



**Suggested
Insecticides
for
Managing
Cotton
Insects**

**in the Lower Rio Grande Valley
2004**

**This publication is to be used with E-7, "Managing Cotton
Insects in the Lower Rio Grande Valley, 2004."**

Suggested Insecticides for Management of Cotton Insects in the Lower Rio Grande Valley

John W. Norman, Jr.*

A committee of state and federal research scientists and Extension specialists meets annually to review cotton pest management research and management guidelines. Guidelines are revised at this meeting to reflect the latest proven techniques for maximizing profits for the Texas cotton producer by optimizing inputs and production.

Management of Cotton Pests

The proper management of cotton pests is dependent upon the use of pest management principles. Pest management does not rely solely on insecticides. Therefore, the USER of this insert is strongly encouraged to refer to E-7 for discussion of pest biology, scouting techniques, economic thresholds, insecticide resistance management, conservation of existing natural control agents, overall crop management practices which do not promote pest problems, ovicide use, microbial insecticide use, and guidelines for protecting bees from insecticides.

Policy Statement for Making Insecticide Use Recommendations

This is not a complete listing of all products or their uses registered for cotton. The insecticides and their suggested use patterns included in this publication reflect a consensus of opinion of Extension entomologists based on field tests. The data from these field tests met the minimum requirements as outlined in the Guidelines for the Annual Entomology Research Review and Extension Guide Revision Conference. Products listed must conform to our performance standards and avoid undue environmental consequences.

Suggested insecticide use rates have exhibited sufficient efficacy in tests to be effective in providing adequate control in field situations. However, it is impossible to eliminate all risks. Conditions or circumstances which are unforeseen or unexpected may result in less than satisfactory results. Texas Cooperative Extension will not assume responsibility for such risks. Such responsibility shall be assumed by the user of this publication.

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

clearances is subject to change and may have changed since this publication was printed.

The USER is always 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. Always read and follow carefully the instructions on the container label. Pay particular attention to those practices which ensure worker safety.

For additional information, contact your county Extension staff or write the Extension Entomologist, Department of Entomology, Texas A&M University, College Station, TX 77843; or call (979) 845-7026.

Endangered Species Regulations

The Endangered Species Act is designed to protect and to assist in the recovery of animals and plants that are in danger of becoming extinct. In response to the Endangered Species Act, many pesticide labels now carry restrictions limiting the use of products or application methods in designated biologically sensitive areas. These restrictions are subject to change. Refer to the Environmental Hazards or Endangered Species discussion sections of product labels and/or call your local county Extension agent or Fish and Wildlife Service personnel to determine what restrictions apply to your area. Regardless of the law, pesticide users can be good neighbors by being aware of how their actions may affect people and the natural environment.

Worker Protection Standard

The Worker Protection Standard (WPS) is a set of federal regulations that applies to all pesticides used in agricultural plant production. If you employ any person to produce a plant or plant product for sale and apply any type of pesticide to that crop, WPS applies to you. The WPS requires you to protect your employees from pesticide exposure. It requires you to provide three basic types of protection: you must inform employees about exposure, protect employees from exposure, and mitigate pesticide exposures that employees might receive. The WPS requirement will appear in the "DIRECTIONS FOR USE" part of the label. For more detailed information consult EPA publication 735-B-93-001 (GPO #055-000-0442-1) *The Worker Protection Standard for Agricultural Pesticides -- How to Comply: What Employers Need to Know*, or call Texas Department of Agriculture, Pesticide Worker Protection Program, (512) 463-7717.

*Extension agent-IPM, The Texas A&M University System.

Table 1. Insecticide suggestion table.

Pest	Insecticides (listed alphabetically)	Insecticide class ¹	Pounds active ingredient per acre ²	Formulated amount per acre	Precaution status ³	Re-entry interval (hrs) ⁴	Honey bee hazard ⁵
Cutworms	Bifenthrin (Capture® 2 E)	SP	0.04-0.10	2.6-6.4 oz.	W	24	H
	Chlorpyrifos (Lorsban® 4 E)	OP	0.75-1.0	1.5-2 pts.	W	24	H
	Cyfluthrin (Baythroid® 2 E)	SP	0.0125-0.025	0.8-1.6 oz.	D	12	H
	Cyhalothrin (Karate® 2.08 CS)	SP	0.02-0.03	1.28-1.92 oz.	D	24	H
	Cypermethrin (Ammo® 2.5 E)	SP	0.04-0.1	2-5 oz.	C	12	H
	Deltamethrin (Decis® 1.5 E)	SP	0.013-0.019	1.11-1.62 oz.	D	12	H
	Esfenvalerate*** (Asana XL® 0.66 E)	SP	0.03-0.05	5.8-9.6 oz.	W	12	H
	Methyl Parathion (4 E)	OP	1.0	32 oz.	D	48**	H
	Zeta-cypermethrin (Fury® 1.5 E)	SP	0.016-0.024	1.37-2.05 oz.	W	12	H
	(Mustang® Max 0.8E)	SP	0.008-0.012	1.28-1.92 oz.	W	12	H
	Silverleaf Whiteflies† (Adults)	Endosulfan (Phase® 3 E)	CD	1.0	1.33 qts.	D	24
(Thiodan® 3 E)		CD	1.0	1.66 qts.	D	24	M
(Adults and Immatures)‡	Bifenthrin (Capture® 2 E) + Acephate	SP +OP	0.08	5.2 oz.	W	12	H
	(Address® 75 S)		0.5	10.66 oz.	C	24	H
	(Address® 90 S)			9 oz.	C	24	H
	(Orthene® 90 S)			9 oz.	C	24	H
	(Orthene® 97)			8 oz.	C	24	H
	Fenpropathrin (Danitol® 2.4 EC) + Acephate	SP +OP	0.08	4.2 oz.	W	12	H
	(Address® 75 S)		0.5	10.66 oz.	C	24	H
(Address® 90 S)			9 oz.	C	24	H	
(Orthene® 90 S)			9 oz.	C	24	H	
(Orthene® 97)			8 oz.	C	24	H	
Cotton Fleahopper	Acephate	OP					
	(Address® 75 S)		0.188-0.25	3,34-5.33 oz.	C	24	H
	(Address® 90 S)		0.225	4 oz.	C	24	H
	(Orthene® 90 S)		0.225	4 oz.	C	24	H
	(Orthene® 97)		0.2425	4 oz.	C	24	H
	Acetamiprid (intruder® 70 WP)	N	0.025-0.05	0.6-1.1 oz.	C	12	H
	Chlorpyrifos (Lorsban® 4 E)	OP	0.19-0.5	6-16 oz.	W	24	H
	Dicrotophos (Bidrin® 8 E)	OP	0.05-0.1	0.8-1.6 oz.	D	48**	H
	Dimethoate (Dimate® 4 E)	OP	0.125-0.25	4-8 oz	W	12	H
	(Dimethoate® 2.67 E)		0.11-0.22	5.3-10.7 oz.	W	12	H
	(Dimethoate® 4 E)		0.125-0.25	4-8 oz	W	12	H
	(Dimethoate® 5 E)		0.125-0.25	3.2-6.4 oz.	D	48	H
	Imidacloprid (Provado® 1.6 F)	N	0.047	3.75 oz.	C	12	H
	(Trimax® 4 F)		0.047	1.5 oz.	C	12	H
	Indoxacarb (Steward® 1.25 SC)	I	0.09-0.11	9.2-11.3 oz.	C	12	H
	Methomyl (Lannate® 2.4 LV)	C	0.113-0.225	6-12 oz.	D	72	H
	Methyl Parathion (4 E)	OP	0.1	3.2 oz	D	4 days*	H
	Oxamyl (Vydate® 2 L)	C	0.25	16 oz	D	48	H
	(Vydate® 3.77 C-LV)		0.25	8.5 oz	D	48	H
	Oxydemeton-methyl (Metasystox-R® 2 E)	OP	0.25	16 oz	W	48**	M
Thiamethoxam (Centric® 40 WG)	N	0.047	2 oz.	C	12	H	

(continued)

Table 1. Insecticide suggestion table. (continued)

Pest	Insecticides (listed alphabetically)	Insecticide class ¹	Pounds active ingredient per acre ²	Formulated amount per acre	Precaution status ³	Re-entry interval (hrs) ⁴	Honey bee hazard ⁵	
Cotton Aphids §§	Acetamiprid (Intruder® 70 WP)	N	0.025-0.05	0.6-1.1 oz.	C	12	H	
	Chlorpyrifos (Lorsban® 4 E)	OP	0.25-1.0	8-32 oz.	W	24	H	
	Dicrotophos (Bidrin® 8 E)	OP	0.25-0.5	4-8 oz.	D	48**	H	
	Dicrotophos (Bidrin® 8 E) + Amitraz (Ovasyn 1.5 E)	OP + T	0.25-0.5 +	4-8 oz. +	D + W	48**	H	
	Dicrotophos (Bidrin® 8 E) + Profenofos (Curacron 8 E)	OP + OP	0.25-0.5 +	4-8 oz. +	D + W	48**	H	
	Dimethoate (Dimate® 4 E)	OP	0.125-0.25	4-8 oz.	W	12	H	
	Dimethoate® 2.67 E)		0.11-0.22	5.3-10.7 oz.	W	12	H	
	Dimethoate® 4 E)		0.125-0.25	4-8 oz.	W	12	H	
	Dimethoate® 5 E)		0.125-0.25	3.2-6.4 oz.	D	48	H	
	Imidacloprid (Provado® 1.6 F)	N	0.047	3.75 oz.	C	12	H	
	(Trimax® 4 F)		0.047	1.5 oz.	C	12	H	
	Methomyl (Lannate® 2.4 LV)	OP	0.225	12 oz.	D	72	H	
	Methyl Parathion (4 E)	OP	0.25-0.375	8-12 oz.	D	4 days**	H	
	Parathion (8 E)	OP	0.25-0.375	4-6 oz.	D	7 days	H	
	Profenofos (Curacron® 8 E)	OP	0.5	8 oz.	W	48**	H	
	Thiamethoxam (Centric® 40 WG)	N	0.047	2 oz.	C	12	H	
	Spider Mites	Avermectin B ₁ (Zephyr 0.15 E)		0.01-0.02	8-16 oz.	W	48	H
		Dicofol (Kelthane® MF)	CH	1.0-2.0	1-2 qts.	C	12	R
		Parathion (8 E)	OP	0.25	4 oz.	D	7 days	H
		Profenofos (Curacron® 8 E)	OP	0.5-0.75	8-12 oz.	W	48**	H
Propargite (Comite® 6.55 E)		CD	0.8-1.6	1-2 pts.	D	24	R	
Boll Weevil (Overwintered)		Azinphosmethyl (Guthion® 2 L)	OP	0.25	1 pt.	D	48**	H
		Endosulfan (Phase® 3 E)	CD	0.375-1.5	1-4 pts.	D	48	M
	(Thiodan® 3 E)		0.375-1.5	1-4 pts.	D	48	M	
	(Thiodan® 50 WP)		0.5-1.5	1-3 lbs.	D	48	M	
	Malathion (Fyfanon® ULV 9.9)	OP	0.61-1.22	8-16 oz.	C	12	H	
	Methyl Parathion (4 E)	OP	0.25-0.5	8-16 oz.	D	4 days**	H	
	Methyl Parathion encapsulated (PennCap M® 2 F)	OP	0.25-0.5	1-2 pts.	W	4 days**	H	
	Oxamyl (Vydate® 2 L)	C	0.25	16 oz.	D	48	H	
	(Vydate® 3.77 C-LV)		0.25	8.5 oz.	D	48	H	
	(In-season)	Azinphosmethyl (Guthion® 2 L)	OP	0.25	1 pt.	D	48**	H
Dicrotophos (Bidrin® 8 E)		OP	0.5	8 oz.	D	48**	H	
Endosulfan (Phase® 3 E)		CD	0.375-1.5	1.4 pts.	D	48	M	
(Thiodan® 3 E)			0.375-1.5	1.4 pts.	D	48	M	
(Thiodan® 50 WP)			0.5-1	1-3 lbs.	D	48	M	
Malathion (Fyfanon® ULV 9.9)		OP	0.92-1.22	12-16 oz.	C	12	H	
Methyl Parathion (4 E)		OP	0.375-0.5	12-16 oz.	D	4 days**	H	

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§§Difficulty in controlling cotton aphids has been encountered in some areas of Texas. Poor or erratic control can be expected in the High Plains, Trans Pecos, Rolling Plains and Wintergarden areas. Resistance exists to most registered materials and continued excessive use of certain insecticides is apt to expand the resistance problem. Where resistance exists in an area, the initial insecticide application should be made at the higher labeled rate. Poorest control has occurred during periods of rapid population growth. Contact the county Extension agent in your area for the latest information on aphid control.

Table 1. Insecticide suggestion table. (continued)

Pest	Insecticides (listed alphabetically)	Insecticide class ¹	Pounds active ingredient per acre ²	Formulated amount per acre	Precaution status ³	Re-entry interval (hrs) ⁴	Honey bee hazard ⁵	
Bollworm & Tobacco Budworm (Eggs)	Methyl Parathion encapsulated (PennCap M [®] 2 F)	OP	0.25	1 pt.	W	4 days**	H	
	Oxamyl (Vydate [®] 2 L)	C	0.25	16 oz.	D	48	H	
	(Vydate [®] 3.77 C-LV)		0.25	8.5 oz.	D	48	H	
	<i>(Use only with a larvicide, see ovicide section E-7.)</i>							
	Amitraz (Ovasyn [®] 1.5 EC)	T	0.125-0.25	0.67-1.33 pt.	W	24	R	
	Methomyl (Lannate [®] 2.4 LV)	C	0.113-0.225	6-12 oz.	D	72	H	
	Profenofos (Curacron [®] 8 E)	OP	0.125-0.25	2-4 oz.	W	48**	H	
	Thiodicarb (Larvin [®] 3.2 F)	C	0.125-0.25	5-10 oz.	W	12	M	
	(Bollworm Larvae)	Acephate (Address [®] 75 S)	OP	1	21.33 oz.	C	24	H
		(Address [®] 90 S)			17.7 oz.	C	24	H
(Orthene [®] 90 S)				17.7 oz.	C	24	H	
(Orthene [®] 97)				16.5 oz.	C	24	H	
<i>Bacillus thuringiensis (See listing in Table 2. See "Microbial Insecticides" section in E-7.)</i>								
(Tobacco Budworm Larvae)	Bifenthrin*** (Capture [®] 2 E)	SP	0.04-0.1	2.56-6.4 oz.	W	12	H	
	Cyfluthrin*** (Baythroid [®] 2 E)	SP	0.025-0.05	1.6-3.2 oz.	D	12	H	
	Cyfluthrin + Imidacloprid (Leverage [®] 2.7 SE)	SP + N	0.032+ 0.047	3.75 oz.	W	12	H	
	Cyhalothrin*** (Karate [®] 2.08 CS)	SP	0.025-0.04	1.6-2.56 oz.	D	24	H	
	Cypermethrin*** (Ammo [®] 2.5 E)	SP	0.04-0.1	2-5 oz.	C	12	H	
	Deltamethrin*** (Decis [®] 1.5 E)	SP	0.019-0.03	1.62-2.56 oz.	D	12	H	
	Esfenvalerate*** (Asana XL [®] 0.66 E)	SP	0.03-0.05	5.8-9.6 oz.	W	12	H	
	Indoxacarb (Steward [®] 1.25 SC)	I	0.09-0.11	9.2-11.3 oz.	C	12	H	
	Methomyl (Lannate [®] 2.4 LV)	C	0.45	1.5 pts.	D	72	H	
	Methoxyfenozide (Intrepid [®] 2 F)	IGR	0.25-0.38	16.0-24.0 oz.	C	4	R	
	Methyl Parathion (4 E)	OP	1.25-2.0	2.5-4 pts.	D	4 days**	H	
	Profenofos (Curacron [®] 8 E)	OP	0.5-1.0	8-16 oz.	W	48**	H	
	Spinosad (Tracer [®] 4 SC)	NA	0.067-0.089	2.14-2.9 oz.	C	4	H	
	Thiodicarb (Larvin [®] 3.2 F)	C	0.6-0.9	1.5-2.25 pts.	W	12	M	
	Tralomethrin*** (Scout [®] X-tra 0.9 E)	SP	0.018-0.024	2.56-3.37 oz.	D	24	H	
	Zeta-cypermethrin*** (Fury [®] 1.5 E)	SP	0.033-0.045	2.82-3.83 oz.	W	12	H	
			(Mustang [®] Max 0.8E)	0.0165-0.0225	2.64-3.6 oz.	W	12	H
	(Tobacco Budworm Larvae)	Acephate (Address [®] 75 S)	OP	1	21.33 oz.	C	24	H
		(Address [®] 90 S)			17.7 oz.	C	24	H
		(Orthene [®] 90 S)			17.7 oz.	C	24	H
(Orthene [®] 97)				16.5 oz.	C	24	H	
Emamectin benzoate (Denim [®] 0.16 EC)			0.0075	6.0 oz.	D	48	H	
<i>Bacillus thuringiensis (See listing in Table 2. See "Microbial Insecticides" section in E-7.)</i>								
(Tobacco Budworm Larvae)	Indoxacarb (Steward [®] 1.25 SC)	I	0.09-0.11	9.2-11.3 oz.	C	12	H	
	Methomyl (Lannate [®] 2.4 LV)	C	0.45	1.5 pts.	D	72	H	

(continued)

Table 1. Insecticide suggestion table. (continued)

Pest	Insecticides (listed alphabetically)	Insecticide class ¹	Pounds active ingredient per acre ²	Formulated amount per acre	Precaution status ³	Re-entry interval (hrs) ⁴	Honey bee hazard ⁵
	Methoxyfenozide (Intrepid® 2 F)	IGR	0.25-0.38	16-24 oz.	C	4	R
	Methyl Parathion (4 E)	OP	1.25-2.0	2.5-4 pts.	D	4 days**	H
	Profenofos (Curacron® 8 E)	OP	0.5-1.0	8-16 oz.	W	48**	H
	Spinosad (Tracer® 4 SC)	NA	0.067-0.089	2.14-2.9 oz.	C	4	H
	Thiodicarb (Larvin® 3.2 F)	C	0.6-0.9	1.5-2.25 pts.	W	12	M
	<p>*** The synthetic pyrethroid insecticides (examples include bifenthrin, deltamethrin, esfenvalerate, cyfluthrin, cyhalothrin, tralomethrin, cypermethrin and zeta-cypermethrin) recommended for control of bollworms also will provide boll weevil control. However, application intervals similar to those recommended for the traditional phosphate insecticides (3 to 5 days under heavy pressure) are necessary to provide adequate control. When treatments are to be made for a bollworm-boll weevil complex a suggested treatment regime is to use a pyrethroid followed 3 to 5 days later by a phosphate boll weevil insecticide.</p> <p>Since pyrethroids are not more effective than phosphates for boll weevil control, but are more effective for bollworm control, they should be saved for bollworm management.</p> <p>We do not recommend using pyrethroids for boll weevil control alone or for early season pests because increased use may enhance the opportunity for insects to develop resistance to pyrethroids.</p> <p>Bifenthrin suppresses spider mites when used for control of bollworms.</p> <p>The use of synthetic pyrethroid insecticides may increase cotton aphid numbers.</p>						
Plant Bug (Creontiades spp.)	Acephate (Address® 75 S)	OP	0.5	10.66 oz.	C	24	H
	(Address® 90 S)			9 oz.	C	24	H
	(Orthene® 90 S)			9 oz.	C	24	H
	(Orthene® 97)			8 oz.	C	24	H
	Bifenthrin*** (Capture® 2 E)	SP	0.04-0.1	2.6-6.4 oz.	W	12	H
	Cyfluthrin*** (Baythroid® 2 E)	SP	0.025-0.04	1.6-2.6 oz.	D	12	H
	Cyfluthrin*** + Imidacloprid (Leverage® 2.7 SE)	SP + N	0.047 + 0.032	3.75 oz.	W	12	H
	Cyhalothrin*** (Karate® 2.08 CS)	SP	0.02-0.03	1.28-1.92 oz.	D	24	H
	Cypermethrin*** (Ammo® 2.5 E)	SP	0.04-0.1	2-5 oz.	D	24	H
	Deltamethrin*** (Decis® 1.5 E)	SP	0.013-0.019	1.11-1.62 oz.	D	12	H
	Dicrotophos (Bidrin® 8 E)	OP	0.5	8 oz.	D	48	H
	Dimethoate (Dimate® 4 E)	OP	0.25	8 oz.	W	12	H
	(Dimethoate® 2.67 E)		0.22	10.7 oz.	W	12	H
	(Dimethoate® 4 E)		0.25	8 oz.	W	12	H
	(Dimethoate® 5 E)		0.25	6.4 oz.	D	48	H
	Esfenvalerate*** (Asana XL® 0.66 E)	SP	0.03-0.05	5.8-9.6 oz.	W	12	H
	Methomyl (Lannate® 2.4 L-V)	C	0.225	0.75 pt.	D	72	H
	Methyl Parathion (4 E)	OP	0.5-1.0	1-2 pts.	D	4 days**	H
	Methyl Parathion encapsulated (Penncap-M® 2 F)	OP	0.25	1 pt.	W	4 days**	H
	Oxamyl (Vydate® 2 L)	C	0.25	1 pt.	D	48	H
	(Vydate® 3.77 C-LV)		0.25	8.5 oz.	D	48	H
	Parathion (8 E)		0.5-1.0	8.0-16.0	D	7 days	H
	Tralomethrin*** (Scout® X-tra 0.9 E)	SP	0.016-0.02	2.28-2.84 oz.	D	24	H
	Zeta-cypermethrin*** (Fury® 1.5 E)	SP	0.035-0.05	2.99-4.26 oz.	W	12	H
	(Mustang® Max 0.8E)		0.0175-0.02	2.8-4.0 oz.	W	12	H
Beet Armyworm	Chlorpyrifos (Lorsban® 4 E)	OP	1	2 pts.	W	24	H
	Diflubenzuron (Dimilin® 2 F)	IGR	0.0625-0.125	4-8 oz.	C	12	R
	Emamectin benzoate (Denim® 0.16EC)		0.0075	6.0 oz.	D	48	H

(continued)

Table 1. Insecticide suggestion table. (continued)

Pest	Insecticides (listed alphabetically)	Insecticide class ¹	Pounds active ingredient per acre ²	Formulated amount per acre	Precaution status ³	Re-entry interval (hrs) ⁴	Honey bee hazard ⁵
	Indoxacarb (Steward® 1.25 SC)	I	0.09-0.11	9.2-11.3 oz.	C	12	H
	Methoxyfenozide (Intrepid® 2 F)	IGR	0.06-0.16	14-10 oz.	C	4	R
	Methomyl (Lannate® 2.4 LV)	C	0.45	1.5 pts.	D	72	H
	Profenofos (Curacron® 8 E)	OP	0.75-1.0	12-16 oz.	W	48**	H
	Spinosad (Tracer® 4 SC)	NA	0.067-0.089	2.14-2.9 oz.	C	4	H
	Tebufofenozide (Confir® 2 F)	IGR	0.06-0.25	4-16 oz.	C	4	R
	Thiodicarb (Larvin® 3.2F)	C	0.6-0.9	1.5-2.25 pts.	W	12	M

*Refer to federal label for specific field re-entry instructions

**Re-entry interval increases from 48 to 72 hours or from 4 days to 5 days where the average annual rainfall is less than 25 inches.

†A wide variety of product combinations suppress whiteflies. These combinations generally include a pyrethroid combined with an organophosphate or endosulfan. The products listed have provided superior control of SLWF in efficacy studies conducted in the Lower Rio Grande Valley.

‡Efficacy studies have shown that the combination with Orthene® is necessary for Danitol®, whereas performance of Capture® is sometimes satisfactory on its own.

¹C=carbamate; OP=organophosphate; SP=synthetic pyrethroid; CD=cyclodiene; CH=chlorinated hydrocarbon; T=triazapentadiene; IGR=insect growth regulator; NI=nitroguanidine; NA=naturalyte; I=indeno-oxadiazine

²Refer to Table 3 for converting pounds active ingredient per gallon to acres per gallon and to Table 4 for converting percent active ingredient of dry insecticides to formulated insecticides per acre.

³C=Caution; W=Warning; D-Danger

⁴Time after application before re-entering fields without protective clothing. The wearing of protective clothing as described on the label may shorten the re-entry interval. In general, no insecticide label will have the statement "allow spray to dry" or "allow dust to settle" as a re-entry interval. However, there may be limited instances where EPA could grant a shorter re-entry interval than the minimum of 12 hours following application. Re-entry intervals are determined by the product's federal label or by Texas Department of Agriculture regulations and are subject to change.

⁵H=highly toxic; M=moderately toxic; R=relatively non-toxic

Table 2. Registered Bacillus thuringiensis products and labeled rates for controlling bollworm and tobacco budworm.

Product	Rate per acre (formulated material)
Condor	0.5-1.67 qts.
Dipel DF	0.5-2.0 lbs.
Dipel ES	1-4 pts.
Javelin	0.25-1.5 lbs.

Table 3. Converting pounds active ingredient per gallon to acres per gallon.

Pounds active ingredient needed per acre	Pounds active ingredient per gallon																	
	0.15	0.30	0.66	0.90	1.00	1.80	2.00	2.40	2.50	2.67	3.00	3.20	4.00	6.00	6.55	7.50	8.00	9.33
	Acres per gallon*																	
0.01	15.0	30.0	66.0	90.0	100.0	180.0	200.0	240.0	250.0	267.0	300.0	320.0	400.0	600.0	655.0	750.0	800.0	933.0
0.015	10.0	20.0	44.0	60.0	66.7	120.0	133.3	160.0	166.7	178.0	200.0	213.3	266.7	400.0	436.7	500.0	533.3	622.0
0.019	7.9	15.8	34.7	47.4	52.6	94.7	105.3	126.3	131.6	140.5	157.9	168.4	210.5	315.8	344.7	394.7	421.1	491.1
0.02	7.5	15.0	33.0	45.0	50.0	90.0	100.0	120.0	125.0	133.5	150.0	160.0	200.0	300.0	327.5	375.0	400.0	466.5
0.025	6.0	12.0	26.4	36.0	40.0	72.0	80.0	96.0	100.0	106.8	120.0	128.0	160.0	240.0	262.0	300.0	320.0	373.2
0.03	5.0	10.0	22.0	30.0	33.3	60.0	66.7	80.0	83.3	89.0	100.0	106.7	133.3	200.0	218.3	250.0	266.7	311.0
0.04	3.8	7.5	16.5	22.2	25.0	45.0	50.0	60.0	62.5	66.8	75.0	80.0	100.0	150.0	163.8	187.5	200.0	233.3
0.05	3.0	6.0	13.2	18.0	20.0	36.0	40.0	48.0	50.0	53.4	60.0	64.0	80.0	120.0	131.0	150.0	160.0	186.6
0.0625	2.4	4.8	10.6	14.4	16.0	28.8	32.0	38.4	40.0	42.7	48.0	51.2	64.0	96.0	104.8	120.0	128.0	149.3
0.08	1.9	3.8	8.3	11.3	12.5	22.5	25.0	30.0	31.3	33.4	37.5	40.0	50.0	75.0	81.9	93.8	100.0	116.6
0.1	1.5	3.0	6.6	9.0	10.0	18.0	20.0	24.0	25.0	26.7	30.0	32.0	40.0	60.0	65.5	75.0	80.0	93.3
0.11	1.4	2.7	6.0	8.2	9.1	16.4	18.2	21.8	22.7	24.3	27.3	29.1	36.4	54.5	59.5	68.2	72.7	84.8
0.113	1.3	2.7	5.8	7.9	8.8	15.9	17.7	21.2	22.1	23.6	26.5	28.3	35.4	53.1	58.0	66.4	70.8	82.6
0.125	1.2	2.4	5.3	7.2	8.0	14.4	16.0	19.2	20.0	21.4	24.0	25.5	32.0	48.0	52.4	60.0	64.0	74.6
0.17	0.9	1.8	3.9	5.3	5.9	10.6	11.8	14.1	14.7	15.7	17.6	18.8	23.5	35.3	38.5	44.1	47.1	54.9
0.19	0.8	1.6	3.5	4.7	5.3	9.5	10.5	12.5	13.2	14.1	15.8	16.8	21.1	31.6	34.5	39.5	42.1	49.1
0.2	0.7	1.5	3.3	4.5	5.0	9.0	10.0	12.0	12.5	13.4	15.0	16.0	20.0	30.0	32.8	37.5	40.0	48.7
0.22	0.7	1.4	3.0	4.1	4.5	8.2	9.1	10.9	11.4	12.1	13.6	14.5	18.2	27.3	29.8	34.1	36.4	42.4
0.225	0.6	1.3	2.9	4.0	4.4	8.0	8.9	10.7	11.1	11.9	13.3	14.2	17.8	26.7	29.1	33.3	35.6	41.5
0.25	0.6	1.2	2.6	3.6	4.0	7.2	8.0	9.6	10.0	10.7	12.0	12.8	16.0	24.0	26.2	30.0	32.0	37.3
0.33	0.4	0.9	2.0	2.7	3.0	5.5	6.1	7.3	7.6	8.1	9.1	9.7	12.1	18.2	19.8	22.7	24.2	28.3
0.37	0.4	0.8	1.8	2.5	2.7	4.9	5.4	6.5	6.7	7.2	8.1	8.6	10.8	16.2	17.7	20.3	21.6	25.2
0.375	0.4	0.8	1.8	2.4	2.7	4.8	5.3	6.4	6.7	7.1	8.0	8.5	10.7	16.0	17.5	20.0	21.3	24.9
0.45	0.3	0.7	1.5	2.0	2.2	4.0	4.4	5.3	5.6	5.9	6.7	7.1	8.9	13.3	14.6	16.7	17.8	20.7
0.5	0.3	0.6	1.3	1.8	2.0	3.6	4.0	4.8	5.0	5.3	6.0	6.4	8.0	12.0	13.1	15.0	16.0	18.7
0.55	0.3	0.5	1.2	1.6	1.8	3.3	3.6	4.4	4.5	4.9	5.5	5.8	7.3	10.9	11.9	13.6	14.5	17.0
0.58	0.3	0.5	1.1	1.5	1.7	3.1	3.4	4.1	4.3	4.6	5.2	5.5	6.9	10.3	11.3	12.9	13.8	16.1
0.6	0.2	0.5	1.1	1.5	1.7	3.0	3.3	4.0	4.2	4.5	5.0	5.3	6.7	10.0	10.9	12.5	13.3	15.6
0.675	0.2	0.4	1.0	1.4	1.5	2.7	3.0	3.6	3.7	4.0	4.4	4.7	5.9	8.9	9.7	11.1	11.9	13.8
0.75	0.2	0.4	0.9	1.2	1.3	2.4	2.7	3.2	3.3	3.6	4.0	4.3	5.3	8.0	8.7	10.0	10.7	12.4
0.8	0.2	0.4	0.8	1.2	1.3	2.3	2.5	3.0	3.1	3.3	3.8	4.0	5.0	7.5	8.2	9.4	10.0	11.7
0.88	0.2	0.3	0.8	1.0	1.1	2.0	2.3	2.7	2.8	3.0	3.4	3.6	4.5	6.8	7.4	8.5	9.1	10.6
0.9	0.2	0.3	0.7	1.0	1.1	2.0	2.2	2.7	2.8	3.0	3.3	3.6	4.4	6.7	7.3	8.3	8.9	10.4
1	0.1	0.3	0.7	0.9	1.0	1.8	2.0	2.4	2.5	2.7	3.0	3.2	4.0	6.0	6.6	7.6	8.0	9.3
1.17	0.1	0.3	0.6	0.8	0.9	1.5	1.7	2.1	2.1	2.3	2.6	2.7	3.4	5.1	5.8	6.4	6.8	8.0
1.25	0.1	0.2	0.6	0.7	0.8	1.4	1.6	1.9	2.0	2.1	2.4	2.6	3.2	4.8	5.2	6.0	6.4	7.5
1.5	0.1	0.2	0.4	0.6	0.7	1.2	1.3	1.6	1.7	1.8	2.0	2.1	2.7	4.0	4.4	5.0	5.3	6.2
1.8	0.1	0.2	0.4	0.5	0.6	1.1	1.3	1.5	1.6	1.7	1.9	2.0	2.5	3.8	4.1	4.7	5.0	5.8
2	0.1	0.2	0.3	0.5	0.5	0.9	1.0	1.2	1.3	1.3	1.5	1.6	2.0	3.0	3.3	3.8	4.0	4.7

*See Table 1 for specific rates of insecticides for each insect or mite pest.

Table 4. Converting percent active ingredient of dry insecticides to formulated insecticide per acre.

Pounds active ingredient needed per acre	Percent active ingredient					
	5	15	20	50	80	90
	Pounds of formulated product per acre*					
0.09	1.80	0.60	0.45	0.18	0.11	0.10
0.188	3.76	1.25	0.94	0.38	0.24	0.21
0.25	5.00	1.67	1.25	0.50	0.31	0.28
0.3	6.00	2.00	1.50	0.60	0.38	0.33
0.45	9.00	3.00	2.25	0.90	0.56	0.50
0.5	10.00	3.33	2.50	1.00	0.63	0.56
0.6	12.00	4.00	3.00	1.20	0.75	0.67
0.75	15.00	5.00	3.75	1.50	0.94	0.83
1.0	20.00	6.67	5.00	2.00	1.25	1.11
1.25	25.00	8.33	6.25	2.50	1.56	1.39
1.33	26.60	8.87	6.65	2.66	1.66	1.48
1.5	30.00	10.00	7.50	3.00	1.88	1.67
1.6	32.00	10.67	8.00	3.20	2.00	1.78
2.0	40.00	13.33	10.00	4.00	2.50	2.22
2.4	48.00	16.00	12.00	4.80	3.00	2.67

*See Table 1 for specific rates of insecticides for each insect or mite pest.

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