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EFFICACY OF INSECTICIDES AGAINST SESAME SHOOT WEBBER *ANTIGASTRA CATALAUNALIS*

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ABSTRACT

Field experiments evaluated the efficacy of insecticides against sesamum shoot webber *Antigastra catalaunalis* Duponchel. Emamectin benzoate 5 SG @ 200g/ ha recorded minimum damage (1.93% and 1.31%) and larval incidence (1.87 and 2.70/ plant) during kharif and rabi, respectively. Predatory coccinellids and spiders (0.61 and 0.68/ plant), maximum seed yield of 650 kg/ ha and highest B: C ratio of 1:2.49 were obtained with emamectin benzoate 5 SG.

Key words: *Antigastra catalaunalis*, capsule borer, TMV 4, emamectin benzoate, coccinellids, spiders, yield, cost benefits

Sesame (*Sesamum indicum* L.) is an important oilseed crop with sesame oil being a high priced oil (Alegbejo et al., 2003). Sesame yield is relatively low in India, and it is partly due to insect pests and diseases. In India, it is grown in many states including Tamil Nadu (Sheeba and Indiragandhi 2020; 2021), and its oil has medicinal value (Gnanasekaran et al., 2010). Sesame quality and quantity gets affected due to insect pests as it is attacked by more than 65 insect pests. Of these, the leaf/ shoot webber cum capsule borer *Antigastra catalaunalis* Duponchel (Lepidoptera: Pyraustidae) is the most serious reducing the yield considerably (Sheeba and Indiragandhi 2020; 2021; Ahuja, 1990; Ahuja and Kalyan, 2002). In India, *Antigastra* damage during flowering stage and capsule formation stages respectively will cause yield loss about 2-75% and 1.4 to 31.2% and when it reached 10% ETL, immediately spraying operations are to be done (Egonyu et al., 2005; Singh, 1987). This study provides the results of field experiments carried out to evaluate the efficacy of some insecticides.

MATERIALS AND METHODS

Field experiments were conducted during two seasons viz., kharif (July 2018) and rabi (February 2019) at the Oilseeds Research Station, Tindivanam ($12^0 12'30''$N & $79^0 40'17''$E), Tamil Nadu, India. The experiments were laid out in a randomized block design (RBD) with seven treatments replicated four times, with variety TMV 4 sown in a plot size of 5 x 4 m^2 with 30x 10 cm spacing. The treatment evaluated include- spinosad 45SC @ 200 ml/ ha, fipronil 5SC @ 1000 ml/ ha, emamectin benzoate 5SG @ 200g/ ha, chlorpyriphos 20EC @ 1250 ml/ ha, profenophos 50EC @ 1000 ml/ ha, quinalphos 25EC @ 750 ml/ ha and untreated check. The package of practices except plant protection measures was followed. The spraying of insecticides was given on 5th August, 2018 and 3rd March, 2019 when the incidence of shoot webber noticed during kharif and rabi, respectively. Hand operated high volume knapsack sprayer was used, with spraying done in the late evening. The observations on *Antigastra* damage in plants and larvae/ plant were recorded one day before and 1, 3 and 7 days after spray; damage was calculated as per the methodology described by Khan et al. (2009). The larval counts were recorded in 10 randomly selected plants/ plot. During harvesting seed yield was computed to calculate the cost economics. The data were analyzed statistically following the Gomez and Gomez (1984), with treatment means compared by Duncan's Multiplication Range Test (DMRT) (Duncan, 1951).

RESULTS AND DISCUSSION

Results of the kharif trials indicated that least plant damage (3.25, 2.60, 1.93%) was observed with emamectin benzoate 5SG @ 200g/ ha; also with minimum number of larvae of 3.24, 2.40, 1.87/ plant. The next best treatments were spinosad 45SC and fipronil 5SC, with % reduction over control with emamectin benzoate being 66.67% (Table 1). Yalawar et al. (2020) reported that emamectin benzoate 5%

Table 1. Effect of insecticides on *A. catalaunalis*, its natural enemies, yield and CBR

Kharif season

Treatment	Dosage ml/ g ha^{-1}	Plant damage (%) PTC	Plant damage (%) 1 DAS	Plant damage (%) 3 DAS	Plant damage (%) 7 DAS	Larvae/ plant PTC	Larvae/ plant 1 DAS	Larvae/ plant 3 DAS	Larvae/ plant 7 DAS	Damage ROC (7 DAS)	Natural enemies (no/ plat) Coccinellid	Natural enemies (no/ plat) Spider	Yield (kg ha^{-1})	Increase over control	CBR
Spinosad 45SC	200	4.12 (17.00)	3.55^{bc} (12.60)	2.84^{b} (8.10)	2.15^{a} (8.43)	3.86 (14.90)	3.39^{b} (11.50)	2.73^{b} (7.50)	2.00^{ab} (4.00)	47.44	0.45	0.62	575^{b}	47.44	2.26
Fipronyl 5SC	1000	4.23 (17.90)	3.91^{c} (15.30)	2.88^{b} (8.30)	2.2^{a} (8.53)	3.80 (14.50)	3.33^{ab} (11.10)	2.70^{b} (7.30)	2.36^{b} (5.60)	53.85	0.34	0.50	600^{b}	53.85	2.32
Emamectin benzoate 5SG	200	4.00 (16.00)	3.25^{a} (10.59)	2.60^{a} (6.80)	1.93^{a} (7.98)	3.74 (14.00)	3.24^{a} (10.50)	2.40^{a} (5.80)	1.87^{a} (3.50)	66.67	0.61	0.68	650^{a}	66.67	2.49
Chlorpyriphos 20EC	1250	4.01 (16.10)	3.34^{ab} (11.20)	2.72^{ab} (7.40)	2.54^{a} (9.19)	3.92 (15.40)	3.67^{bc} (13.50)	2.81^{b} (7.90)	2.42^{ab} (5.90)	35.90	0.50	0.46	530^{bc}	35.90	2.18
Profenophos 50EC	1000	4.05 (16.40)	3.39^{ab} (11.50)	2.81^{b} (7.90)	2.55^{a} (9.19)	4.07 (16.60)	3.55^{c} (12.60)	2.86^{c} (8.20)	2.49^{ab} (6.20)	32.05	0.44	0.48	515^{bc}	32.05	2.16
Quinolphos 25EC	750	4.09 (16.80)	3.47^{b} (12.10)	2.82^{b} (8.00)	2.6^{a} (9.28)	4.20 (17.70)	3.70^{c} (13.70)	2.96^{c} (8.80)	2.53^{c} (6.40)	21.79	0.32	0.53	475^{c}	21.79	1.99
Control	-	4.30 (18.50)	4.83^{d} (23.40)	5.20^{c} (27.90)	6.27^{b} (14.51)	4.44 (19.75)	4.80^{c} (23.10)	5.17^{d} (26.80)	5.45^{d} (29.70)	-	1.2	0.85	390^{d}	-	-
SEd	-	0.67	0.44	0.37	0.94	0.37	0.43	0.37	0.34	-	-	-	21.3	-	-
CD (p=0.05)	-	NS	0.96	0.81	1.97	NS	0.94	0.80	0.74	-	-	-	46.3	-	-

Rabi season

Treatment	Dosage ml/ g ha^{-1}	Plant damage (%) PTC	Plant damage (%) 1 DAT	Plant damage (%) 3 DAT	Plant damage (%) 7 DAT	Larvae/ plant PTC	Larvae/ plant 1 DAT	Larvae/ plant 3 DAT	Larvae/ plant 7 DAT	Damage ROC (%) 7DAS	Natural enemies population (no/ plant) Coccinellid	Natural enemies population (no/ plant) Spider	Yield (kg ha^{-1})	Increase over control (%)	CBR
Spinosad 45SC	200	4.15 (17.20)	3.61^{ab} (13.00)	3.10^{ab} (9.60)	2.88^{a} (9.76)	4.38 (19.20)	3.55^{b} (12.60)	2.89^{ab} (8.30)	2.59^{b} (6.29)	46.84	0.48	0.64	580^{b}	46.84	2.29
Fipronyl 5Sc	1000	4.05 (16.40)	3.58^{ab} (12.50)	2.83^{ab} (8.05)	2.74^{a} (9.55)	4.07 (16.60)	3.38^{ab} (11.50)	2.70^{ab} (7.40)	2.00^{a} (4.00)	50.63	0.35	0.56	595^{a}	50.63	2.30
Emamectin benzoate 5SG	200	4.07 (16.60)	3.36^{a} (11.29)	2.70^{a} (7.30)	2.31^{a} (8.72)	3.92 (15.40)	3.25^{a} (10.59)	2.41^{a} (5.80)	1.70^{a} (3.38)	62.03	0.56	0.65	640^{a}	62.03	2.38
Chlorpyriphos 20EC	1250	4.34 (18.80)	3.47^{a} (12.10)	3.25^{ab} (10.59)	2.95^{a} (9.89)	4.38 (19.20)	4.11^{c} (16.90)	3.69^{bc} (13.60)	2.70^{b} (7.30)	37.97	0.52	0.58	545^{b}	37.97	2.25
Profenophos 50EC	1000	4.29 (18.40)	3.93^{ab} (15.40)	3.60^{bc} (12.90)	3.21^{a} (10.30)	4.11 (16.90)	3.83^{b} (14.70)	3.33^{bc} (11.10)	3.29^{c} (10.80)	34.18	0.45	0.42	530^{bc}	34.18	2.20
Quinolphos 25EC	750	4.34 (18.80)	4.12^{bc} (16.92)	3.70^{bc} (13.69)	3.36^{a} (10.55)	4.20 (17.70)	3.75^{b} (13.90)	3.55^{bc} (12.60)	3.24^{c} (10.50)	27.85	0.46	0.58	505^{bc}	27.85	2.15
Control	-	4.30 (18.50)	5.18^{d} (26.80)	5.44^{d} (29.60)	6.63^{b} (14.92)	4.44 (19.75)	5.20^{d} (24.00)	5.45^{d} (29.70)	5.57^{d} (29.90)	-	0.92	0.96	395^{c}	-	-
SEd	-	0.44	0.43	0.44	0.51	0.27	0.14	0.27	0.29	-	-	-	22.9	-	-
CD (p=0.05)	-	NS	0.91	0.93	1.06	NS	0.30	0.57	0.61	-	-	-	48.5	-	-

PTC- Pretreatment count; Values mean of three replications; Values in parantheses square root transformed, for population and arc sine transformed for % damage; ROC – Reduction over control. PTC- Pre treatment count. Values mean of three replications. Values in parantheses square root transformed for population and arc sine transformed for damage.

SG was the most effective. During rabi season also emamectin benzoate was superior with 3.36, 2.70 and 2.31% damage, respectively on 1,3,7 DAS (Table 1); the next best were fipronil 5SC and spinosad 45SC, and on par with each other; similarly emamectin benzoate 5SG @ 200g/ ha treated plots recorded the least larval counts. Maximum reduction over control (62.03) was observed in emamectin benzoate 5SG followed by fipronil 5SC (50.63) and spinosad 45SC (46.84). Results of the present study agree with those on emamectin benzoate 5% SG and spinosad 45%SC (Yalawar et al., 2020). Emamectin benzoate stood first in reducing damage (%), larval incidence (no/ plant), increased yield and economic returns in two consecutive seasons. The natural enemies viz., coccinellids (0.61) and spiders (0.68) were more in emamectin benzoate 5SG. Jyoti and Basavana (2008) observed that emamectin benzoate 5SG and spinosad 45SC were safe to natural enemies. *Schymnus* spp., and *Coccinella undecimpunctata* are not negatively affected by emamectin benzoate (Sechser et al., 2003). Maximum yield was obtained with emamectin benzoate 5SG (640-650 kg/ ha) (Table 1), with maximum of cost benefit ratio (2.38 -2.49). Increased yield in emamectin benzoate treated plots might be due to the reduced damage. Varma et al. (2013) reported that emamectin benzoate 0.001% treated plots recorded minimum flower damage.

AUTHOR CONTRIBUTION STATEMENT

All authors equally contributed.

CONFLICT OF INTEREST

No conflict of interest.

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