IPM Guidelines Support Document 1

Impact of insecticides and miticides on predators in cotton October 2005 update

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Insecticides (in increasing rank order of impact on beneficials)	Rate (g ai / ha)	Target Pest(s)						Beneficials															Pest resurgence [12]			Toxicity to bees[14]
		Helicoverpa	Mites	Mirids	Aphids	Thrips	Persistence[8]	Overall Ranking[10]	Predatory beetles				Predatory bugs					Lacewing adults	Spiders	Hymenoptera			Thrips	Mite	Aphid	Helicoverpa	
									Total[1]	Red & Blue beetle	Minute 2-spt lady beetle	Other lady beetles	Total[2]	Damsel bugs	Big-eyed Bugs	Other Predatory bugs	Apple Dimpling			Total (wasps)	Trichogramma	Ants					
Bt[11]		✓					very short	very low	VL	VL	VL	VL	VL	VL	VL	VL	VL	VL	VL	VL	VL	VL	VL				VL
NP Virus		✓					very short	very low	VL	VL	VL	VL	VL	VL	VL	VL	VL	VL	VL	VL	VL	VL	VL				VL
Pirimicarb	250				✓		short	very low	VL	VL	VL	VL	L	L	M	VL	VL	VL	VL	VL	M	VL	L				VL
PSO (Canopy)[16]	2%	✓			✓		short	very low	VL	L	L	VL	VL	VL	VL	VL	VL	VL	L	VL	VL	H	VL				VL
Methoxyfenozide	400	✓					medium-long	very low	L	VL	VL	L	L	L	L	VL	VL	VL	VL	VL	VL	VL	VL				VL
Etoxazole	38.5		✓				short	low	VL	VL	-	L	VL	VL	VL	VL	VL	VL	M	L	VL	VL	L				VL
Dicofol[3]	960		✓				long	low	L	-	-	-	L	-	-	-	L	-	L	-	-	-	VL				VL
Amorphous silica[17]	2500	✓					short	low	L	L	-	M	M	-	VL	-	L	L	L	L	-	M	VL				-
Spinosad	96	✓					medium	low	VL	M	L	VL	M	L	H	VL	L	VL	VL	M	H	H	H	+ve			H[15]
Diafenthiuron	350		✓		✓		medium	low	M	H	VL	M	L	M	VL	L	H	VL	L	L	VL	H	L			+ve	M
Pymetrozine	150				✓		short	low	M	M	M	M	L	L	L	VL	H	M	L	L	L	M	VL				VL
Indoxacarb[13]	127.5	✓		✓			medium	low	H[14]	L	VH	VH	L	L	L	L	VH	L	VL	L	VL	VH	VL		+ve		H[15]
Abamectin	5.4	✓[6]	✓				medium	moderate	L	M	H	VL	M	L	M	M	H	VL	M	M	M	H	M				H
Emamectin	8.4	✓					medium	moderate	L	VL	M	VL	H	H	H	H	H	L	M	M	M	VL	M				H
Endosulfan (low)	367.5	✓		✓	✓	✓	medium	moderate	M	VL	VH	M	M	M	M	L	H	L	M	VL	-	VH	H				M[15]
Propargite	1500		✓				medium	moderate	M	H	H	M	M	H	VL	VL	L	VL	M	M	H	H	M		+ve	+ve	L
Acetamiprid	22.5				✓		medium	moderate	M	M	VH	H	M	M	H	M	VH	L	VL	L	H	VH	VH				M[15]
Amitraz	400	✓	✓[9]				medium	moderate	H	M	VH	H	L	-	-	-	H	VL	M	M	L	H	M				L
Fipronil (low)	12.5			✓		✓	medium	moderate	L	VL	H	L	L	H	L	L	VH	VL	M	M	M	VH	VH		+ve	+ve	VH
Chlorfenapyr (low)	200	✓	✓				medium	moderate	M	L	VH	VL	M	VL	H	H	VH	L	L	M	VH	H	M				H
Thiamethoxam	100				✓		medium	moderate	H	H	H	H	M	M	M	H	H	M	VL	M	H	VH	H	+ve		+ve	H
Endosulfan (high)	735	✓		✓	✓	✓	medium	moderate	M	VL	VH	M	M	M	M	M	H	L	M	L	VH	VH	H				M[15]
Fipronil (high)	25			✓		✓	medium	moderate	L	VL	H	L	M	H	H	L	VH	VL	M	M	M	VH	VH	+ve		+ve	VH
Imidacloprid	49			✓	✓		medium	moderate	H	L	VH	H	H	M	H	L	VH	L	L	L	M	H	H	+ve		+ve	M
Methomyl	169	✓					very short	high	H	L	VH	VH	M	L	VH	L	VH	M	M	M	H	H	H	+ve			H[15]
Thiodicarb	750	✓					long	high	VH	M	VH	VH	M	M	L	L	VH	VL	M	M	M	M	H	+ve	+ve		M[15]
Chlorfenapyr (high)	400	✓	✓				medium	high	H	M	VH	L	H	H	H	H	VH	L	M	M	VH	VH	M		+ve		H
OP's[5]		✓	✓	✓	✓	✓	short-medium	high	H	M	H	H	H	M	H	H	VH	L	M	H	H	VH	H	+ve			H
Carbaryl[3]							short	high	H	-	-	-	H	-	-	-	-	-	-	-	-	-	H	-	-	-	H
Pyrethroids[4]		✓	✓[7]	✓[7]			long	very high	VH	-	-	-	VH	-	-	-	VH	VH	VH	VH	VH	VH	VH	+ve	+ve	+ve	H

Insects

Foototes to Impact of insecticides and miticides on predators in cotton table October 2005 update table.

1. Total predatory beetles – ladybeetles, red and blue beetles, other predatory beetles
2. Total predatory bugs – big-eyed bugs, minute pirate bugs, brown smudge bugs, glossy shield bug, predatory shield bug, damsel bug, assassin bug, apple dimpling bug
3. Information; Citrus pests and their natural enemies, edited by Dan Smith; University of California Statewide IPM project, Cotton, Selectivity and persistence of key cotton insecticides and miticides.
4. Pyrethroids; alpha-cypermethrin, cypermethrin,beta-cyfluthrin, cyfluthrin, bifenthrin, fenvalerate, esfenvalerate, deltamethrin, lambda-cyhalothrin,
5. Organophosphates; dimethoate, omethoate, monocrotophos, profenofos, chlorpyrifos, chlorpyrifos-methyl, azinophos ethyl, methidathion, parathion-methyl, thiometon
6. Helicoverpa punctigera only.
7. Bifenthrin is registered for mite control; alpha-cypermethrin, beta-cyfluthrin, bifenthrin, deltamethrin and lambda-cyhalothrin are registered for control of mirids
8. Persistence of pest control; short, less than 3 days; medium, 3-7 days, long, greater than 10 days.
9. Suppression of mites only.
10. Impact rating (% reduction in beneficials following application, based on scores for the major beneficial groups); VL (very low), less than 10%; L (low), 10-20%; M (moderate), 20-40%; H (high), 40-60%; VH (very high), > 60%. A '-' indicates no data available for specific local species.
11. Bacillus thuringiensis
12. Pest resurgence is +ve if repeated applications of a particular product are likely to increase the risk of pest outbreaks or resurgence. Similarly sequential applications of products with a high pest resurgence rating will increase the risk of outbreaks or resurgence of the particular pest species.
13. Very high impact on minute two-spotted ladybeetle and other ladybeetles for wet spray, moderate impact for dried spray.
14. Data Source: British Crop Protection Council. 2003. The Pesticide Manual: A World Compendium (Thirteenth Edition),. Where LD50 data is not available impacts are based on comments and descriptions. Where LD50 data is available impacts are based on the following scale: very low = LD50 (48h) > 100 ug/bee, low = LD50 (48h) < 100 ug/bee, moderate = LD50 (48h) < 10 ug/bee, high = LD50 (48h) < 1 ug/bee, very high = LD50 (48h) < 0.1 ug/bee. Refer to the Protecting Bees section in this booklet.
15. Wet residue of these products is toxic to bees, however, applying the products in the early evening when bees are not foraging will allow spray to dry, reducing risk to bees the following day.
16. May reduce survival of ladybeetle larvae – rating of moderate for this group.
17. May be detrimental to eggs and early stages of many insects, generally low toxicity to adults and later stages.

Table 2 :Impact of insecticides applied at planting or as seed treatments on key beneficial groups in cotton (high =more disruptive)

Insecticides	Rate (g ai / ha)	Main Target Pest(s)					Persistance[6]	Overall[7]	Beneficial group				
		WW	Mite	Mir.	Aph.	Th.[5]			Predatory beetles[1]	Predatory bugs [2]	Spiders	Wasps & Ants	Thrips
At Planting													
Aldicarb	**450**		✔	✔	✔	✔	medium -long	**very low[3]**	v low	v low	v low	v low	v high
Phorate	**600**	✔	✔	✔	✔	✔	medium -long	**very low[3,4]**	No data	No data	No data	No data	v high
Carbosulfan	**750-1000**	✔		✔		✔	medium -long	**very low[3,4]**	No data	No data	No data	No data	v high
Chlorpyrifos	**250-750**	✔					medium	**very low[4]**	No data	No data	No data	No data	No data
Seed Treatments													
Thiodicarb	**500 g ai / 100kg seed**					✔	short	**very low[3]**	v low	v low	v low	v low	high
Thiodicarb + Fipronil	**259 + 12 g ai / 100kg seed**	✔				✔	short-medium	**very low[3,4]**	No data	No data	No data	No data	high
Imidocloprid	**525 g ai / 100kg seed**	✔			✔	✔	medium	**very low[3]**	v low	v low	v low	v low	v high
Imidocloprid	**700 g ai / 100kg seed**	✔			✔	✔	medium	**very low[3,4]**	No data	No data	No data	No data	v high
Thiomethoxam	**280 g ai / 100kg seed**	✔			✔	✔	medium	**very low[3,4]**	No data	No data	No data	No data	v high

1. Predatory beetles – ladybeetles, red and blue beetles, other predatory beetles
2. Predatory bugs – Big-eyed bugs, minute pirate bugs,brown smudge bugs, glossy shield bug, predatory shield bug, damsel bug, assassin bug, apple dimpling bug
3. Except for effects on thrips which are predators of mites. Note that aldicarb and phorate will also control mites.
4. Based on observations with other soil or seed applied insecticides.
5. WW., wireworm; Mir, mirids; aph, aphids; th., thrips
6. Persistence; short, 2- 3 weeks; medium, 3-4weeks, long, 4-6 weeks
7. Impact rating (% reduction in beneficials following application); very low, less than 10%; low, 10-20%; moderate, 20-40%; high, 40-60%; very high, > 60%

DISCLAIMER Information provided is based on the current best information available from research data. Users of these products should check the label for further details of rate, pest spectrum, safe handling and application. Further information on the products can be obtained from the manufacturer.

Important Use of Pesticides

Pesticides must only be used for the purpose for which they are registered and must not be used in any other situation or in any manner contrary to the directions on the label.

Some chemical products have more than one retail name. All retail products containing the same chemical may not be registered for use on the same crops. Registration may also vary between States. Check carefully that the label on the retail product carries information on the crop to be sprayed.

This publication is only a guide to the use of pesticides. The correct choice of chemical, selection of rate, and method of application is the responsibility of the user.

Pesticides may contaminate the environment. When spraying, care must be taken to avoid spray drift on to adjoining land or waterways. Residues may accumulate in animals fed any crop product, including crop residues, which have been sprayed with pesticides. In the absence of any specified grazing withholding period(s), grazing of any treated crop is at the owner's risk.