



Eco-friendly management of fruit borer (*Meridarchis scyroides* Meyrick) in ber

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Abstract

All the treatments were found significantly superior over control in reducing the fruit borer incidence in ber. Whereas the treatments Profenophos 50 EC 0.05 % (18.33%), NSKE @ 5 % (20.95%) and Azadirachtin 3000 ppm (21.73%) found significantly superior over rest of the treatments in reducing the borer incidence. The healthy fruit yield data revealed that more or less treatment Profenophos 50 EC 0.05 % gave significantly higher yield and was remain at par with NSKE @ 5 % and Azadirachtin 3000 ppm treatments during the year 2008-09 to 2012-13 except the year 2011-12. Similarly in pooled results treatment Profenophos 50 EC 0.05 % give significantly higher yield (41.55 kg/tree.) followed by treatments Azadirachtin 3000 ppm (35.99 kg/tree.) and NSKE @ 5 % (34.79 kg/tree.) Highest gross income of Rs. 115500/ha was recorded in the treatment Profenophos 50 EC 0.05 %. Highest net income of Rs. 96700/ha, additional income of Rs. 46850/ha and ICBR 1:2.49 was recorded in treatment Profenophos 50 EC 0.05 % followed by treatment Azadirachtin 3000 ppm @ 25 ml / ltr. (1:1.64). and NSKE @ 5 % (1:1.52).

Key words: Ber (*Ziziphus mauritiana*), eco-friendly management, fruit borer (*Meridarchis scyroides*),

Introduction

Ber (*Ziziphus mauritiana* Lamk.) is an ancient poor man's drought hardy fruit crop grown in semiarid and arid regions of different states of India. Now-a-day's ber (*Ziziphus mauritiana*) is cultivated under arid zone in large scale. The estimated area in India under regular plantation of improved varieties is about 70,000 ha (Pareek, 1996) in major ber growing states are Haryana, Punjab, Uttar Pradesh, Rajasthan, Gujarat, Madhya Pradesh, Bihar, Maharashtra, Andhra Pradesh and Tamil Nadu. Praveen *et al.* (1998) reported that ten insect's species belonging to four different orders were found feeding in ber. Among them the fruit borer (*Meridarchis scyroides*) and fruit fly (*Carpomyia vesuviana* Bosta) are the important pests. *C. vesuviana* has been observed to damage as much as 80 % of the crop under severe infestations (Cherian and Sunderam, 1941). Infestation starts with the onset of fruit setting. The adult female lays eggs singly by inserting its "ovipositor in the developing fruit. After 2 to 5 days the larva hatches out and starts feeding on the pulp making galleries in it. The excreta of the larva accumulate in the galleries, which may sometimes causing rotting of the fruit. Infested fruit become deformed and their growth becomes checked, a large number of such fruits drop off. There may be 2 or 3 generations of the pest during the active period (Batra, 1953) while the fruit matures (from November to April in north India). To prevent infestation prophylactic sprays should be carried out with 0.03 % oxidemeton or dimethoate starting from the stage when 70-

80 % fruits attain pea size and then repeating the spray at one-month intervals (Pareekh and Vishal Nath, 1996). During the maturity of fruits' it necessary spraying should be done with 0.5 % Malathion at weekly intervals since, malathion has been observed to dissipate quickly in ber fruits decreasing well below the tolerance level of 3 ppm within two days after spraying (Popli *et al.* 1980). Damage by fruit borer (*Meridarchis scyroides*) has been observed mainly in southern and western India, the reddish larvae bore into the fruit and feed on the pulp. So this present investigation was carried out to find out the economical and effective newer insecticides/biopesticides against fruit borer in ber.

Materials and Methods

The experiment was conducted during the year 2008-09 to 2012-13 at All India Co-ordinated Research Project on Arid Zone Fruits, S. D. Agricultural University, Sardarkrushinagar, Gujarat, India. The treatments are (i) Spinosad 45 SC @ 1 ml / l. (ii) Indoxacarb 14.5 SC @ 1 ml / l. (iii) NSKE @ 5 % (iv) Azadirachtin 3000 ppm @ 2.5 ml / l. (v) Azadirachtin 10,000 ppm @ 1.0 ml / l. (vi) Profenophos 50 EC 0.05 % @ 1.0 ml / l. (vii) Control (No spray). Three sprays of insecticides were made starting from pea size ber fruits at a 15 day interval. The experiment was replicated 4 times in RBD. One hundred fruits per tree were examined at each commercial picking by cutting open to confirm the damage of fruit borer infestation and converted in per cent damage. Damaged and

healthy fruits were also weighted at each picking.

Results and Discussion

(a) Fruit borer incidence

The observations recorded for the infestation of ber fruit borer (Table 1) indicated that during the year 2008-09 all the treatments found significantly superior over control except indoxacarb 14.5 SC and spinosad 45 SC (25.75 and 24.50 %) in reducing the infestation. Among the treatments Profenophos 50 EC 0.05 % (15.42 %) found significantly superior and was at par with NSKE @ 5 % (17.58%), azadirachtin 3000 ppm (18.50%) and azadirachtin 10,000 ppm (22.00%). During the year 2009-10 also all the treatments found significantly superior over control except indoxacarb 14.5 SC (11.66%), and spinosad 45 SC (12.38%) in reducing the infestation of ber fruit borer. Treatment Profenophos 50 EC 0.05 % (6.08%) was found significantly superior than rest of treatment except treatment azadirachtin 3000 ppm (8.44%).

In the year 2010-11 treatments Profenophos 50 EC 0.05 % (8.75%), NSKE @ 5 % (12.38%) and azadirachtin 3000 ppm (14.38%) found significantly superior over control and also were found at par with each other. Treatments azadirachtin 10,000 ppm (22.13%), indoxacarb 14.5 SC (24.75%) and spinosad 45 SC (27.75%) found at par with control in reducing the fruit borer infestation.

During the year 2011-12 all the treatments found significantly superior over control in reducing the ber fruit

borer incidence. Treatments Profenophos 50 EC 0.05 % (5.88%), NSKE @ 5 % (6.13%) and azadirachtin 3000 ppm (6.50%) found significantly superior over rest of the treatments in reducing the fruit borer incidence.

Similarly during the year 2012-13 all the treatments except spinosad 45 SC (32.68%) found significantly superior over control in reducing the borer incidence. More or less treatments Profenophos 50 EC 0.05 % (12.74%), NSKE @ 5 % (17.90%) and azadirachtin 3000 ppm (21.90%) found significantly superior over rest of the treatments.

Pooled results also clearly indicated that all the treatments found significantly superior over control in reducing the fruit borer incidence. Whereas the treatments Profenophos 50 EC 0.05 % (18.33%), NSKE @ 5 % (20.95%) and azadirachtin 3000 ppm (21.73%) found significantly superior over rest of the treatments in reducing the borer incidence. Patil and Patil (1997) reported that the dimethoate 30 EC + jiggery solution (at 0.03 + 1.0% concentration) was the most effective treatment against ber fruit borer followed by monocrotophos (at 0.04%) and endosulfan 35 EC (at 0.07%). Rajaram and Siddeswaran, 2006 reported that fenthion 0.1% recorded the lowest mean fruit damage of 26.6% and is at par with endosulfan 0.07% (26.67%) and both are equally effective in controlling the fruit borer and fruit fly complex. He also reported that Azadirachtin 1 % and *Ocimum sanctum* extract 1 % are also effective up to 10 days after sprays against these pests.

Table 1. Efficacy of insecticides/ biopesticides against fruit borer in ber during 2008-09 to 2012-13

S. No.	Treatment	Mean per cent infestation of ber fruit borer					
		Year					Pooled
		2008 -09	2009 -10	2010 -11	2011 -12	2012 -13	
1	Spinosad 45 SC @ 1 ml / l.	30.28* (24.50)	21.02 (12.38)	32.04 (27.75)	22.56 (14.25)	35.14 (32.68)	28.21
2	Indoxacarb 14.5 SC @ 1 ml / l.	31.02 (25.75)	22.90 (11.66)	30.06 (24.75)	22.76 (14.63)	32.59 (28.58)	27.87
3	NSKE @ 5 %	25.51 (17.58)	17.97 (9.03)	20.99 (12.38)	14.89 (6.13)	25.38 (17.90)	20.95
4	Azadirachtin–3000 ppm @ 2.5 ml / l.	26.16 (18.50)	17.38 (8.44)	21.97 (14.38)	15.27 (6.50)	27.85 (21.90)	21.73
5	Azadirachtin–10,000 ppm @ 1.0 ml / l.	28.34 (22.00)	19.00 (10.11)	28.08 (22.13)	20.61 (12.00)	30.83 (25.87)	25.37
6	Profenophos 50 EC 0.05 % @ 1.0 ml / l.	23.60 (15.42)	14.85 (6.08)	17.50 (8.75)	14.45 (5.88)	21.27 (12.74)	18.33
7	Control (No spray)	34.37 (31.00)	22.42 (14.22)	33.70 (30.40)	26.08 (19.00)	37.90 (37.28)	30.89
	SEm ±	1.94	0.94	2.10	1.04	1.50	0.71
	C.D. @ 5%	5.75	2.81	6.23	3.00	4.47	2.00
	CV %	13.60	9.76	15.92	10.62	9.98	12.70
	Y x T						NS

Note: *arc sin transformed value Figure in parentheses is original value

(b) Fruit yield

The healthy fruit yield (Table 2) data revealed that more or less treatment Profenophos 50 EC 0.05 % gave significantly higher yield and remain at par with NSKE @ 5 % and azadirachtin 3000 ppm treatments during the year 2008-09 to 2012-13 except the year 2011-12. Similarly in pooled results treatment Profenophos 50 EC 0.05 % give significantly higher yield (41.55 kg/tree.) followed by treatments Azadirachtin 3000 ppm (35.99 kg/tree.) and NSKE @ 5 % (34.79 kg/tree.)

(c) Economics

Data indicated (Table 3) that highest gross income of Rs. 115500/ha, highest net income of Rs. 96700/ha, additional income of Rs. 46850/ha was recorded in treatment Profenophos 50 EC 0.05 % . Highest ICBR 1:2.49 was recorded in treatment Profenophos 50 EC 0.05 % followed by treatment Azadirachtin 3000 ppm @ 25 ml / ltr. (1:1.64) and NSKE @ 5 % (1:1.52).

Table 2. Healthy ber fruit yield (kg/tree)

S.No.	Treatment	Healthy ber fruit yield (kg/tree)					
		Year					Pooled
		2008-09	2009-10	2010-11	2011-12	2012-13	
1	Spinosad 45 SC @ 1 ml / l.	22.85	23.90	38.48	23.03	27.31	27.11
2	Indoxacarb 14.5 SC @ 1 ml / l.	19.94	23.32	39.52	22.51	27.42	26.54
3	NSKE @ 5 %	29.04	32.24	51.55	22.93	38.17	34.79
4	Azadirachtin-3000 ppm @ 2.5 ml / l.	27.61	42.05	49.31	23.75	37.28	35.99
5	Azadirachtin-10,000 ppm @ 1.0 ml / l.	25.06	30.19	46.00	22.46	36.12	31.96
6	Profenophos 50 EC 0.05 % @ 1.0 ml / l.	30.79	43.86	62.21	23.65	47.23	41.55
7	Control (No spray)	16.49	21.14	35.54	22.22	24.85	24.05
	SEm±	0.92	0.93	4.67	0.46	3.14	1.61
	C.D. @ 5%	2.73	2.78	13.87	NS	9.33	5.27
	CV %	7.48	6.04	20.26	4.02	18.44	13.34
	Y x T						NS

Table 3. Economics of different treatments for the control of ber fruit borer.

Sr. No.	Treatment	Yield (kg/ha)	Gross income (Rs/ha)	Total Cost of cultivation (Rs/ha)	Net income (Rs/ha)	Additional income over control (Rs/ha)	ICBR
1	Spinosad 45 SC @ 1 ml / l.	7538	75380	41600	33780	-16070	----
2	Indoxacarb 14.5 SC @ 1 ml / l.	7379	73790	23660	50130	280	1:0.01
3	NSKE @ 5 %	9670	96700	18620	78080	28230	1:1.52
4	Azadirachtin-3000 ppm @ 2.5 ml / l.	10008	100080	19025	81055	31205	1:1.64
5	Azadirachtin-10,000 ppm @ 1.0 ml / l.	8886	88860	19340	69520	19670	1:1.02
6	Profenophos 50 EC 0.05 % @ 1.0 ml / l.	11550	115500	18800	96700	46850	1:2.49
7	Control (No spray)	6685	66850	17000	49850	----	

- Ber price : Rs.10/- per kg Labour charge Rs 120/day (Two labour per spray)

- Cost of FYM+ Chemical fertilizer+ Labour charge = Rs.17000/-

- Cost of Sprays includes cost of insecticides and labour cost for three sprays.

1 Spinosad 45 SC Rs. 13267 per liter 2 Indoxacarb 14.5 SC Rs. 3300 per liter

3 Neem seed kernel powder Rs. 10 per kg 4 Azadirachtin 3000 ppm Rs. 290 per liter

5 Azadirachtin 10,000 ppm Rs. 900 per liter 6 Profenophos 50 EC Rs. 600 per liter

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