

Cotton Insect Management

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Effective management and control of cotton insects requires not only knowledge of their life cycles and biology but also understanding of the methods used in determining insect populations in the field. Timely scouting of fields, preferably twice weekly, provides information on the cotton plant and cotton insect populations.

Use treatment guidelines to determine the need for insecticides. Beneficial insect populations are greatly reduced by single applications or destroyed by several applications. Insecticides applied unnecessarily often generate bollworm, aphid or spider mite problems because of reduced beneficial populations.

Scouting

Scouting involves monitoring insects throughout the season to determine population levels. The point sample scouting method used in Arkansas includes a whole plant search for bollworm and boll weevil, fruit counts, the shake cloth for monitoring plant bugs and the small square set to determine fruit set and plant bug activity. Further details on insects and cotton scouting are available in Extension Circular 561 (Scouting Manual).

Insect Management

Cutworms

Several cutworm species attack cotton in the seedling stage. Symptoms of damage are wilted plants or plants cut off at the ground. Larvae usually feed at night and hide in the soil or under leaf trash during the day. The larvae vary in color, are often greasy-looking and curl up into a ball when touched. The primary damage by cutworms is stand loss.

Table 1. Insecticides for Control of Cutworms

Insecticide	Formulation Per Acre	Acres Per Gallon
Sevin 80 S	1 1/2-2 1/2 lb	
Larvin 3.2	1 1/2 pt	5.3
Orthene 90 S	1.0 lb	
Ammo 2.5 EC	1.3-5.0 oz	100-25
Fury 1.5 EC	1.37-2.05 oz	94-63
Karate 2.08 CS	1.28-1.92 oz	100-66.6
(capsule suspension)		
Asana XL 0.66	5.8-9.6 oz	22-13.2
Scout X-Tra 0.9 E	2.28-2.84 oz	56-45.4
Baythroid 2 E	0.8-1.6 oz	160-80
Decis 1.5 EC	1.11-1.62 oz	116-79
Capture 2EC	2.6-6.4 oz	49.2-20

Treatment Level: When stand loss is occurring.

Thrips

Several thrips species attack cotton upon emergence in the spring. Thrips are very small insects that may be seen if plants are shaken over a thrips box. Adults and nymphs feed on young leaves, terminals and other tender plant structures. Ragged, crinkled leaves that curl upward with a silvery appearance on the underside are typical symptoms of thrips damage to young cotton. Damage is primarily to seedling cotton, and heavy damage may stunt and delay growth. This damage may cause reduced yield, even though the cotton plant eventually outgrows visible damage. Thrips damage may contribute to a reduction in stand.

Treatments for thrips may be applied as seed treatments, at planting in-furrow as a systemic insecticide or after emergence as a foliar spray. Apply foliar sprays before the first or second true leaf begins to emerge. Thrips adults and nymphs feed inside the rolled leaves of plant terminals.

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Table 2. Insecticides for Control of Thrips

Insecticide	Formulation Per Acre	Acres Per Gallon	Method of Application
Di-Syston 15 G	4-6.7		
Temik 15 G	3.33 lb		In-furrow at planting ¹
Thimet 20 G	2.5-5.0 lb		
Payload 15 G	5.0-6.67 lb		
Di-Syston/TSX	12.3-15 lb		
Di-Syston 8EC	10.3-16.5 fl oz		In-furrow spray
Orthene 90 S	0.83-1.1 lb		In-furrow spray
Gaucho Treated Seed			Seed treatment
Orthene Treated Seed ²	Commercially available 1/5 lb of 90 S per 10-12 lb seed		Mix Orthene thoroughly with seed
Orthene 90 S	0.22 lb		Foliar spray
Bidrin 8 EC	3.2 oz	40	Foliar spray
Dimethoate 4.0 EC	6.4 oz	20	Spray
Di-Syston 8E ³	3-9 fl oz	42.7-14.2	Spray

Treatment Level: Apply foliar sprays when the first or second true leaf begins to emerge and noticeable damage appears or on older seedling cotton when an average of 1 to 2 thrips per plant are found in thrips box. See FSA 7010 for more information on thrips control.

¹Apply Temik, Di-Syston and Thimet with in-furrow fungicide.

²Orthene seed treatment may need spray treatment to aid in thrips control 7 to 10 days after emergence. When relying on foliar sprays for thrips control, Orthene treated seed should be used at planting.

³If foliar applications of Di-Syston 8E are made, do not apply soil treatments within the same crop year.

Table 3. Insecticides for Control of Western Flower Thrips

Insecticide	Formulation Per Acre	Acres Per Gallon	Method of Application
Monitor 4 EC	1-2 pt	8-4	Spray

Treatment Level: Apply foliar spray when at least 100 thrips are found per bloom plus some leaf damage. Treatment is seldom warranted. Populations may resurge to treatment levels in about 10 days after treatment.

Plant Bugs

(Tarnished Plant Bug, Clouded Plant Bug and Cotton Fleahopper)

Three species of plant bugs attack cotton in Arkansas – tarnished plant bug or *Lygus* bug, clouded plant bug and the cotton fleahopper. These plant bugs do similar damage. Feeding is by a piercing/sucking mouthpart. The insects damage terminals, squares (especially small squares), small bolls and other tender plant parts by inserting their needle-like mouthpart into them. Small squares usually turn dark and drop off while bolls may develop abnormally.

The adult tarnished plant bug is a general brown-colored insect with mottled, small, irregular white patches. The immature form or nymph is light green with five black dots on its back, long antennae and no wings. The nymph moves quickly and resembles the adult as it nears maturity.

The clouded plant bug is slightly longer than 1/4 inch and larger than the tarnished plant bug. Adults have a mottled appearance with mixtures of gray, brown and yellow colors. The first segment of

the hind legs is strikingly larger than the front legs. The top of the body is covered with small black hairs, and the legs and antennae have red bands. Young nymphs resemble tiny spiders with a small, hairy body and long legs.

The adult cotton fleahopper is a small insect about 1/7 inch long and pale green in color with tiny, dark spots. Nymphs are white and translucent at first, then become pale green after feeding. Fleahoppers feed primarily on small squares and other tender plant parts.

Scout for plant bugs at least weekly and preferably twice a week, especially during early squaring through peak squaring. Insecticide application should be considered when: (1) plant bug numbers reach a predetermined threshold based on fruiting or (2) the square damage or small square set is approaching an economic injury level and plant bugs are present.

Table 4. Insecticides for Control of Plant Bugs (Lygus) and Cotton Fleahopper

Insecticide	Formulation Per Acre	Acres Per Gallon	Method of Application
Bidrin 8 EC	4.8-8 oz	26.7-16	30
Dimethoate 4 EC	9.6-16 oz	13.3-8	14
Orthene 90 S	0.33-0.56 lb		21
Vydate C-LV	8.5 oz	15.1	14
Provado 1.6 F	3.75 oz	34.1	14
Centric 25WG	3 oz		
or 40WG	2 oz		
Address 90 S	0.33-0.56 lb		
Orthene 97	0.31-0.52 lb		

Treatment Level: Plant Bugs – Treat for 1 plant bug per row foot (14,000 per acre) on normal fruiting fields or 1 per 3 feet on abnormal fruiting fields.

Square Damage – Before approximately July 1 in northeast and July 7 in southeast if small square loss due to plant bugs as determined by square slicing is approaching 25 percent and bugs are present in field, treat with insecticide. After approximately these dates, if small square loss is due to plant bugs present in field, treat with insecticide. Terminate monitoring square damage by plant bugs after 5 to 6 weeks of squaring and peak squaring has occurred.

Plant Bug Boll Damage – Treat when 25 percent of small bolls (quarter size) show plant bug damage.

Boll Weevil

The boll weevil is one of the most destructive insects that attack cotton if infestations are left uncontrolled. A thorough knowledge of the insect's biology is important for effective control.

Boll weevils emerge from overwintering sites in the spring and enter cotton fields. When cotton begins to square, females begin to lay eggs. Eggs are deposited singly inside squares and young bolls. One female boll weevil lays an average of 150 eggs in two weeks. The development time from egg to adult averages about 22 days but may be as little as 16 days during midsummer. The eggs hatch in 2 to 4 days, and the larvae feed for 7 to 11 days before entering the pupal stage.

Boll weevils damage cotton by feeding on squares and young bolls. This feeding causes some square

shed. The most damage is done when eggs are laid inside squares and bolls. The eggs hatch and young weevils feed inside squares causing damage that usually results in square shed or boll lint damage.

Spring Suppression of Boll Weevil

Boll weevil population is generally lowest during spring emergence from overwintering sites. Boll weevil pheromone traps detect these low level populations. The number trapped determines the need for a pinhead square application of insecticide to suppress boll weevil populations.

Insecticide	Formulation Per Acre	Acres Per Gallon	Minimum Days Last Application to Harvest
Vydate C-LV	6.45-8.5 oz	19.8-15.1	14
Malathion 96.5%	10-16 oz	1.24-0.77	
Thiodan 3 EC	1-4 pt	8-2	
Phaser 3EC	1-4 pt	8-2	

Treatment Level: Treat fields at 7th node or pinhead square when 4 or more total boll weevils per trap are found per week prior to squaring. If the trap catch is 10 or higher per week, use the higher rate of insecticide. These rates recommended prior to bloom. If plant bugs are a problem, add insecticide from Table 4.

Boll Weevil Resistance Management Plan

The boll weevil has become resistant to many insecticides used for its control. Pyrethroid insecticides are very effective in controlling boll weevil. Development of resistance to pyrethroid in Arkansas may be a reality unless steps are taken to delay or prevent resistance. A resistance management plan is outlined in the following table.

Time Period	Management Options
Pinhead Square through July 1	Use Vydate, Malathion or Endosulfan Do not use pyrethroids
July 1 through August 15	Use pyrethroids for boll weevil control (Asana, Baythroid, Karate, Scout X-Tra, Fury, Capture)
August 15 through Termination of Control	Use insecticides other than pyrethroids

Insecticide	Formulation Per Acre	Acres Per Gallon	Minimum Days Last Application to Harvest
Decis	1/2 pt		
Thiodan 3 EC	1 pt	8	Do not apply after bolls open
Phaser 3EC			
Fyfanon (ULV)	14 oz	9.1	21
Vydate C-LV	8.5 oz	15.1	14
Asana XL 0.66 EC	5.8-9.6 oz	22-13	21
Baythroid 2 EC	1.79-2.11 oz	71.4-60.6	21
Capture 2 EC	3.84-6.4 oz	33.3-20	14
Karate 2.08 CS	1.6-1.92 oz	80-66.6	21
Scout X-Tra	2.56-3.33 oz	50-38.4	28
Fury 1.5 EC	2.82-3.83 oz	45.5-33.4	14
Malathion 96.5%	10-16 oz	1.24-0.77	

Treatment Level: Treat when 1 damaged square per row foot is found (14,000 per acre).
Comments: Use these insecticides after first bloom.

Bollworm and Tobacco Budworm

Bollworm (*Helicoverpa zea*) and tobacco budworm (*Heliothis virescens*) are two different insects, but the larvae look identical when observed in the cotton field. The adult stages are easily distinguishable.

The life cycle of each insect is similar. The discussion that follows applies to both insects unless otherwise specified.

Bollworm eggs are laid singly, usually in the terminal area and on other tender plant parts. However, eggs may be laid all over the plant, especially on blooms. Eggs are pearly white to a cream color and are about half the size of a pinhead. The eggs hatch into a small larva in 3 to 4 days. The life cycle for bollworms from egg to adult requires about 30 days on the average with the larva feeding for about 14 to 16 days. Newly hatched larvae first feed

Insecticide	Formulation Per Acre	Acres Per Gallon	Minimum Days Last Application to Harvest
Pyrethroids – Bollworm Rates			
Ammo 2.5 EC	2-5 oz	62.5-25	14
Asana XL 0.66 EC	5.8-9.6 oz	22-13	21
Baythroid 2 E	1.6-2.6 oz	80-49	21
Capture 2 EC	2.56-6.4 oz	50-20	14
Fury 1.5 EC	2.82-3.83 oz	45-33	14
Karate 2.08 CS	1.6-2.56 oz	80-50	21
Scout X-Tra 0.9 E	2.56-3.33 oz	50-38.4	28
Decis 1.5 EC	1.62-2.56 oz	79-50	
Pyrethroids – Budworm Rates (Use only in combination with Table 8)			
Ammo 2.5 EC	5.12 oz	25	14
Asana XL 0.66 EC	7.8-9.6 oz	16.5-13.2	21
Baythroid 2 E	2.38-3.2 oz	54-40	21
Capture 2 E	5.12-7.12 oz	25-18	14
Fury 1.5 EC	3.83 oz	33	14
Karate 1 E	4.25-5.12 oz	30.3-25.0	21
Scout X-Tra 0.9 E	2.56 oz	38.4	28
Decis 1.5 EC	2.56 oz	50	
Organophosphates (Use after August 1)			
Curacron 8 E	3/4-1 pt	10.6-8	14
Other Classes of Insecticides			
Tracer 4 (after Tracer 4)	2.144-2.88 oz	60-44	28
Steward 1.25	11.3 oz	11.5	14
Carbamates (Use prior to August 1)			
Lannate 1.8 L	2-3 pt	4-2.67	15
Lannate 2.4 LV	1 1/2-2 1/4 pt	5.3-3.6	15
Larvin 3.2	1 3/4-2 1/4 pt	4.6-3.5	28

Treatment Level: Treat for bollworms/budworms when 7,000 (1 per 2 row feet) small larvae (less than 1/4 inch) are present per acre. If larvae develop in the field, treat for 3,500 (1 per 4 row feet) medium to large sized larvae per acre. When damage to squares occurs, treat for 14,000 damaged squares per acre (1 per row foot) plus eggs and small larvae. For tobacco budworm, time applications against egg hatch if greater than 7,000 to 10,000 eggs are found per acre (7 to 10 on 14 feet).

on terminals and young squares. Larger larvae feed on larger squares and on bolls. The greatest economic loss occurs when bollworm larvae feed on bolls.

Natural enemies feed upon the eggs and young larvae of bollworms especially during the early part of the growing season. However, when bollworm populations reach treatment levels, time the insecticide to control eggs and small larvae. If properly timed, low dosages of selected insecticides and ovicides may effectively control the field population of bollworm larvae and eggs. Use an appropriate rate for larvae larger than first instar or 1/16 inch.

Insecticide	Formulation Per Acre	Acres Per Gallon	Minimum Days Last Application to Harvest
Lannate 2.4 LV	1 1/2 pt	5.3	15
Larvin 3.2	18 oz	7.1	28
Use the following after August 1			
Curacron 8 E	1/2 pt	16	14
Comment: Apply in combination with a pyrethroid insecticide to aid in control of bollworm/tobacco budworm.			

Banded Wing Whiteflies

The whitefly adult is a small, white insect with three narrow brown bands across the wings. The immature whitefly is flat and scale-like, doesn't fly and is found on the underside of leaves. Cotton is damaged by adults and immature whiteflies sucking sap from the plant. Heavy populations may cause some defoliation. The whitefly larvae secrete honeydew that may accumulate on cotton lint when bolls are opening. Black, sooty mold that could stain the lint may develop on the honeydew.

Insecticide	Formulation Per Acre	Acres Per Gallon	Minimum Days Last Application to Harvest
Orthene 90 S	0.56 lb		21
Monitor 4 EC	1-2 pt	8-4	50
Centric 25WG or 40WG	3 oz 2 oz		
Capture 2	3.8-6.4 oz	33-20	
Danitol 2.4EC + Orthene	8-16 oz	16-8	
Treatment Level: When 50 percent of the plants are heavily infested.			

Cotton Aphids

Aphids may build up in cotton fields any time during the growing season. Aphids reproduce very rapidly during favorable conditions, and large populations may build up in a short time. A new

generation may occur every 5 days during the warm summer months. Aphids damage cotton by sucking juices from the plant and secreting honeydew. High populations of young cotton cause the leaves to curl down or crinkle; plants may become stunted and die, especially when they are young. When infestations occur during the main fruiting period, the older leaves may turn yellow and shed. Squares and small bolls may drop off as a result of severe leaf shed. During late season, the secretion of honeydew falls on open cotton and the lint may be stained by a black sooty mold which develops on the honeydew-contaminated lint.

Insecticide	Formulation Per Acre	Acres Per Gallon	Minimum Days Last Application to Harvest
Methyl Parathion 2 plus Thiodan 3 EC	1 pt	8	Do not apply after bolls open
Lannate 2.4 LV	6.7-13.3 oz	19.1-9.6	15
Bidrin 8 EC	4 oz	32	30
Dimethoate 4 EC	8 oz	16	14
Provado 1.6 F	2-3.75 oz	64-34.1	14
Monitor 4 EC	1-2 pt	8-4	50
Centric 25WG or Centric 40WG	3 oz 2 oz		
Treatment Level: Treat when populations are building and aphids are present on approximately 50 percent of the plants.			

Aphid Management and Control

1. Use systemic in-furrow insecticides at planting to suppress early season aphids.
2. Avoid, if possible, early season use of insecticides and over-the-top applications of arsenical herbicides.
3. Follow treatment threshold recommendations.
4. Use 5-gallon volume per acre by air and as much as possible by ground application using hollow cone nozzles.
5. Alternate or change insecticides if insecticide has been used previously in field.
6. **Contact your county agent for most recent recommendations.**

Spider Mites

Spider mites may invade fields any time during the year. They generally move into fields from field borders which serve as overwintering sites. Spider mites build high populations in a relatively short time. Mites develop from an egg to an adult in 5 to 7 days during summer. Spider mites feed on plant

juices causing small, yellow spots on the leaves, resulting in a speckled appearance. Leaves may turn reddish when the infestation becomes heavy or during dry weather. Areas in fields infested with spider mites may appear lighter in color or reddish from a distance.

Table 11. Miticides for Control of Spider Mites

Insecticide	Formulation Per Acre	Acres Per Gallon	Minimum Days Last Application to Harvest
Comite	1 1/2-2 pt	5.3-4	50
Kelthane	1-1 1/2 qt	4-2.66	14
Capture 2 EC	3.8-6.4 oz	33-20	14
Zephyr 0.15 E	8-16 oz	16-8	14

Treatment Level: Treat infested areas when 50 percent of plants are infested. Spot treatment may be beneficial.

Loopers

Cabbage and soybean looper larvae are light green with several white lines down the length of the body. The larva arches the body as it crawls, thus the name looper. The larvae feed entirely on foliage between the leaf veins leaving a net-like appearance. Severe feeding while immature bolls are in the field reduces yield significantly, whereas feeding damage late in the season may not cause yield loss.

Table 12. Insecticides for Control of Cabbage Loopers or Soybean Loopers

Insecticide	Formulation Per Acre	Acres Per Gallon	Minimum Days Last Application to Harvest
Larvin 3.2 F	2 1/4 pt	5.3-3.6	28
Orthene 90 S	1.0 lb		21
Tracer 4	2.14-2.9 oz	60-45	28
Steward 1.25SC	6.7-9.2 oz	19-14	
Orthene 97	0.93 lb		
Confirm	8-16 oz	16-8	14
Intrepid 2F	4-8 oz	32-16	14

Treatment Level: When 25 percent defoliation has occurred and bolls are still being developed.

Armyworms

The beet armyworm and fall armyworm may occasionally cause damage to cotton fields. The eggs are laid in masses, and larvae may occur in high numbers.

Beet armyworm larvae range in color from light green to dark olive green or black and average 1 1/4 inches long at maturity. The beet armyworm is a general feeder and feeds on foliage, squares, blooms and bolls. The larvae tend to feed in groups. Feeding results in cotton plants appearing ragged overall. Infestations of larvae may be spotty, occurring only in certain areas of the field.

Fall armyworm larvae are light to medium brown and have a smooth appearance. The fall armyworm may be easily confused with the bollworm. However, the fall armyworm has an inverted “Y” on the front of its head that is cream colored in contrast to a darker brown head. The fall armyworm tends to feed primarily on bolls even when small larvae, but they will feed on squares and blooms.

Table 13. Insecticides for Control of Beet Armyworms

Insecticide	Formulation Per Acre	Acres Per Gallon	Minimum Days Last Application to Harvest
Steward 1.25SC	9.2-11.3 oz	14-11.5	14
Tracer 4	2.2-3.6 oz	58-36	28
Confirm	8-16 oz	16-8	14
Intrepid 2F	4-8 oz	32-16	14

Treatment Level: Fields should be scouted very carefully for egg masses, and time treatments on egg hatch to get most effective control. *Treat when infestation is damaging bolls and squares comparable to bollworm treatment levels.*

Table 14. Insecticides for Control of Fall Armyworms

Insecticide	Formulation Per Acre	Acres Per Gallon	Minimum Days Last Application to Harvest
Larvin 3.2 F	1.5-2.25 pt	5.3-3.5	28
Tracer 4	2.2-3.6 fl oz	58-36	28
Steward 1.25SC	9.2-11.3 oz	14-11.5	14
Lannate 2.4LV	1.5-2.25 pt	5.3-3.6	15
Lannate 1.8L	2-3 pt	4-2.7	15
Curacron 8E	0.75-1 pt	10.7-8	14

Treatment Level: Treat infestations when larvae are causing damage to bolls and squares in levels comparable to bollworm treatment levels. Approximately 3,000 to 5,000 larvae per acre.

Stink Bugs

Several species of stink bugs can cause economic losses in cotton. The most important species are the green, brown and southern green stink bugs. Adults of the green and southern green stink bug are both green but can be differentiated by band color on antennae. Green stink bugs have black bands and southern green stink bugs have red bands on the antennae. Nymphs of the green stink bug have a striped abdomen, and nymphs of the southern green stink bug have a spotted abdomen. Adults of the brown stink bug are brown and without sharp spines on the “shoulders,” and nymphs are a light brown to pale green color. After migrating into cotton from alternate hosts, these destructive pests feed on developing bolls during mid to late season. Feeding is done with piercing/sucking mouthparts and is concentrated on seeds and surrounding tissues.

Insecticide	Formulation Per Acre	Acres Per Gallon	Minimum Days Last Application to Harvest
Bidrin 8	6-8 oz	21.3-16	30
Methyl parathion 4	1 pt	8	8

Treatment Level: Treat at 1 bug per 6 row feet or when 20 percent of medium bolls display internal signs of feeding and stink bugs are observed. Many pyrethroids, at bollworm rates, will provide good control of "green" species, but "brown" species are less susceptible to insecticides, specifically pyrethroids.

Insect Treatment Levels for Narrow Row Cotton – 30-inch Row Spacing

Insect treatment levels for aphids, thrips, whiteflies, cutworms, loopers and spider mites are the same on 30-inch as 38-inch row spacing. Since treatment levels for bollworm/tobacco budworm larvae, boll weevil and plant bugs are based on a per acre basis, the numbers will change. The percent square set will not change for plant bugs.

Row Feet Sampled	Row Width	
	30"	38"
14	11	14
28	22	28
56	45	56

Row Feet Sampled	Row Width			
	30"		38"	
	Newly Hatched Less than 1/4"	Medium Size 1/4"-1/2"	Newly Hatched Less than 1/4"	Medium Size 1/4"-1/2"
14	6	3	7	3-4
28	11	6	14	7
56	22	11	28	14

Row Feet	Number of Damaged Squares	
	30"	38"
14	11	14
28	22	28
56	45	56

Number of Plant Bugs Per 24 Foot Row			
30" Row		38" Row	
Normal	Problem Fields	Normal	Problem Fields
19	6	24	8

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