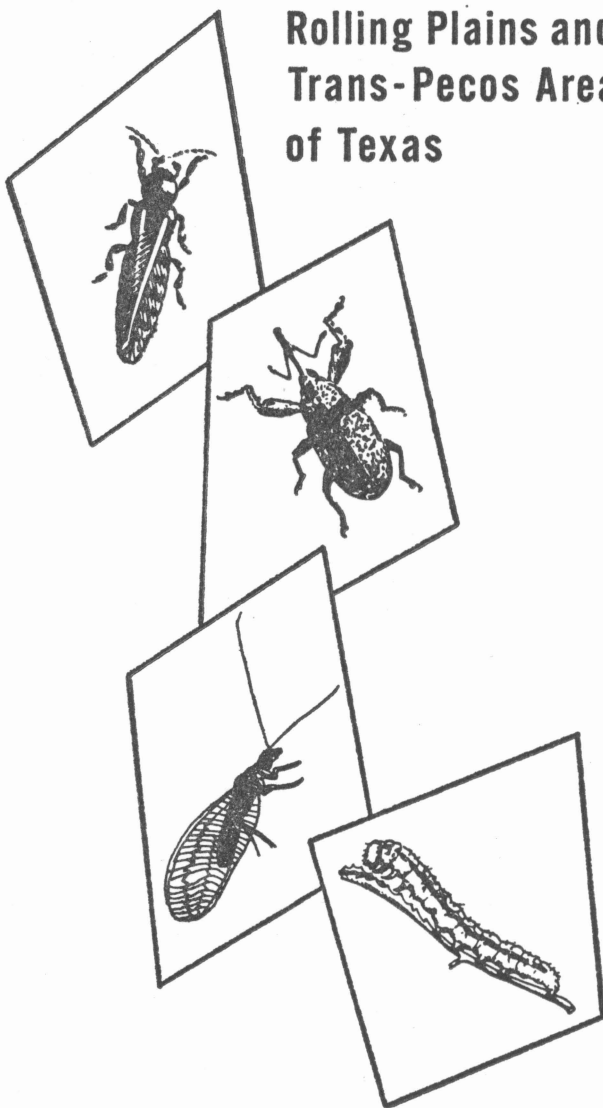


Guide for controlling

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 evaluated carefully and utilized in developing these recommendations. 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.

Insecticide use 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 using these fields for growing certain vegetable or root crops.

Natural parasite and predator populations are important in cotton insect control and should be protected. Use chemicals 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

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

Early Season Pests

Thrips are sometimes a pest during the early season. They normally cause heaviest damage from plant emergence until early squaring begins. Heavy infestations may reduce stands, stunt plants, reduce fruiting and thus delay maturity. Thrips numbers, damage and population buildups vary from season to season and area to area.

The *cotton fleahopper*, which usually damages small squares, occupies a key position in a cotton insect management program. Base applications not only on fleahopper numbers but also upon fruiting rate and excessive small-square losses. Carefully evaluate the decision to apply the first field application, because insecticide applications made after the appearance of the first square may create conditions favorable for bollworm-tobacco budworm outbreaks due to destruction of beneficial insects.

Late Season Pests

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 insecticidal applications begin, inspect fields frequently and repeat applications until the 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 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 the following season.

Insecticides may be required at application intervals of not more than 5 days for effective control of the boll weevil, bollworm, tobacco budworm and pink bollworm.

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 recommendations. 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.

Begin *pink bollworm* field 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 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, stalk destruction and plowing under debris immediately after harvest reduce boll weevil, pink bollworm, bollworm and tobacco budworm populations. Pay particular attention 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. 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.* (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 beneficial insect populations in many instances effectively control cotton pests such as the bollworm, tobacco budworm, cotton aphid and spider mites. Most insecticides are highly injurious to populations of beneficial insects. For this reason, make frequent field inspections before insecticides are applied to determine if economically damaging levels of injurious insects are present. While natural populations of beneficial insects frequently provide effective biological control, practical methods have not been devised for release of beneficial insects.

GENERAL INFORMATION

In the late season program, dusts and sprays are equally effective when applied properly. If showers occur and the insecticide is washed off within 24 hours, repeat application as soon as possible, except when aphicides are used. Increase dosages to the maximum recommended when infestations are heavy.

For detailed information on using 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 dust 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 plant.

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, methyl parathion and parathion. Avoid skin contact. Do not breathe vapors or drift from sprays or dusts.

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

Do not graze livestock in cotton fields or feed gin trash treated with insecticides, except those with no label restrictions.

Prevent drift from contaminating neighboring crops.

Most insecticides are destructive to honey bees. Since bees help pollinate many agricultural crops, make every effort to prevent their destruction.

For additional information, contact your county agent, or area Extension entomologist at Lubbock, Vernon or Fort Stockton.

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
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

	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.

POLICY FOR MAKING INSECT CONTROL RECOMMENDATIONS

Insect control recommendations made by the Texas Agricultural Extension Service, Texas A&M University, are based upon:

- Effectiveness of materials under Texas conditions
- Avoiding residues remaining on the crop at harvest
- Avoiding toxicity to plants, animals and humans
- Avoiding adverse side-effects on beneficial predators, parasites, honey bees, fish and other wildlife, plants, animals and humans, wherever possible.

Recommended chemicals also must be registered and labeled for use both by the United States Department of Agriculture and the Texas Department of Agriculture. The status of insecticide label clearances is subject to change and may have occurred since this publication was printed. County agents and Extension entomologists are notified as these changes occur.

The insecticide *user* is always responsible for residues on his own crop, as well as for problems caused by drift from his property to other properties or crops.

Should questions arise concerning current label status of any recommended chemical, contact your county agent or area Extension entomologist at Lubbock, Vernon or Fort Stockton.

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COTTON INSECT CONTROL PROGRAM

Insects	Insecticides (listed alphabetically)		Pounds per acre of actual insecticide(s) ¹	Remarks
Cutworms	A.	Toxaphene-DDT (4-2 mixture) ^{2,11} *2½ pt. to 2 qt. of the 4-2 formulation.	2.0-3.0*	May cause damage during seedling stage. Keep fields as weed free as possible 3 weeks prior to planting to minimize cutworm problems. Plow under cover crops at least 3 weeks prior to planting. Ground applications along crop rows are preferred.
	Baits			
	A.	Carbaryl (Sevin) (5% bait)	1.5 (30 lb. bait/acre)	
	B.	Trichlorfon (Dylox) ¹⁰ (5% bait)	1.5 (30 lb. bait/acre)	
	(See below for control of beet armyworms and yellowstriped armyworms.)			
Garden webworms	A.	Methyl parathion ^{6,9}	0.25-0.5	Generally a problem on seedling to six-leaf stage. Apply treatment as needed.
	B.	Toxaphene-DDT (4-2 mixture) ^{2,11} *2½ pt. to 2 qt. of the 4-2 formulation.	2.0-3.0*	
Thrips	A.	Azinphosmethyl (Guthion) ⁸	0.125	Inspect cotton as soon as it emerges to a stand. Base applications 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.	Toxaphene ³	0.75-1.0	
Cotton fleahoppers	A.	Bidrin ^{2,8}	0.1-0.25	Base all treatments on damage (excessive loss of squares) as well as numbers of fleahoppers. During first 3 weeks of squaring, begin treatments when 35 to 50 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. Use insecticides only when few or no squares are being "set" by the plants due to fleahopper attack. Insecticides applied early in the fruiting period may result in outbreaks of bollworm and tobacco budworm due to the destruction of beneficial insects. Use recommended higher application rates only when infestations are severe.
	B.	Carbaryl (Sevin) ⁵	0.5-1.0	
	C.	Toxaphene-DDT (4-2 mixture) ^{2,11}	0.75-1.5*	
	D.	Trichlorfon (Dylox) ¹⁰	0.25-0.5	
*Use only ULV application at 0.75 lb./acre rate (1 pt. of the 4-2 formulation); as water emulsion spray or ULV, 1½-2 pt. of the 4-2 formulation.				
Overwintered boll weevils	A.	Azinphosmethyl (Guthion) ⁸ (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, 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 oz.	
	D.	Methyl parathion ^{6,9}	0.25-0.5	
	E.	Toxaphene + methyl parathion ^{2,6,9,11}	1.0 + 0.25	
Cotton aphids	A.	Bidrin ^{2,8}	0.125-0.25	Generally beneficial insects will effectively hold cotton aphid populations below damaging levels. Therefore, give careful consideration before beginning applications.
	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 — Check fields twice weekly once worms are observed in the field. Method A: Examine the terminal buds (upper 3 to 4 inches of the plant) of 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 and 5% of the squares and small bolls have been injured by small bollworms. Method B: Make a whole plant examination (terminals, squares, flowers and bolls) of all plants on 10 feet of row in at least five locations in the field. When larval counts average 2 or more larvae per 10 feet of row or exceed 10 in 50 feet of row, begin treatment. Check fields closely 2 to 3 days following each application for effective control. Where control has not been obtained, repeat application immediately. Apply insecticides at 5-day intervals or less.
Tobacco budworms	B.	Carbaryl (Sevin) + methyl parathion ^{6,9,9}	2.0 + 0.5 to 3.0 + 0.75	
	C.	Methyl parathion ^{6,12}	1.25-2.0	
	D.	Toxaphene + methyl parathion ^{2,6,11,12}	2.0 + 1.0 to 3.0 + 1.5	
<div>Under most conditions, avoid treating cotton for early budworm infestations until after blooms are observed in the field. Where moderately resistant tobacco budworms are noted treatment interval may need shortening to 3 days and methyl parathion dosage increased to 2 pounds per acre. WHERE HIGH RESISTANCE LEVELS OCCUR, EFFECTIVE CHEMICAL CONTROLS ARE NOT AVAILABLE.</div>				
Boll weevils*	A.	Azinphosmethyl (Guthion) ⁸ (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 build-ups, 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 oz.	
	D.	Methyl parathion ^{6,9}	0.375-1.0	
	E.	Toxaphene + methyl parathion ^{2,6,9,11}	1.0 + 0.25 to 2.0 + 0.5	
*Refer 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 when 10 to 20% of the plants are infested. Insecticides are most effective if applied when worms are small.
Yellowstriped 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 mite species are highly resistant to miticides and are difficult to control with available materials. Use 0.6 to 1.0 lb. Azodrin for control of resistant carmine mite.
	B.	Carbophenothion (Trithion) ⁸	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	Lygus bugs are attracted to succulent growth where their feeding causes shedding of squares and young bolls, stunted growth and deformed bolls. The need for lygus bug control is regulated by the amount of succulent growth available to the feeding insects.
	B.	Methyl parathion ^{6,9}	0.5	
	C.	Parathion ⁶	0.5	

dosage increased to 2 pounds per acre. WHERE HIGH RESISTANCE LEVELS OCCUR, EFFECTIVE CHEMICAL CONTROLS ARE NOT AVAILABLE.

treatment. Check fields closely 2 to 3 days following each application for effective control. Where control has not been obtained, repeat application immediately. Apply insecticides at 5-day intervals or less.

Boll weevils*	A.	Azinphosmethyl (Guthion) ⁸ (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 build-ups, 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 oz.	
	D.	Methyl parathion ^{6,9}	0.375-1.0	
	E.	Toxaphene + methyl parathion ^{2,6,9,11}	1.0 + 0.25 to 2.0 + 0.5	
*Refer 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 when 10 to 20% of the plants are infested. Insecticides are most effective if applied when worms are small.
Yellowstriped 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 mite species are highly resistant to miticides and are difficult to control with available materials. Use 0.6 to 1.0 lb. 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	Lygus bugs are attracted to succulent growth where their feeding causes shedding of squares and young bolls, stunted growth and deformed bolls. The need for lygus bug control is regulated by the abundance of lygus in relation to the fruiting condition of the cotton plants and the period of prebloom to 2 weeks after bloom initiation. Begin treatment when 10 lygus are found per 50 sweeps (count each nymph as 2) of a 15- to 16-inch net. Make sweeps at several locations in the field by sweeping across the top of one row only in such a way that the top 10 inches of the plants are struck. After the early fruiting period, begin treatment when lygus counts exceed 20 to 30 per 50 sweeps. These population levels can be tolerated without causing yield or quality losses provided the plants have retained squares and set bolls normally during the first 4 to 5 weeks of fruiting.
	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 two 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) ⁸	0.25	Apply dusts or sprays when cotton leafworms appear and at 5-day intervals until under control. Young worms are easier to kill than old worms. The BROWN COTTON LEAFWORM can be controlled effectively with parathion at 0.125-0.25 lb. per acre or malathion at 0.35 lb. per acre.
	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 Soybean 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.	Malathion (ULV only)	8 fluid oz.	
	C.	Toxaphene ²	1.5-3.0	
Pink bollworms	A.	Azinphosmethyl (Guthion) ⁸	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.