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Brown stem rot or Fusarium wilt?

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

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Abstract
Different seasons have different diseases and therefore, different production questions have to be addressed. In this cool and wet summer, our Plant Disease Clinic received a number of samples with disease symptoms that challenged both agronomists who are doing field calls and plant pathologists who are involved with the diagnosis. The first sample (photo images) came July 18th from Steve Barnhart, regional agronomist of Agriliance.

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Different seasons have different diseases and therefore, different production questions have to be addressed. In this cool and wet summer, our Plant Disease Clinic received a number of samples with disease symptoms that challenged both agronomists who are doing field calls and plant pathologists who are involved with the diagnosis. The first sample (photo images) came July 18th from Steve Barnhart, regional agronomist of Agriliance. The plants were dead from a disease and had a typical brown stem rot (BSR) symptom, browning in the pith. He told us that "the symptoms looked like BSR, but I felt it was too early." Too early indeed. The Soybean Disease Compendium says "no external symptom of BSR before pod setting" and these plants did not have pods set yet.

In Steve's plot images, the diseased plants are wilting and dead. Typical BSR stem symptoms together with early death also are common in other samples submitted to the Plant Disease Clinic. Upon splitting the stems of these plants from base up, typical BSR-like browning was observed in the pith up to 3rd node of stems. In the root system, fine roots were rotten with purple discoloration evident on the lateral roots.

Brown stem rot like symptom may be caused by several factors.

This is the first time we have seen diseased plants with such symptoms. This summer, the weather is very conducive to brown stem rot. The stem browning is so typical for BSR that we cannot reject the possible existence of BSR. However, BSR does not cause root rot. The root rot, especially purple discoloration, is an indication of possible Fusarium infection. The wilting symptoms at this early stage of growth are similar to those of Fusarium wilt, a disease rare in Iowa. Over the last ten years, we have observed Fusarium wilt only once. The plants from the previous samples did not have BSR-like pith browning and had severe root rot (lateral roots were not present).

Fusarium wilt also is called Fusarium blight and the last time we saw this disease was in late July of 1999. It is caused by Fusarium oxysporum, a very common soilborne fungus. Plants killed by this disease appear from a distance to have Phytophthora root rot, and may be scattered or in small patches in the field. Upper leaves are wilted and seem to be scorched. The middle or lower leaves turn yellow or have pale yellow spots, then wither or drop prematurely. Unlike Phytophthora root rot, there should be no evidence of any lesions on the stem and the root rot is less than Phytophthora. The stem pith can be brown as people see this summer, so the disease can be mistaken for brown stem rot. Soybean cyst nematodes
and herbicide injury can predispose soybeans to infection by this fungus.

There are three possibilities for the occurrence of these diseased plants:

1. it is caused by Fusarium wilt pathogens that can cause severe pith-browning symptoms uncommon to us;
2. plants are infected with both Fusarium and BSR pathogens, resulting in synadric effects that kill plants in early stages with severe browning in pith; and
3. in this cool and wet summer, plants were killed earlier than when the textbook says, by the BSR pathogen with non-virulent *Fusarium* fungi, growing saprophytically on the roots of dead plants.

Of these possibilities, the last is less likely true. Whatever the case may be, these diseased plants are new to us. Additionally, symptoms like this have been observed in other states in the upper Midwest. Currently, we are doing isolation in the laboratory and will keep you updated with the results of the investigation and give you information about how to manage the problems.

*Wilting soybean plants (photo by Steve Barnhart).*
Root rot with purple discoloration (photo by Steve Barnhart).

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