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Powdery Mildew of Soybean

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Powdery mildew of soybean is caused by a fungus, *Microsphaera diffusa*. It is possible, although not proven that this specific species may infect other legumes grown in WI including clovers. Epidemics of powdery mildew occur in soybean about every 10-15 years in WI. The first epidemic was observed in 1975 and several epidemics have since occurred with the latest occurring in 2004. Visual differences in varietal susceptibility to this pathogen were very evident in the UW soybean variety evaluation trials. Powdery mildew occurred in 2005, but the disease was less severe and more sporadic in Wisconsin.

Identification and Symptomology

Powdery mildew of soybean requires cool air temperatures and low relative humidity. This combination of temperature and relative humidity is not common in Wisconsin or the Midwest. Thus, powdery mildew is an occasional and unexpected problem. White, powdery patches composed of mycelium and conidia develop on cotyledons, stems, pods, and particularly on the upper surface of leaves (Fig. 1 and 3). Small colonies form initially, then enlarge and coalesce until the entire surface of infected plant parts are covered with mycelium and conidia. Symptoms are less common than signs of the pathogen. Symptoms on the leaves are green and yellow islands, interveinal necrosis, necrotic specks, and crinkling of the leaf blade followed by defoliation. These symptoms may be almost absent when mycelial growth is abundant. Chlorotic spots and veinal necrosis are typically expressed by resistant cultivars challenged in a controlled environment. Several late season diseases can result in yellow and dropping leaves so examine leaves carefully for the powdery mildew pathogen. Plants may be co-infected with the powdery mildew pathogen and other pathogens, making it appear that powdery mildew is major cause of symptoms.

Yield Losses

Estimates of yield loss have been achieved by comparing yield of plots treated or not treated with a fungicide or comparing yield of resistant and susceptible cultivars in the presence of powdery mildew epidemics. Measured yield losses of 0 to 10 bushels per acre were estimated in Iowa studies from 1976 through 1978 by comparing both resistant and susceptible cultivars and fungicide applications. Disease severity was high in these trials. Yield losses in WI tend to be in the 0-5 bushel per acre range. Soybean planted late for a region will lose more yield to powdery mildew than early-planted soybeans.

Management

Crop rotation is not an effective tactic to manage powdery mildew because inoculum can be readily introduced into fields by long-range dissemination of inocula of *M. diffusa*. One exception is planting date. Frequently powdery mildew is more severe in late-planted soybean fields. It is difficult for companies to breed for resistance because normally powdery mildew pressure is low or nonexistent in most years. Dramatic differences in severity of powdery mildew can be observed among soybean varieties.(Fig.2) Several fungicides such as Topsin M are effective in controlling powdery mildew. Quadris and Headline have less efficacy for powdery mildew. Investigators evaluating foliar fungicides on soybean should take note of powdery mildew severity.



Figure 1. White, powdery patches composed of mycelium and conidia on soybean leaves.



Figure 2. Soybean varieties susceptible (left) and resistant (right) to powdery mildew.



Figure 3. Closeup of white, powdery patches.

More information on soybean diseases and production can be found at:

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

<http://soybean.uwex.edu>

Pest Management in WI Field Crops-2006

<http://cecommerce.uwex.edu>

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