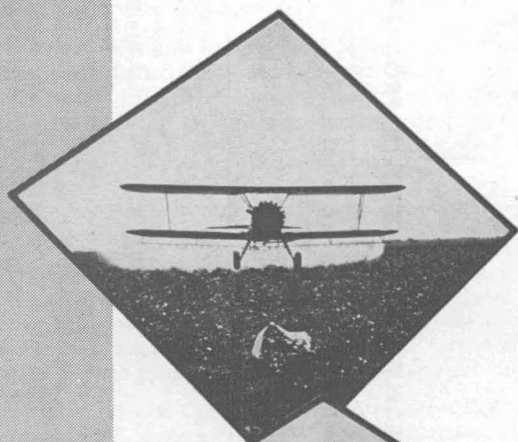


South Texas Guide

for controlling **Cotton Insects**



RECOMMENDATIONS IN THIS GUIDE are based on results of continuing research conducted throughout the state by the Texas Agricultural Experiment Station and the Entomology Research Division, U. S. Department of Agriculture. In developing control recommendations for some of the minor cotton pests, research results from other cotton producing states have been carefully evaluated. A committee of state and federal research personnel and Extension specialists meets annually to review research results and to develop the most recent, safest and most profitable recommendations for Texas producers.

The development of resistance to insecticides, deposit of pesticide residues in soil or on neighboring crops and destruction of beneficial insect parasites and predators dictate that the use of insecticides should be restricted to actual need, based on field inspections.

At least ten insect and mite species attacking Texas cotton show some degree of resistance to once effective chemicals. Evidence indicates that the more extensively a material is used, the more rapidly resistance develops.

Fruits, vegetables and animal feed can be contaminated by insecticidal drift. Continued excessive use of persistent insecticides results in soil residues which jeopardize the use of these fields for growing certain vegetable or root crops.

Natural populations of parasites and predators are important in cotton insect control and should be protected. Chemicals should not be used unless economic populations of injurious insects develop.

Chemical use is paramount to profitable cotton production in most areas, but a sound insect control program also makes maximum use of natural and cultural controls. Immediate results and long-range consequences require careful consideration in developing profitable, effective insect control programs.

Cotton insects can be controlled economically by applying recommended insecticides at the correct time. (See recommendations.) Insecticides must cover the plant for effective control. Plants, however, usually are not protected when insects attack new growth or when chemicals are washed off.

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

Substantial profits have been made even when many applications were necessary for maximum yields. On upland soils, where insect infestations do not last long, fewer applications may be needed. The control program for 1968 includes three phases:

1. **EARLY SEASON CONTROL** to insure early fruiting and maturity in certain areas.
2. **LATE SEASON CONTROL** to insure continued fruiting and protect fruit set.
3. **EARLY STALK DESTRUCTION AND FARM CLEAN-UP** to reduce overwintering populations of boll weevils, pink bollworms, bollworms and tobacco budworms.

For greatest benefits, the grower must carry out an adequate control program. Inspect cotton before applying insecticides to

SOUTH TEXAS GUIDE FOR C

determine degree of infestation and to check for pests, such as aphids and spider mites, which may influence the choice of insecticides.

Extension of the early season control program after the one-third grown square stage may create conditions favorable for bollworm buildup. However, if fleahoppers are numerous, it may be necessary to initiate the late season control program.

Apply late season treatments when infestation counts indicate the need. Cotton grown under irrigation or on high-yielding land usually requires protection longer than cotton on dryland acreage.

Early Stalk Destruction and Farm Clean-Up

Early harvest, immediate stalk destruction and plowing under debris before the first frost reduce boll weevil, pink bollworm, bollworm and tobacco budworm populations. These practices force the boll weevil into starvation before time to enter winter quarters, prevent late-season buildup of weevils, pink bollworms, bollworms and tobacco budworms and reduce the number surviving the winter. The addition of 0.5 lb. methyl parathion or 0.25 lb. azinphosmethyl (Guthion) to arsenic acid or phosphate-type defoliants has proved effective in reducing potential overwintering boll weevil populations. *Do not add methyl parathion or azinphosmethyl to chlorate-type defoliants and/or desiccants. See L-219, Ways to Fight the Pink Bollworm in Texas.*

Beneficial Insects

Natural populations of beneficial insects help control cotton pests, such as the bollworm, cotton aphid and spider mite. However, never rely entirely on beneficial insects for control. Examine fields frequently to determine insecticide need. The introduction or release of *Trichogramma* wasps or convergent lady beetles has proved ineffective in controlling damaging bollworm populations.

Pink Bollworm

Begin pink bollworm counts 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.

After the first bolls form, bloom inspections are no longer the most reliable means of determining pink bollworm population levels. Begin boll inspections as soon as the first bolls are 3 weeks old. Continue inspections weekly. 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. Where tunneling is not found, check lint and seed for evidence of feeding or presence of worms. This is particularly important in determining infestation counts in Pima cotton.

CONTROLLING COTTON INSECTS

Start treatment when 10 to 15 percent of the bolls are infested. Continue treatment until 70 percent are open.

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

General Information

In the late season program, dusts and sprays are equally effective when properly applied. Maintain a strict 5-day schedule even if showers occur. Repeat the application as soon as possible if the insecticide is washed off within 24 hours, except when aphicides are used. Increase dosages to the maximum when infestations are heavy, and apply insecticides at 5-day intervals or less.

For detailed information on the use of sprays and spray machinery, see L-486, *Insecticidal Spraying of Field Crops with Ground Machinery*.

Apply dusts when the air is calm. Dew on plants is not necessary. Dusts and wettable powders are washed off more

CONVERSION TABLE

Pounds of Actual Insecticide in
Different Quantities of Spray Concentrate*

Insecticide	Gal.	2 Qt.	1 Qt.	1 Pt.
Azinphosmethyl (Guthion)	2.0	1.0	0.5	0.25
Azodrin	5.0	2.5	1.25	0.625
Bidrin	8.0	4.0	2.0	1.0
Carbophenothion (Trithion)	4.0	2.0	1.0	0.5
Demeton	2.0	1.0	0.5	0.25
Dieldrin	1.5	0.75	0.375	0.187
Endrin	1.6	0.8	0.4	0.2
Ethion	4.0	2.0	1.0	0.5
Heptachlor	2.0	1.0	0.5	0.25
Methyl parathion	2.0	1.0	0.5	0.25
Methyl parathion	4.0	2.0	1.0	0.5
Methyl Trithion	4.0	2.0	1.0	0.5
Parathion	2.0	1.0	0.5	0.25
Toxaphene	6.0	3.0	1.5	0.75
Strobane	2.0	1.0	0.5	0.25
Pounds Actual Carbaryl or Trichlorfon Per Acre				
	3.0	2.0	1.0	0.5
Pounds of carbaryl (Sevin) or trichlorfon (Dylox) 80% wettable or soluble powder required	3.75	2.5	1.25	0.625
Pounds Actual Trichlorfon Per Acre				
	0.5	0.375	0.25	
Pounds of trichlorfon (Dylox) 50% soluble powder required	1.0	0.75	0.50	

*Certain formulations may differ in the amount of actual insecticide per gallon. Refer to the manufacturer's label for specific concentration, and adjust spray mixtures accordingly.

easily than sprays by light showers. Place dust nozzles on ground machines 4 to 6 inches above the plants.

Ground machines and airplanes are equally effective for insecticide application. For best results with airplanes, flag the swaths so that they overlap.

Some insecticides are destructive to honeybees. Since bees help pollinate many agricultural crops, prevent their destruction.

CAUTION

All insecticides are poisonous. Follow carefully all precautions on the label. Take special precautions when handling azinphosmethyl (Guthion), Azodrin, Bidrin, demeton, disulfoton (Di-Syston), endrin, methyl parathion, parathion and phorate (Thimet). Avoid skin contact. Do not breathe the vapors or drift from sprays or dusts.

Prevent drift from contaminating neighboring crops.

For additional information, contact your county agent or write the Extension entomologist, Texas A&M University, College Station, Texas 77840.

EARLY SEASON CONTROL PROGRAM

Insects	Insecticides (Listed alphabetically)	Pounds per acre of actual insecticides to be applied as spray unless other- wise indicated ¹	Remarks
Application at planting time for control of:			Granular in-furrow applications provide control for 4 to 6 weeks following planting. Systemic seed treatment provides control for 3 to 5 weeks following planting. Phorate and disulfoton may retard plant emergence and result in stand reduction when used under conditions unfavorable for rapid germination and plant emergence, such as cool, wet weather, planting too deep, etc. Injury is generally more pronounced on light, sandy soils and is increased when higher rates of application are used. Exercise care in using systemic insecticides with pre-emergence herbicides.
	Granules-in-furrow		
Thrips	A. Disulfoton (Di-Syston)	0.5-1.0	
Aphids	B. Phorate (Thimet)	0.5-1.0	
Spider mites			
Leaf miners	Pre-treated seed	Pounds per 100 lb. seed	
	A. Disulfoton	0.5	
	B. Phorate	0.5-1.5	
Cutworms	A. Strobane-DDT (2-1 mixture) ^{2, 4, 14}	2.0-3.0	Examine seedling cotton for these pests. Apply treatment as needed.
Garden webworms	B. Toxaphene-DDT (2-1 mixture) ²	2.0-3.0	
(See below for control of beet armyworms and yellow striped armyworms.)			
Darkling beetles	A. Dieldrin ²	0.375	Brown to black beetles which feed around the base of seedlings. Damage resembles cutworm attack. Begin control when damage warrants.
	B. Heptachlor ^{2, 4}	0.5	
Thrips	A. Azinphosmethyl (Guthion) ³	0.125-0.25	THRIPS—Inspect cotton as soon as it emerges to a stand. If thrips are present and leaf buds between the cotyledons are affected, treat at once. Make a second application 7 days later if infestation persists. Applications on four-leaf or older cotton should be based on the extent of plant damage. Silvering of the lower leaf surface is commonly observed, followed by wilted, deformed and bronzed or blackened leaves. If difficulty is encountered in thrips control, substitute methyl parathion at 0.25 lb. per acre for DDT. FLEAHOPPERS—Begin treatment when 15 to 35 fleahoppers (nymphs and adults) are found per 100 terminals. As plants increase in size and fruit load, larger populations may be tolerated without serious damage. Base later treatments on fleahopper numbers and on damage as indicated by excessive loss of small squares. Apply sprays at 7-day intervals. Repeat application of trichlorfon at 3 to 5-day intervals as needed.
Fleahoppers	B. Bidrin ^{2, 8}	0.1-0.25	
	C. Carbaryl (Sevin) ⁵	0.5-1.0	
	D. Strobane-DDT (2-1 mixture) ^{2, 4, 14}	1.25-2.25	
	E. Toxaphene-DDT (2-1 mixture) ^{2, 14}	1.25-2.25	
	F. Trichlorfon (Dylox) ¹³ (fleahoppers only)	0.25-0.5	
Cotton aphids	A. Bidrin ^{2, 8}	0.125-0.25	In early season, apply insecticides as needed. In late season, begin treatment when honeydew appears.
	B. Demeton (Systox) ^{2, 7}	0.125-0.25	
	C. Methyl parathion ^{6, 10}	0.25-0.375	
	D. Parathion ⁶	0.25-0.375	

LATE SEASON CONTROL PROGRAM

Apply dusts at same rate of actual insecticide per acre as recommended below for sprays.

Bollworms Tobacco budworms	A. Azodrin ^{2,7}	0.8-1.0	HOW TO CHECK FOR BOLLWORMS —Examine the terminal buds (upper 3 to 4 inches of the plant) of each 100 cotton plants and 100 consecutive squares and bolls at each of several points in the field. Begin treatment when bollworm eggs and four to five young worms are found per 100 terminals or 5% of the squares and small bolls have been injured by small bollworms. Apply dusts or sprays at 5-day intervals or less. Check fields closely 2 to 3 days following each application for effective control. Where control has not been obtained, repeat application immediately.
	B. Carbaryl (sevin + methyl parathion) ^{6, 10}	2.0 + 0.5 to 3.0 + 0.75	
	C. Methyl parathion ^{6,10}	1.25-2.0	
	D. Strobane + methyl parathion ^{2, 4, 6, 10, 14}	2.0 + 1.0 to 3.0 + 1.5	
	E. Toxaphene + methyl parathion ^{2, 6, 10, 14}	2.0 + 1.0 to 3.0 + 1.5	
Boll weevils	A. Azinphosmethyl (Guthion) ³ (EC or ULV)	0.25	HOW TO CHECK FOR BOLL WEEVILS —Examine cotton weekly. Examine 100 squares, at least one-third grown, at random, taking a few squares at several representative places in the field. If 15 to 25% or more have weevil punctures, begin treatment. Apply insecticides at 5-day intervals. Under extremely heavy buildups, it may be necessary to shorten the interval to 3 days.
	B. Carbaryl (Sevin) ⁵	1.6-2.4	
	C. Malathion (ULV only)	12-16 fluid ounces	
	D. Methyl parathion ^{6,10}	0.375-1.0	
	E. Methyl Trithion ^{2,12}	0.375-1.0	
	F. Strobane + methyl parathion ^{2, 4, 6, 10, 14}	1.0 + 0.25 to 2.0 + 0.5	
	G. Toxaphene + methyl parathion ^{2, 6, 10, 14}	1.0 + 0.25 to 2.0 + 0.5	
Beet armyworms Yellow striped armyworms	A. Methyl parathion ^{6,10}	1.0-1.5	Examine cotton for presence of these pests. Apply treatment as needed. Insecticides are most effective if applied when worms are small.
	B. Trichlorfon (Dylox) ¹³	2.0	
Spider mites	A. Azodrin ^{2,7}	0.25-1.0	Treat when leaves begin to turn yellow. Two applications at 5-day intervals may be necessary with all materials except demeton. In certain locations, some species of mites are highly resistant to miticides and are difficult to control with available materials. Use 0.6 to 1.0 lb. of Azodrin for control of resistant carmine mite.
	B. Carbophenothion (Trithion) ²	0.375-0.75	
	C. Demeton (Systox) ^{2,7}	0.25	
	D. Ethion ^{2,4}	0.375-0.75	
	E. Methyl parathion ^{6,10}	0.25-0.375	
	F. Parathion ⁶	0.25	
Lygus bugs	A. Carbaryl (Sevin) ⁵	1.0-2.0	Begin treatment when an average of 7 to 10 lygus are caught per 100 sweeps with a 15- to 16-inch net. Apply 5- to 7-day intervals as long as required to reduce population.
	B. Methyl parathion ^{6,10}	0.5	
	C. Parathion ⁶	0.5	
	D. Trichlorfon (Dylox) ¹³	1.0-1.5	
Stink bugs	A. Carbaryl (Sevin) ⁵	1.25-2.5	Begin treatment when an average of 2 or more stink bugs are caught per 100 sweeps with a 15- to 16-inch net. Apply at 5- to 7-day intervals as long as required to reduce population.
	B. Methyl parathion ^{6,10}	0.5-1.0	
	C. Parathion ⁶	0.5-1.0	
	D. Trichlorfon (Dylox) ¹³	1.0-1.5	
Leafworms	A. Azinphosmethyl (Guthion) ³	0.25	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—0.125-0.25 lb. or malathion—0.35 lb.
	B. Carbaryl (Sevin) ⁵	1.0-1.25	
	C. Methyl parathion ^{6,10}	0.125-0.25	
	D. Parathion ⁶	0.125-0.25	
Cabbage loopers			Insecticide applications are not generally satisfactory. Parasites, predators and disease organisms frequently prevent extensive losses. Where control is required, endrin (0.4-0.5 lb. per acre) or methyl parathion (1.5-2.0 lb. per acre) will give best results. Insecticides are most effective if applied when worms are small. Poor control of larger worms is common.
Grasshoppers	A. Carbaryl (Sevin) ⁵	1.5-2.0	Apply insecticides when damaging infestations appear. Baits are preferred for control of "jumbo" grasshoppers. (Ask your county agent about bait mixtures.)
	B. Dieldrin ²	0.2	
	C. Heptachlor ^{2,4}	0.25-0.375	
	D. Toxaphene ²	1.5-3.0	
Pink bollworms	A. Azinphosmethyl (Guthion) ³	0.75	Apply insecticides at 5-day intervals. See text for additional information and procedures for making infestation counts for pink bollworms. Add methyl parathion where bollworm or budworm populations warrant.
	B. Carbaryl (Sevin) ⁵	2.0-2.4	

¹Dusts are effective, but sprays are considered more practical under early season conditions.

²Do not graze or feed treated plants, including gin waste, to dairy animals or animals being finished for slaughter.

³Do not apply within 1 day of picking. Do not pasture fields or feed gin waste.

⁴Do not apply after bolls are open.

⁵Problems may be encountered in spraying wettable powder with low-volume farm sprayers. Follow manufacturer's directions carefully.

⁶Do not apply within 5 days of hand picking.

⁷Do not apply within 21 days of harvest.

⁸Do not apply within 10 days of harvest.

⁹Workers entering fields within 5 days of application should be protected.

¹⁰Workers entering fields within 24 hours after application should wear protective clothing.

¹¹Do not apply when rotating with root crops.

¹²Do not apply after half the bolls are open.

¹³Do not apply within 7 days of picking. Do not graze livestock in treated fields within 14 days after application.

¹⁴Do not feed gin waste to livestock.