
**BIO-EFFICACY OF VARIOUS INSECTICIDES AGAINST OKRA
SHOOT AND FRUIT BORER, *Earias vittella* (FAB.)****DABHI, M.V.*; ACHARYA, M.F.; KOSHIYA, D.J. AND KHANPARA, A.V.**

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ABSTRACT

Various insecticides were tested for the control of shoot and fruit borer, *E. vittella* in *kharif* season okra crop. Among various treatments, indoxacarb @0.0075% was found significantly superior over the rest of treatments in controlling fruit damage. The next best effective treatment was profenophos + cypermethrin @ 0.044 % which was on par with endosulfan @ 0.07%, chlorpyrifos @ 0.04% and provided protection against *E. vittella* during *kharif* season. Significant maximum yield of marketable okra fruits was recorded from the plot sprayed with indoxacarb (8126 kg/ha) followed by profenophos + cypermethrin (8032 kg/ha); endosulfan (7943 kg/ha) and chlorpyrifos (7846 kg/ha). The insecticides profenophos + cypermethrin, endosulfan, indoxacarb and chlorpyrifos registered the highest net profit of Rs. 39210, 38692, 38371 and 37460/ha, respectively.

KEY WORDS: Bio-efficacy, *Earias vittella*, Damage, Insecticides

INTRODUCTION

Among the vegetables, okra *Abelmoschus esculentus* (L.) Moench belongs to fruit vegetables and being widely cultivated in Bihar, Orissa, West Bengal, Andhra Pradesh, Madhya Pradesh, Karnataka, Gujarat and Assam. The area under this crop is about 0.36 million hectares with production of 3.50 million tonnes and productivity of 9.72 tonnes/ha in India (Anon., 2006). In Gujarat, okra is mainly grown in Vadodara, Surat, Junagadh, Banaskantha, Bhavnagar, Valsad, Gandhinagar, Kheda and Anand districts. It occupies an area of 35190 hectares with production of 272699 metric tonnes and productivity of 7.74 tonnes/ha. Eleven insect

pest species have been recorded in Gujarat (Patel *et al.*, 1970) among which shoot and fruit borer, aphid, jassid and whitefly are the destructive pests. The estimated loss in fruit yield of okra due to *E. vittella* was recorded upto 45% in Karnataka (Krishnakumar and Srinivasan, 1983), 22.5 % in Uttar Pradesh (Verma *et al.*, 1985), 50.58% on summer okra (Brar *et al.*, 1995).

MATERIALS AND METHODS

Field experiment was carried out to evaluate the efficacy of some newer insecticides against shoot and fruit borer at Agronomy Farm, B. A. College of Agriculture, Anand Agricultural University, Anand in *kharif* season during 2005-06 and 2006-07. Total ten treatments including control (unsprayed) were replicated thrice in randomized block design. Gujarat Okra-2 was sown at a spacing of 60 x 30 cm with a plot size of 4.5 x 2.25 cm. The insecticidal treatments were applied thrice, first at 25 days after germination and then at 10 days interval after each spraying. The observations on fruit damage and yield of healthy fruits were recorded. The data converted to per cent damage and statistically analyzed.

RESULTS AND DISCUSSION

The pooled data clearly indicated significantly the least (9.86 %) incidence of *E. vittella* to okra fruits in the plots treated with indoxacarb. The treatment of profenophos + cypermethrin, endosulfan and chlorpyrifos ranked second as these treatments exhibited 13.19 to 15.81 per cent damage to okra fruits (Table 1). However, the insecticidal treatments imidacloprid, Gronim, dimethoate, NSKE and trizophos were found less effective in reducing the fruit borer incidence. Almost same trend of effectiveness was also reported by Narangalkar (2003), Shah (1997), Patel *et al.* (1997), Adiroubane and Letchoumanne (1998) and Panikar *et al.* (2003).

The yield data clearly revealed that all the insecticidal treatments gave significantly higher yield than untreated control (Table 1). The highest yield (8126 kg/ha) of marketable fruits was recorded from the treatment of indoxacarb followed by profenophos + cypermethrin (8020 kg/ha), endosulfan (7959 kg/ha) and chlorpyrifos (7820 kg/ha). Significantly low yield was recorded from the plots treated with NSKE,

Gronim, dimethoate and trizophos as these treatments registered 5288 to 5884 kg/ha yield.

Considering the economics of the treatments, maximum gross realization (Rs. 65008/ha) was found in the treatment of indoxacarb followed by profenophos + cypermethrin (Rs. 64160/ha), endosulfan (Rs. 63672/ha) and chlorpyrifos (Rs. 62500/ha). The maximum net profit was obtained in profenophos + cypermethrin (Rs. 62586/ha) followed by endosulfan (Rs. 62068/ha) and indoxacarb (Rs. 61747/ha). Considering the yield of marketable okra fruits, gross realization and net profit, the treatments indoxacarb, profenophos + cypermethrin and endosulfan could be recommended for the management of this pest. Misra *et al.* (2002) reported that the spray application of Rocket (profenophos + cypermethrin) 0.044 % registered highest fruit yield of okra. Similarly, Bharpoda *et al.* (2003) showed that the use of indoxacarb (Avaunt) 15 SC in cotton produced higher yields.

CONCLUSION

Considering the per cent damage to okra fruits, higher yield and maximum net profit the insecticides indoxacarb, profenophos + cypermethrin, endosulfan and chlorpyrifos can be recommended for the management of fruit and shoot borer of okra.

REFERENCES

- Adiroubane, D. and Letchoumanane, S. (1998). Field efficacy of botanical extracts for controlling major insect pests of okra (*Abelmoschus esculentus*). *Indian J. Agric. Sci.*, 68 (3) : 168-170.
- Anonymous (2006). Meeting demands of markets. *The Hindu : Survey of Indian Agriculture*, 40-127.
- Bharpoda, T. M., Sisodiya, D. B. and Patel, J. R. (2003). Effectiveness of indoxacarb 15% SC in controlling insect pests of 'H-6' upland cotton (*Gossypium hirsutum*). *Indian J. Agric. Sci.*, 73 (4) : 203-205.
- Brar, K. S.; Arora, S. K. and T. R. Ghai. (1995). Resistance in okra to cotton jassid, *Amrasca biguttula biguttula*. *Madras Agric. J.*, 82 (3): 231-232.

- Krishnakumar, N. K. and K. Srinivasan. (1983). Efficacy of insecticides for the control of shoot and fruit borer, *E. vittella* and gram caterpillar, *H. armigera* in okra and its economics. *South Indian Horticulture*, 31 (6):312-317.
- Misra, H. P.; Dash, D. D. and Mahapatra, D. (2002). Efficacy of some insecticides against okra fruit borer, *Earias* spp. and leaf roller, *Sylepta derogata* Fab. *Ann. Pl. Prot. Sci.*, 10 (1) : 51-54.
- Narangalkar, A. L. (2003). Population dynamics and management of pest complex of okra, *Abelmoschus esculentus* (L.) Moench. Ph. D. thesis submitted to G. A. U., Sardar Krushinagar.
- Panikar, B.; Bharpoda, T. M.; Patel, J. R. and Patel, J. J. (2003). Evaluation of various schedules based on botanical and synthetic insecticides in okra ecology. *Indian J. Ent.*, 65 (3) : 344-346.
- Patel, H. K.; Patel, V. C. and Patel, J. R. (1970). Catalogue of crop pests of Gujarat State. *Tech. Bulle.* 6 : 17-18.
- Patel, M. C.; Patel, J. J.; Jayani, D. B.; Patel, J. R. and Patel, B. D. (1997). Bioefficacy of conventional insecticides against pests of okra. *Indian J. Ent.*, 59 (1) : 51-53.
- Shah, B. R. (1997). Bioecology, bioefficacy and residual status of some ready mix insecticides in relation to pest complex of okra, *Abelmoschus esculentus* (L.) Moench. Ph. D. thesis submitted to G. A. U., Sardar Krushinagar.
- Verma, R. S.; Upadhaya, K. D.; Gupta, S. P.; Singh, R. V. and Lodhi, P. S. (1985). Interaction between root-knot nematode (*Meloidogyne javanica*) and spotted bollworm (*Earias fabia*) on okra and effects on yield. *Indian J. Pl. Prot.*, 12 (2): 131-133.

Table 1: Effect of various insecticidal treatments against shoot and fruit borer, *E. vittella* on kharif okra

Treatments	Mean per cent fruit damage			Fruit yield (Kg/ha)		
	First year	Second year	Pooled	First year	Second year	Pooled
1. Endosulfan 0.07%	22.07 ^{cde} (14.12)	22.89 ^{de} (15.13)	22.48 ^c (14.62)	7943 ^{ab}	7975 ^a	7959 ^a
2. Indoxacarb 0.0075%	18.38 ^e (9.94)	18.21 ^f (9.76)	18.30 ^d (9.86)	8145 ^a	8106 ^a	8126 ^a
3. Chlorpyrifos 0.04%	23.29 ^{bcd} (15.63)	23.56 ^{cde} (15.98)	23.43 ^c (15.81)	7846 ^{ab}	7794 ^{ab}	7820 ^a
4. Profenofos + Cypermethrin 0.044%	21.23 ^{de} (13.11)	21.36 ^{ef} (13.27)	21.30 ^c (13.19)	8032 ^{ab}	8007 ^a	8020 ^a
5. Dimethoate 0.03%	26.91 ^b (20.48)	28.23 ^{bc} (22.37)	27.57 ^b (21.42)	5814 ^{cd}	5816 ^{bc}	5815 ^c
6. Imidacloprid 0.04%	26.13 ^{bc} (19.40)	27.23 ^{bcd} (20.94)	26.68 ^b (20.16)	7182 ^{abc}	7119 ^{abc}	7151 ^{ab}
7. Triazophos 0.04%	27.57 ^b (21.42)	29.54 ^b (24.31)	28.55 ^b (22.84)	5431 ^{cd}	6337 ^{abc}	5884 ^{bc}
8. Gronim 0.0075%	27.15 ^b (20.82)	27.34 ^{bcd} (21.93)	27.24 ^b (20.95)	6255 ^{bcd}	5144 ^c	5699 ^c
9. NSKE 5%	27.36 ^b (21.12)	27.80 ^{bc} (21.75)	27.58 ^b (21.43)	5341 ^d	5234 ^c	5288 ^c
10. Control	36.81 ^a (35.90)	37.18 ^a (36.52)	36.99 ^a (36.20)	2924 ^e	2920 ^d	2922 ^d
S. Em ±	1.29	1.33	0.84	506	604	368
C. V. %	8.69	8.73	8.71	13.51	16.23	14.92

1. Figures in parentheses are retransformed values; those outside are arc sin transformed values.
2. Figure (s) indicating common letters do not differ significantly from each other at 5% level of significance according to DNMR.

Table 2: Economics of different treatments for control of pest complex in okra during *kharif* season

Insecticides	Quantity required per ha (lit. or kg)*	Total cost of treatment including labour charge (₹/ha)	Yield (Kg/ha)	Gross realization (₹/ha)	Net Profit (₹/ha)	Profit over control (₹/ha)
Endosulfan	3.000	1603	7959	63672	62068	38692
Indoxacarb	0.750	3261	8126	65008	61747	38371
Chlorpyrifos	3.000	1723	7820	62560	60836	37460
Profenofos + Cypermethrin	1.500	1573	8020	64160	62586	39210
Dimethoate	1.500	1176	5815	46520	43544	21968
Imidacloprid	0.300	978	7151	57208	56230	32854
Triazophos	1.500	1446	5884	47072	45626	22250
Gronim	4.980	2317	5699	45592	40784	19998
NSKE	75.00	1198	5288	42304	41105	17729
Control	--	--	2922	23376	--	--

* For three sprays

Market Price:

Endosulfan : ` 260/lit. ; Indoxacarb : ` 3250/lit. ; Chlorpyrifos : ` 300/lit.

Profenofos + Cypermethrin : ` 500/lit. ; Dimethoate : ` 235/lit. ; Imidacloprid: ` 1720/lit.

Triazophos: ` 415/lit. ; Gronim: ` 300/lit. ;Neem seeds: ` 5/kg

Cost of okra fruits = ` 8/kg; Labour charge @ ` 91.50/day