Journal of Pharmacognosy and Phytochemistry

Available online at www.phytojournal.com

E-ISSN: 2278-4136
P-ISSN: 2349-8234
JPP 2019; 8(4): 2453-2455
Received: 13-05-2019
Accepted: 15-06-2019

Godse Satyanarayana Goud
Department of Entomology, School of Agriculture Science, G H Raisoni University, Chhindwara, Madhya Pradesh, India

CM Bondre
Department of Entomology, School of Agriculture Science, G H Raisoni University, Chhindwara, Madhya Pradesh, India

KA Gawali
Department of Entomology, School of Agriculture Science, G H Raisoni University, Chhindwara, Madhya Pradesh, India

Correspondence
Godse Satyanarayana Goud
Department of Entomology, School of Agriculture Science, G H Raisoni University, Chhindwara, Madhya Pradesh, India

Efficacy of some chemical and botanical pesticides against brinjal shoot and fruit borer *Leucinodes orbonalis* Guenee

Godse Satyanarayana Goud, CM Bondre and KA Gawali

Abstract
A field experiment was conducted at Experimental field of the Department of Entomology, (GHRU) School of Agricultural Sciences, Saikheda, Dist, Chhindwara, Madhya Pradesh, in RBD with 7 treatments replicated 3 times during *Kharif*, 2018 to study the field efficacy of Some chemical and botanical pesticides against Brinjal Shoot and Fruit Borer *Leucinodes orbonalis* Guenee Neem Oil 2% @200ml/ha, Garlic Extract 5%, Reeta/Soap Nut Extract 5%, NSKE 5%, Spinosad 45 SC @75gm.ai/ha, Chlorantraniliprole 9.3% + Lambda Cyhalothrin 4.6% ZC @35gm.ai/ha, Emamectin benzoate 5 SG @10gm,ai/ha. All the test insecticides and botanical pesticides proved their efficacy but Chlorantraniliprole 9.3% + Lambda Cyhalothrin 4.6% ZC and Emamectin benzoate 5 SG proved highly effective in insecticides and botanicals.

Keywords: *Leucinodes orbonalis*, brinjal, larva, infestation, shoot and fruit

Introduction
Brinjal is an important crop grown in all the seasons. Due to its nutritive value, consisting of minerals like iron, phosphorous, calcium and vitamins like A, B and C, unripe fruits are used primarily as vegetable in the country. It is also used as a raw material in pickle making (Singh, 1963) [15] and as an excellent remedy for those suffering from liver complaints. In 2013, global production of eggplants was 49.4 million tonnes (FAOSTAT, 2013). More than 1,600,000 hectares (4,000,000 acres) are devoted to the cultivation of eggplants in the world. India constitutes 27% of world total (FAOSTAT, 2012) [3]. In India, Brinjal shoot and fruit borer (BFSB) is considered the most destructive pest causing huge losses in brinjal. It causes severe damage in South Asia (Thapa, 2010) [16], where yield losses may reach up to 85 to 90 percent (Misra, 2008; Jagginavar *et al.*, 2009) [13, 4]. The larvae bore into tender shoots at the vegetative stage, flower and fruit (CABI, 2007) [2]. The present study was carried out to evaluate the efficacy of different insecticides to find the best practice if insecticides have to be applied for management of the borer

Materials and Methods
The study was conducted at Experimental field of the Department of Entomology, (GHRU) School of Agricultural Sciences, Saikheda, Dist, Chhindwara, Madhya Pradesh, during *Kharif* 2018-2019. The experiment was carried out in randomized complete block design with three replications and seven treatments. Seedlings of three to four leaf stage was transplanted into the field for trail. Each sub plot is measured 4m2 (2m X 2 m). Each sub-plot was separated from each other by bunds. Light irrigation was given right after transplanting. The experiment plot was ploughed thoroughly. Farm Yard manure (FYM) @ 5 tonnes /ha was incorporated into the soil at the time of final land preparation.
A spacing of 60X45cm is maintained. Chemical fertilizers were applied @120:50:70kg of N: P2O5: K2O per hectare. Full dose of P2O5 and 20% K2O and Nitrogen are applied as basal dose. Rest of the fertilizers applied as two top dressings at an interval of 3 weeks. Three insecticide sprays were applied at 20 days intervals using a knapsack sprayer. Water was applied to control plots when insecticides were sprayed. Treatments were applied to the whole plots and data was recorded.
For recording shoot infestation, healthy and infested shoots were counted on 10 randomly selected plants. Shoot damage caused by *L. orbonalis* was identified by wilting of the terminal shoots in vegetative stage. Data were recorded one day before spray and three, seven and fourteen days after treatment. Percent shoot infestation was calculated by using the following formula:

$$\text{Per cent fruit infestation} = \frac{\text{Weight of damaged fruit}}{\text{Total weight of fruits observed}} \times 100$$

Data were analyzed by using analysis of variance (ANOVA) and mean separation was done by calculating least significance difference at P = 0.05.

Results and Discussion

The attack of *L. orbonalis* (shoot infestation) was recorded only at 7 days in *kharif* after first spray, as there was no infestation by *L. orbonalis* (shoot and fruit borer) prior to 7 days. Per cent fruit infestation on number basis at 7 days after first spray showed significant differences among treatments. Minimum and significantly less fruit infestation (7.90%) was recorded in plot treated with Chlorantraniliprole 9.3% + Lambda Cyhalothrin 4.6% ZC than rest of treatments. Per cent fruit infestation on number basis at 14 days after first spray showed that all the Chemical and botanical pesticides were effective significantly in reducing the damage over control except Chlorantraniliprole 9.3% + Lambda Cyhalothrin 4.6% ZC @35gm.ai/ha. Minimum and significantly less fruit infestation was recorded in plot treated with Spinosad 45 SC @75gm.ai/ha (17.22). Per cent fruit infestation on number basis at 7 days after second spray that per cent fruit infestation in all the treated plots was significantly less (10.58 to 16.10%) than control plot (22.48%). Minimum and significantly less fruit infestation (10.58%) was recorded in plot treated with Chlorantraniliprole 9.3% + Lambda Cyhalothrin 4.6% ZC 35gm.ai/ha than rest of treatments except Reetha/Soap Nut Extract 5% (16.10%). per cent fruit infestation on number basis at 14 days after second spray showed that all the Chemical and botanical pesticides were effective significantly in reducing the damage over control. Per cent fruit infestation in all the treated plots was significantly less (8.23 to 14.82%) than control plot (23.48%). Minimum and significantly less fruit infestation (8.23%) was recorded in plot treated with Chlorantraniliprole 9.3% + Lambda Cyhalothrin 4.6% ZC @35gm.ai/ha than rest of treatments. Among the treated plots maximum infestation was recorded in Reetha/Soap Nut extract, which found significantly higher than the fruit infestation in all the treated plots. Per cent fruit infestation on number basis at 7 days after third spray showed significant that all the Chemical and botanical pesticides were effective significantly in reducing the damage over control. Per cent fruit infestations in all the treated plots were significantly less (5.83 to 11.22%) than control plot (25.10%). Minimum and significantly less fruit infestation (5.83%) was recorded in plot treated with Chlorantraniliprole 9.3% + Lambda Cyhalothrin 4.6% ZC @35gm.ai/ha than rest of treatments. Per cent fruit infestation on number basis at 14 days after third spray showed that all the Chemical and botanical pesticides were effective significantly in reducing the damage over control. Per cent fruit infestations in all the treated plots were significantly less (6.48 to 13.83%) than control plot (25.60%). Minimum and significantly less fruit infestation (6.48%) was recorded in plot treated with Emamectin benzoate 5 SG @10gm,ai/ha than rest of treatments except in Chlorantraniliprole 9.3% + Lambda Cyhalothrin 4.6% ZC @35gm.ai/ha (7.33%).

On the basis of shoot and fruit infestation recorded under different treatments it was observed that all the insecticidal treatments were effective significantly over control in reducing shoot and fruit infestation. Percent fruit infestation on number basis and weight basis among different treated plots ranged from 8.23 to 14.84 and 8.23 to 14.82 per cent as against 22.06 and 23.16 per cent in control respectively. Among the insecticides Chlorantraniliprole 9.3% + Lambda Cyhalothrin 4.6% ZC was found most effective against *L. orbonalis* followed by Spinosad 45 SC, Emamectin benzoate 5 SG Among the Botanical pesticides Neem Oil *was* found effective followed by Garlic Extract, Reetha/Soap Nut Extract, NSKE, (Fig: 3 and 4).

Similar to the present finding Sen Koushik *et al.*, (2017) [8]. also reported Chlorantraniliprole 9.3% + Lambda Cyhalothrin 4.6% ZC to be most effective against Brinjal shoot and fruit borer (L. *orbonalis*) Khattak and Rashid (2006) [7], Rahman *et al.* (2009) [14], Azad *et al*. (2012) [1], Mathur *et al.* (2012) [12], Ashadul *et al*. (2014) [9] and karkar *et al*. (2014) [6] also reported Neem Oil to be effective against shoot and fruit borer of brinjal, which is in agreement with the present findings.

Mainali *et al*. (2012), Kameshwaran and Kumar (2015) [5] also reported spinosad 45 SL, Emamectin Benzoate 5 SG to be moderately effective against brinjal shoot and fruit borer. Malasawzuali *et al.* (2013) also reported garlic to be moderately effective in reducing the infestation of brinjal shoot and fruit borer.

Table 1: Percent fruit infested on number basis under different treatments

Sr. No.	Treatments	Per cent fruit infested at different days after spraying						
		1st Spray		2nd spray		3rd Spray		Overall mean
		7	14	7	14	7	14	
1	Neem Oil 2% @200ml/ha	12.25 (20.48)*	14.73 (22.56)	13.72 (21.73)	12.40 (20.61)	8.65 (17.10)	11.93 (20.20)	12.28 (20.51)
2	Garlic Extract 5%	10.20 (18.62)	12.35 (20.57)	12.40 (20.61)	10.47 (18.87)	7.35 (15.72)	10.25 (18.66)	10.50 (18.90)
3	Reeta/Soap Nut Extract 5%	14.23 (22.16)	15.82 (23.43)	16.10 (23.65)	14.82 (22.63)	11.20 (19.54)	13.83 (21.83)	14.33 (22.24)
4	NSKE 5%	12.65 (20.83)	13.03 (21.15)	11.70 (19.99)	10.43 (18.84)	6.83 (15.15)	9.15 (17.60)	10.63 (19.02)
5	Spinosad 45 SC @75gm.ai/ha	14.08 (22.03)	17.22 (24.51)	16.07 (23.62)	12.47 (20.67)	11.22(19.56)	10.69 (19.07)	13.62 (21.65)
6	Chlorantraniliprole 9.3% + Lambda Cyhalothrin 4.6% ZC @35gm.ai/ha	7.90 (16.32)	10.10 (18.52)	10.58 (18.98)	8.23 (16.67)	5.83(13.97)	7.33 (15.71)	8.33 (16.77)
7	Emamectin benzoate 5 SG @10gm,ai/ha	10.42 (18.82)	10.23 (18.65)	12.03 (20.29)	10.28 (18.70)	7.48 (15.87)	6.48 (14.75)	9.49 (17.93)
8	Control	17.37 (24.62)	18.33 (25.34)	22.48 (28.29)	23.48 (28.97)	25.10 (30.05)	25.60 (30.38)	22.06 (28.00)
	SEm(±)	0.44	0.51	0.37	0.54	0.60	0.84	0.32
	CD at 5%	(1.34)	(1.55)	(1.14)	(1.64)	(1.83)	(2.56)	0.97

*Figures in parentheses are arc sine transformed values

Table 2: Percent fruit infested on weight basis under different treatments

Sr. No.	Treatments	Per cent fruit infested at different days after spraying						
		1st Spray		2nd spray		3rd Spray		Overall mean
		7	14	7	14	7	14	
1	Neem Oil 2% @200ml/ha	11.93 (20.20)*	13.85 (21.84)	14.40 (22.29)	11.61 (19.91)	8.97 (17.42)	9.33 (17.78)	11.68 (19.98)
2	Garlic Extract 5%	13.34 (21.41)	12.75 (20.91)	13.40 (21.46)	10.90 (19.27)	9.96 (18.39)	10.00 (18.43)	11.72 (20.02)
3	Reeta/Soap Nut Extract 5%	14.90(22.70)	13.87 (21.86)	16.62 (24.05)	15.42 (23.11)	10.18 (18.60)	11.94 (20.21)	12.87 (21.02)
4	NSKE 5%	13.54 (21.58)	13.23 (21.32)	17.07 (24.39)	14.22 (22.14)	10.26 (18.67)	12.92 (21.06)	13.54 (21.58)
5	Spinosad 45 SC @75gm.ai/ha	10.89 (19.26)	13.04 (21.16)	13.55 (21.59)	11.55 (19.86)	9.92 (18.35)	9.48 (17.93)	9.62 (18.06)
6	Chlorantraniliprole 9.3% + Lambda Cyhalothrin 4.6% ZC @35gm.ai/ha	8.15 (16.58)	9.75 (18.19)	10.43 (18.84)	9.42 (17.86)	5.43 (13.47)	7.65 (16.05)	8.47 (16.92)
7	Emamectin benzoate 5 SG @10gm,ai/ha	10.94 (19.31)	11.38 (19.71)	12.50 (20.70)	9.70 (18.14)	7.78 (16.19)	6.65 (14.94)	10.12 (18.54)
8	Control	18.35 (25.35)	21.25 (27.44)	23.47 (28.96)	24.78 (29.84)	25.38 (30.24)	25.73 (30.47)	23.16 (28.76)
	SEm(±)	0.60	0.71	0.51	0.49	0.69	0.59	0.30
	CD at 5%	1.82	2.15	1.54	1.49	2.10	1.78	0.91

*Figures in parentheses are arc sine transformed values

References

1. Azad MAK, Yesmin MN, Islam MS. Effect of Botanical Extract on Pest Control in Brinjal Field, J Environ. Sci. & Natural Resources. 2012; 5(2):173-176.
2. CABI. Crop protection compendium. CAB International. (Available at: http:// www. cabicompendium.org/cpc), 2007.
3. FAOSTAT FAO. 2012-05-12. Archived from the original on 2015-09-06.Retrieved 2012-05-12.
4. Jagginavar SB, Sunitha ND, Biradar AP. Bioefficacy of flubendiamide 480SC against brinjal fruit and shoot borer, *Leucinodes orbonalis* Guen. Karnataka Journal Agricultural Science. 2009; 22(3):712-713.
5. Kameshwaran C, Kumar K. Efficacy of newer insecticides against the brinjal, *Solanum melongena* (L.) shoot and fruit borer, *Leucinodes orbonalis*. (Guen.) Asian Journal of bio science. 2015; 10(2):119-128.
6. Karkar DB, Korat DM, Dabhi MR. Evaluation of botanicals for their bioefficacy against insect pests of brinjal. Karnataka J Agric. Sci, 2014, 27(2).
7. Khattk Abdullah, Muhammad Rashid, Muhammad Waqar. Response of *Azadirachta indica* against Bemisiatabaci Gennadius (Homoptera: Aleyrodidae) and *Amrasca biguttula* Ishida (Homoptera: Cicadellidae) on Cotton Cultivar, Pakistan j, zool., 2006, 46(6).
8. Koushik Sen, Arka Samanta, Alam, Partha Dhar, Arunava Samanta. Field Evaluation of a New Ready Mix Formulation Ampligo 150 ZC (Chlorantraniliprole 9.3% + LambdaCyhalothrin 4.6% ZC) against Shoot and Fruit Borer (*Leucinodes orbonalis* Guen.) infestation in Brinjal. Journal of Pharmacognosy and Phytochemistry. 2017; 6(5):1674-1678.
9. Ashadul MI, Hussain MA, Shapla SA, Mehraj H, Jamal Uddin AFM. Plant Extract for the Management of Brinjal Shootand Fruit Borer (*Leucinodes orbonalis* Guenee) American-Eurasian J Agric. & Environ. Sci. 2014; 14(12):1409-1414.
10. Mainali Ram Prasad, Ram Babu Peneru, Padma Pokhrel, Yagya Prasad Giri. Field bio-efficacy of newer insecticides against eggplant fruit and shoot borer, *Leucinodes orbonalis* (guenee), Int J Appl Sci Biotechnol. 2014; 3(4):727-730.
11. Malsawmzuali Imtinaro L, Alemla AOM, Neog P. Ecofriendly pest management against brinjal shoot and fruit borer, *Leucinodes orbonalis* Guenee. Indian Journal of Entomology. 2013; 75(4):320-324.
12. Mathur A, Singh S, Singh NP, Meena M. Field evaluation of plant products and microbial formulations against brinjal shoot and fruit borer, *Leucinodes orbonalis* Guenee under semi-arid conditions of Rajasthan. Journal of Biopesticides. 2012; 5(1):71-74.
13. Misra HP. New promising insecticides for the management of brinjal shoot and fruit borer, *Leucinodes orbonalis* Guenee. Pest Management of Horticulture Ecosystem. 2008; 14(2):140-147.
14. Rahman MA, Prodhan MDH, Maula AKM. Effect of botanical and synthetic pesticides in controlling epilachna beetle and the yield of bitter gourds. International journal of Sustainable Crop Products. 2009; (5):23-26.
15. Singh S, Krishnakumar S, Katyal SL. Fruit culture in India. Indian Council of Agricultural Research, New Delhi, 1963, 412.
16. Thapa RB. Integrated management of brinjal fruit and shoot borer, *Leucinodes orbonalis* Guen: An overview. J Inst. Agric. Anim. Sci. 2010; 30(32):1-16.