9-15-2003

Charcoal rot -- a disease new to Iowa farmers

X. B. Yang
Iowa State University, xbyang@iastate.edu

Shrishail S. Navi
Iowa State University, ssnavi@iastate.edu

Palle Pedersen
Iowa State University, palle@iastate.edu

Charcoal rot -- a disease new to Iowa farmers

Abstract
August was the driest month on record in Iowa with most of the state being in severe drought. Because of these extreme environmental conditions a disease new to soybean producers has been prevalent in Iowa soybean fields this year. The disease is charcoal rot, a yield robber from the south.

Keywords
Plant Pathology, Agronomy

Disciplines
Agricultural Science | Agriculture | Agronomy and Crop Sciences | Plant Pathology

Charcoal rot -- a disease new to Iowa farmers

August was the driest month on record in Iowa with most of the state being in severe drought. Because of these extreme environmental conditions a disease new to soybean producers has been prevalent in Iowa soybean fields this year. The disease is charcoal rot, a yield robber from the south.

What is charcoal rot?

Charcoal rot is a root disease caused by the soil borne fungus *Macrophomina phaseolina*. The disease appears in hot and dry weather and has been an endemic problem in southern soybean growing areas where summer is relative dry or irrigation is needed. Charcoal rot also is a problem in the central part of the Midwest, especially in Kansas and parts of Missouri. When severe, the disease reduces yield by killing plants at early reproductive stages.

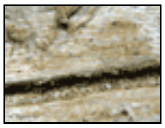
What does charcoal rot look like?

Symptoms of charcoal rot, also known as dry-weather wilt and summer wilt, appear during hot, dry weather when unfavorable environmental conditions stress the plant. In infested fields, diseased plants are wilted and dead pre-maturely in August with patches similar to those of sudden death syndrome (SDS). Discoloration in cortex tissues of taproot and lower stems is typical. When stems are split, piths of diseased plants have brown stem rot (BSR)-like browning in the lower part of the stem. In some plants, however, no pith browning can be found.

On dead plants whose diseased tissues are dry, the fungus produces numerous microsclerotia, which are tiny black fungal structures similar to charcoal dust. Microsclerotia of *M. phaseolina* can be found on the epidermis, just beneath the epidermis, and inside taproots and lower stems of dead and dry plants. A hand-held magnifier is a must to see the microsclerotia. Locating microsclerotia takes experience. Training or working with an experienced person may be needed for most of us.

Soybean field with charcoal rot.

Enlarge [1]



Microsclerotia inside root.

Enlarge [2]

Microsclerotia on root surface.

Enlarge [3]

Soybean plants wilted by charcoal rot.

Enlarge [4]

Where has the disease been found?

We have recently made a survey in eastern Iowa covering areas from Nashua in northern Iowa to Crawfordsville in southern Iowa. We collected samples from many fields showing large areas of premature drying. In most of the fields we visited, charcoal rot symptoms/signs were found in these premature drying fields. In central Iowa, the disease was found in almost all suspected fields with patches of premature-drying soybean plants. Fields with more that 70 percent killed plants have been found in a field along Interstate 35 between Ames and Des Moines. In Davis County in southern Iowa, Iowa State University Extension field crop specialist Mark Carlton also has found several soybean fields with severe damage from charcoal rot.

This is the first time in Iowa that prevalent damage from soybean charcoal rot has been found that can cause severe yield losses. We are surprised with such wide occurrence of this disease because it has been considered a southern disease. In the last few years, the Iowa State University Plant Disease Clinic occasionally received diseased plants with charcoal rot at the end of a season but never as bad as this year. Although we know the disease is prevalent in dry weather, it is unknown how it showed up in such a wide area at such a level.

It is important to identify this disease because the disease can be easily misidentified as BSR or SDS. Misidentification could result in re-occurrence of this disease in next year's soybeans. According to *Soybean Disease Compendium*, seeds may carry the pathogen in the seed coat. Although the seed borne nature needs to be investigated further, it would be wise to identify the diseases before the end of the growing season in seed fields because infected seeds have lower germination.

You can send samples to the Iowa State University Plant Disease Clinic if you have a field that fits the description of charcoal rot infested fields. In a future ICM article we will discuss how to manage this disease.

This article originally appeared on pages 149-150 of the IC-490(21) -- September 15, 2003 issue.
