

# 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 minimal insecticide applications.

During most seasons in localized areas cotton insect pests do get ahead of parasites and predators in sufficient numbers to make insecticidal controls necessary and economical.

However, any insecticide application should be based on need. Methods for determining pest and beneficial insect populations are available (see MU publication [PS12](#), *Cotton Insects and Mites*, for color illustrations of cotton pests and their damage). Each producer can learn and apply these simple methods for determining insect populations. Private cotton insect scouts can perform this service for a fee.

Most of the recommended insecticides in this publication, when applied to cotton fields, will destroy both pest and beneficial insects. Pest insect populations often recover faster than do populations of beneficial insects. The result is even more damage to production. Therefore, be sure you have an economic insect threat before you apply insecticides. See tables of recommended insecticides for the control of cotton pests mentioned in this publication.

## Thrips

Control of thrips may result in earlier maturity and increased cotton yields. Cotton plantings usually are in the four-leaf stage or younger at small grain harvest, and often they are subject to heavy thrips populations migrating from the drying small grain and from field borders.

Thrips injury causes leaf edges to brown and makes leaves curl and pucker. On heavily infested plants the undersides of leaves, especially the first cotyledonary leaves, have a silvery appearance.

Best control results have been obtained by using a systemic in-furrow insecticide at planting. For rescue treatments, spray just as the cotton comes up to a stand and make a second application one week later.

## Cotton fleahoppers and plant bugs

Cotton fleahoppers and tarnished plant bugs sometimes injure plants by sucking juices from the very small squares, causing them to blast. Most severe injury occurs in the first four weeks of the fruiting season. This square blasting causes plants to remain in a vegetative state, delaying fruiting and fiber maturity.

Carbohydrate stress can also cause squares to be shed under cloudy conditions. Be sure that insects are causing trouble before you use insecticides.

Control measures are usually justified when there is an average of 6 to 8 clouded plant bugs per 100 ft. of row during the first week of squaring; 8 to 10 bugs during the second week; 10 to 12 during the third week; and 15 or more during the fourth week of squaring.

If you spray for plant bugs, check sprayed fields weekly for aphids and bollworms throughout the remainder of that season.

## Aphids

Aphids (plant lice) are tiny green, yellow or black soft-bodied insects that feed on the underside of cotton leaves. They suck plant juices and excrete a sweetish, sticky fluid (honeydew) that sometimes blackens the upper surfaces of leaves. Damaged leaves curl down at the edges.

Aphids are more common after insecticide applications have been made. Insecticidal control of aphids is rarely needed in Missouri because beneficial insects normally control them. Aphid buildup may result in some leaf curling and honeydew deposition. Control may be required under these conditions.

## Spider mites

Spider mites are tiny greenish, tan or red mites that may be found on the underside of leaves. They may attack cotton at any stage of growth, but they generally cause more damage in mid to late season following hot, dry weather.

As the mites remove leaf juices, 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 decrease in the quality and quantity of lint.

Spider mites usually first occur around field margins next to vegetation, around stumps or ditch banks, etc., where they have overwintered. A good cultural control method is to leave a vegetation-free zone 10 to 20 feet wide between any border vegetation and the cotton field point rows. Any equipment, people or animals moving through a cotton field can spread mites. Mite infestations often occur immediately after mowing border vegetation.

Spot treating border areas can stop an infestation before it spreads throughout the entire field.

Control efforts should begin as soon as mites are evident, or as soon as leaves in an infested area begin to discolor. For effective control with all miticides, it is essential to get good coverage of all foliage, especially the undersides of leaves. Note that spider mite populations may decline suddenly in early August. Therefore, observe fields carefully in August to determine whether mites are present in damaging numbers before applying control measures.

# Bollworms

Cotton bollworm is the same insect as corn earworm, which may be 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.

Bollworm eggs are pearly white and about the size of a period mark in print. The eggs normally are laid singly on terminal buds, terminal leaves, or blooms and squares. At certain times, moths seem to prefer the lower portions of a plant for egg laying. Newly hatched bollworms can be found feeding on terminals and very small squares.

As bollworms increase in size, they tend to feed downward, attacking larger squares, blooms, small bolls, and finally nearly full-grown bolls.

While natural outbreaks sometimes occur, severe outbreaks usually follow insecticide applications meant to control other pests. Bollworms occasionally are present early in the season before any bolls have formed. In cases where no insecticides have been applied to a field, natural control usually is excellent and little damage results. However, if bollworms are damaging more than 5 percent of the squares, insecticide treatment may be justified.

The greatest danger of bollworm outbreak is in midseason after most corn has stopped silking. Bollworm moths are attracted to cotton in bloom. From this time until the end of the fruiting season, check fields weekly for bollworms. Check terminals, upper squares and bolls for eggs, larvae and damage. Depending on the number of beneficial insects present in each field, control measures should begin if you find 10 bollworms or eggs per 100 plants 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. Experience indicates that an insecticide application at labeled rates greatly increases the chances of a bollworm infestation, since beneficial insects and spiders are killed. In fields that have never been treated, spraying may be delayed a few days to give the beneficial insects an opportunity to bring an infestation under control. However, remember that as larvae become larger, they become increasingly difficult to control.

Recommended insecticides will not give effective control of the 3/4-grown to fully grown bollworms. If the field treated is being monitored by an experienced cotton scout, *Bacillus thuringiensis* (Bacor, Biotrol, Dipel, Thuricide), may be used to control low-level infestations of first and second instar bollworm larvae. Applying such material at the proper time may allow beneficial insects to build up in a field and delay the use of a hard insecticide that would reduce the beneficials in the field.

# Boll weevils

Boll weevils are unable to survive Missouri winters in great numbers due to low temperatures and the lack of suitable hibernation quarters. 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 floodway ditches, and the St. Francis and Mississippi rivers.

To check for weevils, walk through a field and pick 100 normal-appearing squares 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 20 percent of the squares are punctured. If weevil infestations occur early (mid-July), start treatments when 15 to 20 percent of the squares show feeding punctures. Pheromone traps are recommended in spring to monitor weevil populations.

In fields where boll damage is evident or where a high percentage of remaining squares are being punctured, continue controls until the bolls are at least 16 days old. Stalk destruction immediately after harvest will reduce local boll weevil infestations significantly.

# European corn borer

Cotton damage by this insect has been noted since 1956. Infestation levels are related to the acreage of corn planted near cotton fields, as well as the maturity of adjacent cotton.

Properly timed insecticide applications, as well as excellent coverage, are necessary to control this corn borer. Usual scouting techniques do not provide adequate estimates of field populations of the pest, but frequent boll inspections late in the season will help determine infestation levels. Eggs are laid in masses of three to 50 with 15 eggs/mass being an average. Eggs are usually deposited on the underside of leaves and hatch in three to five days. Larvae bore into bolls or stalks within 48 hours of hatching.

# Other insects

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

# Precautions

All insecticides are poisonous. They must be handled with caution. Follow all precautions as printed on the container label. Workers entering cotton fields following treatment with insecticide should follow reentry procedures given on the container label. Protective clothing and proper safety precautions should be observed as prescribed on container label.

Observe preharvest intervals for all insecticide applications (see following list).

Do not graze cotton fields or feed gin trash treated with acephate, aldicarb, azinphosmethyl, baythroid, dicofol, dimethoate, fenvalerate, methomyl, permethrin, profenofos or thiodicarb to dairy or meat animals.

Do not apply long residual or highly toxic insecticides immediately adjacent to or over fish-bearing waters. Leave an insecticide-free zone of 50 to 100 feet between any body of water and the treated crop. Avoid application while honey bees are working blooms. Cotton plants are pollinated by insects.

Do read the label. Labels are legally binding and full of helpful information.

**Preharvest interval for recommended insecticides:**

<b>Insecticide</b>	<b>Days</b>
Orthene	21
Lorsban	14
Bidrin	30
dimethoate	14
Bolstar	14
Guthion	2
malathion	0
Vydate	14
methyl parathion	7
Karate	24
Asana	21
Ambush	21
Pounce	14
Ammo	14
Cymbush	14
Baythroid	14
Capture	14
Larvin	28
Curacron	14
Lannate	15
Kelthane	14
Sevin	7

**Missouri cotton insect control recommendations.**

<b>Insect</b>	<b>Symptom</b>	<b>Insecticide (trade name)</b>	<b>Formulation per acre</b>	<b>Lbs. A.I./Acre</b>	<b>Comments</b>	
Thrips	Mouse eared and savoyed leaves, seedling to 6 leaf.	Infurrow:			Treatments in order of preference:  1. Infurrow systemics. 2. Foliar treatment. 3. Seed treatment.	
		<sup>op</sup> acephate (Orthene 90S)	1-2 lbs.	0.9-1.8		
		<sup>c</sup> aldicarb (Temik 15G)	2-5 lbs.	0.3-0.75		
		<sup>op</sup> disulfoton (Disyston 15G)	4-6.7 lbs.	0.6-1.0		
		<sup>op</sup> phorate (Thimet 15G)	4-6.7 lbs	0.6-1.0		
		Foliar:				
		<sup>op</sup> acephate (Orthene 90S)	0.25 lbs.	0.2		
		<sup>op</sup> dicrotophos (Bidrin 8EC)	3.2 oz.	0.2		
		<sup>op</sup> dimethoate (4.0)	8 oz.	0.2		
		<sup>op</sup> dimethoate (2.67)	9.6 oz	0.2		
		Seed treatment:				Per 100 lbs. seed
		<sup>op</sup> acephate (Orthene)		0.5		
		<sup>op</sup> disulfoton (Disyston)		0.25-0.5		
		<sup>op</sup> phorate (Thimet)		0.25-0.5		
Cutworms	Seedling cut off at base	<sup>op</sup> chlorpyrifos (Lorsban 4E)	1-2 pts.	0.5-1.0	Sport treat only infested areas when plant populations are reduced below three plants per row foot.	
		<sup>op</sup> acephate (Orthene 90S)	1.1 lb.	1.0		
		<sup>c</sup> thiodicarb (Larvin 3.2)	1-1/2 pts	0.6		
		<sup>c</sup> carbaryl (Sevin 80S)	2 lbs.	1.6		

Insect	Symptom	Insecticide (trade name)	Formulation per acre	Lbs. A.I./Acre	Comments
Plant bugs and cotton fleahopper	Shedding of small squares, deformed small bolls, plants need to retain 80%+ of fruit set in first 4 weeks.	<sup>op</sup> acephate (Orthene 90S)	5 oz.	0.3	As squaring begins: 1st week 6-8/100 ft. 2nd week 8-10/100 ft. 3rd week 12-15/100ft. Aphids resistant to organo. Insecticides can become a problem after plant bug treatment kills beneficial insects.
		<sup>op</sup> chlorpyrifos (Lorsban 4E)	6.4 oz.	0.5	
		<sup>op</sup> dicrotophos (Bidrin 8E)	3.2 oz.	0.2	
		<sup>op</sup> dimethoate (Cygon 400)	6.4 oz.	0.2	
		<sup>op</sup> dimethoate Di. 2.67	9.6 oz.	0.2	
		<sup>c</sup> oxamyl (Vydate)	1 pt.	0.25	
		<sup>op</sup> sulprofos (Bolstar 6E)	5.3 oz.	0.3	
Aphids	Leave curl down around edges appearing drought stressed. Numerous "plant lice" infest underside of leaves. Sticky honeydew on leaves and lint.	<sup>P</sup> bifenthrin (Capture 2E)	3.2 oz.	0.06	ontrol measures rarely necessary except following previous insecticide application. Organophosphate resistance common. Predators and parasites are often best control methods. Use no pyrethroid until after mid July.
		<sup>op</sup> chlorpyrifos (Lorsban 4E)	12 oz.	0.75	
		<sup>op</sup> dicrotophos (Bidrin 8E)	4 oz.	0.4	
		<sup>op</sup> dimethoate (Cygon 400)	12.8 oz.	0.4	
		<sup>op</sup> dimethoate (Di. 2.67)	20 oz.	0.4	
		<sup>c</sup> endosulfan (Thiodan 3E)	1 qt.	0.7	
		<sup>c</sup> methomyl (Lannate 1.8)	1 pt.	0.25	
		<sup>op</sup> profenofos (Curacron 8E)	0.5 pt.	0.5	
		Use <sup>P</sup> + <sup>op</sup> or methomyl for resistant aphids.			
White flies	Minute gnat-size white insects fly up as you walk through cotton.	<sup>op</sup> acephate (Orthene 90S)	0.6 lb.	0.5	Usually not a problem in Missouri. Be sure infestation is economic.

<b>Insect</b>	<b>Symptom</b>	<b>Insecticide (trade name)</b>	<b>Formulation per acre</b>	<b>Lbs. A.I./Acre</b>	<b>Comments</b>
Spider mites	Yellow to brown areas near leaf veins and petiole. Silver gossamer webbing on underside of infested leaves.	<sup>p</sup> bifenthrin (Capture 2E)	4 oz.	0.06	Usually a problem in dry weather. Mites move into cotton from border vegetation, often after mowing. Leaving vegetation-free zone 10-20 ft. around cotton fields is a good control. Mites are spread by equipment, people or animals moving through a field.
		<sup>op</sup> chlorpyrifos (Lorsban 4E)	1 pt.	0.5	
		<sup>oc</sup> dicofol (Kelthane)	1 qt.	0.5	
		<sup>op</sup> profenofos (Curacron 8E)	1 pt.	1.0	
		propargite (Comite)	1.5 pt.	1.2	
Armyworm	Defoliation and feeding on squares, bolls or blooms.	<sup>op</sup> chlorpyrifos (Lorsban 4E)	2 pt.	1.0	Defoliation approaching 25% is economically damaging. Fruit damage is similar to that of bollworm.
		<sup>c</sup> methomyl (Lannate 1.8)	2 pt.	0.45	
		<sup>op</sup> profenofos (Curacron 8E)	1 pt.	1.0	
		<sup>c</sup> thiodicarb (Larvin 3.2)	1.5 pt.	0.6	



Insect	Symptom	Insecticide (trade name)	Formulation per acre	Lbs. A.I./Acre	Comments
Bollworm	Feeding on fruit including squares, flowers or bolls.	<sup>op</sup> acephate (Orthene 90S)	1.1 lb.	1.0	No resistance to currently recommended insecticides is known for bollworm in Missouri. Beneficial insects that control aphids feed on bollworm eggs and larvae late in the growing season. Natural control is common.
		<sup>p</sup> bifenthrin (Capture 2E)	2.6 oz.	0.06	
		<sup>p</sup> cyfluthrin (Baythroid 2E)	1.6 oz.	0.028	
		<sup>p</sup> cyhalothrin (Karate 1E)	3.2 oz.	0.025	
		<sup>p</sup> cypermethrin (Ammo 2.5E)	2.56 oz.	0.04	
		<sup>p</sup> cypermethrin (Cymbush 3E)	2.1 oz.	0.04	
		<sup>p</sup> esfenvalerate (Asana)	5.8 oz.	0.03	
		<sup>c</sup> methomyl (Lannate 1.8)	2 pts.	0.45	
		<sup>p</sup> permethrin (Ambush 2E)	6.4 oz.	0.1	
		<sup>p</sup> permethrin (Pounce 3.2E)	4.0 oz.	0.1	
		<sup>op</sup> rofenofos (Curacron 8E)	1 pt.	1.0	
		<sup>op</sup> sulprofos (Bolstar 6E)	1 pt.	0.75	
		<sup>c</sup> thiodicarb (Larvin 3.2)	1.5 pt.	0.6	
Boll weevil	Punctured squares and bolls either on the plant or on the ground. Punctures with plug indicates egg laying female.	<sup>op</sup> azinphosmethyl (Guthion 2L)	1 pt.	0.25	Follow trapping information. This is an occasional pest in Missouri. Winter weather is often responsible for low infestation.
		<sup>op</sup> malathion (Cythion)	14 oz.	1.0	
		<sup>op</sup> methyl parathion 4E	1 pt.	0.5	
		<sup>c</sup> oxamyl (Vydate CLV)	8.5 oz.	0.25	
Compound class: <sup>op</sup> = organophosphate compound; <sup>c</sup> = carbamate compound; <sup>p</sup> = pyrethroid compound; <sup>oc</sup> = organochlorine compound					

## Counting procedures by plant growth stage.

Plant growth stage	Scouting procedure
Preplant to emergence	Check pheromone traps and use sweep net to monitor insects adjacent to fields.
Emergence to third true leaf	Examine 5-10 plants in a section of row in each of 7-10 random locations in each pest management unit. When cotton has two true leaves, use a thrips box to check plants. Sweep weed species adjacent to fields.
Third true leaf to pinhead square	Examine 5-10 plants from two adjacent 9-foot sections of row in each of 7-10 random locations in each field. Sweep 20 times and drop cloth twice along 4 sections of row and 15 inch sweep net and 3 foot drop cloth. Sweep weed species adjacent to fields.
Pinhead square to first bloom	Examine 5-10 plants from two adjacent 9-foot sections of row in each of 7-10 random locations in the pest management unit. Sweep 20 times and drop cloth twice along 4 sections of row. Examine 50-60 green squares at random throughout each management unit.
Bloom to cutout	Examine 5-10 plants from two adjacent 9-foot sections of row in each of 7-10 random locations in each field. Examine 50-60 green squares at random and 5-10 green bolls at each stop.
Cutout to defoliation	Examine 5-10 plants from two adjacent 9-foot sections of row in each of 7-10 random locations in each field. Examine 5-10 green squares and bolls per stop.

### Equipment needed:

10x hand lens, 3-foot Dropcloth, Vials with ethyl alcohol, Hand trowel, Water jug, Wide, full-brimmed hat, 15-inch sweep net, Pocket knife, Plastic bags, Survey forms on clipboard with plastic cover, Long sleeve clothing, Thrips box

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