Plant Protection Programs University of Missouri

Integrated Pest & Crop Management

The First 40 Days after Planting are Critical for Grain Sorghum Health

By Allen Wrather

Grain sorghum was the sixth most valuable field crop grown in Missouri during 2008 following soybeans, corn, wheat, rice, and cotton. The value of this crop was about $30 million, but the value would have been greater if not for reduced yields caused by seedling diseases. Grain sorghum seedling diseases can be caused by several microorganisms that normally live in the soil on organic matter but can attack grain sorghum seedling roots especially when the soil is cold and wet and the soil pH is low. Seedling diseases cause dark red to black rotten areas to develop on grain sorghum roots. The leaves of diseased seedlings may wither or appear pale-green, and diseased plants will be smaller than healthy plants. Plants that survive this disease are often weak and yield less than healthy plants. Severely damaged plants may die, and this results in thin stands and skips in rows, and farmers must occasionally replant entire fields due to death of most or all seedlings.

Farmers can help protect grain sorghum seedlings from this problem by following a few simple guidelines.

1. Plant only when the soil temperature 4 inches deep has warmed up to about 65°F by 8:00 a.m. and plant only when at least 7 days of warm and dry weather are predicted immediately after planting.

2. Plant only high-quality seed that has a high germination rate.

3. Plant in fertile soils that have a pH of 6.0 to 6.5. Grain sorghum seedlings growing in soil with a pH less than 5.5 are more likely to be diseased.

4. Plant in well drained fields. Make sure field surface drainage is adequate to quickly eliminate excess water and enhance internal soil drainage by breaking hardpans with a ripper.

5. Have the seed treated with extra fungicides when grain sorghum is planted early in the season, in poorly drained fields, in clay soils, and certainly when planting in fields where seedling diseases have been a problem in previous years.

6. When planting no-till, equip your planter to move trash away from the row, so the sun can warm the soil around the seed faster.

Following these suggested procedures will give Missouri grain sorghum farmers a better chance of producing high yield and profit during 2009. More information is available at your county extension office or on the University of Missouri Delta Center Web Page (www.aes.missouri.edu/delta).

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Table of Contents

Cool, Wet Soils Can result in More Corn Injury from Preemergence Residual Herbicides

By Kevin Bradley

Under the cool and wet soil conditions that have persisted throughout most of Missouri this year, injury from preemergence residual herbicides is more likely to occur. This is because corn plants are able to take up the herbicides at a rapid rate but are not able to metabolize or break down these herbicides at a similar pace. Some injury may also be attributable to the herbicide coming into direct contact with the seed as a result of wet soil conditions and/or failure to close the seed row.

Corn can exhibit a variety of injury symptoms at or soon after emergence as a result of preemergence herbicide applications. Herbicide injury to corn as a result of cool and wet soil conditions is perhaps most common with the soil-applied grass herbicides like metolachlor (Dual II Magnum/ Cinch/Stalwart), acetochlor (Degree, Harness, TopNotch), alachlor (Lasso, MicroTech), dimethanamid (Frontier, Outlook), and flufenacet (Define), and

Figure 1. "Buggy-whipping" injury on corn as a result of a Define herbicide and cool, wet soil conditions after planting.

also with any of the various atrazine pre-mixes that contain these herbicides (Bicep II Magnum, Lumax, Lexar, Cinch ATZ, Stalwart Xtra, Degree Xtra, Harness Xtra, FulTime, Keystone,

Figure 2. "Bottle-brush" roots as a result of sandy soils and cool, wet soil conditions following an application of Hornet.

Bullet, Guardsman, or Guardsman Max). In rare cases, corn seedlings may fail to emerge from the soil and "leaf out" underground as a result of injury from these herbicides. Corn that has emerged and has been injured as a result of one of these herbicides will appear malformed and have twisted leaves that do not unroll properly. This is often referred to as "buggy-whipping" *(Figure 1)*. Fortunately, this injury is usually short-lived and rarely causes yield reductions. Most plants that have been injured as a result of these herbicides will grow out of this injury once soil drying occurs.

Flumetsulam is another herbicide that has the potential to cause injury to corn as a result of cool, wet soil conditions. Flumetsulam is the active ingredient in Python and one of the ingredients in Hornet. Corn that has been injured as a result of Python or Hornet applications may be slightly yellowish (chlorotic) in color and will have both stunted roots and shoots. The short lateral roots are a key symptom of flumetsulam injury, which is often referred to as "bottle-brushed roots" *(Figure 2)*. As with the soil-applied grass herbicides, injury from flumetsulam is usually short-lived and plants typically grow out of this injury once soil drying occurs.

Dinitroaniline herbicides such as pendimethalin (Prowl) can also cause injury to emerging corn plants if cool, wet soil conditions persist after planting. Injury from this herbicide is also common when corn seed has been planted too shallow and/or comes into direct contact with the herbicide solution. Perhaps one of the most characteristic symptoms of corn plants that have been injured as a result of pendimethalin is the inhibition of main, and to a greater extent, lateral, root formation. This typically results in short and thick, or "clubbed", lateral roots *(Figure 3)*. Affected corn plants may also have leaves with a red or purplish color around the margins although certain corn hybrids, compaction, or carryover of imidazolinone herbicides may exhibit similar symptoms on young corn plants.

Continued on page 51

Cool, Wet Soils Can Result in More Corn Injury from Preemergence Residual Herbicides

continued from page 50

Figure 3. "Root-clubbing" injury on corn as a result of shallow planting and a preemergence application of Prowl.

Isoxaflutole and mesotrione are some other preemergence herbicides that may cause injury to corn as a result of cool and wet soil conditions. Isoxaflutole is the active ingredient in Balance Pro and Balance Flexx, and is one of the ingredients in Epic and Radius. Mesotrione is the active ingredient in Callisto and is one of the ingredients in Lumax, Lexar, Camix, and Halex. Corn that has been injured as a result of these herbicide applications will have leaves with anywhere from a chlorotic to a completely bleached-white appearance (Figure 4). Injury will usually appear on the older leaves while new leaves often appear normal and unaffected. Although symptoms of these herbicides are perhaps more noticeable than any other type of herbicidal injury, this injury is usually short-lived and often confined to low areas or wet spots within a field. In severe cases where a high percentage of the foliage has a chlorotic or bleached-white appearance, the plants may eventually turn brown (necrotic) and die.

Similar "bleaching" symptoms can occur on emerging corn plants due to carryover of the herbicide clomazone (Command) in the soil solution. Command is not labeled for use on corn, but residues from the previous soybean crop are capable of injuring emerging corn plants when inadequate breakdown of this herbicide occurs. Conditions that favor the carryover of this herbicide include excessive dry periods after application and soils with a pH less than 6.0. Unlike the specific bleached areas that are characteristic of mesotrione or isoxaflutole, carryover of clomazone often results in plants that eventually turn completely bleached white in appearance and die.

Although rare, some injury may also occur to corn as a result of misapplications of atrazine or environmental conditions like cool and wet soil that favors atrazine injury. These conditions slow the rate of atrazine degradation considerably, creating some slight injury that is not usually an issue following atrazine applications. Severe rainfall events may also drive corn leaf tips into the soil causing greater amount of foliar uptake than would normally occur. Atrazine symptoms appear as chlorosis and necrosis along the edges of the lower leaves. These symptoms are usually insignificant and transient in nature.

Corn can exhibit a variety of symptoms as a result of a mistake made during a preemergence burndown application of a growth regulator herbicide. Some of the more common growth regulator herbicides used in corn are 2, 4-D, dicamba, and clopyralid, but several other growth regulator herbicides are available and registered for use in other settings. Clopyralid is the active ingredient in Stinger and one of the active ingredients in Hornet. Dicamba is the active ingredient in Banvel and Clarity, and one of the active ingredients in Distinct, Status and Marksman. 2, 4-D is sold under a variety of trade names. If a misapplication of a growth regulator herbicide has occurred prior to planting, corn plants can leaf out underground or show symptoms very similar to the chloroacetamide herbicides. Usually this type of injury is due to the planting slot not being properly closed and/or corn being planted too shallow. Each of these scenarios most often causes the herbicide to come into direct contact with the

Figure 4. Bleaching injury on corn as a result of a preemergence application of Balance and cool, wet soil conditions after planting.

Continued on page 53

Fusarium Head Blight or Scab of Wheat

By Laura Sweets

Fusarium head blight or scab of wheat develops on plants in the flowering to early grain fill stages of growth. Although winter wheat in south Missouri just began heading in the last week, the winter wheat in much of the rest of the state has not yet reached the heading or flowering stages of growth. So the time for possible infection by the Fusarium head blight fungus is approaching. Infection is very dependent on environmental conditions while wheat is in susceptible stages of growth, i.e. flowering. Moderate temperatures in the range of 77-86°F, frequent rain, overcast days, high humidity and prolonged dews favor infection and development of scab. Weather conditions over the next several weeks will determine the extent and severity of scab in this year's wheat crop. Fusarium head blight or scab problems will be more severe if rains coincide with flowering of wheat fields. Many parts of the state have been wet and the forecast for the week of April 27 to May 1 with moderate chances for rain almost every day could be quite conducive to scab problems in areas of the state in which the wheat crop is flowering.

The characteristic symptom of scab on wheat is a premature bleaching of a portion of the head or the entire head. Superficial mold growth, usually pink or orange in color, may be evident at the base of the diseased spikelets. Bleached spikelets are usually sterile or contain shriveled and or discolored seed.

Scab is caused by the fungus *Fusarium graminearum*. This fungus overwinters on host residues such as wheat stubble, corn stalks and grass residues. Spores are carried by wind currents from the residues on which they have survived to wheat heads. If environmental conditions are favorable, i.e. warm and moist, the spores germinate and invade flower parts, glumes and other portions of the spike. Scab infection occurs when favorable environmental conditions occur as the wheat crop is in the flowering to early grain fill stages.

Unfortunately, the detrimental effects of scab are not limited to its adverse effects on yield. The fungus which causes scab may also produce mycotoxins. Vomitoxin (deoxynivalenol or DON) and zearalenone may occur in wheat grain infected by the scab fungus. This is a primary concern where grain is fed to non-ruminant animals. Ruminants are fairly tolerant of these two mycotoxins. Also, the fungi which cause scab may survive on the seed and can cause seedling blight and root rot problems when scabby grain is used for seed.

Crop rotation, variety selection and residue management are preventative measures for managing scab in wheat. At this point in the season the only remaining management option would the application of a fungicide to try to reduce scab levels. The fungicide table in the last issue of the *Integrated Pest & Crop Management Newsletter* included fungicides with some activity against the Fusarium head blight or scab fungus. It is important to note that for most of these products their respective labels list "suppression" of Fusarium head blight or scab and not control or eradication of the disease. Check each product label for information on appropriate application timing and interval between application and harvest. Growers should be scouting fields to evaluate stage of growth of each field and following weather forecasts prior to making a decision on fungicide application to suppress scab. Before the crop begins to turn color (it is easier to detect scab infections on head while they are still green) fields should also be scouted to get a feel for incidence and severity of scab in this year's wheat crop. Because of possible mycotoxin concerns and seed quality concerns, grain from fields with scab may require special handling. Wheat planted on corn, sorghum or wheat residue (even wheat double cropped with soybeans) has a greater risk for scab.

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Cool, Wet Soils Can Result in More Corn Injury from Preemergence Residual Herbicides

continued from page 51

germinating corn seed. These symptoms can also occur because the proper corn planting rotational interval has not been followed. For example, most 2, 4-D product labels indicate that at least 7 days should elapse between application and planting. Similarly, dicamba has specific rotational intervals that are based on the preplant rate applied.

For more information and pictures pertaining to the diagnosis of corn injury symptoms as a result of preemergence herbicides, see the MU publication, Practical Weed Science for the Field Scout (IPM 1007). This publication contains over 60 pages of information pertaining to the diagnosis of herbicide injury symptoms on corn and soybean. More information about IPM 1007 as well as a PDF version of the publication can be found online at http://extension.missouri.edu/explore/agguides/pests/ipm1007.htm.

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Weather Data for the Week Ending April 28, 2009

By Pat Guinan

		Weekly Temperature (oF)						Monthly Precipitation (in.)		Growing Degree Days‡	
Station	County	Avg. Max.	Avg. Min.	Extreme High	Extreme Low	Mean	Departure from long term avg.	April 1 - April 26	Departure from long term avg.	Accumulated Since Apr. 1	Departure from long term avg.
Corning	Atchison	76	49	90	38	62	+6	3.85	+1.45	125	+58
St. Joseph	Buchanan	73	52	82	43	62	+6	3.49	+0.55	119	+37
Brunswick	Carroll	75	51	84	38	64	+7	3.10	+0.49	132	+42
Albany	Gentry	73	48	83	35	60	+4	4.21	+1.40	102	+36
Auxvasse	Audrain	78	54	87	38	65	+8	2.22	-0.92	134	+43
Vandalia	Audrain	77	51	86	38	64	+7	2.35	-0.85	126	+48
Columbia-Jefferson Farm	Boone	77	54	86	40	65	+7	1.59	-1.77	138	+23
Columbia-South Farms	Boone	77	54	86	39	65	+7	1.76	-1.60	139	+24
Williamsburg	Callaway	77	54	87	38	65	+8	2.21	-1.38	132	+41
Novelty	Knox	73	49	82	38	61	+4	2.75	-0.14	107	+27
Linneus	Linn	73	51	82	39	62	+6	3.33	+0.56	117	+43
Monroe City	Monroe	75	51	84	37	62	+5	2.81	-0.05	115	+21
Versailles	Morgan	77	56	86	41	66	+7	1.63	-1.99	160	+14
Green Ridge	Pettis	76	54	83	40	65	+8	2.72	-0.36	143	+50
Lamar	Barton	76	56	82	41	66	+7	1.98	-1.85	162	+17
Cook Station	Crawford	78	52	87	36	65	+6	4.25	+0.69	136	-16
Round Spring	Shannon	79	49	88	32	64	+5	3.11	-0.46	130	-3
Mountain Grove	Wright	74	53	85	41	63	+5	3.52	-0.74	124	+12
Delta	Cape Girardeau	75	52	84	43	64	+3	3.47	+0.06	147	-37
Cardwell	Dunklin	79	56	86	47	67	+4	3.04	-0.99	210	-24
Clarkton	Dunklin	79	53	87	41	66	+3	3.22	-0.24	180	-46
Glennonville	Dunklin	78	54	84	42	66	+4	2.74	-0.59	189	-42
Charleston	Mississippi	77	53	85	40	65	+5	3.12	-0.55	166	-13
Portageville-Delta Center	Pemiscot	79	56	86	42	67	+5	2.68	-1.28	211	-17
Portageville-Lee Farm	Pemiscot	78	56	86	43	67	+5	2.98	-0.98	212	-10
Steele	Pemiscot	80	56	87	47	68	+6	2.52	-1.43	223	-3

* 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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