CONTROL OF COTTON INSECTS WITH A DECIS®/PHASER®/OVASYN® IPM PROGRAM IN TEXAS

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Abstract

An IPM program consisting of Decis® (deltamethrin), Phaser® (endosulfan) and Ovasyn® (amitraz) was compared to a standard program consisting of methyl parathion, Karate® (lambda-cyhalothrin) and Larvin® (thiodicarb). The study was conducted in 1995, 1996, 1997, and 1998. The IPM program outperformed the standard program which was reflected in 1) reduced bollworm/tobacco budworm *(Helicoverpa zea/Heliothis virecens*), boll weevil (*Anthonomus grandis*) and spider mites (*Tetranychus spp*.), 2) higher beneficial populations, 3) increased yield and 4) improved economic benefits. The benefit was attributable to the use of Phaser® which was much less harsh on beneficials than methyl parathion and the careful selection of products and rates accompanied with the use of local thresholds. The benefit was seen in both conventional and BT cotton.

Introduction

Pyrethroids are commonly used to control bollworm/tobacco budworm (*Helicoverpa zea*/*Heliothis virescens*) and boll weevil (*Anthonomus grandis*). With increasing accounts of tobacco budworm resistance to pyrethroids, pyrethroids are frequently tank-mixed with other chemistries to achieve optimal control. When boll weevil is the major pest, it is common to use methyl parathion. Methyl parathion is also harsh on beneficial insects.

An IPM program approach was tested in a four year study in the Hearne, TX area. The concept was to use Decis® (deltamethrin)/Phaser® (endosulfan)/Ovasyn® (amitraz) products in a way to effectively control bollworm/tobacco budworm and boll weevil while at the same time minimizing the impact on beneficials, thereby allowing for optimal control.

Materials and Methods

In each of the four years, demonstration sites were established (0.5 – 2 acre size). In 1995, only conventional cotton was used. In 1996, 1997 and 1998, both conventional and BT cotton was used. At each site, two programs were compared; an IPM program and standard program. An untreated check was also included. The treatments are shown in Table 1. Treatments were made based on local thresholds for the pest population and rates used were selected according to label recommendations. The population was monitored through the season. Yields were taken at normal harvest time.

Results and Discussion

Bollworm/Tobacco Budworm

Figure 1 shows results for 1995, 1996, 1997 and 1998 for the IPM program versus the standard program against bollworm/tobacco budworm in conventional cotton. Note that the IPM program provided control comparable or better than the standard program in each of the four years.
Figure 2 shows results for 1996, 1997 and 1998 for the IPM program versus the standard program against bollworm/tobacco budworm in BT cotton. Note that the IPM program provided control comparable or better than the standard program in 1996 and 1998. In 1997, BT cotton without treatments provided control as good as either the IPM or standard program.

Boll Weevil

Figure 3 shows results for 1995, 1996, 1997 and 1999 for the IPM program versus the standard program against boll weevil in conventional cotton. Note that the IPM program provided control comparable or better than the standard program in each of the four years.

Figure 4 shows results from 1996, 1997 and 1998 for the IPM program versus the standard program against bollworm/tobacco budworm in BT cotton. Note that the IPM program provided control comparable or better than the standard program in each of the three years.

Beneficials

Figure 5 shows results from 1996, 1997 and 1998 with regards to the effect of the IPM program versus the standard program on lady beetles (*Hippodamia covergens*) in conventional cotton. Similarly, this is shown in BT cotton (Figure 6). In each of these trials, the IPM program was significantly less harsh on beneficials than the standard program.

Figure 7 shows the effect of the IPM program versus the standard program on green lacewing (*Chrysopa spp*.) Note that data are only available from 1995 (conventional cotton) and 1998 (conventional and BT cotton). In each of these trials, the IPM program was significantly less harsh on green lacewing than the standard program.

Spider Mites

Figure 8 shows results for the impact of the IPM program versus the standard program on spider mites (*Tetranychus spp*.). Note that data are only available from 1995 (conventional cotton) and 1998 (conventional cotton and BT

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cotton). The IPM program had significantly fewer spider mites than either the untreated or the standard program. Significantly more spider mites were observed in the standard program versus the untreated conventional or BT cotton indicating that a flare-up occurred in each of these trials.

Yields

Figure 9 shows cotton yields for each trial in 1995, 1996, 1997 and 1998. In each trial, the IPM program yielded more than the standard program in either conventional or BT cotton.

Economics

In Table 2, insecticide costs, application costs, tech fees and yields are shown for each of the trials in 1995, 1996, 1997 and 1998. Note that in each comparison the IPM program had a significant economic advantage over the standard program.

There was one major difference between the IPM program and the standard program. The standard program always included methyl parathion whereas the IPM program used Phaser® (endosulfan) instead. Phaser® is known to be relatively harmless to beneficials whereas methyl parathion is very harsh. This likely explains the differences in the beneficial numbers. The harsh effect of methyl parathion on beneficials very likely resulted in the flare up of spider mites in the standard program. The higher number of beneficials in the IPM program early in the season augmented the chemical control program which consequently aided in the control of bollworm/tobacco budworm and boll weevil.

Conclusion

The IPM program outperformed the standard program which was reflected in 1) reduced bollworm/tobacco budworm, boll weevil and spider mites, 2) higher beneficial populations, 3) increased yield and 4) improved economics. The benefit was attributable to 1) early use of Phaser® in the IPM program versus use of methyl parathion in the standard program; the latter having a harsh effect on beneficials, and 2) careful selection of products and rates in the IPM program based on local threshold information. The benefit was seen in both conventional and BT cotton.

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Vydate® is a registered trademark of E.I. DuPont de Nemours and Company
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Table 1. Spray Schedule

Treatment Dates	IPM Program	Standard Program
	1995	
	Conventional Cotton	**Conventional Cotton**
June 6	Phaser®	Vydate®
	0.5 lb ai/A	0.5 lb ai/A
June 16, 25,	Phaser®6 + Ovasyn®	M. Parathion + Larvin®
July 13	0.5 + 0.125 lb ai/A	0.5 + 0.25 lb ai/A
July 16, 23,	Decis® + Ovasyn®	Karate® + Larvin®
August 3	0.018 + 0.125 lb ai/A	0.033 + 0.375 lb ai/A
August 6, 11, 17	Decis® + Ovasyn®	Karate® + Larvin®
	0.03 + 0.125 lb ai/A	0.04 + 0.375 lb ai/A
	1996	
	Conventional and Bt Cotton	**Conventional and Bt Cotton**
June 12, 19	Phaser®	M. Parathion
	0.375 lb ai/A	0.5 lb ai/A
June 26	Decis®	Karate®
	0.018 lb ai/A	0.025 lb ai/A
July 3	Phaser®	M. Parathion
	0.5 lb ai/A	0.5 lb ai/A
July 10, 17	Decis® + Ovasyn®	Karate® + Larvin®
	0.018 + 0.125 lb ai/A	0.25 + 0.32 lb ai/A
July 24	Decis®	Karate®
	0.025 lb ai/A	0.04 lb ai/A
July 30,	Decis®	Karate®
August 5,8	0.018 lb ai/A	0.025 lb ai/A
August 11, 15,	Decis® + Phaser®	Karate® + M. Parathion
18, 21, 25	0.018 + 0.375 lb ai/A	0.25 + 0.5 lb ai/A
	1997	
	Conventional and Bt Cotton	**Conventional and Bt Cotton**
June 7, 14, 20, 27	Phaser®	M. Parathion
July 3, 10	0.375 lb ai/A	0.5 lb ai/A
July 17	Decis® + Ovasyn®	Karate® + Larvin®
	0.025 + 0.25 lb ai/A	0.04 + 0.3 lb ai/A
July 24, 31	Decis® + Phaser®	Karate® + M. Parathion
August 7, 14	0.02 + 0.375 lb ai/A	0.035 + 0.5 lb ai/A
	1998	
	Conventional Cotton	**Conventional Cotton**
June 2	Bidrin®	Bidrin®
	0.375 lb ai/A	0.375 lb ai/A
June 5, 12, 19, 26	Phaser®	M. Parathion
July 3	0.375 lb ai/A	0.5 lb ai/A
July 10, 17, 24	Phaser® + Ovasyn®	M. Parathion + Larvin®
	0.5 + 0.125 lb ai/A	0.5 + 0.3 lb ai/A
July 31,	Decis® + Ovasyn®	Karate® + Larvin®
August 3, 10, 17, 24	0.025 + 0.25 lb ai/A	0.04 + 0.3 lb ai/A
	Bt Cotton	**Bt Cotton**
July 2	Bidrin®	Bidrin®
	0.375 lb ai/A	0.375 lb ai/A
June 5, 12, 19, 26	Phaser®	M. Parathion
July 3, 10	0.375 lb ai/A	0.5 lb ai/A
July 24, 31	Decis®	Karate®
August 17, 24	0.02 lb ai/A	0.03 lb ai/A

Table 2: Economics

IPM Program		Standard Program	
1995			
Conventional Cotton		**Conventional Cotton**	
Insecticides	$ 97/A	Insecticides	$118/A
Application Cost (10x)	$ 40/A	Application Cost (10x)	$ 40/A
Lint Yield (775 lb)	$504/A	Lint Yield (633 lb)	$411/A
Net Return	$367/A	Net Return	$253/A
IPM Program Advantage = $114/A			
1996			
Conventional Cotton		**Conventional Cotton**	
Insecticides	$109/A	Insecticides	$125/A
Application Cost (15x)	$ 60/A	Application Cost (15x)	$ 60/A
Lint Yield (990 lb)	$644/A	Lint Yield (952 lb)	$619/A
Net Return	$475/A	Net Return	$434/A
IPM Program Advantage = $41/A			
Bt Cotton		**Bt Cotton**	
Insecticides	$109/A	Insecticides	$125/A
Application Cost (15x)	$ 60/A	Application Cost (15x)	$ 60/A
Tech. Fee	$ 32/A	Tech. Fee	$ 32/A
Lint Yield (1014 lb)	$659/A	Lint Yield (995 lb)	$647/A
Net Return	$458/A	Net Return	$430/A
IPM Program Advantage = $28/A			
1997			
Conventional Cotton		**Conventional Cotton**	
Insecticides	$ 79/A	Insecticides	$100/A
Application Cost (11x)	$ 44/A	Application Cost (11x)	$ 44/A
Lint Yield (1170 lb)	$761/A	Lint Yield (860 lb)	$559/A
Net Return	$638/A	Net Return	$415/A
IPM Program Advantage = $223/A			
Bt Cotton		**Bt Cotton**	
Insecticides	$ 79/A	Insecticides	$100/A
Application Cost (11x)	$ 44/A	Application Cost (11x)	$ 44/A
Tech. Fee	$ 32/A	Tech. Fee	$ 32/A
Lint Yield (1014 lb)	$631/A	Lint Yield (910 lb)	$529/A
Net Return	$476/A	Net Return	$353/A
IPM Program Advantage = $123/A			
1998			
Conventional Cotton		**Conventional Cotton**	
Insecticides	$124/A	Insecticides	$128/A
Application Cost (14x)	$ 56/A	Application Cost (14x)	$ 56/A
Lint Yield (923 lb)	$600/A	Lint Yield (837 lb)	$544/A
Net Return	$420/A	Net Return	$360/A
IPM Program Advantage = $60/A			
Bt Cotton		**Bt Cotton**	
Insecticides	$ 53/A	Insecticides	$ 64/A
Application Cost (11x)	$ 44/A	Application Cost (11x)	$ 44/A
Tech. Fee	$ 32/A	Tech. Fee	$ 32/A
Lint Yield (1053 lb)	$684/A	Lint Yield (877 lb)	$570/A
Net Return	$555/A	Net Return	$430/A
IPM Program Advantage = $125/A			
Note: Assuming cotton lint price = $0.65/lb			

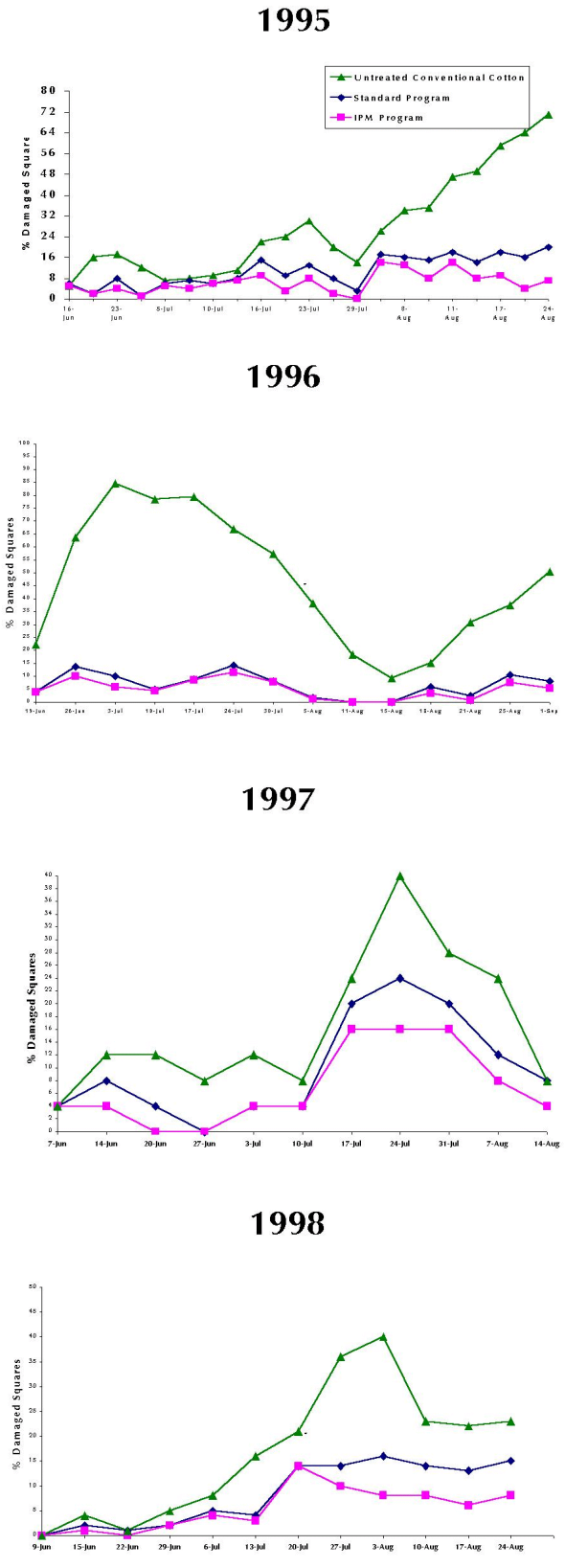


Figure 1. Control of Bollworm/Tobacco Budworm (*Helicoverpa zea/Heliothis virescens*) in Conventional Cotton.

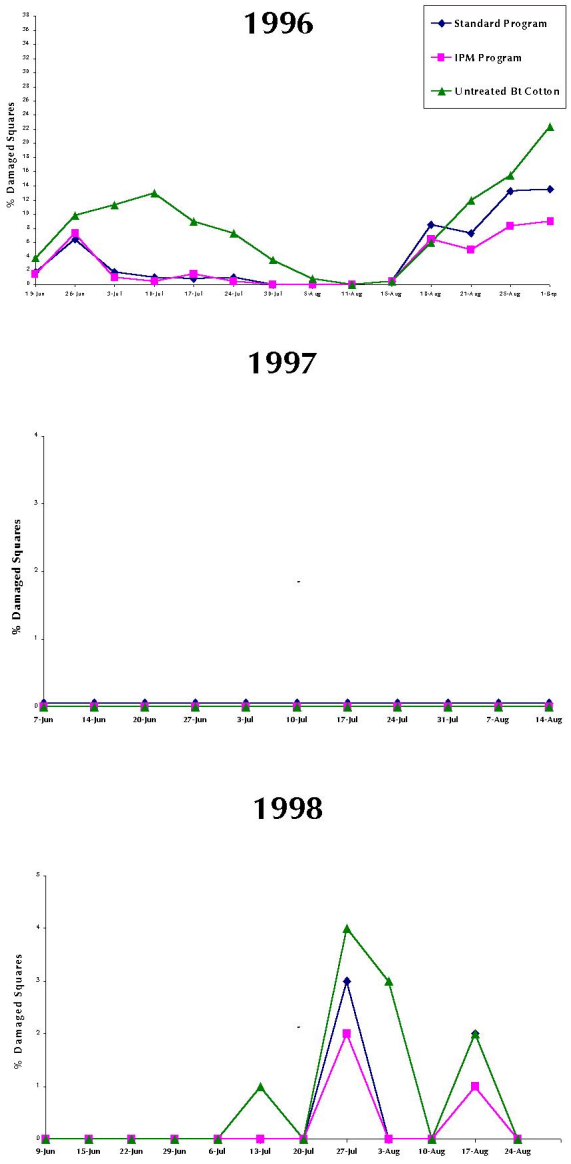


Figure 2. Control of Bollworm/Tobacco Budworm (*Helicoverpa zea/Heliothis virescens*) in Bt Cotton.

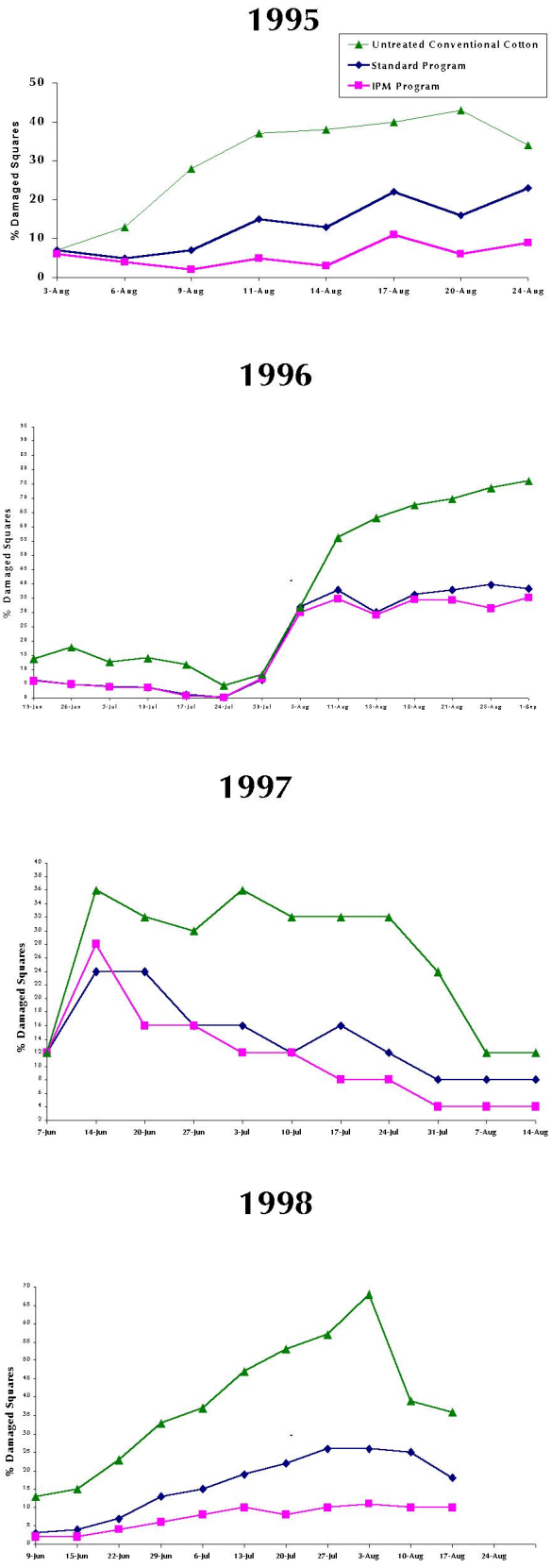


Figure 3. Control of Boll Weevil (*Anthonomus grandis*) in Conventional Cotton

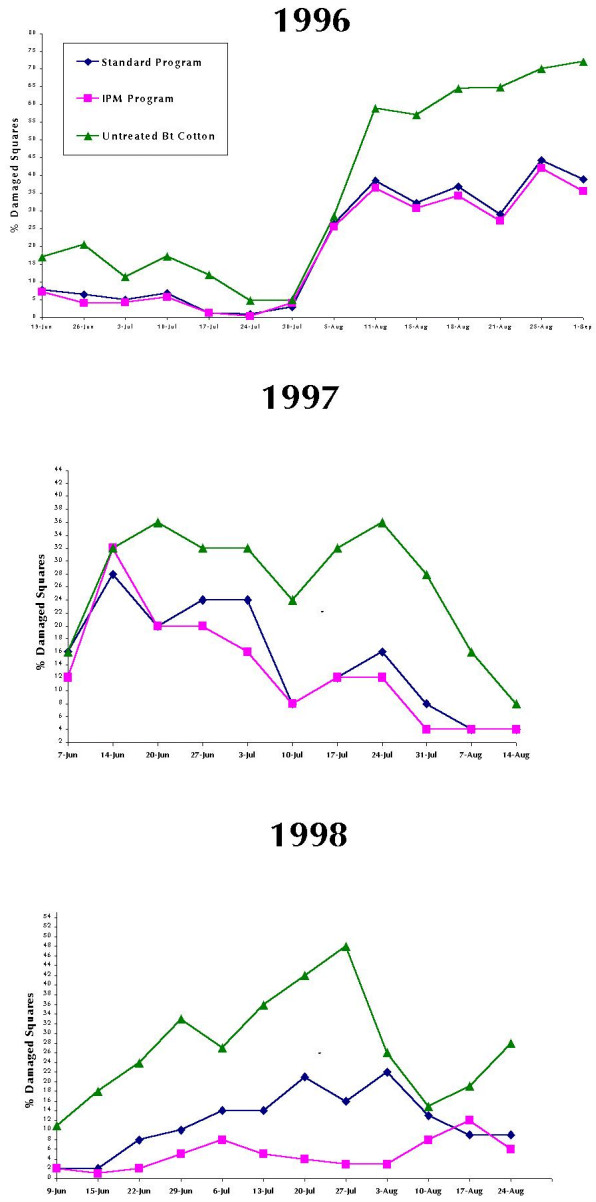


Figure 4. Control of Boll Weevil (*Anthonomus grandis*) in Bt Cotton.

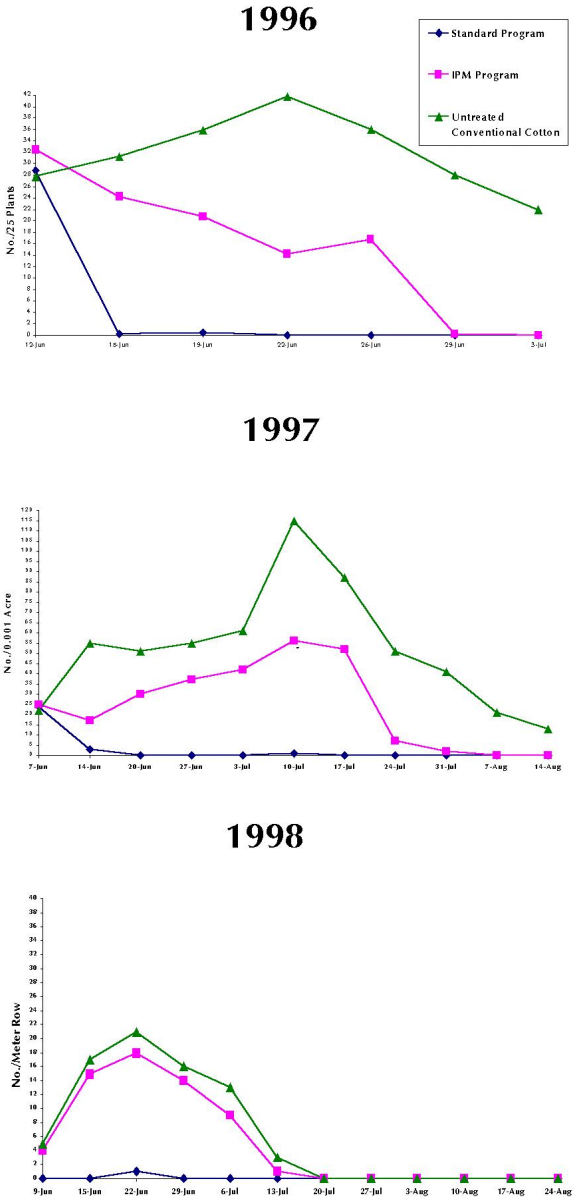
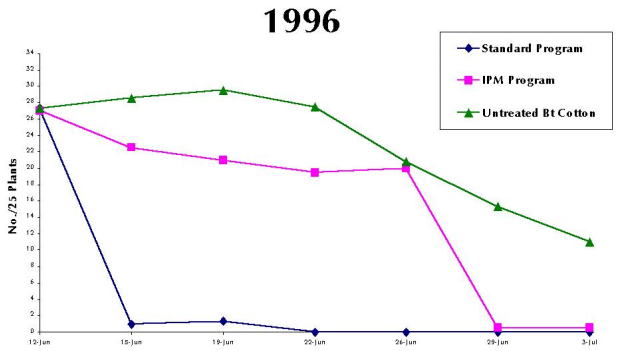
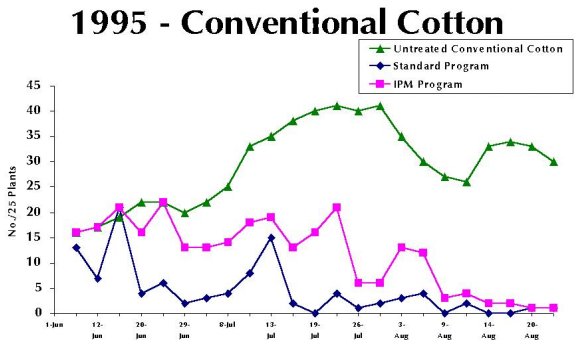
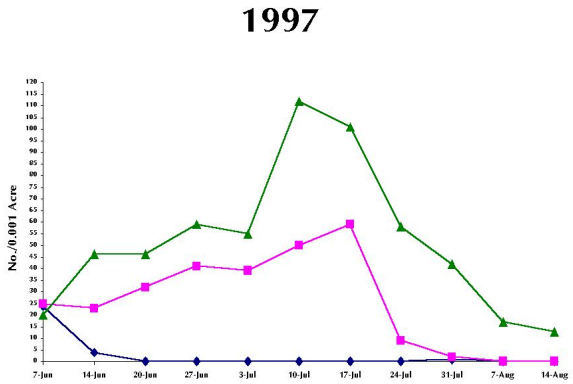
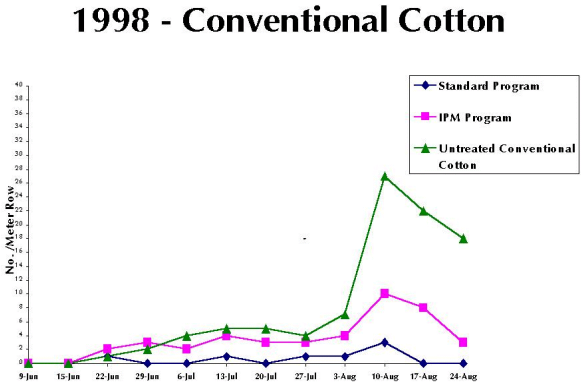


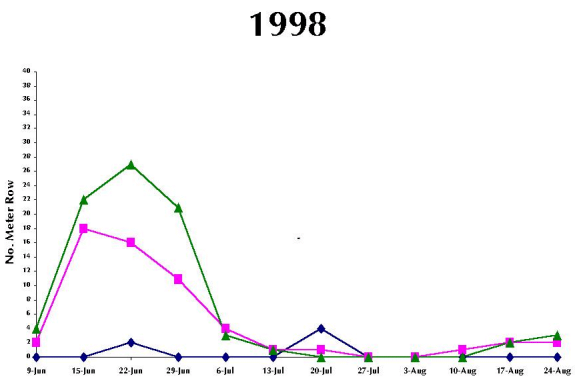
Figure 5. Impact on Lady Beetles (*Hippodamia* sp.) in Conventional Cotton.











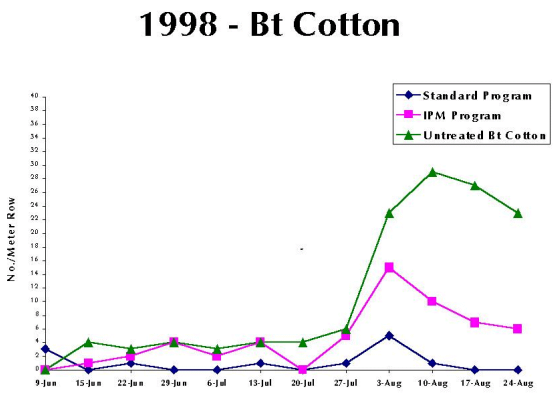
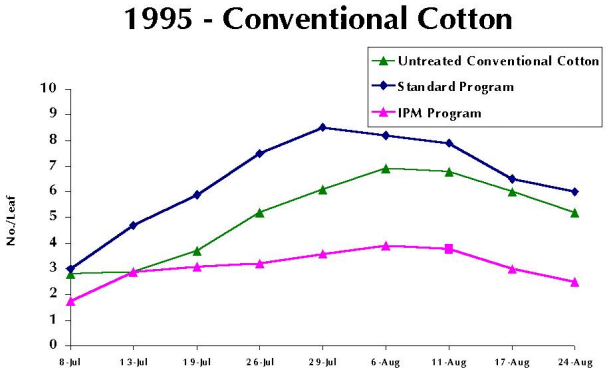
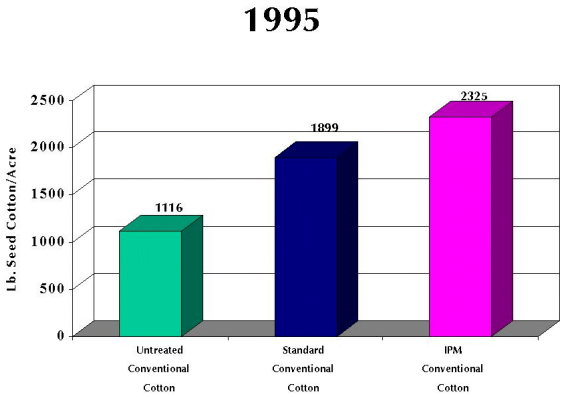
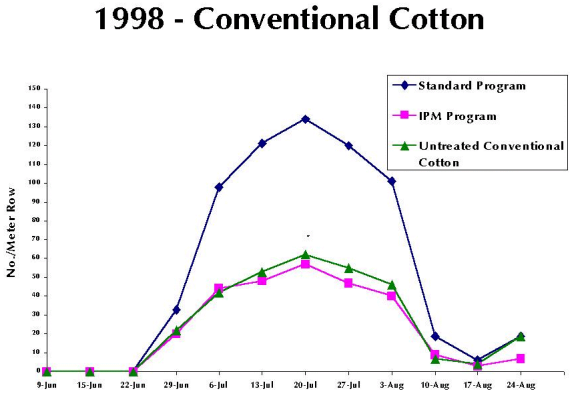


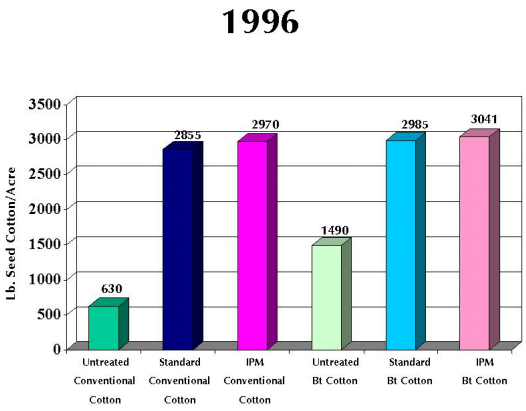
Figure 6. Impact on Lady Beetles (*Hippodamia* sp.) in Bt Cotton.

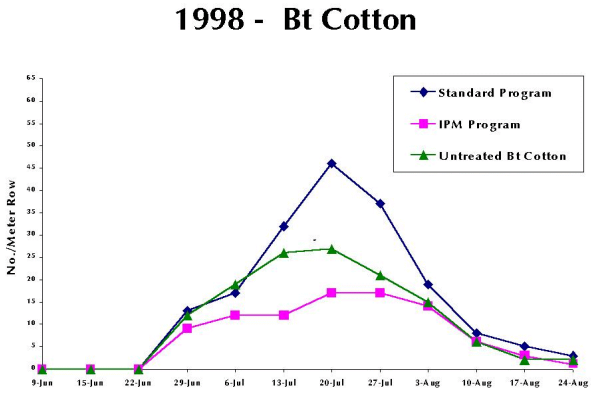
Figure 7. Impact on Green Lacewing (*Chrysopa* spp.).











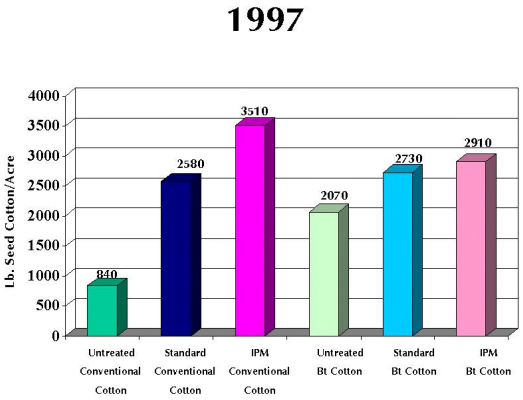


Figure 8. Impact on Spider Mites (*Tetranychus* spp.).

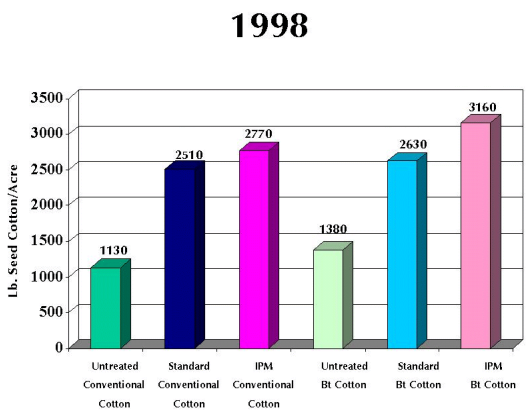


Figure 9. Cotton Yield