Soybean Foliage Diseases May Begin to Show Up

By Laura Sweets

Again, the 2010 season has been a challenging one for soybean production. Wet weather and flooding have led to late plantings and replanting. There is a wide range in growth stages of soybean plants in fields across the state. Since a significant number of acres were just planted and are only now emerging, soybean foliage diseases have not been particularly widespread or severe so far this season. I have seen low levels of Septoria brown spot on the first true leaf of very early planted soybean plants. However, the recent period of wet weather and wind driven rains may lead to the appearance of foliage diseases such as Septoria brown spot or bacterial blight. Frogeye leaf spot, downy mildew and bacterial pustule are the other foliage diseases likely to occur on soybeans during the mid-season period. In most years the soybean foliage diseases occur in low levels and do not cause significant losses. However, under favorable conditions for disease development, losses can be serious.

Septoria brown spot causes small, angular to somewhat circular, red to brown spots on the unifoliolate and lower trifoliolate leaves. The individual spots can run together forming irregularly shaped brown blotches on the leaves. Infected unifoliolate leaves will yellow and drop prematurely. Brown spot usually starts on the lower portion of the plant. Under favorable weather conditions (warm, wet weather), the disease may move up through the plant. Late in the growing season, infected leaves may turn rusty brown or yellow and drop prematurely.

The fungus which causes this disease, *Septoria glycines*, survives in infested residues left on the soil surface. During periods of wet spring weather, spores produced on the residues are splashed or blown to cotyledons or unifoliolate leaves of soybean where they cause infection. Warm, wet weather favors infection and disease development. Symptoms develop over a temperature range of 59-86°F with 77°F being optimum for symptom development. The spread of brown spot is restricted by dry weather. Because the pathogen survives in infested residues left on the soil surface, the disease is more severe in continuous soybean fields.

The principle means of reducing Septoria brown spot is to rotate crops with at least one year between soybean crops. The use of foliar fungicides from bloom to early pod development may be warranted in high value fields (ex. seed production fields) or in fields with second year beans. See the 2009 *Missouri Pest Management Guide: Corn, Grain Sorghum, Soybean and Winter Wheat M171* for information on fungicides labeled for use on soybeans.

Bacterial blight also produces lesions on the leaves. The lesions usually begin as small, angular, yellow lesions. Lesions usually have a translucent or water soaked appearance which may be more easily seen if leaves are held up to the light. Lesions progress in color from yellow to light brown and eventually to a dark reddish brown. Older lesions have a dark center surrounded by a water soaked margin and a yellow halo. In cool, rainy weather the small, angular lesions may enlarge and merge producing large, irregular dead areas in the leaf. With wind and rain these large dead areas drop out or tear away, giving the leaf a ragged appearance. Symptoms typically occur several days after a rain with driving winds or a hail storm. If there are alternating periods of wet and dry weather, plants may show bands of leaves with symptoms, i.e. leaves that expanded during wet periods show bacterial

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Table of Contents

Soybean Foliage Diseases May Begin to Show Up
Page 89

Rice Blast Can Take a Big Bite Out of Profits
Page 90

Corn Foliage Diseases
Page 90

Weather Data for the Week Ending
June 21, 2010
Page 94
Soybean Foliage Diseases May Begin to Show Up continued from page 89

blight symptoms and leaves that expanded during dry periods are free of disease.

**Bacterial blight**, caused by the bacterium *Pseudomonas savastanoi* pv. *glycinea*, occurs worldwide and is common during cool, wet weather. The causal bacterium may be carried in seed or can survive in crop residues. Bacteria on the seed may cause cotyledon infection. Bacteria can then be spread from infected cotyledons or infested residues by wind driven rain or splashing rain. Further spread occurs during rainstorms and hail storms or during cultivation when plants are wet. During early to mid-season, disease outbreaks usually occur five to seven days after wind driven rains. Hot, dry weather checks disease early to mid-season, disease outbreaks usually occur five to seven days after wind driven rains. Hot, dry weather checks disease development.

Management strategies for bacterial blight include planting disease-free seed, avoiding highly susceptible varieties in areas where bacterial blight is serious, rotating crops with at least one year between soybean crops and not cultivating when foliage is wet.

**Bacterial pustule**, caused by the bacterium *Xanthomonas axonopodis* pv. *glycines*, occurs in most soybean-growing areas. Although bacterial pustule can occur in Missouri, it is not found as frequently as the other foliage diseases. Bacterial pustule is common during periods of warm, wet weather. The causal bacterium may be carried in seed or can survive in crop residues. Bacteria are spread from infected residues or infected plants tissues by wind driven rain or splashing rain. Further spread occurs during rainstorms and hailstorms.

Bacterial pustule lesions begin as small, light-green lesions. Lesions may range from small spots to large areas of brown tissue formed when smaller lesions merge. Initially the center of the lesion may be slightly raised. The raised center or “pustule” may be more evident in older lesions or on lesions on the lower leaf surface.

Symptoms of bacterial pustule may appear similar to those caused by bacterial blight. Typically bacterial pustule lesions do not show the water soaking around the lesions that is common with bacterial blight. Also, the small, raised pustules in the center of the lesions are characteristic of bacterial pustule but not of bacterial blight.

The raised center or “pustule” on the lower leaf surface might be mistaken for soybean rust pustules. Bacterial pustules do not produce spores, and they may show cracking or fissures across the pustule rather than the circular openings characteristic of soybean rust pustules. A high-power hand lens may be necessary to distinguish between bacterial pustule and soybean rust when examining leaves in the field.

Management strategies for bacterial pustule include planting disease-free seed, avoiding highly susceptible varieties in areas where bacterial blight is serious, rotating crops with at least one year between soybean crops and not cultivating when foliage is wet.

**Frogeye leaf spot**, caused by the fungus *Cercospora sojina*, occurs worldwide. However, the disease is most serious in warm regions or during periods of warm, humid weather. The fungus that causes frogeye leaf spot survives in infested soybean residue and infected seed. Spores produced on infested residues or infected plant tissues are spread by splashing rain or winds.

Symptoms of frogeye leaf spot occur primarily on leaves, although the causal fungus may also infect stems, pods and seed. Lesions are small, circular to somewhat irregular spots that develop on the upper leaf surfaces. Initially the spots are dark and water soaked in appearance. As the lesions age, the center becomes light brown to light gray in color. Older lesions have a light center with a darker red to purple-brown border. Lesions may merge to kill larger areas of the leaf surface. Heavily spotted leaves usually wither and drop prematurely.

Disease development is favored by warm, humid weather. Leaves that expand and develop during periods of warm, wet weather are more likely to be infected than leaves that expand during dry periods. Dry weather severely limits disease development.

The principle means of reducing frogeye leaf spot are to plant disease-free seed, to select resistant varieties and to rotate crops with at least one year between soybean crops. The use of foliar fungicides from bloom to early pod development may be warranted in high value fields (ex. seed production fields) or in years when weather is especially favorable for disease development. See the 2009 Missouri Pest Management Guide: Corn, Grain Sorghum, Soybean and Winter Wheat M171 for information on fungicides labeled for use on soybeans.

**Downy mildew**, caused by the fungus *Peronospora manshurica*, is reported wherever soybeans are grown. The downy mildew fungus survives as oospores in infected leaf residues and on seeds. Spores produced in diseased areas on lower leaf surfaces are wind-blown and serve to infect additional leaves on that plant or other plants.

Initial symptoms of downy mildew are pale green to light yellow spots or blotches on the upper leaf surface of young leaves. These areas enlarge into pale to bright yellow blotches of indefinite size and shape. Eventually lesions turn grayish brown to dark brown with a yellow margin. During periods of heavy dew or wet weather, a gray to purple fuzz that is visible growth of the downy mildew fungus develops on the lower leaf surface beneath the diseased areas on the upper leaf surface. Severely infected leaves turn yellow and then brown. Downy mildew is favored by high humidity and temperatures of 68-72 degrees F.

Management options for downy mildew include planting disease-free seed and rotating crops with at least one year between soybean crops.

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