

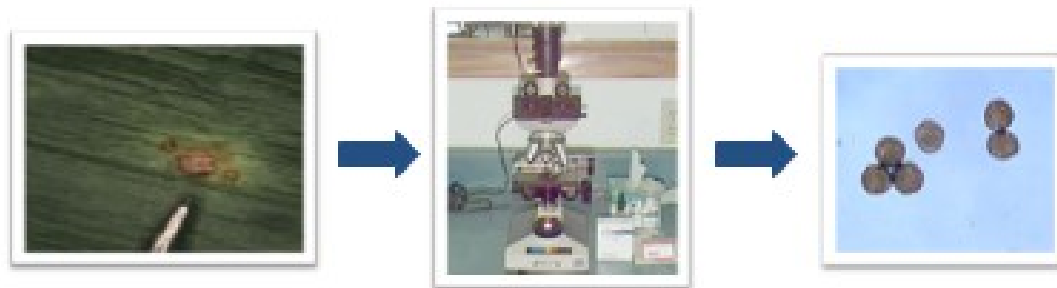
The DuPont logo, consisting of the word "DUPONT" in a red, oval-shaped font.The Pioneer logo, featuring a green stylized plant icon to the left of the word "PIONEER" in a bold, green, sans-serif font.

# Trends in diagnoses of soybean foliar disease for 2015

Karen Lackermann, DuPont Pioneer

# What is the Pioneer Plant Diagnostic Laboratory?

- The primary Diagnostic Lab is located in Johnston, Iowa
- For over 40 years, we have been providing plant diagnostic services to Pioneer employees and customers from all over the United States
- Average 5000-7000 diagnoses per year. 15-25% are soybean samples



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# Primary soybean foliar diseases diagnosed

- Most common foliar disease diagnoses for 2015:
  1. Bacterial blight
  2. Downy mildew
  3. Frogeye leaf spot
  4. Less often: brown spot, bacterial pustule, *Cercospora kikuchii*, Fusarium wilt
  
- No soybean rust
  
- All potential soybean vein necrosis virus samples tested negative

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# Bacterial Blight

(*Pseudomonas savastanoi* pv. *glycinea*, formerly *P. syringae* pv. *glycinea*)

- Can be common in soybean fields, particularly in the Midwest US
- Early symptoms may resemble Asian soybean rust or bacterial pustule
- Disease symptoms are usually visible in the upper plant canopy in contrast to soybean rust usually found in the lower to mid-canopy

	Environment	Early Infections	Typical Symptom
<b>Asian Soybean Rust</b>	Cool and rainy	Lower canopy	Pustules
<b>Bacterial Pustule</b>	Dry and hot	Upper canopy	Pustules
<b>Bacterial Blight</b>	Cool and rainy	Upper canopy	No pustules
<b>Brown Spot</b>	Rainy	Lower canopy	No pustules



## Bacterial Blight Symptoms:

Young lesions are small, angular, and yellow-to-brown in color

Lesion centers turn reddish brown to black surrounded by a water-soaked margin

Lesions are often bordered by a yellowish green halo



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**To help distinguish Bacterial Blight from Soybean Rust, use a hand lens to determine if rust pustules or spores are present**

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# Downy Mildew

(*Peronospora manshurica*)

- Survives as oospores on dead leaves and on seeds
- Infection occurs during high humidity and moderate temperature
- Young leaves are most susceptible
- Effect on yield is typically minimal
- Many different races of the pathogen



Sources: <http://www.extension.umn.edu/agriculture/crop-diseases/soybean/downymildew.html>,  
<http://www.soybeanresearchinfo.com/diseases/downymildew.html>, <http://www.fieldcroppathology.msu.edu/extension-3/soybean/soybean-foliar-diseases/downy-mildew-peronospora-manshurica/>

## Downy Mildew Symptoms:

Early symptoms on upper leaves are pale green to light yellow spots. Older lesions are grayish brown to dark brown with a lighter (yellow-green) margin.



The lower leaf surface may have tufts of gray to light purple sporangiophores, especially during periods of high humidity or moisture.

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# Red Leaf Blotch

(*Coniothyrium glycinis*)

Previous names: *Phoma glycinicola*, *Dactuliochaeta glycinis*, *Pyrenochaeta glycinis*

- Mainly occurs in central Africa
- Initial lesions on unifoliate leaves are dark red to brown, circular to angular, 1-3mm
- Lesions merge and enlarge
- Leaf tissue dies and may fall out giving a shot-hole appearance
- Later, dark red spots develop on upper leaf surfaces and red/brown spots with borders on the lower surfaces
- During periods of high humidity, mycelia and pycnidia (upper leaf surface) and sclerotia (lower leaf surface) may be visible



## Bacterial Tan Spot (*Curtobacterium flaccumfaciens* pv. *flaccumfaciens*)

- First identified in the US in 1920, now reported in many countries around the world
- Becomes systemic in vascular tissues and can be seed-borne
- Leaf yellowing progresses in an elongated pattern toward midrib



# Lots of confusing information about diagnosing Charcoal Rot...

The “squiggly lines” are listed as diagnostic for charcoal rot in many online resources and in the previous edition of the Soybean Disease Compendium

**BUT, there’s new information:**



Daren Mueller @dsmuelle · Oct 4

If you are splitting soybean stems at harvest - squiggly lines are not charcoal rot; they are Diaporthe. @Mvclones



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# Association of *Diaporthe longicolla* with Black Zone Lines on Mature Soybean Plants

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## ABSTRACT

Olson, T. R., Gebreil, A., Micijevic, A., Bradley, C. A., Wise, K. A., Mueller, D. S., Chilvers, M. I., and Mathew, F. M. 2015. Association of *Diaporthe longicolla* with black zone lines on mature soybean plants. Plant Health Progress doi:10.1094/PHP-RS-15-0020.

In 2014, during a survey for soybean (*Glycine max* L.) diseases in Illinois, Indiana, Iowa, Michigan, and South Dakota, zone lines were observed on the lower stems of soybean plants. The survey was performed by sampling two to three fields per state. In each field, at least five plants exhibiting zone lines were collected. Isolations were made from the zone lines by plating 1-cm pieces on potato dextrose agar. A total of 90 isolates producing black stromata in concentric patterns and alpha conidia were tentatively identified as *Diaporthe longicolla* (Hobbs) Santos, Vrandecic and Phillips. DNA was extracted from the mycelia of 10 representative isolates and the identity was confirmed by sequencing

the internal transcribed spacer (ITS) region. Additionally, phylogenetic analysis combining translation elongation factor-1 $\alpha$  and actin sequences was performed and the ten isolates grouped with the *D. longicolla* ex-type cultures in a well-supported clade (94% bootstrap support). A pathogenicity test was performed in the greenhouse by inserting *D. longicolla*-infested toothpicks into the lower stems of the soybean plants. To complete Koch's postulates, *D. longicolla* was re-isolated from the zone lines of the inoculated plants and the pathogen identity was confirmed by sequencing the ITS gene.



# How to Diagnose Charcoal Rot



Randomly scattered black fruiting bodies, usually limited to the lower 5 nodes



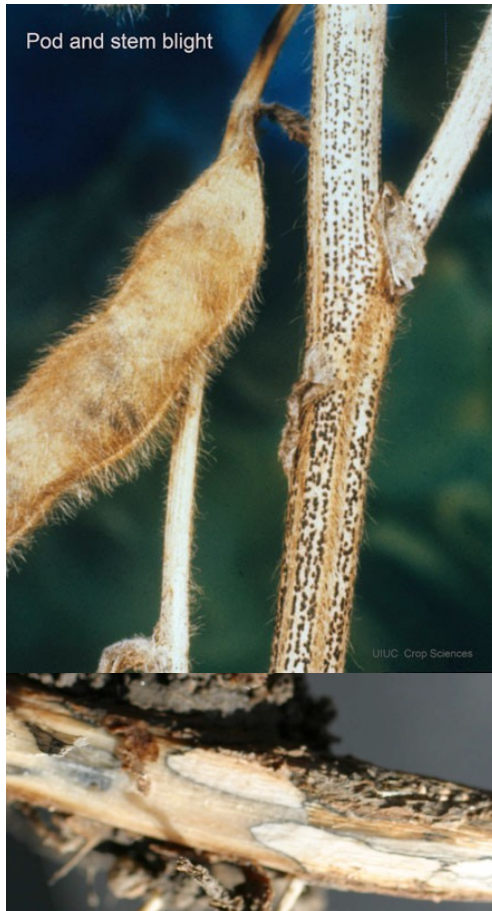
Beneath the stem tissue on the lower stem, may look like the stem has been dusted or peppered with charcoal dust

Microsclerotia may be visible inside the stem



Source: <https://extension.purdue.edu/extmedia/CPN/CPN-1004.pdf>

# How to Diagnose Diaporthe Pod and Stem Blight



## Linear rows of black pycnidia

- Anthracnose stem blight and charcoal rot have randomly scattered black fruiting bodies
- Pycnidia may cover the entire plant at maturity

Upper portions of infected plants may turn yellow and die

Infected seed are cracked, shriveled, dull, and may have a gray mold on them

**“The Diaporthe species of pod and stem blight produce black zone lines that are visible when the stem is sectioned transversely or longitudinally1”**

Sources: 1<https://extension.purdue.edu/extmedia/CPN/CPN-1007.pdf>,  
<http://www.extension.umn.edu/agriculture/crop-diseases/soybean/podblight.html>



# Acknowledgements

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