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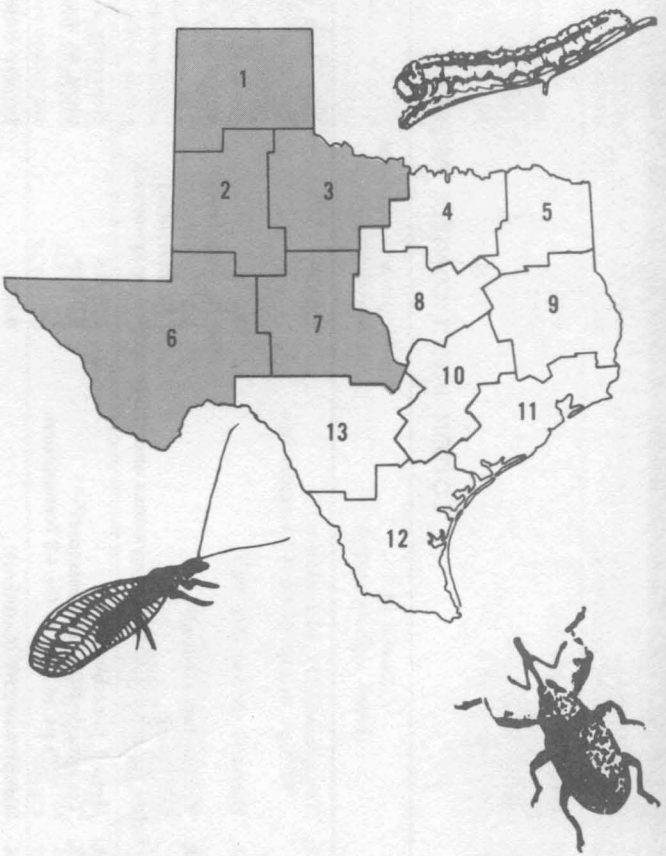
Guide for controlling Cotton Insects

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



TEXAS A&M UNIVERSITY
TEXAS AGRICULTURAL EXTENSION SERVICE
J. E. Hutchison, Director, College Station, 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.

Use of insecticides should be restricted to actual need, based on field inspections.

At least 12 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. 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. Use chemicals only if economic populations of injurious insects develop.

Cotton insects can be controlled economically by applying recommended insecticides at the correct time. (See recommendations.) Insecticides must cover the plants 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

When insecticide applications are necessary to prevent economic damage, base 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 pests 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 loss. Under certain conditions cotton can sustain heavy square loss without reducing yields. Carefully evaluate the decision to apply the first 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 or on high-yielding land is subject to insect damage later in the season 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 the High Plains and Trans-Pecos counties 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 to 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 prior to first ⅓-grown squares 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 during early and mid-season. 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. Where infestations occur late in the season, 40 to 50 percent of the top bolls may be infested without economic loss.

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 pound methyl parathion or 0.25 pound 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 and applicators are cautioned to use combinations of phosphate-type defoliants (Folex and Def) and phosphate insecticides with extreme care.* These combinations may pose 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 within 24 hours following an application, fields should be checked to determine the need for repeating the applications. 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 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 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, disulfoton (Di-Syston), methyl parathion, parathion and phorate (Thimet). Avoid skin contact. Do not breath vapors or drift from sprays or dusts.

Do not enter field 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 honeybees. Since bees help pollinate many agricultural crops, make every effort to prevent their destruction.

For additional information, contact your county agent or write the Extension entomologists, Texas A&M University, College Station, Texas 77843.

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
Dimethoate (Cygon)	2.67	1.33	0.67	0.33
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

*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

Recommendations on use of pesticides made by the Texas Agricultural Extension Service and the Texas Agricultural Experiment Station are based upon:

- Effectiveness under Texas conditions
- Avoidance of residues in excess of allowable tolerances
- Avoidance of toxicity to desirable vegetation, animals and humans
- Avoidance of adverse side effects upon beneficial predators, parasites, honeybees, fish and other wildlife, plants, animals and humans

Suggested pesticides must be registered and labeled for use by the Environmental Protection Agency and the Texas Department of Agriculture. The status of pesticide label clearance is subject to change, and may have changed since this publication was printed. County Extension agents and appropriate specialists are advised of changes as they occur.

The USER always is responsible for the effects of pesticide residues on his livestock and crops, as well as problems that could arise from drift or movement of the pesticide from his property to that of others. *Always read and follow carefully the instructions on the container label.*

For further information, contact your county Extension agent or:

Leader-Agricultural Chemicals, Texas A&M University (713) 845-1353

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COTTON INSECT CONTROL PROGRAM

Insects	Insecticide (listed alphabetically)	Pounds per acre of actual insecticide(s)[1]	Remarks
Cutworms	A. Toxaphene-DDT (4-2 mixture)[2,11] *2⅔ 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. Insecticide sprays or baits are recommended for application over the drill.
	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 yellow striped 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] *2⅔ pt. to 2 qt. of the 4-2 formulation.	2.0-3.0*	
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]	0.05-0.1	
	C. Carbaryl (Sevin)[5]	0.5	
	D. Dimethoate (Cygon)[13]	0.1	
	E. Toxaphene[2]	0.75-1.0	
Cotton fleahoppers	A. Bidrin[2,8]	0.05-0.1	Base all treatments on damage (excessive loss of squares) as well as numbers of fleahoppers; for example, during the first 3 weeks of squaring, 35 to 50 cotton fleahoppers (nymphs and adults) per 100 terminals may cause damage. 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. Dimethoate (Cygon)[13]	0.1	
	D. Toxaphene-DDT (4-2 mixture)[2,11]	0.75-1.5*	
	E. 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)[3] (EC or ULV)	0.25	Where weevils are found, apply between pin-head size and first ⅓-grown squares to prevent egg laying. If more weevils emerge from hibernation sites, base additional treatment on economic damage levels shown under "boll weevils" below. 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]	0.1	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 Tobacco budworms	A. Azodrin[2,7]	0.8-1.0	FIELD INSPECTION PRIOR TO INITIAL CHEMICAL APPLICATION: Check fields twice weekly (on a 3- to 4-day schedule). Examine 100 squares (½ grown or larger) at random throughout the field for worm damage. *Prior to bloom,* begin treatment when 15 to 25 percent of the squares are worm damaged. *After bolls are present,* begin treatment when 5 to 8 percent of the squares are worm damaged.
	B. Carbaryl (Sevin) + methyl parathion[5,6,9,12]	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	
	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.		FIELD INSPECTION AFTER INITIATION OF INSECTICIDE APPLICATIONS: Check fields closely 2 to 3 days following each application. Where control has not been obtained, repeat application immediately. Apply insecticide at intervals as determined by infestations. *Method A:* Examine the terminal buds 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.
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 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.		

	C. *Methyl parathion*[6,9,12]	1.25-2.5	
	D. Toxaphene + methyl parathion[2,6,11,12]	2.0 + 1.0 to 3.0 + 1.5	

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.

throughout the field for worm damage. Prior to blooms, begin treatment when 15 to 25 percent of the squares are worm damaged. *After bolls are present,* begin treatment when 5 to 8 percent of the squares are worm damaged.

FIELD INSPECTION AFTER INITIATION OF INSECTICIDE APPLICATIONS: Check fields closely 2 to 3 days following each application. Where control has not been obtained, repeat application immediately. Apply insecticide at intervals as determined by infestations.

Method A: Examine the terminal buds 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.

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 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 Yellow striped armyworms	A. Methyl parathion[6,9,12]	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)[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. 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	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[6,9,12]	0.5-1.0	
	C. Parathion[6,12]	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 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)[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	

[1]Dusts are effective, but sprays are considered more practical under early season conditions.
[2]Do not graze or feed treated plants, including gin waste, to dairy animals or animals being finished for slaughter.
[3]Do 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.
[4]Do not apply after bolls are open.
[5]Problems may be encountered in spraying wettable powder with low-volume farm sprayers. Follow manufacturer's directions carefully.
[6]Do not apply within 5 days of handpicking.
[7]Do not apply within 21 days of harvest.
[8]Do not apply within 10 days of harvest.
[9]Workers entering fields within 24 hours after application should wear protective clothing.
[10]Do not apply within 7 days of picking. Do not graze livestock in treated fields within 14 days after application.
[11]Do not feed gin waste to livestock.
[12]Fields treated with these rates of methyl parathion should not be entered for 48 hours following application.
[13]Do not apply within 14 days of harvest nor repeat application within 14 days. Do not graze livestock in treated fields or feed gin waste, burrs, etc., from treated fields.

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