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## Charcoal rot -- a dry weather disease

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## **Abstract**

In the last issue of the ICM Newsletter, we [reported](#) that charcoal rot, a drought-related soybean disease, was prevalent in Iowa late this summer, causing premature death of soybeans. We briefly discussed identification and scouting methods. In this article, we address management issues and provide more information on identifying this disease in fall.

## **Keywords**

Plant Pathology

## **Disciplines**

Agricultural Science | Agriculture | Plant Pathology

# INTEGRATED CROP MANAGEMENT

## Charcoal rot -- a dry weather disease

In the last issue of the ICM Newsletter, we reported [1] that charcoal rot, a drought-related soybean disease, was prevalent in Iowa late this summer, causing premature death of soybeans. We briefly discussed identification and scouting methods. In this article, we address management issues and provide more information on identifying this disease in fall.

Charcoal rot is caused by *Macrophomina phaseolina*, a disease that appears in hot and dry weather when soil temperatures are 80-95°F (27-35°C) for 2 to 3 weeks. The disease has been an endemic problem in some southern soybean growing areas where summer is relatively dry or irrigation is needed. The fungus is highly variable with a wide host range and geographic distribution. In addition, it can infect more than 500 crop and weed species. *M. phaseolina* is known to infect corn and causes stalk rot. There is no information available on the role that rotation with corn has on charcoal rot development in Iowa.



**Soybean plants infected by charcoal rot.**

[Enlarge](#) [2]



**Pith discoloration by charcoal rot.**

[Enlarge](#) [3]

## BSR and charcoal rot

Although weather in July was good for infection by the brown stem rot (BSR) pathogen, August weather was too hot and dry for BSR. If you find a field with plants having BSR-like discoloration, you should check for charcoal rot. Charcoal rot can be easily mistaken for brown stem rot because there is also discoloration in the pith of charcoal rot infected plants. However, there are differences between BSR and charcoal rot. Discoloration by charcoal rot is limited to the lower portion of stems, often not higher than 5th node, while the discoloration in BSR can reach the upper portion of a stem. In plants with severe BSR foliar symptoms, discoloration should be found in the upper portion of a stem. If plants died early with pith discoloration limited to lower stems, usually with fungal fruiting structures inside the stems, it is more likely charcoal rot.

## Management measures

Charcoal rot fungus has a broad host range. Alfalfa and white clover are hosts in addition to soybean and corn. Small grains are considered to be poor hosts. Soybean yield loss can be reduced by rotating with small grains such as wheat and barley for one or two years. Also, increasing seeding rate is not recommended because high plant populations increase drought stress. As we observed this year, there are differences in charcoal rot susceptibility among soybean varieties. No chemical treatments are available to control charcoal rot in soybean.

## Seed infection

The importance of seed-borne charcoal rot is unknown in Iowa. Studies from the tropics indicate that soybean seed coats often carry the pathogen, and infected seeds have lower germination rates and seedling damping off is common. Therefore, if seed fields have severe charcoal rot incidence, seed should be tested for the infection after harvest.

## Identify charcoal rot in fall

If you did not scout for this disease before early September, but suspect charcoal rot may be a problem, the following steps can help you identify the problems from mature soybeans.

- Check plants that are short and died prematurely. Infected plants may have premature yellowing of the top leaves.
- Look for plants with unfilled upper pods and generally low plant vigor. In some cases, the upper one-third of the plant may have only flat pods without seed.
- Microsclerotia (fruiting structures) of the fungus can be found on the epidermis (skin), just beneath the epidermis after peeling it off, and inside taproots and lower stems of dead and dry plants.
- Scrape the outer tissues of stems around the soil line and look for the presence of tiny black fungal structures that appear similar to charcoal dust - a diagnostic symptom of charcoal rot.
- When stems are split, piths of diseased plants have browning in the lower portion of the stems. In some plants, however, pith browning may not develop.

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[1] <http://www.ipm.iastate.edu/ipm/icm/2003/9-15-2003/charcoalrot.html>

[2] [http://www.ent.iastate.edu/imagegal/plantpath/soybean/charcoalrot/diseased\\_plantxb.html](http://www.ent.iastate.edu/imagegal/plantpath/soybean/charcoalrot/diseased_plantxb.html)

[3] [http://www.ent.iastate.edu/imagegal/plantpath/soybean/charcoalrot/brown\\_pithxb.html](http://www.ent.iastate.edu/imagegal/plantpath/soybean/charcoalrot/brown_pithxb.html)

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