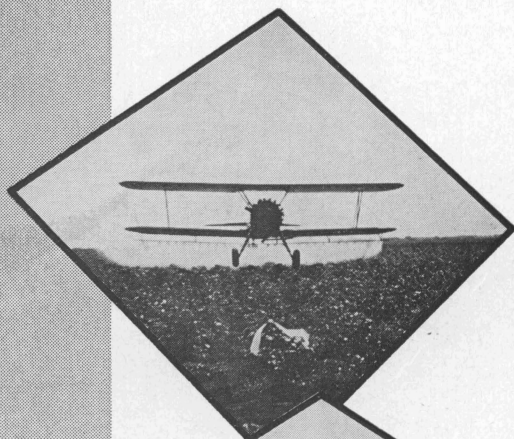


*Revised
Dr. Newton*

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. Research results for some of the minor cotton pests 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 safest, most profitable recommendations for Texas producers.

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 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 be used only if economic populations of injurious insects develop.

Wise chemical use is paramount to profitable cotton production in most areas of Texas, 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 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*.

INSECT CONTROL PROGRAM

For effective, economic insect control, base insect control applications on infestation as determined by field inspection. Each grower should be able to determine insect population levels, to time insecticide applications on the basis of insect numbers or damage and to recognize the damage caused by different cotton insects.

Early Season Control

Thrips and fleahoppers are the major pests during the early season. Control of these pests helps insure early fruiting and maturity. Insecticide selection and rate will be influenced by pest species to be controlled, pest population level and impact on beneficial insects.

Thrips normally cause heaviest damage from plant emergence until early squaring begins. Heavy infestations cause delayed plant maturity, stunting and reduced stands. *Thrips*

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numbers, damage and population buildups vary from season to season.

Fleahoppers damage small squares but do not cause larger squares or bolls to shed. Fleahopper control should be based on infestation counts and excessive loss of small squares. Insecticide applications after the one-third grown square stage may create conditions favorable for a bollworm buildup. However, if fleahoppers are preventing normal square set, an insecticide application may be required.

Late Season Control

Bollworms, tobacco budworms, pink bollworms and boll weevils are the principal insects involved in the late season control program. Apply insecticide treatments when infestation counts indicate the need. Once insecticide applications begin, producers should inspect fields frequently and repeat applications until pest population has been reduced below economic levels. Control of late season insects is designed to insure continued fruiting and protect fruit previously set.

Cotton grown under irrigation or on high-yielding land usually requires protection longer than cotton on dryland acreage. Production practices, such as late irrigation and excessive rates of nitrogen which prolong plant growth, may necessitate continued insect control measures. These practices also greatly favor an increase in the number of injurious insects which may overwinter, thereby increasing the potential for insect damage in the following season.

Insecticides should be applied at intervals of not more than 5 days for effective control of the boll weevil, bollworm and pink bollworm.

PINK BOLLWORM

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.

Start treatment when 10 to 15 percent of the bolls are infested. Continue treatment until 70 percent are open. See L-219, *Ways to Fight the Pink Bollworm in Texas*.

EARLY STALK DESTRUCTION AND FARM CLEANUP

Early harvest, stalk destruction and plowing under debris immediately after harvest reduce boll weevil, pink bollworm, bollworm and tobacco budworm populations. Particular attention should be paid to the destruction of green or cracked bolls and other plant debris left at the end of rows following stripper harvest.

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. Under these conditions, combined with a short harvest period, a diapause boll weevil control program can be carried out at a minimum expense.

CONTROLLING COTTON INSECTS

To accomplish this, add 0.5 lb. methyl parathion or 0.25 lb. azinphosmethyl (Guthion) to arsenic acid or phosphate-type defoliants to effectively reduce potential overwintering boll weevil populations. Make a second application 10 to 14 days after defoliation. Plow under stalks as soon as possible to prevent regrowth. To be effective, the diapause boll weevil control program should be planned and carried out on a community-wide basis. *Do not add methyl parathion or azinphosmethyl to chlorate-type defoliants* (See L-145, *Cotton Defoliation Guide for Texas*, for a list of chlorate-type defoliants.) Growers are cautioned to handle combinations of phosphate-type defoliants (Folex and Def) and phosphate insecticides with extreme care. This combination poses a much greater toxicity hazard than either of the compounds used alone.

BENEFICIAL INSECTS

Natural populations of beneficial insects help control cotton pests, such as the bollworm, cotton aphid and spider mite. However, do not rely on beneficial insects for control without examining fields frequently to determine injurious pest infestations. Practical methods of releasing beneficial insects for bollworm control have not yet been developed.

GENERAL INFORMATION

In the late season program, dusts and sprays are equally effective when applied properly. 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.

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
Ethion	4.0	2.0	1.0	0.5
Methyl parathion	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
Toxaphene + DDT (4-2)	6.0	3.0	1.5	0.75
Strobane	2.0	1.0	0.5	0.25
Strobane + DDT (4-2)	6.0	3.0	1.5	0.75

Pounds actual carbaryl (Sevin) or trichlorfon (Dylox) per acre				
3.0	2.0	1.0	0.5	0.25

Pounds of carbaryl (Sevin) or trichlorfon (Dylox) 80% wettable or soluble powder required	3.75	2.5	1.25	0.625	0.312
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*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.

For detailed information on the use of sprays and spray machinery, see L-486, *Insecticidal Spraying of Field Crops with Ground Machinery* and L-764, *Pesticide Application Ground Equipment Calibration Guide*.

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

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

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), methyl parathion, parathion and phorate (Thimet). Avoid skin contact. Do not breathe the vapors or drift from sprays or dusts.

Do not enter fields for 48 hours following the application of methyl parathion at rates used for bollworm and tobacco budworm control.

Prevent drift from contaminating neighboring crops.

Most insecticides are destructive to honeybees. Since bees help pollinate many agricultural crops, every effort should be made to prevent their destruction.

For additional information, contact your county agent, area Extension entomologist at Weslaco or write to Extension entomologist, Texas A&M University, College Station, Texas 77843.

FALL DIAPAUSE BOLL WEEVIL CONTROL PROGRAM

A fall diapause boll weevil control program can drastically reduce weevil populations if properly carried out. By reducing overwintered boll weevil numbers in the fall, growers seldom find it necessary to apply insecticides for weevil control during the following season to protect squares. Being able to avoid in-season boll weevil insecticide applications is often the key to eliminating the need for bollworm or tobacco budworm control.

For maximum benefit, an organized program should be carried out and all growers *must* cooperate.

Basic requirements for diapause boll weevil control program:

1. Plant cotton in the community in a short, uniform period.
2. Add an effective boll weevil insecticide to the defoliant or desiccant.
3. Apply a second insecticide application 7-10 days later unless stalks have been destroyed.
4. Shred and plow under stalks immediately after harvest.

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COTTON INSECT CONTROL PROGRAM

Insects	Insecticides (listed alphabetically)	Pounds per acre of actual insecticide(s) 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 about 3 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 increases when higher rates of application are used. Exercise care in using systemic insecticides with pre-emergence herbicides.
Thrips	Granules-in-furrow		
Aphids	A. Disulfoton (Di-Syston)	0.5-1.0	
Spider mites	B. Phorate (Thimet)	0.5-1.0	
Leaf miners	Pre-treated seed	Pounds per 100 lb. seed	
	A. Disulfoton	0.5	
	B. Phorate	0.5	
Cutworms	A. Strobane-DDT (4-2 mixture) ^{2, 4, 11}	2.0-3.0*	Examine seedling cotton for these pests. Apply treatment as needed.
Garden webworms	B. Toxaphene-DDT (4-2 mixture) ²	2.0-3.0*	
*2⅔ pt. to 2 qt. of the 4-2 formulation (See below for control of beet armyworm and yellow striped armyworms.)			
Thrips	A. Azinphosmethyl (Guthion) ³	0.125	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 second application 7 days later if infestation persists. Base applications on four-leaf or older cotton on the extent of plant damage. Silvering of the lower leaf surface is commonly observed, followed by wilted, deformed and bronzed or blackened leaves.
	B. Bidrin ^{2, 8}	0.1	
	C. Carbaryl (Sevin) ⁵	0.5	
	D. Strobane ^{2, 4}	0.75-1.0	
	E. Toxaphene ²	0.75-1.0	
Cotton fleahoppers	A. Bidrin ^{2, 8}	0.1-0.25	Base all treatments on fleahopper numbers and damage as determined by excessive loss of small squares. During the first 4 weeks of squaring, begin treatment when 25 to 35 cotton 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. Apply sprays at 7-day intervals. Repeat application of trichlorfon at 3 to 5-day intervals as needed.
	B. Carbaryl (Sevin) ⁵	0.5-1.0	
	C. Strobane-DDT (4-2 mixture) ^{2, 4, 11}	1.0-1.5*	
	D. Toxaphene-DDT (4-2 mixture) ^{2, 11}	1.0-1.5*	
	E. Trichlorfon (Dylox) ¹⁰	0.25-0.5	
*1½-2 pt. of the 4-2 formulation			
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, 9}	0.25-0.375	
	D. Parathion ⁶	0.25-0.375	
Apply dusts at same rate of actual insecticide per acre as recommended below for sprays.			
Bollworms	A. Azodrin ^{2, 7}	0.8-1.0	FIELD INSPECTION — Method A: 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 four to five young worms are found per 100 terminals or 5% of the squares and small bolls have been injured by small bollworms. Method B: Make a whole plant examination (terminals, squares, flowers or bolls) of all plants on 10 feet of row in at least five locations in the field. When larval counts average more than 1.5 larvae per 10 feet of row or exceed 7 larvae in 50 feet of row, begin treatment. Apply insecticides 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.
Tobacco budworms	B. Carbaryl (Sevin) + methyl parathion ^{5, 6, 9}	2.0 + 0.5 to 3.0 + 0.75	
	C. Methyl parathion ^{6, 12}	1.25-2.0	
	D. Strobane + methyl parathion ^{2, 4, 6, 11, 12}	2.0 + 1.0 to 3.0 + 1.5	
	E. Toxaphene + methyl parathion ^{2, 6, 11, 12}	2.0 + 1.0 to 3.0 + 1.5	
	Under most conditions, avoid treating cotton for early infestations of budworms until time of flowering. Where resistant tobacco budworms are noted treatment interval may have to be shortened to 3 days and dosage of methyl parathion increased to 2 pounds per acre.		
Boll weevils	A. Azinphosmethyl (Guthion) ³ (EC or ULV)	0.25	FIELD INSPECTION — 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, 9}	0.375-1.0	
	E. Strobane + methyl parathion ^{2, 4, 6, 9, 11}	1.0 + 0.25 to 2.0 + 0.5	
	F. Toxaphene + methyl parathion ^{2, 6, 9, 11}	1.0 + 0.25 to 2.0 + 0.5	
Beet armyworms	Methyl parathion ^{6, 9}	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.
Yellow striped armyworms	B. Trichlorfon (Dylox) ¹⁰	2.0	
Spider mites	A. Azodrin ^{2, 7}	0.25-1.0	Treat when mites begin to cause noticeable leaf damage. 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, 9}	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 at 5 to 7-day intervals as long as required to reduce population.
	B. Methyl parathion ^{6, 9}	0.5	
	C. Parathion ⁶	0.5	
	D. Trichlorfon (Dylox) ¹⁰	1.0-1.5	
Stink bugs	A. Carbaryl (Sevin) ⁵	1.25-2.5	Begin treatment when 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, 9}	0.5-1.0	
	C. Parathion ⁶	0.5-1.0	
	D. Trichlorfon (Dylox) ¹⁰	1.0-1.5	
Cotton 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 LEAF-WORM 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, 9}	0.125-0.25	
	D. Parathion ⁶	0.125-0.25	
Cabbage loopers Spotted cabbage loopers	A. Azodrin ^{2, 7}	1.0	Cabbage looper infestations usually are reduced or eliminated by disease agents before excessive leaf damage occurs. If Azodrin is used, several applications may be necessary for effective control.
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. 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 apply ultra low volume application within 2 days of handpicking. 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 handpicking.

⁷Do not apply within 21 days of harvest.

⁸Do not apply within 10 days of harvest.

⁹Workers entering fields within 24 hours after application should wear protective clothing.

¹⁰Do not apply within 7 days of picking. Do not graze livestock in treated fields within 14 days after application.

¹¹Do not feed gin waste to livestock.

¹²Fields treated with these rates of methyl parathion should not be entered for 48 hours following application.