Integrated Pest & Crop Management

March Madness – a historic month

By Pat Guinan

A highly unusual and stagnant warm weather pattern impacted a large area of the United States in March, generally from the Rocky Mountains eastward to the Atlantic seaboard. An area of low pressure remained parked over the Pacific Northwest while an area of high pressure spun clockwise off the Atlantic coast. Gulf of Mexico air was consistently pumped into the heart of the country on southerly wind flow that lasted for days, while the polar jet stream remained locked over Canada, preventing arctic air from spilling into the region.

More than 7,700 daily high temperature records were set during the month and preliminary data indicates it was the warmest March on record for the contiguous United States, surpassing the previous warmest March, in 1910, by 0.5 degrees F. The average March temperature was 51.1°F and was 8.6 degrees above the 20th century average for March.

According to the Midwestern Regional Climate Center, based in Champaign, IL, nine Midwestern states experienced their warmest March ever: Illinois, Indiana, Iowa, Kentucky, Michigan, Minnesota, Missouri, Ohio, and Wisconsin. Only Washington, Oregon, and California experienced cooler than average weather in March.

Preliminary data indicate Missouri's statewide average March temperature was 57.8°F, or 13.1 degrees above normal, ranking it the highest above normal monthly temperature departure for any month in Missouri, since 1895. Monthly double digit departures above normal occur rarely in the Show Me state, having occurred only 5 times since 1895:

Year	Month	Average Temp (°F)	Dept. from Normal (°F)
1910	March	55.0	+10.3
1933	January	40.7	+10.2
1963	October	66.7	+10.6
2006	January	41.2	+10.7
2012	March	57.8	+13.1

Figure 1 shows the magnitude of warmth in Missouri, when compared to Marches in the past, surpassing the previous record, set back in 1910, by nearly 3 degrees. March 2012 also exceeded temperature norms for April in Missouri, averaging 2.7 degrees above the average temperature for April.

Average March temperatures were in the mid 50's across northern Missouri, and upper 50's and lower 60's across central and southern sections. There were many locations across the state where more than half the days experienced high temperatures in the 70's and 80's during the month. Additionally, numerous high maximum and high minimum temperature records were broken. Minimum temperatures remained above freezing in most areas of the state beginning March 11th through the end of the month.

Several significant rainfall events occurred during the month and translated to above normal precipitation for much of the state. The statewide average total was 4.18 inches, or a little less than an inch above normal. Regionally, heaviest amounts fell over west central, southwestern and south central Missouri where 5-7 inches were common. Heaviest amounts were reported in Ozark, Douglas and Newton counties where 9.19, 8.53 and 8.13 inches were observed, respectively. Lighter monthly totals, ranging from 3-5 inches, were common across the

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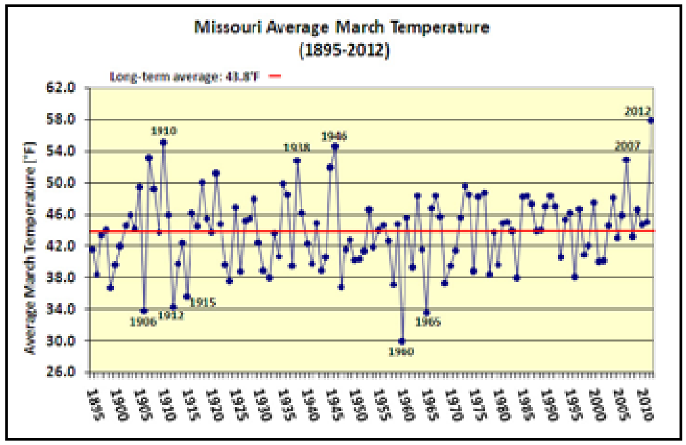
rest of the state, with the exception of some northern and eastern border counties where less than 3 inches were observed. Far northeastern counties reported the driest conditions where CoCoRaHS observers in Lewis, Pike and Clark counties reported 1.54, 1.31, and 1.14 inches, respectively, for the month.

Unprecedented warmth and sufficient moisture led to an exceptionally early start to the growing season in March. By the end of month, numerous plants were at growth stages 3-4 weeks ahead of normal and creating significant concern for agricultural and horticultural interests, due to the potential for freezing temperatures in April. Though not widespread, there were also reports of some corn planting occurring in northern and central parts of the state during the last two weeks March.



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2012 Wheat Disease Situation

By Laura Sweets

The 2012 growing season has already been an "interesting" one for winter wheat in Missouri.

The record mild winter allowed for early infestations of the aphids that may transmit barley yellow dwarf virus and the foliage disease Septoria leaf blotch. Sporulating lesions of Septoria were found on wheat leaves in southwest Missouri as early as February 6, 2012. Powdery mildew was also an early season issue on winter wheat in southwest Missouri. Eastern Arkansas has been reporting stripe rust outbreaks and stripe rust has been confirmed in southeast Missouri fields and fields in St. Charles, County, MO. Most recently there have been calls and questions from many areas of Missouri about purpling of flag leaves possibly from the barley yellow dwarf virus.

So what is the current disease situation on winter wheat in Missouri?

Foliage Diseases: Although Septoria was actively sporulating on wheat foliage very early in the season, the disease does not appear to have moved up the plants. Most lesions which are present are on the lowest leaves and the flag leaf and 2-3 leaves below the flag leaf are clean. Powdery mildew seems to have been controlled by fungicide application or slowed down by the change in weather conditions from March to April. Stripe rust hasn't been reported outside of the areas in which it was initially reported. There haven't been any confirmed reports of leaf rust yet this season.

If foliar fungicide applications are being considered it is important to scout fields first. Look for the presence of foliage diseases which might be impacting yield and could be controlled with a fungicide application. Descriptions of the common foliage diseases on winter wheat in Missouri are given below. But also scout fields for stage of growth. The unusually warm temperatures during January, February and March have resulted in a very early wheat crop. Most parts of the state are reporting wheat 25-28 days ahead of average as far as stage of growth. Many of the wheat foliar fungicides are applied at flag leaf emergence, heading or until the beginning of flowering. Most of the these fungicides have harvest restrictions of Feekes growth stage 10.5 (head completely emerged) or 30, 35 or 40 days prior to harvest. Due to the warm temperatures, wheat may be passed the time when it can be sprayed.

Lesions of **Septoria leaf blotch** begin as light yellow flecks or streaks. These flecks expand into yellow to reddish-brown, irregularly shaped blotches. Dark brown specks (fruiting bodies or pycnida of the causal fungus, *Septoria tritici*) may be scattered within the centers of mature lesions. Lesions may coalesce killing larger areas of leaf tissue.

Stagonospora glume blotch (formerly called Septoria glume blotch) may also begin as light yellow flecks or streaks on leaves. The lesions also turn yellow to reddish-brown but usually have a more oval to lens shaped appearance than those of Septoria leaf blotch. Again, the dark brown specks or fungal fruiting bodies of the causal fungus *Stagonospora nodorum* may be evident within the lesions. Symptoms of Stagonospora glume blotch are more

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common on heads than foliage of wheat. Infected heads will have dark blotches on the glumes.

The initial symptoms of **tan spot** are small tan to brown flecks on the leaves. These expand into tan to light brown, elliptical lesions which often have yellow borders. The centers of mature tan spot lesions may have a dark brown region caused by outgrowth of the fungus. But the fungus which causes tan spot, *Pyrenophora tritici-repentis*, does not produce pycnidia or fruiting bodies as the Septoria fungus does. So mature tan spot lesions do not have the distinct dark brown specks scattered throughout the centers of the lesions as do Septoria leaf blotch lesions. Although tan spot can occur in Missouri, it is not usually a problem in the state.

Leaf rust lesions appear primarily on the upper leaf surfaces and leaf sheaths. Initially, lesions are small, yellow to light-green flecks. Eventually, leaf rust appears as small, circular to oval shaped, orange-red pustules. These pustules break open to release masses of orange-red spores of *Puccinia recondita*. The edges of the open pustules tend to be smooth without the tattered appearance of stem rust pustules. Heavily rusted leaves may yellow and die prematurely.

Stripe rust, caused by the fungus *Puccinia striiformis,* has become more prevalent in Missouri over the last few years. Stripe rust may develop earlier in the season than leaf rust or stem rust. The pustules of stripe rust are yellow or yellowish-red and occur in obvious stripes or streaks running lengthwise on the wheat leaves. This disease is more commonly associated with cooler temperatures, especially cooler night temperatures.

Stem rust, caused by the fungus *Puccinia graminis* f. sp. *tritici*, is most common on stems and leaf sheaths of wheat plants but may develop on any of the above ground portions of the plant including both upper and lower leaf surfaces and glumes and awns. Stem rust pustules are small, oval, and reddish-brown. The ruptured pustules tend to have more ragged edges than leaf rust pustules. Frequently both leaf rust and stem rust occur on the same plant and both types of pustules may develop on an individual leaf.

Powdery mildew infections begin as light-green to yellow flecks on the leaf surface. As powdery mildew develops the leaf surfaces become covered with patches of cottony white mold growth of *Erysiphe graminis* f. sp. *tritici*, the causal fungus. These patches eventually turn a grayish-white to grayish-brown in color and small black fungal fruiting bodies may be visible within the patches of mildew growth.

The fungi which cause most of these wheat foliage diseases survive in infested wheat residues left on the soil surface. The next growing season spores are produced during moist periods and are carried by wind currents to susceptible wheat leaves where infection may begin. Disease problems tend to be more severe when wheat is planted in fields with infested wheat residue left on the soil surface. Eventually spores that are produced in the initial lesions on plants are wind blown to other leaves or other plants causing secondary infection.

Leaf rust, stem rust and stripe rust are exceptions to this simplified explanation of disease development. The rust fungi do not survive in infested residue left in a field. Rather, the rust fungi are reintroduced into this area each season when spores are carried up on air currents from the southern United States.

Most of the foliage diseases of wheat are favored by warm, wet or humid weather. Frequently infection begins on the lower portion of the plant. If weather conditions are favorable for disease development, the disease may move up through the plant. Severely infected leaves may yellow and die prematurely. Yield losses tend to be highest when the flag leaves are heavily infected.

There are several fungicides that are labeled for use on wheat to control fungal foliage diseases. It is important to scout wheat fields and determine which leaf diseases are occurring as well as the level of their severity before making a decision to apply a foliar fungicide. In particular be on the lookout for Septoria leaf blotch, Stagonospora glume blotch, leaf rust and stripe rust. When scouting fields, try to identify the disease or diseases which are present, determine the average percent of infection on a leaf and the number of leaves showing infection and determine the stage of growth of the crop. Generally, the profitable use of foliar fungicides on wheat depends on a number of factors including varietal resistance, disease severity, effectiveness of the specific fungicides and timing of fungicide application. The greatest increases in yield are usually obtained when fungicides are applied to disease susceptible varieties with high yield potential at the early boot to head emergence growth stage when the flag leaf is in danger of severe infection. Fungicide applications are seldom beneficial if applied after flowering or after the flag leaf is already severely infected. It is also important to read the fungicide label for specific information on rates, recommended timing of application, frequency of applications, preharvest intervals and grazing restrictions.

A management program for foliage diseases of wheat should include the following steps.

- Plant disease free seed of varieties with resistance

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to diseases likely to occur in your area.

- Rotate with non-host crops for one or more years.
- Manage residues- if tillage system is a conservation tillage system, particular care should be given to rotation and variety selection.
- Maintain good plant vigor with adequate fertility.
- Control volunteer wheat.
- Use foliar fungicides if warranted (see accompanying tables for additional information on wheat fungicides).

The North Central Regional Committee on Management of Small Grain Diseases (NCERA-184) developed a table containing information on fungicide efficacy for control of certain foliar diseases of wheat. These efficacy ratings were determined by field testing the materials over multiple years and locations by members of the committee. This table is included in this issue of the IPCM newsletter.

Fusarium head blight or Scab: It seems early in the year to be thinking about Fusarium head blight or scab but with the unusually early development of the wheat crop, the wheat in the southern part of the state may be in a susceptible stage of growth and wheat in the remainder of the state could be in the susceptible stage of growth, i.e. flowering, in the next week or two. Again this would be about 24-28 days ahead of average. This may be delayed some by the cooler temperatures in April but flowering is likely to be ahead of normal and if fungicide applications for Fusarium head blight management are being considered the stage of growth needs to be monitored carefully. The rain throughout most of the state this past weekend could be conducive to the development of Fusarium head blight in fields in which the crop is beginning to flower or is flowering. The forecast for the coming week doesn't show significant chances for precipitation so fields flowering this week might escape infection. Information on Fusarium head blight symptoms are given below.

Fusarium head blight or scab of wheat develops on plants in the flowering to early grain fill stages of growth. 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 March, many parts of the state have been cooler and wetter in April. 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*.

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2012 Wheat Disease Situation

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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 this issue of the Integrated Pest & Crop Management Newsletter lists the fungicides labeled for the suppression 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.

Other Head Diseases of Winter Wheat:

From flowering through the early stages of grain fill is also the time to scout for other head diseases of wheat such as loose smut, Septoria and Stagnospora infections on heads, bacterial stripe and black chaff on heads and take-all.

Loose smut is obvious as heads emerge from the boot and for several weeks after that. The kernels on infected heads are replaced with masses of powdery black spores. So the heads have a very distinct black, powdery appearance. These spores are eventually dislodged by wind and rain, so later in the season the smutted stems are less evident and only the bare rachis will be left. Spores produced on smutted heads are wind carried to adjacent plants in the field and infect through the flowers. The fungus that causes loose smut survives within the embryo of wheat seeds. If infected seed is planted, the plants growing from those seeds will be infected and develop smutted heads the next season. If seed from a field that has a "small" amount of smut in one season is used for seed, the field planted with that seed may have a substantially higher level of smut. Loose smut is best controlled by planting either disease-free seed or using a systemic fungicide seed treatment.

Septoria leaf blotch is present in the lower canopy of many fields this year. It hasn't seemed to move up in the canopy to the flag leaf or head but with increased precipitaiton and high humidity it could still develop on flag leaves and heads. On the heads dark brown to black blotches may develop. *Stagnospora nodorum* may also cause leaf lesions but is usually more common on heads-again causing dark blotches on glumes of part or all of the head.

Bacterial stripe or black chaff is a bacterial disease that produces symptoms on both leaves and heads. Water-soaked lesions may develop on young leaves. These expand into reddish-brown to brownish-black streaks on the leaves. Glumes and awns show brown-black blotches or streaks. Fungicides are not effective against bacterial stripe or black chaff so the use of resistant or tolerant varieties and crop rotation are the main management options.

Take-all is one of the more common root and crown rot diseases of wheat in Missouri. The fungus which causes this disease may infect seedlings in the fall. Symptoms are usually most evident after heading as white heads on the 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 typically 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 seen if the lowest leaf sheath is scraped off with a knife or fingernail. A management program for take-all should including planting good quality seed of adapted, disease resistant varieties, planting in well-drained sites under good seed bed conditions, rotating with nonhost crops for one to three years, controlling weed-grass hosts and volunteer wheat, using seed treatment fungicides and maintaining good plant vigor with adequate fertility.

Virus Diseases of Wheat: Although aphid numbers were extremely high in some fields in southwest Missouri earlier this spring, the symptoms of barley yellow dwarf have been slow to develop. Over the last week to ten days,

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calls related to purpling of the flag leaf have been received. Several samples from eastern and central Missouri have been tested for the four most common virus diseases of winter wheat in Missouri (descriptions follow) and, thus far, the only positives have been for barley yellow dwarf. At this point in the season and with much wheat in the boot stage or beyond, there are no management recommendations for barley yellow dwarf or other wheat virus diseases for this year's crop.

Descriptions of the wheat virus diseases most likely to occur on winter wheat in Missouri are given in the following paragraphs.

Symptoms of wheat spindle streak mosaic appear in early spring as yellow-green streaks or dashes on the dark green background of the leaves. These lesions usually run parallel to the leaf veins and tend to be tapered at the ends giving the lesions a spindle shaped appearance. Foliage symptoms are most obvious when air temperatures are about 50°F. As temperatures warm-up, foliage symptoms of wheat spindle streak mosaic tend to fade. Plants may be slightly stunted and have fewer tillers than normal. Wheat spindle streak mosaic tends to be more prevalent in lower, wetter areas of a field. The virus which causes this disease is soilborne and is spread by the soil fungus *Polymyxa graminis*. Wet falls tend to favor outbreaks of wheat spindle streak mosaic the following spring.

Wheat soilborne mosaic causes light green to yellow green to bright yellow mosaic patterns in leaf tissues. Symptoms are most evident on early spring growth, and warmer temperatures later in the season slow disease development. Symptoms of wheat soilborne mosaic are not always particularly distinctive and might occur as a more general yellowing similar to that caused by nitrogen deficiency. Infected plants may be stunted. This disease may be more severe in low lying, wet areas of a field. The soilborne wheat mosaic virus survives in the soil and is spread by the soil fungus *Polymyxa graminis*. Again, wet falls tend to favor outbreaks of wheat soilborne mosaic the following spring.

Barley yellow dwarf is an extremely widespread virus disease of cereals. Symptoms include leaf discoloration ranging from a light green or yellowing of leaf tissue to a red or purple discoloration of leaf tissue. Discoloration tends to be from the leaf tip down and the leaf margin in towards the center of the leaf. Plants may be stunted or may have a rigid, upright growth form. Symptoms are most pronounced when temperatures are in the range of 50-65°F. The barley yellow dwarf virus persists in small grains, corn and perennial and annual weed grasses. More than twenty species of aphids can transmit the barley yellow dwarf virus. Symptoms may be more severe and yield losses higher if plants are infected in the fall or early in the spring. Infections developing in late spring or summer may cause discoloration of upper leaves but little stunting of plants or yield loss.

The other virus disease likely to occur on winter wheat in Missouri is wheat streak mosaic, but symptoms of this disease are not usually evident until later in the season when air temperatures increase. Wheat streak mosaic causes a light green to yellow green mottling and streaking of leaves. Symptoms may vary with variety, virus strain, stage of wheat growth when plants are infected and environmental conditions. Plants may be stunted. As temperatures increase later in the spring, yellowing of leaf tissue and stunting of plants may become more obvious. The wheat streak mosaic virus is spread by the wheat curl mite. Symptoms are frequently found along the edges of fields where the mite vector first entered the field. Both the wheat streak mosaic virus and the wheat curl mite survive in susceptible crop and weed hosts. Thus, the destruction of volunteer wheat and weed control are important management options for wheat streak mosaic.

A management program for virus diseases of wheat should include the following steps.

- Plant good quality seed of resistant varieties.
- Avoid planting too early in the fall to minimize opportunity for insect vectors to transmit viruses to young plants.
- Destroy volunteer wheat and control weed grasses.
- Maintain good plant vigor with adequate fertility.

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Management of Small Grain Diseases
Fungicide Efficacy for Control of Wheat Diseases *(Revised 4-17-12)*

The North Central Regional Committee on Management of Small Grain Diseases (NCERA-184) has developed the following information on fungicide efficacy for control of certain foliar diseases of wheat for use by the grain production industry in the U.S. Efficacy ratings for each fungicide listed in the table were determined by field testing the materials over multiple years and locations by the members of the committee. Efficacy is based on proper application timing to achieve optimum effectiveness of the fungicide as determined by labeled instructions and overall level of disease in the field at the time of application. Differences in efficacy among fungicide products were determined by direct comparisons among products in field tests and are based on a single application of the labeled rate as listed in the table. Table includes most widely marketed products, and is not intended to be a list of all labeled products.

Efficacy of fungicides for wheat disease control based on appropriate application timing

Class	Active ingredient	Product	Rate/A (fl. oz)	Powdery mildew	Stagonospora leaf/glume blotch	Septoria leaf blotch	Tan spot	Stripe rust	Leaf rust	Stem rust	Head scab	Harvest Restriction
Strobilurin	Fluoxastrobin 40.3%	Evito 480 SC	2.0 – 4.0	G	--[3]	--3	VG	**--3**	VG	--3	NL	40 days
	Pyraclostrobin 23.6%	Headline SC	6.0 - 9.0	G	VG	VG	E	**E2**	E	G	NL	Feekes 10.5
Triazole	Metconazole 8.6%	Caramba 0.75 SL	10.0 - 17.0	VG	VG	--3	VG	**E**	E	E	G	30 days
	Propiconazole 41.8%	Tilt 3.6 EC4	4.0	VG	VG	VG	VG	**VG**	VG	VG	P	Feekes 10.5
	Prothioconazole 41%	Proline 480 SC	5.0 - 5.7	--3	VG	VG	VG	**--3**	VG	VG	G	30 days
	Tebuconazole 38.7%	Folicur 3.6 F4	4.0	G	VG	VG	VG	**E**	E	E	F	30 days
	Prothioconazole19% Tebuconazole 19%	Prosaro 421 SC	6.5 - 8.2	G	VG	VG	VG	**E**	E	E	G	30 days
Mixed mode of action	Metconazole 7.4% Pyraclostrobin 12%	TwinLine 1.75 EC	7.0 – 9.0	G	VG	VG	E	**E**	E	VG	NL	Feekes 10.5 and 30 days
	Propiconazole 11.7% Azoxystrobin 7.0%	Quilt 200 SC	14.0	VG	VG	VG	VG	**E**	E	VG	NL	Feekes 10.5
	Propiconazole 11.7% Azoxystrobin 13.5%	Quilt Xcel 2.2 SE	10.5 - 14.0	VG	VG	VG	VG	**E**	E	VG	NL	Feekes 10.5
	Propiconazole 11.4% Trifloxystrobin 11.4%	Stratego 250 EC	10.0	G	VG	VG	VG	**VG**	VG	VG	NL	35 days
	Prothioconazole 10.8% Trifloxystrobin 32.3%	Stratego YLD	4.0	G	VG	VG	VG	**VG**	E	VG	NL	35 days
	Tebuconazole 22.6% Trifloxystrobin 22.6%	Absolute 500 SC	5.0	G	VG	VG	VG	**VG**	E	VG	NL	35 days

[1] Efficacy categories: NL=Not Labeled and Not Recommended; P=Poor; F=Fair; G=Good; VG=Very Good; E=Excellent.
[2] Efficacy may be significantly reduced if solo strobilurin products are applied after stripe rust infection has occurred
[3] Insufficient data to make statement about efficacy of this product
[4] Multiple generic products containing the active ingredients propiconazole and tebuconazole may also be labeled in some states. Products including tebuconazole incude: Embrace, Monsoon, Muscle 3.6 F, Onset, Orius 3.6 F, Tebucon 3.6 F, Tebustar 3.6 F, Tebuzol 3.6 F, Tegrol , and Toledo. Products containing propiconazole include: Bumper 41.8 EC, Fitness, Propiconazole E-AG, and PropiMax 3.6 EC.
This information is provided only as a guide. It is the responsibility of the pesticide applicator by law to read and follow all current label directions. No endorsement is intended for products listed, nor is criticism meant for products not listed. Members or participants in the NCERA-184 committee assume no liability resulting from the use of these products.

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The First 40 Days Are Critical For Grain Sorghum Health and Yield

By J. Allen Wrather

Grain sorghum is the sixth most valuable field crop grown in Missouri most years preceded only by soybeans, corn, wheat, rice, and cotton. The value of Missouri grown grain sorghum would be greater if not for reduced yields caused by seedling diseases. Grain sorghum seedling diseases are 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. Most diseased plants die, and this causes

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The First 40 Days Are Critical For Grain Sorghum Health and Yield

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thin stands, skips in rows, and occasionally entire fields or parts of fields must be replanted. Some diseased plants may survive, and these are often weak and yield less than healthy plants. Farmers can help protect grain sorghum seedlings from seedling diseases 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. Equip planters with devices to move trash away from the row when planting no-till 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 2012. More information is available at your University of Missouri Extension county office and is posted on the University of Missouri Delta Center web page (www.aes.missouri.edu/delta).

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Black Cutworm Moth Numbers Low Except for SE Missouri

By Wayne Bailey

Numbers of black cutworm moths remain low in most areas of the state, although moderate numbers of moths have been captured consistently in Southeast Missouri during the past few weeks. Black cutworm moths typically begin arriving in Missouri from more southern states about April 1 with peak flights occurring about April 10 annually. In 2012 first captures of black cutworm moths were reported from the Nevada area during the second week of March. Even though moth numbers are moderately elevated in southeast counties and moths arrived several weeks early in Nevada in southwest Missouri, no "intensive moth captures" have been reported. The predictive model is designed to merge moth captures from pheromone traps with historic and current weather data to predict the date of first cutting by 4th instar stage black cutworm larvae. At this time the risk of economic infestations in field corn is reduced except for possibly Southeast Missouri counties. However, it is still possible that moth flights may continue for several weeks and cause problems in both corn and soybean fields. The economic threshold for black cutworm in field corn is to treat when ¾-inch or smaller larvae cause 2 to 3 percent or more of seedling plants to wilt or be cut above or below ground up to the 5-leaf stage of corn seedling growth. Several management options are available for black cutworm in field corn. Many corn hybrids now contain insecticidal traits which provide good protection from black cutworm larvae.

In 2011 black cutworm problems were somewhat reduced in corn as compared to previous year. However, many soybean fields did experience black cutworm infestations that caused damage ranging from minor stand loss to total loss of plant stand. Black cutworm larvae occasionally cause damage to seedling soybean when their feeding activities result in high plant mortality. In most years, low populations of black cutworm larval in soybean go unnoticed as surviving plants often compensate for lost plants. However, moderate to heavy feeding by black cutworm larvae on soybeans seedlings may substantially reduce crop yields and result in replant situations. Historically a good economic threshold for black cutworm feeding on soybean seedlings is 20% or more cutting of soybean seedlings. With higher commodity prices for soybean, this economic threshold is probably too conservative. As commodity prices go higher, producers can afford to treat pest infestations at lower thresholds. With this in mind, an economic threshold of 10% or more cutting is a more reasonable economic threshold for black cutworm infestations in seedling soybean. Both corn and soybean producers are encouraged to monitor crop stands beginning at plant emergence and continuing at least twice weekly for the 6 to 8 weeks. Seed applied insecticide treatments on soybean should help reduce black cutworm larval numbers, but may not prevent economic damage in situations where lar-

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val feeding is severe. In corn, these seed treatments often control about 50% of black cutworm larvae under heavy infestations. They should work better in soybean where the treated seeds are grouped closer together in the row. If rescue insecticide applications are necessary in corn or soybean, be sure to follow label directions, precautions, and restrictions for the crop being rescued.

True Armyworm Larvae Reported in Tall Fescue and Wheat

Wheat, tall fescue, grass pastures, and occasionally field corn are host plants of true armyworm (*Mythimna unipuncta* formerly *Pseudaletia unipuncta*). Infestations of small armyworm in grass pastures and wheat fields were reported during the past few days from numerous tall fescue and wheat fields in the southern half of the state. True armyworm larvae are very small in size and numbers relatively low at this time. However the potential for this pest to cause severe damage in most host crops is elevated by the presence of small larvae this early in the year. The major damage to tall fescue and other grass pastures is destruction of plant foliage along with some cutting of seed heads. Heavy true armyworm infestations may defoliate and consume 100% of the grass foliage and move to feed in adjoining grass pastures before reaching maturity.

True armyworm larvae hatch from spring laid eggs and rapidly grow through approximately 7 or more worm stages (instars) as they develop from egg to adult moth. The early instars avoid light and spend much time close to the soil surface and on lower plant foliage. Feeding by early instars is usually minimal, but the amount of damage they cause rapidly increases as the larvae increase in size, become more active during daylight hours, and move upward on host plants to feed. A total of 2-3 generations may be produced each season, but only the first generation generally causes problems in grass crops and pastures. Later generation larvae tend to move to turf to feed and develop. Larvae may also cause problems on highways when they move in mass (like their armyworm name implies) and are killed by vehicle traffic. Large slick spots on the road surfaces may form and result in vehicle accidents. True armyworm larvae do not feed on legumes, only grasses.

Scouting: True armyworm moths have grayish-brown to tan colored forewings, with a white spot located in the center of each forewing, and grayish-white to pale hindwings. Larvae are almost hairless with smooth bodies. Although very small larvae are often pale green in color, they quickly change to yellowish-brown or tan bodies with tan to brown heads mottled with darker brown patterns. Three distinct broad, longitudinal dark stripes run the length of the body with one occurring on the back and one each running down each side. An additional one or more orange lines can be found running the length of each side of the body from head to tail. Larval identifying characteristics include the presence of four pairs of abdominal prologs located in the center of the larva and a single pair of anal prologs present at the tail end of the larva. Each abdominal proleg will have a dark brown to black triangle located on the foot of the proleg. These dark triangles are good identification characters as few other larvae possess this characteristic. Larvae of true armyworm are often active at night or on cloudy days as they avoid light. To determine the presence of small larvae scout plant debris on the ground and for feeding damage on lower plant foliage. Small larvae are best scouted during late afternoon, evening , and early morning hours. As larvae increase in size, they will feed during both night and day periods and move upward on host plants as they consume foliage. Larger larvae tend to remain on the upper regions of host plants.

Economic Thresholds: Tall Fescue and Grass Pastures - Occasional severe pest of grass seed and forage fields. Treat when an average of 4 or more half-grown or larger worms (½ inch to 1 ½ inch larvae) per square foot are present during late spring and before more than 2% to 3% of seed heads are cut from stems in tall fescue seed fields.

True armyworm populations have been light in wheat this spring. Few fields have required an insecticide application and no head cutting has been reported. Economic Threshold: Wheat -Treat when an average of 4 or more half-grown or larger worms per square foot are present during late spring and before more than 2% to 3% of seed heads are cut from stems. Although foliage feeding always occurs with true armyworm larvae, cutting of wheat heads from plants occurs only in some years. The trigger to begin cutting of wheat heads by this pest is unknown. Wheat should be monitored several times per week after heading as true armyworm larvae can cut most heads from plants in a 2-3 day period once they begin cutting heads.

Larvae of this pest can severely damage corn when high larval populations defoliate plants to the point of killing them. Producers are encouraged to scout corn plants weekly for the presence of true armyworm larvae. Although seedling plants are most at risk during this time of the year, corn plants can be defoliated throughout the growing season. **Economic Threshold: Field Corn** – Treat seedling corn when 25% or more of plants are being damaged. Control is justified after pollen shed if leaves above ear zone are being consumed by larvae. True armyworm can be a severe pest on field corn and generally cause excessive defoliation and plant mortality.

Continued on page 29

Black Cutworm Moth Numbers Low Except for SE Missouri

continued from page 28

True Armyworm, Mythimna unipuncta former Pseudaletia unipuncta - Tall Fescue, Grass Pastures

Occasional severe pest of grass seed and forage fields. Treat when an average of 4 or more half-grown or larger worms 2 to 1 1/2 inch larvae) per square foot are present during late spring and before more than 2-3 percent of seed heads are cut from stems in tall fescue seed fields. Insecticides applied as foliar broadcasts

Insecticides Control of True Armyworm in Tall Fescue and Grass Pastures - 2012

Chemical Name	Trade Name	Rate of formulated material per acre	Pre-Harvest Intervals Days
malathion	**Malathion several Products**	see specific labels	
zeta-cypermethrin	***Mustang Max**	**2.8 to 4.0 fl oz/acre	0 days hay, forage, grazing
carbaryl	**Sevin 4F**	1 to 1 1/2 quarts/acre	14 days for forage or grazing
spinosad	**Success**	3 to 6 fl oz./acre	0 days hay, forage
spinosad	**Tracer 4SC**	1.o to 3.0 fl oz/acre	0 days hay, forage
lambda cyhalothrin + chlorantraniliprole	**Voliam xpress**	5.0 to 8.0 fl oz	0 days hay, forage, grazing
lambda cyhalothrin	***Warrior II w zeon tech**	1.28 to 1.92 fl. oz	5 days harvest

****Note, FMC recommends a minimum rate of 3 oz/acre for true armyworm control using Mustang Max**
***Designates a restricted-use pesticide. Use is restricted to certified applicators only.**
Be sure to read the label and follow all label directions, precautions, and restrictions.

True Armyworm, Mythimna unipuncta formerly Pseudaletia unipuncta (Haworth)

Wheat 2012

Comments: Occasional severe pest of wheat and grass pastures. Treatment is justified when an average of 4 or more half-grown or larger worms per square foot are present during late spring and before more than 2% to 3% of heads are cut from stems. Scout at dusk, dawn, or at night as small larvae feed on foliage at night and remain in plant debris near ground during day. Optimal control from Success and Tracer insecticides is best achieved when they are applied at peak egg hatch or when larvae are small.

Common Name	Trade Name	Rate of formulated material per acre	Placement/Comments	REI Hours	Pre-Harvest Intervals Days
cyfluthrin	***Baythroid XL**	1.8 to 2.4 fl oz	foliage 1st & 2nd instars only	12	30 (grain) 3 (grazing or forage)
methomyl	***Lannate SP**	1/4 to 1/2 lb	foliage	48	7 (grain) 10 (grazing or feeding)
zeta-cypermethrin	***Mustang Max**	1.76 to 4.0 fl oz	foliage	12	14 (grain. forage, hay)
chlorpyrifos	***Nufos 4E**	1 pt	foliage	24	28 (grain or straw) 14 (forage or hay)
microencapsulated methyl parathion	***Penncap-M**	2 to 3 pt	foliage	48	15 (harvest or graze)
carbaryl	**Sevin 80S**	1 1/4 to 1 7/8 lb	foliage	12	21 (grain or straw) 7 (hay or forage)
spinosad	**Tracer naturalyte**	1.5 to 3.0 fl oz	foliage, timing important	4	21 (grain or straw) 14 (forage or hay)
chlorpyrifos + bifenthrin	***Stallion**	9.25 to 11.75 fl oz	foliage	24	14 (grazing) 28 (straw)
cyfluthrin	***Tombstone Helios**	1.8 to 2.4 fl oz	foliage	12	30 (grain) 7 (grazing)
lambda-cyhalothrin	***Warrior II with Zeon**	1.28 to 1.92 fl oz	foliage	24	30 (grain or straw) 7 (hay or forage)

***Designates a restricted-use pesticide. Use is restricted to certified applicators only.**
Read the label to determine appropriated insecticide rates. Be sure to follow all label directions, precautions, and restrictions.

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Armyworm, "True" - Mythimnaunipuncta formerly Pseudaletia puncta (Haworth)

Field Corn 2012

Comments: Treat seedling corn when 25% or more of plants are being damaged. Control is justified after pollen shed if leaves above ear zone are being onsumed by larvae. Optimal control by Tracer is best achieved when the insecticide is applied at peak egg hatch or when larvae are small.

Common Name	Trade Name	Rate of formulated material per acre	REI Hours	Pre-Harvest Intervals Days
permethrin	*Ambush 25WP	6.4 to 12.8 fl oz	12	30 (grain or stover), 0 (forage)
permethrin	*Ambush Insecticide	6.4 to 12.8 fl oz	12	30 (grain or stover), 0 (forage)
permethrin	*multiple products	see specific label	12	see specific label
esfenvalerate	*Asana XL	5.8 to 9.6 fl oz	12	21 (grain)
cyfluthrin	*Baythroid XL (for 1st & 2nd instars)	1.6 to 2.8 fl oz	12	21 (grain or fodder) 0 (green forage)
flubendiamide	*Belt SC	2.0 to 3.0 fl oz	12	1 (green forage and silage) 28 (grain or stover)
bifenthrin	*Brigade 2EC	2.1 to 6.4 fl oz	12	30 (grain, fodder, graze)
chlorpyrifos + gamma-cyhalothrin	*Cobalt	13 to 26 fl oz	24	21 (grain or ears) 14 (graze or silage haravest)
deltamethrin	*Delta Gold 1.5EC	1.5 to 1.9 fl oz	12	21 (grain, fodder) 12 (cut forage or graze)
zeta-cypermethrin + bifenthrin	*Hero	4.0 to 10.3 fl oz	12	30 (grain, stover, graze) 60 (forage)
methoxyfenozide	Intrepid 2F	4.0 to 8.0 fl oz	4	21 (grain)
methomyl	*Lannate SP	1/4 to 1/2 lb	48	0 (ears), 3 (forage), 21 (fodder)
methomyl	*Lannate LV	3/4 to 1 1/2 pt	48	0 (ears), 3 (forage), 21 (fodder)
chlorpyrifos	*Lorsban Advanced	1 to 2 pt	24	21 (grain, ears ,forage, fodder)
chlorpyrifos	*Lorsban 4E	1 to 2 pt	24	21 (grain, ears, forage, fodder)
zeta-cypermethrin	*Mustang Max	3.2 to 4.0 fl oz	12	30 (grain, stover) 60 (forage)
chlorpyrifos	*Nufos 4E	1 to 2 pt	24	21 (grain or ears)
microencapsulated methyl parathion	*Penncap-M	2 to 3 pt	48	12 (grain, forage, graze)
carbaryl	Sevin 4F	2 to 4 pt	12	48 (grain or fodder) 14 (harvest or graze forage)
chlorpyrifos + bifenthrin	*Stallion	9.25 to 11.75 fl oz	24	30 (grain, stover) 60 (forage)
cyfluthrin	*Tombstone Helios	1.6 to 2.8 fl oz	12	21 (grain or fodder), 0 (forage)
spinosad	Tracer 4SC	1.0 to 3.0 fl oz	1	28 (grain), 3 (fodder or forage)
lambda-cyhalothrin	*Warrior II	1.28 to 1.92 fl oz	24	21 (grain), 1 (graze, forage) 21 (treated feed or fodder)

Note: See Table 1 for listing of commercial seed treatments. See Table 2 for listing of (Bt) trangenic traits.
***Designates a restricted-use pesticide. Use restricted to certified applicators only. Read the label and follow all insecticide rate information, directions, precautions, and restrictions.**

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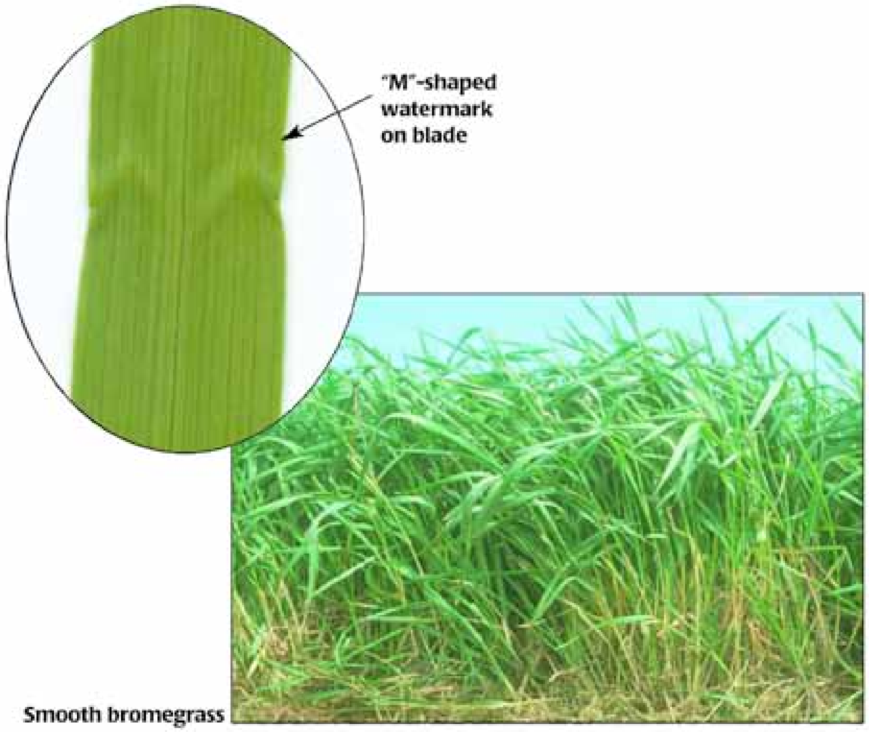
Forage of the Month: Smooth bromegrass

By Rob Kallenbach

Smooth bromegrass is a cool-season grass often used for hay, pasture, silage, green chop and erosion control. Its responsiveness to nitrogen fertilizer, ability to grow well with legumes, good drought-tolerance and excellent overwintering capacity make it important throughout the northern United States. Although Missouri is on the southern edge of its range, smooth bromegrass still provides a valuable resource for many farmers. Smooth bromegrass can easily suffer from overgrazing and does not regrow as well as other cool-season grasses. It is important to avoid clipping or grazing smooth bromegrass shorter than 4 inches. Fields clipped or grazed shorter than this do not regrow well or persist very long.

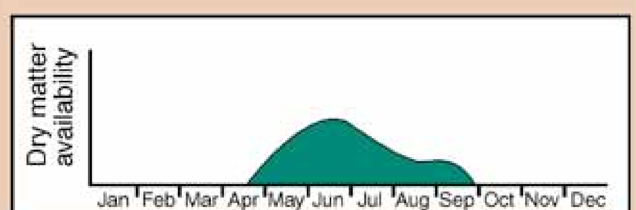

Seed head


Collar region



Smooth bromegrass

Origin: Eastern Europe
Adaptation to Missouri: Especially good in northern Missouri
Growth habit: Rhizomatous, sod-forming, perennial.
Blade: Rolled in bud, flat and narrow, tapers to tip, smooth on top, distinct "W" at midpoint of leaf, dull on lower side, margins smooth to rough.
Sheath: Round, smooth, closed near top, lower sheath pubescent.
Ligule: Membranous, truncate to rounded, 1/10 inch.
Auricles: Absent.
Seed head: Open drooping panicle, often one-sided, spreading.
Fertilization: 30 to 40 lb N/acre following the first grazing or harvest in spring. In addition, apply 40 to 60 lb N/acre in mid-August for fall pasture. Phosphorus and potassium as needed.
Timing of production: 80 percent of growth before June 15.
When to begin grazing: When the grass reaches 8 inches in height.
When to cut for hay: Early heading stage, typically about mid-May.
Lowest cutting or grazing height: 4 inches
Fall management: Light grazing or haying possible through October if a 6-inch stubble is left for winter.



Yield distribution of smooth bromegrass in Missouri.

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Weather Data for the Week Ending April 15, 2012

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.	April 1-15	Departure from long term avg.	Accumulated Since Apr.1	Departure from long term avg.
Corning	Atchison	67	43	77	33	56	+5	2.64	+1.07	135	+125
St. Joseph	Buchanan	66	45	74	34	56	+4	1.41	-0.31	127	+112
Brunswick	Carroll	66	44	76	33	56	+4	1.77	+0.13	120	+102
Albany	Gentry	67	41	75	31	55	+5	2.44	+0.71	113	+106
Auxvasse	Audrain	65	44	76	33	55	+2	2.95	+1.07	116	+96
Vandalia	Audrain	65	43	75	31	54	+3	3.07	+1.03	111	+101
Columbia-Bradford Research and Extension Center	Boone	65	43	76	31	55	+2	3.46	+1.38	111	+79
Columbia-Capen Park	Boone	67	41	80	28	54	0	3.34	+1.27	99	+60
Columbia-Jefferson Farm and Gardens	Boone	65	44	77	34	55	+2	3.58	+1.49	121	+88
Columbia-Sanborn Field	Boone	66	45	78	35	57	+3	3.38	+1.29	135	+96
Columbia-South Farms	Boone	65	44	77	34	55	+2	3.75	+1.66	119	+86
Williamsburg	Callaway	66	44	76	32	55	+3	2.91	+0.93	123	+104
Novelty	Knox	63	41	72	29	53	+1	2.54	+0.84	87	+85
Linneus	Linn	64	41	74	30	54	+3	2.10	+0.58	107	+95
Monroe City	Monroe	64	43	73	30	54	+2	2.05	+0.19	107	+90
Versailles	Morgan	68	46	78	33	57	+3	3.72	+1.32	138	+90
Green Ridge	Pettis	66	45	76	36	6	+3	2.94	+0.96	122	+98
Lamar	Barton	69	49	75	43	59	+4	1.15	-0.91	154	+102
Cook Station	Crawford	68	40	78	27	55	0	1.45	-0.55	126	+71
Round Spring	Shannon	71	41	81	28	57	+3	1.22	-0.95	139	+95
Mountain Grove	Wright	68	45	75	37	57	+4	1.75	-0.50	140	+110
Delta	Cape Girardeau	72	45	85	33	59	+3	0.33	-1.70	175	+100
Cardwell	Dunklin	76	48	85	35	63	+5	0.64	-1.65	215	+109
Clarkton	Dunklin	74	47	85	34	62	+4	1.26	-0.69	199	+101
Glennonville	Dunklin	74	48	85	33	62	+4	0.79	-1.06	208	+107
Charleston	Mississippi	71	46	83	34	60	+4	0.09	-2.18	187	+107
Portageville-Delta Center	Pemiscot	74	50	85	38	63	+4	0.58	-1.71	219	+114
Portageville-Lee Farm	Pemiscot	73	50	84	38	62	+4	1.02	-1.25	212	+108
Steele	Pemiscot	76	49	85	38	63	+5	0.48	-1.83	216	+114

‡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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