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Efficacy of certain chemicals with bio-pesticides against *Leucinodes orbonalis* (Guen.) on brinjal

Sagar Mallikarjuna Rao Jagarlamudi and Ashwani Kumar

Abstract
The field trail was conducted at central research field, Department of entomology SHUATS, Prayagraj during *Kharif* August to November 2019 entitled on "Efficacy of certain chemicals with bio-pesticides against *Leucinodes orbonalis* (Guen.) on brinjal" The data of lowest per cent of infestation of Brinjal shoot and fruit borer on the mean (3rd,7th, &14th DAS) of first spray revealed that among all the treatments were recorded as follows Flubendiamide (7.15%), Cypermethrin (8.09%) is found to be the next best treatments, Indoxacarb (9.22%), Imidiacloprid (10.55%), Azadirachtin (11.56%), Bt (13.32%), among all the treatments Cartap Hydrochloride (14.57%), is found to be least effective but comparatively superior over the control. Followed by second spray revealed that Flubendiamide (7.47%), Cypermethrin (8.22%), is found to be next best treatments , Indoxacarb (9.31%), Imidiacloprid (10.59%), Azadirachtin (11.04%), Bt (12.70%), among all the treatments and Cartap Hydrochloride (13.81%) is found to be least effective but comparatively superior over the control. In the series of the fruit infestation data on the mean (3rd, 7th & 14th DAS) of the third spray revealed that Flubendiamide (7.47%), Cypermethrin (8.22%), is found to be the next best treatments, Indoxacarb (9.31%), Imidiacloprid (10.59%), Azadirachtin (11.04%), Bt (12.70%), among all the treatments and Cartap Hydrochloride (13.81%) is found to be least effective but comparatively superior over the control.

Keywords: Efficacy, insecticides and bio-pesticides, *Leucinodes orbonalis*, brinjal, Bt

1. Introduction
In India, Production share of Brinjal with 8.3% stands at fourth position among vegetable Crops after potato, tomato and onion with 25.5, 11.9 and 11.5 per cent respectively (Sahu *et al*., 2018) [8]. Vegetable cultivation is one of the most profitable and dynamic branches of agriculture. It has become an important source of income for both farmers and field labours, serving as a vehicle for reducing poverty in rural areas. Brinjal (*Solanum melongena* Linnaeus) also known as eggplant is referred as the "King of vegetables" originated from India and now grown as a vegetable throughout the tropical, sub-tropical and warm temperate areas of the world. (Roy *et al*., 2016) [7]. Nutritive value per 100 g of raw brinjal indicates that it supplies 25 calories, 0.2 gm total fat, 2 mg sodium, 229 mg potassium, 6 gm total carbohydrate, 3 gm dietary fibre, 3.5 gm sugar, 1 gm protein, vitamins (B-6, B-12 and C), iron, magnesium, phosphorus, etc. (USDA, 2013) [12]. This insect belongs to family Pyralidae of the insect order Lepidoptera. This pest is widely distributed in Malaysia, Myanmar, Srilanka, India, Pakistan, Germany and East Africa (Atwal and Dhaliwal, 2005). Despite of diverse ill effects, of the chemical's pesticides, insecticides use still constitutes major control option to tackle this pest. At the same time, frequent use of pesticides has made this insect tolerant to the chemicals, making it more difficult to control. Pesticides molecules of the new generation have been claimed to be effective as well as safer for non-target organism. In this context, it is essential to step up towards IPM as it is more reliable and eco-friendlier than any other methods. (Singh *et al.*, 2008, Vinayaka *et al.*, 2019) [9, 13]. Eggplant fruit and shoot borer, *Leucinodes orbonalis* (Guen.) is the key pest of eggplant (Mainali, 2014) [5].

2. Materials and Methods
The Study on the, "Comparative efficacy of certain chemicals with Bio-pesticides against *Leucinodes orbonalis* (Guen.) on brinjal" was carried out during August, 2019 to December, 2019 at Central Research Farm, Sam Higginbottom University of Agriculture and Technology Sciences, Prayagraj, Uttar Pradesh, India. The Study on the "Efficacy of certain chemicals with Bio-pesticides against *Leucinodes orbonalis* (Guen.) on brinjal" was carried out during

August, 2019 to December, 2019 at Central Research Farm, Sam Higginbottom University of Agriculture and Technology Sciences, Prayagraj, Uttar Pradesh, India.

2.1. Experimental site

The experiment is conducted during the *kharif* season, 2019 at SHUATS, Central field, Prayagraj, is situated at 25.24^0 N latitude 81.51^0 E longitudes and at an altitude of 98 Mt. above sea level. The climate is typically semi-arid and subtropical. The maximum temperature reaches up to 49 ^{0}C in summer and drops down to 15 ^{0}C in winter.

2.1.1 Material

For carrying out the studies, various biopesticides and chemicals (Table 1), brinjal seed (Banaras purpal long), agricultural implements manure and fertilizers, knapsack sprayer, measuring cylinder, buckets, labels, threads, polythene bags, wax, hand lance, weighing balance, labours etc. were used. These materials were provided by the department of Agriculture Plant Protection and Entomology, "Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj, Uttar Pradesh.

2.2 Method adopted

2.2.1 Cultural operations

2.2.1.1 Preparatory tillage

Before sowing, the field was thoroughly ploughed and pulverized with tractor drawn cultivator to attain desirable tilt on 8th & 9th August, 2019. One harrowing was applied to field before sowing. Stubble and weeds were picked up from the field. The land was leveled with the help of rake and the plots were demarcated according to layout as per statistical designs.

2.2.1.2 Seed rate and Sowing

The brinjal variety Banaras purple long was transplanted with spacing of 60 cm between row to row and 60 cm between plant to plant by placing 2 seedlings per hill at depth of 5 cm. Transplanting was done on 14.08.2019.

2.2.1.3 Gap filling

Gap filling was done where ever seedlings are not proper or damaged in order to avoid the loss of land. It was done immediately after 7 days of transplanting.

2.2.1.4 Thinning

Thinning was done at more dense plants area, in order to avoid competition between the plants. It was done when plants were 20 days old, keeping healthy plant at each hill.

2.2.1.5 Application of fertilizers

Chemical fertilizers were applied @ NPK 50:25:25 kg/ha and 20 tonnes FYM per hectare. Full P, K, 33.3% N and FYM were applied as basal in the drills before transplanting the seedlings and rest of the nitrogen was top dressed in three equal splits at 20,40 and 60 days after transplanting.

2.2.1.6 Intercultural operations

Weeding operations were carried out to conserve soil moisture and to keep the experimental field free from the weeds. Weeding was done at 20 days, 40 days and 60 (DAS).

2.2.1.7 Required Irrigation

Lifesaving irrigations were given as and when required for *Kharif* crop.

2.2.1.8 Picking: Picking was done plot wise manually.

2.2.1 Experimental Details

Season	:	Kharif
Crop	:	Brinjal
Design	:	Randomized block design
Replication	:	3
Treatment	:	8
Plot size	:	2m x 1m
Total no of plots	:	24
Total length of Area	:	9m
Total width of area	:	6.5m
Spacing	:	60 x 60 cm
Row to row spacing	:	60 cm
Plant to Plant	:	60 cm
Dose of fertilizer	:	50:25:25, N.P.K. Kg/ha.
FYM	:	20 tonnes/ha.
Variety	:	Banaras purple long
Seed rate	:	500 gm./ha
Main irrigation channel	:	1.0m
Sub irrigation Channel	:	0.5 m
Width of bund	:	0.3m

Table 1: Details of Insecticides Used In Experiment:

Sr. No	Treatments no.	Treatments name	Group	Quantity	Waiting Period (Days)	References
1	T_0	Untreated	-	-	-	-
2	T_1	Imidiacloprid 17.8 SL	Neo necotinoid	250g a.i/ha	3	Dwivedi *et al.* (2014) [3]
3	T_2	Bt. var. Krustaki	Bio – pesticide	500ml/ha	2	Singh and Sachan, (2015) [10]
4	T_3	Cypermethrin 25 EC	Synthetic pyrethroid	2ml/lit	1	Nawale *et al.* (2018) [6]
5	T_4	Cartap Hydrochloride 50 SP	Neris toxin	0.5kg a.i/ha	7	Sahu *et al.* (2018) [8]
6	T_5	Indoxacarb 14.5 SC	Oxadiazine family	1ml/lit	5	Tripura *et al.* (2017) [11]
7	T_6	Flubendiamide 20 WG	Methyl group	30gm a.i/ha	7	Mahata *et al.* (2014) [4]
8	T_7	Azadirachtin 0.03% EC	Botanical	5ml/lit	7	Tripura *et al.* (2017) [11]

*Waiting period according to the recommendation of Govt. of India, Ministry of Agriculture Major use of pesticide: Registered under the Insecticide Act, 1968.

2.3 Preparation of insecticidal spray solution

The desired concentration of insecticidal spray solution of desired concentration for each treatment was freshly prepared each time at the site of experiment, just before spraying. The quantity of spray materials required for crop was gradually increased as the crop advanced in age. The spray solution of desired concentration was prepared by adoption the following formula:

$$V = \frac{C \times A}{\%\ a.i.}$$

Where,
V= Volume of a formulated pesticide required.
C= Concentration required.
A= Volume of total solution to be prepared.
% a.i. = given Percentage strength of a formulated pesticide.

2.4 Application of spray solution
Spraying was done with the help of a hand compression sprayer. Spraying was done preferably in the early morning hours when there is no wind. The required quantity of insecticides was being thoroughly mixed with water as per the concentration of spray at times of spraying and then the solution was used for spraying. From that the total quantity of water required to cover 1 ha area was determined and then the actual quantity of insecticide to be mixed on gram active ingredient or mili per litre basis was calculated. The spraying was done during morning hours with the help of knapsack sprayer. The suspension was thoroughly mixed before spraying and stirred frequently during the time of spray due care was taken for even distribution of spray solution, thoroughly coverage of entire plant and avoiding drifting of spray solution. Spraying and containers were washed thoroughly with fresh water after each application to avoid contamination.

Table 2: Dates of spray application

Sr. No.	Spray application	Date of application
1	First spray	25.09.2019
2	Second spray	10.10.2019
3	Third Spray	25.10.2019

2.5 Methods of recording observations
2.5.1 Efficacy of treatments
The incidence and damage of brinjal shoot and fruit borer were recorded before 1-day spraying and on 3rd day, 7th day and 14th day after insecticidal application. The damage of brinjal shoot and fruit borer was recorded on 6 randomly selected and tagged plants from each plot and then it was converted into per cent of infestation by following formula.

On Shoot
Number Basis: The total number of shoots and number of shoots infested of five selected plants from each treatment replication wise were recorded.

$$\% \text{ Shoot infestation} = \frac{\text{No. of shoot infested}}{\text{Total no. of shoot}} \times 100$$

On Fruit
Number Basis: At each picking the total number of fruits and number of fruits infested of five selected plants from each treatment replication wise were recorded.

$$\text{Fruit infestation} = \frac{\text{No. of fruit infested}}{\text{Total no. of fruit}} \times 100$$

(Yadav *et al.* 2015) [4]

3. Results and Conclusion
The present study entitled, "Efficacy of certain chemicals with Bio- pesticides against *Leucinodes orbonalis* (Guen.) On brinjal." was undertaken at the central research farm, SHUATS, Prayagraj. The data so obtained through observation on various aspects were subjected to statistical analysis wherever necessary and the compiled mean data are tabulated in the following pages. Results, the mean (3, 7 & 14DAS) per cent infestation of first spray thus obtained are presented aspect wise here under.
The data on the mean (3, 7 & 14DAS) per cent infestation of first spray revealed that all the chemicals are effective. Among all the treatments, lowest per cent infestation of shoot and fruit borer was recorded in Flubendiamide (7.15%), Cypermethrin (8.09%) is found to be the next best treatments, Indoxacarb (9.22%), Imidiacloprid (10.55%), Azadirachtin (11.56%), Bt. *var. Krustaki* (13.32%), among all the treatments and Cartap Hydrochloride (14.57%) is found be least effective but comparatively superior over the control. Out of all the treatments T_5 and T_3 were par with each other. Next treatments T_8, and T_2 were par with each other. Next treatments T_6 and T_4 were par with each other. Similarly treatments T4 and T_7 were par with each other.

Table 3: Efficacy of certain chemicals with Bio- pesticides against *Leucinodes orbonalis* (Guen.) on brinjal. (First Spray): (% Shoot Infestation)

Treatments		% Shoot Infestation				
		Before	3 DAS	7 DAS	14 DAS	Mean
T_0	Untreated	22.11 (28.05)	16.76 (24.14)	18.84 (25.71)	20.13 (26.64)	18.58 (25.49)
T_1	Imidiacloprid 17.8 SL	13.81 (21.78)	9.82 (18.24)	9.87 (18.31)	11.97 (20.24)	10.55 (18.93)
T_2	Bt.*var. Krustaki*	17.94 (25.03)	13.65 (21.67)	12.94 (21.07)	13.40 (21.47)	13.32 (21.40)
T_3	Cypermethrin 25 EC	10.35 (18.76)	7.90 (16.31)	7.40 (17.18)	8.97 (17.41)	8.09 (16.96)
T_4	Cartap Hydrochloride 50 SP	18.06 (25.12)	14.92 (22.69)	13.73 (21.71)	15.05 (22.82)	14.57 (22.40)
T_5	Indoxacarb 14.5 SC	12.37 (20.56)	8.86 (17.28)	8.50 (16.93)	10.31 (18.72)	9.22 (17.64)
T_6	Flubendiamide 24WG	9.92 (18.31)	6.80 (15.11)	6.74 (15.04)	7.90 (16.30)	7.15 (15.48)
T_7	Azadirachtin 0.03% EC	14.17 (22.08)	10.07 (18.49)	11.73 (19.99)	12.87 (21.01)	11.56 (19.83)
	Overall Mean	14.84	11.09	11.21	12.57	11.63
	F- test	S	S	S	S	S
	S. Ed. (±)	1.42	0.89	0.97	0.81	0.59
	C. D. (P = 0.05)	3.04	1.92	2.08	1.75	1.26

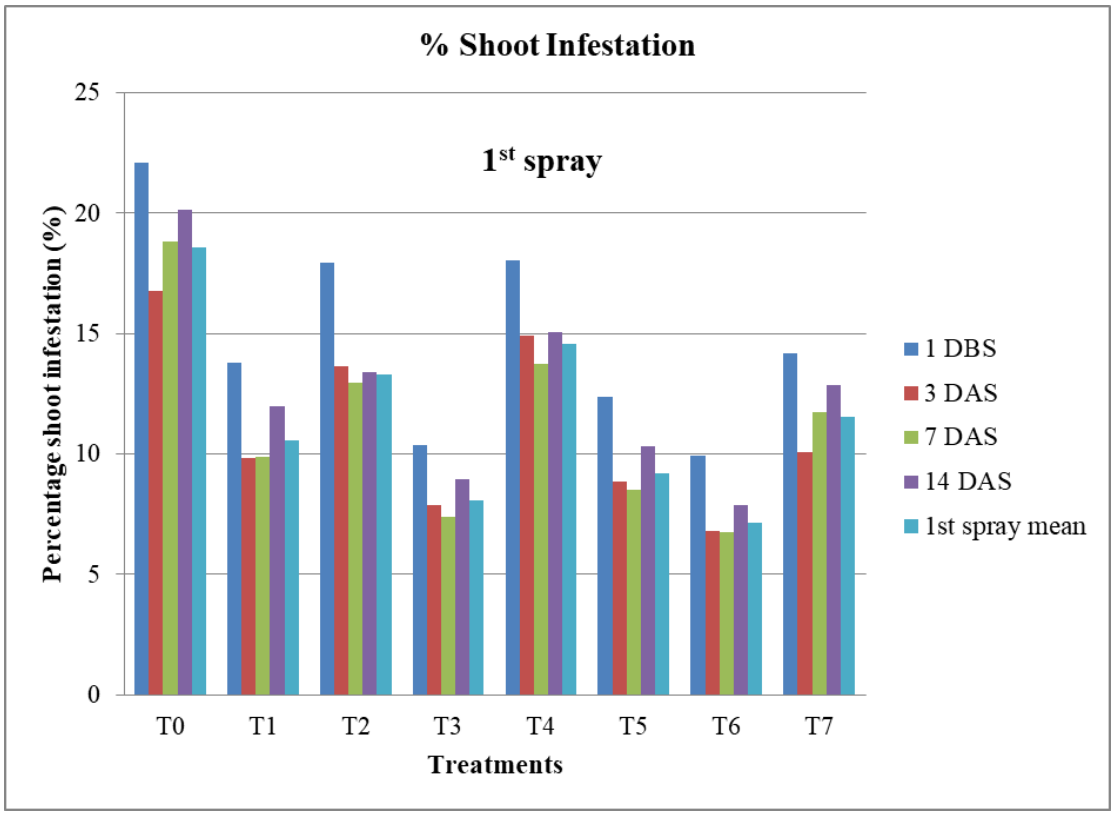

Fig 1: Graphical representation of efficacy of certain chemicals with Bio-pesticides against *Leucinodes orbonalis* (Guen.) on brinjal. (First Spray) (% Shoot Infestation)

3.1 Effect of different treatments on *Leucinodes orbonalis* (Guen.) per cent after second spray mean (fruit infestation.)

The comparative efficacy of certain chemicals with Bio-pesticides against brinjal shoot and fruit borer Results, the mean (3, 7 & 14DAS) per cent infestation of second spray thus obtained are presented aspect wise here under,

The data on the mean (3, 7 & 14DAS) per cent infestation of second spray revealed that all the chemicals are effective. Among all the treatments, lowest per cent infestation of shoot and fruit borer was recorded in Flubendiamide (7.47%), Cypermethrin (8.22%) is found to be the next best treatments, Indoxacarb (9.31%), Imidiacloprid (10.59%), Azadirachtin (11.04%), B.t (12.70%), among all the treatments and Cartap Hydrochloride (13.81%) is found be least effective but comparatively superior over the control. Out of all the treatments T_8 and T_2 were par with each other. Similarly treatments T_4 and T_7 were par with each other.

Table 4: Efficacy of certain chemicals with Bio- pesticides against *Leucinodes orbonalis* (Guen.) on brinjal. (Second Spray): (% Fruit Infestation).

Treatments		% Fruit Infestation				
		Before	3 DAS	7 DAS	14 DAS	Mean
T_0	Untreated	25.75 (30.48)	20.86 (27.16)	22.05 (28.00)	23.79 (29.19)	22.24 (28.11)
T_1	Imidiacloprid 17.8 SL	13.09 (21.20)	9.66 (18.09)	10.24 (18.66)	11.87 (20.15)	10.59 (18.96)
T_2	Bt.*var. Krustaki*	16.84 (24.22)	12.40 (20.51)	12.12 (20.36)	13.59 (21.62)	12.70 (20.83)
T_3	Cypermethrin 25 EC	11.93 (20.19)	7.01 (15.34)	8.33 (16.53)	9.31 (17.74)	8.22 (16.53)
T_4	Cartap Hydrochloride 50 SP	17.06 (24.35)	14.12 (22.06)	13.24 (21.32)	14.06 (22.02)	13.81 (21.8)
T_5	Indoxacarb 14.5 SC	12.79 (20.91)	8.67 (17.05)	9.15 (17.58)	10.11 (18.52)	9.31 (17.71)
T_6	Flubendiamide 24WG	10.33 (18.73)	6.12 (14.32)	7.89 (16.30)	8.39 (16.83)	7.47 (15.81)
T_7	Azadirachtin 0.03% EC	14.81 (22.52)	10.05 (18.46)	11.09 (19.44)	12.00 (20.26)	11.04 (19.38)
	Overall Mean	15.32	11.11	11.76	12.89	11.92
	F- test	S	S	S	S	S
	S. Ed. (±)	1.70	1.32	0.74	0.49	0.45
	C. D. (P = 0.05)	3.64	2.84	1.59	1.05	0.96

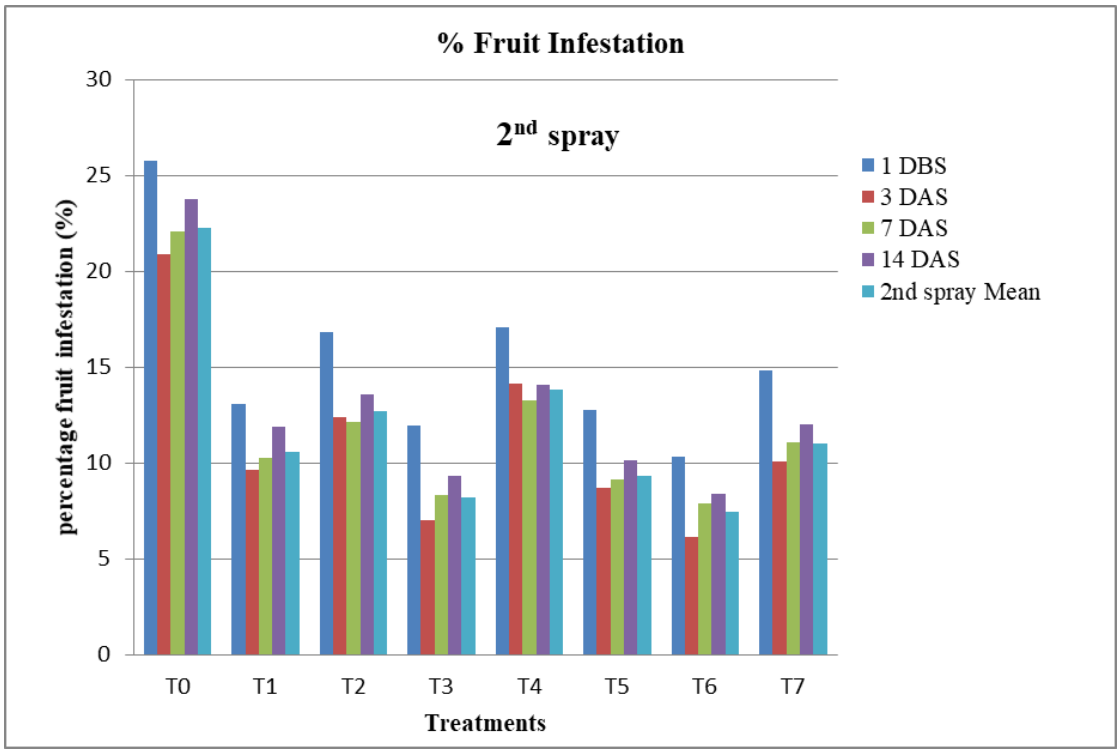

Fig 2: Graphical representation of efficacy of certain chemicals with Bio-pesticides against *Leucinodes orbonalis* (Guen.) on brinjal shoot. (Second Spray) (% Fruit Infestation mean).

3.2 Effect of different treatments on *Leucinodes orbonalis* (Guen.) per cent after third spray mean (%Fruit infestation.)

The comparative efficacy of certain chemicals with Bio-pesticides against brinjal shoot and fruit borer Results, the mean (3, 7 & 14DAS) per cent infestation of third spray thus obtained are presented aspect wise here under,

The data on the mean (3, 7 & 14DAS) per cent infestation of third spray revealed that all the chemicals are effective. Among all the treatments, lowest per cent infestation of shoot and fruit borer was recorded in Flubendiamide (7.47%), Cypermethrin (8.22%) is found to be the next best treatments, Indoxacarb (9.31%), Imidiacloprid (10.59%), Azadirachtin (11.04%), Bt.*var. Krustaki* (12.70%), among all the treatments and Cartap Hydrochloride (13.81%) is found be least effective but comparatively superior over the control. Out of all treatments T_2 and T_6 are par with each other.

Table 5: Efficacy of certain chemicals with Bio-pesticides against *Leucinodes orbonalis* (Guen.) on brinjal. (Third Spray) (% Fruit infestation)

Treatments		% Fruit Infestation				
		Before	3 DAS	7 DAS	14 DAS	Mean
T_0	Untreated	28.38 (32.19)	24.37 (29.58)	25.46 (30.30)	26.30 (30.85)	25.38 (30.24)
T_1	Imidiacloprid 17.8 SL	14.06 (22.02)	9.41 (17.83)	9.68 (18.11)	11.03 (19.38)	10.04 (18.44)
T_2	Bt.var. Krustaki	18.15 (25.21)	14.11 (22.05)	14.10 (22.05)	15.02 (22.79)	14.41 (22.29)
T_3	Cypermethrin 25 EC	10.44 (18.84)	7.14 (15.50)	7.94 (16.37)	8.95 (17.40)	8.01 (16.42)
T_4	Cartap Hydrochloride 50 SP	19.18 (25.97)	15.11 (22.87)	15.14 (22.89)	17.84 (24.98)	16.03 (23.58)
T_5	Indoxacarb 14.5 SC	12.92 (21.05)	8.23 (16.67)	8.88 (18.89)	9.93 (18.37)	9.02 (17.97)
T_6	Flubendiamide 24WG	9.79 (18.19)	6.98 (15.28)	6.89 (15.14)	6.25 (14.48)	6.71 (14.96)
T_7	Azadirachtin 0.03% EC	16.61 (24.03)	10.35 (18.76)	12.77 (20.93)	13.55 (21.60)	12.23 (20.43)
	Overall Mean	16.19	11.96	12.60	13.60	12.72
	F- test	S	S	S	S	S
	S. Ed. (±)	0.78	0.73	0.99	0.47	0.57
	C. D. (P = 0.05)	1.68	1.56	2.12	1.00	1.22

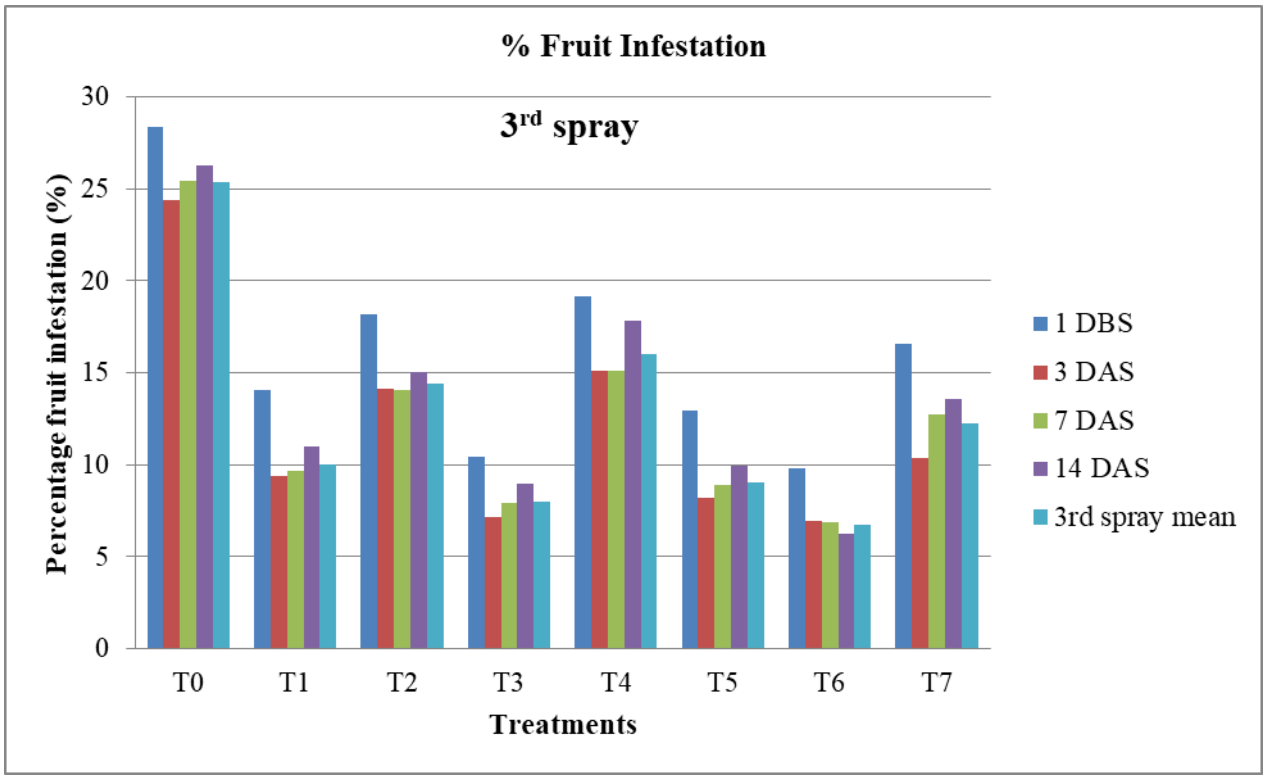

Fig 3: Graphical representation of efficacy of certain chemicals with Bio-pesticides against *Leucinodes orbonalis* (Guen.) on brinjal shoot. (Third Spray) (% Fruit Infestation).

4. Discussion

To evaluate the efficacy of chemical insecticides and bio-pesticides against brinjal shoot and fruit borer

The data on the mean (3, 7 & 14 DAS) per cent infestation of first spray revealed that all the chemicals are effective. Among all the treatments, lowest per cent infestation of shoot and fruit borer was recorded in Flubendiamide (7.47%), Cypermethrin (8.22%) is found to be the next best treatments, Indoxacarb (9.31%), Imidiacloprid (10.59%), Azadirachtin (11.04%) , Bt (12.70%), among all the treatments and Cartap Hydrochloride (13.81%) is found be least effective but comparatively superior over the control. For shoot infestation the supporting authors references are, (Mahata *et al*. 2014) [4] reported that Field evaluation of new diamide and other insecticides against *Leucinodes orbonalis* (Guen.) in brinjal revealed that flubendiamide 30 g a.i. ha-1 was superior over other treatments recording the lowest shoot (2.65%) and fruit (14.07%) infestation followed by chlorantraniliprole 27.25 g a.i. ha-1 (2.77% shoot, 15.33% fruit infestation), flubendiamide 20 g a.i. ha-1 (3.43% and 15.85%), chlorantraniliprole 18.5 g a.i ha-1 (3.76%, 16.78%), indoxacarb 72.5 g a.i. ha-1 (3.96% and 17.18%) and thiamethoxam 62.5 g a.i. ha-1 (6.62% and 26.75%). Anwar *et al*. (2015) [1] reported that emamectin benzoate was most effective against brinjal fruit borer and resulted in lower infestation (40.1%) followed by cypermethrin (40.43%), whereas fenvalerate offered moderate control (41.31%) of borers. The study recommended the use of emamectin benzoate for effective control of brinjal fruit borer. The data on the mean (3, 7 & 14DAS) per cent infestation of second spray revealed that all the chemicals are effective. Among all the treatments, lowest per cent infestation of shoot and fruit borer was recorded in Flubendiamide(7.47%) ,Cypermethrin (8.22%) is found to be the next best treatments, Indoxacarb (9.31%), Imidiacloprid (10.59%), Azadirachtin (11.04%) , B.T(12.70%), among all the treatments and Cartap Hydrochloride (13.81%) is found be least effective but comparatively superior over the control.

5. Summary and Conclusion

The present study entitled, "Comparative efficacy of certain chemicals with Bio-pesticides against shoot and fruit borer, *Leucinodes orbonalis* (Guen.) On brinjal" was undertaken at the Central research field, Department of Entomology SHUATS, Prayagraj. The data so obtained through observation on various aspects were subjected to statistical analysis wherever necessary and the data was compiled. Results, thus obtained are under objective "To evaluate the efficacy of chemical insecticides and bio-pesticides against brinjal shoot and fruit borer" The data on the mean (3, 7 & 14DAS) per cent infestation of first spray revealed that all the chemicals are effective. Among all the treatments, lowest per cent infestation of shoot and fruit borer was recorded in Flubendiamide (7.15%), Cypermethrin (8.09%) is found to be the next best treatments , Indoxacarb (9.22%) , Imidiacloprid (10.55%), Azadirachtin (11.56%) , B.T(13.32%), among all the treatments and Cartap Hydrochloride (14.57%) is found be least effective but comparatively superior over the control followed by fruit infestation mean (3, 7 & 14DAS) per cent infestation of second spray revealed that all the chemicals are effective. lowest per cent infestation of shoot and fruit borer was recorded in Flubendiamide(7.47%), Cypermethrin (8.22%) is found to be the next best treatments, Indoxacarb (9.31%), Imidiacloprid (10.59%), Azadirachtin (11.04%), B.T (12.70%), among all the treatments and Cartap Hydrochloride (13.81%) is found be least effective but comparatively superior over the control in series of the Fruit infestation data on the mean (3, 7 & 14DAS) per cent infestation of third spray revealed that all the chemicals are effective. lowest per cent infestation of shoot and fruit borer was recorded in Flubendiamide (7.47%), Cypermethrin (8.22%) is found to be the next best treatments , Indoxacarb (9.31%), Imidiacloprid

(10.59%), Azadirachtin (11.04%) , B.T(12.70%), among all the treatments and Cartap Hydrochloride (13.81%) is found be least effective but comparatively superior over the control. Another objective on evaluation of field data the highest yield was recorded in Flubendiamide 20WG (205.15q/ha), followed by Cypermethrin 25EC (215.10q/ha), Indoxacarb 14.5 SC (209.20q/ha), Imidiacloprid 17.8 SL (203.60q/ha), Azadirachtin 0.03% EC (198.50 q/ha), Bt.*var. Krustaki* (179.30/ha), Cartap Hydrochloride 50 SP (135.80q/ha) as compared to Control (90.65q/ha).

6. Conclusion

From the analysis of present findings, it can be concluded that among insecticides, treatments Flubendiamide 24WG was found to be most superior in managing brinjal shoot and fruit borer. Whereas the treatment Cartap Hydrochloride found to be the least effective in managing *Leucinodes orbonalis* (Guen.)

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