Plant Protection Programs University of Missouri

Integrated Pest & Crop Management

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 began flowering in the last week, the winter wheat in much of the rest of the state ranges from vegetative stages of growth to flag leafs emerging to just beginning to head. So the time for possible infection by the Fusarium head blight fungus is at hand. 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. After a warm, dry first half of April, many parts of the state have been cooler and wetter since April 15. If the rain continues as the crop moves through the flowering stages, the risk for scab will increase.

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 fungi which cause scab may also produce mycotoxins. Vomitoxin (deoxynivalenol or DON) and zearalenone may occur in wheat grain infected by scab fungi. 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 listed the fungicides labeled for the suppression

Continued on page 63

Table of Contents

Seed Decay and Seedling Blights of Corn

By Laura Sweets

Some years, early season stand establishment problems are widespread and, in some cases, severe- especially in early planted corn fields. The weather pattern during and immediately after planting is a major factor contributing to those problems. Corn which begins to germinate before periods of cold, wet weather in April or early May tends to show damage from saturated soils, cold soil temperatures, frost injury, herbicide injury, nitrogen deficiencies, seed decay and seedling blights. In some fields the seed decay and seedling blight may progress into crown decay resulting in even more severe stunting and yellowing of plants. If weather patterns are favorable for germination and emergence of corn and not as favorable for development of corn seed and seedling diseases, there will be a substantial reduction in seed decay and seedling blight problems in corn.

Corn planting had been ahead of normal because of the warm dry weather during the first two weeks of April. A substantial number of corn acres were planted during those two weeks. The cooler, wetter weather since April 15 may have impacted emergence and stand quality. There have been a few reports of fields in which corn has emerged or can be rowed but not as many as would normal for this time of year. In some fields corn emerged but growth since emergence has been quite slow. And in some fields emergence is slow and uneven. In assessing these stands it is important to dig in the thin areas to see if intact, ungerminated seed can be found or if the seed is rotted or the seedlings have rotted before they could emerge. Rotted seed can be difficult to find. The rotted seed may be completely coated with soil and hard to see or it may be rotted so completely that only remnants of the seed coat may remain. Certainly weather conditions over the next several weeks will be a key factor in which early season corn diseases develop and how serious these diseases are.

Seed decay and seedling blights of corn are generally caused by soil-inhabiting fungi such as species of *Pythium*, *Fusarium*, *Diplodia*, *Rhizoctonia* and *Penicillium*. These fungi may rot the seed prior to germination or cause preemergence or postemergence seedling blight. Affected seeds are usually discolored and soft and may be overgrown with fungi. Rotted seed may be difficult to find because they decompose very rapidly and because soil adheres fairly tightly to the decomposing seed.

With preemergence seedling blights, the seed germinates but the seedlings are killed before they emerge from the soil. The coleoptile and primary roots are usually discolored and have a wet, rotted appearance. With postemergence seedling blights, the seedlings emerge through the soil surface before developing symptoms. Seedlings tend to yellow, wilt and die. Discolored, sunken lesions are usually evident on the mesocotyl. Eventually the mesocotyl becomes soft and water soaked. The root system is usually poorly developed, and roots are discolored, water soaked and slough off. If the primary root system and mesocotyl are severely affected before the nodal or permanent root system has developed, the plants have little chance of surviving.

The *Pythium*, *Fusarium*, *Diplodia*, *Rhizoctonia* and *Penicillium* species which cause seed decay, seedling blight and crown decay are common in soils throughout the state. If conditions are favorable for germination and emergence, these fungi may not have the opportunity to invade seed, germinating seed or young seedlings so seed decay, seedling blights and crown rot will not be significant problems. On the other hand, conditions that are not favorable for germination and emergence, give these soil fungi more time to attack the seed and developing plants.

Numerous other factors also contribute to early season corn establishment problems. Insect damage, nutrient imbalances, herbicide injury, soil conditions and environmental factors, especially saturated soil conditions and oxygen deprivation, may also cause or contribute to early season corn establishment problems. Corn seedling blights are more severe in wet soils, in low lying areas in a field or in soils that have been compacted or remain wet for an extended period of time. Low soil temperatures (50-55°F) and wet soil conditions especially favor Pythium seed decay and seedling blight. Disease severity is also affected by planting depth, soil type, seed quality, mechanical injury to seed, soil crusting, herbicide injury or other factors which delay germination and emergence of corn.

Planting high quality seed into a good seedbed when soil temperatures are above 50F will help minimize these early season problems. Virtually all field corn seed comes with a fungicide seed treatment. Hopper box treatments can be used to supplement the existing seed treatment.

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Watch out for Giant Ragweed

By Kevin Bradley

Over the past two years we have been conducting a survey of soybean fields at harvest to determine the extent and distribution of herbicide-resistant weeds throughout Missouri. The majority of weed samples we have collected over the past two years have been waterhemp, but in 2009 we observed an increase in the number of fields with giant ragweed that survived treatment and were present at harvest. Recently, we have completed our initial greenhouse screen of these plants and believe we have identified several more giant ragweed populations that are resistant to glyphosate. Some of these populations also showed signs of multiple resistance to both glyphosate and ALS-inhibiting herbicides like Firstrate (Figure 1).

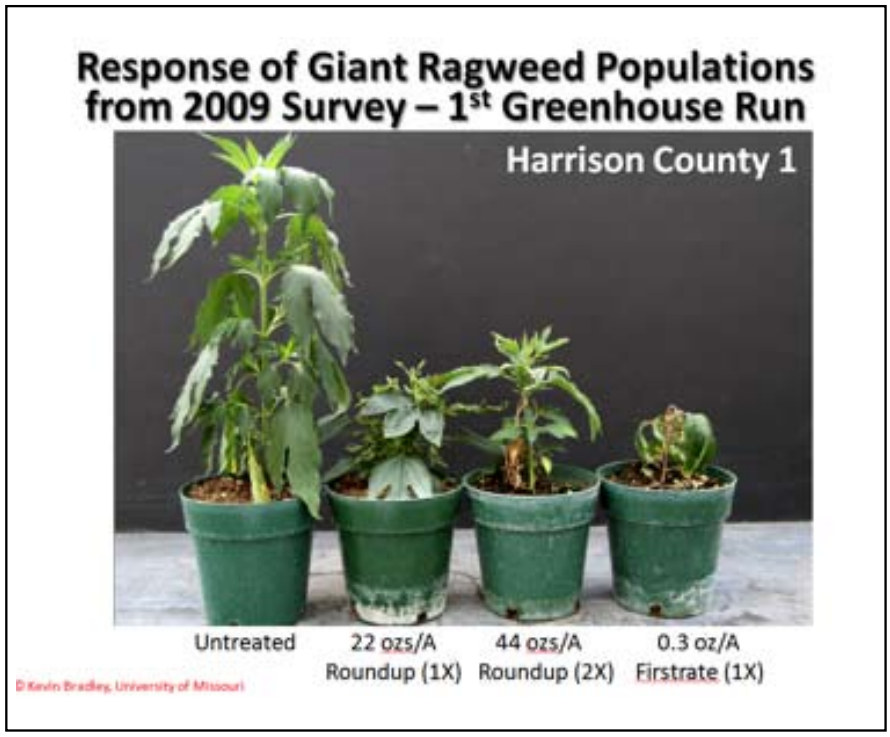

Figure 1. Initial results from greenhouse experiments suggest that the number glyphosate-resistant giant ragweed populations in Missouri is on the rise. This population from Harrison County appears to be resistant to glyphosate and ALS-inhibiting herbicides.

Clearly, our most significant weed problem in Missouri right now is glyphosate-resistant waterhemp. However, this doesn't mean we should overlook giant ragweed and the increase in the number of problems we have seen with giant ragweed over the past two seasons. One of the characteristics of giant ragweed is that it is usually one of the first summer annual weeds to emerge in Missouri so this can be beneficial in that we have the "opportunity" to deal with this weed prior to corn or soybean planting.

For control of glyphosate-resistant giant ragweed populations prior to corn or soybean planting, consider tank-mixes of 2,4-D or Sharpen with your glyphosate burndown. Gramoxone plus 2,4-D and Ignite plus 2,4-D are also options for the control of giant ragweed in a burndown situation. If the population is not ALS-resistant, the addition of products that contain chlorimuron, like Canopy EX, Synchrony, Valor XLT, or Envive, or products that contain cloransulam, like Authority First, Sonic, Firstrate or Gangster, can provide good control of giant ragweed in soybeans. Assuming the population is not ALS-resistant, these same herbicides should also provide some residual control of giant ragweed plants that emerge later in the season.

In soybeans, if giant ragweed is present in-crop, the key to effective control is application timing. Giant ragweed that has reached 1 foot or more in height is not only more difficult to control but at this height has more than likely already caused a significant yield loss. If the population is glyphosate-resistant, one of the most effective herbicide options is Firstrate. If the population is both glyphosate- and ALS-resistant, then the remaining herbicide options are far less effective and application timing becomes critically important. Giant ragweed populations with multiple resistance should be treated with tank-mixes of glyphosate and Cobra, Phoenix, or Flexstar (or other products with fomesafen).

For more information, you can visit this website: http://www.extension.purdue.edu/extmedia/BP/GWC-12.pdf and download a free publication authored by several university weed scientists from around the Midwest that details the biology and management of giant ragweed in corn and soybean production systems.

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Wheat Disease Update - May 3, 2010

By Laura Sweets

Although we have not received very many wheat samples so far this season, there have been a number of phone calls related to possible disease problems and fungicide application. Of the few samples that have come in, Septoria leaf blotch was evident on one and several have had symptoms characteristic of barley yellow dwarf or wheat soil-borne mosaic and/or wheat spindle streak mosaic viruses. In wheat trials in the Columbia area, Septoria leaf blotch is beginning to develop and leaf rust is just beginning to develop on susceptible varieties.

Stage of growth of wheat varies greatly across the state and even within regions of the state. In southern Missouri many fields are beginning to head and in southeast Missouri some fields may be flowering. The rate at which a field moves from the boot stage to flowering can be influenced by temperature. At warmer temperatures the crop can move quickly through those growth stages. At cooler temperatures, the crop may move very slowly from boot to flowering. The increase in foliage diseases such as Septoria leaf blotch and leaf rust as well as the head disease scab or Fusarium head blight will be determined by precipitation and humidity as well as temperature. Forecasts vary from one rain event over the next 5-7 days to multiple rain events over the next 5-7 days. Frequent light rains, high humidity, extended periods of overcast weather, and moisture that stays in the canopy will favor the increase of foliage diseases and Fusarium head blight.

If growers are considering fungicide application, now is the time to be scouting fields to determine incidence and severity of any fungal foliage diseases which might be showing up and to accurately assess the stage of growth of each field. Most of the fungicides for control of fungal foliage diseases should be applied by Feekes growth stage 10.5 and fungicides for the suppression of Fusarium head blight should be applied at Feekes growth stage 10.51. Descriptions of wheat foliage diseases, Fusarium head blight or scab as well a table on wheat fungicides can be found in this issue and the last issue of the *Integrated Pest and Crop Management Newsletter*. It is also important to remember that all of these fungicides have restrictions as to how late in the season they can legally be applied. Two of the most common label restrictions are "no later than Feekes 10.5" and "do not apply within 30 days of harvest". Violation of these preharvest intervals led to serious problems in some states last year. Read and follow label directions for any product used on wheat. The bottom line on fungicide application for control of foliar diseases or suppression of Fusarium head blight is that growers in the southern part of the state need to be making those decisions right now before the crop is past Feekes 10.5 or 10.51 and growers in the central and northern areas of the state will be facing those decisions in the next 7-14 days.

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Plant Diagnostic Clinic Clients and Other Interested Parties:

I am writing to let you know that we are temporarily suspending the activities of the University of Missouri Extension Plant Diagnostic Clinic, effective immediately, until we have identified a new Clinic Director. We understand how important the clinic is to you and apologize for any inconvenience this action may cause. However, we also recognize that, in the absence of a diagnostician, we cannot provide the level of service that clinic clientele have come to expect. Approval to proceed with the search for a new diagnostician has been received and advertisements have been posted nationally. Such searches can take several months to complete but we will alert you promptly when we have identified the Diagnostic Clinic's new director.

The University of Missouri Clinic is part of a national network called the National Plant Diagnostic Network. Below you will find links to the network web page and to the North Central Regional network that is part of the larger group.

North Central Plant Diagnostic Network: http://www.ncpdn.org/DesktopDefault.aspx
National Plant Diagnostic Network: http://www.npdn.org/

Please feel free to pass on any comments or questions you may have.
My e-mail address is collinsmic@missouri.edu.

Mike Collins, *Director*
Division of Plant Sciences | College of Agriculture, Food and Natural Resources | University of Missouri

Scattered Reports of Black Cutworm Damage in Corn

By Wayne Bailey

Damage from black cutworm larvae began about 10 days ago with corn plants being cut in several scattered areas of the state. Although only scattered fields have received damage from this pest at this time, many of the infested fields had plants damaged at a level well above the economic threshold of 1-2% cutting below ground and 3-4% or more cutting of plants above ground. Because moth captures have been erratic statewide, all corn producers are encouraged to scout corn plants from emergence and continuing until plants reach the 4-leaf stage of growth. Late planted corn is most at risk from black cutworm larval attack. Small seedlings are most heavily damaged by large worms. As larvae have grown in size during the past few weeks, small recently emerged corn seedlings will sustain severe damage if a black cutworm infestation is present. Damage is often restricted to low areas of the field which contained lush vegetation during the spring when eggs were being deposited, although some fields will have larval infestations throughout. Producers are encouraged to scout fields several times per week to determine the presence and level of black cutworm infestations. As corn plants reach the 4-leaf stage they are less likely to be attacked by this pest. Economic thresholds for black cutworm infestations vary by field, plant size, and insect size and number, but generally treatment is recommended if 1-2% or more of plants are cut below ground and 3-4% or more of plants are cut above ground. Above ground cutting is less serious as the growing point of the corn plant is left undamaged, in contrast to being damaged when plants are cut underground.

Although limited numbers of black cutworms may overwinter in Missouri in some years, a majority of infestations originate from moths migrating into the state on the front side of early spring storms which originated from sites along the Gulf Coast and Mexico. Female moths will lay up to a 1,000 eggs either singularly or in masses of up to 30 eggs on a variety of vegetations and occasionally on plant residues. Larvae vary from light gray to black in color and grow to 1 ½ - 2 inches in length. A total of 6 to 7 worm stages or instars are produced with instars 1-3 feeding on leaf tissue and instars 4 -7 cutting plant stems as well as feeding on foliage. When disturbed, the larvae will curl into a "C" shape and play dead until the danger has passed. This insect produces 3 generations annually with 35 – 50 days required to complete a generation (egg to adult). The black cutworm is a general feeder with the first generation often attacking the field crops of corn, sorghum, and occasionally wheat. Later generations are often responsible for problems in turf and vegetables.

Economic infestation of black cutworm larvae in corn can be controlled with a rescue application of insecticides. Transgenic seed containing the Herculex trait has been shown to provide good control of black cutworm infestations. Seed treatments will provide some control, but may not prevent an infestation from reaching or exceeding economic threshold levels. In Missouri the risk of black cutworm damage of corn is elevated at this time. Corn producers are encouraged to scout fields 2-3 times per week from plant emergence through the 4–leaf stage of growth in order to determine percent cut plants above and below ground level. Numerous insecticides are labeled for rescue applications for control of black cutworm larvae in field corn. As always, be sure to read and follow all label restrictions, precautions, and use guidelines.

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Alfalfa Weevil Larvae Infected with Fungal Pathogen

By Wayne Bailey

The threat from alfalfa weevil larval infestations has substantially drop in central and northern Missouri during the past few days. Most fields statewide are approaching or have reached the growth stages where harvest of "first cutting" is possible. In addition, Ben Puttler (retired entomologist associated with the MU Division of Plant Sciences) has reported the presence of the fungal pathogen Zoophthora spp., in most central Missouri alfalfa fields. This fungus is present in fields each year, but is dependent on the occurrence of wet, warm conditions to be expressed and become an effective biological control agent of alfalfa weevil larvae. Once found in an alfalfa weevil population, a majority of larvae in a field will die within just a few days. When scouting for alfalfa weevil larvae in the field, the first indication that the fungus is present in the weevil population is a change in color of the larvae from their normal lime green color to more of a yellow color. Once yellow larvae are observed, the alfalfa weevil larval population will collapse within a few to about 7 days later depending on weather conditions. In the past, several researchers have attempted to develop commercial formulations of the fungus for use on alfalfa weevil larval infestations, but with little success. Because the fungus is almost always present in alfalfa fields, the application of additional fungal spores in alfalfa fields is of little value. Weather is the controlling factor which determines whether this fungus is expressed in and kills alfalfa weevil larvae annually. Recent wet and recent warm conditions have resulted in effective control of the moderate numbers of weevils found in northern and central Missouri fields this spring. However, in most years the fungus appears too late for early control of alfalfa weevil populations in southern counties of Missouri.

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It Is Time to "Spray-Smother-Spray"

By Craig Roberts and Kevin Bradley

Pastures of tall fescue in Missouri are infected with a fungus known as the "endophyte." The tall fescue endophyte causes fescue toxicosis, a serious disorder that costs the Missouri beef industry $160 million each year and is harmful to dairy cattle, horses and sheep. Fescue toxicosis is characterized by poor health and production, including low rate of gain, poor milk production, and poor reproduction.

While many producers manage tall fescue to minimize the effects of toxicosis, other producers plan to replace their toxic tall fescue with another forage. For these producers, it is time to begin thinking of killing of the old tall fescue.

Normally, a stand of grass can be killed with a high rate of glyphosate, which is sold under a variety of different trade names but is perhaps most commonly known as Roundup. With toxic tall fescue, however, killing the stand usually requires a fairly high rate of glyphosate. That is because a single spray may not kill all the individual plants. Many plants are covered by dung piles; these plants avoid herbicide contact and often emerge later in the year. Also, a single spray does not kill the tall fescue seed present in the soil. This seed, still infected with the endophyte, can germinate and provide toxic seedlings long after the field is sprayed.

For these reasons, Missouri Extension recommends replacing toxic tall fescue with a technique known as "spray-smother-spray." There are other techniques being explored in other states, but the spray-smother-spray recipe is a proven method in Missouri. The entire procedure can be done in four months and will provide excellent summer pasture in the process. It calls for spraying glyphosate in the spring, no-tilling a smother crop in the summer, and establishing the new grass in the fall. (See Figure 1.)

The initial spray is in late May—between May 15 and May 21—which is about 1 week before a summer annual crop would be planted. Glyphosate should be applied at a rate of at least 2 lbs per acre, or 2 quarts per acre of a 4 lb/gallon glyphosate formulation. The smother crop is planted on or near June 1, and it is usually pearlmillet or a hybrid of sorghum x sudangrass. The smother crop is grazed all summer and sprayed with a second application of glyphosate in late August—between August 15 and August 21—about 1 week before the new cool-season grass is planted.

The new grass to be planted in the fall should be one that has a long growing season, is tolerant to severe climate stresses, and is nutritional to livestock. It will surely come as a surprise, but the grass that best meets these criteria is another type of tall fescue—a nontoxic one. These new varieties are infected with endophytes, but the new endophytes produce little or no toxins. In northern Missouri, the new grass is sometimes a blend of orchardgrass and endophyte-free tall fescue.

If replacing toxic tall fescue is your goal, plan ahead. And begin planning for the first step—spraying tall fescue in late May. For more information, contact your local University Extension office.

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Figure 1.

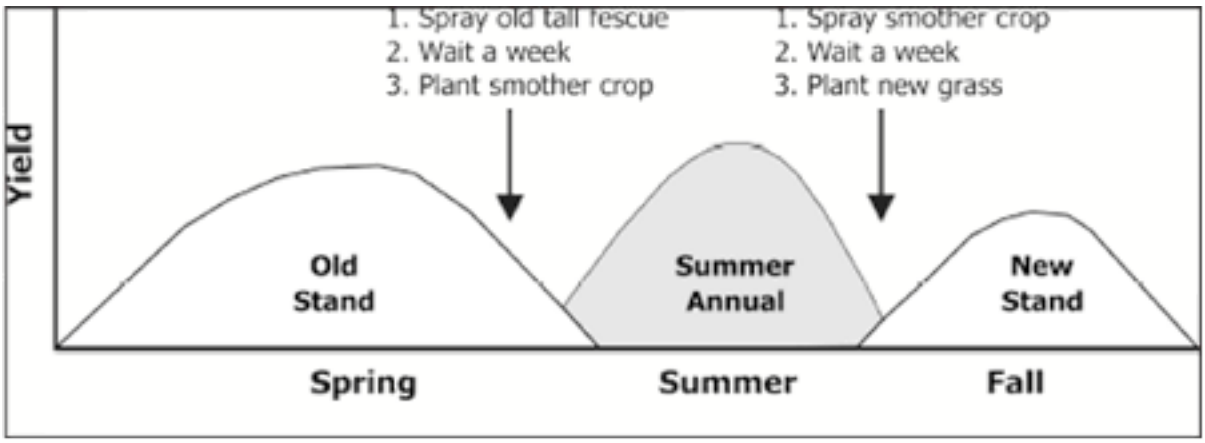

Figure 1. Recipe for Spray-Smother-Spray, a method to replace toxic tall fescue pasture with a cool-season grass.

Fusarium Head Blight or Scab of Wheat *continued from page 57*

of Fusarium head blight or scab. Growers should be scouting fields 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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Weather Data for the Week Ending May 3, 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.	April 1-April 30	Departure from long term avg.	Accumulated Since Apr. 1	Departure from long term avg.
Corning	Atchison	74	48	87	41	61	+4	2.83	-0.30	329	+215
St. Joseph	Buchanan	71	50	79	41	60	+3	3.60	-0.09	322	+191
Brunswick	Carroll	71	50	83	42	60	+2	5.40	+2.08	331	+186
Albany	Gentry	72	48	81	38	60	+3	4.54	+0.90	294	+181
Auxvasse	Audrain	71	50	81	40	60	+2	5.44	+1.64	348	+199
Vandalia	Audrain	71	50	81	43	60	+2	6.98	+3.27	335	+205
Columbia-Bradford	Boone	71	49	81	39	59	0	7.73	+3.49	323	+151
Columbia-Jefferson Farm	Boone	70	49	81	39	60	+1	7.06	+2.79	355	+182
Columbia-South Farms	Boone	71	49	81	39	60	+1	7.73	+3.44	351	+178
Williamsburg	Callaway	71	50	82	41	61	+3	5.51	+1.44	365	+220
Novelty	Knox	69	49	81	40	59	+1	5.73	+2.21	292	+159
Linneus	Linn	70	48	81	39	59	+2	5.03	+1.62	297	+171
Monroe City	Monroe	70	50	80	42	60	+2	6.33	+2.90	317	+168
Versailles	Morgan	73	50	85	39	61	+2	3.45	-0.89	384	+173
Green Ridge	Pettis	71	50	82	41	60	+1	4.25	+0.32	344	+192
Lamar	Barton	71	50	82	42	60	0	2.38	-2.27	368	+158
Cook Station	Crawford	73	49	80	36	61	+1	4.57	+0.30	344	+125
Round Spring	Shannon	75	49	83	36	61	+2	3.39	-0.97	339	+144
Mountain Grove	Wright	71	48	77	38	60	+1	3.33	-1.10	339	+1.69
Delta	Cape Girardeau	74	54	79	43	64	+2	5.12	+1.00	405	+1.38
Cardwell	Dunklin	77	57	85	44	67	+3	3.25	-1.33	493	+161
Clarkton	Dunklin	76	56	83	44	66	+2	4.80	+0.46	455	+135
Glennonville	Dunklin	76	56	81	45	66	+2	4.24	+0.06	472	+148
Charleston	Mississippi	74	56	81	45	66	+2	4.24	+0.06	472	+148
Portageville-Delta Center	Pemiscot	75	58	81	46	67	+3	5.08	+0.65	504	+179
Portageville-Lee Farm	Pemiscot	75	58	81	46	67	+3	3.62	-0.89	512	+193
Steele	Pemiscot	77	58	85	46	67	+3	3.01	-1.66	522	+197

* 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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