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COMPARATIVE EFFICACY OF SOME TRADITIONAL AND NEWLY INTRODUCED INSECTICIDES AGAINST *HELICOVERPA ARMIGERA* ON COTTON

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A field study was carried out to see the comparative efficacy of conventional insecticides viz. curacron, larvin, lorsban and a newly introduced insecticide tracer (spinosad) applied @ 400 g, 380 g, 400 g and 288 g per acre respectively against *Helicoverpa armigera* on cotton. Tracer gave significantly better control of *Helicoverpa armigera* as compared to conventional insecticides.

INTRODUCTION

Work done earlier on conventional insecticides against bollworms, reported by Butter et al. (1982), Kaseem et al. (1986) and Shelke et al. (1986) showed the level/mechanism of resistance in *Helicoverpa armigera* to different conventional insecticides. In the recent past work of similar nature was reported by Ahmad et al. (1995), Whitehead and Treacy (1995), Armes et at. (1996) and Murray and Lloyd (1997). In the present investigation, effort has been made to study the comparative effectiveness of a' newly introduced insecticide tracer (spinosad) and some conventional insecticides. Spinosad is the result of the fermentation process of newly found species of Actinomycete bacterium and *Saccharopolyspora spinosa.* The fermentation of *Saccharopolyspora spinosa* produces several metabolites which are called spinosyn A and spinosyn D. Tracer has a novel molecular structure and mode of action affecting nicotinic acetylcholine receptors at the postsynaptic cells.

MATERIALS AND METHODS

The cotton variety CIM-443 was sown following randomized complete block design of layout at the Tandalianwala, Jamra, Faisalabad during May-October, 1999. Two sprays were applied at an interval of 15 days. The following five treatments including an untreated control were replicated thrice.

Treatments	Insecticides/C hem icals	Dose a.i./ac
T_1	Curacron (profenofos) 50 EC	400 g
T_2	Larvin (thiodicarb) 80 DF	380 g
T_3	Tracer (spinosad) 480 SC	288 g
T_4	Lorsban (chlorpyrifos) 40 EC	400g
T_5	Control/untreated	

Regular pest scouting was done twice a week after the germination of the crop for estimating *Helicoverpa armigera* population. The pest attained the economic threshold level in the month of September and then the control measures were adopted. The larval population of *Helicoverpa armigera* (alive or dead) was recorded from 5 terminals (1.5 top) of plants/plot i.e. 15 terminals/treatment. The plants were selected randomly. The treatments were applied once on 20.9.1999 and then on 29.9.1999. The data thus collected were analyzed statistically by applying analysis of variance technique.

RESULTS AND DISCUSSION

The data recorded on percent larval mortality are given in Table I. Tracer was found to be statistically different from larvin, and curacron, but was at par with lorsban, whereas larvin was statistically at par with lorsban. Tracer with 95.24% mortality was found to be the best followed by lorsban (70.71%), larvin (65.24%) and curacron (47.38%). By 7th day after spray, larvin (67.38%) and lorsban (78.81 %) proved non-significantly different from each other while tracer (92.50%) was at par with lorsban, and larvin. Curacron (49.52%) was also found at par- with larvin. After 2nd spray, tracer (85.71%) and lorsban (80.16%) proved significantly different from each other but both were better than curacron (69.84%) and larvin (69.84%). By 7th day after 2nd spray, tracer (91.67%) and larvin (74.17%) were statistically at par with each other. lorsban (68.33%) differed significantly from curacron (27.50%).

In the present study, the efficacy of tracer was compared with curacron (O.P.), larvin (carbamate) and lorsban (O.P.). Pyrethroids were not included as these have proved the least effective against *Heliothis armigera* (Ahmad et al., 1997). The inclusion of curacron and larvin is supported by the studies carried out by aforesaid authors who found that certain strains of *Helicoverpa armigera* collected from the Punjab, were sensitive to these insecticides. Present results are contrary to the findings of Xia et al. (1996) who observed that profenofos oil emulsion had a good ovicidal effect at a rapid killing rate. Also, there is disagreement with the findings of Sudhakar and Paul (1991 a, b), Townsend (1995), Whitehead and Treacy (1995) since they reported that conventional insecticides such as permethrin, tlucythrinate, monocrotophos, cypermethrin, deltamethrin, permethrin and fenvalerate, quinalphos, triazophos, except pirate were effective against *Helicoverpa armigera.* In the present findings tracer proved better than the conventional insecticides.

Table 1. Percent mortality of *Helicoverpa armigera* larvae after 1st and 2nd sprays

Treatments	1st spray		2nd spray		Overall average mortality (%)	
	72 hr	7 days	72 hr	7 days	72 hr	7 days
Tt Curacron	47.38 b	49.52 c	60.32 c	27.50 c	52.94	38.52
T_2 Larvin	65.24 b	67.38 be	69.84 c	74.17 ab	67.54	70.77
T_3 Tracer	95.24 a	92.50 a	85.71 a	91.67 a	90.47	92.08
T_4 Lorsban	70.71 ab	78.81 ab	80.16 b	68.33 b	75.43	73.57

Xia et al. (1996) showed that larvin had a rapid action and long residual persistence. This might be the reason for higher mortality with this insecticide. The development of resistance to curacron might be the reason for low mortality with this insecticide. Although there is no systematic information available on the resistance of organoposphates and carbamates against *Helicoverpa armigera* but resistance to pyrethroids has been amply documented. Conventional insecticides like lorsban still proved better against *Helicoverpa armigera.* These findings are similar to that of Manoharan and Uthamasamy (1993) who reported 100% mortality of *Helicoverpa armigera* with chlorpyrifos alone and in combination with synergists on cotton and with the addition of sesame oil to fenvalerate, cypermethrin and alpha-cypermethrin increased the mortality by 35.00, 20.00 and 41.76% respectively. Other synergists and insecticides proved less effective. The conventional insecticides gave less larval mortality of *Helicoverpa armigera* while tracer proved to be the best. These results are in agreement with those of Murray and Lloyd (1997) who reported that spinosad provided satisfactory control of the noctuids for most of the season, while conventional treatments did not. It is therefore concluded that *Helicoverpa armigera* might have gone resistant to conventional insecticides, thus there is need for a new insecticide which can kill the pest in a more efficient and economic manner. It may be said that tracer is a good substitute for conventional insecticides for providing rapid control against *Helicoverpa armigera* on cotton.

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