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Evaluation of Chemical and Botanical Insecticides Against Brinjal Epilachna Beetle

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ABSTRACT

Novel insecticides like diflubenzuron, bactospeine and a need formulation repel in were tested at the recommended concentrations and in combinations with the conventional insecticides like fenpropathrin, monocrotophos and carbaryl at half the recommended doses against spotted leaf beetle of brinjal. Spraying was coincided with the moderate infestation of the beetle. Data were recorded one day prior to spraying and also at 1,5,10 and 14 days after spraying. Fenpropathrin was found to be the best among all the treatments with 88.7 per cent reduction at one day after spraying. Combinations of diflubenzuron and bactospeine with fenpropathrin were more effective with 90.4 and 88.7 per cent reduction at 5 days after spraying and with 95.7 and 92.2 per cent reduction over control at 10 days after spraying.

Key words : Brinjal, Conventional, Insecticides, Ladybird Beetle, Novel Methods of Pest Control

Brinjal is an important solanaceous vegetable grown widely all over the country. It is high in nutritive value with 6.4% carbohydrates, 1.3% fat, 0.02% calcium, 0.06% phosphorus and is also claimed to have medicinal value. As many as 26 species of insect and non-insect pests have been reported to attack and cause damage to brinjal crop (Vevai, 1970). Among them spotted leaf beetle, Henosepilachna vigintioctopunctata is one.

Due to the irrational use of conventional insecticides several adverse effects like pest resistance, resurgence, residues, environmental pollution etc cropped up. To overcome the above disadvantages novel methods of pest control should be utilized. New insecticides like Diflubenzuron (Dimilin 25 WP) a chitin inhibitor, Bacillus thuringiensis (Bactospeine 16000 IU/mg) a microbial insecticide and a neem formulation (RD-9 Repelin) were utilized alone and in combination with conventional insecticides like fenpropathrin (Danitol 10 EC) a synthetic pyrethroid, monocrotophos (Nuvacron 36SC) an organophosphate and carbaryl (Sevin 50 WP) a carbamate at half of the recommended dosage to control the ladybird beetle on brinjal.

MATERIAL AND METHODS

Seed of brinjal variety, Pusa Purple Long weighing 150 gms was broadcasted in a raised nursery seedbed of 3 m^2 area in the College Farm, Agricultural College,Rajendranagar. The field experiment was laid out in in randomized block design with 16 treatments, replicated thrice. The plots measuring 20 m^2 each were transplanted with brinjal seedlings at inter- and intra-row spacing of 75 x 50 cm. Fertilizer was applied @ 100-60-60 kg NPK/ha in the form of urea, superphosphate and muriate of potash. The recommended agronomic practices were carried out from time to time.

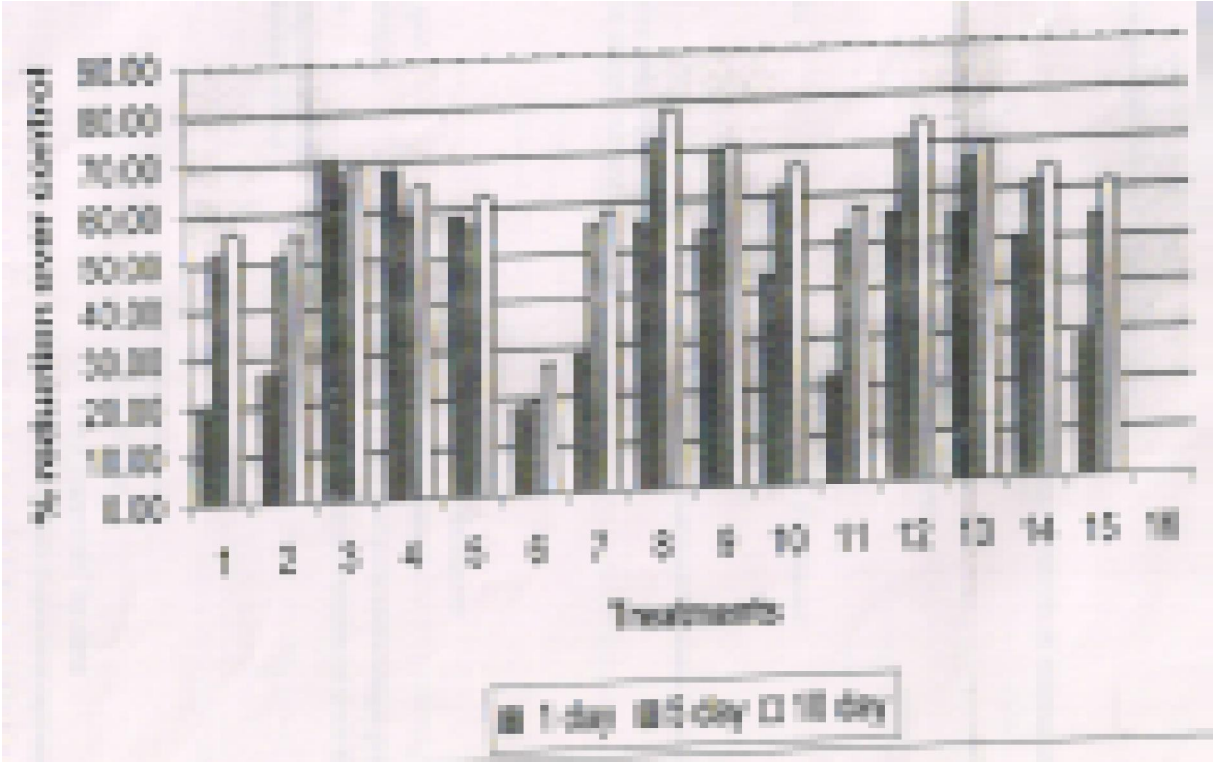
The insecticides were sprayed with knapsack compression sprayer at fortnightly intervals. The pest incidence was noticed 35 days after planting. Only one spray coinciding with the pest infestation was given during the period of study because there was moderate level of infestation in the field as noticed from the pre-treatment counts. Care was taken to prevent drift of spray fluid reaching the adjacent plots by putting a screen between plots. Observations on number of grubs and adult beetles were recorded from five randomly selected and tagged plants per plot/ treatment/ replication. The pest population levels were recorded one day prior to spraying and also on one, five, ten and fourteen days after imposing treatments in all the plots. The data on population at 14 days after spraying are not presented here as there was only negligible level of pest population without any build up of population at 14 days after spraying. From this data per cent mean reduction of pest population over control was calculated using modified aborts formula (Fleming and Ratnakaran, 1985) and then transformed to angular values. The data were subjected to analysis of variance.

$$\% \text{ population reduction} = \frac{(\text{Post-treatment population in treatments} \times \text{Pre-treatment population in check})}{\text{Pre-treatment population in check} \quad \text{Post-treatment population in treatments}} \times 100$$

Table 1. Efficacy of insecticidal treatments against H.*vigintioctopunctata.*

Treatment	Dose	Mean no of grubs & adults before spray	One day after spraying			Five days after spraying			Ten days after spraying		
			Mean no of grubs & adults	%reduc-tion Control	Over	Mean no of grubs & adults	%reduc-tion Control	Over	Mean no of grubs & adults	%reduc-tion Control	Over
Diflubenzuron	0.025	16.00	14.10	12.00	20.26	6.20	62.00	51.94	5.10	68.20	55.70
Bactospeine	0.15	13.00	10.40	20.00	26.57	5.10	61.10	51.42	4.30	66.60	54.70
Fenpropathrin	0.02	14.00	1.60	88.70	70.33	2.10	85.10	67.33	1.80	87.50	69.32
Monocrotophos	0.054	13.00	1.90	85.80	67.89	3.60	72.40	58.32	2.40	81.30	64.38
Carbaryl	0.15	13.00	3.70	72.00	58.05	4.20	68.20	55.70	2.90	77.90	61.97
Repelin	1.0	15.00	13.70	9.10	17.62	13.60	10.60	19.06	12.00	20.00	26.57
Diflubenzuron+Bactospeine	0.0125+0.075	12.00	9.30	22.90	28.59	4.00	67.20	55.09	3.30	72.00	58.06
Diflubenzuron+Fenpropathrin	0.0125+0.01	12.60	4.10	67.50	55.24	1.20	90.40	71.99	0.50	95.70	78.08
Diflubenzuron+Monocrotophos	0.0125+0.027	11.70	4.20	64.00	53.15	1.50	87.60	69.34	1.30	88.70	70.33
Diflubenzuron+Carbaryl	0.0125+0.075	13.00	6.90	47.30	43.48	3.10	76.80	61.24	2.20	83.30	65.88
Diflubenzuron+Repelin	0.0125+0.50	15.00	12.90	14.20	22.14	5.60	63.00	52.53	4.50	70.00	56.79
Bactospeine+Fenpropathrin	0.075+0.01	13.80	4.50	67.90	55.52	1.60	88.70	70.33	1.10	92.20	73.79
Bactospeine+Monocrotophos	0.075+0.027	11.00	3.70	66.60	54.70	1.90	83.50	66.01	1.40	87.60	69.34
Bactospeine+Carbaryl	0.075+0.075	10.50	4.40	58.00	49.64	2.50	76.40	60.96	1.90	81.50	64.50
Bactospeine+Repelin	0.075+0.50	13.70	10.60	23.30	28.84	4.90	65.00	53.73	3.20	76.40	60.96
Control		10.50	10.60	0.00	0.00	10.70	0.00	0.00	10.50	0.00	0.00
S.Ed					1.62			1.92			1.95
CD (0.05)					3.23			3.83			3.90

Fig 1. Efficacy of insecticides on epilachna beetle on brinjal



RESULTS AND DISCUSSION

At one day after spraying (Table 1, Fig 1) fenpropathrin showed highest efficacy against epilachna beetle with 88.7 per cent mean reduction of population over control. Monocrotophos and carbaryl followed recording 85.8 per cent and 72 per cent mean reduction of beetles. The next best treatments which were on par are bactospeine+ fenropathrin, diflubenzuron + fenpropathrin, bactospeine+monocrotophos and difluben - zuron+monocrotophos which showed 67.90,67.50,66.60 and 64.0 per cent mean reduction of pest population indicating no significant difference between them. Fairly good control of beetles was observed in the plots treated with bactospeine+carbary (58%) and diflubenzuron + carbary (47.3%). Diflubenzuron+repelin (14.2%) and diflubenzuron (12%) were on par with each other and showed poor efficacy while repelin was least effective among all the treatments with only 9,10 per cent mean reduction of beetles over control. However, all treatments were superior to control in bringing down the pest population.

At 5 days after spraying, diflubenzuron+ fenpropathrin was the most effective treatment with 90.40 per cent reduction and closely followed by bactospeine+fenpropathrin and difluenzuron +monocrotophos with 88.70 and 87.60 per cent reduction of grubs and adult population. Fenpropathrin and bactospecine+ monocrotophos with 85.10 and 83.50 per cent reduction also gave very good control of pest. Treatments that followed in the descending order of efficacy were diflubenzuron+ carbaryl, bactospeine+carbaryl, monocrotophos and were on par with 76.80, 76.40 and 72.40 per cent reduction.

At 10 days after spraying, the trend with regard to the efficacy of treatments was more or less similar to that obvserved at five days after spraying. Difluvenzuron+fenpropathrin was the most effective and significantly superior to the rest of the treatments. Bactospeine+fenpropathrin (92.2%) and diflubenzuron+monocrotophos (88.7%) also gave good control of the beetle. Repelin was found to be the least effective with 20 per cent reduction of population.

During the present investigation conventional insecticides proved more effective than combinations at one day after spraying and their efficacy declined from five days after spraying probably due to degradation. Rai *et al.,* (1986) reported prolonged efficacy of fenpropathrin against the beetle. Good control of beetles was obtained with monocrotophos at one day after spray (Pareek and Kavadia, 1987). Diflubenzuron and bactospeine were better individually and in combination at five days after spray than at one day after spray when compared with conventionals. Diflubenzuron+carbaryl was effective on epilachna (Srinivas *et al.,* 1986). Diflubenzuron shows its effect slowly *i.e,* during and after next molt after application (Arjuna Rao and Mehrotra, 1986). It interferes with cuticle deposition (Mulder and Gijswijt, 1973) and might have resulted in increased toxicity of combinations. Chandrasekhar, (1989) also reported enhanced toxicities of conventional in combination with diflubenzuron. Cantwell *et al.,* (1986) reported good degree of efficacy of bactospeine against spotted leaf beetles. Krushev and Marchenko (1981) reported increased toxicity of conventional in combination with bactospeine against insects. Repelin continued to show poor efficacy and there were no report to confirm the result.

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