Integrated Pest & Crop Management

Corn Stalk Rots

By Laura Sweets

Any factors which stress corn during the growing season may contribute to an increase in stalk rots that season. And this has certainly been a season of stresses for corn in Missouri with late planting due to wet soil conditions, flooding, cool temperatures, high temperatures, high night temperatures, moisture stress, heavy rains, hail, some foliage diseases, etc. Therefore, it would be wise to scout fields for corn stalk rots and to harvest fields with stalk rot problems as quickly as possible.

A number of different fungi and bacteria cause stalk rots of corn. Although many of these pathogens cause distinctive symptoms, there are also general symptoms which are common to all stalk rot diseases. Early symptoms, which occur a few weeks after pollination, usually start with premature dying of bottom leaves. Eventually, the entire plant may die and appear light green to gray. Diseased stalks usually begin losing firmness during August. The cells in the interior of the stalk are dissolved, resulting in a loss of stalk firmness and strength. Stalks may then lodge, particularly if harvest is delayed or wind storms occur.

Fusarium stalk rot and Gibberella stalk rot can be difficult to distinguish in the field. Both can cause a pink to reddish discoloration of diseased stalk tissue. Tufts of white mycelium may be evident at the nodes of diseased stalks. When stalks are split open the pith is usually shredded and discolored.

Anthracnose stalk rot, caused by the fungus *Colletotrichum graminicola*, may be most evident at the nodes. Initially lesions are tan to reddish-brown but they become shiny black later in the season. These shiny black lesions may begin at a node and extend out from that node. The lesions may merge to discolor much of the lower stalk tissue. Internal pith tissues may also be discolored and may disintegrate as disease progresses.

Diplodia stalk rot may begin as a brown to tan discoloration of the lower internodes. Stalks become spongy. The pith disintegrates leaving only the vascular bundles. Mats of white fungal growth of *Diplodia maydis* may be evident on affected tissues. Diplodia also produces fruiting bodies which may be seen as small black specks embedded in the white fungal mat. Diplodia also causes an ear rot of corn. Diplodia ear rot has been found in scattered fields across the state so Diplodia stalk rot could also occur this season.

Charcoal rot may begin as a root rot and move into the lower internodes of the stalks. Pith tissues will be shredded and plants may break at the crown. The charcoal rot fungus, *Macrophomina phaseolina*, produces very small survival structures called microsclerotia which may be visible as very small, black flecks just beneath the stalk surface or on the vascular strands remaining in the interior of the shredded stalks. Charcoal rot is usually more severe under hot, dry conditions, so this corn stalk rot could be a serious problem in areas of the state which suffered from drought conditions the latter part of the growing season.

Stalk rots are caused by several different fungi and bacteria which are part of the complex of

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microorganisms that decompose dead plant material in the soil. They survive from one growing season to the next in soil, in infested corn residues or on seed. Stalk rot pathogens enter the corn plant in a variety of ways. The spores may be blown into the base of the leaf sheath where they may germinate and grow into the stalk. Spores may enter directly into a plant through wounds made by corn borers, hail or mechanical injury. When fungi are present in soil or infested residue as either spores or mycelium, they may infect the root system causing root rot early in the growing season and later grow up into the stalk causing stalk rot.

Stalk rot becomes a problem when plants are stressed during the grain filling stage of development. Water shortage, extended periods of cloudy weather, hail damage, corn borer infestation, low potassium in relation to nitrogen, leaf diseases and other stresses that occur in August and September may be associated with an increase in stalk rot.

Losses from stalk rots vary from season to season and from region to region. Yield losses of 10 to 20% may occur on susceptible hybrids. Tolls greater than 50% have been reported in localized areas. Losses may be direct losses due to poor filling of the ears or lightweight and poorly finished ears or indirect through harvest losses because of stalk breakage or lodging. Harvest losses may be reduced if fields are scouted 40-60 days after pollination to check for symptoms of stalk rot. Stalk rot can be detected by either pinching stalks or pushing on stalks. If more than 10-15 percent of the stalks are rotted, the field should be harvested as soon as possible.

Management of stalk rots of corn should include the following:

· Select hybrids with good stalk strength and lodging characteristics.

· Plant at recommended plant populations for that hybrid.

· Follow proper fertility practices.

· Avoid or minimize stress to corn (especially during pollination and grain fill).

· Harvest in a timely manner.

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Potential for late season fall armyworm in grass pastures and alfalfa.

By Wayne Bailey

Although no reports of fall armyworm damage in grass pastures and alfalfa have been received at this time, the potential does exist for this pest to infest and damage grass pastures and fall seeded alfalfa fields during the next few weeks. Damage from fall armyworm larvae can be substantial during late summer and fall when larval numbers often peak. Fall armyworm larvae tend to feed on all tender green tissue which give infested pastures the appearance of drought. If heavy feeding occurs, grass plants may become severely stunted or killed. Damage may occur on 60 different hosts with tall fescue and orchardgrass being favored host plants. Damage in newly seeded alfalfa can be severe with complete stands of seedling alfalfa destroyed in a matter of a few days.

Several generations of fall armyworm occur in Missouri each year. Larvae produced in spring and summer tend to be light in color ranging from light green to tan. Larvae produced during fall generations often are dark to completely black in color. Both color phases of this insect will possess stripes running the length of the body. Identifying characteristics of the larvae include an inverted Y on the face of the insect, four black spots or bumps found on the top of each segment with those on the last segment of a worm arranged in a square pattern, and three white lines on the back of the segment located just behind the head capsule. Sometimes the three white lines will extend to additional segments. Larvae typically grow through 6 "worm stages" often reaching a length of 1 ¼ to 1 ½ inches.

Damage in grass pastures often "just appears overnight" as growing larvae become large enough to consume substantial amounts of forage in short periods of time. Larvae are especially active both early and late in the day. Scouting is best accomplished during these periods to gain an accurate estimate of larval numbers. The economic threshold for this pest in grass pastures is three or more larvae per square foot. Insecticides labeled for use on this pest in grass pastures can be found in the following table. Best control is achieved if 20 gallons or more of water is applied per acre. Be sure to follow all label precautions and restrictions.

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Potential for late season fall armyworm in grass pastures and alfalfa.

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Recommended Insecticides for Fall Armyworm larvae in Grass Pastures

Control: Treatment is justified when 3 or more larvae are present per square foot. Best to apply insecticide applications early or late in day when larvae are most active.

Common Name	Trade Name	Rate of formulated material per acre	Pre-Harvest/Grazing Intervals Days
zeta-cypermethrin	***Mustang Max**	3.2 to 4.0 fl oz	0/0
carbaryl	**Sevin XLR Plus**	1 to 1 1/2 quarts	14/14
lambda-cyhalothrin	***Warrior II**	1.28 to 1.92 fl oz	7

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

Recommended Insecticides for Fall Armyworm Larvae in Alfalfa

Insect Pest - Fall Armyworm larvae

Chemical Name	Common Name	Rate of formulated material	Pre-Harvest Intervals Days	Comments
Beta-cyfluthrin	***Baythroid XL**	1.6 to 2.8 fl oz/acre	7 days	1st & 2nd Instars only
Chlorpyrifos + gamma cyhalothrin	***Cobalt**	19 to 38 fl oz/acre	7-14 days	May cause temporary phytotocity
Chlorpyrifos	***Lorsban Advanced** ***numerous products**	1 to 2 pts/acre see specific labels	14 - 21 days 14 - 21 days	
Zeta-cypermethrin	***Mustang Max**	2.8 to 4.0 fl oz/acre	3 days	
Gamma-cyhalothrin	***Proaxis**	2.56 to 3.84 fl oz/acre	1 day forage 7 day hay	1st & 2nd Instars only
Carbaryl	**Sevin 4F**	1 - 1 1/2 qt/acre	14 day forage 14 day hay	
Carbaryl	**Sevin XLR Plus**	1 - 1 1/2 qt/acre	14 day forage 14 day hay	
Zeta-cypermethrin	***Stallion**	9.25 to 11.75 fl oz	7 days	coverage essential for control
Lambda-cyhalothrin + chlorantraniliprole	***Volian xpress**	6.0 to 9.0 fl oz	1 day forage 7 day hay	
Lambda-cyhalothrin	***Warrior II with ZT**	1.92 to 3.2 fl oz/acre	1 day forage 7 day hay	Use higher rate for large larvae
Lambda-cyhalothrin	***Numerous products**	see specific labels	1 day forage 7 day hay	Use higher rate for large larvae Use higher rate for large larvae

***Designates a restricted-use product. Read and follow all label directions, precautions, and restrictions.**

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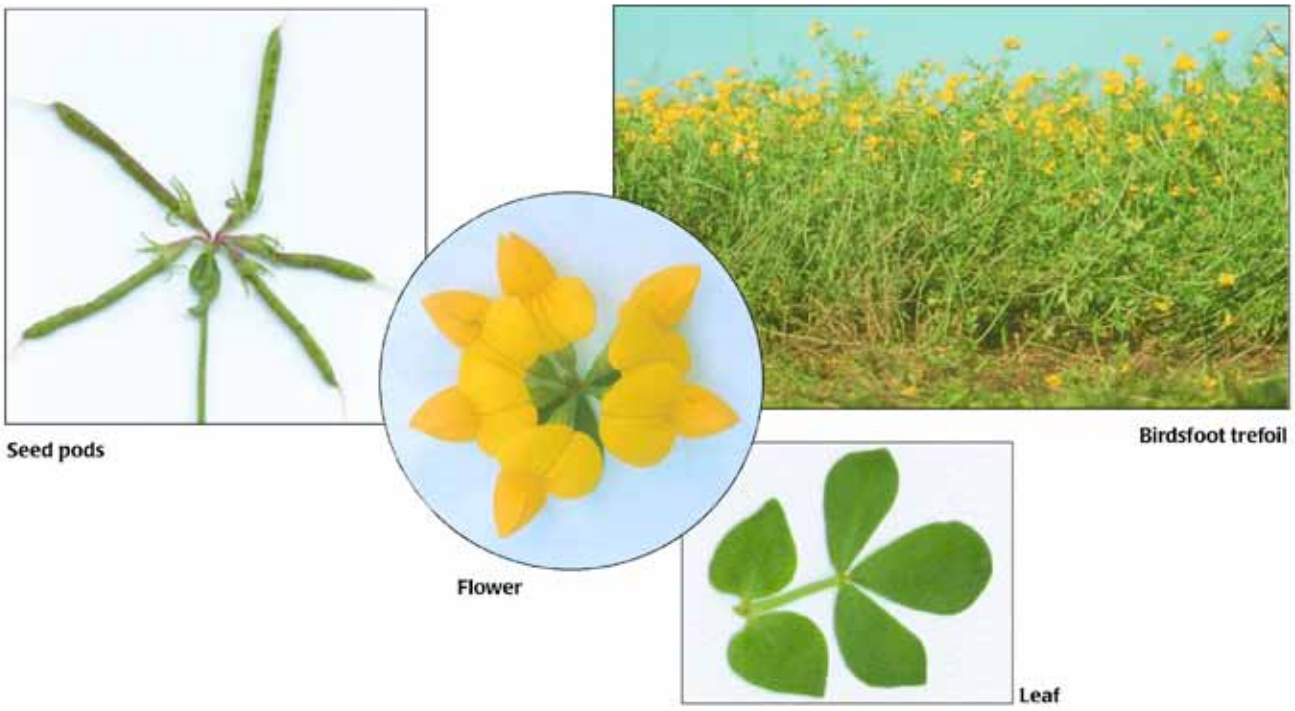
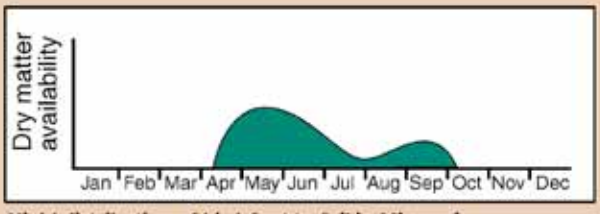
Forage of the Month: Birdsfoot trefoil (*Lotus corniculatus* L.)

By Rob Kallenbach

Birdsfoot trefoil is a short-lived perennial legume capable of producing high-quality forage on soils where other legumes do not survive. Although it generally yields less than red clover and alfalfa when cut for hay, it often gives better performance than these legumes when grown in a grass/legume pasture. Unlike many other perennial legumes, birdsfoot trefoil does not cause bloat in cattle. However, it does not tolerate continuous grazing or frequent haying. It is also prone to a number of diseases and pests that make management for reseeding essential. Although birdsfoot trefoil may grow statewide, it is best adapted to northern Missouri.



Origin: Mediterranean basin
Adaptation to Missouri: Statewide but persists better in northern Missouri.
Growth habit: Semi-erect to prostrate, short-lived perennial.
Leaf: Pentafoliolate, alternately on short stalks with two leaflets at the petiole base resembling stipules, pointed leaflets are mainly glabrous and not serrated.
Stems: Decumbent, with stems arising from the crown, often branched.
Stipules: Glandiform, tiny, dark.
Flowers: Yellow, may be tinged with orange or red, borne in clusters of 4 to 8 at the end of the flower stalk.
Fertilization: No N needed if nodulated. Maintain 30 lb P/acre and 250 lb K/acre.
Timing of production: 70 percent of annual production between April 1 and June 30.
When to begin grazing: Often based on the height of the grass in the mixture. Few if any pure stands exist.
When to cut for hay: Not normally cut for hay unless it is mixed with a companion grass. Harvest based on the maturity of the grass.
Lowest cutting or grazing height: 4 inches
Fall management: Avoid severe grazing from Sept. 15 until the first hard killing frost.



Yield distribution of birdsfoot trefoil in Missouri.

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Discolored Soybean Seed

By Laura Sweets

This may be a year when soybean seed discoloration is a problem in Missouri. Soybean diseases are one of several factors which can cause discoloration and deterioration of soybean seed. The late season soybean diseases which can lead to discolored soybean seed tend to be favored by wet conditions, including frequent rains, heavy dews and high humidity, as plants mature or if harvest is delayed due to wet conditions.

When the late season pod and stem diseases occur, maturing plants have a blackish cast and black to gray spots, blotches and streaks may cover stems, branches and pods. The late season diseases lead to increased problems with discolored and damaged soybean seed. Purple seed stain; a general blotchy brown discoloration that might be the result of the Cercospora or Colletotrichum species which cause anthracnose and tipblight; bleeding hilum which can be caused by virus diseases such as soybean mosaic and bean pod mottle; a white mold growth which could be Phomopsis seed decay or secondary fungi entering through pods damaged by insects could all show up in beans this fall. The diseases which contribute to discolored soybean seed are usually favored by wet conditions late in the season. Weather conditions from now through harvest will have a major influence on how severe discoloration and deterioration of soybean seed is this season.

Symptoms of the seed damage which may result from Phomopsis seed decay, purple seed stain, frogeye leaf spot, virus diseases and Colletotrichum anthracnose and tipblight are described below.

Phomopsis seed decay: Phomopsis seed decay results when the fungi which cause pod and stem blight move from the stems and pods onto the seed. Plants infected with pod and stem blight may be stunted and have discolored stems. Black pycnidia or fruiting bodies of the fungi *Phomopsis sojae* or *Phomopsis longicolla* develop on the lower portion of the main stem, branches and pods as plants reach maturity. The pycnidia may be limited to small patches usually near the nodes or may cover dead stems and pods. On stems, the pycnidia are usually arranged in linear rows while on pods they are randomly scattered. Prolonged periods of warm, wet weather during flowering and pod fill favor the development of pod and stem blight. If conditions remain warm and wet, the fungus may grow through the pods and infect the seed. Infected seed is oblong or misshapen and may have a white moldy appearance.

Purple seed stain: *Cercospora kikuchii* can infect soybean seeds, pods, stems and leaves but is most commonly found on the seed. However, during the last several years leaf spot and leaf blight caused by this fungus have been prevalent in parts of the state. Leaf blight occurs on the uppermost leaves and begins as reddish purple to reddish brown angular to somewhat circular lesions on the soybean leaves. These lesions may coalesce to kill larger areas of leaf tissue. The entire uppermost trifoliolate leaf and petiole may be blighted and brown. Cercospora leaf spot may develop as a premature yellowing and then blighting of the youngest, upper leaves over large areas of affected fields. Brown lesions or spots are usually evident in the yellowed tissue. In most fields symptoms do not progress down the plants more than one to two nodes. Pods at the uppermost nodes may develop round, reddish purple to reddish brown lesions. Infected seed show a conspicuous discoloration varying in color from pink to pale purple to dark purple. The discoloration may range from small specks to large blotches which cover the entire surface of the seed coat. Warm, humid weather favors disease development. Yields are usually not reduced but a high percent of seed stain may be evident at harvest.

Frogeye leaf spot: *Cercospora sojina* causes frogeye leaf spot on soybean. Symptoms occur primarily on leaves although the causal fungus may also infect stems, pods and seeds. Lesions are small, circular to somewhat angular spots that develop on the upper leaf surfaces. Initially the spots are dark and water soaked in appearance. As the lesions age they develop a dark reddish-brown border. The center of the lesion becomes light brown to light gray in color. Lesions may merge to kill larger areas of the leaf. Heavily spotted leaves may wither and drop prematurely. Stem lesions usually develop later in the season. Young stem lesions are deep red with a narrow, dark brown to black margin. As the stem lesions age, the centers become brown to smoky gray in color. Lesions on pods are circular to elongate, slightly sunken and reddish brown. The fungus can grow through the pod wall to infect maturing seed. Infected seeds may show discoloration of the seed coat that ranges from small specks to large blotches

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Discolored Soybean Seed

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of light gray to dark gray or brown.

Virus diseases: There are several virus diseases which may occur on soybean in Missouri including bean pod mottle, soybean mosaic and tobacco ringspot or budblight. Of these, soybean mosaic virus and bean pod mottle virus are most likely to cause symptoms on the seed. Seed infected with soybean mosaic or bean pod mottle virus may have a symptom called bleeding hilum. This is a discoloration, usually black or dark in color that bleeds from the hilum down the sides of the seed. The affected area may be quite small and near the hilum or may be quite extensive and cover most of the seed. It is important to keep in mind that bleeding hilum is also a genetic characteristic of certain soybean varieties. The intensity of the discoloration can be influenced by environmental conditions during the growing season.

Colletotrichum anthracnose and tipblight: *Colletotrichum truncatum* and several other *Colletotrichum* species cause anthracnose of soybean. Typically, anthracnose is a late season stem and pod disease of soybean. Symptoms occur on stems, pods and petioles as irregularly shaped, light to dark brown spots, streaks or lesions. Eventually black fungal structures may be evident in these lesions. Anthracnose may also cause a tipblight. The tipblight phase of anthracnose causes a yellowing or browning of the uppermost leaves and pods. The blighted tips may dry up and die prematurely. This fungus may also infect seed. Seed may be smaller than normal and severely infected seed may be a moldy, dark brown in color and shriveled. Anthracnose is favored by warm, wet weather, and the tipblight phase of anthracnose is most likely to occur after a rainy period.

The incidence and severity of the soybean diseases which cause seed discoloration and deterioration are greatly increased by warm, wet conditions late in the season. For grain crops there are no potential rescue treatments. Fields should be harvested as soon as possible to prevent further seed damage.

Many of the pathogens causing seed discoloration and deterioration can survive on soybean seed. Heavily infected seed, if planted, could produce diseased seedlings resulting in stand problems. Therefore, seed from infected fields should not be saved for planting. If infected seed must be used for planting, it should be thoroughly cleaned, a sample submitted for a germination test (preferably a stress test) and a fungicide seed treatment applied.

Many of the pathogens that cause these diseases may also survive in infested residues left on the soil surface. Thus, crop rotation is an important means of preventing or reducing disease outbreaks. At least one year between soybean crops is recommended. Varieties may differ in their reaction to these various diseases and, if possible, good quality seed of resistant varieties should be planted.

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Green Cloverworm Problems in Soybean

By Wayne Bailey

Numerous soybean fields located in southwest Missouri are experiencing problems with green cloverworm larvae. This insect is traditionally a rare to occasional pest in Missouri, where it is usually controlled by the beneficial fungal pathogen *Nomuraea rileyi*. The moths of this insect may overwinter in more southern areas of the state, but most migrate into Missouri during spring each year. Two generations are produced annually with both generations susceptible to the fungal pathogen if conditions are favorable. Larvae feed on leaf tissue, but not on pods. Larvae killed by the fungal pathogen often take a posture of rearing up off the leaf and then turn white in color as the fungal pathogen produces white fruiting bodies which will blow in the wind to infest additional larvae.

Control is justified when foliar damage reaches or exceeds 20% and five larvae or more are present per foot of row. Larvae are most easily monitored using a ground sheet measuring 36" x 42" with a stick wound around each edge on the 42-inch sides. The sticks are used to twist the ground cloth to a size that fits the area between rows. Although you calculate the number of larvae per foot of row, generally one to three feet of row on both sides of the ground cloth are vigorously shaken to dislodge larvae and allow them to drop onto the cloth for collection and counting. Divide the total number of larvae collected per location by the number of feet of row of soybean shaken to determine number of larvae per foot. A minimum of 5 different locations within the field should be sampled to determine a reliable estimate of larvae numbers per foot of row.

Drought may be the contributing factor allowing the high numbers of green cloverworms observed this year. The fungal pathogen is always present at low levels in the soil, but works best when precipitation is present and field conditions are somewhat damp or wet.

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Green Cloverworm Problems in Soybean

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GREEN CLOVERWORM - *Hypena scabra* (Fabricius)

Common Name	Trade Name	Rate of formulated material per acre	Placement	REI Hours	Pre-Harvest Intervals Days
esfenvalerate	***Asana XL**	2.9 to 5.8 fl oz	foliage	12	21 (grain) Do not graze or feed livestock
cyfluthrin	***Baythroid XL**	0.8 to 1.6 fl oz	foliage	12	45 (grain, feeding dry vines) 15 (green forage)
bifenthrin	***Brigade 2EC**	2.1 to 6.4 fl oz	foliage	12	18 (grain)
chlorpyrifos + gamma-cyhalothrin	***Cobalt**	7 to 13 fl oz	foliage	24	30 (grain) Do not graze or feed livestock
lambda-cyhalothrin + thiamethoxam	***Endigo ZC**	2.5 to 3.5 fl oz	foliage	24	30 (grain) Do not graze or feed livestock
zeta-cypermethrin +	***Hero**	2.6 to 6.1 fl oz	foliage	12	21 (grain) Do not graze or feed livestock
methomyl	***Lannate SP** ***Lannate LV**	1/4 to 1/2 lb 3/4 to 1 1/2 pt	foliage	48	14 (grain) 3 (forage) 12 (hay)
Imidacloprid + cyfluthrin	***Leverage 2.7**	3.8 fl oz	foliage	12	45 (grain, feeding dry vines) 15 (green forage)
chlorpyrifos	***Lorsban Advanced**	1/2 to 1 pt	foliage	24	28 (grain) Do not graze or feed livestock
acephate	**Orthene 97**	3/4 to 1 lb	foliage	24	14 (grain) Do not graze or feed livestock
microencapsulated methyl parathion	***Penncap-M**	2 to 3 pt	foliage	96	20 (grain)
carbaryl	**Sevin 4F**	2 to 3 pt	foliage	12	21 (dry grain or hay) 14 (graze or forage)
spinosad	**Tracer Naturalyte**	1 to 2 fl oz	foliage	4	28 (grain) Do not graze or feed livestock
cyfluthrin	***Tombstone Helios**	0.8 to 1.6 fl oz	foliage	12	45 (grain, feeding dry vines) 15 (green forage)
lambda-cyhalothrin	***Warrior II with ZT**	0.96 to1.60 fl oz	foliage	24	30 (grain) Do not graze or feed livestock

***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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Weather Data for the Week Ending September 18, 2011

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.	August 1-31	Departure from long term avg.	Accumulated Since Apr. 1	Departure from long term avg.
Corning	Atchison	68	52	91	42	60	-7	0.28	-1.54	3494	+353
St. Joseph	Buchanan	67	52	88	41	60	-7	1.34	-1.08	3365	+226
Brunswick	Carroll	68	51	86	39	60	-7	0.97	-0.97	3418	+237
Albany	Gentry	67	50	88	36	58	-8	0.64	-1.44	3287	+195
Auxvasse	Audrain	71	52	90	38	61	-6	1.21	-1.10	3472	+263
Vandalia	Audrain	72	51	90	37	61	-6	1.22	-1.22	3403	+226
Columbia-Bradford Research and Extension Center	Boone	70	51	91	40	60	-8	1.80	-0.30	3441	+139
Columbia-Capen Park	Boone	71	50	91	39	60	-8	2.68	+0.57	3457	+47
Columbia-Jefferson Farm and Gardens	Boone	70	52	90	40	61	-7	1.92	-0.11	3543	+236
Columbia-Sanborn Field	Boone	70	53	90	42	62	-6	2.33	+0.22	3732	+323
Columbia-South Farms	Boone	70	52	89	40	61	-7	2.11	+0.01	3528	+224
Williamsburg	Callaway	72	51	93	38	61	-6	1.94	-0.48	3465	+311
Novelty	Knox	69	50	88	37	60	-7	0.39	-1.79	3195	+82
Linneus	Linn	68	50	88	37	59	-7	0.67	-1.44	3249	+197
Monroe City	Monroe	72	51	89	35	61	-6	0.48	-1.70	3339	+177
Versailles	Morgan	71	52	94	39	62	-6	2.61	+0.13	3734	+363
Green Ridge	Pettis	69	52	87	40	61	-7	2.27	-0.45	3553	+372
Lamar	Barton	74	54	100	41	64	-5	2.40	-0.74	3878	+359
Cook Station	Crawford	73	50	97	40	61	-7	1.79	-0.85	3501	+127
Round Spring	Shannon	72	51	93	43	60	-8	1.23	-1.17	3381	+142
Mountain Grove	Wright	73	52	95	42	62	-6	1.84	-0.70	3490	+276
Delta	Cape Girardeau	77	55	95	49	65	-5	1.69	-0.21	3820	+104
Cardwell	Dunklin	79	56	94	52	67	-5	1.04	-0.64	4172	+159
Clarkton	Dunklin	78	55	95	50	66	-6	1.54	+0.02	4079	+123
Glennonville	Dunklin	76	55	92	50	65	-7	2.45	+1.00	4063	+129
Charleston	Mississippi	78	56	93	51	66	-4	1.15	-0.45	3971	+237
Portageville-Delta Center	Pemiscot	78	58	93	52	68	-4	0.74	-1.02	4243	+266
Portageville-Lee Farm	Pemiscot	77	58	92	53	67	-5	1.30	-0.45	4206	+257
Steele	Pemiscot	79	56	93	52	67	-5	1.18	-0.63	4290	+312

‡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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