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EFFICACY OF INSECTICIDES AND SOME ORGANIC PRODUCTS AGAINST BRINJAL SHOOT AND FRUIT BORER *LEUCINODES ORBONALIS* (GUENEE)

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ABSTRACT

Seven organic products and an insecticide- emamectin benzoate 5SG (0.002%) were evaluated against the brinjal shoot and fruit borer *Leucinodes orbonalis* (Guenee) at the research farm, Palampur. The results among the organic products, *Agniastra* (5%), *Brahmastra* (5%) and cow urine (10%) were effective. Emamectin benzoate was superior to the organic products giving maximum yield of fruits and marketable fruits (43.97 and 42.57 q/ ha, respectively).

Key words: Efficacy, organic, prophylactic spray, emamectin benzoate, *Agniastra*, *Brahmastra*, cow urine, fruit yield

Brinjal (*Solanum melongena* L.) is an important vegetable and its native of India (Choudhary, 1970). In India, it is cultivated in 0.73 million ha with an annual production of 12.51 mt and grown in Odisa, Bihar, Karnataka, West Bengal, Andhra Pradesh, Maharashtra and Uttar Pradesh (NHB, 2018). In Himachal Pradesh, it is grown in 1,213 ha with a production of 27,710 mt (Anonymous, 2018). Brinjal is attacked by number of insect and mite pests viz., *Leucinodes orbonalis* (Guenee), *Henosepilachna vigintioctopunctata*, *Euzophera perticella* Ragonot, *Urentius sentis* Distant, *Eublemma olivacea* Walker, *Amrasca biguttula biguttula* Ishida, *Bemisia tabaci* (Gennadius), *Trialeurodes vaporariorum* (Westwood), *Aphis gossypii* Glover, *Myzus persicae* (Sulzer) and *Polyphagotarsonemus latus* (Banks)(Chandel et al., 2016). Of these, *L. orbonalis* is the most serious causing extensive damage both in vegetative and reproductive stages (Banerjee et al., 2009; Panja et al., 2013). Infestation due to leafhopper, whitefly and shoot and fruit borer results in about 70-92% loss in yield (Rosaiah, 2001; Raju et al., 2007). Emamectin benzoate @ 6.25 g a.i./ ha has proved the most effective against jassid, whitefly, aphid and borer (Kalawate and Dethe, 2012). A number of insecticides have been recommended, but their indiscriminate use has posed a serious problem and hazards (Pal, 2004). Use of organic amendments and indigenous plant products can be an alternative. The significant reduction in *L. orbonalis* was observed after spraying of vermiwash with biopesticides (Mishra et al., 2014). Also 7% and 5% diluted *panchagavya* applications were found to be effective (Kumar et al., 2015). Cow urine (20%) and neem leaf extract (10%) had been found effective (Patel et al., 2017). Organic amendments and plant products are known to leave no toxic residues and are non- phytotoxic. The present study evaluates the efficacy of some organic products.

MATERIALS AND METHODS

Field experiment was conducted during kharif 2017, at the Experimental Farm, Department of Entomology, CSK HPKV, Palampur (32.6° N 76.3° E, 1290 masl). Seedlings of variety Arka Keshav, were transplanted with at 60 x 45 cm spacing in plot size of 3 x 2 m. Randomized block design (RBD) was followed with traetments being *Agniastra* (5%), *Brahmastra* (5%), cow urine (10%), *Darekastra* (10%), *Jeevamrit* (10%), *Panchgavya* (10%) and *Tamralassi* (5%) and an insecticide, emamectin benzoate 5SG @0.002%. Two sets of trials were maintained in set 1, the treatments were applied starting from 20 days after transplanting till harvest and in set 2, treatments were applied after the appearance of *L. orbonalis* moths in the pheromone trap. A total of 12 and 9 sprays of organic products were given in set 1 and 2 whereas, organic products were applied at 10 days interval in both the sets. A total 6 sprays of emamectin benzoate was applied in set 1 and 5 sprays in set 2 at 20 days interval. Observations were recorded on the fruit infestation terms of drooping shoots and number of damaged fruits, % shoot infestation computed to at weekly intervals from five randomly selected plants and fruit infestation (number and weight basis) from each picking. Marketable fruit yield was also recorded. Data were subjected to ANOVA

after transformation through CPCS-1 software as per Gomez and Gomez (1984).

RESULTS AND DISCUSSION

Result indicated that set 1(prophylactic sprays) was effective against *L. orbonalis* as compared to set 2 (sprays applied after the appearance of pest) and treatments were significantly superior to the control (Table 1). Among all the treatments, minimum mean % shoot infestation was recorded in emamectin benzoate (2.09%) which was followed by cow urine (8.75%), *Agniastra* (9.66%) and *Brahmastra* (9.91%). Maximum total% mean shoot infestation was recorded in *Jeevamrit* (13.34%). In set 1, shoot infestation was observed minimum (5.42%) in *Agniastra*, followed by *Brahmastra* (6.11%), cow urine (6.11%) and *Jeevamrit* (6.11%). But in set 2, minimum shoot infestation was in cow urine (11.11%) followed by *Brahmastra* (13.70%) and *Agniastra* (13.89). These findings are similar to those of Anil and Sharma (2010) with emamectin benzoate. Jagadeesha (2010) concluded that the fermented plant products were found to be on par with vermicompost + neem cake + recommended dose of fertilizers + *Pongamia glabra* + *Agniastra*. The superiority of emamectin benzoate against *L. orbonalis* was also reported by Islam et al. (2016). Shoot infestation was the lowest (2.5%) in the plots treated with Tracer 45 SC followed by Proclaim 5 SG (4.06%) being statistically similar (Akter et al., 2017). Based on % reduction in shoot infestation emamectin benzoate @ 0.0025% was found superior (89.56%) by Shah et al. (2012) in Anand, Gujrat.

The data presented in Table 1 reveal that in Set 1, all the treatments differed significantly and no signicant differences were observed for number of pickings. Mean minimum fruit infestation (number basis) was observed in emamectin benzoate (3.73%) which was statistically at par with at par with cow urine (4.43%) and *Agniastra* (5.56%) as compared to control (13.46%). In set 2, minimum infestation was in emamectin benzoate (5.37%). Minimum fruit infestation (weight basis) was recorded in emamectin benzoate (3.35%) which was statistically at par with *Agniastra* (4.13%), cow urine (4.21%) and *Brahmastra* (5.20%). In set 2, no significant difference was observed in number of pickings. Among all the treatments, maximum yield of fruits was obtained in emamectin benzoate (51.67 q/ ha) which was at par with *Brahmastra* (45.50 q/ ha) and *Agniastra* (41.67 q/ ha) in Set 1. Whereas in Set 2, maximum yield of fruits was in emamectin benzoate and *Jeevamrit* (36.27 q/ ha) followed by *agniastra* (28.33 q/ ha); while minimum was in cow urine (20.30 q/ ha) followed by *Panchagavya* (22.13 q/ ha). Kalawate and Dethe (2012) observed emamectin

Table 1. Effect of treatments on infestation (on number and weight basis) by *L. orbonalis*

Treatment	Dose (ml/ l)	% Shoot infestation			% Fruit infestation (on number basis)			% Fruit infestation (on weight basis)		
		Set 1	Set 2	Mean	Set 1	Set 2	Mean	Set 1	Set 2	Mean
Agniastra (5%)	50	5.42 (13.35)	13.89 (21.38)	9.66 (19.70)	2.98 (2.00)	8.14 (2.68)	5.56 (2.34)	2.86 (2.00)	5.40 (2.38)	4.13 (2.19)
Brahmastra (5%)	50	6.11 (14.27)	13.70 (21.71)	9.91 (19.03)	4.45 (2.17)	7.08 (2.95)	5.55 (2.56)	4.16 (2.15)	6.24 (2.62)	5.20 (2.39)
Cow urine (10%)	100	6.39 (14.59)	11.11 (20.99)	8.75 (17.37)	3.82 (2.20)	5.03 (2.15)	4.43 (2.18)	3.60 (2.15)	4.81 (2.27)	4.21 (2.21)
Darekastra (10%)	100	6.39 (13.19)	18.15 (24.87)	12.27 (18.00)	8.84 (3.14)	11.86 (3.41)	10.35 (3.28)	7.76 (2.96)	10.01 (3.31)	8.89 (3.14)
Jeevamrit (10%)	100	6.11 (14.27)	20.56 (26.35)	13.34 (20.31)	6.35 (2.77)	12.34 (3.66)	9.35 (3.22)	6.11 (2.64)	11.33 (3.61)	8.72 (3.13)
Panchgavya (10%)	100	6.81 (15.00)	17.59 (24.39)	12.20 (17.79)	11.62 (3.24)	15.91 (3.29)	13.77 (3.27)	10.02 (3.17)	11.29 (3.52)	10.66 (3.35)
Tamralassi (5%)	50	7.78 (16.18)	17.41 (24.44)	12.60 (20.31)	8.29 (2.97)	12.42 (3.61)	10.36 (3.29)	9.05 (3.08)	5.47 (3.54)	7.26 (3.31)
Emamectin benzoate 5SG (0.002%)	0.4	1.39 (6.69)	2.78 (10.95)	2.09 (8.82)	2.09 (1.77)	5.37 (2.46)	3.73 (2.12)	2.00 (1.74)	4.69 (2.44)	3.35 (2.09)
Control	-	6.25 (14.21)	19.07 (22.19)	12.66 (18.20)	8.42 (3.16)	18.09 (4.43)	13.46 (3.80)	8.91 (3.23)	20.66 (4.74)	14.79 (3.99)
CD (p= 0.05)		3.09	3.69	1.93	2.6	1.5	0.35	1.2	2.7	0.37

Figures in parentheses arc sine transformed values

benzoate and spinosad are efficient. Similarly, Anwar et al. (2015) reported that after 7th day of spraying lowest % fruit infestation (26.93%) was recorded in emamectin benzoate. Wankhede and Kale (2010) reported that emamectin benzoate 5% SG was the best. Emamectin benzoate, abamectin and spinosad showed better efficacy than IGR-based biopesticide buprofezin (Islam et al., 2016). According to Akter et al., (2017) the lowest % fruit infestation (8.43%) was recorded in the plots treated with Tracer 45 SC followed by Proclaim 5 SG (25.92%) and Bt (35.67%). Suganya et al. (2005) reported that emamectin benzoate and spinosad were equally effective in tomato. Anil and Sharma (2010) also observed minimum (16.58%) fruit infestation in emamectin benzoate followed by endosulfan (20.42%) and agrospray oil T (20.61%). Islam et al. (2016) obtained maximum marketable yield with emamectin benzoate.

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AUTHOR CONTRIBUTION STATEMENT

Shagun Sood conducted the experiment and recorded the data. PC Sharma conceptualized the experiment and supervised the experiment. Nitika Negi analysed the data and assisted in compilation of results.

CONFLICT OF INTEREST

No conflict of interest.

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