Plant Protection Programs University of Missouri

Integrated Pest & Crop Management

Corn Stalk Rots

By Laura Sweets

Any factors which stress corn during the growing season may contribute to an increase in stalk rots that season. And this has certainly been a season of stresses for corn in Missouri with late planting due to wet soil conditions, flooding, cool temperatures, moisture stress, heavy rains, some foliage diseases, etc. Therefore, it would be wise to scout fields for corn stalk rots and to harvest fields with stalk rot problems as quickly as possible.

A number of different fungi and bacteria cause stalk rots of corn. Although many of these pathogens cause distinctive symptoms, there are also general symptoms which are common to all stalk rot diseases. Early symptoms, which occur a few weeks after pollination, usually start with premature dying of bottom leaves. Eventually, the entire plant may die and appear light green to gray. Diseased stalks usually begin losing firmness during August. The cells in the interior of the stalk are dissolved, resulting in a loss of stalk firmness and strength. Stalks may then lodge, particularly if harvest is delayed or wind storms occur.

Fusarium stalk rot and Gibberella stalk rot can be difficult to distinguish in the field. Both can cause a pink to reddish discoloration of diseased stalk tissue. Tufts of white mycelium may be evident at the nodes of diseased stalks. When stalks are split open the pith is usually shredded and discolored.

Anthracnose stalk rot, caused by the fungus *Colletotrichum graminicola*, may be most evident at the nodes. Initially lesions are tan to reddish-brown but they become shiny black later in the season. These shiny black lesions may begin at a node and extend out from that node. The lesions may merge to discolor much of the lower stalk tissue. Internal pith tissues may also be discolored and may disintegrate as disease progresses.

Diplodia stalk rot may begin as a brown to tan discoloration of the lower internodes. Stalks become spongy. The pith disintegrates leaving only the vascular bundles. Mats of white fungal growth of *Diplodia maydis* may be evident on affected tissues. Diplodia also produces fruiting bodies which may be seen as small black specks embedded in the white fungal mat. Diplodia also causes an ear rot of corn. Diplodia ear rot has already been found in fields across the state and Diplodia stalk rot could also be more widespread than normal this season.

Charcoal rot may begin as a root rot and move into the lower internodes of the stalks. Pith tissues will be shredded and plants may break at the crown. The charcoal rot fungus, *Macrophomina phaseolina*, produces very small survival structures called microsclerotia which may be visible as very small, black flecks just beneath the stalk surface or on the vascular strands remaining in the interior of the shredded stalks. Charcoal rot is usually more severe under hot, dry conditions, so this corn stalk rot is not likely to be widespread this season.

Stalk rots are caused by several different fungi and bacteria which are part of the complex of microorganisms that decompose dead plant material in the soil. They survive from one growing season to the next in soil, in infested corn residues or on seed. Stalk rot pathogens enter the corn plant in a variety of ways. The spores may be blown into the base of the leaf sheath where they may germinate and grow into the stalk. Spores may enter directly into a plant through wounds made by corn borers, hail or mechanical injury. When fungi are present in soil or infested residue as either spores or mycelium, they may infect the root system causing root rot early in the growing season and later grow up into the stalk causing stalk rot.

Stalk rot becomes a problem when plants are stressed during the grain filling stage of development. Water shortage, extended periods of cloudy weather, hail damage, corn borer infestation, low potassium in relation to nitrogen, leaf diseases and other stresses that occur in August and September may be associated with an increase in stalk rot.

Losses from stalk rots vary from season to season and from region to region. Yield losses of 10 to 20% may occur on susceptible hybrids. Tolls greater than 50% have been

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Late Season Soybean Diseases

By Laura Sweets

This has been an unusual year for soybean diseases. Sudden death syndrome (SDS) and Cercospora leaf spot/blight have been the most commonly reported problems over the last several weeks. Although these diseases have been covered in detail in recent issues of the Integrated Pest and Crop Management Newsletter, they are summarized below as well. In addition to SDS and Cercospora, Septoria brown spot has moved up in the canopy of some fields. This is also the time of year when anthracnose and pod and stem blight may show up on maturing soybean plants. Losses from soybean cyst nematode continue to be a problem. This would be a good year to sample fields for SCN.

Yield losses from these various late season diseases will vary depending on when symptoms began to occur, number of plants infected, severity of disease in infected plants and weather conditions from now to harvest. In some cases although yellowing of the upper nodes may be quite widespread and spectacular in a field, damage is limited to the uppermost leaves and pods so yield loss should be minimal. In other cases, especially with sudden death syndrome, the entire plant may have been killed prematurely. If large areas of a field are thus affected, yield losses will be greater. Although it is too late in the season to do much to control these diseases this year, management strategies to prevent or minimize these diseases next season are also given below.

Sudden Death Syndrome

Symptoms of sudden death syndrome (SDS), caused by a strain of *Fusarium virguliforme*, may appear several weeks before flowering but are more pronounced after flowering. Foliage symptoms begin as scattered yellow blotches in the interveinal leaf tissue. These yellow blotches may increase in size and merger to affect larger areas of leaf tissue. Yellow areas may turn brown but veins remain green giving the leaves a striking appearance. Infected plants may wilt and die prematurely. Severely affected leaflets may drop off the plant leaving the petiole attached or may curl upward and remain attached to the plant. Root systems may show deterioration and discoloration of lateral roots and taproot. When split open, internal tissues of the taproot and stem may show a light gray to light brown discoloration.

Management options for SDS are somewhat limited but should include planting varieties which have performed well where SDS has been a problem, improving drainage in poorly drained fields, avoiding compaction, staggering planting dates, delaying planting until soils are warm and dry, avoiding continuous crop soybean, maintaining good crop vigor, avoiding crop stress including stress from soybean cyst nematode and harvesting fields with SDS in a timely fashion.

Septoria Brown Spot

Septoria brown spot causes small brown spots on the unifoliolate and lower trifoliolate leaves. The individual spots may run together forming irregularly shaped brown blotches on the leaves. Infected leaves may 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. Brown spot was evident in many Missouri soybean fields earlier this season. But late season rains can trigger a reoccurrence of Septoria brown spot. Symptoms move up through the canopy of soybean plants. Lower leaves may show heavy spotting, yellowing and dropping prematurely. Upper leaves may also show spotting and yellowing. Some fields which have a yellow cast from the road may be showing symptoms of Septoria brown spot rather than SDS.

The fungus which causes this disease, *Septoria glycines*, survives in infested residues left on the soil surface. Fields with continuous soybean production are more likely to show damage. Planting disease-free, good quality seed of resistant varieties, rotating crops with at least one year between soybean crops and maintaining good plant vigor should reduce losses from Septoria brown spot.

Cercospora Leaf Spot and Purple Seed Stain

Cercospora kikuchii can infect soybean seeds, pods, stems and leaves but is most commonly found on the seed. However, this year we are seeing some cases of leaf spot or leaf blight caused by this fungus. Infection is primarily occurring on the uppermost leaves and begins as reddish purple to reddish brown, angular to somewhat circular lesions on the soybean leaves. These lesions may coalesce to kill larger areas of leaf tissue. The uppermost trifoliolate leaf and petiole may be blighted and brown. One striking symptom of this disease may be the premature yellowing and then blighting of the youngest, upper leaves over large areas of affected fields. In most fields, the symptoms have not progressed down the plants more than one to two nodes. Pods at the uppermost node may develop round, reddish purple to reddish brown lesions. This pathogen may also infect seed causing purple seed stain. Infected seed show a conspicuous discoloration ranging in color from pink to pale purple to dark purple. The discoloration may range from small specks to large blotches which cover the entire surface of the seed coat. Temperatures of 82-86°F with extended periods of high humidity favor disease development.

At this point in the season control of Cercospora leaf spot and purple seed stain is not feasible. It is important to remember that since this fungus can infect the seed, seed from heavily infected fields should not be used for seed. If infected seed must be planted, seed lots should be thoroughly cleaned and an appropriate seed treatment fungicide used. Rotating soybean with crops other than legumes will also help reduce Cercospora leaf spot and blight in future soybean crops.

Colletotrichum species

Colletotrichum truncatum and several other *Colletotrichum* species cause

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anthracnose of soybean. Typically, anthracnose is a late season stem and pod disease of soybean. Symptoms occur on stems, pods and petioles as irregularly shaped, light to dark brown spots, streaks or lesions. Eventually black fungal structures may be evident in these lesions. Anthracnose may also cause tip blight. The tip blight phase of anthracnose causes a yellowing or browning of the uppermost leaves and pods. The blighted tips may dry up and die prematurely. Anthracnose is favored by warm, wet weather, and the tip blight phase of anthracnose is most likely to occur after a rainy period.

Again, at this point in the season control of anthracnose is not feasible. This fungus may also infect seed so seed from heavily infected fields should not be used for seed. If infected seed must be planted, seed lots should be thoroughly cleaned and an appropriate seed treatment fungicide used. Rotating crops with at least one year out of soybean will also help reduce anthracnose.

Pod and Stem Blight

Phomopsis longicolla and the other *Diaporthe* and Phomopsis species that cause pod and stem blight and Phomopsis seed decay can survive in infested crop residues, in the soil and in seed. Symptoms usually develop on stems of plants during later reproductive stages of growth.

Pod and stem blight infected plants may be stunted and their stems discolored. Black pycnidia or fruiting bodies of the cause fungi develop on the lower portion of the main stem, branches and pods as plants reach maturity. The pycnidia may be limited to small patches near the nodes or may cover dead stems and pods. On stems, pycnidia are usually arranged in linear rows while on pods they are scattered across the pods. The fungi may grow through the pod walls and infect the seed causing Phomopsis seed decay. Infected seed is usually oblong in shape, somewhat shrunken or shriveled and covered with a white mold growth.

Prolonged periods of wet weather during flowering and pod fill favor the development of pod and stem blight. If wet weather continues through harvest, levels of Phomopsis seed decay may be high.

At this point in the season control of pod and stem blight is not feasible. Management options include rotating crops with at least one year between soybean crops and planting disease-free seed.

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reported in localized areas. Losses may be direct losses due to poor filling of the ears or lightweight and poorly finished ears or indirect through harvest losses because of stalk breakage or lodging. Harvest losses may be reduced if fields are scouted 40-60 days after pollination to check for symptoms of stalk rot. Stalk rot can be detected by either pinching stalks or pushing on stalks. If more than 10-15 percent of the stalks are rotted, the field should be harvested as soon as possible.

Management of stalk rots of corn should include the following:

- Select hybrids with good stalk strength and lodging characteristics.
- Plant at recommended plant populations for that hybrid.
- Follow proper fertility practices.
- Avoid or minimize stress to corn (especially during pollination and grain fill).
- Harvest in a timely manner.

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Weather Data for the Week Ending September 14, 2009

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.	Sept 1 - Sept 14	Departure from long term avg.	Accumulated Since Apr. 1	Departure from long term avg.
Corning	Atchison	82	62	84	57	71	+2	0.09	-1.54	2972	-86
St. Joseph	Buchanan	79	61	82	60	69	0	0.30	-1.68	2887	-189
Brunswick	Carroll	82	59	85	55	69	0	0.00	-1.43	2941	-175
Albany	Gentry	81	58	83	55	69	+1	0.00	-1.56	2803	-247
Auxvasse	Audrain	81	59	83	55	69	-1	0.03	-1.75	2932	-213
Vandalia	Audrain	82	57	85	55	68	-2	0.35	-1.51	2915	-220
Columbia-Bradford	Boone	81	60	83	58	69	-1	0.04	-1.58	*	*
Columbia-Jefferson Farm	Boone	80	62	82	59	70	0	0.12	-1.44	2995	-256
Columbia-South Farms	Boone	81	62	83	59	70	0	0.11	-1.51	2911	-258
Williamsburg	Callaway	82	58	84	55	69	-1	0.01	-1.80	2926	-170
Novelty	Knox	79	57	81	54	67	-2	0.04	-1.50	2658	-401
Linneus	Linn	80	59	85	56	69	0	0.01	-1.78	2755	-235
Monroe City	Monroe	79	57	83	54	67	-3	0.06	-1.65	2807	-307
Versailles	Morgan	82	61	87	58	70	-1	2.97	+1.19	3132	-171
Green Ridge	Pettis	79	61	83	58	69	-1	1.27	-0.65	2990	-65
Lamar	Barton	79	64	83	62	70	-2	3.56	+1.35	3169	-279
Cook Station	Crawford	81	57	86	53	68	-2	2.57	+0.78	2910	-409
Round Spring	Shannon	82	60	88	55	69	-1	3.84	+2.18	2955	-217
Mountain Grove	Wright	80	61	86	59	69	-1	0.09	-1.69	2893	-265
Delta	Cape Girardeau	84	61	86	58	71	-2	1.63	+0.32	3301	-342
Cardwell	Dunklin	82	65	87	63	73	-1	0.89	-0.21	3638	-290
Clarkton	Dunklin	85	63	89	60	72	-2	0.94	+0.05	3529	-348
Glennonville	Dunklin	84	64	87	62	73	0	0.51	-0.36	3575	-280
Charleston	Mississippi	85	62	87	59	73	0	0.25	-0.62	3482	-146
Portageville-Delta Center	Pemiscot	84	65	87	60	74	0	2.43	+1.25	3706	-166
Portageville-Lee Farm	Pemiscot	84	65	87	61	74	0	0.71	-0.58	3717	-127
Steele	Pemiscot	84	65	89	63	74	0	0.80	-0.36	3780	-90

* 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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