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Effect of "Skip Row Coverage" of Insecticide Application on Some Sucking Pests and Their Predators in Cotton

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ABSTRACT

A selective method of application of insecticide *viz.*, 'Skip row coverage' has been employed against sucking pests in cotton. Skip row coverage with monocrotrophos (as alternate row or as alternate pair row) was as effective as full coverage against the leafhopper, *Amrasca biguttula biguttula* Ishida and the aphid, *Aphis gossypii* Glov. Deltamethrin, endosulfan and monocrotophos as skip row spray coverage harboured more population of the predator, *Chrysoperla carnea* (Steph), while monocrotophos, carbaryl and deltamethrin spared the predator, *Menochilus sexmaculata (Fab.)* by 2 .0 to 2.4, 1.6 to 2.2 and 1.2 to 2.8 times more than full coverage with the respective insecticides.

KEY WORDS : Skip row coverage, insecticides, cotton, *Amrasca biguttula biguttula, Aphis gossypii, Menochilus sexmaculata, Chrysoperla carnea*

Insecticides have to be used most selectively and hormoniously in pest management programmes so as to reduce their adverse effects on beneficial organisms and also to reduce the environmental hazards. An attempt was made to gather information on a selective method of application *viz.*, skip row coverage ie., application of insecticide in alternate rows (ARC) or alternate pair rows (APRC) in comparison with full coverage (FC), against the cotton leaf hopper *Amrasca biguttula biguttula* Ishida and aphid *Aphis gossypii* Glov. and its impact on the predators, *Menochilus sexmaculata* (Fab.) and *Chrysoperla carnea* (Steph).

MATERIALS AND METHODS

Field studies were carried out on MCU.5 WT cotton during 1981-82 winter season in a randomized block design with 13 treatments (Table 1) and three replications. The agronomic practices recommended for the variety were followed. Acid delinted cotton seeds were sown on 7th September, 1981 and six rounds of treatments were given on 49, 67, 82, 106, 124 and 141 days after sowing using a high volume knapsack sprayer. The quantity of spray fluid used was 900 and 450 lit./ ha in respect of full and skip row coverage methods of application respectively. Observations on the number of aphid, jassid, coccinellid predator (larvae) and chrysopid predator (larvae) were made 55, 60, 70, 80 and 90 days after sowing from ten plants selected at random in the case of full coverage (FC) treatments. In each plant, three leaves, one each from top, middle and bottom were considered for the assessment. In respect of skip row coverage treatments (ARC,APRC), two sets of five plants each were selected at random, one set from treated rows and another from untreated rows and the mean of the ten plants of the two sets was considered for the particular treatment.

RESULTS AND DISCUSSION

The leafhopper population ranged from 3.20 to 12.27 per 30 leaves in various treatments and 33.94 in untreated check. Although all the treatments were effective in bringing down the population, monocrotophos FC, ARC and endosulfan FC were the most effective ones. Skip row coverage with monocrotophos (alternate row coverage) was as effective as full coverage with the same insecticide or with endosulfan (81.1 to 90.6 % reduction over check). The predators were more or less in the same level in full coverage and skip row coverage which may be due to the drift of insecticides from the sprayed rows to the skipped rows (Table 1).

Monocrotophos applied as full coverage and skip row coverage (ARC and APRC) and endosulfan as full coverage were equally effective against the aphid (74.5 to 93.3% reduction over check). The effectiveness of monocrotophos and endosulfan (full coverage) against the leafhopper and aphid had been brought out by several workers (Hassenein *et al.*,1970 ; Sundaramurthy and Subbaiah, 1971; Sidhu and Dhawan, 1976). But the present study has shown that even skip row coverage with monocrotophos would be effective against the leafhopper and aphid.

TABLE 1. Effect of "Skip Row Coverage" on sucking insects, their predators and yield in cotton

Treatment		Dosage (g ai / ha)	Population: Jassid	Population: Aphid	Population: *M. sexmaculata*	Population: *C. carnea* (larvae)	Seed Cotton yield (kg / ha)
Monocrotophos	FC	500	3.20^{a}	10.13^{a}	0.67^{a}	3.40^{abc}	1466^{f}
	ARC	250	6.40^{abc}	39.40^{b}	2.00^{abc}	4.07^{abcd}	1582^{ef}
	APRC	250	9.40^{bcd}	28.73^{b}	2.27^{abc}	3.93^{abcd}	1349^{fg}
Endosulfan	FC	700	5.20^{ab}	15.00^{a}	3.27^{bcd}	2.47^{a}	2464^{bc}
	ARC	350	9.67^{cdef}	54.80^{cd}	3.40^{bcd}	4.20^{abcd}	1985^{d}
	APRC	350	11.94^{ef}	64.13^{c}	0.93^{ab}	4.47^{bcd}	2155^{cd}
Carbaryl	FC	1000	8.80^{bcde}	71.87^{cd}	2.27^{abc}	5.67^{cd}	2105^{cd}
	ARC	500	12.93^{def}	130.00^{ef}	7.20^{e}	5.87^{cd}	2096^{d}
	APRC	500	15.53^{f}	94.33^{cde}	5.93^{cde}	5.33^{bcd}	1852^{de}
Deltamethrin	FC	15	11.40^{cdef}	96.07^{cdef}	1.67^{abc}	3.33^{ab}	2970^{a}
	ARC	7.5	13.33^{f}	84.86^{def}	3.60^{bcd}	5.07^{bcd}	2923^{a}
	APRC	7.5	12.27^{ef}	136.53^{fg}	6.33^{de}	5.33^{d}	2566^{b}
Untreated check		-	33.94^{g}	154.53^{g}	11.53^{f}	5.74^{d}	1108^{g}

In columns, means followed by the same letters are not different statistically (P = 0.05) by L.S.D.
FC = Full coverage ; ARC = Alternate row coverage ; APRC = alternate pair row coverage

M. sexmaculata population was greater in plots treated with carbaryl as ARC and deltamethrin as APRC than those treated with full coverage with the respective insecticides. The rest of the treatments irrespective of the method of application showed significantly lower population than untreated check (Table 1). The higher population of predatory larvae in the skip row coverage plots of carbaryl and deltamethrin may be due to the greater ability of the insect to feed, colonize and mutliply in large numbers in untreated rows, as compared with full coverage. Full coverage with monocrotophos, endosulfan and deltamethrin reduced *C. carnea* population more than in skip row coverage with these insecticides. Carbaryl by all methods of application (FC, ARC and APRC), and endosulfan and deltamethrin by APRC method of application enabled the predator to colonize in large numbers as found in untreated check (Table 1).

House *et al.* (1985) have shown that synthetic pyrethroids reduced the predator and parasitoid populations but did not entirely exclude them from cotton. This is in agreement with the present findings wherein deltamethrin as full coverage reduced the larvae of *M. sexmaculata* and *C. carnea*. Further, monocrotophos and endosulfan also as full coverage reduced the larvae of *C. carnea* while the skip row coverage with these insecticides were relatively safer. Larvae of *M. sexmaculata* colonized in greater numbers in the skip row coverage plots of carbaryl (ARC) and deltamethrin (APRC), while *C. carnea* was found in larger numbers in plots treated with endosulfan and deltamethrin as skip row coverage (APRC).

In the present study, the larval population of *C. carnea* was less affected by carbaryl as full, alternate row and alternate pair row coverages. Krishnamoorthy (1985) also reported that carbaryl exhibited medium to low toxicity to second and third instar larvae of *Brynckochrysa* (=*Chrysopa scelestes* (Banks). However, there is a report that carbaryl was toxic to larvae and adults of *C.occulata* Say in laboratory and field studies (Pree and Hagley, 1985). There was no significant difference in yield between full coverage and skip row coverage with respective treatments of monocrotophos, carbaryl and deltamethrin (ARC). Endosulfan as full coverage registered singificantly higher yield than skip row coverage. Although monocrotophos was the most effective against sucking pests, it was not as effective as carbaryl, endosulfan and deltamethrin in registering higher yield. The low yield in

monocrotophos may be the result of greater damage by bollworms than with carbaryl and deltamethrin (Surulivelu, 1986).

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REFERENCES

Hassenein, M.H.,Khalil, F.M. and Eisa, M.A. 1970. The effectiveness of certain insecticides on the population density of jassids in the cotton fields of Upper Egypt. *Bull. Ent. Soc. Egypt*, 4,197-202.

House, G.J., All, J.N., Short, K.T. and Law, S.E. 1985. Impact of synthetic pyrethroids on beneficial insects from cotton grown in the Southern Piedmont. *J. Agrl. Ent.*, 2,161-166.

Krishnamoorthy, A. 1985. Effect of several pesticides on eggs, larvae and adults of the green lacewing, *Chrysopa scelestes* Banks. *Entomon*, 10, 21-28.

Pree, D.J. and Hagley, E.A.C. 1985. Toxicity of pesticides to *Chrysopa occulata* Say. *J. Econ. Ent.*,78., 129-132.

Sidhu, A.S. and Dhawan, A.K. 1976. Developing economic threshold of spraying against cotton jassid, *Amrasca devastans* (Dist). *J. Res. Punjab Agri. Univ.*, 13, 186- 189.

Sundaramurthy, N. and Subbaiah, V. 1971. A note on the efficacy of monocrotophos on the control of pest complex of irrigated Cambodian cotton. *Madras agric. J.*, 58, 522-524.

Surulivelu, T. 1986. *Studies on selective use of insecticides against cotton pests*. Ph.D. Thesis. Tamil Nadu Agricultural University, Coimbatore.