

# Texas Guide

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## For Controlling Cotton Insects



THE AGRICULTURAL AND MECHANICAL  
COLLEGE OF TEXAS  
TEXAS AGRICULTURAL EXTENSION SERVICE  
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# TEXAS GUIDE FOR CONTROLLING COTTON INSECTS

**COTTON INSECTS** can be controlled economically by the use of the proper poisons at the correct time (See table). *Poisons must cover the plants to kill insects.* Plants usually are not protected from insect attack on new growth or if poisons are washed off.

Substantial profits have been made, *even when a large number of poison applications were necessary for maximum yields*, by controlling damaging infestations of boll weevils and bollworms on cotton growing on fertile soils. On upland soils where insect infestations do not last long, fewer applications may be needed. The control program for 1962 includes three phases:

1. **EARLY SEASON CONTROL** (insures early fruiting and maturity)
2. **LATE SEASON CONTROL** (based upon infestation)
3. **EARLY STALK DESTRUCTION AND FARM CLEANUP**

The grower must carry out an adequate control program to obtain greatest benefits. All cotton acreage usually needs early season control. Cotton should be inspected before applying insecticides to determine the degree of infestation and to check for pests such as aphids and spider mites which may influence the choice of insecticides if these pests are present with other pests.

Dryland acreage should receive late season treatment when infestation counts indicate that it is needed. Cotton growing under irrigation or on other high-yielding land usually needs protections throughout most of the growing season.

For information on the identification, life history and nature of damage of the major cotton insects, see B-933, *Cotton Insects*.

## **Early Stalk Destruction and Farm Cleanup**

Early harvest, immediate stalk destruction and plow under of debris before the first frost reduces boll weevil and pink bollworm populations. These practices force the boll weevil into starvation before time to enter winter quarters, prevent late season buildup of weevils and pink bollworms and reduce the numbers that survive the winter. See L-219, *Ways to Fight the Pink Bollworm in Texas*.

## **When to Apply Insecticides**

### **PINK BOLLWORM**

Pink bollworm counts should begin after cotton has been blooming for at least five days. Select five representative locations in the field, step off 300 feet of row and count the number of rosetted blooms. Add the total number of rosetted blooms from these five loca-

tions and multiply by 10 to obtain the number of worms per acre. When approximately 350 or more worms per acre are found, begin treatment immediately.

When less than 350 worms per acre are found, make boll inspections as soon as first bolls are 4 weeks old and continue at weekly intervals. Walk diagonally across the field and collect at least 100 bolls (two-thirds grown or larger). Crack the bolls and examine the inside of the hull for tunnels made by small worms. Start treatment when 10 to 15 percent of the bolls are infested and continue until 70 percent are open.

If pink bollworms and other cotton insects occur simultaneously, add suitable insecticides to the DDT for effective control of other pests.

### **OTHER INSECTS**

Methods of making infestation records and criteria to be used in determining need for treatment are given in the "remarks" column of the various pests in the table of this guide.

Application of insecticides near the time bollworms usually appear may create conditions favorable for these pests to build up in damaging numbers. A well-planned early season program should be employed to control early season pests such as thrips, overwintered boll weevils and fleahoppers. Time these treatments so that insecticidal applications may cease at least 30 days before bollworms normally appear unless injurious infestations make additional treatments necessary. Avoiding insecticidal applications during this period permits beneficial insects to build up as an aid to bollworm control.

Although beneficial insects may aid in controlling cotton pests such as the bollworm, cotton aphid and spider mite, *growers never should rely entirely on beneficial insects to control cotton insects*, but should examine their fields frequently to determine the need for insecticides.

**INSECTICIDES SHOULD BE APPLIED AT INTERVALS OF NOT MORE THAN 5 DAYS TO MAINTAIN EFFECTIVE CONTROL OF THE BOLL WEEVIL, BOLLWORM AND PINK BOLLWORM.**

## **Treatment with Systemic Insecticides at Planting Time**

Four to 6 weeks protection from planting date can be obtained from thrips, aphids, spider mites and leaf miners with phorate (Thimet) applied to the seed or placed in the furrow in granulated form at planting. One-fourth to 1/2 pound of the active ingredient per acre may be applied as a seed treatment or 1/2 to 1 pound per acre in the furrow. Seed may be treated at the rate of 1 to 1 1/2 pounds per 100 pounds of seed to accommo-

date planting rate. One pound of actual Di-syston applied in granular form at time of planting is also effective. Overdosing with seed treatments may retard early growth especially under weather conditions unfavorable for emergence. Use extreme care in handling treated seed or granules because they are toxic to man.

## **Three-way Insecticidal Mixtures**

Commercial mixtures of emulsifiable concentrates containing three insecticides are being marketed in the State. In most instances, they give control of several pests. However, they are often formulated in such proportions that the needed dosage of one of the necessary insecticides is not sufficient to control a certain pest. For example, insufficient amounts of needed insecticides for bollworm or boll weevil control may be applied when such mixtures are used, resulting in poor control. Therefore, growers should know the contents of such mixtures and make sure that they are applying recommended dosages of the insecticides required to give control of the pests involved.

Spray recommendations are based on the formulation below. Examine the labels on all containers and if the formulation varies from these, consult your county agent or extension entomologist for amounts to be used.

### **POUNDS OF ACTUAL MATERIAL PER GALLON**

Aldrin	2	Methyl Trithion	4
DDT	2	Parathion	2
Demeton	2	Sevin (W.P.) 80% wettable	
Dieldrin	1.5	powder	
Endrin	1.6	Toxaphene	6
Ethion	4	Trithion	4
Guthion	2	Gamma BHC—0.9, DDT—1.5	
Heptachlor	2	Strobane—4, DDT—2	
Malathion	5	Toxaphene—4, DDT—2	
Methyl parathion	2		

## **Caution**

All insecticides are poisonous. Follow precautions on the labels strictly. Take special precautions in handling parathion, endrin, methyl parathion, demeton, Di-syston, Guthion, Trithion and phorate (Thimet) to avoid prolonged contact with the skin or breathing the vapors or drift from either spray or dust.

Be mindful of insecticidal drift that may contaminate neighboring vegetables or forage crops at the time cotton is sprayed or dusted. Plan crop locations in advance to eliminate this problem.

## GENERAL INFORMATION

In the late season program, dusts and sprays are equally effective when properly applied. Repeat the application as soon as possible if the poison is washed off within 24 hours, except when aphicides are used. Increase dosages to maximum indicated in the table when necessary to obtain control.

Apply dusts when the air is calm or nearly so. Dew on plants is not necessary. Dusts and wettable powders are washed off more easily by light showers than sprays. Place dust nozzles on ground machines 4 to 6 inches above the plants.

Apply sprays when wind velocities do not exceed 10 miles per hour and when leaves are dry. Where adjacent crops may be contaminated, applications should be made under conditions of lower wind velocity. Poison "run-off" may occur if leaves are wet. For early season treatment with ground equipment, one or two cone-type nozzles per row, placed 10 to 15 inches above the tops of plants will suffice. Nozzle spacings of 20 inches on the boom are adequate for late season control. Apply sprays at approximately 60 pounds pressure and at the rate of 2 to 8 gallons per acre. As a safety measure, mount spray booms on the rear of the tractor.

Ground machines and airplanes are equally effective for applying poisons. For information on how to calibrate and adjust spray machines, see L-486, *Insecticidal Spraying of Field Crops with Ground Machinery*. For best results with airplanes, flag the swaths so that they overlap. *Increase dosages recommended in this guide by at least 50 percent when an airplane is used in making early season applications.* Apply sprays at 2 to 2½ gallons per acre except in West Texas; increase the amount to 3 or 4 gallons per acre for this area.

Some poisons are destructive to honeybees. A determined effort should be made to prevent their destruc-

tion, since bees help pollinate many agricultural crops.

Supplemental guides for the South Texas and High Plains and Trans-Pecos areas are available.

The recommendations in this Guide are based upon results of experiments conducted by the Texas Agricultural Experiment Station of the A&M College of Texas and the Entomology Research Division, United States Department of Agriculture.

*For additional information, contact your county agent or write the extension entomologists, College Station, Texas.*



### EARLY SEASON CONTROL PROGRAM (Insecticides listed at random)

INSECTS	INSECTICIDES		AMOUNT OF SPRAY CONCENTRATE PER ACRE	REMARKS
	DUSTS	SPRAYS		
Cutworms and certain army-worms		A. Toxaphene-DDT <sup>1</sup> B. Toxaphene <sup>1</sup> C. Endrin <sup>1</sup> D. DDT <sup>1</sup>	1 1/3 to 2 qt. 1 1/3 to 2 qt. 1 1/2 to 2 pt. 1/2 to 1 gal.	Examine seedling cotton for presence of these pests. Apply treatment as needed.
Thrips		A. Dieldrin + DDT <sup>1</sup> B. Guthion <sup>2</sup> C. Strobane-DDT <sup>1,3</sup> D. Sevin <sup>4</sup> E. Toxaphene-DDT F. Heptachlor + DDT <sup>1,3</sup> G. Endrin + DDT <sup>1</sup> Apply spray at 7-day intervals	1 to 1 1/2 pt. + 1 qt. 1/2 to 1 pt. 1 1/2 pt. to 1 1/2 qt. .7 to 1.3 lb. 1 1/2 pt. to 1 1/2 qt. 1 to 1 1/2 pt. + 1 qt. 1 to 1 1/2 pt. + 1 qt.	Thrips usually damage cotton from the time it emerges until the plants are 4 to 6 weeks old. If thrips are present, make first application soon after emergence. Early planted cotton may not need thrips protection until the four-leaf stage. In either case, make the second application 7 days after the first. Methyl parathion at 1 pt. per acre may be substituted for DDT in the above mixture to control thrips.
Overwintered boll weevils	Dusts are effective, but sprays are considered more practical and economical under early season conditions.	A. Toxaphene-DDT B. Sevin C. Strobane-DDT D. Guthion E. Methyl parathion <sup>5</sup> F. Methyl Trithion <sup>1,3</sup>	1 1/3 to 2 qt. 1.3 to 1.6 lb. 1 1/3 to 2 qt. 1 to 1 1/4 pt. 1 to 1 1/2 pt. 1/2 to 3/4 pt.	These insecticides also control thrips and cotton fleahoppers. Make application for overwintered boll weevil control just before first squares are one-third grown to prevent egg laying. If the emergence of more weevils from hibernation sites occurs, an additional treatment may be necessary. Guthion, Sevin, Methyl Trithion and methyl parathion produce more rapid, effective control of overwintered boll weevils in areas where they are resistant to chlorinated hydrocarbons.
Fleahoppers		A. Guthion B. Sevin C. Heptachlor + DDT D. Strobane-DDT E. Toxaphene-DDT F. Dieldrin + DDT G. Endrin + DDT	1/2 to 1 pt. .7 to 1.3 lb. 1 to 1 1/2 pt. + 1 qt. 1 1/2 pt. to 1 1/2 qt. 1 1/2 pt. to 1 1/2 qt. 1 to 1 1/2 pt. + 1 qt. 1 to 1 1/2 pt. + 1 qt.	Treatments for thrips and overwintered boll weevils also control fleahoppers; however, injurious fleahopper infestations may develop after this period. Subsequent treatment for fleahoppers should be made ONLY when infestation counts warrant. <b>HOW TO CHECK FOR FLEAHOPPERS</b> —After cotton is old enough to produce squares, examine the main stem terminal buds (about 3-4 in. of the top of the plant) of 100 cotton plants at several representative points in the field. Begin treatments when 15 to 35 fleahoppers (nymphs and adults) are found per 100 terminals.

Methyl parathion at 1 pt. per acre may be substituted for DDT in the above mixtures to control fleahoppers. Apply sprays at 7 day intervals.

Where no resistance to insecticides has been encountered in controlling boll weevils, thrips and fleahoppers, one of the chlorinated hydrocarbons listed under thrips and fleahoppers may be used without DDT.

Cotton aphids	Dusts are effective, but sprays are considered more practical and economical under early season conditions.	A. Malathion B. Methyl parathion C. Parathion <sup>5</sup> D. Demeton <sup>5</sup>	1 to 1 1/2 pt. 1 to 1 1/2 pt. 1 to 1 1/2 pt. 1/2 to 1 pt.	In early season, apply insecticides as needed. In late season, begin treatment when honeydew appears. Demeton, parathion, malathion or methyl parathion may be combined with other sprays.
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### LATE SEASON CONTROL PROGRAM (Insecticides listed at random)

INSECTS	INSECTICIDES		AMOUNT OF SPRAY CONCENTRATE PER ACRE	REMARKS
	DUSTS	SPRAYS		
Apply dusts at 10-15 lb. per acre unless otherwise indicated.				
Bollweevils and bollworms	A. Low-lime calcium arsenate + 5% DDT <sup>1</sup>	A. Sevin	1.9 to 2.5 lb.	HOW TO CHECK FOR BOLL WEEVILS—Examine cotton weekly. Pull 100 squares, at least 1/3 grown, at random, removing a few squares at several representative places in the field. If 15 to 25% or more have weevil punctures, begin treatment. Two or more applications of insecticides are required to control weevils. IF APHIDS ARE A PROBLEM, ADD 1% PARATHION TO CALCIUM ARSENATE. Increase dosages where heavy bollworm infestations occur. Apply insecticides at 5-day
	B. 2½% Guthion-10% DDT	B. Strobane-DDT	1½ to 2 qt.	
	C. 5% methyl parathion-10% DDT	C. Methyl Trithion + DDT <sup>1,3</sup>	¾ to 1 pt. + 2 to 3 qt.	
	D. 10% Sevin-40% sulfur	D. Methyl parathion + DDT <sup>1,5</sup>	1½ to 2 pt. + 2 to 3 qt.	
		E. Toxaphene-DDT	1½ to 2 qt.	
		F. Guthion + DDT <sup>1,2</sup>	1 pt. + 2 to 3 qt.	

Where no resistance to insecticides has been encountered in controlling boll weevils, one of the following may be used:

Bollweevils and bollworms	A. Low-lime calcium arsenate + 5% DDT <sup>1</sup>	A. Sevin	1.9 to 2.5 lb.	HOW TO CHECK FOR BOLL WEEVILS—Examine cotton weekly. Pull 100 squares, at least 1/3 grown, at random, removing a few squares at several representative places in the field. If 15 to 25% or more have weevil punctures, begin treatment. Two or more applications of insecticides are required to control weevils. IF APHIDS ARE A PROBLEM, ADD 1% PARATHION TO CALCIUM ARSENATE. Increase dosages where heavy bollworm infestations occur. Apply insecticides at 5-day intervals. UNDER CONDITIONS OF HEAVY BOLL WEEVIL INFESTATIONS WHERE IT IS DESIRABLE TO REDUCE WEEVIL NUMBERS QUICKLY, THE FOLLOWING MATERIALS ARE EFFECTIVE:
	B. 2½% Guthion-10% DDT C. 5% methyl parathion-10% DDT D. 10% Sevin-40% sulfur	B. Strobane-DDT C. Methyl Trithion + DDT <sup>1,3</sup>  D. Methyl parathion + DDT <sup>1,5</sup>  E. Toxaphene-DDT F. Guthion + DDT <sup>1,2</sup>	1½ to 2 qt. ¾ to 1 pt. + 2 to 3 qt. 1½ to 2 pt. + 2 to 3 qt. 1½ to 2 qt. 1 pt. + 2 to 3 qt.	
Where no resistance to insecticides has been encountered in controlling boll weevils, one of the following may be used:				
	A. 3-10-40 mixture <sup>1</sup> B. 2½% dieldrin-10% DDT-40% sulfur C. 20% Strobane-40% sulfur D. 2½% heptachlor-10% DDT-40% sulfur E. 20% toxaphene-40% sulfur F. 2½% endrin-40% sulfur	A. Endrin B. BHC-DDT <sup>1</sup> (3-5 mixture) C. Dieldrin + DDT  D. Heptachlor + DDT	1½ pt. to 1 qt. 1⅓ to 2 qt. 1¼ pt. to 1 qt. + 2 to 3 qt. 1 pt. to 1 qt. + 2 to 3 qt.	A. Chlorinated hydrocarbon-DDT mixture + methyl parathion or Methyl Trithion. B. Guthion-DDT C. Sevin D. Low-lime calcium arsenate + DDT E. Methyl parathion or Methyl Trithion + DDT at 3-day intervals.
Bollworms	A. 20% toxaphene-40% sulfur B. 10% Sevin-40% sulfur C. 10% DDT-40% sulfur D. 2½% endrin-40% sulfur E. 20% Strobane-40% sulfur F. 2- or 3-10-40 mixture G. 2½% endrin-5% DDT-40% sulfur	A. Strobane-DDT B. Endrin C. DDT D. Endrin + DDT  E. Toxaphene-DDT F. Sevin	1½ to 2 qt. 1 to 1¼ qt. 2 to 3 qt. 1¼ to 1¾ pt. + 1 pt. to 1 qt. 1½ to 2 qt. 1.9 to 2.5 lb.	HOW TO CHECK FOR BOLLWORMS—Examine the terminal buds (upper 3 to 4 inches of the plant) of 100 cotton plants and 100 consecutive squares and bolls at each of several points in the field. Begin treatment when bollworm eggs and 4 or 5 young worms are found per 100 terminals or 5% of the small squares and bolls have been injured by small bollworms. Apply dusts or sprays at 5-day intervals.
Cotton aphids	Use sprays as recommended for early season control. Use 1% methyl parathion, 1% parathion or 4% malathion dust.			
Spider mites	A. 1% parathion B. 2½% methyl parathion	A. Trithion <sup>1</sup> B. Methyl parathion C. Ethion <sup>1,3</sup> D. Parathion E. Demeton	¾ to 1½ pt. 1 to 1½ pt. ¾ to 1½ pt. ½ to 1 pt. ½ to 1 pt.	Treat when leaves begin to turn yellow. Demeton, ethion or Trithion generally are more effective for controlling the two-spotted mite. Two applications at 5-day intervals may be necessary with all materials except demeton.
Lygus and stink bugs	A. 3-10-40 mixture B. 10% DDT-75% sulfur C. 20% toxaphene-40% sulfur	A. Toxaphene-DDT B. BHC-DDT (3-5 mixture) C. DDT	1 to 2 qt. 1⅓ to 2 qt. 1½ to 2 qt.	When 8 to 10 bugs are found per 100 squares or young bolls, begin treatment. Apply dusts or sprays at 7 to 10-day intervals.
Leafworms	A. Calcium arsenate B. 2½% Guthion C. 1% parathion D. 10% Sevin-40% sulfur E. 1% methyl parathion	A. Guthion B. Parathion C. Sevin D. Methyl parathion E. Toxaphene-DDT	1 to 1⅓ pt. ½ to 1 pt. 1.3 to 1.6 lb. ½ to 1 pt. 1 to 2 qt.	Apply dusts or sprays when cotton leafworms first appear and at 5-day intervals until control is obtained. Young worms are easier to kill than old worms. The BROWN COTTON LEAF WORM can be controlled effectively with parathion—½ to 1 pt.; malathion—½ pt.; or endrin—1¾ pt. per acre.
Cabbage loopers	A. 2½% endrin-40% sulfur at 18 lb. per acre	A. Endrin	1 to 1¼ qt.	Begin treatment when small worms first appear. Regular applications of toxaphene-DDT or 2- or 3-10-40 for bollworms usually prevent heavy looper damage. Cabbage loopers are susceptible to viral and bacterial diseases which, in many instances, will control the infestation and eliminate the need for insecticidal control.
Grasshoppers	A. 5% heptachlor-40% sulfur B. 2½% dieldrin-40% sulfur C. 2½% Aldrin-40% sulfur D. 20% toxaphene-40% sulfur	A. Dieldrin B. Aldrin <sup>1</sup> C. Heptachlor D. Toxaphene	⅔ to 1⅓ pt. 1 to 1½ pt. 1 to 2 pt. 1 to 2 qt.	Apply insecticide when damaging infestations appear. Baits are preferred for control of "jumbo" grasshoppers. (See your county agent for bait mixture.)
Pink bollworms	A. 2½% Guthion-10% DDT B. 10% DDT C. 10% Sevin-40% sulfur	A. Sevin B. DDT C. Guthion + DDT	1.9 to 2.5 lb. 3 qt. to 1 gal. ¾ to 1½ pt. + 2 to 3 qt.	Apply DUSTS at 15 lb. per acre at 5-day intervals. Apply SPRAYS at 5-day intervals. See text for additional information and how to make infestations counts for pink bollworms.

pt. = pints

qt. = quarts

gal. = gallons

lb. = pounds

<sup>1</sup>Do not feed treated forage or allow dairy or meat animals to graze in treated fields.<sup>2</sup>Do not apply within 5 days of harvest at the 1/4 pound rate of active ingredients per acre. Do not apply within 21 days of harvest if a larger dosage is used.<sup>3</sup>Do not apply after bolls open.<sup>4</sup>Problems may be encountered in spraying wettable powder with low-volume farm sprayers; follow manufacturer's directions carefully. Allow 7 days between last application and grazing treated fields.<sup>5</sup>Do not apply within 5 days of hand picking.