Pakistan J. Sci. Ind. Res., Vol. 30, No. 7, July 1987

EFFECTIVENESS OF SOME SOIL APPLIED GRANULAR SYSTEMIC AND FOLIAR INSECTICIDES AGAINST *HELIOTHIS ARMIGERA* ON OKRA

Muhammad Zaman

Agricultural Research Institute, Tarnab, Peshawar

(Received April 6, 1986; revised April 23, 1987)

Ten days post-germination side-dressed application of aldicarb G (3.36 kg a.i./ha), carbofuran G (1.68 kg), mephosfolan G (2.22 kg) and thiofanox G (2.8 kg) did not control the incidence of *Heliothis armigera* (Hub.). Sprays of cyhalothrin (0.0017 %), decamethrin + dimethoate (0.031 %), fenpropathrin (0.011 %) and fluvalinate (0.033 %) were significantly effective against the eggs and larvae of the pest.

Key words: Insecticides, Okra, Pod borer.

INTRODUCTION

The pod borer, *Holiothis armigera* (Hub.), was noted to be a serious pest of okra which mainly attacked the pods (fruits) and also floral shoot to a lesser extent. Soil and foliar application of some insecticides were carried out from control point of view. Among the tested products only carbofuran [6] and mephosfolan [5] are referred to as showing poor and good effect, respectively, against this pest on other hosts.

MATERIALS AND METHODS

Two sets of experiments were carried out in randomised complete block design at the Agricultural Research Institute Tarnab, Peshawar. Okra T-13 was sown on March 21/22, 1984, on ridges 0.5 m apart, in two sets and replicated thrice. Plot size measured 3.3 x 4.5 and 3.23 x 4.5 m for the Ist and 2nd set, respectively. Treatments and checks were bufferred with sufficient spacings/plantation of okra. Granular insecticides (Table 1) were applied on April 8, 1984 (10 days post-germination) at the middle level of the ridges as side-dressing and incorporated in the soil. This was followed by immediate irrigation. In the 2nd set spray of insecticides (Table 2) was carried out on May 20, 1984, with a compressed air sprayer.

In the Ist set eggs were counted on May 13, 1984 on pods (fruits) of okra and averaged per plot. Ripe fruits were picked on June 24, 1984 and collected separately. Infested and uninfested fruits were counted and infestations were converted into per cent proportions. In the 2nd set eggs and larvae were counted on pods 1 day before and subsequently 1 day after spraying of insecticides. Reduction/increase over pre-spray countings were converted into per cent proportions. Ripe pods were picked and collected on July 10, 1984 and infested and uninfested fruits were counted. Infestations were converted into per cent proportions.

Data obtained in the two experiments were subjected to statistical treatment.

RESULTS AND DISCUSSION

Set 1 (Granular). Aldicarb treated plants showed relatively the lowest number of eggs deposition followed by mephosfolan (Table 1). The remaining insecticides treated and untreated plants showed a relatively higher level of egg deposition. The level of infestation after 77 days of application of granules was, however, lower in the carbo-

Table 1. Density of eggs of the pod borer, *Heliothis armigera* (Hub.), and per cent infestation after soil application of insecticides.

S. No.	Treatment	Rate(kg) a.i./ha	Density of eggs after 35 days	% infestation after 77 days
1.	Aldicarb G (Temik 10 %)	3.36	50.0	48.6
2.	Carbofuran G (Furadan 3 %)	1.68	128.7	39.2
3.	Mephosfolan G (Gytrolane 3 %)	2.22	95.3	41.8
4.	Thiofanox G (Dacamox 5 %)	2.80	110.0	43.7
5.	Untreated	–	104.0	40.2

Table 2. Per cent reduction/increase in the pod borer, *Heliothis armigera* (Hub.), population and infestation after spray of insecticides.

Sl. No.	Treatment	Concentration (%)	% reduction/ increase(+) after 1 day		% infestation after 52 days of spray
			Eggs(*)	Larvae(**)	
1.	Cyhalothrin EC (PP321 = Karate 2.5 %)	0.0017	88.0b	96.7 b	21.2
2.	Decamethrin + Dimethoate EC (Decis D 31.25 %)	0.031	79.0 b	97.4 b	16.9
3.	Fenpropathrin EC (Danitol 10 %)	0.011	83.3 b	95.7 b	21.3
4.	Fluvalinate EC (Mavrik 25 %)	0.033	82.2 b	100.0 b	22.2
5.	Untreated	–	50.2 a	31.0^{+} a	27.3

(*) = $P < 0.05$, (**) = $P < 0.05$ and 0.01. Means underscored for non-significant differences by the same letters.

furan treated plants. This was followed by mephosfolan and thiofanox and untreated plants. On the other hand aldicarb treated plants showed maximum infestation although egg deposition was the minimum. It is possible that carbofuran might have affected the abundance of the pest up to a certain extent. However, the treated and untreated plants showed a comparable level of infestation ($P > 0.05$). It appears that these insecticides might have concentrated in the leaves or stem after translocation or the uptake of these insecticides in the pods might not have reached lethal levels. Or, alternatively, some deloxyfying mechanism may exist in the okra plants. Mephosfolan [5] was found to be effective against *H. armigera* on red gram while carbofuran [6] was found to be ineffective on sorghum crop. Host plants may seem to enhance or retard the efficacy of systemic insecticides against a target pest. The effectiveness of aldicarb and thiofanox against *H. armigera* could not be traced in literature.

Set 2 (Spray). All the insecticides had a marked effect against the eggs and larvae of *H. armigera* within 1 day of spraying (Table 2). Cyhalothrin caused a relatively higher reduction in the number of eggs as compared to the remaining insecticides. Fluvalinate was found to be superior in its effect against the larvae. However, the trend of effectiveness was comparable in case of all the insecticides against both the stages. More than 50 % reduction occurred in the number of eggs on the untreated plants over the pretreatment level which may have been due to hatchings as there has been a subsequent increase (31 %) in the number of larvae. Decamethrin + dimethoate showed relatively a lower level of infestation after 52 days when compared to the remaining insecticides. The level of infestation was, however, comparable ($P > 0.05$). Literature was referred to in connection with the effectiveness of cyhalothrin, decamethrin + dimethoate, fenprophathrin and fluvalinate but no relevant reports were found for comparing the present observations. There were, however, reports about the separate application of decamethrin (2,3,4,7,8) and dimethoate (9,10) as quoted in parenthesis which indicated a good effect of these two products against *H. armigera* One report indicated a variable performance of decamethrin against this species [1]. Decamethrin + dimethoate showed a relatively good performance against the pest on short and long term basis in the present case.

From the data of the two experiments it appears that soil (root) application of systemic insecticides did not prove satisfactory in controlling the incidence of *H. armigera.* on okra, while spray of insecticides had a good effect against the eggs and larvae of the pest. It is recommended that spray application should be timed with maximum eggs deposition and larval appearance and be repeated 2-3 times at fortnightly intervals in order to ensure good protection to the crop during the season.

REFERENCES

1. A. Angelini, J.P. Trijan, M. Vaissayre, Activite comparee de trois pyrethroids de premier generation et d, un certain nombre de pyrethrinoides nouveaux contre les chenilles de la capsule du cottonier, Cot. Fib. Trop., **37** (4), 359 (1982).
2. J. Cadou, Niveau de protection phytosanitaire et rendemant en culture cottonier pluviale au Mali, *Ibid.* **37**(4), 317 (1982).
3. E.F. Collingwood and L. Bourdouxhe. Trials with decamethrin for the control of *Heliothis armigera* Hub., on tomatoes in Senegal, Trop. Pest. Manag., **26**(1), 3 (1980).

4. E.F. Collingwood, L. Bourdeaux and M. Diouf, Protection des vegetaux, Report des essais pesticides (1976-79), Premier partie, insecticides Daker Senegal. Institute Senegalais de Recherches – Agricoles. (1980), pp. 93.
5. A.M. Hanifa, G. Balasubramanian, A.I. David and T.R. Subramanian, Madras Agri. J., **61**, 970 (1974).
6. P. Kishore and M.G. Jotwani. Entomol. Newslet., **6**, 65 (1976).
7. K.P. Srivastava, V.T. Gajbhiye, H.K. Jain, N.P. Agnihotri and M. Singh. Indian J. Agric. Sci., **53**, 1048 (1983).
8. G.I. Sukhoruchenko, A.A. Somirnova, E.V. Viker and A.I. Kapitan, Entomol. Obozr., **60**, 5 (1981).
9. S.M. Thakre, K.M. Khan and M.N. Bople, Pesticides, **17**, 24 (1983).
10. R.C. Thakur, B.S. Thakhur and R. Verma. *Ibid.* **14**, 36 (1980).