

## Foliar Diseases of Soybeans in New York State IPM Field Teaching Module

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| Concept  | Activity   | Handouts  |
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| To manage foliar diseases in soybeans, growers need to learn to identify them.<br><b>NOTE: A different module covers Soybean Rust.</b> | Scout soybean fields and correctly identify foliar diseases.<br><i>Play Foliar Diseases on Soybean Jeopardy.</i>   | Soybean Disease and Pest Management Field Guide<br>Soybean disease scouting cards |
| To make sound management decisions, growers must learn to monitor, then determine economic thresholds.                                 | Scouting and assessing insect pests levels.  | Assessing infection levels.<br>Scouting card for soybean foliar diseases          |
| Growers should know their options for managing foliar disease.   | Lecture on Management of Soybean Diseases  | Soybean Disease and Pest Management Field Guide<br>Fungicide chart                |
| Resources:<br>Cornell Guide to Integrated Field Crop Management.   | Related Modules:<br><a href="#">Module 2: Introduction to IPM</a><br><a href="#">Module 3: Principles of Scientific Sampling</a><br><a href="#">Module 4: What is a Threshold?</a><br><a href="#">Module 5: Economic Implications of IPM</a> |   |

### Here's what we'll do:

**Beforehand:** Set up meeting with a farmer that could possibly have infestations of foliar diseases in a soybean field

### Today on-site:

- Learn how to correctly identify foliar diseases
- Learn the lifecycle of several foliar diseases
- Become skilled at sampling and monitoring for foliar diseases
- Know the methods for managing foliar diseases in soybeans

| <b>ACTIVITY # 1: Identify foliar diseases of soybeans</b> |                      |                  |  |
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| <b>Setting</b>  | <b>Time Required</b> | <b>Materials</b> | <b>Handouts</b>  |
| Soybean field   | 30 minutes           | Clipboards       | Soybean Disease and Pest Management Field Guide<br>Scouting Cards<br>Soybean Jeopardy gameboard<br>Easel and scotch tape |

| <b>Q:</b>  | <b>Pose a series of questions:</b>   | <b>A:</b> |
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| <p>This could be taught one of two ways:</p> <ol style="list-style-type: none"> <li>1. The traditional question and answer teaching method that follows.</li> <li>2. Or ... play <i>Foliar Diseases on Soybean Jeopardy</i>.</li> </ol> <p>Directions for <i>Soybean Jeopardy</i>:</p> <p>Place game on easel. Tape a small piece of paper over each Q&amp;A. Number each from 1 to 5 (top to bottom) for each category. Break TAG group into two teams. Have each team take turns picking the question in a category. The team that picks gets the first chance to answer the question. Each question is worth 100 points. Whichever team has the most points after answering all the questions wins.</p> |  |           |
| What are the six major foliar diseases on soybeans in NY?  | <p>White mold (<i>Sclerotinia sclerotiorum</i>)</p> <p>Bacterial blight (<i>Pseudomonas syringae</i>)</p> <p>Bacterial pustule (<i>Xanthomonas axonopodis</i> pv. <i>Glycines</i>)</p> <p>Downy mildew (<i>Peronospora manshurica</i>)</p> <p>Frogeye leaf spot (<i>Cercospora sojina</i>)</p> <p>Septoria brown spot (<i>Septoria glycines</i>)</p> |           |
| <p><b>Scout and collect diseased leaves and stems. Line-up all the diseased leaves on a flat surface. Have growers use the <i>Soybean Disease and Pest Field Guide</i> to identify each disease. Next, have them determine infection percentages.</b></p>  |  |           |
| <b>White mold, aka stem rot</b>  |  |           |
| What soil-borne pathogen attacks soybean stems and leaves?   | <p>A fungus, white mold: <i>Sclerotinia sclerotiorum</i>.</p> <p>Overwinters in soil; can survive several years. Usually if you get white mold, you should rotate out for several years.</p>   |           |
| What are the symptoms of white mold?   | <p>Look for white, cottony growths and small, dark, round or elongate bumps on or within the stem.</p> <p>Infected stems and pods are pale brown and look water-soaked.</p>  |           |
| What conditions promote infection?   | <p>Cool, damp weather.</p> <p>Planting soybeans directly after dry beans or soybeans.</p>  |           |

| <b>Bacterial blight</b>                       |   |
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| What are the symptoms of bacterial blight?    | Brown spots show on margins of cotyledons. Next, small yellow or brown spots show on leaves.<br>Middles of spots turn dark reddish-brown or black and dry out.<br>Spots develop into angular lesions surrounded by water-soaked tissue—which in turn is surrounded by a yellowish-green halo.   |
| What pathogen causes bacterial blight?        | A bacterium, <i>Pseudomonas syringae</i> pv. <i>Glycinea</i> .<br>Overwinters in crop residue left on the surface or transmitted by seed.   |
| What conditions promote infection?            | Cool, wet weather; poorly drained soil.   |
| <b>Bacterial pustule</b>                      |   |
| What are the symptoms of bacterial pustule?   | Resembles bacterial blight.<br>Lesions are small, pale, yellowish-green spots with dark reddish-brown centers, found on upper leaf surfaces.<br>A small, raised, light-colored pustule shows in the middle of the lesion—but on the lower leaf surface.<br>How this differs from bacterial blight:<br>1. Has the pustule<br>2. Lacks water-soaked areas |
| What pathogen causes bacterial pustule?       | A bacterium, <i>Xanthomonas axonopodis</i> pv. <i>glycines</i> .<br>Overwinters in crop residue on soil surface.  |
| What conditions promote infection?            | Warm, wet weather; poorly drained soil.   |
| <b>Septoria brown spot</b>                    |   |
| What are the symptoms of Septoria brown spot? | Cotyledons and unifoliate leaves are infected first.<br>Spots range from tiny dots to ¼-inch diameter spots ... or can be angular.<br>Color varies from red to brown.<br>Shows on both upper and lower leaf surfaces.   |
| What pathogen causes Septoria brown spot?     | A fungus, <i>Septoria glycines</i> .<br>Overwinters on crop residue or transmitted by seed.   |
| What conditions promote infection?            | Wet, warm weather or poorly drained soil.   |

| <b>Downy mildew</b>  |  |
|--|--|
| What pathogen causes downy mildew?   | A fungus, <i>Peronospora spp.</i><br>Overwinters in leaf residue or transmitted by seed.   |
| What are the symptoms of downy mildew?   | Pale green or light yellow spots show first on upper leaves. As disease progresses, spots enlarge into varying shapes and sizes.<br>Next, lesions show on lower leaf surfaces, <i>particularly in moist weather</i> . Leaves yellow and become dusted with gray or purplish mildew.<br>Severely infected leaves may curl, brown, and drop prematurely.<br>Pods can be infected <i>without obvious external symptoms</i> . Infected seed is dull white and partly or completely covered with a pale coating of fungal spores. |
| What conditions promote infection?   | More pronounced during warm, wet weather or in poorly drained soil.  |
| <b>Frogeye leaf spot</b>   |  |
| What pathogen causes frogeye leaf spot?  | A fungus, <i>Cercospora sojina</i> . Overwinters in crop residue. Transmitted by seed.   |
| What are the symptoms of frogeye leaf spot?  | Small, brownish spots show on leaves. These lesions develop grayish “frogeye” centers (some frogs have gray eyes), then merge and enlarge, showing on lower leaf surfaces as well.   |
| What conditions promote infection?   | Long spells of wet, moist weather; poorly drained soil.  |
| <b>NOTE: A different module covers Soybean Rust</b>  |  |
| <b>Scout and collect diseased leaves and stems. Line them up on a level surface. Have growers identify each disease, using the <i>Soybean Disease and Pest Field Guide</i>. Next, have them determine infection percentages.</b> |  |

| <b>ACTIVITY # 2: Managing foliar diseases of soybeans</b>                                    |   |                  |                 |
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| <b>Setting</b>   | <b>Time Required</b>  | <b>Materials</b> | <b>Handouts</b> |
| Soybean field  | 30 minutes  | Clipboards       |                 |
| Are there economic thresholds for these diseases?  | <p>No specific thresholds for foliar diseases of soybeans exist in New York. Research needs to be done to determine these thresholds.</p> <p>Until then, likelihood of 10% yield loss is a reasonable rule of thumb for treatment.</p>  |                  |                 |
| What preventive measures help limit soybean diseases?  | <ol style="list-style-type: none"> <li>1. Rotate crops with corn (or other non-hosts)</li> <li>2. Use certified, disease-free seed</li> <li>3. Use resistant cultivars; ask your dealer how cultivars compare for disease susceptibility or resistance and productivity</li> <li>4. Fungicide seed treatment at planting</li> <li>5. Foliar fungicide is seldom warranted</li> <li>6. Plow down infected residue</li> </ol> |                  |                 |
| What should be considered before spraying a fungicide for soybeans diseases other than rust? | <p>Is the fungicide effective against the disease?</p> <p>What percentage of plants are infected? Is the disease widespread?</p> <p>Remember the rule of thumb: if 10% of leaves are diseased, it's time to think about fungicide. Is the cost worth the prevention of loss in yield?</p>   |                  |                 |
| Two bacterial diseases aren't controlled by fungicides. What are they?                       | Bacterial blight and bacterial pustule... Fungicides don't control bacterial diseases.  |                  |                 |
| One fungal disease is poorly controlled by fungicides. What is it?                           | White mold (stem rot).  |                  |                 |
| What are management methods for white mold, <i>aka</i> stem rot?                             | <p>Rotate to a non-susceptible crop: corn, wheat, oats, etc.</p> <p>Increase row width to 30 inches or reduce plant density to lower relative humidity in the canopy.</p> <p>A few cultivars have partial resistance. More important: avoid highly susceptible cultivars.</p>   |                  |                 |

## References

Soybean Disease and Pest Management Field Guide (Iowa State University, University Extension)

<https://www.extension.iastate.edu/Store/ItemDetail.aspx?ProductID=12726>

Downy Mildew (Iowa State University)

[http://extension.agron.iastate.edu/soybean/diseases\\_downymildew.html](http://extension.agron.iastate.edu/soybean/diseases_downymildew.html)

Plant Health Website (University of Wisconsin)

<http://www.plantpath.wisc.edu/soyhealth/>

White Mold, Stem Rot: *Sclerotinia sclerotiorum*

<http://www.soybeans.umn.edu/crop/diseases/whitemold/index.htm>

Sclerotinia Stem Rot (White Mold) (North Dakota State University)

<http://www.ndsu.nodak.edu/soydiseases/sclerotinia.shtml>

Crop Diseases of Corn, Soybean and Wheat (Purdue University)

<http://www.btny.purdue.edu/extension/Pathology/CropDiseases/soybean/Soybean.html>

Soybean Diseases in Illinois (University of Illinois)

<http://cropdisease.cropsci.illinois.edu/soybeans/index.html>

Bacterial blight (Iowa State University)

[http://extension.agron.iastate.edu/soybean/diseases\\_bblight.html](http://extension.agron.iastate.edu/soybean/diseases_bblight.html)