the stress.

As concerning as the drought stress discussed above is the impact of the recent unusually warm day and night temperatures. The ultimate size of the spike can be significantly reduced by warm temperatures (see Figure 1). Small grains, however, are able to compensate to some extent for these reductions if conditions are favorable during the rest of the season. They can add extra kernels and add weight to kernels that do develop in the spike. Early heat and drought stress may have taken the top off the yield potential of the crop in some areas of the state, but with favorable conditions going forward there is still potential for the development of a reasonably good crop; stress during vegetative development is typically less impactful than stress during grain filling.

Figure 1. The effect of maximum daily temperatures on the number of spikelets per spike that are initiated between the 4 and 5.5 leaf stage of spring wheat in Langdon, ND (adapted from data provided by Terry Gregoire, retired Area Agronomist, NDSU)

Joel Ransom
Extension Agronomist, Cereal Crops
HOW LONG CAN SUGARBEET SURVIVE UNDER FLOODED CONDITIONS?

Most of the sugarbeet production areas in the Red River Valley received varying amounts of rainfall over the past three days (June 6 through 8). In a few areas, such as Humboldt, St. Thomas and Kennedy, 3.84 to 5.21” of rainfall were recorded resulting in standing water in some fields. As a result, some growers are wondering how long can sugarbeet at seed, cotyledonary, 2-, 4- and 6-leaf stages be in flooded conditions and survive. We know from experience that sugarbeet can tolerate flooded conditions better than most other crops. However, there is little research data to provide definitive answers. Research was done at NDSU greenhouse to determine how long various stages of potted sugarbeet grown in Fargo clay soil could be in flooded conditions and survive. The research indicated (data shown below) that larger beets (4-leaf and 6-leaf) survived well even after 96 hr (4 days). Seedling emergence was good after the soil was covered with water for 24 and 48 hr and was not significantly different from emergence under ideal conditions. However, emergence decreased significantly after 72 and 96 hr of flooding. Cotyledonary beets were susceptible to flooding with about 50% survival. Two-leaf stage beets were able to withstand 24 hr of flooding but survivorship decreased as the duration of flooding increased. It is possible that in fields, plants may survive longer if the water is moving, and in cooler conditions compared to the greenhouse temperature that ranged from 75 to 82° F.

<table>
<thead>
<tr>
<th>Submergence (hr)</th>
<th>Seed(ling) (% emergence)</th>
<th>Cotyledon (%)</th>
<th>2-If (%)</th>
<th>4-If (%)</th>
<th>6-If (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>24</td>
<td>81 ab</td>
<td>53 b</td>
<td>73 ab</td>
<td>100 a</td>
<td>100 a</td>
</tr>
<tr>
<td>48</td>
<td>76 ab</td>
<td>56 b</td>
<td>53 bc</td>
<td>100 a</td>
<td>100 a</td>
</tr>
<tr>
<td>72</td>
<td>66 b</td>
<td>42 b</td>
<td>48 bc</td>
<td>100 a</td>
<td>100 a</td>
</tr>
<tr>
<td>96</td>
<td>41 c</td>
<td>52 b</td>
<td>23 c</td>
<td>92 b</td>
<td>100 a</td>
</tr>
<tr>
<td>Check</td>
<td>84 a</td>
<td>100 a</td>
<td>100 a</td>
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</tbody>
</table>

IT IS TIME TO SCOUT AND RECORD SUGARBEET FIELDS WITH FUSARIUM

Fusarium yellows/decline symptoms were observed in research plots in the Moorhead factory district. The fungi Fusarium oxysporum and Fusarium secorum cause Fusarium yellows and Fusarium decline, respectively, on sugarbeet. Fusarium yellows/decline may cause significant reduction in plant stand and root yield, and it is recommended that infected roots not be placed in long-term storage.

The pathogens may infect seedlings and older plants in fields where average daily soil temperature is at or above 55° F and in the presence of adequate moisture. In seedlings and young plants, oldest leaves become yellow followed by wilting and death (Figure 1). On older plants (4 leaves and older), symptoms include interveinal yellowing and death of older leaves (Figure 2). Sometimes there is distinct necrosis of half the leaf on one side of the midrib (Figure 3), which then spreads to the other side of the mid-rib. Under severe disease conditions, infected plants may die
with seedling being more vulnerable. Cross sections or longitudinal sections of infected roots will show darkening of the vascular system (Figure 4). In fields where the disease is not severe, older leaves of infected plants display typical foliar symptoms but the plants survive. Infected plants have roots with no external symptoms but may be spangled and with typical darkening of the vascular system. Roots of infected plants do not store well in piles and have high respiration rates which results in low sugar concentration during storage. The best and only way to manage Fusarium yellows/decline is by planting varieties with tolerance to Fusarium yellows and other root diseases common to specific fields. Consult your agriculturists or seed sales representatives for Fusarium tolerant varieties appropriate for your growing area. At this time, fields should be scouted for Fusarium yellows/decline and records should be kept to be used when deciding on varieties the next time these fields are planted to beets.

![Figure 1. Foliar symptom of Fusarium yellows on 2-4 leaf stage sugarbeet showing wilting and yellowing of cotyledons and true leaves under warm and dry conditions in 2020.](image-url)
Figure 2. Typical symptoms of Fusarium yellows on older plants include interveinal chlorosis and necrosis starting on oldest leaves followed by similar symptoms on younger inner leaves.

Figure 3. Yellowing and necrosis on half-leaf along the midrib that later spreads to cover the entire leaf.
Mohamed Khan  
Extension Sugarbeet Specialist  
NDSU & U of MN  
218-790-8596

**FUSARIUM HEAD BLIGHT RISK**

Winter wheat has progressed into the heading and flowering stages of development, while some of the earliest planted barley is about a week or two away from heading. As a reminder, there are two Fusarium head blight (FHB) risk tools that can be used to assess scab risk this year. One is available on the NDSU Small Grain Disease Forecasting website (https://www.ag.ndsu.edu/cropdisease), while a national model can be accessed at http://www.wheatscab.psu.edu/. The national model underwent revisions this past winter to make it more user-friendly (Figure 1). Currently, both the NDSU model and National FHB (Figure 2) model indicate low scab risk for ND.

A few questions have been received on what the latest rainfall events may do to scab risk. I like to call this rainfall an “activation” rain event. The fungal structures of the *Fusarium* fungus survive on host residue and need consecutive days of warm and humid weather (ie: what some areas experienced the past week) to mature and release spores. To put this in perspective, if a barley crop begins heading in two weeks, the recent weather events likely activated the fungal structures allowing spores to be available to infect barley spikes in the coming weeks. However, this will only occur if we continue to have prolonged periods of warm and wet weather, especially as the barley crop begins to head. A similar mentality can be used for the spring wheat crop as it approaches flowering later on this growing season.
Figure 1. The National Fusarium Risk Tool has expanded to include states west of North Dakota and is easy to use to find scab risk information.

Figure 2. Users can select the growth type of wheat (winter or spring) as well as the level of resistance to access scab risk information. Currently (June 9), scab risk remains low for the state.
DICAMBA: RECENT LEGAL RULINGS ON DICAMBA FORMULATIONS DESIGNED FOR OVER THE TOP APPLICATIONS TO TOLERANT SOYBEANS

On June 3, the U.S. 9th Circuit Court ruled that EPA had not carried out their statutory responsibility with respect to the issuance of three dicamba registrations: Engenia, FeXapan, and Xtendimax. As a consequence, the court vacated their registrations. Essentially, this is legal talk for saying these registrations no longer exist. You can read the ruling here:

https://cdn.ca9.uscourts.gov/datastore/opinions/2020/06/03/19-70115.pdf

What was so unprecedented about this ruling is the court did not give EPA any directions on cancelling these products. After reviewing the ruling, registrants stopped distribution to retailers on June 4. By that afternoon, the North Dakota Department of Agriculture (NDDA) indicated in a news release, that the sale and use of these products were no longer legal. By the afternoon of June 5, the NDDA reversed their earlier position and instructed dealers and applicators that sales and use may resume under state registration until such time as EPA clarified what the court ruling meant. You can read that statement here:


On the evening of June 8, EPA released a 12-page order regarding the distribution, sales and use of Engenia, FeXapan, and Xtendimax. You can read the actual order here; it is a cancellation order:


The main points of the order are as follows:

1. **Distribution or sale by the registrant.** Distribution or sale by the registrant (BASF, Bayer and Corteva) of all existing stocks of the three products listed below is prohibited effective as of the time of the order on June 3, 2020, except for distribution for the purposes of proper disposal.

2. **Distribution or sale by persons other than the registrant.** Distribution or sale of existing stocks of the three products listed above that are already in the possession of persons other than the registrant is permitted only for the purposes of proper disposal or to facilitate return to the registrant or a registered establishment under contract with the registrant, unless otherwise allowed in item #3 or #4 below.

3. **Distribution or sale by commercial applicators.** For the purpose of facilitating use no later than July 31, 2020, distribution or sale of existing stocks of the three products listed above that are in the possession of commercial applicators is permitted.

4. **Use.** Use of existing stocks of products listed above inconsistent with any respect with the previously approved labeling accompanying the product is prohibited. Use after July 31, 2020 is prohibited.

**List of Cancelled Products:**

- BASF, Engenia--EPA Registration Number 7969-345
- Bayer, Xtendimax with VaporGrip--EPA Registration Number 524-6 17
- Corteva, FeXapan--EPA Registration Number 352-9 13
On the afternoon of June 9, the NDDA released a statement concurring with EPA’s order. In addition, they reminded applicators that, under State 24C labeling, applications beyond June 30 are prohibited. You can read their statement here:


Moving forward, the Plaintiffs in the lawsuit contend that EPA’s June 8 order does not comply with the Court’s ruling. They will likely seek some additional relief from the Court. At the time of this writing, it is impossible to know what, if anything, this will mean for users of these products.

When the lawsuit was filed, Syngenta had yet to receive a registration for Tavium. It is not named in the court ruling, so Tavium may continue to be used as directed by Federal and State labeling on tolerant soybeans.

BASF, Bayer, Corteva, and Syngenta are all seeking registrations for their products for 2021 and beyond. Again, at the time of this writing, it is impossible to know if these products will be available next season and under what sort of labeling instructions. In the meanwhile, users of Xtend traited soybeans and users of the herbicides designed for them should closely monitor Federal and State directives to stay in compliance with the law.

Andrew A. Thostenson
Pesticide Program Specialist

DICAMBA: CONSIDERATIONS FOR DICAMBA ALTERNATIVES

Last week, we submitted a supplemental article to Crop and Pest Report that outlines some of the best alternative herbicide options for difficult-to-control weeds in the case where dicamba cannot be applied to Xtend soybeans. We have received further clarification on the ability to use approved dicamba products, but there may still be the need for alternative products on some of these acres. There are a few points I would like to address in more detail for these products.

We highlighted that Group 14 (PPO-inhibiting) herbicides are one of the best alternatives for many weeds. It is important to remember that using a Group 14 herbicide postemergence will require different application parameters than dicamba. It is not as easy as swapping out a dicamba herbicide for a Group 14 herbicide. Group 14 herbicides are contact herbicides and thus require smaller droplets than systemic herbicides like dicamba and glyphosate. Simply put, you will experience poor weed control if you spray Group 14 herbicides through your Xtend soybean spray nozzles. The adjuvant requirements will also be different than those required for dicamba applications. Best control will be achieved by selecting nozzles that produce smaller droplets, increasing carrier volume, and using full rates of oil adjuvants.

The other factor to keep in mind is that many of these herbicides could also be in limited supply depending on how many acres of Xtend soybean we will actually be able to spray with approved products. If you do choose to or need to use these products, it would be wise to start the process of finding products and adjuvants. Lastly, these Group 14 herbicides are contact herbicides and work best when applied to smaller weeds. Weed control will be best on tough weeds like kochia and waterhemp if they are 2 inches or smaller at application.


Joe Ikley
Extension Weed Specialist
DICAMBA: TIME PROVEN SOLUTIONS FOR WEED CONTROL IN ROW CROPS INCLUDING SOYBEAN

The chloroacetamide herbicides (SOA 15) were discovered and commercialized in the 1960s for grass and broadleaf weed control in many crops including soybean. Dual Magnum, Harness, Outlook, Warrant and Zidua are commonly used SOA 15 herbicides. These herbicides historically were used preplant or preemergence in row crops. More recently, these herbicides have been used early postemergence following a PRE herbicides in row crops including soybean and sugarbeet where they provided extended residual activity for troublesome weeds including waterhemp. Chloroacetamide herbicides are activated by rainfall totals ranging from 0.25 to 0.75 inch, depending on herbicide and soils and have a reasonably low risk of herbicide resistance since they often are used in a systems approach for weed management with other herbicides.

NDSU research indicates chloroacetamide herbicides timed 21 to 28 days following PRE application or when soybean ranges from the V3 and V5 stage provide good to excellent waterhemp control. In a 2016 experiment, Warrant applied early POST and following Authority MTZ improved season long waterhemp control 27% and 47% compared to Authority MTZ PRE fb PowerMax or Warrant plus PowerMax EPOST in soybean. Similar results have been reported in other low growing crops such as sugarbeet confirming season long waterhemp control when residual herbicides are layered or applied PRE followed by EPOST. Please check product specific label for specific growth stage details. SOA 15 herbicides do not control emerged weeds.

DICAMBA: INTER-ROW CULTIVATION

Dr. Richard Zollinger’s presentations often featured SOA 31. His message was properly timed inter-row cultivation was effective for controlling weeds and weeds do not develop resistance to cold hard steel.

Cultivation removes weeds that glyphosate fails to control, but the removal is limited to between crop rows and remaining weeds should be removed through other means such as hand weeding. NDSU research reports cultivation improved waterhemp control by 10 to 15% in sugarbeet compared to glyphosate plus a chloroacetamide POST. We did, however, observe cultivation in an underdeveloped crop canopy (less than 8-In sugarbeet) followed by excessive rain caused further weed flushes to become worse than plots without cultivation.

Chloroacetamide herbicides (SOA 15) have an effective life of 2 to 3 weeks and our data indicates cultivation 2 to 3 weeks following residual herbicide application does not interfere with herbicidal activity, but some producers may consider following cultivation with another residual herbicide application (layered application or residual herbicides) to further suppress weed flushes.
My department chair recently texted me a photo of a heavily defoliated columbine and a closeup of the critter causing the damage, and asked “What are these little green worms eating my wife’s columbine leaves?” After responding, I promptly checked our columbines and sure enough, I found the same culprit — columbine sawfly larvae. Columbine sawfly (*Pristiphora rufipes*) is native to Europe but is adventive and widespread in North America. Adults (not pictured) are small, stingless wasps with dark wings and orange legs. Larvae (Figures 1 and 2) resemble small green caterpillars, and reach a length of just over 10 mm when mature. Note the fleshy prolegs on the abdomen — sawfly larvae have six or more pairs, while true caterpillars have five or fewer.

The larvae begin feeding along leaf margins, and eventually consume the leaves except for the midribs. A heavily defoliated plant (Figure 3) has a characteristic skeleton look to it. Fortunately, the damage is only aesthetic and plants will recover fully unless drought stressed. Larvae do not feed on the flowers. Adults emerge in early May and lay eggs on the leaves. Larvae begin hatching in late May and can continue to feed through mid-June or later, depending on the year. When mature, larvae drop to the soil to pupate, and remain as pupae until the next spring when they finish development and emerge as adults. There is only one generation per year.

Control is aimed at the larvae. For light infestations, larvae simply can be picked off or shaken off and drowned in a cup of soapy water. Insecticidal soap is effective on small larvae, but the larvae must be completely covered by the soap spray. Bt spray, while effective on young true caterpillars, DOES NOT work in controlling sawfly larvae. Ready-to-use pyrethroid insecticides labeled for use on ornamental plants can be used, but only as a last resort because birds will consume the larvae, and pollinators such as bees, butterflies and hummingbirds visit the flowers for nectar. Look for the active ingredients cyfluthrin or esfenvalerate. Cover the flowers and apply only to the leaves and stems according to the label instructions. Once the spray dries, uncover the flowers. If you decide to use an insecticide, be sure to read, understand and follow the directions on the product label.

*Patrick Beauzay*
State IPM Coordinator
Research Specialist, Extension Entomology
AROUND THE STATE

NORTH CENTRAL ND

Some much welcomed rain was observed across the state this past weekend, however, many could have gone without the severe weather component. Observed reports of precipitation throughout the area were as follows (week starting May 31st): Minot: 0.62” (NCREC: 0.74”); Bottineau: 0.66”; Garrison: 0.89”; Karlsruhe: 0.41”; Mohall: 0.92”; Plaza: 0.45”; and Rugby: 0.35”. Bare soil temperatures at the NCREC was observed at 73°F as of June 8th. Some hit and miss showers could be possible throughout the week.

Spring wheat continues to advance through the tillering stages. Soybean is in the cotyledon stage with field pea in the V3 to V4 vegetative stages. Canola is observed between the rosette and the V2 stage. Canola flea beetle populations continue to hold in the area. Some hit and miss grasshoppers are being observed in area ditches near field edges. Nothing to be concerned of yet – but something to take note of at this time. Herbicide applications are continuing in the area when weather permits. Spencer Furniss and Riley Racine will be serving as the area scouts for the Summer of 2020. They are based out of the NCREC will begin their duties this week scouting for any potential crop disease and insect issues that may be in the area.

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

NORTHWEST ND

Planting is wrapping up in Northwest North Dakota. I was out in the Ray area on Friday and saw two seeders out but in the western part of Williams County, seeding is done and crops are emerging. Earlier planted fields are up with rows visible in many places. Scattered thunderstorms moved through the region over the weekend with strong winds and some rain, though moisture was not widespread. The Dagmar, MT NDAWN station showed 0.31”, Alamo had 0.15”, Crosby 0.79”, and the Williston station 0”. A few showers continued the morning of Monday June 8th, but less than 0.1” fell in most places. More moisture is needed to get crops off to a good start, but unfortunately there is not much in the forecast. High temperatures are predicted to be in the 70’s and 80’s this week with very low chances of showers.

Here at the Williston REC, winter wheat is headed out with a few anthers showing on early varieties. Spring wheat and durum are tillering, pea is V6-V7, and lentil V4-V5. The weeds are growing quickly and now is the time for in-crop spraying. Horseweed is bolting and I’ve seen a few narrowleaf hawksbeard flowers in some fields.

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

Significant planting progress was made this past week with ranges from 80 to 100% completed. Prevent Plant appears to be in the 20-30% across the region. There are farmers wanting to plant late season beans but recent rains are likely to change plans. Rains varied across the region with 5 inch plus amounts in the NE and much lesser amounts to the west and south. Early season small grains are looking very good, with 4-5 leaves scattered across the region and spraying beginning on earlier planted fields. Post emergence herbicide has been in full swing as rain permits. Temperatures in the 80's have really helped the crops progress this past week. There is still standing corn fields to harvest and with strong thunderstorm winds laying many fields down will greatly reduce the amount of harvested acres. The eastern portion of our region is at a high risk for sugar beet stem maggots and growers need to monitor the situation closely. Cutworms are noticeable in the area, and there not any flea beetle activity that has been reported. Lots of conversation about prevent plant and how to handle the acreage across the region is being asked.

Bill Hodous
Ext Agent/Ramsey County
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SOUTH-CENTRAL/SOUTHEAST ND

According to NDAWN, rainfall during June 1-8 ranged from 0.2 inch (Jamestown) to 2.8 inches (Oakes), with the Carrington REC receiving 0.3 inches. Areas that received moderate amounts of rain during the past weekend have rewetted topsoil moisture, resulting in PRE herbicide activation and a favorable environment for late-planted crop seed germination. High winds on June 6 moved soil (erosion), and damaged trees and various structures. Various levels of hail also were reported in the region.

Alfalfa is at the bud stage and harvest has begun in southern ND. Winter cereals generally are in the boot to early seed formation stages. Barley and spring wheat seeded late April are in the jointing to early heading stages. Late-April planted corn has 5 leaves and soybean is in the second trifoliolate (V2) stage. Row crop planting likely will end this week. Averaged across 11 NDSU planting date trials, dry bean (pinto, black and navy) had similar yield (19.3 cwt/acre) when planted June 5-13 compared to yield (19.0-19.1 cwt/acre) with mid- or late-May planting periods.

Pinto bean ‘green’ planted with winter rye.

Greg Endres
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NDSU Carrington Research Extension Center
SOUTHWEST ND

Scattered showers have brought some much needed moisture to the region, however more is still needed for many. On June 9th Dickinson received 0.10 inch, bringing our total for the month up to 0.24 inch. Winter wheat at the Dickinson REC is beginning to head out, and spring planted small grains are anywhere from just beginning tillering up to stem elongation depending on planting date. As weeds emerge during the summer don’t forget to keep a vigilant eye out for palmer amaranth. A range of insect concerns have been brought up in pockets across the region, some dealing with cutworm, wireworm, flea beetles, and pea leaf weevil. While the symptoms of pea leaf weevil now may just be mild defoliation, remember that the larva feed on the root nodules, potentially reducing nitrogen fixation. For more information on scouting and economic thresholds be sure to check out the NDSU Extension Pea Leaf Weevil management publication. https://www.ag.ndsu.edu/publications/crops/integrated-pest-management-of-pea-leaf-weevil-in-north-dakota/

Ryan Buetow
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WEATHER SUMMARY AND OUTLOOK

Many parts of the region were looking for rain and although all North Dakota Agricultural Weather Stations recorded at least some precipitation, amounts varied greatly (Figure 1). The northern Red River Valley was situated near a stalled warm front where thunderstorms developed over and over the same area (training) and in turn 3 to 6 inches of rain was recorded. Before the rain, that area was mostly quite dry, but that changed quickly to overly saturated with overland and river flooding. These next 7 days it does not appear a strong low pressure system will move through, meaning, the rain that does fall through the middle of next week looks more hit and miss and outside of a localized area, significant rainfall seems unlikely, at least through early next week.

As was the case with rainfall, temperature anomalies varied significantly across the region. Far western North Dakota and eastern Montana recorded temperatures near to slightly below average, whereas, parts of eastern North Dakota and western Minnesota recorded temperatures 5 to 7 degrees above average for early June (Figure 2). These next 7 days will start off cool, in fact, some locations may record lows in the 30s the next couple of mornings, but much warmer temperatures will return this weekend into early next week.
The projected growing degree days (GDDs) base 32°, 44° and 50° for the period of June 11 through June 17, 2020 can be found in Figure 3. A high percentage of these growing degree days will occur Sunday through next Wednesday.

Using May 1 as a planting date, accumulated growing degree days for wheat (base temperature 32°) is given in Figure 4. 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)
Using May 20 as a planting date, accumulated growing degree days for corn (base temperature 50°) is given in Figure 5. 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 5. Accumulated Growing Degree Days for Corn (Base 50°) since May 20, 2019](image)

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

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