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EFFICACY OF INSECTICIDES AGAINST *EARIAS* SPP. ON OKRA

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ABSTRACT

Field trials were conducted at the Entomological Research Farm, PAU, Ludhiana for two years (2017 and 2018) with chlorantraniliprole 18.5SC and pyridalyl 10EC against *Earias* spp. infesting okra *Abelmoschus esculentus* (L.). Chlorantraniliprole 18.5SC @ 125 ml/ ha and pyridalyl 10EC @ 500 ml/ ha were found to be significantly superior. Significantly higher yield was obtained with maximum economic returns in these treatments.

Key words: Okra, *Earias* spp., okra, chlorantraniliprole 18.5SC, pyridalyl 10EC, emamectin benzoate 5SG, fruit yield, economic return

Okra *Abelmoschus esculentus* (L.) is an important vegetable crop with India holding the largest area and maximum production followed by Nigeria (Anonymous, 2019). It is cultivated in 5.09 lakh ha area with production of 60.95 lakh mt and productivity of 12 mt/ ha (Anonymous, 2018). It is attacked by number of insect pests like jassid, whitefly, mite and spotted bollworm. Among these, spotted bollworm, (*Earias* spp.) is the most serious and its larvae bore into the young shoots at early vegetative stage of the plant and at later stage damage fruits resulting in serious economic loss. For the management of this pest, loads of pesticides are applied and their indiscriminate use has lead to harmful effects like resistance to insecticides, residue, environmental pollution etc. Okra crop suffers a loss of 50.58% in fruit yield (Brar et al., 1994). Kranthi et al. (2002) mentioned that *E. vittella* (F.) had developed resistance against many conventional insecticides. The present study evaluates some insecticides against *Earias* spp. in okra that can be used at low dose and are ecofriendly.

MATERIALS AND METHODS

Field trials for evaluating the efficacy of chlorantraniliprole 18.5SC and pyridalyl 10EC were carried out in okra crop under Punjab conditions at the Entomological Research Farm, PAU, Ludhiana. Variety Punjab Padmini and Punjab Bahar were sown in June in 2017 and 2018, respectively. All recommended agronomic practices were followed. The experiments were laid out in randomized block design with three replications in plot size of 50 m^2 and spacing of 45x 30cm. Chlorantraniliprole 18.5SC @ 100, 125 and 150 ml/ ha and pyridalyl 10EC @ 375, 500 and 625 ml/ ha were evaluated along with standard emamectin benzoate 5SG @ 175 g/ ha, and an untreated control. Two sprays were given at 15 days interval. The observations on borer infestation were made from 10 randomly selected plants/ plot, before spray, and 3, 7 and 10 days after spray. Total numbers of healthy and damaged fruits were counted from the plots after each picking and % infestation was compared for the efficacy of treatments. Yield and avoidable yield loss over control were calculated. Economics of treatments was also worked out to account cost benefit ratio. The observations were analyzed using CPCS program as per the method given by Cheema and Singh (1990) after transformation of the data.

RESULTS AND DISCUSSION

Okra fruit borer *Earias* spp. attacks the crop with the initiation of flowering and fruiting from July onwards. As okra is a multiple picking crop require low dose and less persistent insecticides. The pooled analysis of data (2017 and 2018) revealed that after first application of insecticides, mean % infestation was lower in chlorantraniliprole 18.5SC @ 125 and 150 ml/ ha, pyridalyl 10EC @ 500 and 625 ml/ ha and emamectin benzoate 5SG @ 175 g/ ha; these were at par with each other and significantly better than their lower doses and control after 7 days of spray (Table 1). After second spray, no fruit infestation was recorded after 7 days of sprays in chlorantraniliprole 18.5SC @ 125 and 150 ml/ ha and pyridalyl 10EC @ 500 and 625 ml/ ha and emamectin benzoate 5SG @ 175 g/ ha.

Table 1. Efficacy of insecticides against *Earias* spp. and their natural enemies in okra (2017-18, pooled)

Treatments	Dose/ ha (ml/g)	Mean fruit infestation (%)								Number of natural enemies per plant							Yield (q/ha)	Avoidable yield loss (%)
		After first spray				After second spray				After first spray				After second spray				
		Pre	3DAS	7DAS	10DAS	Pre	3DAS	7DAS	10DAS	Pre	3DAS	7DAS	10DAS	3DAS	7DAS	10DAS		
Chlorantraniliprole 18.5SC	100	11.82	5.71 (13.82)	3.91 (11.39)	3.20 (10.30)	6.79 (15.09)	4.39 (12.09)	2.36 (8.84)	2.88 (9.72)	0.15	0.04	0.06	0.10	0.04	0.06	0.11	88.54	22.37
Chlorantraniliprole 18.5SC	125	9.14	4.26 (11.90)	0.69 (3.38)	0.00 (0.00)	5.23 (13.22)	2.69 (9.44)	0.00 (0.00)	0.00 (0.00)	0.16	0.01	0.01	0.03	0.01	0	0.01	93.87	26.79
Chlorantraniliprole 18.5SC	150	11.57	3.19 (10.19)	0.00 (0.00)	0.00 (0.00)	4.95 (12.84)	2.37 (8.85)	0.00 (0.00)	0.00 (0.00)	0.23	0.00	0	0	0	0	0.01	99.16	30.69
Pyridalyl 10EC	375	9.31	5.05 (12.97)	3.86 (11.32)	3.51 (10.70)	6.23 (14.39)	4.30 (11.9)	2.52 (9.13)	2.30 (8.71)	0.21	0.03	0.03	0.11	0.01	0.06	0.10	87.71	21.65
Pyridalyl 10EC	500	10.11	4.11 (11.69)	0.64 (3.24)	0.00 (0.00)	5.18 (13.09)	2.57 (9.21)	0.00 (0.00)	0.00 (0.00)	0.28	0	0	0	0	0	0	93.54	26.53
Pyridalyl 10EC	625	10.53	3.94 (11.43)	0.00 (0.00)	0.00 (0.00)	5.04 (12.90)	2.36 (8.84)	0.00 (0.00)	0.00 (0.00)	0.14	0	0	0	0	0	0.01	98.33	29.66
Emamectin Benzoate 5SG	175	11.08	4.15 (11.74)	0.00 (0.00)	0.00 (0.00)	4.54 (12.22)	2.51 (8.85)	0.00 (0.00)	0.00 (0.00)	0.25	0	0.01	0.03	0.04	0.01	0.03	96.04	28.44
Control	-	11.44	12.89 (21.02)	13.70 (21.71)	15.01 (22.77)	16.63 (24.04)	16.94 (24.27)	18.25 (25.2)	19.82 (26.40)	0.16	0.23	0.28	0.33	0.47	0.50	0.53	68.75	-
CD (p=0.05)		NS	(2.34)	(5.94)	(1.02)	(1.75)	(3.13)	(1.09)	(1.71)	NS	0.02	0.04	0.05	0.03	0.04	0.06	3.50	-

*Mean of three replications; Figures in parentheses arc sine transformations

Table 2. Economics of chlorantraniliprole 18.5SC and pyridalyl 10EC against *Earias* spp. in okra

Treatments	Dose (ml/ g)	Yield (q/ ha)	Cost of two sprays (Rs/ ha)	Additional yield over control (q/ ha)	Income from additional yield (Rs/ ha)	Net returns over control (Rs/ ha)
Chlorantraniliprole 18.5SC	125	93.87	4355	25.12	39571.87	35216.87
Pyridalyl 10EC	500	93.54	3100	24.77	39020.62	35920.62
Emamectin benzoate 5SG	175	96.04	2840	27.27	42958.12	40118.12
Control	-	68.75	-	-	-	-

Cost of chlorantraniliprole 18.5SC: Rs 2463/150 ml, pyridalyl 10EC: Rs 1425/500 ml, emamectin benzoate 5SG: Rs 3700/500 g

Chlorantraniliprole is an anthranilic diamide, and a selective and potent activator of insect ryanodine receptors (Lahm et al., 2007). Siddartha (2016) reported that application of chlorantraniliprole 20SC @ 0.3 ml/ l of water reduced the larval incidence and fruit damage by *Earias* spp. in the okra seed crop. Similar results were obtained in the present experiments after 7 days of treatment. Latif et al. (2019) observed that chlorantraniliprole was effective in controlling *Earias* spp. on okra in Pakistan; Gautam et al. (2016) reported that pyridalyl 10EC gave excellent control. The selective inhibition of cellular protein synthesis by pyridalyl might contribute significantly to the insecticidal activity and the selectivity (Moriya et al., 2008). Rajuponnu and Regupathy (2018) reported that emamectin benzoate and pyridalyl were found effective, and Parthiban et al. (2014) found that emamectin benzoate as effective. The population of spiders in insecticides treated plots was observed to be lower as compared to control during both the years. Fruit yield was significantly higher in all the insecticide treatments, with chlorantraniliprole 18.5SC @ 125 and 150 ml/ ha and pyridalyl 10EC @ 500 and 625 ml/ ha giving maximum yield and net returns. Avoidable yield loss was also higher in chlorantraniliprole 18.5SC and pyridalyl 10EC (Table 2). Patel et al. (2017) reported least fruit damage and highest fruit yield with chlorantraniliprole 35WG and emamectin benzoate 5SG.

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