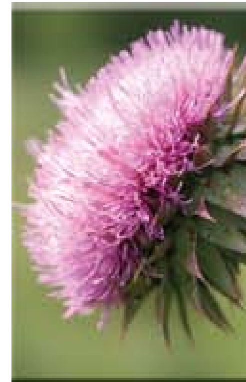
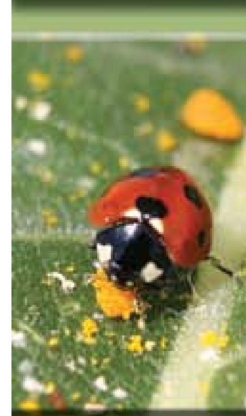
Plant Protection Programs University of Missouri

Integrated Pest & Crop Management


Take-All Of Wheat

By Laura Sweets

There have been a few reports of wheat plants with bleached stems and off-color foliage and the question is whether or not this could be take-all of wheat. Take-all is one of the more common root and crown rot diseases of wheat in Missouri. The most noticeable symptom of take-all is white heads in the field of wheat. But there are many causes of white heads in wheat besides take-all so a diagnosis should not be based only on the presence of white heads. Examining the lower stem and culm area for the black discoloration characteristic of take-all would be another key symptom to check. Also plants with take-all tend to have very poor root systems so that clumps of plants pull out of the ground very easily and roots are discolored and rotted. There certainly are other root rot diseases of wheat but take-all is one of the more common ones in Missouri.

Symptoms are usually most evident after heading as white heads on wheat plants. Entire heads on infected plants may be bleached (white heads) and sterile. Infected plants are also stunted and slightly yellow, have few tillers and ripen prematurely.

Plants with take-all usually have poorly developed root systems and roots are sparse, blackened and brittle. With sufficient soil moisture, a black-brown dry rot may extend into the crown and up the lower stem. This shiny, black discoloration of the lower stem and crown may be evident if the lowest leaf sheath is scraped off with a knife or fingernail.

Diseased plants may lodge and fields may appear uneven in height and irregular in maturity. At harvest, the heads on diseased plants may be darkened by "sooty" molds and may contain either no grain or shriveled grain.

Take-all of wheat is caused by the fungus Gaeumannomyces graminis. This fungus survives in infected host plants (wheat, barley, rye and weed grasses such as smooth bromgrass, cheat, quackgrass and bentgrass) and in infested host debris.

Infection occurs when the fungus penetrates the young roots of a living host plant. Infection can occur throughout the growing season but is more severe when temperature is 54 to 64 F. The take-all fungus is more active in wet soils. So the disease is typically most severe in wet areas or wet years. Root infections in the fall and early spring are most likely to progress to the crown and foot of the plant.

Hot, dry weather after heading increases the water stress on plants infected with take-all and may lead to the sudden development of white heads on plants that were actually infected earlier in the season or the previous fall. Take-all is favored by continuous cropping of wheat. It is also more severe in lighter, alkaline, infertile and poorly drained soils.

Plant nutrients offer increased resistance to take-all and a greater capacity to tolerate infections by producing more roots. It is important to maintain good levels of available nitrogen, phosphorus and potassium. Soil pH also affects the development of this disease. Disease damage is usually worse as soil pH approaches 7.0.

At this point in the season there are no effective management options for take-all. A management program for take-all should include the following steps:

- Plant good quality seed of adapted, disease resistant varieties.
- Plant in well-drained sites under good seedbed conditions.
- Rotate with nonhost crops for one to three years.
- Control weed-grass hosts and volunteer wheat.
- Use seed treatment fungicides.
- Maintain good plant vigor with adequate fertility.

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Bean Leaf Beetles in Soybean; Flea Beetles in Field Corn

By Wayne Bailey

Bean leaf beetle adults leaving overwintering sites or moving from alfalfa fields after infesting them early season generally move to soybean fields. These beetles are capable of flying long distances and will seek seedling soybean plants on which they will feed, mate, and then oviposit eggs in the soil for the next generation of beetles. During this past week, bean leaf beetle numbers approached or exceeded economic levels in some Northern Missouri soybean fields. Most fields were early planted and received much precipitation following planting. Economic infestations of beetles were found in fields with and without insecticide treated seed. Insecticide trials conducted in Missouri and other states show that Cruiser and Gaucho are both very effective at controlling this insect pest under most environmental conditions. The problems encountered with control of early season bean leaf beetle in these few fields may be due to several factors including the long period of time between planting and the appearance of the beetles, the dilution of the insecticides by continuous wet soil conditions, or by excessive numbers of beetles migrating into these fields. We know first planted fields typically attract high numbers of beetles. In addition, laboratory research from Minnesota and field trials from Missouri, Nebraska and other states show that under normal conditions seed treatments are very effective at early season insect control for about a 45-day period followed by a reduction in efficacy over the next few weeks. It is likely that all of these factors had some influence on the economic infestations of bean leaf beetle adults observed in northern Missouri soybean fields. The following insecticides are recommended for bean leaf beetle control in soybean.

Similar to bean leaf beetle, some flea beetle problems were observed on corn plants produced from both non-treated seed and seed treated with the 250 rate of insecticide. Flea beetles often damage corn grown from non-treated seed if beetle populations are high coming out of winter. In contrast, plants from insecticide treated seed rarely experience problems with this early season pest. The factors discussed previously with bean leaf beetle are likely reasons for the economic damage seen with flea beetles in field corn. The problems encountered with seed-treated plants in northern Missouri soybean and corn fields are rare, but can occur when field conditions limit the efficacy of the insecticide seed treatments.

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Table 1. Bean Leaf Beetle

Been Leaf Beetle			
Comments: Treatment on seedling soybean is rarely needed. If necessary, treat when five or more beetles are present per foot of row and 1 or more plants per foot of row are destroyed. Cold, dry growing conditions may lead to increases BLB problems on emerging and seedling soybean. Before bloom treat when 5 or more beetles are present per foot of row and defoliation exceeds 30%. At stages from bloom to pod fill, treat when defoliations reaches 20% and beetles average 10 or more per foot of row (30-inch rows) or 1 to 3 beetles (7-inch rows). At seed maturity, treat when 5%-10% of pods are damaged, plants are still green and 10 or more beetles per foot of row are present.			
Common Name	***Trade Name***	***Rate of formulated material per acre***	***Placement***
permethrin	***Ambush 25W**	3.2 to 6.4 fl. oz.	On foliage
esfenvalerate	***Asana XL**	5.8 to 9.6 fl. oz.	
cyfluthrin	***Baythroid XL**	0.8 to 2.8 fl. oz.	
bifenthrin	***Brigade 2EC**	2.1 to 6.4 fl. oz.	
chlorpyrifos + gamma-cyhalothrin	***Cobalt**	19 to 38 fl. oz.	
dimethoate	***Dimethoate 4EC**	1 pt.	
carbofuran	***Furadan 4F**	1/4 to 1/2 pt. 2(ee) label	
zeta-cypermethrin +	***Hero**	2.6 to 6.1 fl. oz.	
methomyl	***Lannate LV**	3/4 to 1 pt.	
chlorpyrifos	***Lorsban 4E**	1 to 2 pt.	

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Bean Leaf Beetles in Soybean; Flea Beetles in Field Corn *continued from page 80*

Common Name	Trade Name	Rate of formulated material per acre	Placement
acephate	Orthene 97	3/4 to 1 lb.	On foliage
microencapsulated methyl parathion	*Penncap-M	2 to 3 pt.	
permethrin	*Pounce 3.2EC	2.0 to 4.0 fl. oz.	
lambda-cyhalothrin	*Proaxis	1.92 to 3.2 fl. oz.	
carbaryl	Sevin XLR Plus	1 to 2 pt.	
spinosad	Success	3.0 to 6.0 fl. oz.	
spinosad	Tracer 4SC	1.0 to 3.0 fl. oz.	
lambda-cyhalothrin	*Warrior	1.92 to 3.2 fl. oz.	

*** Designates a restricted-use pesticide. Use is restricted to certified applicators only.** Regardless of the formulation selected, read the label to determine appropriated insecticide rates, directions, precautions, and restrictions.

Table 2. Flea Beetles in Field Corn

Flea Beetles in Field Corn			
Comments: Treat when 5 or more beetles per plant are present or when seedling plants are being severely damaged or killed and beetles are present.			
Common Name	**Trade Name**	**Rate of formulated material per acre**	**Placement**
permethrin	*Ambush 25W	6.4 to 12.8 fl. oz.	Spray over row
esfenvalerate	*Asana XL	5.8 to 9.6 fl. oz.	Spray over row
cyfluthrin	*Baythroid XL	0.8 to 1.6 fl. oz.	Spray over row
bifenthrin	*Brigade 2EC	2.1 to 6.4 fl. oz.	Spray over row
chlorpyrifos + gamma-cyhalothrin	*Cobalt	13 to 26 fl. oz.	Spray over row
bifenthrin	*Fanfare 2EC	2.1 to 6.4 fl. oz.	Spray over row
zeta-cypermethrin + bifentrhin	*Hero	4.0 to 10.3 fl. oz.	Spray over row
methomyl	*Lannate LV	0.75 to 1.5 pt.	Spray over row
chlorpyrifos	*Lorsban 4E	1 to 2 pt.	Spray over row
chlorpyrifos	*Lorsban Advanced	1 to 2 pt.	Spray over row
zeta-cypermethrin	*Mustang Max	3.2 to 4.0 fl. oz.	Spray over row
chlorpyrifos	*Nufos 4E	1 to 2 pt.	Spray over row
microencapsulated methyl parathion	*Penncap-M	2 to 3 pt.	Spray over row
permethrin	*Pounce 3.2EC	4.0 to 8.0 fl. oz.	Spray over row
lambda-cyhalothrin	*Proaxis	2.56 to 3.84 fl. oz.	Spray over row
carbaryl	Sevin XLR Plus	2 to 4 pt.	Spray over row
lambda-cyhalothrin	*Warrior	2.56 to 3.84 fl. oz	Spray over row
Seed Treatments:			
thiamethoxam	Cruiser	see product label	commercially applied to seed
clothianidin	Poncho	see product label	commercially applied to seed
tefluthrin	Proshield with Force ST	see product label	commercially applied to seed

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Stewart's Bacterial Wilt of Corn

By Laura Sweets

The variations in weather conditions this spring have put stress on young corn plants. In some fields seedlings have been showing yellowing and/or stunting from cool, wet soils immediately after planting and saturated soils since planting. However, with the more recent warm weather, corn in many parts of the state has really taken off and is now 12 to 18 inches tall. So symptoms of Stewart's bacterial wilt are beginning to develop on these rapidly growing young corn plants.

On young corn plants the symptoms of Stewart's bacterial wilt include linear, pale green to yellow streaks that tend to follow the veins of leaves and originate from feeding marks of the corn flea beetle. Lesions may extend the length of the leaf. Plants may appear stunted or somewhat distorted. If the bacteria become systemic within the plant, the entire plant wilts and may die prematurely. Cavities of a brown, soft rot can develop in the stalk pith.

On field corn the disease tends to be limited to the leaf blight phase of the disease in which foliage symptoms develop but the pathogen does not become systemic within the plant. With the leaf blight phase of Stewart's bacterial wilt, the linear, pale green to yellow lesions develop on the leaves. These lesions tend to parallel the leaf veins and to have wavy, irregular margins. These streaks soon become dry and brown.

The bacterium which causes Stewart's bacterial wilt overwinters in the guts of some species of adult corn flea beetles. Adult beetles feeding on corn seedlings in late spring and early summer can contaminate the feeding wounds with the causal bacterium. Flea beetles can continue to spread the bacterium throughout the season by feeding on infected plants and then healthy plants. The potential for Stewart's bacterial wilt to develop on young corn plants is greater after mild winters when higher levels of the corn flea beetle may be present.

Most field corn hybrids have enough resistance to Stewart's bacterial wilt that additional management is not necessary.

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Crazy Top of Corn

By Laura Sweets

This has been another difficult year for corn planting. Wet conditions have delayed planting. Some corn that was planted early is being replanted because of poor stands. However, some of the early planted corn is being left and these fields might be ones in which crazy top may become evident. Crazy top of corn is caused by the downy mildew fungus, Sclerophthora macrospora. The causal fungus is a soilborne fungus which causes infection when young plants are subjected to saturated soil conditions or water accumulating in whorls or leaf sheaths.

In corn, crazy top is likely to occur when young corn plants are subjected to saturated soil conditions for 24- 48 hours from planting to about the five-leaf stage of growth. Accumulation of soil and water in the whorl of small plants may also result in infection. The disease causes a deformation of plant tissues including excessive tillering, rolling of leaves, proliferation of the tassel until it resembles a mass of leafy structures and stunting of corn plants. Leaves of infected plants may be narrow and straplike in shape, leathery in texture and yellow or yellow striped in color.

In seasons with wet springs or rains after corn has emerged, young corn plants subjected to saturated soil conditions may show symptoms of crazy top. Occasionally a band of affected plants may encircle a drowned out spot in a field. Some hybrids may be more susceptible to crazy top. This disease is seldom severe enough to cause significant losses.

The downy mildew fungus which causes crazy top of corn (*Sclerophthora macrospora*) has been reported on more than 140 species of perennial and annual grasses. In addition to corn, downy mildew occurs on wheat, barley, rice, oats, sorghum, crabgrass, green foxtail, barnyard grass and numerous other grasses. In addition to surviving in various grass hosts, the fungus produces survival structures called oospores which can persist for months in infested crop residues and in the soil.

Losses from crazy top are seldom severe enough in corn to warrant control. Furthermore practical management options for crazy top are very limited. Improving soil drainage or water management may be beneficial. Rotation to nongrass crops may help may also be of some benefit.

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Tips for Troubleshooting Field Crop Problems

By Allen Wrrather

I was recently listening to some old men talk about stuff that old men talk about. I understand that you may think me mentally off for sitting around listening to old men, but I find it easier to do now that I have become one of these old men. As usual, the first story told by an old man never has a chance because other old men will tell stories to top the first. The best story this particular day was about the freeze on Mother's Day one year that killed all the crops and was so severe the radiators in some tractors froze and broke. There of course were some doubts among the other old men about the validity of this story. Most old men can't agree on much. However, these old men were farmers, and they all agreed that all farmers will experience problems with crops in some fields this year. These problems will most likely be caused by too much or too little fertilizer, too much or too little water, temperatures too high or low, crust over the planted row, insects, diseases, herbicide drift or carry over, and other things.

Producers should get the cause of crop problems diagnosed so action can be taken to reduce the problem from becoming worse this year or prevent it from developing next year. Diagnosis of crop problems can sometimes be easy, but it is more often difficult. This article is a brief summary of the material in University of Missouri Extension Guide G4050 that describes a six step process to help farmers and crop consultants diagnose the cause(s) of field crop problems. This guide titled, Troubleshooting Field Crop Problems, is online at http://extension.missouri.edu/explore/agguides/crops/g04050.htm.

First, determine the variety and the age of the plant. An investigator should identify the plant variety because some are more resistant or susceptible to certain diseases, insects, and herbicides, and this information may be very useful when diagnosing the cause of the problem.

Second, identify all the symptoms affecting the leaves, stems, roots and fruit. An investigator should observe all parts of abnormal plants when troubleshooting a field crop problem including the leaves, stems, fruit and roots as well as the tissue inside roots and stems. Frequently, the point of injury to the plant is not where the symptoms appear. For example, leaves on one or several branches may be discolored and withered because of a canker on a lower branch or a borer in the stem. Nutritional deficiencies and injuries from herbicides may damage both roots and leaves. Examine individual plants in detail and determine the location of symptoms on the plant. Are symptoms on old or young leaves, upper or lower stems, or perhaps on one side of the plant? Look for insects and insect feeding damage. Cut stems to check for discoloration inside the stem and for insect feeding. Hold leaves up to the light to check for mosaic, other viral symptoms, or the presence of webbing and mites. Investigators should look for leaf abnormalities in color, size, shape and texture. Also, carefully dig up roots and examine them. Check for galls, rot, abnormal root color and feeder root condition, and assess root growth. While probing the soil, check for soil compaction, soil structure, texture and organic matter, and the presence and depth of hardpans. Also take note on fertilizer placement and the depth of planting, and other recently completed cultural practices.

Third, estimate the percentage of plants damaged in the affected part of the field. Were all plants in an area or only 10 percent affected? Symptoms of injury due to insects and disease may appear on every plant in an area, but this is unusual. Symptoms of injury due to herbicides, improper placement of fertilizer, and lightning will usually appear on every plant in an area.

Fourth, determine the distribution or pattern of the problem in the field. Look at the entire field to determine where the problem appears. Determine the distribution of the problem in the field as it relates to field characteristics such as areas with light soil, and drainage patterns. Is the problem only in wet areas? Take notice of whether the problem is associated with certain rows or areas of lower or higher elevation.

Fifth, evaluate whether the crop and weeds in the field share similar symptoms. Examine the weeds in the area where the crop is injured and in nearby fence rows. Symptoms caused by nutritional disorders are usually not plant specific. For example, most plants growing in low-pH soils, including crops as well as weeds, will be stunted. However, diseases are usually plant specific, and weeds in the area are normally not affected by the same diseases that can attack corn or soybean.

Sixth, determine the history of the problem. Ask when the problem was first noticed, and whether crop problems were observed in the same area during previous growing seasons.

The answers to these questions may provide clues that could be useful in diagnosing the causes of field crop problems. Following these suggested procedures will give field crop consultants and producers a better chance of diagnosing the cause of field crop problems during 2009.

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Weather Data for the Week Ending May 31, 2009

By Pat Guinan

Station	County	Weekly Temperature (oF)						Monthly Precipitation (in.)		Growing Degree Days‡	
		Avg. Max.	Avg. Min.	Extreme High	Extreme Low	Mean	Departure from long term avg.	May 1 - May 31	Departure from long term avg.	Accumulated Since Apr. 1	Departure from long term avg.
Corning	Atchison	78	58	89	54	68	+2	1.74	-2.69	614	+118
St. Joseph	Buchanan	75	59	86	55	67	+1	3.74	-1.12	570	+50
Brunswick	Carroll	77	58	88	50	68	+1	3.76	-1.50	621	+81
Albany	Gentry	75	56	85	51	66	0	5.98	+1.51	527	+37
Auxvasse	Audrain	78	58	86	52	68	+1	3.98	-0.99	623	+80
Vandalia	Audrain	77	57	84	51	67	+1	4.93	-0.11	605	+90
Columbia-Jefferson Farm	Boone	78	58	87	50	68	+1	4.20	-0.76	627	+44
Columbia-South Farms	Boone	78	58	87	51	68	+1	4.96	0.00	627	+44
Williamsburg	Callaway	77	58	85	51	67	+1	4.53	-0.70	608	+82
Novelty	Knox	74	56	82	50	65	-1	6.70	+1.90	519	+11
Linneus	Linn	75	55	84	48	66	0	3.17	-1.81	541	+48
Monroe City	Monroe	76	57	83	51	66	0	4.61	-0.17	572	+34
Versailles	Morgan	78	60	88	52	69	+1	4.65	-0.61	673	+40
Green Ridge	Pettis	77	60	88	53	68	+1	4.02	-0.80	628	+70
Lamar	Barton	80	60	88	51	69	+1	5.53	-0.39	650	-3
Cook Station	Crawford	80	58	85	52	69	+1	6.01	+1.10	609	-45
Round Spring	Shannon	83	58	90	50	69	+2	5.52	+0.28	617	+14
Mountain Grove	Wright	79	59	86	48	68	+1	5.75	+0.54	579	+13
Delta	Cape Girardeau	81	63	86	60	71	0	4.18	-0.95	735	-31
Cardwell	Dunklin	86	65	89	61	74	+1	6.53	+1.55	853	-33
Clarkton	Dunklin	86	64	89	58	73	+1	5.92	+1.57	801	-59
Glennonville	Dunklin	83	64	88	59	73	+1	7.54	+3.28	817	-44
Charleston	Mississippi	81	65	86	61	71	+2	5.96	+1.20	786	+33
Portageville-Delta Center	Pemiscot	83	65	90	60	73	+1	7.24	+2.68	861	-6
Portageville-Lee Farm	Pemiscot	*	*	*	*	*	*	*	*	*	*
Steele	Pemiscot	83	67	92	62	74	+2	10.49	+5.48	895	+19

* 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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