Plant Protection Programs University of Missouri

Integrated Pest & Crop Management

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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Rice Blast Can Take a Big Bite Out of Profits

By Allen Wrather

The current hot, dry weather in southeast Missouri, northeast Arkansas, and west Tennessee will slow the development of rice blast, but this weather pattern may change. Rice farmers in these areas should scout their rice fields or hire a professional to scout their fields for blast from boot stage until head emergence is complete. If symptoms are present on leaves at boot stage, growers should take action to manage this disease.

If blast symptoms are present on leaves at the split boot stage and the weather is predicted to be cloudy with frequent rains and heavy dew for the next 10 days, rice may be treated with a fungicide for protection against this disease developing on the rice heads. Fungicides should be applied for blast management when panicles begin to emerge from the boot (when the heads of 50% of the main tillers have emerged ¼ inch from the boot) and again 7-10 days later when panicle emergence is 75-90% complete (the heads of 50% of the main tillers have all emerged but for ¼ inch). Farmers may use Quadris, Gem, Stratego, Quilt, and Quilt Xcel for the first application and Quadris or Gem for the second application.

Blast is caused by a fungus that can infect leaves, nodes and panicles. Leaf spots are typically diamond shaped with a brown to red-brown border and a gray-white center. They may be 0.5 inches long and 0.25 inches wide, but size will vary. Yield loss will be severe when the disease develops on the nodes just below the head. This phase of the disease is called neck blast or rotten neck. The infected nodes will be discolored, the heads on these plants will turn white, and grain will not develop or develop poorly.

University Extension Regional Agronomists can supply more information about blast, or you can call me at the Delta Center. More information about rice blast is also available at the Delta Center Web Page, aes.missouri.edu/delta.

Following these suggested procedures will give rice farmers a better chance to produce high yields and profits during 2010.

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Corn Foliage Diseases

By Laura Sweets

This is shaping up to be another "interesting" year for corn and other field crops in Missouri and most of the Midwest. Prolonged periods of wet weather and then flooding delayed planting or led to replanting. Overall the corn crop is behind normal although not as far behind normal as it was at this time last year. There is also a wide range in growth stages of corn across the state. We have not received many samples or calls related to corn foliage diseases but with the most recent bout of wet weather, it is likely that corn foliage diseases may begin to show up in fields.

So far the samples that have been submitted have had anthracnose leaf blight on the lowest leaves, especially in fields with corn on corn (see May 24 issue of the *Integrated Pest & Crop Management Newsletter* for more detailed information on anthracnose of corn). However, corn growth over the last week to 10 days has been incredible. Plants that were at the 2-3 leaf stage around June 5 are now 3-4 feet tall. The anthracnose lesions which were so evident on the first true leaf and the oldest, smallest leaves on plants in early June are in some cases now hard to find. The small leaves at the very base of the plant have sloughed off or are sloughing off and lesions are not very prevalent on the leaves that have emerged with the rapid growth over the last week to 10 days.

There have also been reports of common rust on field corn in southwest Missouri and some small corn (3-4 leaf stage) in an early planted corn seed treatment trial at the Bradford Research Center just east of Columbia had common rust pustules on the lowest leaves. This is earlier than normal for common rust to develop on field corn in Missouri.

There have been a few samples with what would appear to be early lesions of gray leaf spot. Gray leaf spot may begin as small, reddish-brown oval lesions in the leaf tissue. At this stage it can be difficult to identify in the field as these small, brown lesions could be the initial symptoms of several foliage diseases. As the gray leaf spot lesions expand and begin to hit the leaf veins, they take on the straight edges which are more characteristic of gray leaf spot.

Gray leaf spot, common rust and southern rust are the foliage diseases most likely to occur on corn in Missouri over the next few weeks. Northern corn leaf blight does not occur every year but may occur in wet or cool, wet years so that would be another foliage disease to look for when scouting fields. I have had some questions about the bacterial leaf spot, Holcus leaf spot. Although this disease would be likely to occur after hail storms or rain storms with hard, driving winds, I have not seen any samples that were positive for Holcus leaf spot yet this year.

Generally speaking with the corn foliage diseases, the later in the season (especially the longer after pollination) that the foliage disease becomes established, the lower direct yield losses will be. Highest yield losses occur if diseases such as rust or gray leaf spot develop prior to pollination. Also, most of the corn foliage diseases are favored by extended periods of free moisture on the leaf surfaces. This moisture can be from rain, overhead irrigation or heavy dews that stay late in the day. Fields with poor air movement, river bottom fields or shaded portions of fields may also have higher levels of corn foliage diseases.

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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 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 founds 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 infested 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 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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Most of the control recommendations for minimizing losses due to corn foliage diseases are preventative measures such as planting resistant hybrids, rotating crops so the corn doesn't follow corn in the same field or tillage to reduce the amount of infected residue left on the soil surface. Several fungicides are labeled for use on corn to control foliage diseases. See the *2009 Missouri Pest Management Guide: Corn, Grain Sorghum, Soybean and Winter Wheat M171* for fungicides labeled for use on field corn.

In making the decision on whether or not to apply a foliar fungicide to corn it is important to consider the yield potential of each individual field. If fields are uneven and struggling because of wet conditions, foliar fungicides are less likely to give significant increases in yield. If nitrogen loss is a problem again because of wet conditions, it may be more beneficial to correct the nitrogen deficiency than apply a fungicide. Foliar fungicides may give greater yield increases on susceptible hybrids than on hybrids with resistance to the foliage disease present. With foliar fungicides it is important to be scouting fields so that products are applied before the disease has built up to high levels. Later planted fields which will have plants at earlier growth stages later in the season may also benefit more from fungicide application if diseases are occurring than early planted fields which are at more advanced growth stages.

With the wide range in planting dates and plant vigor across the state it is impossible to make blanket assessments of the incidence or severity of corn foliage diseases or to make statewide management recommendations. Individual fields need to be monitored for stand, vigor and yield potential, for other issues such as nitrogen loss or weed escape problems, for the foliage diseases present and the severity of those diseases as well as for the forecast weather conditions in the area before deciding to apply a foliar fungicide.

Fields with high levels of various foliage diseases may also show higher levels of stalk rot this fall. As harvest approaches, check fields which have had foliage disease problems for stalk rot and try to harvest problem fields promptly.

Symptoms of Common Corn Foliage Diseases

Anthracnose (Colletotrichum graminicola)

Infection is most common on lower leaves of young plants but may occur on upper leaves of maturing plants too. Anthracnose lesions tend to be brown, spindle-shaped lesions with yellow to reddish-brown borders. Concentric rings or zones are sometimes apparent within the diseased areas. Stalk symptoms appear as black linear streaks on the surface of lower internodes late in the season.

Holcus Leaf Spot (Bacterial leaf spot)

Lesions usually are oval to rectangular in shape. Initially, they are dark-green and water soaked. Later they become dry and turn light brown with a reddish margin. The lesion resembles parchment paper. Holcus leaf spot may occur a few days after a rain storm but does not usually cause serious losses.

Common Rust (Puccinia sorghi)

Circular to elongate, golden-brown to reddish-brown pustules develop on both upper and lower leaf surfaces. As plants mature, the pustules become brownish-black in color. The pustules rupture, revealing powdery brown spores.

Southern Rust (Puccinia polysora)

Light, reddish-brown, circular to oval pustules develop primarily on the upper leaf surface. Eventually pustules rupture to reveal powdery spores. Later a brownish-black spore stage often forms in rings around the initial pustules.

Gray Leaf Spot (Cercospora zeae-maydis)

Lesions on maturing corn are pale brown to reddish-brown and blocky to rectangular in shape when compared to other corn leaf blights. The lesions typically are restricted by leaf veins giving the lesions parallel edges. Older lesions have a gray cast. Lesions may merge, resulting in large areas of dead leaf tissue. Lesions usually develop first on lower leaves but under favorable weather conditions, extensive leaf blighting over the entire plant may occur.

Northern Corn Leaf Blight (Exserohilum turcicum)

Long, elliptical, grayish-green or tan lesions ranging from 1.0-6.0 inches in length develop on the lower leaves. As the season progresses, nearly all leaves of a susceptible plant may be covered with lesions, giving this plant the appearance of having been injured by frost. During damp weather, dark olive-green to black spores may be produced across surface of lesions.

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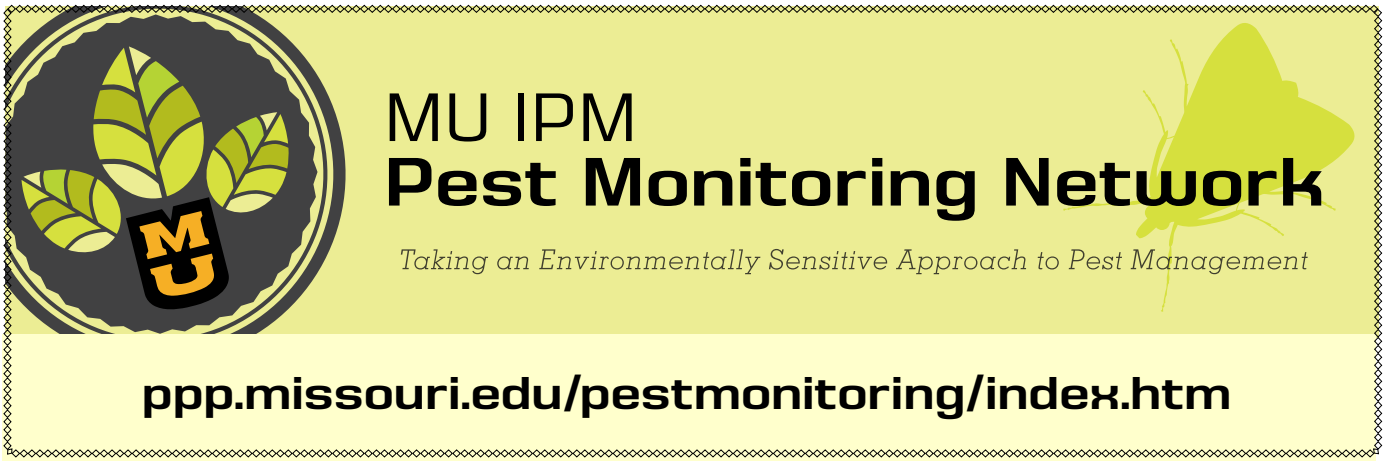
MU IPM
Pest Monitoring Network
Taking an Environmentally Sensitive Approach to Pest Management
ppp.missouri.edu/pestmonitoring/index.htm


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Weather Data for the Week Ending June 20, 2010

By Pat Guinan

Station	County	Weekly Temperature (°F)						Monthly Precipitation (in.)		Growing Degree Days‡	
		Avg. Max.	Avg. Min.	Extreme High	Extreme Low	Mean	Departure from long term avg.	June 1-June 20	Departure from long term avg.	Accumulated Since Apr. 1	Departure from long term avg.
Corning	Atchison	88	67	94	62	76	+3	4.49	+1.31	1225	+305
St. Joseph	Buchanan	85	67	90	64	76	+3	9.34	+5.85	1176	+245
Brunswick	Carroll	87	67	92	64	77	+4	6.30	+2.72	1250	+286
Albany	Gentry	86	66	93	62	76	+3	7.59	+4.31	1148	+245
Auxvasse	Audrain	87	67	92	64	77	+3	4.02	+0.79	1271	+299
Vandalia	Audrain	87	66	92	62	77	+4	4.18	+1.24	1260	+326
Columbia-Bradford Research and Extension Center	Boone	88	68	94	64	77	+3	2.61	-0.41	1236	+222
Columbia-Sanborn Field	Boone	88	70	93	66	78	+4	5.40	+2.23	1369	+317
Williamsburg	Callaway	87	68	94	65	77	+4	3.09	-0.05	1298	+360
Novelty	Knox	86	65	91	61	76	+3	5.62	+2.85	1138	+211
Linneus	Linn	87	65	92	60	77	+5	7.04	+3.54	1150	+252
Monroe City	Monroe	87	66	91	63	77	+3	5.73	+3.05	1210	+247
Versailles	Morgan	88	68	93	64	78	+5	2.94	-0.07	1353	+293
Green Ridge	Pettis	87	68	92	65	77	+4	2.66	-1.23	1279	+292
Lamar	Barton	87	69	93	66	77	+3	3.32	-0.87	1372	+270
Cook Station	Crawford	91	66	94	63	78	+5	3.91	+0.81	1282	+198
Round Spring	Shannon	93	67	97	64	79	+6	1.65	-1.23	1303	+282
Mountain Grove	Wright	90	66	94	63	78	+6	2.57	-0.07	1285	+309
Delta	Cape Girardeau	94	72	97	69	82	+6	0.37	-1.93	1553	+290
Cardwell	Dunklin	97	73	99	72	85	+7	0.09	-2.19	1767	+347
Clarkton	Dunklin	97	73	99	72	85	+7	0.39	-2.19	1694	+307
Glennonville	Dunklin	95	74	98	71	85	+8	0.00	-2.21	1703	+321
Charleston	Mississippi	94	72	96	70	83	+7	0.67	-1.80	1650	+398
Portageville-Delta Center	Pemiscot	97	75	98	74	85	+7	0.46	-2.23	1777	+377
Portageville-Lee Farm	Pemiscot	96	75	98	73	85	+7	0.26	-2.22	1787	+402
Steele	Pemiscot	98	77	100	76	87	+9	3.24	+0.45	1838	+428

* Complete data not available for report

‡Growing degree days are calculated by subtracting a 50 degree (Fahrenheit) base temperature from the average daily temperature. Thus, if the average temperature for the day is 75 degrees, then 25 growing degree days will have been accumulated.

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