

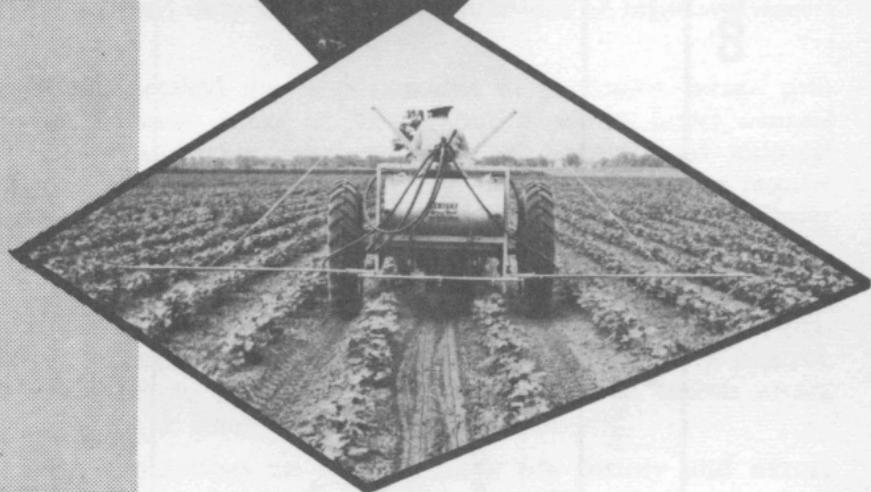
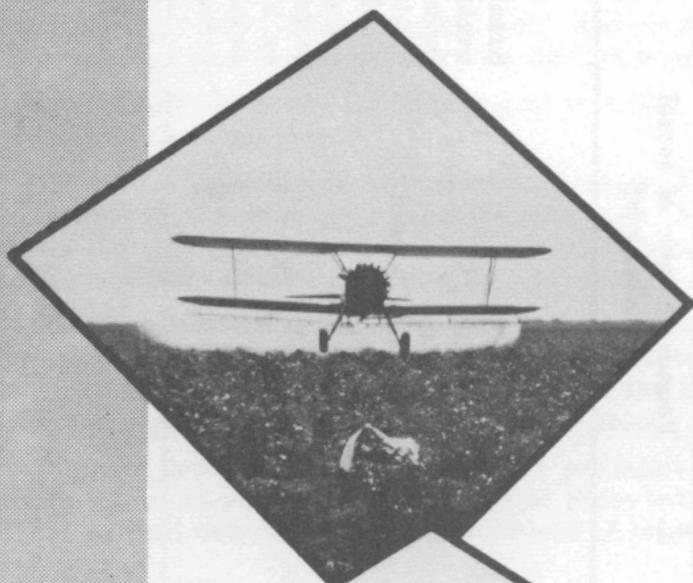
L-508

Revised 16,000-3-12-70
Revised - 2 Lomas 1970

Guide for controlling

Cotton Insects

*in the High Plains,
Rolling Plains and
Trans-Pecos Areas
of Texas*



GUIDE FOR

Controlling Cotton Insects

IN THE

High Plains, Rolling Plains And Trans-Pecos Areas Of Texas

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 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*.

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 help 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 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 late season control. Apply insecticide treatments when infestation counts indicate the need. Once insecticidal applications begin, producers should inspect fields frequently and repeat applications until the pest population has been reduced below economic levels.

Cotton grown under irrigation or on high-yielding land usually requires protection longer than cotton on dryland acreage. Production practices, such as late August 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. Control of late season insects is designed to insure continued fruiting and protect fruit previously set.

Bollworms normally cause more damage to cotton in this part of the state than any other insect. Eggs generally are laid on the tender growth of the plant's terminal area. Eggs hatch in about 3 days and the small worms begin working their way down the cotton plants, feeding on the squares and bolls.

Tobacco budworm and *beet armyworm* infestations may accompany bollworms. These species attack cotton in a manner similar to that of bollworms. Apply insecticides when worms are small.

Boll weevils are a serious threat to cotton production in these areas. See the table for discussion of infestation counts and control recommendation. Overwintered weevils often are confined after emergence to small areas of the field. Spot treatment of infested areas early in the season will slow and sometimes prevent the spread of weevils throughout the field. The beneficial insect population in the field is less affected when treatment is confined only to the spots where weevils exist.

Pink bollworm field inspections should begin 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 worms. This is particularly important in determining infestation counts in Pima cotton.

Begin treatment when 10 to 15 percent of the bolls are infested. Continue treatment until 70 percent are open. Because of yields, cultural practices and economics involved in producing Acala and Pima cottons, begin insecticide applications when 5 to 10 percent of the bolls are infested, and continue until the top bolls are mature.

For additional information, see L-219, *Ways to Fight the Pink Bollworm in Texas*.

EARLY STALK DESTRUCTION AND FARM CLEANUP

Early harvest, immediate stalk destruction and plowing under of plant debris 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.

The above 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. To be most effective, the addition of an insecticide to the defoliant or desiccant should be planned and used 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 above 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.

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.

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 + DDT (4-2)	6.0	3.0	1.5	0.75
Strobane	2.0	1.0	0.5	0.25
Pounds actual carbaryl (Sevin) or trichlorfon (Dylox) 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
			0.625	0.312

*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.

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 Lubbock, Vernon or Ft. Stockton or write the Extension entomologist, Texas A&M University, College Station, Texas 77843.

Cooperative Extension Work in Agriculture and Home Economics, Texas A&M University and the United States Department of Agriculture cooperating. Distributed in furtherance of the Acts of Congress of May 8, 1914, as amended, and June 30, 1914.

COTTON INSECT CONTROL PROGRAM

Insects	Insecticides (listed alphabetically)	Pounds per acre of actual insecticide(s) ¹	Remarks
Application at planting time for control of:			
	Granules-in-furrow		
Thrips	A. Disulfoton (Di-Syston)	0.5-1.0	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.
Aphids	B. Phorate (Thimet)	0.5-1.0	
Spider mites	Pre-treated seed	Pounds per 100 lb. seed	
Leaf miners	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) ^{2,11}	2.0-3.0*	
*2 $\frac{2}{3}$ pt. to 2 qt. of the 4-2 formulation. (See below for control of beet armyworms 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 a 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	
*1 $\frac{1}{2}$ to 2 pt. of the 4-2 formulation.			
Overwintered boll weevils	A. Azinphosmethyl (Guthion) ³ (EC or ULV)	0.25	Where weevils are found, apply just before first squares are one-third grown to prevent egg laying. If more weevils emerge from hibernation sites, an additional treatment may be necessary. These insecticides also control thrips and cotton fleahoppers.
	B. Carbaryl (Sevin) ⁵	1.25-1.5	
	C. Malathion (ULV only)	12-16 fluid ounces	
	D. Methyl parathion ^{6,9}	0.25-0.5	
	E. Strobane + methyl parathion ^{2,4,6,9,11}	1.0 + 0.25	
	F. Toxaphene + methyl parathion ^{2,6,9,11}	1.0 + 0.25	
Cotton aphid	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 exceeds 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 increase dosage of methyl parathion 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	
*Refers to overwintered boll weevil control recommendations above before one-third grown square stage.			
Beet armyworms	A. 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
	B. Carbofenothion (Trithion) ²	0.375-0.75	

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 increase dosage of methyl parathion to 2 pounds per acre.

field. Begin treatment when bollworm eggs and 10% to 15% 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 exceeds 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.

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	
*Refers to overwintered boll weevil control recommendations above before one-third grown square stage.			
Beet armyworms	A. 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 ⁸	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 ⁸	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 ⁸	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 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 ^{6,9}	0.125-0.25	
	D. Parathion ⁸	0.125-0.25	
Cabbage looper Spotted cabbage looper	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.