Plant Protection Programs University of Missouri

Integrated Pest & Crop Management

Evaluate Winter Wheat Seed Quality Prior to Planting

By Laura Sweets

Fusarium head blight or scab was widespread, and in some fields severe, this season. The fungus which causes this disease may infect kernels and can affect stands if infected seed is planted. If wheat is going to be saved for seed, this is certainly a year to pay careful attention to the quality of seed being saved. Initial reports from both the Missouri Seed Improvement Association and the Missouri Department of Agriculture indicate poor germination test results on wheat from this year's crop. Samples with germination rates of 50-60% and visibly fungus infected seed are common.

Fusarium head blight or scab infection may result in shriveled and shrunken kernels, lightweight bleached or tombstone kernels or kernels that have a pinkish cast or discoloration. Lots with high levels of scab may have lower germination rates. The fungus that causes scab can also cause a seedling blight of wheat. If scab infected seed is used for planting, seedling blights and stand establishment problems may occur. Management of Fusarium seedling blight is through the planting of disease-free seed or a combination of thoroughly cleaning the seed lot, having a germination test run, adjusting the seeding rate to compensate for germination rate and using a fungicide seed treatment effective against seed-borne Fusarium or scab (see accompanying table of wheat seed treatment fungicides).

Because scab can decrease germination, a germination test may be especially useful in determining if a particular lot should be used for seed. The minimum germination rate for certified seed is 85% germination. It is possible that lower germination rates might be successfully used for seed if the seeding rate is adjusted to compensate for the low germination rate. But this can be risky, especially if weather conditions at and after planting are not favorable for germination and emergence. Fungicide seed treatments can provide some benefit but they cannot resurrect dead seed.

If seed from a field that had Fusarium head blight or scab is being considered for use as seed this fall, it is important to get an accurate germination test and use this information in deciding whether or not to use the lot for seed, whether the seeding rate will need to be increased and whether or not to apply a seed treatment fungicide.

Before submitting a sample for a germination test it is important to thoroughly clean the seed. The wheat seed should be cleaned to remove small and damaged seed and to eliminate weed seeds. With the amount of scab is some lots this year, thoroughly cleaning a lot may clean out 25-30% of the seed in the lot. But a thorough cleaning will give more reliable germination test results and removing small and damaged seed will not only aid in crop establishment it will also provide a more uniform wheat seedling stand. Removing small and damaged seed will also increase the thousand-kernel weight (TKW), which serves as a measure of seed quality. Wheat seed lots with TKW values greater than 30 grams tend to have increased fall tiller number and seedling vigor.

The next step is to perform a germination test. Germination tests can either be completed at home or by sending a sample to the Missouri Seed Improvement Association or the Missouri Department of Agriculture.

A home test can be performed by counting out 100 seeds and placing them in a damp paper towel. Place the paper towel into a plastic bag to conserve moisture and store in a warm location out of direct sunlight. After five days, count the number of germinated seeds that

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Late Season Soybean Diseases

By Laura Sweets

This is the time of year when late season soybean diseases may show up in Missouri soybean fields. Symptoms of late season Phytophthora root rot, sudden death syndrome (SDS) and Cercospora leaf spot/blight might be evident in fields. In addition to Phytophthora, 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. In areas of the state which have experienced recent hot, dry conditions, charcoal rot could become a problem.

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.

Late Season Phytophthora Root Rot

Wet conditions after planting regardless of planting date increase the likelihood of Phytophthora root rot. Phytophthora may cause seed decay and seedling blight but it can also cause symptoms later in the season as plants move into reproductive stages of growth. Infected older plants show reduced vigor through the growing season or die gradually over the season. Lower leaves may show a yellowing between the veins and along the margins. Upper leaves may yellow. The stems show a characteristic brown discoloration that extends from below the soil line upward and even out the side branches. Eventually the entire plant may wilt and die. Withered leaves remain attached even after the plant dies. Preventive measures are the main means for managing Phytophthora root rot. Select varieties with either race-specific resistance, tolerance or a combination of the two, plant in good seedbed conditions, tile to improve drainage, take steps to reduce compaction, rotate crops and use an appropriate fungicide seed treatment.

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

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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 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.

Soybean Cyst Nematode

Symptoms of soybean cyst nematode (SCN) range from no obvious symptoms to subtle differences in plant height

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and vigor or unexpected decreases in yield to severe stunting and discoloration of plants or dead plants. Foliage symptoms may include a yellowing of leaves from the margin inward or a general yellowing of leaves. But such foliage symptoms are also caused by a number of other factors including root rot diseases, nutrient deficiencies, herbicide injury and compaction, so foliage symptoms should not be used to diagnose SCN. Plants with SCN may have poorly developed root systems, if plants are carefully dug up, females may be evident on the roots. The females appear as tiny (smaller than nitrogen-fixing nodules), whitish to yellow to brownish, lemon-shaped structures on the roots. Symptom expression may be more severe if plants are subjected to other stresses such as moisture stress, nutrient deficiencies, herbicide injury, insect damage or other diseases.

Charcoal Rot

Symptoms typically begin to develop as plants move into reproductive stages of growth. Infected plants are less vigorous and have smaller leaves. Leaves may turn yellow and wilt. Leaves eventually turn brown and have a dry appearance. The taproot and lower stem develop a silvery gray to light-gray discoloration of the epidermis (outer layer of the soybean stem). The epidermis may flake or shred away from the stem, giving the stems a tattered appearance. Fine black specks or microsclerotia may be evident in tissues below the epidermis and eventually in epidermal tissues. Management options for charcoal rot include rotating crops, maintaining good crop vigor to help reduce losses from charcoal rot and irrigating properly from just before bloom to pod fill.

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Evaluate Winter Wheat Seed Quality Prior to Planting *continued from page 115*

have both an intact root and shoot. This will give the grower an estimate of % germination. It is important to choose random seeds throughout the entire seed lot and conduct at least five 100 seed counts.

The Missouri Seed Improvement Association performs germination tests. The test requires one pound of seed and costs $13.75. For details email MOSEED@AOL.com or check the Missouri Seed Improvement Association web site at http://www.moseed.org/.

The State Seed Control Laboratory at the Missouri Department of Agriculture also performs germination tests. The test requires one pint to one quart of seed. From June 1 through August 31 tests are free but between September 1 and November 1 there is a $12.00 fee per sample and a limit of four samples per farmer. Information and a submission form can be obtained on the Missouri Department of Agriculture web site, http://mda.mo.gov/plants/seed/ and then clicking on Submitting Seed Service Samples.

If germination is below 85% it is important to increase the seeding rate to compensate; however seeding any wheat with a germination test below 80% would not be recommended.

The next step is to decide whether a fungicide seed treatment is necessary. A number of fungicides are labeled for use as seed treatment fungicides on winter wheat.These seed treatment fungicides protect germinating seed and young seedlings from seedborne and soilborne pathogens. Seed treatment fungicides will not improve germination of seed that has been injured by environmental factors and will not resurrect dead seed. A correct assessment of the cause of poor seed quality or poor germination rates is the first step in deciding if a seed treatment fungicide is necessary.

Fungicide seed treatments for winter wheat are included in the 2009 Pest Management Guide: Corn, Grain Sorghum, Soybean and Winter Wheat, Extension Publication M171. Printed copies of this bulletin are available from the Extension Publications Distribution Center, 2800 Maguire Blvd., Columbia, MO, 573-882-7216.

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The Missouri Corn Stalk Nitrate Test Challenge

By John Lory

For the second year MU Soil Testing Lab and I will be teaming together to run the Missouri Corn Stalk Nitrate Challenge. We will analyze up to 10 samples at the MU lab from any Missouri farm at no cost if you submit the requested information when you submit samples. Typical analysis cost for the test is $12 per sample.

The Stalk Nitrate Test is a powerful tool to assess how well you managed nitrogen in your corn crop this year. Research from Iowa and other states has calibrated nitrate concentration in the corn stalk with the nitrogen status of the harvested corn crop. Nitrate concentrations above 2000 parts per million are indicative of a crop that had excess nitrogen; nitrate concentrations below 700 parts per million are indicative of plants that had marginal nitrogen supply (250-700 parts per million) or were clearly nitrogen deficient (<250 parts per million).

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The Missouri Corn Stalk Nitrate Test Challenge *continued from page 118*

How to sample fields

- The window of opportunity for collecting samples is from ¼ milk stage to up to three weeks after black layer formation.
- Use a set of hand shears or loppers to remove an eight-inch segment of corn stalk from the corn plant. The top cut should be 14 inches above the ground; the bottom cut six inches above the ground.
- Get a stalk segment from at least 15 randomly selected plants from the field or subfield you are sampling.
- Place the samples in a paper bag for shipping to the lab for analysis. Do not freeze the sample. Samples held more than 24 hours before shipping should be refrigerated.

Send samples to: Attention Stalk Nitrate Test Challenge, 23 Mumford Hall, University of Missouri Soil Testing Lab, Columbia, MO 65211 or MU Delta Regional Soil Testing Lab, 147 State Hwy T, Portageville. MO 63873.

Visit the Corn Stalk Nitrate Challenge website at http://nmplanner.missouri.edu/tools/Stalk_Nitrate_Challenge.asp for more information and to download more copies of the reporting form.

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STALK NITRATE CHALLENGE DATA FORM

Your Name: _____ Your phone # or email address: _____

Your address: _____

Field location (You can get lat/long of a point at http://maps.google.com. (right click and select "what's here")): _____

_____

Corn Variety: _____ Planting date: _____

Yield goal: _____ bu/A Actual/expected yield: _____ bu/A

Winter cover/trap crop? (if yes, what crop?): _____ Crop(s) previous year: _____

Source of Nitrogen 1:

Fertilizer type _____ Date of Application: _____

Method of application: _____ Target N rate: _____ lbs/A

If surface applied: Incorporated (yes/no): _____ Days to incorporation: _____

N loss inhibitor used (yes/no) _____ Type used _____

Source of Nitrogen 2 (if needed):

Fertilizer type _____ Date of Application: _____

Method of application: _____ Target N rate: _____ lbs/A

If surface applied: Incorporated (yes/no): _____ Days to incorporation: _____

N loss inhibitor used (yes/no) _____ Type used _____

Source of Nitrogen 3 (if needed):

Fertilizer type _____ Date of Application: _____

Method of application: _____ Target N rate: _____ lbs/A

If surface applied: Incorporated (yes/no): _____ Days to incorporation: _____

N loss inhibitor used (yes/no) _____ Type used _____

Stalk Nitrate Sample Information: Date of sampling: _____

Number of stalks included: _____ Area represented by sample _____ Acres

There will be **no analysis cost for your first 10 samples** if you provide the requested information. Test cost typically is $12/sample. Discount may be available for more samples. Contact John Lory for more information.

SAMPLE HANDLING: Sample anytime from 1/4 milk line to three weeks after black layer information. Sample at least **15 stalks** from the sampling area. For each stalk remove the 8-inch section from six inches above the ground to 14 inches above the ground. Select representative plants and do not include heavily diseased or damaged plants. Place the sample in a paper bag (not plastic). *Do not freeze sample.* Refrigerate if samples are shipped more than on day after sampling.

Mail the sample plus this data sheet to: Missouri Soil Testing Lab, Attn: Stalk Nitrate Test Challenge, 23 Mumford Hall, University of Missouri, Columbia MO 65211 or MU Delta Regional Soil Testing Lab, 147 State Hwy T, Portageville, MO 63873. You **must** include a completed form with each sample to receive no-cost analysis. **Questions?** Contact John Lory (LoryJ@missouri.edu or 573-884-7815).

Weather Data for the Week Ending August 17, 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.	Aug. 1 - Aug. 17	Departure from long term avg.	Accumulated Since Apr. 1	Departure from long term avg.
Corning	Atchison	88	68	98	61	78	+4	1.57	-0.85	2917	+480
St. Joseph	Buchanan	89	69	96	64	79	+4	1.35	-0.45	2830	+388
Brunswick	Carroll	89	69	97	62	79	+5	1.08	-1.21	2953	+474
Albany	Gentry	90	67	99	57	78	+4	0.28	-1.92	2801	+379
Auxvasse	Audrain	90	69	97	63	79	+4	0.86	-0.86	2924	+417
Vandalia	Audrain	91	69	99	63	79	+4	0.94	-1.19	2911	+436
Columbia-Bradford Research and Extension Center	Boone	91	68	98	62	78	+2	0.67	-1.37	2878	+292
Columbia-Sanborn Field	Boone	91	72	99	67	81	+5	0.47	-1.45	3118	+458
Williamsburg	Callaway	90	68	98	62	79	+4	1.28	-0.71	2958	+504
Novelty	Knox	88	67	96	63	77	+3	0.81	-1.26	2734	+307
Linneus	Linn	89	68	96	61	78	+4	0.71	-1.45	2771	+397
Monroe City	Monroe	90	68	98	62	78	+3	0.53	-1.46	2862	+387
Versailles	Morgan	94	69	102	61	81	+5	0.37	-1.55	3124	+493
Green Ridge	Pettis	90	69	98	63	79	+5	0.48	-1.69	2984	+540
Lamar	Barton	93	70	101	64	81	+4	1.95	+0.47	3123	+387
Cook Station	Crawford	93	67	99	56	79	+3	0.79	-1.22	2945	+298
Round Spring	Shannon	93	67	98	57	78	+3	0.86	-0.88	2953	+426
Mountain Grove	Wright	95	70	101	63	81	+6	0.26	-1.11	3009	+520
Delta	Cape Girardeau	94	70	100	61	81	+4	0.58	-0.96	3318	+395
Cardwell	Dunklin	95	73	98	65	83	+4	0.19	-1.27	3608	+441
Clarkton	Dunklin	98	71	102	62	84	+6	0.00	-1.19	3540	+418
Glennonville	Dunklin	96	73	100	66	84	+6	0.08	-1.15	3578	+469
Charleston	Mississippi	95	73	101	64	83	+6	1.00	-0.40	3510	+585
Portageville-Delta Center	Pemiscot	97	74	101	67	85	+7	0.02	-1.17	3676	+545
Portageville-Lee Farm	Pemiscot	96	74	100	66	85	+7	0.13	-1.12	3696	+588
Steele	Pemiscot	98	74	100	65	85	+7	0.00	-1.49	3770	+636

* 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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