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EVALUATION OF CERTAIN INSECTICIDES AGAINST SPOTTED POD BORER [*MARUCA VITRATA* (GEYER)] ON MUNGBEAN (*VIGNA RADIATA* L.)

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ABSTRACT
Present study was conducted at Agricultural Research Farm, Banaras Hindu University, Varanasi during *Kharif* season of 2013 and 2014 to know the efficacy of certain newer group of insecticides (Indoxacarb 14.5% SC, Spinosad 45% SC, Lambda cyhatlothrin 5% EC, Profenophos 50% EC, Imidacloprid 17.8% SL, Emamectin benzoate 5% SG, Thiamethoxam 25% WG, Bperofezine 25% SC and Clothianidin 50% WDG) against spotted pod borer (*Maruca vitrata*) on mungbean. In *Kharif* season of 2013and 2014Indoxacarb 14.5% SC, Spinosad 45% SC and Profenophos 50% EC were the most effective treatments and significantly superior to other treatment with 75.04, 73.02 and 68.50 % larval population reduction with maximum yield of mungbean *i.e.*,8.09, 9.06 and 8.59q/ha respectively, over control. The least effective treatment was Buprofezine 25% SC followed by Clothianidin 50% WDG with 40.87 and 38.66 % reduction in larval population and minimum yield of mungbean*i.e.*,8.13 and 8.55q/ha, respectively, over control.

INTRODUCTION

Mungbean or green gram (*Vigna radiata* L.) is the important pulse crop of India and it occupies about 3 Mha area with 0.25 MT productionand 425 kg/ha productivity (NAIPR, 2012). It is largely grown as intercrop or sole crop, relay crop in *kharif* season. There are more than 200 insect pests belonging to 48 families in Lepidoptera, Coleoptera, Thysanoptera, Diptera, Hemiptera, Hymenoptera, Isoptera, Orthoptera and 7 Mite of order Acarina attack ongreen gram and inflicting heavy damages at different growth stages in different agro climatic conditions (Lal and Sachan, 1987). Among these insect pests pod borer, *Maruca vitrata* (G.) is one of the devastating pests of pulses. It feed on plant species belonging to 20 genera and 6 families, the majority of which belonging to papilionaceae. Because of its extensive host range and destructiveness, it become as a persistent pest in pulse particularly on green gram, as it is cultivating throughout the year in different seasons. Under field condition *M. vitrata*is observed to bore into the unopened flower (Ganapathy, 1996). The infestation of *M. vitrata* was first noticed in vegetative stage of the black gram, where it webs the tender leaves at growing tip and feed on the chlorophyll content and make small holes, then shifts to the inflorescence and webs of thefloral parts and feed on them, due to which flower buds fail to open and dropped off from the inflorescence (Dillirao, 2001). It is known to cause economic loss of 20 - 25 per cent and yield loss of 2 - 84 per cent ingreen gram (Vishakanthaiah and Jagadeesh Babu, 1980). Farmers are adopting chemical control against *Maruca* after causing damage without knowing its occurrence on crop. The spotted pod borer, *M. vitrata* is serious pest of grain legume crops including mungbean, urdbean,pigeon pea and common beans (Chandrayudu, 2008). It attacks crops right from the pre-flowering to pod maturing stage causing yield loss. Hence, the present study was taken up to study the evaluation of certain insecticides against Spotted Pod Borer (*Maruca vitrata*) on mungbean (*Vigna radiata* L.) for use of safer chemicals, produce safe products and increase production with reduced adverse effect of chemicals on non target organisms.

MATERIALS AND METHODS

The experiment was laid out in a Randomized Block Design (RBD) with 10 treatments including untreated control and replicated thrice. The green gram variety, HUM-12 sown during *Kharif* 2013 and 2014 having 30 × 10 cm spacing between row to row and plant to plant.Nine insecticides *i.e.*, Indoxacarb 14.5% SC, Spinosad 45% SC, Lambda cyhatlothrin 5% EC, Profenophos 50% EC, Imidacloprid 17.8% SL, Emamectin benzoate 5% SG, Thiamethoxam25% WG, Bperofezine 25% SC and Clothianidin 50% WDG were evaluated against *Maruca vitrata*. Water sprayed plots were kept as control and volume of the spray liquid was taken as 500 litters per hectare. The number of pod borer was counted on five randomly selected plants in each treatment. Data were recorded at one day befores praying and1st, 7th and 15th days after spray from each treatment. The mean larval population of 1st, 7th and 15th days after spray was worked out for which reduction in population was calculated for each spray over control. The yield of plots was converted into hectare. The population of larva and grain yield was subjected to statistical analysis after square root transformation ($\sqrt{x+0.5}$).

The insecticide spray solution was prepared by using the following formula

$$\text{Amount of formulation} = \frac{\text{Concentration required (\%)} \times \text{Volume required (litre)}}{\text{Concentration of toxicant in insecticidal formulation}}$$

Per cent reduction in population over control was calculated by using following modified formula given by Henderson and Tilton (1955)

$$\text{Per cent reducationn over control} = 1 - \frac{\text{post treatment Population in Treatment}}{\text{Post Treatment Population in Treatment}} \text{ X } \frac{\text{post treatment Population in Control}}{\text{Post Treatment Population in Control}} \text{X100}$$

RESULTS AND DISCUSSION

During *kharif*, 2013 and 2014 the results on efficacy of treatments are presented in table 1. Before spraying count data of *Maruca* larval population recorded which showed more or less uniform distribution of the pest in the crop. The mean number of larval population varied from 1.98 to 2.65 per plant in all the treatments including untreated control. The data recorded one day after spray revealed that larval population ranged from 1.0 to 3.87. The population reduction range was from 36.26 to 66.06 per cent over untreated control. Most effective treatment one day after spray was Indoxacarb with 66.06 % reduction in population over control followed by Spinosad 65.28% and Profenophos 60.66 % reduction in population over control. The spray of Clothianidin and buprofezin showed low efficacy by recording lesser per cent population reduction *i.e.*36.26 and 39.15 %, respectively.

The data recorded seven days after spray, indicated that the Indoxacarb was the most effective and significantly superior over all the other treatments (84.17) with larval population ranged from 0.47 to 3.90. The population reduction range was from 84.17 to 46.27 % reduction in population over control.

The data recorded 15 days after spray, indicated that the Indoxacarb was the most effective and significantly superior over all the other treatments (80.32) with larval population ranged from 0.48 to 3.20. The population reduction range was from 80.32 to 43.96 % reduction in population over control.

On the basis of overall efficacy Indoxacarb and Spinosad were the most effective treatments and significantly superior to other treatments with 75.04 and 73.02 % larval reduction over control. The least effective treatment was Clothianidin, followed by Buprofezin with 38.66 and 40.87% reduction in larval population over control.

Similar work was also done by Singh *et al.* (2014) and they revealed that Indoxacarb 14.5 SC was effective for *H. armigera* management. Yadav *et al.* (2015) also showed that Indoxacarb 14.5 SC was most effective in reducing the pod borer damage and approximately similar results were found by Sonune *et al.* (2010), Yadav and Singh (2014), Srinivasan, (2008), Duraimurugan, (2014), Daharia and Katlam (2013) and Gadhiya *et al.* (2014).

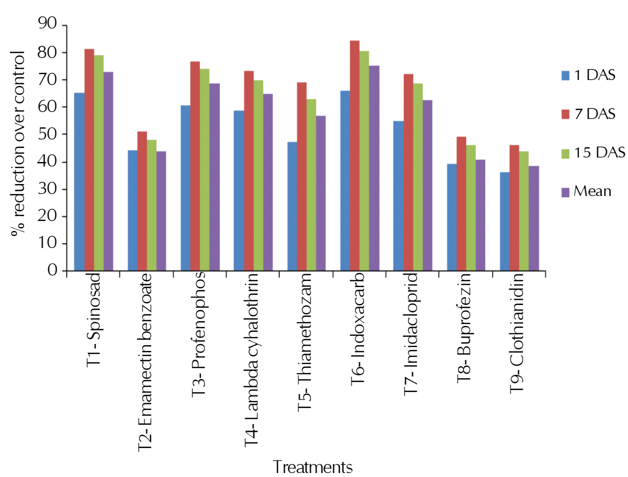

Figure 1: Efficacy of insecticides against M. Vitrata during 2013 and 2014

Table 1: Efficacy of different insecticides against *M. vitrata* on mungbean during*Kharif 2013* and 2014 (Pooled)

Treatment	Dose	Pre-spray	1 DAS	PROC	7 DAS	PROC	15 DAS	PROC	Mean	PROC	Yield
T1: Spinosad 45% SC	60 g a.i. /ha	2.65(1.78)	1.37(1.37)	65.28	0.75(1.12)	81.12	0.69(1.09)	78.84	0.94(1.20)	73.02	9.03
T2: Emamectin benzoate 5% SG	8g a.i. /ha	2.01(1.59)	1.67(1.47)	44.19	1.48(1.41)	50.92	1.28(1.33)	48.24	1.48(1.41)	43.99	7.92
T3: Profenophos 50% EC	500 g a.i. /ha	2.10(1.61)	1.23(1.31)	60.66	0.73(1.11)	76.83	0.67(1.08)	74.08	0.87(1.17)	68.50	8.59
T4: Lambdacyhalothrin 5% EC	40 g a.i. /ha	2.19(1.64)	1.35(1.36)	58.61	0.88(1.17)	73.21	0.81(1.14)	69.91	1.01(1.23)	64.94	8.12
T5: Thiamethoxam 25% WG	0.2 g/L	2.40(1.70)	1.88(1.54)	47.38	1.11(1.27)	69.17	1.10(1.26)	62.76	1.36(1.37)	56.92	7.64
T6: Indoxacarb 14.5% SC	65 g a.i./ha	1.98(1.58)	1.00(1.22)	66.06	0.47(0.98)	84.17	0.48(0.99)	80.32	0.65(1.07)	75.04	8.09
T7: Imidacloprid 17.8% SL	100 g a .i. /ha	2.42(1.71)	1.63(1.46)	54.77	1.02(1.23)	71.91	0.93(1.19)	68.76	1.19(1.30)	62.63	8.20
T8: Buprofezin 25% SC	600 ml /acre	2.43(1.71)	2.20(1.64)	39.15	1.85(1.53)	49.26	1.61(1.45)	46.20	1.89(1.54)	40.87	8.13
T9: Clothianidin 50% WDG	20 g a.i./ha	2.13(1.62)	2.02(1.59)	36.26	1.68(1.47)	46.27	1.47(1.40)	43.96	1.72(1.49)	38.66	8.55
T10: Control (Water Spray)	_	2.60(1.76)	3.87(2.09)		3.90(2.10)		3.20(1.92)		3.65(2.04)		5.58
S.Em ±		(0.05)	(0.03)		(0.02)		(0.02)		(0.03)		
CD @5%		N/S	(0.10)		(0.06)		(0.06)		(0.08)		(1.11)

*Figure in parenthesis is $\sqrt{x+0.5}$ transformed values, DAS: Days after spraying, PROC: Per cent reduction over control.

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