CSI: Crop Scout Investigation

University of Nebraska-Lincoln Extension
Sarah Sivits, Megan Taylor, Jenny Rees
### Types of Pests

<table>
<thead>
<tr>
<th>Weeds</th>
<th>Diseases</th>
<th>Insects</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Weeds Image" /></td>
<td><img src="image2.png" alt="Diseases Image" /></td>
<td><img src="image3.png" alt="Insects Image" /></td>
</tr>
</tbody>
</table>

Photos courtesy Megan Taylor
Pest Development and Biology

- **Insects**—complete or gradual metamorphosis
Western Bean Cutworm Life Cycle

- **Plant Bt Traits:** Cry1F Vip3A
- **Late June-July:** Foliar Insecticide
- **July-August:** Scout & ET 5-8%
- **August-September:** Too late!
- **October-June:** Western Bean Cutworm Life Cycle

Too late!
Western bean cutworm life cycle

- Overwinters in soil as mature larva
- Moth emerges in early to mid July
- Eggs laid on upper third of corn plant, usually on upper surface of leaves
- Prefer pre-tassel corn for egg laying
- Begin scouting for egg masses when moth flight is 25% complete.
Pest Development and Biology

- **Diseases**—understanding the disease triangle

![Diagram of the disease triangle with Environment, Pathogen, and Host at the vertices, and Disease at the apex.]
Bacterial Leaf Streak vs. Gray Leaf Spot

Gray Leaf Spot

Bacterial Leaf Streak

Photo courtesy Tamra Jackson-Ziems
Bacterial Leaf Streak vs. Gray Leaf Spot

- Compare lesion margins of each disease
- GLS margins are smooth, linear
- BLS margins are often wavy or jagged and usually more yellow
- BLS may also develop earlier than GLS – observed as early as mid-June on V4 corn

Photos courtesy Tamra Jackson-Ziems
Pest Development and Biology

• **Weeds** - annuals, biennials, perennials
Palmer Amaranth

- Most problematic weed (32 states)
- High water use efficiency
- High photosynthesis rate (96°F-120°F)
Integrated Pest Management

- Broad based approach
- Integration of practices for economic control of pests

Type of Pest
Type of Control Method
IPM
Resistance Management
Management Thresholds
IPM Steps

1. **Identify** pest
2. Evaluate pest damage
3. Determine need for controls
4. Consider multiple control options
5. Select best **combination** of control options
6. Monitor your selection
Management
WBC Predators and Parasitoids

Wright et al. 2002, Biological Control

Trichogramma ostriniae

Photos courtesy Julie Peterson
Management Thresholds

- Aesthetic
- Action
- Economic
Economic Threshold

Figure credit: Ed Zaborski, University of Illinois.
Application of economic thresholds

Predicted yield loss due to Gray Leaf Spot.

<table>
<thead>
<tr>
<th>Percentage ear leaf area affected by early dent stage</th>
<th>Approximate yield loss expected</th>
</tr>
</thead>
<tbody>
<tr>
<td>5% or less</td>
<td>0-2% loss</td>
</tr>
<tr>
<td>6%-25 %</td>
<td>2-10% loss</td>
</tr>
<tr>
<td>25%-75%</td>
<td>5-20% loss</td>
</tr>
<tr>
<td>75%-dead leaf</td>
<td>15-50% loss</td>
</tr>
</tbody>
</table>

(Source: Pat Lipps, The Ohio State University)
Application of economic thresholds

Economic thresholds for bean leaf beetles in soybeans at the V1 stage.

<table>
<thead>
<tr>
<th>Crop Value</th>
<th>Management costs</th>
<th>$6</th>
<th>$8</th>
<th>$10</th>
<th>$12</th>
</tr>
</thead>
<tbody>
<tr>
<td>$7</td>
<td>Threshold number of beetles/plant</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>$8</td>
<td></td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>$9</td>
<td></td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>$10</td>
<td></td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

Source: Tom Hunt University of Nebraska-Lincoln
Pesticide Resistance Development

• Application of a pesticide creates selection pressure, leading to survival of individuals that possess genes conferring resistance

• Percentage of population with resistance increases with selection over time
Resistance Activity—Roundup

- Susceptible (Die)
- Carrier (???—Die)
- Resistant (Survive)
Cost of Resistance

- Obsolete technology
- Increased pest pressure
- Increased cost of production for growers
Resistance Management

- Accurate identification of pest
- Multiple modes of action
- Timing
- Crop rotation

https://iwilltakeaction.com/
Speed scouting apps available

- First generation European corn borer
- Second generation European corn borer
- Western bean cutworm
- Soybean aphid

https://extension.unl.edu/extension-apps/
2019 GUIDE FOR WEED, DISEASE, and INSECT MANAGEMENT IN NEBRASKA

NEBRASKA SOYBEAN & CORN POCKET FIELD GUIDE — 2017 EDITION —
Scouting Activity
Discussion

• What did you find?
• How do you know?
• What are my options?
Diseases

• Northern Corn Leaf Blight
• Gray Leaf Spot
• Common Rust
Insects

- European Corn Borer
- Western Bean Cutworm
- Spider Mites
Disorders/Deficiencies/Other

• Wind/Hail Damage

• Nitrogen Deficiency

• Potassium Deficiency
Questions?

• Check out UNL CropWatch [https://cropwatch.unl.edu/](https://cropwatch.unl.edu/)
• Check PSEP (Pesticide Safety Education Program) for more information [https://pested.unl.edu/ipmpolicy](https://pested.unl.edu/ipmpolicy)
• Crop Protection Network: [https://cropprotectionnetwork.org/](https://cropprotectionnetwork.org/)
• Contacts:
  • Jenny Rees ([jenny.rees@unl.edu](mailto:jenny.rees@unl.edu))
  • Megan Taylor ([mtaylor42@unl.edu](mailto:mtaylor42@unl.edu))
  • Sarah Sivits ([sarah.sivits@unl.edu](mailto:sarah.sivits@unl.edu))