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Effect of Synthetic Pyrethroids on Bollworm Control, Crop Maturity and Seed Cotton Yield in Summer Cotton

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Two field trials were conducted at Cotton Research Station Srivilliputhur to study the effect of synthetic pyrethroids on cotton bollworm control and crop maturity in MCU 8. The synthetic pyrethroids were more effective than the standard monocrotophos and other organophosphorus insecticides and carbaryl to control boll worms. Among the pyrethroids the most effective one was cypermethrin 100 g> permethrin 100 g> decamethrin 20 g> cypermethrin 50 g = fenvalerate 100 g> Permethrin 50 g> fenvalerate 100 g = decomethrin 10 g a i/ha. Pyrethroids did not influence crop maturity in MCU 8.

Among the pests of cotton the bollworms. *Viz.*, *Earias* spp., *Heliothis armigera* Hb. and *Pectinophora gossypiella* Saund cause heavy reduction of the cotton yield. Synthetic pyrethroids have been found to be effective against these bollworms in many cotton growing tracts of India (Anonymous, 1980). In this paper are reported the results of trials conducted in summer cotton tract to find out the effect of these insecticides on bollworms.

MATERIAL AND METHODS

Two field trials were conducted during 1979 and 1980 summer seasons with MCU 8, a variety suitable for summer cambodia tract at cotton Research Station, Srivilliputhur Sowings were taken up in the first week of March. The design adopted was simple randomised one with three replications. During 1979 the treatments included were fenvalerate (Sumicidin 20 EC) at 50 and 100 g a.i/ha, permethrin (Ambush 50 EC) at 50 g a.i/ha, phoxim (Volaton 50 EC) 0.1%, fenthion (Lebaycid 1000) 0.1%, phosalone (Zolone 35 EC) 0.1%, endosulfan (Thiodon 35 EC) 0.07% monocrotophos (Nuvacron 40) 0.05% and carbaryl (Sevin 50 WP) 0.1% and untreated control. In the second trial (during 1980) treatments consisted mostly of pyrethroids and monocrotophos. They were fenvalerate, permethrin and cypermethrin (Cymbush 25 EC) at 50 and 100 g a.i/ha and decamethrin (Decis 2.8 EC) at 10 and 20 g i/ha. The treatments were given as a schedule; initiated 45 day after sowing and repeated five times at 15-20 day intervel in 1979 and seven times in 1980. Two rounds of spraying with methyldemeton 0.025% 15 and 30 day after sowing were given to control the sucking pests in the early stage of the crop growth. Percentage of damage in mature bolls on boll basis and locule basis was determined by collecting all the bolls in five randomly selected tagged plants in each treatment. To find out the influence of the synthetic pyrethroids on earliness or delay in boll bursting, the Bartlett's Rate Index (Bartlett, 1937) was worked out. Data on bollworm infestation was statistically analysed after converting into the angular transformation.

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RESULTS AND DISCUSSION

The mean bollworm Infestation was 47.9% on boll basis and 32.6% on locule basis in 1979 and 55.9 and 45.9% respectively in 1980 in untreated control plots. However the infestation was as high as 96.4 and 62.5 during late stage of the crop.

Bollworm infestation: Infestation in mature bolls ranged from 18.5 to 61.3% and locule damage varied from 13.2 to 43.2% in different treatments in 1979. Infestation in mature bolls and locule damage was significantly low in pyrethroid treatments. Other treatments were more or less on par with untreated control with slight variation (Table 1). Bad kapas content was very low to the extent of 0.6 to 1.0% in pyrethroid treatments when compared to 4.2 to 9.9% in other treatments and 3:9 in untreated plots.

During 1980, the infestation on boll basis varied from 24.4 to 33.5%. in different pyrethroid treatments and 47.1% in monocrotophos treatment. The locule damage was low in pyrethroid treatments; the range being 15.0 to 25.4% and 35. 1%in monocrotophos treatment The bad kapas content also low in pyrethroid treatments (Table 2) than in monocrotophos treatment. However monocrotophos also significantly reduced the bollworm infestation than untreated control as observed from the low bollworm infestation and bad kapas content.

Crop Maturity : Bartlett's index values were of 0.81 to 0.90 in treated plots and 0.86 in untreated plot during 1979 and 0·48 to 0.55 and 0.45 respectively during 1980. The insecticide treatments had no effect on boll bursting as the difference between treated and untreated plots was not statistically significant in both trials.

Seed cotton: yield Seed cotton yield was significantly higher in pyrethroid treated plots than in untreated and plots treated with other insecticides in both trials. in 1979, fenvalerate treatment increased the yield by 37% and permethrin by 38% over untreated plot. The plots treated with phoxim, fenthion, phosalone, endosulfan, monocrotophos and carbaryl recorded the yield almost on par with the untreated plot. In 1980 the increase in yield by pyrethroid treatment varied from 39 to 111 percent over untreated plots and 34 percent in the standard monocrotophos treatment. Increase in the dose of pyrethroids significantly increased the yield (Table 2).

The new synthetic pyrethroids were effective against bollworms as observed from the reduction in bollworm infestation, locule damage and bad kapas content and increase in seed cotton yield This is in conformity with the results obtained in winter cambodia area in Tamil Nadu by Balasubramanian *et al.* (1980), Sellammal-Murugesan and Balasubramanian (1980) and Surulivelu and Vijayarag

hava Menon (x1980). Among the pyrethroids the most effective one is cypermethrin 100 g> Permethrin 100g> decamethrin 20 g > Cypermethrin 50 g= fenvalerate 100 g > Permethrin 50 g> fenvalerate 100 g = decamethrin 10 g/ha.

Pyrethroid treatment did not increase the mean boll weight and number of retained bolls as also observed by Sellammal Murugesan and Balasubramanian (1980) on MCU 9. They reported that the yield at the first picking in pyrethroids treated plots was greater than monocrotophos treated and untreated check in MCU 9 and were of the view that pyrethroids might have induced uniform bursting of bolls and retained early formed bolls. Chari (1980) reported that fenvalerate induced early maturity and organophosphorus compounds delayed maturity in Hybrid-4 cotton. Sharma *et al.* (1980) reported that pyrethroids, fenvalerate permethrin and decamethrin affected the first picking significantly but not in Hybrid-4 cotton. Regupathy and Subramaniam (1981) observed soil application of aldicarb delaying the crop maturity in MCU 5 cotton. In the present studies also the pyrethroids significantly increased the weight of seed cotton in first picking. But the percentage of seed cotton obtained at the first picking over total plot yield does not vary significantly among the various plots including in untreated plots (Tables 1 and 2). Further the Bartlett's rate index values calculated also did not show significant difference between pyrethroids and standard organophosphorus treated and untreated plots indicating that the crop maturity was not affected in MCU 8 as reported by others on MCU 9, H-4 and SRT-1.

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Table 1. Effect of foliar application of insecticides on boll worm incidence, crop maturity and seed cotton yield during 1979.

Treatment	Dose or conc. a. i.	Bollworm infestation (%)				Seed cotton yield				
						Yield in first picking/plot		Total/plot		
		Boll basis	Locule basis	Bad kapas content	Bartlett's index	Yield (g)	% increase over untreated	Yield kg	% increase over untreated	Kg/ha
Fenvalerate	50g/ha	20.5a	14.5a	0.6a	0.86	471b	6.6	6.76b	37.0	3005
Fenvalerate	100g/ha	18.5a	13.2a	0.6a	0.90	540b	8.0	6.78b	37.4	3014
Permethrin	50g/ha	23.2a	17.4a	1.0a	0.85	453b	6.0	6.82b	38.2	3031
Phoxim	0.1%	40.9bc	28.6b	5.1b	0.81	253a	5.6	4.51a	—	2002
Fenthion	0.1%	51.6cd	38.5cd	9.9c	0.81	267a	5.4	4.77a	—	2121
Phosalone	0.1%	38.6b	31.3bc	4.2b	0.83	310a	5.9	4.94a	—	2193
Endosulfan	0.07%	42.7bc	34.0bcd	5.3b	0.87	312a	6.6	4.38a	—	1946
Monocrotophos	0.05%	61.3d	43.2d	6.3b	0.86	318a	5.7	4.83	—	2146
Carbaryl	0.01%	53.8d	35.2bcd	6.0b	0.85	313a	6.2	4.72a	—	2096
Untreated		47.9bc	32.6bc	3.9b	0.86	329a	5.2	4.94a	—	2194

Means in a column followed by same letter are not significantly different at 1% level as per least significant test.

TABLE 2. Effect of foliar application of insecticides on bollworm incidence, crop maturity and seed cotton yield during 1986

Treatment	Dose or conc a i.	Bollworm infestation%			Yield in first picking/plot		Total seed cotton yield
		Boll basis	Locule basis	Bab kapas content	Yield g	% over total yield	Kg/ha
Permethrin	50g/ha	33.1cd	25.4f	9.3f	115	2.4	2101
Permethrin	100g/ha	25 8a	16.3b	7.4b	90	1.6	2482
Cypermethrin	50g/ha	31.5cd	22.3de	8.4d	190	3.7	2334
Cypermethrin	100g/ha	24.4a	15.0a	6.3a	248	4.1	2725
Decamethrin	10g/ha	33.5d	22.9e	10.5g	143	3.3	1943
Decamethrin	20g/ha	29.3b	22.0c	8.1c	228	4.3	2395
Fenvalerate	50g/ha	32.6cd	23.5e	10.9h	135	3.3	1792
Fenvalerate	100g/ha	30.4c	22.2de	8.9e	165	3.3	2201
Menocrotophos	0.05%	47.1e	35.1g	12.0i	82	2.1	1723
Untreated	—	56.9f	45.9h	13.5i	90	3.1	1290

Means in a column followed by same letter are not significantly different at 1% level as per least significant test.