

Effect of Different Herbal and Synthetic Pesticides on *Emmalocera depressella* (Lepidoptera: Pyralididae) of Sugarcane Pest in Rampur Rudra, District, Chapra (Saran), Bihar (INDIA)

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Abstract: *Emmalocera depressella* feeding on sugarcane are diverse, numerous and usually of limited geographical distribution. However, they all inflict heavy damage the crop thus causing borers to rank among the most dreaded pests in nearly all areas where sugarcane is growth. *Emmalocera depressella* (Sugarcane root borer) belonging to order Lepidoptera and family Pyralididae. It attacks the underground part of the sugarcane stem, hence it is popularly called the sugarcane root borer. In this research paper emphasis is on the comparative efficacy of seven insecticides against the root borer of sugarcane which include both synthetic and herbal Neem Seed Kernel Extract and Nimin were tried. Among the synthetic and herbals later was more effective and eco-friendly.

Studies of different herbal and synthetic pesticides on *Emmalocera depressella* were conducted at the experimental village, Rampur-Rudra, Distt Chapra (Saran), under P.G.Deptt. of Zoology (Entomological Laboratory), Jagdam College, Chapra (Saran), Jai Prakash University, Chapra (Saran), Bihar During 2010-2012.

Keywords: E.depressella, Synthetic pesticides, Carbofuron, Endosulfan, Infestation.

1. INTRODUCTION

Sugarcane (*Saccharum officinarum*) is one of the most important commercial crop which produced in the state of Bihar. Sugarcane is commercially cultivated on a large scale in the dry zone of Bihar in the Rampur-Rudra 25°36' and 26°13' North Latitude and 84°24' and 85°15' East longitude in the Southern part. Sugarcane contributes nearly 70% to the world's total sugar production. This cash crop occupies about 20.4 million hectares of land (2% of total cropped area of the world) with the production of 1392.4 million tons of the sugarcane. The production of sugarcane in 1990-92 was reported to 5,176 thousand metric tons. It is well known that pest and disease are important limiting factors which affect sugarcane production. Bihar sustained annual crop loss proved a great economical loss on sugarcane pest (Siddiali, 1965).

There are 30 species of insect pests have been reported to bring about damage to sugarcane in the State of Bihar, Gupta, 1956, Prasad 1960, Chakarvarti 1970 and Srivastava 1979.

Among sugarcane growing countries in the World, India ranks second by contributing 20.4% area and 18.6% production. Sugarcane occupies nearly 2.5% of the country's gross cropped area and contributes nearly 7% of total value of agricultural output in the country (Yadav-et.al. 2005). In India, sugarcane is grown on 4.36 million hectares with the annual production of 281.5 million tons and productivity of 64.6 tons per hectare. About 35 million farmers in the

country depend on sugarcane for their livelihood. By products of sugar industry such as molasses, bagasse and press mud play an important role in the national economy. Bihar is spread over 3.4 million hectares of land and 61% of the land resources of the state are locked into crop production, as compared to 51% in the country as whole. The sugar industry is the largest agro-based industry in Bihar. According to the estimate of 2006-2007, the area under sugarcane cultivation is 17.2 thousand hectares production amounts for 5,338.8 thousand tones and productivity 42,552 kg/ha against the national average of 70,469 kg/ha. Bihar has the lowest sugar recovery rate in the country at 9% against the national average of 10.36%.

The cane yield is markedly influence by many factors like soil fertility, climate and variety cultural practices, prevalence of pests and diseases and environmental stress. Among them, pests are known to inflict considerable loss in cane yield as well as sugar output. In India, nearly 228 insects and non-insect pests have been reported on the crop. Economical loss in sugarcane has been estimated to be 20% in cane yield and 15% in sugar recovery due to the ravages of the insect pests notable contribution and those of Abdul and Lwahashi 1999, Kalra 1975, Malik and Chaudhary 1990, Alam et al 1993.

About 125 species of insects are known to infest the sugarcane as major pests in various parts of the world. The different technologies have been developed for the management of insect pests, the adoption of integrated pest management (IPM) in the most desired approach because it is the management of least contamination of the environment. The relative stable environment of sugarcane plantation also favors the establishment of natural control by indigenous or introduced bio-control agents.

Controlling the root borers and stalk borers by (a) Mechanical method (b) chemical method (c) Herbal method (d) Integrated Pest Management (IPM) without harming other biota present in ecosystem.

2. MATERIALS AND METHODS

A field experiment was laid out during Feb, 2011-2012 in Rampur-Rudra Block design with eight treatment including control and there replications for evaluating the relative efficacy of different insecticides against sugarcane root borer, *Emmalocera depressella* A mid-early variety BO 128 was planted in a plot. The size of each plot was 10*5.4m² & row-to-row distance was maintained to be 0.90m. The paths between replications were kept at 1m while between sub plots were 0.50m. Three budden sugarcane sets were planted with eye to eye having 40 in numbers in each row. The agronomical practices were followed as per recommendation of particular area.

The eight insecticides including water spray are phorate 10G@ 10 kg a.1./ha, cypermethrin 10 EC @g a.1/ha, fenvalerate 10EC @ 5% Endosulfan 35 EC @ 0.60 kg a.1/ha and nimin 2%.

Applications; Different calculated insecticides were applied in 1st week of July, 2011 on the basis of 80% pupation found in the field. The granular insecticides namely phorate and carbofuran were applied near the root zone of standing cane crops, while cypermethrin, fenvalerate, endosulfan and nimin with the planted crops.

3. RESULT AND DISCUSSION

The comparative efficacy of 7 insecticides against *Emmalocera depressella* (root borer) was studies 2011-2012 under field condition (Table1). The insecticidal treatments were significantly superior to untreated control in case of pest incidence at one month after spraying. The incidence of pest was observed from 7.03% to 15.60%. It means that the minimum incidence (7.03%) was recorded in carbofuran treated plots which was at per with phorate (7.6%), cypermethrin (8.57%), endosulfan (9.87%) and fenvalerate (10.20%). There was no significant difference among neem and kernel 5% and nimin 2% but was significantly superior to control.

During harvest the incidence 4th brood of *E.depressella*, the minimum incidence was recorded in phorate treated plot (11.06%) which was at per with carbofuran (12.20%), endosulfan (12.5%) and nimin (15.20%). Cypermethrin, fenvalerate and Neem seed Kenal Extract were at per with 16.27%, 17.20% and 17.20% incidence, respectively.

In case of 5th brood incidence of pest among the insecticidal treatments, maximum incidence was observed in nimin treated Plat (14.60%) which at per with cypermethrin (14.20%), fenvalerate (15.50%) and Neem Seed Kernel Extract (12.60%). The minimum incidence of 5th brood of pest was observed in phoratetreated plot (10.60%) which was at per with carbofuran (11.50%).

Table-1 Effect of different insecticides on *Emmalocera depressella* in sugarcane.

Incidence of Sugarcane <i>Emmalocera depressella</i> (Root borer) (in percent)							
S.No.	Treatment	Pose	Before spraying	3 rd Brood	4 th Brood	5 th Boord	Yield (t/ha)
T1	Phorate 10g	1kg ai/ha	17.11 (8.67)	15.97 (7.60)	19.88 (11.60)	18.98 (10.60)	82.05
T2	Carbofuran 3g	1kg ai/ha	15.41 (7.17)	15.32 (7.03)	20.40 (12.20)	19.82 (11.50)	76.50
T3	Cypermethrin 10EC	40g ai/ha	15.17 (6.87)	16.96 (8.57)	23.76 (16.27)	22.11 (14.20)	69.50
T4	Fnvalerate 10EC	40g ai/ha	16.29 (7.9)	18.54 (10.20)	24.47 (17.20)	23.15 (15.50)	69.00
T5	Neem seed Kernel Extract	5%	15.37 (7.07)	22.09 (14.20)	24.48 (17.20)	20.27 (12.60)	69.80
T6	Endosulfan 35Ec	0.06kg a.i/ha	15.49 (7.20)	18.27 (9.87)	20.65 (12.50)	18.99 (10.63)	75.20
T7	Nimin	2%	17.62 (9.20)	20.64 (12.50)	22.90 (15.20)	23.43 (14.60)	71.30
T8	Control		16.97 (8.53)	23.19 (15.60)	28.98 (23.50)	27.61 (21.50)	57.26
SE (Mean CD at 5%)			0.867 NS	1.314 3.985	1.261 3.826	1.044 3.168	1.826 5.620

Figure in paramtheses are original values and figure are transferred in $\sqrt{x + \frac{1}{2}}$

The data on the effect of insecticidal treatment on cane-yield at harvest showed that all treatment were significantly superior to control. The maximum yield (82.03t/ha) were recorded from phorate, treated plot @ 1 kg. a.i./he which was at par with carbofuran treated plot (76.80 t/ha) @ 1 kg. a.i./ha followed with endosulfan treated plot (75.20t/ha) @ 0.60kg a.i./ha. The minimum yield (57.26 t/ha) was recorded on control plat. The yield of nimin, neem seed, kermel extract, fenvalerate and cypermethrin treated plot were recorded 71.30t and 69.80t 69.00t and 69.60t per hectare, respectively which were statistically at par. The Neem Seed Kernel Extract 5% and nimin 2% against sugarcane root borer check's the environmental pollution.

The long duration crop stand and attracts a number of insects from planting to harvesting period. Out of various pests *Emmalocera depressella*, which blocks the vascular bundle of the plant and causes Dead Heart Disease'. Infestation dries the shoot as well as reduced the sucrose percentage.

Comparative efficacy of seven insecticides was tried against the root borer of sugarcane which includes both synthetic and herbals. Amongst synthetic and herbals, the later showed comparative good control of the pest infestation. Parasitization in endosulphan, Neem Kernel Suspension was 9.2 % and 7.9 % respectively. So cultivated needs management which are follows: Integrated Pest Management (IPM), Judicious water management and bio-agents to control pests.

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