Corn and Soybean Insect Pests

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Seed/Seedling Pests
Mostly “Minor” Problem

- Seed corn maggot
- Seed corn beetle
- Wireworms
- White grubs
- Black & dingy cutworms

Pest status increases when spring is cold and plants grow slower
Seed Corn Maggot

- Increased risk
  - Proximity to feedlot
  - Cold temperatures
- Damage
  - Unemerged plants
  - Weak seedlings

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Corn Following Pastures, Wheat, or Weedy Fields

- White grubs
- Wireworms

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Wireworms

- 3-6 year life cycle
- Larvae feed on the seed or seedling
- When soil temps rise, go below root zone
- May come back in subsequent years

White Grubs

- C-shaped larvae
- Annual white grubs rarely damage corn
- Phyllophaga (three-year grubs) can damage field crops if abundant.
Pest Potential in Ag Crops

- Silk clipping in corn
- Defoliation in soybeans
- Grub issues in 2018?
  - Unlikely, majority of feeding occurs in the fall
  - Scout fields
  - Neonicotinoid seed treatments are not highly effective
  - Liquid/Granular at plant

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Stink Bugs in Nebraska

- 17 species found in Nebraska
- Early season damage to seedling corn

- Green Stink Bug: Bright green color
- Brown Stink Bug: Yellow/tan color, Brown spots
- Red-shouldered Stink Bug

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Cover Crop and Insects
Stinkbugs

- **Early season**
  - Kill small plants
  - Tillering
  - Repeating pattern of holes

- **Late season**
  - Aborted kernels
  - Banana ears

**Thresholds**

- **5% damaged**
  - BS8 present
- **>10% infested**
  - Corn less than 2ft tall

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Corn Flea Beetles

- Adults scrape the epidermal layer = window-pane effect
- Most serious when spring is cold
- Vector Stewart’s Wilt

Overwintering survival of beetle is high, if sum of the mean monthly temperatures for Dec., Jan, and Feb is greater than 37°

Cutworms

- Many species overwinter as larvae (dingy, darksided)
Cutworms

- Many species overwinter as larvae (dingy, darksided)
- Black cutworms do not overwinter in Nebraska.

Cover Crop and Insects
Black Cutworm

- Moth flight (early spring)
- Lay eggs early spring vegetation
- black dagger
- white bands
Cover Crop and Insects
Black Cutworm

GDD: \( \frac{(\text{Max Temp.} + \text{Min Temp.})}{2} \) - 50

Moth flight (early spring)

Lay eggs early spring vegetation

UNL Cutworm Network
Updated on UNL CropWatch

<table>
<thead>
<tr>
<th>County</th>
<th>Black Cutworm Stage</th>
<th>Black Cutworm Activity</th>
<th>Egg laying</th>
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<tr>
<td>Stanton</td>
<td>3rd instar</td>
<td>1st instar</td>
<td>Egg laying</td>
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</table>

Scouting Corn:
- Leaf damage
- Wilted plants
- Cut stalks
  3-5% damaged

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Early Cutworm Damage

- Larger larvae cut plants or burrow into base of plants
- Look for wilted or cut plants
- Look at base for cutting
- Dig in soil for dark colored larvae curled up at the base of the plant

Cover Crop and Insects
Black Cutworm

Larval Instar | Days | Potential Cut Plants
---|---|---
4 | 25 |  
5 | 21 |  
6 | 14 |  
7 | 5 |  

What if......

Number of Cuts Based on 72F
Which one has more potential cut plants?

<p>| | |</p>
<table>
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<tr>
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<tr>
<td>60F</td>
<td>80F</td>
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</table>
Cover Crop and Insects
Black Cutworm

Moth flight (early spring)
Lay eggs early spring vegetation


Larval Instar Days Potential Cut Plants
4 25
5 21
6 14
7 5

Number of Cuts Based on 72F
What if...... Which one has more potential cut plants?
60F up to 12 plants
80F up to 2.3 plants

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Corn Rootworms

- Northern corn rootworm
- Western corn rootworm

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Originally a Continuous Corn Problem

- Corn following beans in Illinois and Indiana (WCR)
- Two-year diapause in NCR in Iowa, MN, SD, NE
- Resistance to insecticides in central Nebraska
- Resistance to some Bt corn hybrid proteins present in several Midwestern states; including Nebraska

Corn Rootworm Larvae

- Maximum size: ½"
- Dark head and anal plate
- Looks like they have two heads.

Head capsule
Anal plate (tail)
Rootworm Damage

- Diagnose in July/August
  - Lodging ≠ rootworms
  - Dig roots, wash and rate
  - Presence of adults doesn’t mean they emerged in that field
- WCR may lay eggs in soybeans with volunteer corn, grassy weeds
- NCR any pollen source, lay eggs in corn
- Rootworm scouting records from previous years most helpful

Adult Rootworm Emergence

- Begin emerging in early July
- Feed on corn leaves, pollen, silks
- Begin egg-laying about last week in July
- Start scouting mid-July
Sampling Adult Rootworm

- Beetle counts = Number of beetles/plant
- Economic threshold varies
- Ear zone count

Managing Adult Rootworm

- Control adults
  - Prevent injury to corn silks
  - Prevent egg laying in continuous corn fields.
- Determine actions following year
  - Rotate to non-host crop
  - Use planting time insecticide
  - Chemigate
  - Transgenics
Managing Resistance

- Cry3Bb1 problem field previous years
- What should I plant this year?
- Go to your Handy Bt Trait Table

Stalk Feeding Insects

European corn borer
Common stalk borer
Common Stalk Borer

- Purple band around the middle of the body
- Brownish and white stripes
- 1 ½ inches when fully grown

Cover Crop and Insects
Common Stalk Borer

Lay eggs
Smooth brome
Ragweed

Overwinter as eggs

“Dead heart”
damage in corn

(Base Temp. 41F)

Degree Days
575 – Egg hatch begins
750 – Egg hatch complete
1400 – 10% move out of grasses
1700 – 50% move out of grasses

Scout at 1300-1400 degree days

<table>
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<tr>
<th>Stage</th>
<th>% Infested</th>
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<tr>
<td>V1</td>
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<tr>
<td>V2</td>
<td>5.3</td>
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<tr>
<td>V3</td>
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<td>V4</td>
<td>7.4</td>
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<tr>
<td>V5</td>
<td>8.5</td>
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<td>V6</td>
<td>14.9</td>
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200 bu at $3/bu
Common Stalk Borer

Stunted and Abnormal Plants

- Plants may wilt and turn brown
- Abnormal growth
Ear Feeding Insects
European corn borer
Western Bean Cutworm
Corn Earworm
Fall Armyworm

Adult Identification

European corn borer (ECB)
- 1” wingspan on females
- Males are smaller & darker
- Triangle-shaped when wings are at rest

Western bean cutworm (WBC)
- 1.5” wingspan
- Pale white hind wings

Wings have a light tan stripe, white “eyespot”, & white arc-shaped spot
Adult Identification

Corn earworm (CEW)
- 1-1.5” wingspan
- Front wing color varies from yellowish-brown to grey
- Hind wings may have a dark band near the margin

Fall armyworm (FAW)
- 1.5” wingspan
- Grayish, mottled front wing
- Grayish-white hind wings

Egg Identification

ECB
- Flat, oval, pinhead-sized eggs
- Turn from white to black before hatching
- 15-60 eggs per mass

WBC
- Pinhead-sized eggs
- Turn from pearly white to purple before hatching
- 5-200 eggs per mass

Caution:
- Stink bug eggs
- Barrel-shaped
Egg Identification

ECB
- Flat, oval, pinhead-sized eggs
- Turn from white to black before hatching
- 15-60 eggs per mass

WBC
- Pinhead-sized eggs
- Turn from pearly white to purple before hatching
- 5-200 eggs per mass

CEW
- Tiny dome-shaped eggs are light yellow
- Turn black before hatching
- Laid individually

FAW
- Dome-shaped eggs are dirty-white to gray
- Have a moldy or hairy appearance
- 50-200 eggs per mass

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Egg Placement on Corn Plants

**FAW:** On immature leaves (late-planted fields are at greater risk)

**ECB:** Underside of leaves, often in the middle third of plant (1st gen prefers tall, early-planted corn; 2nd gen prefers pollinating corn)

**WBC:** Top side of leaves in the upper third of plant (prefers late whorl stage corn prior to tasseling)

**CEW:** On fresh silks

**FAW:** On immature leaves (late-planted fields are at greater risk)
## Larvae Identification

### ECB
- 1" at maturity
- Whitish-grey larvae have small brown/black spots and a shiny black head

### WBC
- Young, dark brown larvae have faint diamond-like marks on their backs
- Grey to pinkish older larvae have two brown rectangles behind the head

### CEW
- 1.5" at maturity
- Larvae vary in color, but have alternating light and dark stripes and dark bumps along the length of the body

### FAW
- 1.25" at maturity
- Dark green larvae have yellow or orange stripes on their sides and backs

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### Overwintering behavior

<table>
<thead>
<tr>
<th>Insect</th>
<th>Overwinters as</th>
<th>Generations/year in NE</th>
<th>Larval behavior</th>
</tr>
</thead>
</table>
| ECB    | larvae in corn stalks and pupates in the Spring | 2 +Can have >2 in warmer climates | 1. Larvae present before tasseling feed on whorl tissue before boring into the stalk  
2. Larvae present after tasseling tunnel into the stalk or ear |
| WBC    | pre-pupae in the soil | 1 | 1. Young larvae feed on pollen, tassel tissue, or green silks  
2. Older larvae tunnel into ears to feed on developing kernels before dropping to the soil to pupate |

### Larval behavior

<table>
<thead>
<tr>
<th>Insect</th>
<th>Larval behavior</th>
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<tbody>
<tr>
<td>ECB</td>
<td>Larvae feed on whorl tissue or tunnel directly into ears to feed on developing kernels before dropping to the soil to pupate</td>
</tr>
<tr>
<td>WBC</td>
<td>Larvae cause damage by consuming foliage and may tunnel into ears to feed on developing kernels before dropping to the soil to pupate</td>
</tr>
</tbody>
</table>
### Range in Nebraska

**ECB:** *Statewide,* anywhere corn is grown; wide host range, also attacks other corn varieties

**CEW:** *Statewide,* wide host range, also attacks other corns, sorghum, soybean, fruit & vegetable crops

**WBC:** *Statewide,* but most common in central and western regions in areas with continuous corn or sandy soils; also attacks dry beans

**FAW:** *Statewide,* but most common in the east; wide host range, also attacks other corns & sorghum

### Timing of Moth Flight in Nebraska

**Black light trap locations**

- **MD** = Eastern Nebraska Research & Extension Center, Mead
- **CO** = Haskell Agricultural Laboratory, Concord
- **NP** = West Central Research & Extension Center, North Platte
- **CC** = South Central Agricultural Laboratory, Clay Center

[https://entomology.unl.edu/fldcrops/lightrap](https://entomology.unl.edu/fldcrops/lightrap)
2018 Moth Flight in Nebraska

ECB
1st gen adults: June-early July
2nd gen adults: Late July-Sept.

1st gen larvae
2nd gen larvae

North Platte

Clay Center

WBC
Peak moth flight: Mid-July

Larvae – July to Sept.

North Platte

Clay Center

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2018 Moth Flight in Nebraska

CEW
Adults arrive from the south:
June and July

Larvae – Late Jul-Sep

North Platte

Clay Center

FAW
Adults arrive from the south:
June and July

Larvae – Late Jul-Sep

North Platte

Clay Center

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Damage Symptoms

**ECB**
- 1st gen: Whorls and surrounding leaves with a “shot-hole” appearance
- 2nd gen: Ear shanks, stalks, and cobs with feeding damage and entry holes

**CEW**
- 1st gen: Defoliation
- 2nd gen: Damaged ears that usually contain one larva

**WBC**
- Damaged ears that may contain multiple larvae, side entry holes, and secondary fungal infection

**FAW**
- 1st gen: Plants with damaged whorls, defoliation, and stunting
- 2nd gen: Damaged ears with side entry holes and potential secondary fungal infection

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European Corn Borer Scouting

**1st gen:**
- Begin scouting during the moth flight, egg-laying, and early hatching period
- At minimum, examine 25 corn whorls at each of 4 locations in each field
- Determine the percentage of damaged plants and the number of live larvae per plant
- Calculate the average number of live larvae per damaged plant

**2nd gen:**
- Begin scouting when second moth flight appears, concentrate on field that have green silks & shedding pollen
- Select 10 plants in each of 5 locations in each field and count egg masses
- Consider treating if the economic threshold of 25-50% of plants with an egg mass is exceeded and corn is at blister stage or earlier

1st gen ECB scouting spreadsheet; *Extension Circular 3018*
2nd gen ECB scouting spreadsheet; *Extension Circular 1584*
Western Bean Cutworm Scouting

- Select 10 plants in 5 or more different parts of each field
- Examine the surface of corn leaves in the upper third of the plant for egg masses and the tassel, leaf axils, and ear tips for young larvae
- Treatment is recommended if 5-8% of plants are infested with eggs or larvae and if corn is at least 95% tasseled
- If corn is at milk stage before eggs are laid, no treatment is needed

WBC Speed Scouting app is available

CEW and FAW Scouting

CEW
- Examine silks for eggs and eartips for small larvae during the green silking period
- Treatment is not usually economically justified for field corn
- Seed corn, popcorn and sweet corn may require treatment

FAW
- Scout late-planted fields as they reach V5-V8
- Examine eartips for the presence of larvae
- Treatment thresholds are based on defoliation levels and the potential for larvae to enter the ear
Management Recommendations

**Bt Traits**

<table>
<thead>
<tr>
<th>ECB</th>
<th>Cry1Ab, VIP3A, Cry1F, Cry1A.105, &amp; Cry2Ab2</th>
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<tbody>
<tr>
<td></td>
<td><em>Consider planting locally-adapted, high-yielding varieties with ECB resistance</em></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Important Considerations</th>
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</thead>
<tbody>
<tr>
<td>1. Consult appropriate NebGuides when deciding to treat for either generation</td>
</tr>
</tbody>
</table>

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**Management Recommendations**

For specific treatment recommendations consult:

***Pesticide applications are only effective if they reach larvae before they bore into the stalk (ECB) or enter the ears (WBC, CEW, & FAW)***
Additional Resources

ECB

— First generation European corn borer scouting and treatment decisions; *NebGuide G1782*
— First generation European corn borer spreadsheet; *Extension Circular 3018*
— Second generation European corn borer scouting and treatment decisions; *NebGuide G1783*
— Second generation European corn borer scouting spreadsheet; *Extension Circular 1584*

WBC

— Western bean cutworm in corn and dry beans; *NebGuide G2013*
— Western bean cutworm speed scouting spreadsheet; *Extension Circular 1585*

General (including CEW & FAW)

— Corn insects I; *Extension Circular EC1572*
— Corn insects – quick reference guide; *Extension Circular 1562*

Soybean Insect Pests
Estimating Defoliation

A

B

C

D

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Estimating Defoliation

E  

F  

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Estimating Defoliation

G  

H  

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Estimating Defoliation

Why is Defoliation Important?

- Light interception is the most important factor in defoliation
  - Soybeans have high light interception
  - Significant defoliation without yield loss if light interception is at least 90%
- Consider canopy size
  - Large canopy tolerates more defoliation
- Environmental conditions
  - Adequate moisture and regrowth
Where do most insects feed in the canopy?

Most insects feed on young leaves

Soybean Defoliators Thresholds

Vegetative Stage 30% Defoliation
Reproductive Stage 20% Defoliation

% Defoliation: often overestimated
Leaf Area Index (LAI)

- Ratio of leaf area over soil surface

Soybean Defoliators
Japanese beetles

- Overwinter in soil in grassy areas
- Feeds on new growth, leaving the leaf vein
- Field Distribution: aggregate at edge of field and move into the field
Soybean Defoliators
Bean leaf beetles

- 2 generations per year
- Feed on seedlings and new growth in reproductive stage

Soybean Defoliators
Blister beetles

- Feed on leaves leaving the veins
- Parasitize grasshopper eggs
- Contain cantharidin
Soybean Defoliators
Southern Corn Rootworm

- Overwinters as an adult in southern US
- Abundant late season

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Soybean Defoliators
Green cloverworm

- Overwinter as pupae
- 2 generations per year
- Feed on new growth

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Soybean Defoliators
Yellow Woollybear

- 2 generations per year
- Feeding damage occurs May through September
- Feeds mostly within upper one-third of the canopy

Soybean Defoliators
Loopers

- Feed on lower portions of the canopy
- Feeding damage occurs July through September
Soybean Defoliators
Thistle Caterpillar

- Feeding damage occurs May through September

Soybean defoliation thresholds

- Species specific
  - Example: bean leaf beetle

- Multi-species
Feeding Behavior

Japanese beetle
Feeding Behavior

Bean leaf beetles
Feeding Behavior

Green cloverworm
Feeding Behavior

Feeding Behavior
Blister beetle
Feeding Behavior

Thistle caterpillar
Feeding Behavior

Looper

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Evaluating Soybean Defoliation

Step #1: Remove leaves from top, middle and bottom of plant

Step #2: Remove the highest and lowest defoliated trifoliate for each leaf
### Evaluating Soybean Defoliation

**Step #1:** Remove leaves from top, middle and bottom of plant  
**Step #2:** Remove the highest and lowest defoliated trifoliate for each leaf  
**Step #3:** Repeat for middle and bottom leaves
Evaluating Soybean Defoliation

Step #1: Remove leaves from top, middle and bottom of plant
Step #2: Remove the highest and lowest defoliated trifoliate for each leaf
Step #3: Repeat for middle and bottom leaves
Step #4: Repeat 1-3 on 9 more plants

Step #5: Average defoliation of 30 leaflets
* Repeat process at 4 more locations

Figure 2: Levels of soybean defoliation. Injury is often over-estimated.

2019 Field Scout Training
Estimating Leaf Defoliation Using LeafByte

- For Apple products only
- Application to automatically estimate leaf defoliation
- Using previous taken pictures or take new pictures
- Export data into spreadsheet

Settings
- Data Save Location
- Image Save Location
- Dataset Name
- Scale Length
Estimating Leaf Defoliation Using LeafByte

Step 1: Background Removal

LeafByte automatically removes background and shadow, leaving just the scale and leaf.

Estimating Leaf Defoliation Using LeafByte

Step 2: Scale Identification

LeafByte automatically identifies the scale, in order to measure absolute sizes and correct for camera angle.
Estimating Leaf Defoliation Using LeafByte

Step 3: Results
LeafByte automatically finds holes in the leaf, measuring areas and adding them to your spreadsheet. If the leaf margins have been eaten, you can draw them in.

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Estimating Defoliation

2019 Field Scout Training
Estimating Defoliation

2019 Field Scout Training

Q

R

Estimating Defoliation

S

T

2019 Field Scout Training
Soybean Defoliators
Estimating Defoliation

1. Remove leaves from top, middle and bottom of plant.
2. Remove the highest and lowest defoliated trifoliate. Keep other leaflet.
3. Repeat for the middle and bottom leaves on the same plant.
4. Repeat 1 - 3 on 10 more plants.
5. Repeat at 4 more locations and take average defoliation of all 40 leaves.

Levels of soybean defoliation, injury, is often over-estimated.

Thresholds:
Vegetative Stage: 30%
Reproductive Stage: 20%

Bean Leaf Beetles
Several Color Variations

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Bean Leaf Beetle Generations

- Overwinter as adults
  - Leaf litter / residue
  - Warm winter weather doesn’t favor BLB survival
    - Increased metabolism
    - Reduced fat reserves
    - Starvation

- Feed on alfalfa early in the spring
  - Active: April - May
Bean Leaf Beetle Generations

- Feed on alfalfa early in the spring
- Move into early planted soybeans
  - Damage cotyledons, sometimes seriously (rare)

Bean Leaf Beetle Generations

- Adults live approx. 40 days
  - 125-250 eggs/female
  - Eggs laid in soil
  - Larvae feed on roots but do little damage
Bean Leaf Beetle
Three Periods of Damage

- Defoliation reduces yield
- Pod Damage reduces yield and seed quality

Virus Transmission

Bean Pod Mottle Virus

Early virus infection necessary to cause significant losses

VC – V3 Stage
16% yield loss

Other Viruses:
Cowpea Mosaic Virus and Southern Bean Mosaic Virus
Bean Leaf Beetle
Economic thresholds

VC Stage
Beetles/Plants

<table>
<thead>
<tr>
<th>Management Costs</th>
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V1 Stage
Beetles/Plants

<table>
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+$50%$ defoliation = no sig. yield loss

Bean Leaf Beetle
Economic thresholds

R6 Stage
Beetles/Sweep

<table>
<thead>
<tr>
<th>Soybean Value</th>
<th>Pest Management Costs Per Acre</th>
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<td>3</td>
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Sampling
- 5 sites
- 25 sweeping arcs per site

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Bean Leaf Beetle
Management Strategies

- Wait until mid-May to plant soybeans
  - Significantly reduce on spring colonization
  - Could impact subsequent populations
  - Overwintering beetles will infested earliest emerging soybeans
- Seed treatments with early planting?

Dectes Stem Borer

- Small beetle
- Native to North America
- Historically pest of sunflower
- Shift to soybeans
  - 1968: First damage to soybeans
  - 2000: Kansas Border
Dectes Stem Borer: Life Cycle

- Adults
  - Emerge: mid to late June
  - Oviposition in 1-2 weeks
  - Live for ~56 days
  - Lay approximate 33 eggs

- Larvae
  - Bore into petiole
  - Later into main stalk
  - Plant senescence triggers larvae to prepare overwintering chamber
  - Girdle inside of stem

Dectes Stem Borer Emergence

![Bar graph showing percent emergence over days of the year for 2013 and 2014.](image)
**Dectes Stem Borer: Egg Laying**

![Graph showing mean eggs per five plants over weeks after infestation.]

**Scouting for Dectes Stem Borer**

- Wilted leaves among an otherwise healthy canopy
  - Scout Mid- to Late-August
  - % damaged plants
  - Prioritize harvest on heavily damaged fields
**Dectes Stem Borer**

- **Damage**
  - 1-15% yield loss
  - Late season lodging
  - Losses depend on
    - Level of infestation
    - Weather

**Dectes Stem Borer Management**

- Burying soybean residue
- Weed control (ragweed, sunflower, and ragweed)
- Chemical treatments (Difficult / Ineffective)
  - Larvae in soybean stems
  - Extended adult activity
  - Multiple application
  - Prioritize fields for harvest based on damage
Stinkbugs

Nebraska Survey

PhD Student
Blessing Ademokoya

E. variolarius

Chinavia

Murgantia histrionica

Chlorochroa say

Thyanta custator

Coenius delius

Euschistus servus

H. limbolarius

Podisus maculiventris

Mecidea major

Banasa dimidiata

C. lintneriana

E. tristigmus

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Stinkbug Species by Location

Diversity based on location

1. *Euchistus variolarius*
2. *Chinavia hilaris*
3. *Thyanta custator acerra*
4. *Podisus maculatus*
5. *Holcostethus limborius*
6. *Euchistus servus servus*
7. *Euchistus tristigmus luridus*
8. *Banasa dimidiata*
9. *Chlorochroa sayi*
10. *Coenis delius*
11. *Mecidea major*
12. *Murgantia histrionica*
13. *Euchistus tristigmus tristigmus*
14. *Euchistus conspersus*
15. *Euchistus ictericus*
16. *Cosmopepla lintneriana*
17. *Podisus placidus*

![Graph showing stinkbug species by location](image)

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Stinkbug Species Composition

- >2000 Adults
- 17 species

![Pie chart showing stinkbug species composition](image)

Species composition and relative abundance of stink bugs in Nebraska, 2017 & 2018

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Cover Crop and Insects
Stinkbugs

- Reproductive stage
  - Seed and pod damage
  - Delayed maturity
  - "Stay-Green" syndrome

Thresholds
5% of plant exhibiting symptoms
10 stinkbug
25 sweeps

Soybean Gall Midge

- 2011: first documented
  - Isolated to a few fields
  - Secondary pest of plant pathogens or mechanical damage
  - Showed up late in the season
- Observations: 2016/2017
- Field Issues in 2018
  - Large number of fields throughout multiple states
  - Early signs of infestation (Late June)
Field Symptoms

- Damage greatest at the field edge
  - Discoloration at the base of plants
  - Plants easily snapped off
  - Some plants with swollen stems

Soybean Gall Midge Survey

- Multi-state survey initiated
  - Justin McMechan, Thomas Hunt and Bob Wright (UNL)
  - Erin Hodgson (ISU)
  - Adam Varenhorst (SDSU)
  - Bruce Potter (UMN)
- 65 counties across four states were identified as infested with SGM

Counties colored in red indicate the presence of soybean gall midge.
Plant Pathogens and SGM

- Several samples from fields were submitted to plant pathology diagnostic clinics

- Disease interactions with gall midge
  - Preference for diseased plants?
  - Infestation potential?
  - Yield losses?

15-20% of samples had no detectable plant disease

Nebraska Field Survey

- Set distances from field edge
  - 10, 20, 50, 100, and 400ft

- 10 consecutive plants were scored
  - Healthy
  - Infested
  - Wilting
  - Dead

- Relative field score
  - = 80-100
  - = 60-79
  - = 40-59
  - = 20-39
  - = 1-19
  - = 0
Nebraska Field Survey

- Set distances from field edge
  - 10, 20, 50, 100, and 400ft
- 10 consecutive plants were scored
  - Healthy
  - Infested
  - Wilting
  - Dead
- Relative field score
  - ☀️ = 80-100
  - ☀ = 60-79
  - ⬤ = 40-59
  - ● = 20-39
  - ◆ = 1-19
  - 🌞 = 0

Temperatures

- Departure from 30-yr normal
  - April: 8-10°F below
Accumulated Precipitation: June

- Cages deployed on August 1st
- First adults collected on August 2nd
- Adults collected even when plants were removed from cage
- Emergence was sporadic until August 19th.
Adult Soybean Gall Midge

Classified as new species

Pest Identification

- **Genus *Resseliella***
  - Worldwide: 56 species
  - United States: 15 species
  - No species have been reported on soybeans in US

Kolesik and Baker 2013
Genus *Resseliella*

- Very diverse host range
  - Many species found under bark or in flower heads
  - Others species span 29 genera and 23 plant families
- Host plant not known for 13 species
- Nine new species discovered since 2003

Field Observations

- Management practices impacted
  - Soybean MG: 0.5 – 4
  - Planting Dates: late-April to early-June
- Landscape characteristics
  - Heaviest damage observed next to corn field (last years soybeans)
  - Uncut or dense brome ditches and shelter belts
Field Impact Assessment

Field Characteristics

- Maturity: 3.8
- Planted: May 17th
- Seeding Rate: 150,000
- No insecticides applied

Collaborator: Aaron Nygren (UNL Extension Educator, Colfax County)

Data Collected

- Plant stand
- Standing plants
- Plant height
- Nodes per plant
- Pods per plant
- Seeds per plant
- Seed weight
- Yield per plant
Soybean Gall Midge: Plant Impacts

- **Plant Stand**
  - [Graph showing estimated plant stand with 80% survival rate against distance from field edge in feet.]

- **Standing Plants**
  - 56% of plants were standing across all sample locations within the field.

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Soybean Gall Midge: Plant Impacts

- **Plant Height**
  - [Graph showing plant height in inches against distance from field edge in feet.]

- **Nodes**
  - [Graph showing nodes per plant against distance from field edge in feet.]

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**SoyWater Model**

- 5-17: Planted
- 5-24: Emergence
- 6-1: V1
- 6-6: V2
- 6-10: V3
- 6-13: V4
- 6-16: V5
- 6-19: V6
- 7-4: V10

**Soybean Gall Midge: Plant Impacts**

- **Pods**
- **Seeds**

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Soybean Gall Midge: Plant Impacts

Avg. Seed Weight

Yields

Distance from Field Edge (Feet)

Bushels/acre

Historical Average

-100% 95% 90% 31% 20%

-0% 5 10 15 20 25 30 35 40 45 50

0 1 10 20 50 100 200 400

Distance from Field Edge (Feet)

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Tracking Adult Movement

- Things that didn’t work
  - Sticky traps
  - Sweep nets
  - Laying in field

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Management Recommendations

- Expect infested areas to intensify
- Slow spread to new counties
- Don’t change your farm plan
  - Consider corn if significant losses occur
- Foliar applications are possible
  - Border treatments near 2018 problem fields
  - Early vegetative stages (V3)
  - Based on adult soybean gall midge activity

2019 Research Efforts

- Track adult movement beginning in March to determine
  - Source for adults
  - Number of generation
- Insecticide trials with commercial and experimental insecticides
- Use sentinel plant system to determine infestation over the season
- Evaluate cultural control tactics (plant date and tillage)
- Greenhouse studies (length of lifecycle, infestation on healthy vs. damaged plants, plant stage)
Thank you!

- Questions?
- Keep up to date on
  - CropWatch
  - Market Journal
- Twitter:
  @justinmcmechan