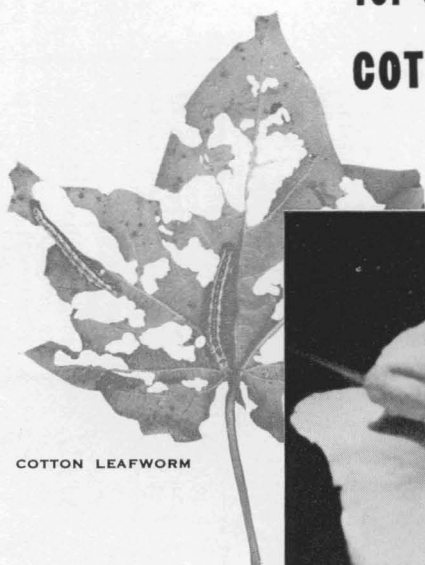


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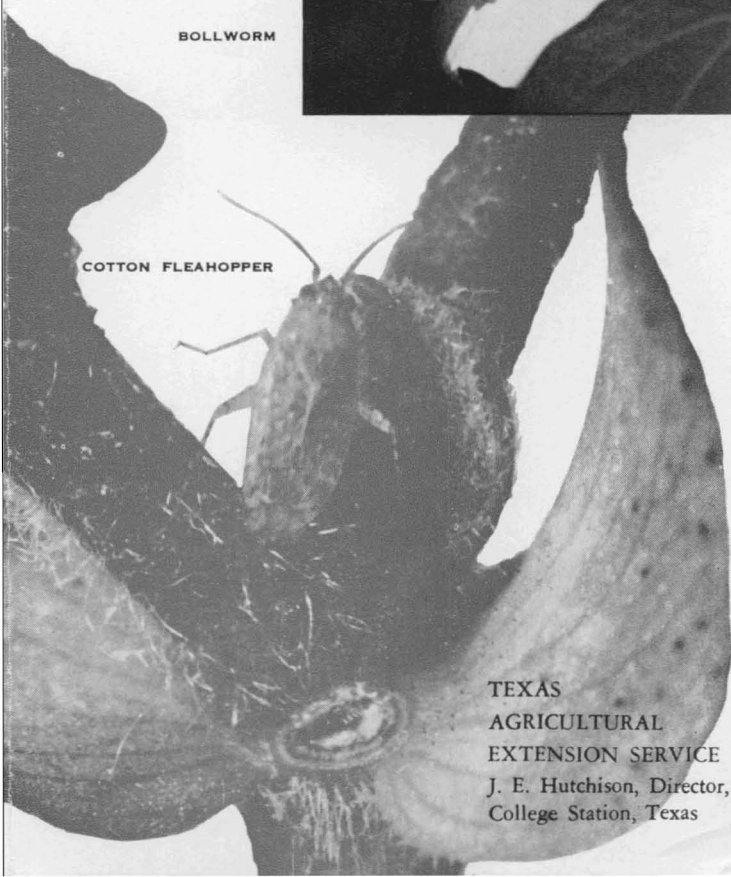
# **Texas Guide for Controlling COTTON INSECTS**



**COTTON LEAFWORM**



**BOLLWORM**



**COTTON FLEAHOPPER**

**TEXAS  
AGRICULTURAL  
EXTENSION SERVICE  
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# TEXAS GUIDE FOR CONTROLLING COTTON INSECTS — 1959

**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 1959 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.

## *Early Stalk Destruction and Farm Cleanup*

Early harvest and immediate stalk destruction before the first frost reduce 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 for more details.

## *Pink Bollworm*

Crop losses from heavy pink bollworm infestations can be reduced by the proper use of insecticides as recommended in this Guide.

## WHEN TO APPLY INSECTICIDES

Pink bollworm counts should begin after cotton has been blooming for at least 5 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 locations 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, boll inspections should be made as soon as first bolls are 4 weeks old, and continued 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 boll carpel (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.

Insecticides recommended for pink bollworm control are (1) DDT, (2) Sevin and (3) a mixture of Guthion and DDT. DDT may be used either as a dust or spray. It should be applied at a rate of 1¼ to 2 pounds of technical material per acre at 5-day intervals or 2 to 3 pounds at weekly intervals. Sevin, available only as a dust, should be used in a 10 percent concentration applied at 10 to 15 pounds per acre at 5-day intervals or 20 to 25 pounds at 7-day intervals. A dust containing 2½ percent Guthion and 10 percent DDT should be applied at a rate of 10 to 15 pounds at 5-day intervals or 15 to 20 pounds at 7-day intervals. When applied as a spray, the rate should be 1 to 2 pints of Guthion (1.5 lb. per gal.) plus 2 to 3 quarts of DDT (2 lb. per gal.) per acre at 5-day intervals, or 2 to 3 pints of Guthion plus 3 to 4 quarts of DDT at 7-day intervals. **Applications of Guthion at the low rate should not be applied within 5 days of harvest or at the high rate should not be made within 21 days of harvest.** Sevin should not be applied after bolls open.

If bollworms and boll weevils occur simultaneously, suitable insecticides should be added to the DDT for effective control of both pests.

A 5-DAY SCHEDULE IS NECESSARY TO OBTAIN EFFECTIVE CONTROL OF THE BOLL WEEVIL AND COTTON BOLLWORM.

## *Seed Treatment with Systemic Insecticides*

Research results show that 4 to 6 weeks' protection from the planting date has been obtained against thrips, aphids, spider mites and leaf miners with Thimet when applied to planting seed. Overdosing with this material may retard early growth. One pound of the active ingredient plus an equal amount of carbon per bushel of seed planted per acre appears to be a relatively safe dosage. Extreme care must be exercised in planting treated seed because of the toxicity of the compound to man. Under weather conditions unfavorable for germination this treatment may reduce the stand of cotton.

**CAUTION:** All insecticides are poisons and precautions given on the labels should be followed strictly. Special precautions should be taken in handling Parathion, Methyl Parathion, Demeton, Guthion and Thimet to avoid prolonged contact with the skin or breathing the vapors or drift from either spray or dust.

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

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

## CONTROL OF COTTON INSECTS IN WEST TEXAS

Most of the cotton pests listed in the Guide, except for the boll weevil, appear in this area. In general, cabbage loopers are more serious in West Texas than in other parts of the State. Fields should be checked frequently for looper and bollworm infestations and control measures should be applied when the worms are small. It is essential to apply insecticides at 5-day intervals until infestation is controlled. Cotton plants can tolerate a certain amount of ragging of leaves by loopers. Regular applications of toxaphene-DDT or 2- or 3-10-40 for bollworms usually prevent heavy looper damage. However, if the looper infestation is high, use endrin as recommended

in the Table. This insecticide will also control the bollworm.

Airplanes should apply 3 to 4 gallons per acre of the spray mixture in this area. Increased volumes of water are necessary because of the high evaporation rate due to low humidity and high temperature.

### 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 where demeton and other aphicides are used. Increase dosages to maximum indicated in the Table when necessary to obtain control.

Dusts should be applied when the air is calm or nearly so. Dew on plants is not necessary. Dust nozzles on ground machines should be placed 4 to 6 inches above the plants.

Spray applications may be made during wind velocities up to 12 miles per hour. Apply spray when leaves are dry, otherwise poison "run-off" may occur. For early season treatment with ground equipment, one or two cone-type nozzles per row, placed 6 to 9 inches above the tops of plants, are sufficient. Nozzle spacings of 20 inches on the boom are adequate for late season control. Sprays should be applied at approximately 60 pounds pressure and at 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 best results with airplanes,

flag the swaths so that they overlap. Increase dosages recommended in this Guide at least 50 percent when an airplane is used to make early season applications. Sprays should be applied at 2 to 2½ gallons per acre except in West Texas; increase the amount to 3 to 4 gallons per acre for this area.

Some poisons are destructive to honeybees. A determined effort should be made to prevent their destruction since bees help pollinate many agricultural crops.

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.

A supplemental guide for the Lower Rio Grande Valley is available from extension agents in that area.



EARLY SEASON CONTROL PROGRAM

(INSECTICIDES LISTED AT RANDOM)

INSECTS	INSECTICIDES		AMOUNT OF SPRAY CONCENTRATE PER ACRE	REMARKS
	DUSTS	SPRAYS AND POUNDS OF TOXICANT PER GALLON		
Cutworms and certain armyworms	A. 20% toxaphene B. 10% DDT Apply dusts at 15 to 20 lb./acre	A. Toxaphene (6 lb./gal.) B. DDT (2 lb./gal.) C. Toxaphene-DDT (4 lb.-2 lb./gal.)	1 1/3 to 2 qt. 1/2 to 1 gal. 1 1/3 to 2 qt.	Examine seedling cotton for presence of these pests. Apply treatment as needed.
Thrips, cotton flea-hoppers, over-wintered boll weevils	A. 2 1/2% endrin-40% sulfur B. 20% toxaphene-40% sulfur C. 2 1/2% heptachlor-40% sulfur D. 2 1/2% aldrin-40% sulfur E. 10% Sevin-40% sulfur F. 2 1/2% dieldrin-40% sulfur Apply dusts at 7 to 10 lb. per acre at 7-day intervals.	A. Endrin (1.6 lb./gal.) B. Toxaphene (6 lb./gal.) C. Heptachlor (2 lb./gal.) D. Aldrin (2 lb./gal.) E. Dieldrin (1.5 lb./gal.) Apply sprays at 7-day intervals	1 to 1 1/2 pt. 1 1/2 pt. to 1 1/2 qt. 1 to 1 1/2 pt. 1 to 1 1/2 pt. 1 to 1 1/2 pt.	Begin treatment when cotton is in the 4-leaf stage or earlier if necessary. Two to 4 applications may be needed, but regardless of number, stop treatment at least 30 days before the bollworm usually appears, UNLESS FLEAHOPPERS OR BOLL WEEVIL INFESTATIONS ARE EXTREMELY HEAVY. This period allows sufficient time for beneficial insects to build up as an aid to bollworm control. Use maximum dosage recommended if overwintered boll weevils are present. Sprays are more effective and economical than dusts for controlling insects on young cotton. One-half pint of malathion (5 lb./gal.) or parathion (2 lb./gal.) may be substituted for the second early season treatment to control thrips, aphids and the BROWN COTTON LEAF-WORM. HOW TO CHECK FOR FLEAHOPPERS—After cotton is old enough to produce squares, examine the main-stem terminal buds (about 3 to 4 inches of the top of plant) of 100 cotton plants at several representative points in the field. Begin treatment when 15 to 35 fleahoppers (nymphs and adults) are found per 100 terminals. In Northwest Texas begin treatment when lower infestations occur.
<p>In areas where difficulties have occurred in controlling thrips, cotton fleahoppers and overwintered boll weevils with the chlorinated hydrocarbons, add 0.5 pound (1 pt.) of malathion, or 0.25 pound (1 pt.) of methyl parathion, or 0.125 pound (1/2 pt.) of Guthion per acre to any of the spray materials recommended above. Methyl parathion, malathion or Guthion at twice the above dosage will also give control. The addition of 0.5 pound (1 qt.) of DDT per acre to the recommended spray materials will control thrips and the cotton flea-hopper. When dusts are used, those recommended with the exception of Sevin, should be combined with 5% malathion, or 2 1/2% methyl parathion or 1 1/2% Guthion for thrips, cotton fleahoppers and boll weevil control. Five percent DDT added to the recom-</p> <p>mended dust, with the exception of Sevin, will control thrips and cotton fleahoppers. A 5 percent Sevin dust at 10 pounds per acre will control fleahoppers and thrips. If these materials are used, it is possible that they may create conditions favorable for bollworm infestations. Therefore, fields should be checked closely following use of these insecticides for possible outbreaks.</p>				
Cotton aphids	A. 1% methyl parathion B. 1% parathion C. 4% malathion	A. Methyl parathion (2 lb./gal.) B. Parathion (2 lb./gal.) C. Malathion (5 lb./gal.) D. Demeton (2 lb./gal.)	1/2 to 1 pt. 1/2 to 1 pt. 1 to 1 1/2 pt. 1/2 to 1 pt.	In early season apply as needed. In late season begin treatment when honeydew appears. Demeton, parathion, malathion or methyl parathion may be combined with other sprays. Apply dusts at 10 to 15 lb. per acre.

LATE SEASON CONTROL PROGRAM

(INSECTICIDES LISTED AT RANDOM)

INSECTS	INSECTICIDES		AMOUNT OF SPRAY CONCENTRATE PER ACRE	REMARKS
	DUSTS	SPRAYS AND POUNDS OF TOXICANT PER GALLON		
Boll weevils and bollworms	A. Low-lime calcium arsenate + 1% parathion B. 2 1/2% endrin-40% sulfur C. 20% toxaphene-40% sulfur D. 2 1/2% heptachlor-10% DDT-40% sulfur E. Calcium arsenate F. 2 1/2% aldrin-10% DDT-40% sulfur G. 10% Sevin-40% sulfur H. 3-10-40 mixture I. 2 1/2% dieldrin-10% DDT-40% sulfur J. 2 1/2% Guthion-10% DDT Apply dusts at 10 to 15 lb./acre at 5-day intervals. Increase dosages where heavy bollworm infestations occur	A. Endrin (1.6 lb./gal.) B. Toxaphene (6 lb./gal.) C. Heptachlor (2 lb./gal.) + DDT (2 lb./gal.) D. Aldrin (2 lb./gal.) + DDT (2 lb./gal.) E. Toxaphene-DDT (4 lb.-2 lb./gal.) F. 3-5 mixture (gamma BHC, .9 lb.-DDT, 1.5 lb./gal.) G. Dieldrin (1.5 lb./gal.) + DDT (2 lb./gal.) H. Guthion (1.5 lb./gal.) + DDT (2 lb./ gal.) Apply sprays at 5-day intervals. In areas where pink bollworms and bollworms are a problem, use a minimum of 1 1/4 lb. DDT/acre.	1 1/4 pt. to 1 qt. 1 1/3 to 2 qt. 1 pt. to 1 qt. + 2 to 3 qt. 1 pt. to 1 qt. + 2 to 3 qt. 1 1/3 to 2 qt. 1 1/3 to 2 qt. 1 1/4 pt. to 1 qt. + 2 to 3 qt. 1 1/4 pt. + 2 to 3 qt.	HOW TO CHECK FOR BOLL WEEVILS—Examine cotton weekly for boll weevils. Pull 100 squares, at least one-third 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 boll weevils. DDT is included in these mixtures for bollworm control and may be omitted where bollworms are not a menace. 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. Use of DDT alone for bollworm control greatly increases possibility of aphid infestations. Both calcium arsenate dusts and toxaphene spray may be used for boll weevil control but they are less effective for bollworm control than other listed materials. During heavy weevil infestations, shorten intervals to 4 days.
<p>Boll weevils hard to kill with chlorinated hydrocarbons continued to appear in certain areas in 1958. Growers should be on the alert for such populations and when reasonable proof of resistance has been obtained, use calcium arsenate, Sevin, or a mixture of Guthion, or methyl parathion or malathion with DDT at 5-day intervals. However, unless resistance has been established, use chlorinated hydrocarbons because the phosphorus compounds in general are more hazardous to the applicator. The following dusts at the rate of 10 to 15 pounds per acre are recommended for resistant weevils: calcium arsenate; 2 1/2% Guthion-10% DDT; 10% Sevin; 5% methyl parathion-10% DDT; or 10% malathion-10% DDT. If sprays are preferred, use 1 1/4 pints Guthion (1.5 lb./gal.) or 1 to 1 1/2 quarts methyl parathion (2 lb./gal.) or 1 to 1 1/2 quarts malathion (5 lb./gal.) for boll weevil control. For boll weevil and bollworm control, 2 to 3 quarts of DDT (2 lb./gal.) should be added to either Guthion, methyl parathion or malathion. IN CASE OF SEVERE BOLL WEEVIL INFESTATIONS, METHYL PARATHION AND MALATHION SHOULD BE APPLIED AT 3 TO 4-DAY INTERVALS.</p>				
Bollworms	A. 2 1/2% endrin-40% sulfur B. 20% toxaphene-40% sulfur C. 10% DDT-40% sulfur D. 10% Sevin-40% sulfur E. 2 or 3-10-40 mixture F. 2 1/2% endrin-5% DDT-40% sulfur	A. Endrin (1.6 lb./gal.) B. Endrin (1.6 lb./gal.) + DDT (2 lb./gal.) C. DDT (2 lb./gal.) D. Toxaphene-DDT (4 lb.-2 lb./gal.)	1 to 1 1/4 qt. 1 1/4 to 1 3/4 pt. + 1 pt. to 1 qt. 2 to 3 qt. 1 1/3 to 2 qt.	Apply dusts at 10 to 15 lb. per acre at 5-day intervals. Apply sprays at 5-day intervals. See remarks above for how to check for bollworms.
Cotton aphids	See early season control			
Spider mites	A. 2 1/2% methyl parathion B. 1% parathion Apply dusts at 10 to 15 lb./acre.	A. Methyl parathion (2 lb./gal.) B. Parathion (2 lb./gal.) C. Demeton (2 lb./gal.)	1 to 1 1/2 pt. 1/2 to 1 pt. 1/2 to 1 pt.	Treat when leaves begin to turn yellow. Demeton or increased dosages of methyl parathion or parathion are necessary to control the two-spotted mite. Two applications of methyl parathion or parathion at 5-day intervals are needed. Demeton or methyl parathion or parathion may be mixed with other sprays.
Cotton fleahoppers	See early season control			
Lygus and stink bugs	A. 20% toxaphene-40% sulfur B. 10% DDT-75% sulfur C. 3-10-40 mixture	A. DDT (2 lb./gal.) B. Toxaphene-DDT (4 lb.-2 lb./gal.) C. 3-5 mixture (gamma BHC .9 lb.-DDT 1.5 lb./gal.)	1 1/2 to 2 qt. 1 to 2 qt. 1 1/3 to 2 qt.	When 8 to 10 bugs are found per 100 squares or young bolls, begin treatment. Apply dusts at 10 to 15 lb./acre at 7 to 10-day intervals. Apply sprays at 7 to 10-day intervals.
Leafworms	A. Low-lime calcium arsenate + 1% parathion B. 1% methyl parathion C. 1% parathion D. Calcium arsenate E. 4% malathion F. 2 1/2% Guthion	A. Methyl parathion (2 lb./gal.) B. Parathion (2 lb./gal.) C. Toxaphene-DDT (4 lb.-2 lb./gal.) D. Malathion (5 lb./gal.) E. Guthion (1.5 lb./gal.)	1/2 to 1 pt. 1/2 to 1 pt. 1 to 2 qt. 1/2 to 1 pt. 1 to 1 1/2 pt.	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 LEAFWORM can be controlled effectively with parathion (2 lb./gal.) 1/2 to 1 pt., malathion (5 lb./gal.) 1/2 pt. or endrin (1.6 lb./gal.) 1 1/4 pt. per acre. Apply dusts at 10 to 15 lb./acre.
Cabbage looper	A. 2 1/2% endrin-40% sulfur at 18 lb./acre	A. Endrin (1.6 lb./gal.)	1 to 1 1/4 qt.	Regular applications of toxaphene-DDT or 2-10-40 for bollworms usually prevent heavy looper damage. Begin treatment when small worms first appear.
Grasshoppers	A. 20% toxaphene-40% sulfur B. 5% heptachlor-40% sulfur C. 2 1/2% aldrin-40% sulfur D. 2 1/2% dieldrin-40% sulfur	A. Toxaphene (6 lb./gal.) B. Heptachlor (2 lb./gal.) C. Aldrin (2 lb./gal.) D. Dieldrin (1.5 lb./gal.)	1 to 2 qt. 1 to 2 pt. 1 to 2 pt. 2/3 to 1 1/3 pt.	Apply insecticide when damaging infestations appear. Baits are preferred for control of "jumbo" grasshoppers. (See your county agent for bait mixtures.) Apply dusts at 10 to 15 pounds per acre.
Pink bollworms	A. 10% DDT B. 10% Sevin C. 2 1/2% Guthion-10% DDT	A. DDT (2 lb./gal.) B. Guthion (1.5 lb./gal.) + DDT (2 lb./gal.)	2 1/2 qt. to 1 gal. 1 to 2 pt. + 2 to 3 qt.	Apply dusts at 10 to 15 lb./acre at 5-day intervals. Apply sprays at 5-day intervals. Refer to text in the Guide for additional information and how to make infestation counts for pink bollworms.

\*pt. = pints      qt. = quarts      lb. = pounds      / = per.

Applications of Guthion at the rate of 0.25 pounds per acre should not be made within 5 days of harvest, at a higher rate it should not be applied within 21 days of harvest. Sevin should not be applied after the bolls open. Fields treated with Sevin should not be grazed, nor should feed trash be fed to dairy or meat animals.