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Effect of insecticides and botanicals alone and in combination with fungicide against okra shoot and fruit borer

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Abstract
The present investigation entitled was conducted on the farm of Department of Agricultural Entomology, Dr. PDKV, Akola during kharif season of 2018-19. The experiment was laid in randomized block design with 15 treatments and 2 replications. The results revealed that treatment Fenvalerate 20% EC @ 2ml/L followed by treatments Lambda-cyhalothrin 5% EC @ 1.33 ml/L, Pyriproxyfen 5% EC + fenpropathrin 15% EC @ 1 ml/L and Lambda-cyhalothrin 5% EC + Hexaconazole 5% EC @ 1.33 ml+1ml/L were found significantly effective in recording lower percentage of shoot damage due to shoot and fruit borer at 30 DAG and 45 DAG. In case of fruit infestation on number basis and weight basis, treatment Fenvalerate 20% EC @ 2ml/L followed by treatments Lambda-cyhalothrin 5% EC @ 1.33 ml/L, Pyriproxyfen 5% EC + fenpropathrin 15% EC @ 1 ml/L and Lambda-cyhalothrin 5% EC + Hexaconazole 5% EC @ 1.33 ml+1ml/L were highly effective in recording lower percentage of fruit infestation on number and weight basis.

Keywords: Dashparni extract, azadirachtin, NSKE, shoot and fruit borer, lambda-cyhalothrin

1. Introduction
Among the vegetable crops grown in India, okra (*Abelmoschus esculentus* (L.) Moench), also known as lady's finger or Bhendi, is an important vegetable grown throughout the year. Besides India, it is grown in many tropical and subtropical parts of the world. In India, it is grown on an area 5.24 lakh hectares with production of 62.03 lakh tonnes with productivity 11.83 tones/hectares [1]. In Maharashtra, okra grown an area of 0.23 lakh hectares with production of 2.41 lakh tones and productivity 10.47 tonn/hectare [2] and is mainly grown in Pune, Nagpur, Nashik, Jalgaon, Ahemadnagar, Aurangabad and Parbhani districts. Commonly it is cultivated in kharif and summer season; however, productivity in state is less as compared to national average. The reasons for low productivity are like unavailability of quality seed, irrigation method, fertilizers, insect pest and diseases. Among these, damage due to the insect pest is one of the major reasons for low productivity. When crop is attacked by shoot and fruit borer, the larva bore into the growing shoot and feed inside resulting in withering and drying of shoot. On availability of fruits, larvae start feeding on them and thus cause direct net yield loss about 54 per cent due to okra fruit borer of yield in marketable fruits. In case of severe infestation complete fruit is de-shaped, hallowed and filled with humus like excreta, result the infested shoots dry and fruits become unfit for human consumption. Hence, the work was carried out to investigate the combination effect of the insecticide and fungicide to the save the numbers of sprays as farmers follow this practice. Therefore, the present investigation was carried out with an objective to evaluate effect of insecticides and botanicals alone and in combination with fungicide against major pest of Okra.

2. Materials and Methods
Field experiment was laid out with Randomized Block Design (RBD) having fifteen treatments and two replications. The gross plot size was 4.8 x 2.7 m., net plot size was 3.6 x 1.8 m and spacing was 60 cm x 45 cm. Akola bahar cultivar was used in present investigation and sowing was done on 30th June. All the agronomical practices were carried out as per the recommendations except, plant protection measures.

Table 1: Treatment details are as follows

Sr. no.	Treatments	Concentration (%) Dose (ml/L)
T1	Lambda-cyhalothrin 5% EC	1.33 ml/L
T2	Dashparni Extract 15%	25.0 ml/L
T3	Fenvalerate 20% EC	2ml/L
T4	NSKE	5%
T5	Lambda-cyhalothrin 5% EC + Dashparni Extract 15%	1.33ml + 12.5ml/L
T6	Pyriproxyfen 5% EC + fenpropathrin 15% EC	1ml/L
T7	Azadirachtin 300 ppm (oil based)	5 ml/L
T8	Fenvalerate 20% EC + Dashparni Extract 15%	1ml + 12.5 ml/L
T9	NSKE 5% + Hexaconazole 5% EC	5% + 1ml/1L
T10	Dashparni Extract 15% + Hexaconazole 5% EC	25.0ml +1ml/L
T11	Azadirachtin 300 ppm + Hexaconazole 5% EC	5ml +1ml/L
T12	Fenvalerate 20EC + Hexaconazole 5% EC	2ml +1ml/L
T13	Lambda-cyhalothrin 5% EC + Hexaconazole 5% EC	1.33ml +1ml/L
T14	Pyriproxyfen 5% EC + Fenpropathrin 15% EC + Hexaconazole 5% EC	1ml +1ml/L
T15	Untreated control	-

Observation on shoot and fruit borer at 30 DAG and 45 DAG were recorded per observational plant per net plot will counted and per cent of shoot infestation per plot were worked out by the following formula.

$$\text{Per cent shoot infestation} = \frac{\text{Number of infested shoots}}{\text{Number of total shoots}} \times 100$$

Per cent fruit damage from randomly selected five plants observations were recorded on number basis and weight basis with the help of following formulas as

$$\text{Per cent fruit borer infestation (on number basis)} = \frac{\text{Number of infested fruits}}{\text{Total no. of fruits plucked}} \times 100$$

$$\text{Per cent fruit damage (Weight basis)} = \frac{\text{Weight of damaged fruits}}{\text{Total weight of fruits}} \times 100$$

Thus, the data so far generated were subjected to corresponding square root or arc sine value and subjected to statistical analysis for testing the level of significance. Thus, the data so far generated were subjected to proper transformation and then statistically analyzed [3].

3. Results and Discussion

3.1 Compatibility of insecticides and botanicals alone and in combination with fungicide against shoot and fruit borer infestation on Okra crop at 30 and 45 DAS

3.1.1 Shoot infestation at 30 DAS (days after sowing)

The data tabulated in (Table 2) revealed that, all the treatments were significantly superior over untreated control in reducing percentage of shoot and fruit borer. The minimum percentage of shoot infestation due to shoot and fruit borer recorded in the treatment (T3) Fenvalerate 20% EC (5.90%), followed by the treatments (T1) Lambda-cyhalothrin 5% EC (5.90%) (T6) Pyriproxyfen 5% EC + fenpropathrin 15% EC (6.38%), (T13) Lambda-cyhalothrin 5% EC + Hexaconazole 5% EC (6.84%), (T14) Pyriproxyfen 5% EC + Fenpropathrin 15% EC + Hexaconazole 5% EC (6.99%) and (T8) Fenvalerate 20% EC + Dashparni Extract 15% (7.49) and at par with each other. The next effective treatment was (T12) Fenvalerate 20% EC + Hexaconazole 5% EC (8.05%) followed by the treatments (T5) Lambda-cyhalothrin 5% EC + Dashparni Extract (8.56%), (T10) Dashparni Extract 15% + Hexaconazole 5% EC (8.78%), (T4) NSKE 5% (9.16%), (T2) Dashparni Extract (9.88%) and (T9) NSKE 5% + Hexaconazole 5% EC (10.35) and at par with each other. The next effective treatment was (T7) Azadirachtin 300 ppm (oil based) (11.66%) and (T11) Azadirachtin 300 ppm + Hexaconazole 5% EC (13.39%) and at par with each other. Maximum percentage of shoot infestation was recorded in (T15) untreated control (19.50%).

3.1.2 Shoot infestation at 45 DAS (days after sowing)

The data presented in (Table 2) revealed that all treatments were significantly superior over untreated control. The minimum percentage of shoot infestation due to shoot and fruit borer recorded in the treatment (T3) Fenvalerate 20% EC (5.39%), and was found at par with (T1) Lambda-cyhalothrin 5% EC (6.49%), (T6) Pyriproxyfen 5% EC + fenpropathrin 15% EC (6.81%), (T13) Lambda-cyhalothrin 5% EC + Hexaconazole 5% EC (7.21%), (T14) Pyriproxyfen 5% EC + Fenpropathrin 15% EC + Hexaconazole 5% EC (7.46%), (T8) Fenvalerate 20% EC + Dashparni Extract 15% (7.77%) and (T12) Fenvalerate 20% EC + Hexaconazole 5% EC (8.50%). The next effective treatments were (T5) Lambda-cyhalothrin 5% EC + Dashparni Extract (8.71%) followed by the treatments (T10) Dashparni Extract 15% + Hexaconazole 5% EC (9.28%), (T4) NSKE (9.53%), (T2) Dashparni Extract (10.00%), (T9) NSKE 5% + Hexaconazole 5% EC (10.63%) and (T7) Azadirachtin 300 ppm (oil based) (11.94) and at par with each other. The next effective treatment was (T11) Azadirachtin 300 ppm + Hexaconazole 5% EC (14.32). Maximum percentage of shoot infestation was recorded in (T15) untreated control (20.11%).

3.1.3 Cumulative effect of insecticides and botanicals alone and in combination with fungicide against shoot infestation on Okra crop at 30 and 45 DAS

The cumulative effect of various treatments (Table 2) against per cent shoot infestation due to shoot and fruit borer on okra crop at 30 and 45 DAS in all treated plots were significantly superior (6.19% to 13.86%) over the untreated control (19.81). The lowest percentage of shoot infestation due to shoot and fruit borer recorded in the treatment (T3) Fenvalerate 20% EC (5.25%) followed by the treatments (T1) Lambda-cyhalothrin 5% EC (6.19), (T6) Pyriproxyfen 5% EC + fenpropathrin 15%EC (6.60), (T13) Lambda- cyhalothrin 5% EC + Hexaconazole 5% EC (7.03%), (T14) Pyriproxyfen 5% EC + Fenpropathrin 15% EC + Hexaconazole 5% EC (7.22%) and (T8) Fenvalerate 20% EC + Dashparni Extract 15% (7.63%) which was at par with each other. The next effective treatment was (T12) Fenvalerate 20% EC + Hexaconazole 5% EC (8.28%) followed by the treatments (T5) Lambda-cyhalothrin 5% EC + Dashparni Extract 15% (8.64%), (T10) Dashparni Extract 15% + Hexaconazole 5% EC (9.03), (T4) NSKE 5% (9.35%), (T2) Dashparni Extract 15% (9.94%), (T9) NSKE 5% + Hexaconazole 5% EC (10.49%) and (T7) Azadirachtin 300 ppm (oil based) (11.80%) and at par with each other. The next effective treatment was (T11) Azadirachtin 300 ppm + Hexaconazole 5% EC (13.83%). Maximum percentage of shoot infestation was recorded in (T15) untreated control (19.81%).

Above results regarding the efficacy of fenvalerate 20EC are in confirmation, with lowest infestation of okra shoot and fruit borer was recorded with 0.015% fenvalerate, followed by 0.01% cypermethrin and 0.07% Endosulphon [4].

The results are also in line with the findings that the efficacy of neem (*Azadirachta indica*) oil, Achook (a neem based formulation), fenvalrate, cypermethrin, karanj [*Pongamia pinnata*] oil, dichlorvos and Malathion for control of *Earias vittella* infesting okras. For sprays were applied fortnightly [5]. Fenvalerate 20 EC 0.005% gave the highest level of control and highest healthy fruit yield (70.75 q ha1). Also, four sprays of fenvalerate 0.05% gave the greatest level of control of okra shoot and fruit borer, *Earias vittella*. Reported that highest healthy fruit yield of okra 7.07 t/ha was obtained with 4 sprays of fenvalerate (0.05%) [6].

NSKE 5% was most effective treatment for minimizing shoot borer infestation on okra i.e. 21.4% followed by the treatments NSKE 5%+ cow urine 5% i.e. 24.0%, cow dung extract 5%+cow urine 5% and cow dung extract 5% alone were effective and significantly superior over untreated untreated control [7]. The effectiveness of different neem products *viz.*, NSKE 5% achook, nimbicidine, rakshak, bioneem @ 0.03 and 0.15 EC, Nimbitor, Neemgold and neemark against per cent fruit borer infestation on okra on both number and weight basis which were significantly superior compared to untreated control [8].

Regarding the efficacy of (T7) Azadirachtin 300 ppm @5ml/L and and (T2) Dashparni extract @ 12.5 ml/L for minimizing the per cent fruit infestation of shoot and fruit borer on okra these present findings proved that the effectiveness of azadirachtin 300 ppm @ 5 ml/L after the most effectiveness of the most popular chemical insecticides *viz.*, emamectin benzoate, Flubendamide, Indoxacarb, Triazophos, Profenophos, Spinosad, Spinetoram and Chlorfenapyr used and which were found superior over untreated control for reducing the per cent fruit infestation on okra both on number and weight basis [9, 10]. Also similar findings regarding neem oil and NSKE 5% found that, botanical pesticides like neem oil and Neem seed Kernel Extract 5% can be recommended against shoot and fruit borer of Bhendi [11].

Table 2: Compatibility of insecticides and botanicals alone and in combination with fungicide against shoot infestation on Okra crop at 30 and 45 DAS

Tr. No	Treatment details	Conc. (%)	Per cent infested shoots		
			30 DAS	45 DAS	Cumulative Mean
1	Lambda-cyhalothrin 5% EC	1.33 ml/L	5.90 (2.42)	6.49 (2.53)	6.19 (2.48)
2	Dashparni Extract 15%	25.0 ml/L	9.88 (3.12)	10.00 (3.15)	9.94 (3.14)
3	Fenvalerate 20% EC	2ml/L	5.10 (2.25)	5.39 (2.32)	5.25 (2.29)
4	NSKE 5%	5%	9.16 (3.02)	9.53 (3.08)	9.35 (3.05)
5	Lambda-cyhalothrin 5% EC + Dashparni Extract 15%	1.33ml +12.5ml	8.56 (2.92)	8.71 (2.94)	8.64 (2.93)
6	Pyriproxyfen 5% EC + fenpropathrin 15% EC	1ml/L	6.38 (2.51)	6.81 (2.60)	6.60 (2.56)
7	Azadirachtin 300 ppm (oil based)	5 ml/L	11.66 (3.41)	11.94 (3.45)	11.80 (3.43)
8	Fenvalerate 20% EC + Dashparni Extract 15%	1ml +12.5 ml/L	7.49 (2.74)	7.77 (2.78)	7.63 (2.76)
9	NSKE 5% + Hexaconazole 5% EC	5% + 1ml/1L	10.35 (3.21)	10.63 (3.25)	10.49 (3.23)
10	Dashparni Extract 15% + Hexaconazole 5% EC	25.0ml + 1ml/L	8.78 (2.96)	9.28 (3.03)	9.03 (3.00)
11	Azadirachtin 300 ppm + Hexaconazole 5% EC	5ml +1ml/L	13.39 (3.66)	14.32 (3.78)	13.86 (3.72)
12	Fenvalerate 20 EC + Hexaconazole 5% EC	2ml + 1ml/L	8.05 (2.83)	8.50 (2.90)	8.28 (2.87)
13	Lambda-cyhalothrin 5% EC + Hexaconazole 5% EC	1.33ml + 1ml/L	6.84 (2.60)	7.21 (2.68)	7.03 (2.64)
14	Pyriproxyfen 5% EC + Fenpropathrin 15% EC + Hexaconazole 5% EC	1ml +1ml/L	6.99 (2.63)	7.46 (2.72)	7.22 (2.68)
15	Untreated control	-	19.50 (4.39)	20.11 (4.45)	19.81 (4.42)
	F test		Sig.	Sig.	Sig.
	SE (M) ±		0.17	0.19	0.18
	CD at 5%		0.51	0.6	0.56
	CV		8.12	9.12	8.62

Figures in parentheses are square root transformations. DAS-Days after spray

3.2 Effect of various treatments against mean per cent fruit infestation at each picking on number basis by shoot and fruit borer on Okra crop

3.2.1 4At Ist Picking

All the treatments were significantly superior over untreated control. (Table 3) The minimum percentage of fruit infestation on number basis due to shoot and fruit borer recorded in the treatment (T3) Fenvalerate 20% EC (15.67%), and was found at par with (T1) Lambda-cyhalothrin 5% EC (16.44%), (T6) Pyriproxyfen 5% EC + fenpropathrin 15% EC (17.10%) (16.53%), (T13) Lambda-cyhalothrin 5% EC + Hexaconazole 5% EC (17.10%), (T14) Pyriproxyfen 5% EC + Fenpropathrin 15% EC + Hexaconazole 5% EC (17.55%), (T8) Fenvalerate 20% EC + Dashparni Extract 15% (17.72%) and (T12) Fenvalerate 20% EC + Hexaconazole 5% EC (18.15%), (T5) Lambda-cyhalothrin 5% EC + Dashparni Extract (18.63%) (T10) Dashparni Extract 15% + Hexaconazole 5% EC (19.95%), (T4) NSKE (20.11%), (T2) Dashparni Extract (21.33%), (T9) NSKE 5% + Hexaconazole 5% EC (22.03%) and (T7) Azadirachtin 300 ppm (oil based) (22.05%). The next effective treatment was (T11) Azadirachtin 300 ppm + Hexaconazole 5% EC (23.05). Maximum percentage of infestation on number basis was recorded in (T15) untreated control (31.55%).

Table 3: Mean per cent fruits infestation by shoot and fruit borer at each picking on number basis

Tr. No	Treatment details	Conc. (%)	No. of Picking							Cumulative mean of 7 pickings
			I	II	III	IV	V	VI	VII	
1	Lambda-cyhalothrin 5% EC	1.33 ml/L	16.44 (4.05)	16.84 (4.10)	16.69 (4.08)	16.99 (4.12)	17.44 (4.17)	17.56 (4.19)	16.83 (4.10)	17.02 (4.12)
2	Dashparni Extract 15%	25.0 ml/L	21.33	21.33	21.82	22.32	22.10	23.12	21.75	21.97

			(4.61)	(4.61)	(4.66)	(4.71)	(4.70)	(4.81)	(4.66)	(4.68)
3	Fenvalerate 20% EC	2ml/L	15.67 (3.95)	16.10 (4.01)	16.27 (4.02)	16.72 (4.08)	16.91 (4.10)	17.26 (4.15)	16.28 (4.03)	16.46 (4.05)
4	NSKE 5%	5%	20.11 (4.48)	20.10 (4.48)	20.50 (4.52)	21.27 (4.61)	21.00 (4.58)	22.15 (4.70)	20.54 (4.53)	20.81 (4.56)
5	Lambda-cyhalothrin 5% EC + Dashparni Extract 15%	1.33ml/L+12.5ml	18.63 (4.31)	18.81 (4.33)	18.95 (4.35)	19.43 (4.40)	19.14 (4.37)	20.42 (4.52)	18.90 (4.34)	19.18 (4.37)
6	Pyriproxyfen 5% EC + fenpropathrin 15% EC	1ml/L	16.53 (4.06)	16.88 (4.11)	16.89 (4.11)	17.11 (4.13)	17.28 (4.15)	18.10 (4.24)	16.92 (4.11)	17.05 (4.12)
7	Azadirachtin 300 ppm (oil based)	5 ml/L	22.05 (4.69)	21.99 (4.68)	23.10 (4.80)	23.56 (4.84)	23.60 (4.84)	24.49 (4.94)	22.91 (4.78)	23.10 (4.79)
8	Fenvalerate 20% EC + Dashparni Extract 15%	1ml/L +12.5 ml/L	17.72 (4.21)	18.07 (4.25)	18.16 (4.26)	18.79 (4.33)	18.60 (4.30)	19.11 (4.36)	18.16 (4.26)	18.37 (4.28)
9	NSKE 5% + Hexaconazole 5% EC	5%+1ml/1L	22.03 (4.68)	21.66 (4.65)	22.77 (4.77)	22.83 (4.77)	22.55 (4.74)	23.06 (4.80)	22.46 (4.73)	22.48 (4.73)
10	Dashparni Extract 15% Hexaconazole 5% EC	25.0ml +1ml/L	19.95 (4.46)	19.16 (4.37)	20.17 (4.48)	20.61 (4.53)	20.55 (4.53)	21.27 (4.61)	20.22 (4.19)	20.28 (4.45)
11	Azadirachtin 300 ppm + Hexaconazole 5% EC	5ml+1ml/L	23.05 (4.77)	22.82 (4.75)	23.83 (4.87)	24.22 (4.91)	24.06 (4.90)	25.58 (5.05)	23.65 (4.86)	23.89 (4.87)
12	Fenvalerate 20 EC + Hexaconazole 5% EC	2ml+1ml/L	18.15 (4.25)	18.48 (4.29)	18.38 (4.28)	19.10 (4.36)	18.85 (4.33)	20.05 (4.46)	18.46 (4.29)	18.78 (4.32)
13	Lambda-cyhalothrin 5% EC + Hexaconazole 5% EC	1.33ml+1ml/L	17.10 (4.13)	17.10 (4.13)	17.33 (4.16)	17.05 (4.13)	18.11 (4.25)	18.32 (4.27)	17.51 (4.18)	17.50 (4.18)
14	Pyriproxyfen 5% EC + Fenpropathrin 15% EC + Hexaconazole 5% EC	1ml+1ml/L	17.55 (4.19)	17.98 (4.24)	17.94 (4.23)	18.00 (4.24)	18.25 (4.26)	19.24 (4.38)	17.91 (4.23)	18.12 (4.25)
15	Untreated control	-	31.55 (5.60)	31.94 (5.64)	32.46 (5.68)	33.30 (5.76)	33.46 (5.78)	34.27 (5.84)	32.49 (5.70)	32.78 (5.72)
	F test		Sig	Sig	Sig	Sig	Sig	Sig	Sig	Sig
	SE (M) ±		0.25	0.24	0.26	0.27	0.24	0.25	0.25	0.25
	CD at 5%		0.78	0.74	0.79	0.82	0.75	0.76	0.77	0.77
	CV		8.22	7.76	8.29	8.49	7.73	7.71	8.08	8.04

Figures in parentheses are square root transformations.

3.2.2 At IInd Picking

The data revealed that all the treatments were significantly superior over untreated control. The minimum percentage of fruit infestation on number basis due to shoot and fruit borer recorded in the treatment (T3) Fenvalerate 20% EC (16.10%), and was found at par with (T1) Lambda-cyhalothrin 5% EC (16.84%), (T6) Pyriproxyfen 5% EC + fenpropathrin 15% EC (16.88%), (T13) Lambda-cyhalothrin 5% EC + Hexaconazole 5% EC (17.10%), (T14) Pyriproxyfen 5% EC + Fenpropathrin 15% EC + Hexaconazole 5% EC (17.98%), (T8) Fenvalerate 20% EC + Dashparni Extract 15% (18.07%), (T12) Fenvalerate 20% EC + Hexaconazole 5% EC (18.48%), (T5) Lambda-cyhalothrin 5% EC + Dashparni Extract (18.81%), (T10) Dashparni Extract 15% + Hexaconazole 5%EC (19.16%), (T4) NSKE 5% (20.10%), (T2) Dashparni Extract (21.33%), (T9) NSKE 5% + Hexaconazole 5% EC (21.66%), (T7) Azadirachtin 300 ppm (oil based) (21.99) and (T11) Azadirachtin 300 ppm + Hexaconazole 5% EC (22.82%). Maximum percentage of infestation on number basis was recorded in (T15) untreated control (31.94%).

3.2.3 At IIIrd Picking

There were significant differences amongst various treatments as regards the per cent of fruit infestation on number basis due to okra shoot and fruit borer. The most effective treatment was (T3) Fenvalerate 20% EC recorded minimum i.e.16.27 per cent of fruit infestation on number basis and found statistically at par with (T1) Lambda-cyhalothrin 5% EC (16.69%), (T6) Pyriproxyfen 5% EC + fenpropathrin 15% EC (16.88%), (T13) Lambda-cyhalothrin 5%EC + Hexaconazole 5% EC (17.33%), (T14) Pyriproxyfen 5% EC + Fenpropathrin 15% EC + Hexaconazole 5% EC (17.94%), (T8) Fenvalerate 20% EC + Dashparni Extract 15% (18.16) and (T12) Fenvalerate 20% EC + Hexaconazole 5% EC (18.38%), (T5) Lambda-cyhalothrin 5% EC + Dashparni Extract (18.95%), (T10) Dashparni Extract 15% + Hexaconazole 5%EC (20.17), (T4) NSKE (20.25%), (T2) Dashparni Extract (21.82%) and (T9) NSKE 5% + Hexaconazole 5% EC (22.77%) and (T7) Azadirachtin 300 ppm (oil based) (23.10%). Next effective treatment was (T11) Azadirachtin 300 ppm + Hexaconazole 5% EC (23.83%). Maximum percentage of infestation on number basis was recorded in (T15) untreated control (32.46%).

3.2.4 At IVth Picking

The data recorded on fourth picking revealed that the most effective treatment which recorded minimum per cent of fruit infestation on number basis due to okra shoot and fruit borer was (T3) Fenvalerate 20% EC (16.72%), and was found at par with(T1) Lambda-cyhalothrin 5% EC (16.99%), (T6) Pyriproxyfen 5% EC + fenpropathrin 15% EC (17.11), (T13) Lambda-cyhalothrin 5% EC + Hexaconazole 5% EC (17.05%), (T14) Pyriproxyfen 5% EC + Fenpropathrin 15% EC + Hexaconazole 5% EC (18.00%), (T8) Fenvalerate 20% EC + Dashparni Extract 15% (18.79%) and (T12) Fenvalerate 20% EC + Hexaconazole 5% EC (19.10%),(T5) Lambda-cyhalothrin 5% EC + Dashparni Extract (19.43%), (T10) Dashparni Extract 15% + Hexaconazole 5% EC (20.61%), (T4) NSKE (21.27%), (T2) Dashparni Extract (22.32%), (T9) NSKE 5% + Hexaconazole 5% EC (22.83) and (T7) Azadirachtin 300 ppm (oil based) (23.56%). Next effective treatment was (T11) Azadirachtin 300 ppm + Hexaconazole 5% EC (24.22%). Maximum percentage of infestation on number basis was recorded in (T15) untreated control (33.30%).

3.2.5 At Vth Picking

All the treatments were significantly superior over untreated

control. The minimum percentage of fruit infestation on number basis due to shoot and fruit borer recorded in the treatment (T3) Fenvalerate 20% EC (16.91%), and was found at par with (T1) Lambda-cyhalothrin 5% EC (17.44%), (T6) Pyriproxyfen 5% EC + fenpropathrin 15%EC (17.28%), (T13) Lambda-cyhalothrin 5% EC + Hexaconazole 5% EC (18.11%), (T14) Pyriproxyfen 5% EC + Fenpropathrin 15% EC + Hexaconazole 5% EC (18.25%), (T8) Fenvalerate 20% EC + Dashparni Extract 15% (18.60%) and (T12) Fenvalerate 20% EC + Hexaconazole 5% EC (18.85%), (T5) Lambda-cyhalothrin 5% EC + Dashparni Extract (19.14%), (T10) Dashparni Extract 15% + Hexaconazole 5% EC (20.55%), (T4) NSKE 5% (21.00%), (T2) Dashparni Extract 15% (22.10%), (T9) NSKE 5% + Hexaconazole 5% EC (22.55%) and (T7) Azadirachtin 300 ppm (oil based) (23.60%). Next effective treatment was (T11) Azadirachtin 300 ppm + Hexaconazole 5% EC (24.06%). Maximum percentage of infestation on number basis was recorded in (T15) untreated control (33.46%).

3.2.6 At VIth Picking

The data revealed that all the treatments were significantly superior over untreated control. The minimum percentage of fruit infestation on number basis due to shoot and fruit borer recorded in the treatment (T3) Fenvalerate 20% EC (17.26%) and found statistically at par with (T1) Lambda-cyhalothrin 5% EC (17.56%), (T6) Pyriproxyfen 5% EC + fenpropathrin 15% EC (18.10%), (T13) Lambda-cyhalothrin 5% EC + Hexaconazole 5% EC (18.32%), (T14) Pyriproxyfen 5% EC + Fenpropathrin 15% EC + Hexaconazole 5% EC (19.24%), (T8) Fenvalerate 20% EC + Dashparni Extract 15% (19.11%) and (T12) Fenvalerate 20% EC + Hexaconazole 5% EC (20.05%), (T5) Lambda-cyhalothrin 5% EC + Dashparni Extract 15% (20.42%), (T10) Dashparni Extract 15% + Hexaconazole 5% EC (21.27%), (T4) NSKE 5% (22.15%), (T2) Dashparni Extract 15% (23.12%) and (T9) NSKE 5% + Hexaconazole 5% EC (23.06%). Next effective treatment was (T7) Azadirachtin 300 ppm (oil based) (24.49%) and (T11) Azadirachtin 300 ppm + Hexaconazole 5% EC (25.58%) and at par with each other. Maximum percentage of infestation on number basis was recorded in (T15) untreated control (34.34%).

3.2.7 At VIIth Picking

There were significant differences amongst various treatments as regards the per cent of fruit infestation on number basis due to okra shoot and fruit borer. The most effective treatment was (T3) Fenvalerate 20% EC recorded minimum i.e.16.28 per cent of fruit infestation on number basis and found statistically at par with (T1) Lambda-cyhalothrin 5% EC (16.83%), (T6) Pyriproxyfen 5% EC + fenpropathrin 15% EC (16.92%), (T13) Lambda-cyhalothrin 5%EC + Hexaconazole 5% EC (17.51%), (T14)Pyriproxyfen 5% EC + Fenpropathrin 15% EC + Hexaconazole 5% EC (17.91%), (T8) Fenvalerate 20% EC + Dashparni Extract 15% (18.16%) and (T12) Fenvalerate 20% EC + Hexaconazole 5%EC (18.46%), (T5) Lambda-cyhalothrin 5% EC + Dashparni Extract 15% (18.90%), (T10) Dashparni Extract 15% + Hexaconazole 5% EC (20.22%), (T4) NSKE 5% (20.54%), (T2) Dashparni Extract 15% (21.75%) and (T9) NSKE 5% + Hexaconazole 5% EC (22.46%) and (T7) Azadirachtin 300 ppm (oil based) (22.91%). Next effective treatment was (T11) Azadirachtin 300 ppm + Hexaconazole 5% EC (23.65%). Maximum percentage of infestation on number basis was recorded in (T15) untreated control (32.49%).

3.2.8 Cumulative effect of mean per cent of fruit infestation of seven pickings on number basis by shoot and fruit borer on Okra crop

The cumulative average per cent fruit infestation of seven pickings on number basis by shoot and fruit borer in all treated plots were significantly lower (20.81% to 23.89%) than the untreated control plot (32.78%) presented in (Table 3). The lowest percentage of fruit infestation on number basis due to shoot and fruit borer recorded in the treatment (T3) Fenvalerate 20% EC (16.46%), and was found at par with (T1) Lambda-cyhalothrin 5% EC (16.83%), (T6) Pyriproxyfen 5% EC + fenpropathrin 15%EC (17.05%), (T13) Lambda-cyhalothrin 5% EC + Hexaconazole 5% EC (17.50%), (T14) Pyriproxyfen 5% EC + Fenpropathrin 15% EC + Hexaconazole 5% EC (18.12%), (T8) Fenvalerate 20% EC + Dashparni Extract 15% (18.37%) and (T12) Fenvalerate 20% EC + Hexaconazole 5%EC (18.78%), (T5) Lambda-cyhalothrin 5% EC + Dashparni Extract 15% (19.18%), (T10) Dashparni Extract 15% + Hexaconazole 5%EC (20.28%), (T4) NSKE 5% (20.81%), (T2) Dashparni Extract 15% (21.97%), (T9) NSKE 5% + Hexaconazole 5% EC (22.48%) and (T7) Azadirachtin 300 ppm (oil based) (23.10%). Next effective treatment was (T11) Azadirachtin 300 ppm + Hexaconazole 5% EC (23.89%). Maximum percentage of infestation on number basis was recorded in (T15) untreated control (32.78%).

3.3 Effect of various treatments against mean per cent fruit infestation at each picking on weight basis by shoot and fruit borer on Okra crop

3.3.1 At Ist picking

All the treatments were significantly superior over untreated control. (Table 4) The minimum percentage of fruit infestation on weight basis due to shoot and fruit borer recorded in the treatment (T3) Fenvalerate 20% EC (3.85%), and was found at par with (T1) Lambda-cyhalothrin 5% EC (4.61%), (T6) Pyriproxyfen 5% EC + fenpropathrin 15% EC (4.83%), (T13) Lambda-cyhalothrin 5% EC + Hexaconazole 5% EC (5.19%), (T14) Pyriproxyfen 5% EC + Fenpropathrin 15%EC + Hexaconazole 5% EC (5.73%) and (T8) Fenvalerate 20% EC + Dashparni Extract 15% (6.21%). Next effective treatment was (T12) Fenvalerate 20% EC + Hexaconazole 5% EC (6.78%) followed by the treatments (T5) Lambda-cyhalothrin 5% EC + Dashparni Extract (7.09%), (T10) Dashparni Extract 15% + Hexaconazole 5%EC (7.91%), (T4) NSKE 5% (8.21%), (T2) Dashparni Extract (8.45%), (T9) NSKE 5% + Hexaconazole 5% EC (9.21%) and (T7) Azadirachtin 300 ppm (oil based) (9.56%) and (T11) Azadirachtin 300 ppm + Hexaconazole 5% EC (10.09%) and at par with each other. Maximum percentage of infestation on weight basis was recorded in (T15) untreated control (14.00%).

Table 4: Mean per cent fruits infestation by shoot and fruit borer at each picking on weights basis (kg/plot)

Tr. No	Treatment details	Conc. (%)	No. of Picking							Cumulative mean of 7 pickings
			I	II	III	IV	V	VI	VII	
1	Lambda-cyhalothrin 5% EC	1.33 ml/L	4.61 (2.15)	4.91 (2.21)	6.01 (2.44)	6.83 (2.59)	7.19 (2.68)	9.11 (3.02)	10.39 (3.22)	7.01 (2.62)
2	Dashparni Extract 15%	25.0 ml/L	8.45 (2.91)	8.30 (2.88)	9.13 (3.02)	10.63 (3.23)	12.39 (3.52)	14.21 (3.77)	16.23 (4.03)	11.33 (3.34)
3	Fenvalerate 20% EC	2ml/L	3.85 (1.96)	4.80 (2.19)	5.84 (2.42)	6.00 (2.44)	7.11 (2.67)	8.36 (2.89)	10.26 (3.20)	6.60 (2.54)
4	NSKE 5%	5%	8.21 (2.86)	8.11 (2.85)	8.11 (2.85)	10.30 (3.21)	12.11 (3.48)	13.69 (3.70)	15.79 (3.97)	10.90 (3.27)
5	Lambda-cyhalothrin 5% EC + Dashparni Extract 15%	1.33ml/L+12.5ml	7.09 (2.66)	7.21 (2.68)	7.56 (2.75)	9.60 (3.09)	11.23 (3.35)	12.91 (3.59)	14.91 (3.86)	10.07 (3.14)
6	Pyriproxyfen 5% EC + fenpropathrin 15% EC	1ml/L	4.83 (2.20)	5.04 (2.24)	6.27 (2.50)	7.33 (2.69)	8.01 (2.83)	9.38 (3.06)	11.25 (3.35)	7.44 (2.70)
7	Azadirachtin 300 ppm (oil based)	5 ml/L	9.56 (3.09)	9.78 (3.13)	9.80 (3.13)	12.71 (3.55)	13.74 (3.71)	15.23 (3.90)	18.11 (4.26)	12.70 (3.54)
8	Fenvalerate 20% EC + Dashparni Extract 15%	1ml/L +12.5 ml/L	6.21 (2.49)	6.11 (2.47)	7.01 (2.64)	8.33 (2.88)	9.18 (3.03)	11.23 (3.35)	13.69 (3.70)	8.82 (2.94)
9	NSKE 5% + Hexaconazole 5% EC	5%+1ml/1L	9.21 (3.03)	9.12 (3.02)	9.45 (3.07)	10.91 (3.30)	13.26 (3.64)	14.69 (3.83)	17.38 (4.17)	12.00 (3.44)
10	Dashparni Extract 15% Hexaconazole 5% EC	25.0ml +1ml/L	7.91 (2.81)	7.60 (2.76)	8.11 (2.85)	9.63 (3.09)	11.74 (3.43)	13.03 (3.61)	15.19 (3.90)	10.46 (3.21)
11	Azadirachtin 300 ppm + Hexaconazole 5% EC	5ml+1ml/L	10.09 (3.18)	10.21 (3.20)	11.15 (3.34)	14.66 (3.82)	14.01 (3.74)	16.29 (4.04)	18.78 (4.33)	13.60 (3.66)
12	Fenvalerate 20 EC + Hexaconazole 5% EC	2ml+1ml/L	6.78 (2.60)	6.55 (2.56)	7.31 (2.70)	9.10 (3.00)	10.11 (3.18)	12.13 (3.48)	14.26 (3.78)	9.46 (3.04)
13	Lambda-cyhalothrin 5% EC + Hexaconazole 5% EC	1.33ml+1ml/L	5.19 (2.28)	5.23 (2.29)	6.38 (2.52)	7.66 2.76)	8.11 (2.85)	9.74 (3.12)	12.26 (3.50)	7.80 (2.76)
14	Pyriproxyfen 5% EC + Fenpropathrin 15% EC + Hexaconazole 5% EC	1ml+1ml/L	5.73 (2.39)	5.50 (2.34)	6.83 (2.61)	7.83 (2.79)	9.03 (3.00)	10.35 (3.22)	12.45 (3.53)	8.24 (2.84)
15	Untreated control	-	14.00 (3.65)	16.50 (3.91)	19.00 (4.26)	22.61 (4.72)	24.00 (4.76)	26.06 (4.96)	29.00 (5.26)	21.59 (4.50)
	F test		Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.
	SE (M) ±		0.2	0.27	0.22	0.20	0.29	0.3	0.29	0.25
	CD at 5%		0.63	0.82	0.69	0.61	0.88	0.92	0.88	0.78
	CV		10.98	14.09	11.29	9.12	12.41	12.06	10.6	11.51

Figures in parentheses are square root transformations.

3.3.2 At IInd Picking

The data revealed that all thetreatments were significantly superior over untreated control. The minimum percentage of fruit infestation on weight basis due to shoot and fruit borer recorded in the treatment (T3) Fenvalerate 20% EC (4.80%), and was found at par with (T1) Lambda-cyhalothrin 5% EC (4.91%), (T6) Pyriproxyfen 5% EC + fenpropathrin 15%EC (5.04%), (T13) Lambda-cyhalothrin 5% EC + Hexaconazole 5% EC (5.23%), (T14) Pyriproxyfen 5% EC + Fenpropathrin 15% EC + Hexaconazole 5% EC (5.50%), (T8) Fenvalerate 20% EC + Dashparni Extract 15% (6.11) and (T12) Fenvalerate 20% EC + Hexaconazole 5% EC (6.55%), (T5) Lambda-cyhalothrin 5% EC + Dashparni Extract 15% (7.21%), (T10) Dashparni Extract 15% + Hexaconazole 5% EC (7.60%), (T4) NSKE 5% (8.11%), and (T2) Dashparni Extract 15% (8.30%). Next effective treatment was (T9) NSKE 5% + Hexaconazole 5% EC (9.12%) followed by the treatments (T7) Azadirachtin 300 ppm (oil based) (9.78%) and (T11) Azadirachtin 300 ppm + Hexaconazole 5% EC (10.21%) and at par with each other. Maximum percentage of infestation on weight basis was recorded in (T15) untreated control (16.50%).

3.3.3 At IIIrd picking

There were significant differences amongst various treatments as regards the per cent of fruit infestation on weight basis due to okra shoot and fruit borer. The most effective treatment was (T3) Fenvalerate 20% EC recorded minimum i.e. 5.84 per cent of fruit infestation on number basis and found statistically at par with (T1) Lambda-cyhalothrin 5% EC (6.01%), (T6) Pyriproxyfen 5% EC + fenpropathrin 15% EC (6.27%), (T13) Lambda-cyhalothrin 5% EC + Hexaconazole 5% EC (6.38%), (T14) Pyriproxyfen 5% EC + Fenpropathrin 15% EC + Hexaconazole 5% EC (6.83%), (T8) Fenvalerate 20% EC + Dashparni Extract 15% (7.01%) and (T12) Fenvalerate 20% EC + Hexaconazole 5%EC (7.31%), (T5) Lambda-cyhalothrin 5% EC + Dashparni Extract (7.56%), (T10) Dashparni Extract 15% + Hexaconazole 5% EC (8.11%), (T4) NSKE 5% (8.11%), (T2) Dashparni Extract (9.13%) and (T9) NSKE 5% + Hexaconazole 5% EC (9.45%). Next effective treatment was (T7) Azadirachtin 300 ppm (oil based) (9.80%) and (T11) Azadirachtin 300 ppm + Hexaconazole 5% EC (11.15%) and at par with each other. Maximum percentage of infestation on weight basis was recorded in (T15) untreated control (19%).

3.3.4 At IVth picking

The data recorded on fourth picking revealed that the most effective treatment which recorded minimum per cent of fruit infestation on weight basis due to okra shoot and fruit borer was (T3) Fenvalerate 20% EC (6.00%), and was found statistically at par with (T1) Lambda-cyhalothrin 5% EC (6.83%), (T6) Pyriproxyfen 5% EC + fenpropathrin 15% EC (7.33%), (T13) Lambda-cyhalothrin 5% EC + Hexaconazole 5% EC (7.66%), (T14) Pyriproxyfen 5% EC + Fenpropathrin 15% EC + Hexaconazole 5% EC (7.83%), (T8) Fenvalerate

20% EC + Dashparni Extract 15% (8.33%) and (T12) Fenvalerate 20% EC + Hexaconazole 5% EC (9.10%). The next effective treatment was (T5) Lambda-cyhalothrin 5% EC + Dashparni Extract 15% (9.60%) followed by the treatments (T10) Dashparni Extract 15% + Hexaconazole 5%EC (9.63%), (T4) NSKE 5% (10.30%), (T2) Dashparni Extract (10.63%), (T9) NSKE 5% + Hexaconazole 5% EC (10.91%) and (T7) Azadirachtin 300 ppm (oil based) (12.71%) and at par with each other. Next effective treatment was (T11) Azadirachtin 300 ppm + Hexaconazole 5% EC (14.66%). Maximum percentage of infestation on weight basis was recorded in (T15) untreated control (22.61%).

3.3.5 At Vth Picking

All the treatments were significantly superior over untreated control. The minimum percentage of fruit infestation on weight basis due to shoot and fruit borer recorded in the treatment (T3) Fenvalerate 20% EC (7.11%), and was found statistically at par with (T1) Lambda-cyhalothrin 5% EC (7.19%), (T6) Pyriproxyfen 5% EC + fenpropathrin 15%EC (8.01%), (T13) Lambda-cyhalothrin 5% EC + Hexaconazole 5% EC (8.11%), (T14) Pyriproxyfen 5% EC + Fenpropathrin 15% EC + Hexaconazole 5% EC (9.03%), (T8) Fenvalerate 20% EC + Dashparni Extract 15% (9.18%) and (T12) Fenvalerate 20% EC + Hexaconazole 5% EC (10.11%), (T5) Lambda- cyhalothrin 5% EC + Dashparni Extract 15% (11.23%), (T10) Dashparni Extract 15% + Hexaconazole 5% EC (11.74%) and (T4) NSKE 5% (12.11%). The next effective treatment was (T2) Dashparni Extract 15% (12.39%) followed by the treatments (T9) NSKE 5% + Hexaconazole 5% EC (13.26%) and (T7) Azadirachtin 300 ppm (oil based) 9) (13.74%) and (T11) Azadirachtin 300 ppm + Hexaconazole 5% EC (14.01%) and at par with each other. Maximum percentage of infestation on weight basis was recorded in (T15) untreated control (24.00%).

3.3.6 At VIth picking

The data revealed that all the treatments were significantly superior over untreated control. The minimum percentage of fruit infestation on weight basis due to shoot and fruit borer recorded in the treatment (T3) Fenvalerate 20% EC (8.36%) and found statistically at par with (T1) Lambda-cyhalothrin 5% EC (9.11%), (T6) Pyriproxyfen 5% EC + fenpropathrin 15%EC (9.38%), (T13) Lambda-cyhalothrin 5% EC + Hexaconazole 5% EC (9.74%), (T14) Pyriproxyfen 5% EC + Fenpropathrin 15% EC + Hexaconazole 5% EC (10.35%), (T8) Fenvalerate 20% EC + Dashparni Extract 15% (11.23%) (T12) Fenvalerate 20% EC + Hexaconazole 5% EC (12.13%), (T5) Lambda-cyhalothrin 5% EC + Dashparni Extract (12.91%), (T10) Dashparni Extract 15% + Hexaconazole 5% EC (13.03%), (T4) NSKE 5% (13.69%) and (T2) Dashparni Extract 15% (14.21%). Next effective treatment was (T9) NSKE 5% + Hexaconazole 5% EC (14.69%) followed by the treatments (T7) Azadirachtin 300 ppm (oil based) (15.23%) and (T11) Azadirachtin 300 ppm + Hexaconazole 5% EC (16.29%) and at par with each other. Maximum percentage of infestation on weight basis was recorded in (T15) untreated control (26.06%).

3.3.7 At VIIth Picking

There were significant differences amongst various treatments as regards the per cent of fruit infestation on weight basis due to okra shoot and fruit borer. The most effective treatment was (T3) Fenvalerate 20% EC recorded minimum i.e. 10.26 per cent of fruit infestation on number basis and found statistically at par with (T1) Lambda-cyhalothrin 5% EC (10.39%), (T6) Pyriproxyfen 5% EC + fenpropathrin 15% EC (11.25%), (T13) Lambda-cyhalothrin 5% EC + Hexaconazole 5% EC (12.26%), (T14) Pyriproxyfen 5% EC + Fenpropathrin 15% EC + Hexaconazole 5% EC (12.45%), (T8) Fenvalerate 20% EC + Dashparni Extract 15% (13.69%) and (T12) Fenvalerate 20% EC + Hexaconazole 5% EC (14.26%), (T5) Lambda-cyhalothrin 5% EC + Dashparni Extract 15% (14.91%), (T10) Dashparni Extract 15% + Hexaconazole 5% EC (15.19%), (T4) NSKE 5% (15.79%) and (T2) Dashparni Extract 15% (16.23%). Next effective treatment was (T9) NSKE 5% + Hexaconazole 5% EC (17.38%) followed by the treatments (T7) Azadirachtin 300 ppm (oil based) (18.11%) and (T11) Azadirachtin 300 ppm + Hexaconazole 5% EC (18.78%) and at par with each other. Maximum percentage of infestation on number basis was recorded in (T15) untreated control (29.00).

3.3.8 Cumulative effect of mean per cent of fruit infestation of seven pickings on weight basis by shoot and fruit borer on Okra crop

The cumulative average per cent fruit infestation of seven pickings on weight basis by shoot and fruit borer in all treated plots were significantly lower (6.60% to 13.60%) than the untreated control plot (21.59%) presented in (Table 4). The lowest percentage of fruit infestation on number basis due to shoot and fruit borer recorded in the treatment (T3) Fenvalerate 20% EC (6.60%), and was found at par with (T1) Lambda-cyhalothrin 5% EC (7.01%), (T6) Pyriproxyfen 5% EC + fenpropathrin 15% EC (7.44%), (T13) Lambda-cyhalothrin 5% EC + Hexaconazole 5% EC (7.80%), (T14) Pyriproxyfen 5% EC + Fenpropathrin 15% EC + Hexaconazole 5% EC (8.24%), (T8) Fenvalerate 20% EC + Dashparni Extract 15% (8.82%) and (T12) Fenvalerate 20% EC + Hexaconazole 5% EC (9.46%), (T5) Lambda-cyhalothrin 5% EC + Dashparni Extract (10.07%), (T10) Dashparni Extract 15% + Hexaconazole 5%EC (10.46%) and (T4) NSKE 5% (10.90%). The next effective treatment was (T2) Dashparni Extract 15% (11.33) followed by the treatments (T9) NSKE 5% + Hexaconazole 5% EC (12.00%), (T7) Azadirachtin 300 ppm (oil based) (12.70%) and (T11) Azadirachtin 300 ppm + Hexaconazole 5%EC (13.60%) and at par with each other. Maximum percentage of infestation on weight basis was recorded in (T15) untreated control (21.59%).

The efficacy of neem (*Azadirachta indica*) oil, achook (a neem based formulation), fenvalrate, cypermethrin, karanj [*Pongamia pinnata*] oil, dichlorvos and Malathion for control of *Earias vittella* infesting Okras. Four sprays were applied fortnightly [5]. Fenvalerate 20 EC 0.005% gave the highest level of control and highest healthy fruit yield (70.75 q ha1). Four sprays of fenvalerate 0.05% gave the greatest level of control of Okra shoot and fruit borer, *Earias vittella* [5]. Reported that highest healthy fruit yield of okra was obtained with 4 sprays of fenvalerate (0.05%). Similarly Lambda-cyhalothrin 0.006% and endosulfan 0.05% were recorded fruit borer infestation on number basis (14.94% and 15.13%) and weight basis (14.64% and 15.20%). The positive impact of above treatments against fruit borer infestation as observed in present investigation to find support with reports of earlier workers who reported that on brinjal attack of shoot and fruit borer is found reduced [12, 13].

4. Conclusion

From the above investigations it is concluded that the cumulative effect of various treatments against per cent shoot infestation due to shoot and fruit borer on okra crop at 30 and 45 DAG and in case of fruit infestation on number basis and weight basis same sequence in all treated plots were significantly superior over the untreated control. The lowest percentage of shoot infestation due to shoot and fruit borer recorded in the treatment Fenvalerate 20% EC @ 2ml/L followed by treatments Lambda-cyhalothrin 5% EC @ 1.33ml/L, Pyriproxyfen 5% EC + fenpropathrin 15% EC @ 1 ml/L, Lambda-cyhalothrin 5% EC + Hexaconazole 5% EC @ 1.33ml + 1ml/L Lambda-cyhalothrin 5% EC + Hexaconazole 5% EC @ 1.33 ml + 1 ml/L, Pyriproxyfen 5% EC + Fenpropathrin 15% EC + Hexaconazole 5% EC @ 1 ml + 1 ml/L, Lambda-cyhalothrin 5% EC + Dashparni Extract 15% @ 1.33ml +12.5ml/L, Fenvalerate 20% EC + Hexaconazole 5% EC @ 2 ml + 1 ml/L, Dashparni Extract 15% + Hexaconazole 5% EC @ 25 ml + 1ml /L NSKE 5% @ 5 ml/L, Dashparni Extract 15%, Azadirachtin 300 ppm (oil based) @ 5 ml/L, Azadirachtin 300 ppm + Hexaconazole 5% EC @ 5ml + 1ml/L. Maximum percentage of infestation on number and weight basis was recorded in untreated control.

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