

AGRICULTURAL GUIDE

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Insect control

Cotton insect control

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These recommendations are based on research conducted in Missouri and are designed to provide adequate yet economical pest insect control with a minimum of insecticide applications.

Cotton insect pests in certain areas and during occasional seasons do get sufficiently ahead of the parasites and predators to make insecticidal control efforts necessary and economical.

The application of any insecticide should be based on need. Methods for determining both pest and beneficial insect* populations are available. Each producer can learn and apply these simple methods or have this service performed for a fee by privately sponsored cotton insect scouting programs or cotton insect pest management programs.

When most of the recommended insecticides are applied to cotton fields, both pest and beneficial insects are destroyed. The pest insects often recover faster than beneficial ones, resulting in even more damage to production. *Therefore, be sure you have an economic insect threat before applying insecticides.*

Thrips

Thrips control is not generally recommended, nor have control efforts generally resulted in increased yields. However, thrips control *may* result in earlier maturity or increased yields on mid-May or later planted cotton. These late plantings usually are in the four-leaf stage or younger at small grain harvest and sometimes are subject to heavy thrips populations migrating from the drying small grain.

Thrips injury results in a browning of the edges of the leaves, which also tend to curl upward. The underside of the leaves of heavily infested plants have a silvery appearance, especially the first cotyledonary leaves.

The best control results have been obtained by using a granular systemic insecticide at planting, or by making one spray application as soon as the cotton has come up to a stand, followed by a second application one week later.

For control of all cotton pests mentioned in this guide, see table of recommended insecticides on pages 2 and 3.

NOTE: See Picture Sheet 12 for color illustrations of pests and their damage. See Picture Sheet 25 for color illustrations of beneficial insects. They are available from your nearest University of Missouri Extension Center.

Aphids

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Aphids (plant lice) are tiny, green, soft-bodied insects which feed on the underside of cotton leaves. They suck the plant juices and excrete a sweetish, sticky fluid (honeydew) which sometimes turns the upper surface of leaves black.

Aphids are more common early in the season or in fields where several applications of chlorinated hydrocarbon-type insecticides have been made.

Insecticidal control rarely is required in Missouri since beneficial insects normally handle the problem adequately. During an extended period of cool weather, aphid build-up may result in some leaf curling and may require control under these conditions.

Cotton Fleahoppers and Other Plant Bugs

Cotton fleahoppers and tarnished plant bugs sometimes cause injury by sucking plant juices from the very small squares, causing them to blast. Most severe injury occurs during the first weeks of the fruiting season. As a result of square blasting, the plants remain in a vegetative state, thus delaying fruiting and maturity of fiber. Keep in mind that many other factors can cause squares to be shed. Therefore, be sure these insects actually are causing the trouble before you use insecticides. Sometimes late in the season clouded plant bugs will cause damage to small bolls.

Controls are usually justified when an average of 12 or more of these insects per 100 terminals are found during the first two weeks of squaring, and 25 to 30 insects thereafter through the period of maximum squaring or late in the season when 25-30 clouded plant bugs are present per 100 plants.

If you spray for fleahoppers and other plant bugs, these sprayed fields should be closely checked for bollworms each week throughout the remainder of the season.

Spider Mites

Spider mites are tiny, greenish, tan or red mites which, under close observation, may be found on the underside of the leaves. They may attack cotton at any stage of growth, but they generally cause the most damage in mid to late season following a period of hot, dry weather. As the mites remove the leaf juices, these injured leaves take on a reddish-bronze appearance and develop a slight downward curling. When damage is severe, leaf drop occurs. Such defoliation results in a lower quality and quantity of lint.

Spider mites usually first occur around the field margins next to vegetation, around stumps, or ditch banks, etc., where they have over-wintered. Spot treatment of such areas will stop the infestation before it spreads over the entire field.

Control efforts should begin as soon as evidence of mites is noticed on seedling cotton or as soon as the leaves in an infested area begin to discolor. Good coverage of all foliage, especially the underside of leaves, is essential for effective

Missouri cotton insect control recommendations

Insects	Insecticides	Pounds actual per acre	When to apply
Armyworms and Yellow-striped Armyworms	For Use by Commercial Applicators		When damaging infestations occur. Apply methyl parathion on third instar or younger larvae.
	*methyl parathion or *thiodicarb (Larvin)	1.0 0.6	
Boll Weevil	For Use by Farmer With Ground Equipment		When 25% of squares have been punctured under normal weather conditions. Under wet conditions and indications of a rapidly rising infestation, start controls when 10-15% of squares show feeding punctures. Repeat at four to five day intervals until infestation is controlled. Young bolls should be protected until at least 16 days old.
	*azinphosmethyl (Guthion)	0.25	
	For Use by Commercial Applicators		
	*azinphosmethyl (Guthion) or *methyl parathion	0.25 0.50	
Bollworm	For Use by Commercial Applicators		When eggs and four to six worms are found per 100 plants on cotton that has received previous insecticide applications. When eggs and six to eight worms per 100 plants are found on cotton that has not been treated with insecticides. Repeat at four to five day intervals. Ovicides should be used in late season applications in conjunction with a larvacide when egg counts show the need for an ovicide. These ovicides rely on contact so good coverage is essential.
	acephate (Orthene)	0.75-1.0	
	*Cypermethrin (Ammo, Cymbush)	0.04-0.10	
	*EPN + methyl parathion	0.5 + 0.5	
	*fenvalerate (Pydrin)	0.1-.0.2	
	©*flucythrinate (Pay-Off)	.025-.060	
	*methomyl (Lannate, Nudrin)	0.45	
	*methyl parathion	1.0	
	*permethrin (Ambush, Pounce)	0.1-0.2	
	*thiodicarb	0.6	
	OVICIDES		
	*methomyl (Lannate, Nudrin)	0.125	
Cotton Aphid	For Use by Farmer With Ground Equipment		When needed for "knockout." Control measures rarely necessary except following previous insecticidal applications. Do NOT spray when lady beetle larvae and other aphid predators commonly occur on infested plants.
	dimethoate (Cygon, Defend)	0.22	
	or malathion	0.5-1.0	
	For Use by Commercial Applicators		
	dicrotophos (Bidrin)	0.25	
	or *methyl parathion or *monocrotophos (Azodrin)	0.25-0.5 0.55	
Cotton Fleahopper, Tarnished Plant Bug and Clouded © Plant Bug	acephate (Orthene) or © dimethoate (Cygon, Defend)	0.25 0.125-0.25	When 12 or more bugs per 100 terminals are present during the first two weeks of squaring and 25-30 insects thereafter through the period of maximum squaring or late in the season when 25-30 clouded plant bugs are found per 100 plants during late season boll set. Repeat at 7-14 day intervals as label restrictions permit.
Cotton Leafworm	For Use by Farmer With Ground Equipment		When damaging infestations occur or whenever infestations occur after bolls are open. Repeat at 7-10 day intervals as long as needed.
	carbaryl	0.5-1.0	
	or *azinphosmethyl (Guthion)	0.25	
	For Use by Commercial Applicators		
	*methyl parathion or *thiodicarb (Larvin)	0.5 0.6-0.9	

Insects	Insecticides	Pounds actual per acre	When to apply
Cutworms climbing	*Cypermethrin (Ammo)	.025-.10	When damage infestations are detected early.
	or		
	*fenvalerate (Pydrin)	0.10-0.20	
	or		
	*methyl parathion	1.0	
subterranean	*thiodicarb (Larvin)	0.5-0.75	Use 5% commercially prepared bait on apple pomace carrier.
	carbaryl (bait)	1.5	
Spider Mites	For Use by Commercial Applicators		
	*dementon (Systox)	0.25	One thorough application is usually sufficient. Repeat if needed.
	or		
	*dicotophos (Bidrin)	0.25	
	or		
	*dicofol (Kelthane)	1.0-1.5	
or			
Thrips	For Use by Farmer With Ground Equipment		
	*aldicarb (Temik granules only)	0.3-0.5	Granules applied in the seed furrow at time of planting.
	or		
	*disulfoton (Di-Syston granules only)	0.6-1.0	
	or		
	*phorate (Thimet granules only)	0.5-1.0	Usually of value only on late planted cotton that is in the seedling stage just prior to and during small grain harvest. Apply controls when there are one or more thrips per plant and cotton is in the cotyledonary stage. On cotton that is between the cotyledonary and four-leaf stage, apply controls when two or more thrips per plant are present.
	or		
	acephate (Orthene)	0.10-0.20	
	or		
	*Cypermethrin (Ammo)	0.25-.03	
	(Cymbush)	0.04-.06	
	or		
dimethoate (Cygon, Defend)	0.15		
For Use by Commercial Applicators			
*dicotophos (Bidrin)	0.15		
or			
*monocrotophos (Azodrin)	0.15		

An asterisk () preceding any insecticide means that all or some uses of the product have been restricted by the Environmental Protection Agency. Applicators must be certified and licensed before they may purchase restricted products.

This sign (©) preceding any insecticide means the lower dosages given should be used only under the direction of a qualified pest management specialist.

PRECAUTIONS: All insecticides are poisonous. They must be handled with caution. Follow all precautions as printed on the container label.

Workers entering cotton fields within 48 hours following treatment with dicotophos, methyl parathion, or monocrotophos or 24 hours following treatment with azinphosmethyl or EPN + methyl parathion should wear clean, tightly woven protective clothing, and dry cotton gloves.

DO NOT apply ethion after any bolls are open. **DO NOT** apply disulfoton more than twice per season, and allow at least 21 days between applications. Allow at least 14 days between applications of dimethoate.

DO NOT harvest until the following intervals after last applications have elapsed: dicotophos and monocrotophos, 30 days; disulfoton and thiodicarb, 28 days; demeton and fenvalerate, 21 days; methomyl, 15 days; cypermethrin, dicofol, dimethoate, and permethrin, 14 days; methyl parathion and EPN + methyl parathion, 7 days; and azinphosmethyl, 1 day.

DO NOT graze cotton fields or feed gin trash treated with aldicarb, azinphosmethyl, demeton, dicofol, dicotophos, dimethoate, ethion, fenvalerate, methomyl, monocrotophos, permethrin, thiodicarb, or toxaphene to dairy or meat animals.

DO NOT apply long residual or highly toxic insecticide immediately adjacent to or over fish-bearing waters. Avoid carbaryl application while honeybees are working blooms.

control with all recommended miticides.

A sudden decline in spider mite populations sometimes occurs in early August. Careful observation should be made to determine if mites are still present in damaging numbers before applying control measures in August.

Bollworms

The cotton bollworm is the most important insect pest of cotton in Missouri. It is the same insect as the corn earworm, which is always present in large numbers on field and sweet corn. However, many cotton fields escape damage from bollworms because beneficial insects and spiders keep them under control.

Although natural outbreaks sometimes do occur, severe outbreaks most often follow insecticide applications made for control of other pests.

Bollworm eggs are pearly white and about the size of a pin head. The eggs normally are deposited singly on the terminal bud or terminal leaves; however, at certain times, the moths seem to prefer the lower portions of the plant for egg laying. The newly hatched bollworms can be found feeding on the terminals and very small squares. As these worms increase in size, they tend to feed downward on the plant, attacking the larger squares, blooms, small bolls and finally the nearly full grown bolls.

Occasionally bollworms are present early in the season before any bolls are formed. In such cases—if no insecticides have been applied to the field—natural control is usually excellent and little damage will result. However, if bollworms are damaging more than five percent of the squares, insecticides may be justified.

The greatest danger of a bollworm outbreak comes toward the middle of the season after most corn has stopped silking. From this time until the end of the fruiting season, cotton fields should be checked each week for bollworms. Terminals, upper squares and bolls should be checked for eggs, worms and amount of damage. Depending upon the previous insecticidal treatment history of each field, control measures should begin when you can find from four to six worms per 100 plants, plus eggs and some damage to the fruiting forms.

Because bollworm insecticides also kill beneficial insects and spiders, it is often difficult to decide when insecticide applications should begin. In fields that have not been treated previously, spraying may be delayed a few days to give the beneficial insects an opportunity to bring the infestation under control. But remember, as the worms become larger, they become increasingly difficult to control. Recommended insecticides will not give effective control of the three-fourths to full grown worms.

Experience indicates an application of insecticide at labeled rates will greatly increase the chances of a bollworm infestation, since beneficial insects and spiders are killed.

If the field treated is being monitored by an experienced cotton scout, the application of *Bacillus thuringiensis* (Bactur, Biotrol, Dipel, Thuricide) may be used to control low level infestations of first and second instar bollworm larvae. The application of such a material at the proper time and rates may allow beneficial insects to build back up in the field, or it may delay the use of a hard insecticide which should reduce natural controls in the field.

Boll Weevils

Boll weevils are not able to survive Missouri winters in any great numbers, due to the combined effects of lack of suitable hibernation quarters and low temperatures.

Localized damage may occur fairly early in some years, and late season injury by migrating weevils may occur nearly every year in some fields along the western and northern fringes of the production area.

To check for weevils, walk through a field and pick 100 normal appearing squares $\frac{1}{3}$ grown or larger. The number of squares showing weevil punctures will be the percentage of infestation for that field. Under normal conditions, start control when 25 percent of the squares are punctured. Apply insecticides at four-day intervals until the infestation is brought under control.

Late in the season when squaring has almost stopped, insecticide application may be justified to protect small bolls. In fields where boll damage is evident, or where a high percentage of the remaining squares is being punctured, controls should be continued until the bolls are at least 16 days old.

Cotton Leafworm

When leafworm infestations occur—even late in the season—control should be used immediately. If worms are allowed to defoliate the crop, the lint in the open bolls is usually stained enough to cause the cotton to be downgraded.

European Corn Borer

Damage by this insect to cotton has been noted since 1956. Infestation levels are related to the acreage of corn planted in proximity to the cotton field, as well as the degree of maturity of the cotton. Multiple applications of insecticides as well as excellent coverage are necessary to bring this pest under control. Since scouting techniques do not provide adequate estimates of field populations frequent boll inspection late in the season will help in determining infestation levels of this pest.

Other Insect Pests

Armyworms, cutworms, grasshoppers and other insects often cause damage to cotton, especially near the field margins. The insects should be controlled when necessary to prevent losses to the stand. Losses from armyworms and grasshoppers usually can be prevented by controlling them in other crops and along grassy fence rows and ditch banks.

Missouri insect control recommendations are revised annually and are subject to change during the growing season. Before using pesticides, make sure they are still recommended for use.