In The Field

Sulphur Cinquefoil

Sulphur cinquefoil has a taproot, which dies back after a freeze. Regrowth from the roots may produce serval erect stems 0.3 to 0.9 meters (1 to 3 feet) tall. Leaves are composed of five- to seven-toothed leaflets that radiate from a common point. Long stiff hairs extend outward from the stems at right angles. Flowers are pale yellow/sulfur-colored with five heart-shaped petals produced at the end of the stems in June and July. Each flower produces hundreds of seeds, which can be scattered by water, wind, animals, and hay.

Sulphur cinquefoil has no forage value for livestock and contains high amounts of tannins, which can interfere with the digestive process. Wildlife have been observed to graze on the seed heads in the fall.

2020 Soybean Gall Midge Alert Network

In 2018, soybean gall midge (Figure 1ab) emerged as a new species causing significant injury (Figure 1c) and yield loss to soybean in Nebraska, Iowa, South Dakota and Minnesota. The rapid widespread emergence of this new pest has left growers, consultants and researchers with significant gaps in critical information that is necessary to mitigate and manage this new threat.

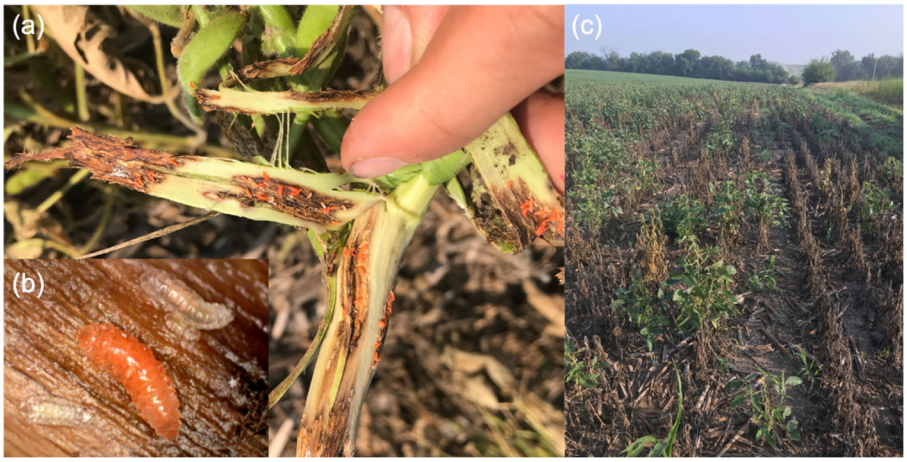


Figure 1. Damage caused by soybean gall midge.

Soybean Research Program (NCSRP), Nebraska Soybean Board (NSB) and North Central IPM Center to monitor soybean gall midge adult (Figure 2) emergence using cages (Figure 3) across 27 sites in four states providing growers and consultants with information to aid in the timing of insecticide applications.

Figure 2. Soybean gall midge adult.

Figure 3. Emergence cages.

Continued support from the NCSRP and NSB has allowed for the establishment of 18 sites in Nebraska (Figure 4). Sites for tracking adult emergence are also set up in Iowa and Minnesota. Covid-19 restrictions have limited South Dakota's participation in the project.

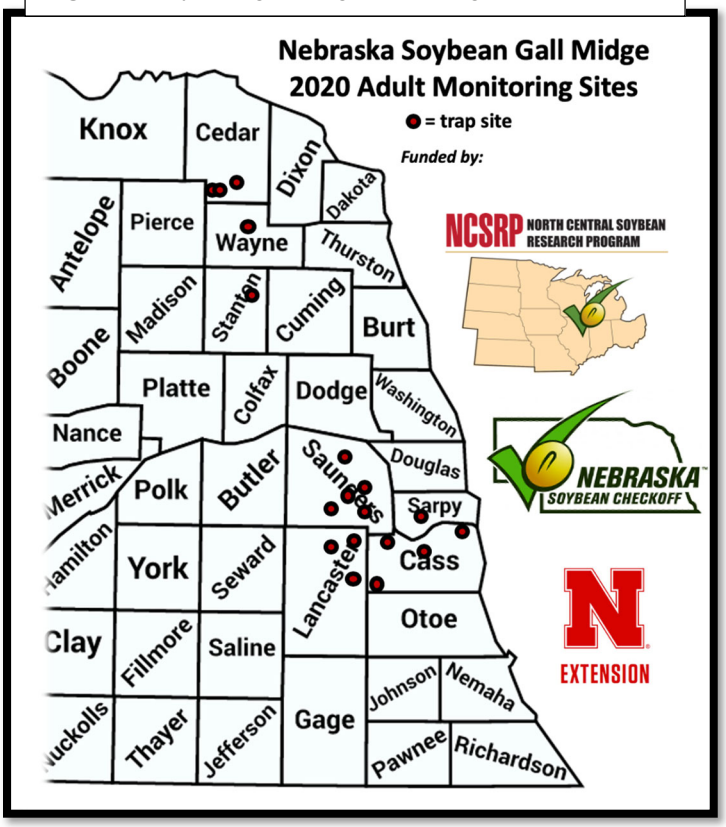
To sign up to receive alerts regarding adult emergence, send an email with your name, phone number and email address to justin.mcmechan@unl.edu with the subject line "SGM Alert Network". Those that signed up in 2018/19 do not need to sign up again.

Soybean Gall Midge Management Strategies

As a grower or consultant, many of you may be wondering what the best strategies are for managing soybean gall midge in 2020. Our 2019 data suggests that we had no single management strategy that could eliminate soybean gall midge injury. Here are some potential considerations for high risk fields during 2020 season.

1. Plant your high-risk fields last
2. Mowing grassy borders around infested fields prior to emergence showed a potential for reduced infestation in 2019 (this was one field and more research is needed)
3. Seed treatments may reduce infestation, but more data is needed
4. Foliar insecticides (pyrethroids) applied at 2 days prior to adult emergence and up to 10 days after first emergence showed a yield response. Caution should be taken as this study was conduct on a field with soybean the previous year.
5. Soybean gall midge egg laying appears to be limited to plants that are at about the V3 stage and later, as they may need natural fissures (cracks) that form at the base of the stem. Insecticide applications should be delayed until plants are susceptible to gall midge.

Figure 4. Soybean gall midge monitoring sites.



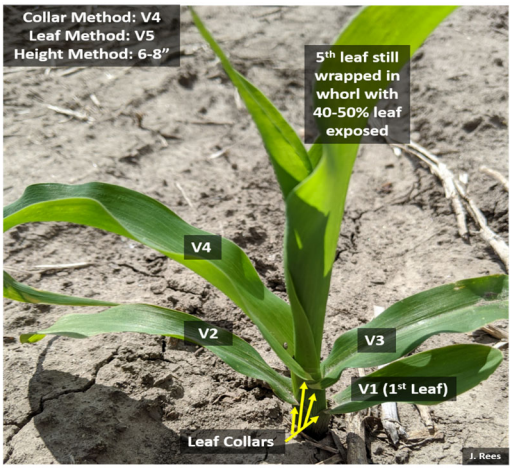
As growers consider these management practices, one primary consideration should be the duration of soybean gall midge adult emergence. Data from 2019 indicated an average of 16 days of adult emergence from a given site. This means that foliar insecticide application is unlikely to provide protection for the entire duration of adult emergence.

Although there is no specific indication of when soybean gall midge adults will emerge, we anticipate emergence will occur sometime in early to mid-June.

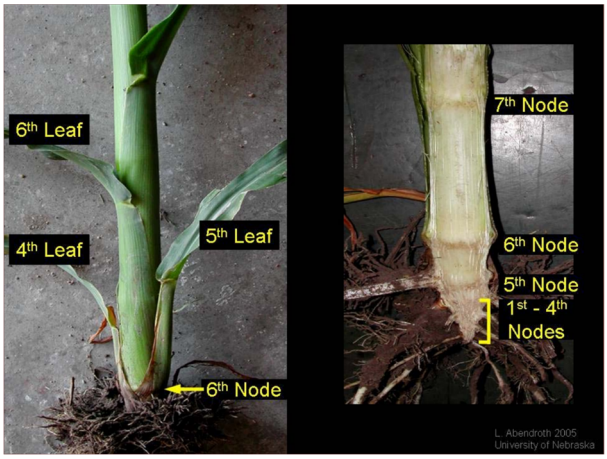
Source: Cropwatch.unl.edu

Corn Ear Development Impacts from Post-emergence Pesticide Applications

Corn ear abnormalities have been noted the past few years. Tracing back the information on various field calls often pointed to a misunderstanding of proper growth stages when making post-emergence herbicide applications in addition to pre-tassel fungicide and insecticide applications. Please see Figures 1 and 2 and Accurately Growth Staging Corn after Lower Leaf Loss and Implication for Post-emergence Herbicide Application https://cropwatch.unl.edu/2020/accurately-growth-staging-corn-after-lower-leaf-loss-and-implication-post-emergence-herbicide for more information on proper growth staging of corn.



Figures 1 and 2. Using the leaf collar and split stalk methods to stage corn.



Development Staging Misunderstandings: Because some herbicide labels use the 'plant height method' of staging, it's important to understand the role of environment on plant heights. The growth stage that is most restrictive should be followed when both corn leaf stage and height are listed on the label. Warm conditions can lead to rapid plant growth, longer internodes, and taller plants while cooler spring conditions, such as in 2019, lead to shorter plants due to shortened internode lengths. What may look like a V8 (8th leaf stage) plant one year or in one field may be a V10 plant in another field based on height. In 2019, many problematic situations authors were called out to appeared to be in the V8-V10 by plant height when they were actually V11-V13 (due to shortened internode length and splitting stalks). The farmers and/or agronomists were misled (due to shortened internode length. The actual development stage can be determined by splitting stalks).

Another misunderstanding we have encountered is incorrect corn development staging even when stalks are split. There are 4 nodes (from which the first 4 leaves develop) found in the inverted triangle at the stalk base. Those who don't account for these 4 nodes can mistake a V12 plant for a V8 plant (12-4=8). This makes a large difference in regards to post-emergence herbicide application timing and potential impact to ear development.

Uneven crop emergence in the field can also result in crop injury. Especially as one considers VT fungicide applications, injury has the potential to occur on plants that are behind and in the vegetative stages compared to the majority of plants in the field. Consider applications at full brown silk instead to account for plant-to-plant variation within the field.

Abnormal Observations by Development Stage: **V5-V8:** In general, number of rows around for a particular hybrid are determined between V5-V8. In most hybrids, the primary ear shoot initiates around V6 with row number often determined around V7. Iowa State's "How a Corn Plant Develops" states, "The row number is strongly related to a hybrid's genetics and impacted only by serious environmental factors such as drought, nutrient deficiencies, and improper herbicide applications."

We've also seen impacts to kernel row number when products were applied in a tank-mix in this time-frame. When combining herbicides, fungicides, insecticides, and nutrient products, it's important to consider the surfactant load of those products and also any potential antagonism with each other. Sometimes the combination can cause one of the individual products to be "hotter" (stronger) than normal. Particularly applying post-emergence herbicide with fertilizer may result in crop injury. Couple that with various environmental conditions, such as cool/wet, can result in slow growth of the corn plant and a limited ability to metabolize the chemical. To minimize impacts to the crop, it's best to keep product tank-mix to a minimum. When using a tank mixture, follow the recommendations for the most restrictive label language of the products being used in the tank-mix.

V12+: Beginning at V12 through around a week prior to pollination, number of ovules per row is determined. Stress during this time impacts kernel row length and can cause shortened or arrested ears, depending on stress and timing.

On modern-day hybrids, the primary ear typically develops on node 13 or a node above or below (12 or 14). Stress impacting these nodes can impact primary ear development causing abnormality or abortion. Incorrect timing or use of drop nozzles where the drops hit the "sink"-the kernels on the developing ear-can create absent or various types of arrested ears (Figure 3). If the primary ear is aborted, depending on the situation, sometimes a secondary ear is produced on a lower node which can be normal or arrested.

Figure 3. Assorted examples of ear abnormalities. Photo by Jenny Rees.

The use of non-ionic surfactants with various pesticides or pesticide combinations can also create abnormal, absent, or arrested ears. Situations with the presence of only a pointed "primordial tip" extending past the kernels suggests application timing during the V12-V14 timing of ear elongation (Figure 4). Research from Purdue University looked at the impacts of non-ionic surfactants applied with fungicide, insecticide, and/or herbicides and tank-mixtures of these products. They found arrested ear development to occur primarily from V10 to pre-tassel when a non-ionic surfactant was included with a pesticide product. They also found glyphosate + AMS during this time-frame to cause jumbling of the kernels on the ear (Figure 5).

Figure 4. Arrested ears with a 'primordial tip' due to pesticide application + NIS prior to tassel. Photo by Jenny Rees.

Figure 5. Jumbled kernels on ears from glyphosate + ams at V12-V13. Photo by Jenny Rees.

Recommendations:

1. Document the development stage of plants via picture or video in each field immediately prior to spraying. Go inside the field past the end rows. We would recommend documenting stage based on nodes and leaf collars by splitting open stalks. Documenting the development stage can aid in assuring correct timing of applications and prevent applications that may result in problems.
2. Avoid applying herbicides, fungicides, and/or insecticides with a non-ionic surfactant from V10 to VT to avoid arrested ear development. Be aware that several pesticide products already have surfactants included in the formulation.
3. Uneven crop emergence in the field can also result in crop injury. Especially as one considers VT fungicide applications, injury has the potential to occur on plants that are still in the vegetative stages in the field. Consider applications at brown silk instead to account for plant-to-plant variation in the field.

Spring Miller Moth Invasion

The moths of army cutworms are being found in several University of Nebraska-Lincoln traps (Table 1). These "miller moths" are the adult stage of cutworms that were commonly found this spring in Nebraska wheat and alfalfa fields. The moths are generally gray or light brown (Figure 1), with a wingspan of 1 1/2 to 2 inches. Each forewing is marked with spots, wavy lines, and other dark and light markings.

Table 1. Army cutworm counts from UNL light traps. Light trap data can be accessed online. https://entomology.unl.edu/fldcrops/lightrap)

	Total moths collected each week		
Location	**April 29-May 5**	**May 6-12**	**May 13-20**
Clay Center, NE	4	1	78
North Platte, NE	5	0	18

Spring emerging army cutworm moths migrate from east to west to eventually spend the summer months in mountainous areas of Colorado and Wyoming. The migrating moths feed in the evening on nectar from flowering plants such as lilacs, viburnums, and linden trees. They do not cause any damage to the plants as they feed. During the daylight hours the moths seek shelter in cracks and crevices including those found in houses and other buildings. The moths begin to emerge from these locations at dusk to resume their feeding and westward migration.

The moths are very attracted to light and may be noticed circling porch lights where they can easily move into living spaces. Moths inside structures can cause human anxiety from their persistent movement around lighting. While they do not cause other harm, they can leave droppings resulting in small stains on surfaces. The stains are readily removed with a mixture of water and most types of common cleaning solutions.

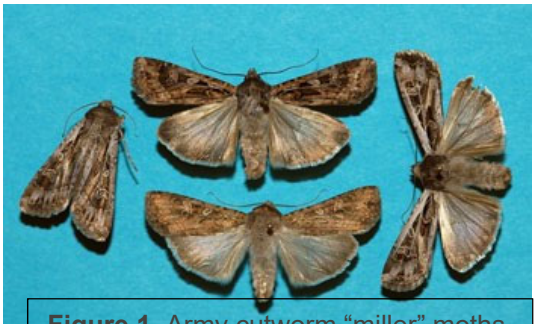


Figure 1. Army cutworm "miller" moths.

Management - The best management method is to keep the moths from entering structures. Keeping porch lights off or the use of yellow colored light bulbs will reduce the number of moths that might enter through a door. The moth's attraction to light can be used as a method to remove those that have entered a building. A simple trap can be constructed with a goose neck lamp placed over a small bucket that contains soapy water. The moths that fly around the trap will soon be caught in the water where they will drown. The dead moths can then be dumped outside. Application of insecticides are not recommended to control adult moths.

Migratory Behavior - The great hordes of millers in the spring are a result of their migratory nature. Their numbers depend on spring cutworm populations and environmental conditions. Moths emerging in Nebraska tend to remain in the area for two to three weeks, but may stay for up to six weeks or as long as local plants are flowering. Cool, wet conditions during this time will extend their stay. Hot, dry conditions will encourage them to move westward.

The moths will migrate westward to higher elevations as they follow the progression in the initiation of spring flowering plants. During this time, with the aid of easterly winds, moth concentrations can increase dramatically. When the last trees finish flowering (e.g. locusts and lindens) and temperatures increase in the high plains, the moths move to the Rocky Mountains. There they escape severe summer temperatures and find alpine flowers, their primary food source. Interestingly, the moths can serve as a high-energy food for grizzly bears foraging in high alpine areas.

In September, the moths once again return to the plains. Army cutworm moths are noticed throughout Nebraska from mid-September through October. As they migrate eastward in the fall, they mate and lay eggs in barren or sparsely vegetated fields, especially winter wheat, alfalfa and grasslands. The eggs hatch within a few weeks and the larvae begin to feed. The cutworms enter a diapause state during the winter and resume feeding in the spring.

Source: Cropwatch.unl.edu