Plant Protection Programs University of Missouri

Integrated Pest & Crop Management

Corn Foliage Diseases

By Laura Sweets

This has been another "interesting" year for corn and other field crops in Missouri and most of the Midwest. Prolonged periods of wet weather and then flooding delayed planting or led to replanting. Overall the corn crop is behind normal although not as far behind normal as it was at this time last year. There is also a wide range in growth stages of corn across the state. We have not received many samples or calls related to corn foliage diseases but with the most recent bout of wet weather, it is likely that corn foliage diseases may begin to show up in fields. So far the samples that have been submitted have had anthracnose leaf blight on the lowest leaves and then a mixture of anthracnose leaf blight and early symptoms of gray leaf spot on the leaves directly above the first 2-3 lowest leaves on the plants. Gray leaf spot, common rust and southern rust are the foliage diseases most likely to occur on corn in Missouri over the next few weeks. Northern corn leaf blight does not occur every year but may occur in wet or cool, wet years so that would be another foliage disease to look for when scouting fields. I have had some questions about the bacterial leaf spot, Holcus leaf spot. Although this disease would be likely to occur after hail storms or rain storms with hard, driving winds, I have not seen any samples that were positive for Holcus leaf spot yet this year.

Generally speaking with the corn foliage diseases, the later in the season (especially the longer after pollination) that the foliage disease becomes established, the lower direct yield losses will be. Highest yield losses occur if diseases such as rust or gray leaf spot develop prior to pollination. Also, most of the corn foliage diseases are favored by extended periods of free moisture on the leaf surfaces. This moisture can be from rain, overhead irrigation or heavy dews that stay late in the day. Fields with poor air movement, river bottom fields or shaded portions of fields may also have higher levels of corn foliage diseases.

Most of the control recommendations for minimizing losses due to corn foliage diseases are preventative measures such as planting resistant hybrids, rotating crops so the corn doesn't follow corn in the same field or tillage to reduce the amount of infected residue left on the soil surface. Several fungicides are labeled for use on corn to control foliage diseases. See the *2009 Missouri Pest Management Guide: Corn, Grain Sorghum, Soybean and Winter Wheat M171* for fungicides labeled for use on field corn.

Fields with high levels of various foliage diseases may also show higher levels of stalk rot this fall. As harvest approaches, check fields which have had foliage disease problems for stalk rot and try to harvest problem fields promptly.

Symptoms of Common Corn Foliage Diseases

Anthracnose (*Colletotrichum graminicola*)

Infection is most common on lower leaves of young plants but may occur on upper leaves of maturing plants too. Anthracnose lesions tend to be brown, spindle-shaped lesions with yellow to reddish-brown borders. Concentric rings or zones are sometimes apparent within the diseased areas. Stalk symptoms appear as black linear streaks on the surface of lower internodes late in the season.

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Japanese Beetles Expand Their Distribution Across Missouri

By Wayne Bailey

During the past three weeks numbers of Japanese beetles have increased and can now be collected from many corn and soybean fields in Missouri. They also are being collected in high numbers from several pheromone traps located throughout the state. Adult Japanese beetles typically feed on green silks and tassels in corn, foliage feed on soybean, and damage the foliage and fruit of over 400 flower, shrub and tree species. Although low numbers of beetles are present on many of these host plants this summer, some corn fields undergoing pollination have received economic damage and required insecticide applications to control this pest. Beetle numbers also are building in some soybean fields and may need to be treated if defoliation reach or exceed 30% during vegetative stages.

This beetle was first found in the United States in 1916, following its accidental introduction from its native country of Japan. Japanese beetles are approximately 1/2–inch in length, metallic green in color with bronze or copper colored wing covers. A diagnostic characteristic is the presence of several white tufts of hair or bristles located around the edge of the shell. Without magnification, these structures are seen as white dots. Japanese beetles can be confused with adult green June beetle, but are smaller in size. Adult beetles emerge from the soil in late May, June, and July to feed for approximately 60 days. During this time the beetles mate and females deposit eggs in the soil. Each female may lay 40 to 60 eggs in groups of 1 to 8 with larvae emerging in about 2 weeks. Larvae will feed on plant roots and decaying material before overwintering in the soil as 3rd instars. The following spring larvae quickly finish development, pupate, and emerge as adult beetles beginning in May.

Feeding damage of Japanese beetles is often observed as a lace-like pattern of defoliation of host plant foliage as beetles avoid leaf veins when feeding. Beetles often gather on host plants which exude strong odors to feed from the top of plants downward. Tassels and silks of corn can be severely damaged by adult feeding, whereas foliage feeding is common on soybean and many other plants. Feeding on corn silks can disrupt pollination and result in substantial yield losses. Foliage feeding on soybean is less damaging, although small double-crop soybean may sustain economic damage. The grub stage of this pest will feed on plant roots of both corn and soybean with most feeding occurring in late June, July and August. Damage to plant root hairs may result in poor uptake of water and nutrients or be more severe and cause reduced stands through plant mortality.

In field corn, an insecticidal treatment is justified if during the silking period there are an average of 3 or more beetles present per ear, silks have been clipped to ½ inch or less in length, and pollination is less than 50% complete. For soybean treatment is justified if foliage feeding exceeds 30% prior to bloom and 20% from bloom through pod fill. The following insecticides are recommended for control of Japanese beetles in field corn and soybean in Missouri.

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Table 1. Japanese Beetle Adults - Corn

Japanese Beetle Adults - Corn			
Comments: Treatment of Japanese beetle is justified if 3 or more beetles are present on green silk, silks are eaten to 1/2 or less in length, and pollination is less than 50% complete.			
Common Name	***Trade Name***	***Rate of formulated material per acre***	***Placement***
esfenvalerate	***Asana XL**	5.8 to 9.6 fl. oz.	Broadcast
cyfluthrin	***Baythroid XL**	1.6 to 2.8 fl. oz.	Broadcast
bifenthrin	***Brigade 2 EC**	2.1 to 6.4 fl. oz.	Broadcast
chlorpyrifos + gamma-cyhalothrin	***Cobalt**	38 to 42 fl. oz.	Broadcast
bifenthrin	***Fanfare 2EC**	2.1 to 6.4 fl. oz.	Broadcast
zeta-cypermethrin	***Mustang Max**	3.2 to 4.0 fl. oz.	Broadcast
microencapsulated methyl parathion	***Penncap-M**	2 to 4 pt.	Broadcast
lambda-cyhalothrin	***Proaxis**	2.56 to 3.84 fl. oz.	Broadcast
carbaryl	**Sevin XLR Plus**	2 to 4 pt.	Broadcast
lambda-cyhalothrin	***Warrior**	2.56 to 3.84 fl. oz.	Broadcast

* **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.

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Table 2. Japanese Beetle Adults - Soybean

Japanese Beetle Adults - Soybean			
Comments: Treat when defoliation reaches 30% before bloom and 20% between bloom and pod fill.			
Common Name	***Trade Name***	***Rate of formulated material per acre***	***Placement***
permethrin	***Ambush 25W**	3.2 to 6.4 fl. oz.	On foliage
esfenvalerate	***Asana XL**	5.8 to 9.6 fl. oz.	
cyfluthrin	***Baythroid XL**	0.8 to 1.6 fl. oz	
bifenthrin	***Brigade 2 EC**	2.1 to 6.4 fl. oz.	
chlorpyrifos + gamma-cyhalothrin	***Cobalt**	19 to 38 fl. oz.	
zeta-cypermethrin +	***Hero**	4.0 to 10.3 fl. oz.	
zeta-cypermethrin	***Mustang Max**	2.8 to 4.0 fl. oz.	
microencapsulated methyl parathion	***Penncap-M**	2 to 3 pt.	
permethrin	***Pounce 3.2EC**	2.0 to 4.0 fl. oz.	
lambda-cyhalothrin	***Proaxis**	3.2 to 3.84 fl. oz.	
carbaryl	**Sevin XLR Plus**	1 to 2 pt.	
lambda-cyhalothrin	***Warrior**	3.2 to 3.84 fl. oz.	

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

Potato Leafhopper Numbers High in Some Alfalfa Fields

By Wayne Bailey

Potato leafhopper adults greenish-yellow in color, wedge shaped and about 1/8-inch in length. Adult leafhoppers are very mobile and quickly move sideways, jump, or fly when disturbed. This is a native insect which migrates into Missouri each spring from more southern states and Mexico. The potato leafhopper is often transported into the state by early spring storms, especially those that contain hail. Migrating leafhoppers are thought to actively fly into storm fronts and be carried great distances by low level winds (jets) which approach 100 mph in speed. After a storm passes, high numbers of leafhoppers often can be found in the trail of the storms. In Missouri, the potato leafhopper adults generally arrive in early May of each year. The arriving adults may feed initially on several tree species before moving to alfalfa to feed and reproduce. Two to three generations of potato leafhopper are often produced with economic damage generally occurring on alfalfa following removal of first and possible second harvests.

Economic Threshold for Potato Leafhopper in Alfalfa		
Alfalfa Stem Length - inches	***Ave # PLH/Sweep (traditional variety)***	***Ave # PLH/Sweep (PLH Resistant Variety***
< 3	**0.2**	0.6
6	**0.5**	1.5
8-10	**1.0**	3.0
12-14	**2.0**	6.0

Damage is caused when both adult and nymphal (immature) leafhoppers use their piercing-sucking mouthparts to penetrate alfalfa leaflets and stems. They remove plant juices and often cause yellowing of established plants, stunted plant growth, and mortality of seedling alfalfa. Both forage quality and quantity are reduced by this alfalfa pest. Potato leafhoppers typically arrive in Missouri about May 5th each year, although their arrival in Missouri was delayed in 2009 with arrival in late May. Scouting is best accomplished using a 15-inch diameter sweep net. Take 10 pendulum sweeps at five random locations in the field. If the average number of potato leafhopper adult and nymphs per sweep reach or exceed the threshold numbers listed below, treatment is justified. The economic threshold for potato leafhopper in alfalfa depends on the height of the alfalfa and whether the alfalfa is a potato leafhopper resistant variety or a traditional alfalfa variety. Second and third cutting alfalfa crops are most at risk.

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Holcus Leaf Spot (Bacterial leaf spot)

Lesions usually are oval to rectangular in shape. Initially, they are dark-green and water soaked. Later they become dry and turn light brown with a reddish margin. The lesion resembles parchment paper. Holcus leaf spot may occur a few days after a rain storm but does not usually cause serious losses.

Common Rust *(Puccinia sorghi)*

Circular to elongate, golden-brown to reddish-brown pustules develop on both upper and lower leaf surfaces. As plants mature, the pustules become brownish-black in color. The pustules rupture, revealing powdery brown spores.

Southern Rust *(Puccinia polysora)*

Light, reddish-brown, circular to oval pustules develop primarily on the upper leaf surface. Eventually pustules rupture to reveal powdery spores. Later a brownish-black spore stage often forms in rings around the initial pustules.

Gray Leaf Spot *(Cercospora zeae-maydis)*

Lesions on maturing corn are pale brown to reddish-brown and blocky to rectangular in shape when compared to other corn leaf blights. The lesions typically are restricted by leaf veins giving the lesions parallel edges. Older lesions have a gray cast. Lesions may merge, resulting in large areas of dead leaf tissue. Lesions usually develop first on lower leaves but under favorable weather conditions, extensive leaf blighting over the entire plant may occur.

Northern Corn Leaf Blight *(Exserohilum turcicum)*

Long, elliptical, grayish-green or tan lesions ranging from 1.0-6.0 inches in length develop on the lower leaves. As the season progresses, nearly all leaves of a susceptible plant may be covered with lesions, giving this plant the appearance of having been injured by frost. During damp weather, dark olive-green to black spores may be produced across surface of lesions.

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Soybean Foliage Diseases May Begin to Show Up

By Laura Sweets

Again, the 2009 season has been a challenging one for soybean production. Wet weather and flooding have led to late plantings and replanting. There is a wide range in growth stages of soybean plants in fields across the state. Soybean foliage diseases have not been particularly widespread or severe so far this season. I have seen trace amounts of Septoria brown spot and only very low levels of bacterial blight and frogeye leaf spot on scattered plants in the field. However, the recent period of wet weather and wind driven rains may lead to the appearance of foliage diseases such as Septoria brown spot or bacterial blight. Frogeye leaf spot, downy mildew and bacterial pustule are the other foliage diseases likely to occur on soybeans during the mid-season period. In most years the soybean foliage diseases occur in low levels and do not cause significant losses. However, under favorable conditions for disease development, losses can be serious.

Septoria brown spot causes small, angular to somewhat circular, red to brown spots on the unifoliolate and lower trifoliolate leaves. The individual spots can run together forming irregularly shaped brown blotches on the leaves. Infected unifoliolate leaves will yellow and drop prematurely. Brown spot usually starts on the lower portion of the plant. Under favorable weather conditions (warm, wet weather), the disease may move up through the plant. Late in the growing season, infected leaves may turn rusty brown or yellow and drop prematurely.

The fungus which causes this disease, *Septoria glycines*, survives in infested residues left on the soil surface. During periods of wet spring weather, spores produced on the residues are splashed or blown to cotyledons or unifoliolate leaves of soybean where they cause infection. Warm, wet weather favors infection and disease development. Symptoms develop over a temperature range of 59-86°F with 77°F being optimum for symptom development. The spread of brown spot is restricted by dry weather. Because the pathogen survives in infested residues left on the soil surface, the disease is more severe in continuous soybean fields.

The principle means of reducing Septoria brown spot is to rotate crops with at least one year between soybean crops. The use of foliar fungicides from bloom to early pod development may be warranted in high value fields (ex. seed production fields) or in fields with second year beans. See the *2009 Missouri Pest Management Guide: Corn, Grain Sorghum, Soybean and Winter Wheat M171* for information on fungicides labeled for use on soybeans.

Bacterial blight also produces lesions on the leaves. The lesions usually begin as small, angular, yellow lesions. Lesions usually have a translucent or water soaked appearance which may be more easily seen if leaves are held up to the light. Lesions progress in color from yellow to light brown and eventually to a dark reddish brown. Older lesions have a dark center surrounded by a water soaked margin and a yellow halo. In cool, rainy weather the small, angular lesions may enlarge and merge producing large, irregular dead areas in the leaf. With wind and rain these large dead areas drop out or tear away, giving the leaf a ragged appearance. Symptoms typically occur several days after a rain with driving winds or a hail storm. If there

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Soybean Foliage Diseases May Begin To Show Up *continued from page 102*

are alternating periods of wet and dry weather, plants may show bands of leaves with symptoms, i.e. leaves that expanded during wet periods show bacterial blight symptoms and leaves that expanded during dry periods are free of disease.

Bacterial blight, caused by the bacterium *Pseudomonas savastanoi* pv. *glycinea*, occurs worldwide and is common during cool, wet weather. The causal bacterium may be carried in seed or can survive in crop residues. Bacteria on the seed may cause cotyledon infection. Bacteria can then be spread from infected cotyledons or infested residues by wind driven rain or splashing rain. Further spread occurs during rainstorms and hail storms or during cultivation when plants are wet. During early to mid-season, disease outbreaks usually occur five to seven days after wind driven rains. Hot, dry weather checks disease development.

Management strategies for bacterial blight include planting disease-free seed, avoiding highly susceptible varieties in areas where bacterial blight is serious, rotating crops with at least one year between soybean crops and not cultivating when foliage is wet.

Bacterial pustule, caused by the bacterium *Xanthomonas axonopodis* pv. *glycines*, occurs in most soybean-growing areas. Although bacterial pustule can occur in Missouri, it is not founds as frequently as the other foliage diseases. Bacterial pustule is common during periods of warm, wet weather. The causal bacterium may be carried in seed or can survive in crop residues. Bacteria are spread from infested residues or infected plants tissues by wind driven rain or splashing rain. Further spread occurs during rainstorms and hailstorms.

Bacterial pustule lesions begin as small, light-green lesions. Lesions may range from small spots to large areas of brown tissue formed when smaller lesions merge. Initially the center of the lesion may be slightly raised. The raised center or "pustule" may be more evident in older lesions or lesions on the lower leaf surface.

Symptoms of bacterial pustule may appear similar to those caused by bacterial blight. Typically bacterial pustule lesions do not show the water soaking around the lesions that is common with bacterial blight. Also, the small, raised pustules in the center of the lesions are characteristic of bacterial pustule but not of bacterial blight.

The raised center or "pustule" on the lower leaf surface might be mistaken for soybean rust pustules. Bacterial pustules do not produce spores, and they may show cracking or fissures across the pustule rather than the circular openings characteristic of soybean rust pustules. A high-power hand lens may be necessary to distinguish between bacterial pustule and soybean rust when examining leaves in the field.

Management strategies for bacterial pustule include planting disease-free seed, avoiding highly susceptible varieties in areas where bacterial blight is serious, rotating crops with at least one year between soybean crops and not cultivating when foliage is wet.

Frogeye leaf spot, caused by the fungus *Cercospora sojina*, occurs worldwide. However, the disease is most serious in warm regions or during periods of warm, humid weather. The fungus that causes frogeye leaf spot survives in infested soybean residue and infected seed. Spores produced on infested residues or infected plant tissues are spread by splashing rain or winds.

Symptoms of frogeye leaf spot occur primarily on leaves, although the causal fungus may also infect stems, pods and seed. Lesions are small, circular to somewhat irregular spots that develop on the upper leaf surfaces. Initially the spots are dark and water soaked in appearance. As the lesions age, the center becomes light brown to light gray in color. Older lesions have a light center with a darker red to purple-brown border. Lesions may merge to kill larger areas of the leaf surface. Heavily spotted leaves usually wither and drop prematurely.

Disease development is favored by warm, humid weather. Leaves that expand and develop during periods of warm, wet weather are more likely to be infected than leaves that expand during dry periods. Dry weather severely limits disease development.

The principle means of reducing frogeye leaf spot are to plant disease-free seed, to select resistant varieties and to rotate crops with at least one year between soybean crops. The use of foliar fungicides from bloom to early pod development may be warranted in high value fields (ex. seed production fields) or in years when weather is especially favorable for disease development. See the *2009 Missouri Pest Management Guide: Corn, Grain Sorghum, Soybean and Winter Wheat M171* for information on fungicides labeled for use on soybeans.

Downy mildew, caused by the fungus *Peronospora manshurica*, is reported wherever soybeans are grown. The downy mildew fungus survives as oospores in infected leaf residues and on seeds. Spores produced in diseased areas on lower leaf surfaces are wind-blown and serve to infect additional leaves on that plant or other plants.

Initial symptoms of downy mildew are pale green to light yellow spots or blotches on the upper leaf surface of young leaves. These areas enlarge into pale to bright yellow blotches of indefinite size and shape. Eventually lesions turn grayish brown to dark brown with a yellow margin. During periods of heavy dew or wet weather, a gray to purple fuzz that is visible growth of the downy mildew fungus develops on the lower leaf surface beneath the diseased areas on the upper leaf surface. Severely infected leaves turn yellow and then brown. Downy mildew is favored by high humidity and temperatures of 68-72 degrees F.

Management options for downy mildew include planting disease-free seed and rotating crops with at least one year between soybean crops.

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Potato Leafhopper Numbers High in Some Alfalfa Fields *continued from page 103*

Table 1. Recommended Insecticides for Potato Leaf Hopper Adult and Nymphs in Alfalfa

Potato Leafhopper			
Chemical Name	***Common Name***	***Rate of Formulated Material***	***Preharvest Interval***
Beta-cyfluthrin	*Baythroid XL	0.8 to 1.6 fl. oz./acre	7 days
Chlorpyrifos plus gamma cyhalothrin	*Cobalt	7 to 13 fl. oz/acre	7-14 days
Dimethoate	Dimethoate	see specific label	10 days
Carbofuran	*Furadan 4F	1 to 2 pts/acre	14-28 days
Chlorpyrifos 4E	*Lorsban 4E *numerous products	1 to 2 pts/acre see specific labels	7-14 days 7-14 days
Malathion	numerous products	see specific labels	0-7 days
Methyl Parathion	*numerous products	see specific labels	15 days
Zeta-cypermethrin	*Mustang Max	2.24 to 4.0 fl. oz/acre	3 days
Permethrin	*numerous products	see specifi label	7-14 days
Gamma-cyhalothrin	*Proaxis	1.92 to 3.2 fl. oz/acre	1 day forage 7 days hay
Carbaryl	Sevin 4F	1 qt/acre	7 days
Carbaryl	Sevin XLR Plus	1qt/acre	7 days
Lambda-cyhalothrin	*Warrior	1.92 to 3.2 fl oz/acre	1 day forage 7 days hay
Lambda-cyhalothrin	*numerous products	see specific labels	1 day forage 7 days hay

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

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Grasshopper Nymphs Present in Missouri

By Wayne Bailey

Grasshopper nymphs can be found throughout Missouri. Typically a summer pest on field crops, the wet conditions in most areas of the state have allowed for the buildup of this pest in the lush, green vegetation of field borders, waterways, and in no-till fields. At present grasshopper nymphs range from very small in size up to 1/2 –inch in length. Wet years usually do not favor grasshopper populations as fungal pathogens can cause high mortality of small grasshoppers. This year the wet weather has not helped with grasshopper mortality, possibly allowing for grasshopper populations to build to problem levels. In Missouri, over 100 grasshopper species can be found although 6-7 species may cause problems in field crops. Typical grasshopper damage consists of irregular shaped holes extending from the leaf margin to the center of the leaf. Damaged tissue surrounding the feeding wound often has dead tissue surrounding the wound. Grasshoppers are capable of doing considerable damage in a very short time, especially at they grow in size. Adult grasshoppers (winged) are more difficult to control than smaller nymphs (wingless).

The following table lists the economic threshold for grasshopper infestations in non-cropland areas and grass pastures, corn, soybean, grain sorghum (milo) pesticide label directions and precautions.

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Table 1. Grasshoppers in Non-Cropland Areas

Grasshoppers in Non-Cropland Areas			
Comments: Control grasshoppers when they are small by applying spot treatments to hatching sites in non-cropland areas. Treatment in these areas is justified when grasshopper numbers reach or exceed 15 grasshoppers per square yard.			
Common Name	***Trade Name***	***Rate of formulated material per acre***	***Placement***
esfenvalerate	***Asana XL**	2.9 to 5.8 fl. oz.	Broadcast
zeta-cypermethrin	***Mustang Max**	3.2 to 4.0 fl. oz.	Broadcast
carbaryl	**Sevin XLR Plus**	1 to 3 pt.	Broadcast
lambda-cyhalothrin	***Warrior**	2.56 fl. oz., see dealer for rates	Broadcast
lambda-cyhalothrin	***Warrior**	2.56 to 3.84 fl. oz.	Broadcast

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

Table 2. Grasshoppers in Grass Pastures

Grasshoppers in Grass Pastures			
Comments: Control grasshoppers when they are small by applying spot treatments to hatching sites in grass pastures. Treatment in these areas is justified when grasshopper numbers reach or exceed 7 grasshoppers per square yard.			
Common Name	***Trade Name***	***Rate of formulated material per acre***	***Placement***
zeta-cypermethrin	***Mustang Max**	3.2 to 4.0 fl. oz.	Broadcast
carbaryl	**Sevin XLR Plus**	1 to 4 pt.	Broadcast
lambda-cyhalothrin	***Warrior**	2.56 to 3.84 fl. oz.	Broadcast

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

Table 3. Grasshoppers in Field Corn

Grasshoppers in Field Corn			
Comments: Control grasshoppers when they are small by applying spot treatments to hatching sites in field borders and grass waterways. Treatment is justified in corn fields when 7 or more grasshoppers per square yard are present and grain fill is being severely limited. After pollen shed, control may be necessary if grasshoppers are damaging foliage above ear zone. Dimethoate should not be applied to corn during pollen-shed.			
Common Name	***Trade Name***	***Rate of formulated material per acre***	***Placement***
esfenvalerate	***Asana XL**	5.8 to 9.6 fl. oz.	Broadcast
cyfluthrin	***Baythroid XL**	2.1 to 2.8 fl. oz.	Broadcast
bifenthrin	***Brigade 2EC**	2.1 to 6.4 fl. oz.	Broadcast
chlorpyrifos + gamma-cyhalothrin	***Cobalt**	7 to 13 fl. oz.	Broadcast
dimethoate	**Dimethoate 4EC**	1 pt.	Broadcast
bifenthrin	***Fanfare 2EC**	2.1 to 6.4 fl. oz.	Broadcast
zeta-cypermethrin + bifenthrin	***Hero**	2.6 to 6.1 fl. oz.	Broadcast
chlorpyrifos	***Lorsban 4E**	1/2 to 1 pt.	Broadcast
microencapsulated methyl parathion	***Penncap-M**	2 to 3 pt.	Broadcast
lambda-cyhalothrin	***Proaxis**	2.56 to 3.84 fl. oz.	Broadcast
carbaryl	**Sevin XLR Plus**	1 to 3 pt.	Broadcast
lambda-cyhalothrin	***Warrior**	2.56 to 3.84 fl. oz.	Broadcast

* **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.

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Grasshopper Nymphs Present in Missouri *continued from page 105*

Table 4. Grasshoppers in Soybean

Grasshoppers in Soybean			
Comments: Treat when defoliation reaches 30% before boom, 20% bloom to pod fill, or when 5% to 10% of pods are damaged.			
Common Name	***Trade Name***	***Rate of formulated material per acre***	***Placement***
esfenvalerate	***Asana XL**	5.8 to 9.6 fl. oz.	Broadcast
cyfluthrin	***Baythroid XL**	2.0 to 2.8 fl. oz.	Broadcast
bifenthrin	***Brigade 2EC**	2.1 to 6.4 fl. oz.	Broadcast
chlorpyrifos + gamma-cyhalothrin	***Cobalt**	7 to 13 fl. oz.	Broadcast
dimethoate	**Dimethoate 4EC**	1 pt.	Broadcast
carbofuran	***Furadan 4F**	1/4 to 1/2 pt.	Broadcast
carbofuran	***Furadan LFR**	1/4 to 1/2 pt.	Broadcast
chlorpyrifos	***Lorsban 4E**	1/2 to 1 pt.	Broadcast
zeta-cypermethrin	***Mustang Max**	3.2 to 4.0 fl. oz	Broadcast
chlorpyrifos	***Nufos 4E**	1/2 to 1 pt.	Broadcast
acephate	**Orthene 97**	1/4 to 1/2 lb.	Broadcast
microencapsulated methyl parathion	***Penncap-M**	2 to 3 pt.	Broadcast
permethrin	***Pounce 3.2EC**	2.0 to 4.0 fl. oz	Broadcast
lambda-cyhalothrin	***Proaxis**	3.2 to 3.84 fl. oz	Broadcast
carbaryl	**Sevin XLR Plus**	1 to 3 pt.	Broadcast
lambda-cyhalothrin	***Warrior**	3.2 to 3.84 fl. oz.	Broadcast

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

Table 5. Grasshoppers in Grain Sorghum

Grasshoppers in Grain Sorghum			
Comments: Control grasshoppers when they are small by applying spot treatments to hatching sites in grain sorghum. Treatment in field is justified when 7 or more grasshoppers per square and are present.			
Common Name	***Trade Name***	***Rate of formulated material per acre***	***Placement***
cyfluthrin	***Baythroid XL**	1.0 to 2.8 fl. oz.	Broadcast
chlorpyrifos + gamma-cyhalothrin	***Cobalt**	7 to 13 fl. oz.	Broadcast
dimethoate	***Dimethoate 4EC**	1/2 to 1 pt.	Broadcast
lambda-cyhalothrin	**Karate w/ Zeon Tech**	1.28 to 1.92 fl. oz.	Broadcast
chlorpyrifos	***Lorsban 4E**	1 to 2 pt.	Broadcast
zeta-cypermethrin	***Mustang Max**	3.2 to 4.0 fl. oz.	Broadcast
chlorpyrifos	***Nufos 4E**	1 to 2 pt.	Broadcast
gamma-cyhalothrin	***Proaxis**	2.56 to 3.84 fl. oz.	Broadcast
carbaryl	**Sevin XLR Plus**	1 to 3 pt.	Broadcast
lambda-cyhalothrin	***Warrior**	2.56 to 3.84 fl. oz.	Broadcast

*** 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.

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Grasshopper Nymphs Present in Missouri *continued from page 106*

Table 6. Grasshoppers in Wheat

Grasshoppers in Wheat			
Comments: Treat when 8 or more adults per square yard are present within crop. Barrier treatments in border areas may be required to prevent migration into the crop if more than 20 adults per square yard are present in field margins.			
Common Name	***Trade Name***	***Rate of formulated material per acre***	***Placement***
cyfluthrin	***Baythroid XL**	1.8 to 2.4 fl. oz.	On foliage
chlorpyrifos +	***Cobalt**	7 to 13 fl. oz.	On foliage
dimethoate	***Dimethoate 4EC**	3/4 pt.	On foliage
carbofuran	***Furadan 4F**	1/4 to 1/2 pt.	On foliage
carbofuran	***Furadan LFR**	1/4 to 1/2 pt.	On foliage
lambda-cyhalothrin	***Karate**	1.28 to 1.92 fl. oz.	On foliage
zeta-cypermethrin	***Mustang Max**	3.2 to 4.0 fl. oz.	On foliage
microencapsulated methyl parathion	***Penncap-M**	2 to 3 pt.	On foliage
lambda-cyhalothrin	***Proaxis**	2.56 to 3.84 fl. oz.	On foliage
carbaryl	**Sevin XLR Plus**	1 to 3 pt.	On foliage
lambda-cyhalothrin	***Warrior**	2.56 to 3.84 fl. oz.	On foliage
Seed Treatments			

* **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.

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Weather Data for the Week Ending July 26, 2009

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.	July 1 - June 26	Departure from long term avg.	Accumulated Since Apr. 1	Departure from long term avg.
Corning	Atchison	84	63	94	58	73	-4	2.06	-2.61	1923	+57
St. Joseph	Buchanan	81	65	91	61	73	-4	4.48	+0.38	1864	-12
Brunswick	Carroll	83	60	90	55	72	-5	2.12	-1.52	1937	+25
Albany	Gentry	82	60	90	55	72	-5	2.62	-1.96	1790	-67
Auxvasse	Audrain	81	62	89	57	72	-5	3.11	-0.30	1924	-2
Vandalia	Audrain	82	61	89	56	72	-5	3.02	-0.87	1906	+9
Columbia-Bradford	Boone	82	61	89	55	72	-6	4.96	+1.51	*	*
Columbia-Jefferson Farm	Boone	82	62	89	57	72	-6	4.81	+1.37	1947	-47
Columbia-South Farms	Boone	82	62	89	57	72	-6	5.09	+1.64	1945	-48
Williamsburg	Callaway	82	60	89	55	72	-5	4.13	+0.36	1904	+24
Novelty	Knox	80	60	88	55	70	-7	4.21	+0.78	1716	-151
Linneus	Linn	82	60	91	56	72	-4	3.83	-0.34	1779	-42
Monroe City	Monroe	81	60	88	53	71	-6	2.44	-0.99	1832	-78
Versailles	Morgan	83	64	90	59	73	-5	4.50	+0.92	2055	+23
Green Ridge	Pettis	83	62	88	59	72	-4	2.87	-0.67	1961	+52
Lamar	Barton	84	63	89	60	73	-6	4.68	+0.89	2073	-38
Cook Station	Crawford	82	59	90	53	71	-7	2.08	-0.59	1892	-160
Round Spring	Shannon	84	60	91	54	71	-6	1.45	-1.66	1922	-30
Mountain Grove	Wright	80	60	87	54	70	-7	2.49	-0.93	1875	-36
Delta	Cape Girardeau	82	63	89	56	73	-6	1.96	-0.91	2171	-133
Cardwell	Dunklin	82	66	87	62	74	-7	8.30	+5.89	2450	-63
Clarkton	Dunklin	82	66	88	59	74	-7	3.35	+0.75	2360	-115
Glennonville	Dunklin	82	66	89	61	75	-5	4.72	+2.08	2378	-87
Charleston	Mississippi	82	65	89	59	74	-5	4.13	+1.05	2294	+11
Portageville-Delta Center	Pemiscot	83	67	89	61	75	-5	3.85	+1.42	2468	-12
Portageville-Lee Farm	Pemiscot	83	67	89	62	75	-5	3.81	+1.19	2478	+16
Steele	Pemiscot	82	67	88	63	75	-6	4.97	+2.37	2544	+57

* 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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