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Efficacy of Different Management Practices against *Chilo partellus* (Swinhoe) in Kharif Maize Crop in Western Uttar Pradesh, India

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A B S T R A C T

The field experiments were conducted to determine the comparative efficacy of different management practices against *Chilo partellus* (Swinhoe) in *Kharif* maize in western Uttar Pradesh. For present studies entitled.Evaluation of efficacy of some novel chemical insecticides against stem borer, *Chilo partellus* (Swinhoe) in maize., were conducted in randomized block design with three replications of six treatments during *Kharif*, 2011 at crop research centre of Sardar Vallabhbhai Patel University of Agriculture & Technology, Meerut (U.P.). The incidence of stem borer was initiated just after the 1st week of germination which increased thereafter and attained the economics threshold level 15 days after sowing, the mean per cent incidence of *C. Partellus* ranged from 11.12 to 17.78 per cent. Among all the treatments the seed treatment with Spinosad 45%SC spray @ 200ml/ha was performed best with maximum larval population reduction of *Chilo partellus* (82.95 per cent reduction After First Spray (AFS), 87.26 per cent reduction After Second Spray (ASS) and 87.57 per cent reduction After Third Spray (AFS) per cent dead hearts (1.66 per cent at 30 DAS and 2.33 per cent at 45 DAS) and percent life injury (1.33 per cent at 30 DAS and 1.66 per cent at 45 DAS). Fallowed by Bifenthrin10%EC spray @ 400ml/ha (75.53 per cent reduction After First Spray (AFS), 77.56 per cent reduction After Second Spray (ASS) and 78.17 per cent reduction After Third Spray (AFS) per cent dead hearts (2.33 per cent at 30 DAS and 3.33 per cent at 45 DAS) and percent life injury (1.66 per cent at 30 DAS and 2.33 per cent at 45 DAS) and minimum Imidachloprid17.8% SL spray @ 250 ml/ha (58.50 per cent reduction After First Spray (AFS), 61.52 per cent reduction After Second Spray (ASS) and 63.01 per cent reduction After Third Spray (AFS) per cent dead hearts (7.33 per cent at 30 DAS and 7.66 per cent at 45 DAS) and percent life injury (6.20 per cent at 30 DAS and 6.66 per cent at 45 DAS). The maximum grain yield of 45.1 q/ha and net profit of Rs. 24345 /ha obtained from the treatment of Spinosad and yield of 38.44 q/ha and net profit of Rs. 22486 /ha obtained from the treatment of Bifenthrin. The minimum grain yield of 28.41 q/ha and net profit of Rs. 7145 /ha was recorded in untreated control.

Keywords

Insecticide, Maize stem borer.

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Introduction

Maize or corn (*Zea mays* Linn.) is one of the important cereal crops of the world, cultivated for food, fodder and for raw material in many industries. In many parts of the world, it is an important food crop. Maize grain contains about 10 percent protein, 4 percent oil, 70 percent carbohydrates, 2-3 per cent crude fiber, 10.4 percent albuminoides, 1.4 percent ash. Its protein "ZEIN" *deficient in* two essential amino acids, tryptophan and *lysine.*

It *also contains significant* quantities *of* vitamin E calcium & *phosphorus.* Around 250 insect and mite species are attacking different stages of maize. The average losses caused by the insects are estimated around 10%. Among them, stem borer, *Chilo partellus* (Swinhoe), is the most serious pest during *kharif* causing 26.7-80.04% yield loss in different agro climatic regions of India.

Maize stem borer, *Chilo partellus* Swinhoe (Lepidoptera: Pyralidae) is one of the major biotic constraints in successful maize and sorghum production worldwide (James, 2003), particularly in Asia and Africa (Siddiqui & Marwaha, 1993). It has been reported to cause severe losses in maize crop throughout its geographical distribution including India. Yield losses of 24-75% have been reported by the attack of this pest alone.

Materials and Methods

To evaluate the efficacy of insecticides to control maize stem borer, the experiment was conducted at Crop research center, (C.R.C.) of the S.V.P.U.A&T, Meerut in western Uttar Pradesh. There were six insecticidal treatments, along with control. The experiment was conducted in a Randomized Block Design (R.B.D.) with seven treatments and replicated thrice. Ten plants were selected randomly for each plot. The total number of plots was twenty one. The maize seeds of cultivar 'SUJATA' were sown in plots size 4 x 3 m^2.

The dead hearts and leaf injury rating due to attack of stem borer were counted from randomly selected ten plants, at 30 and 45 DAS and their percentage was calculated on the basis of total plants observed. These plants were observed one day before and seven days after application. In treated plots insecticides application was done thrice during the crop season. First application of insecticides was given at 15 days after sowing, second application of insecticides was done after 30 days after sowing and third application was done after 45 days of sowing. The grain yields of all the plots were recorded at the time of harvest. Finally, the data obtained were subjected for arc sin transformation and then statistically analyzed.

Results and Discussion

Pretreatment count of stem borer per ten plants ranged from 11.66 to 17.78 per cent. The stem borer population reduced among all the treatments on different days of observation (Table 1).

Application of insecticides

After first application of insecticides

All the treatments were found effective and significantly superior to control treatment. Spinosad 45% S.C. @ 200 ml / ha was found most effective insecticide with (82.95 %) reduction of stem borer incidence. It was significantly superior with other all over treatments, followed by Bifenthrin 10% E.C @ 400 ml / ha (75.92 %). The least reduction of stem borer incidence was recorded in the plots treated with Imidacloprid 17.8% SL (58.50 %) insecticide (Table 1).

After second application insecticides

The second insecticidal application was done after thirty days of sowing. The data on mean per cent reduction over untreated control was revealed that all the treatments were effective and significantly superior to the untreated control. Spinosad 45 % S.C. @ 200 ml/ha was found the most effective treatments and reduced (87.26 %) stem borer incidence followed by Biffenthrin 10% E.C. @ 400 ml/ha reduced (80.59%). Table data revealed that order of effectiveness of different

insecticides after second application as follows, Cartap hydrochloride 50 % S.P. @ 1Kg./ha (77.56 %), Carbofuran 3G @ 20 Kg/ha (74.23 %), Phorate 10G @ 15 K.g /ha (70.91 %) and Imidachloprid 17.8% SL @ 250 ml/ha reduced (61.52 %) (Table 1).

After third application of insecticides

The third application was done at forty five days after sowing. The data on mean per cent reduction over untreated control revealed that all the treatments were effective and significantly superior over untreated control. Spinosad 45% S.C. @ 200 ml/ha was the found most effective treatment with (87.57 %) reduction of stem borer incidence. Bifenthrin 10 % E.C. @ 400 ml/ha reduced (81.20 %) stem borer infestation but it not differ significantly Cartap hydrochloride 50 % S.P. @ 1 kg/ha reduced (78.17 %) stem borer infestation after 7 days after treatment. Carbofuran 3 G @ 20 kg/ha and Phorate 10 G @ 15 kg/ ha had larvae incidence (75.14 %) and (71.82 %) and were at par with each other. Imidachloprid 17.8% SL @ 250 ml/ha was least effective with the lowest (63.06 %) stem borer incidence (Table 1).

Similarly, Ahmed *et al.*, (2002) who reported that Spinosad 45 % SC was very effective and recorded maximum reduction of the stem borer population.

Dead hearts

Thirty days after sowing

The data on dead heart formation is presented in table 1. The minimum dead heart formation (1.66) was found in the plots treated with Spinosad 45% S.C. @ 200 ml/ha followed by Bifenthrin 10 % E.C. @ 400 ml/ha (2.33), Cartap hydrochloride 50 % S.P. @ 1 kg/ha (3.33) and Carbofuran 3 G @ 20 kg/ha (4.66) per cent dead hearts formation. The more dead heart were found in the Phorate 10 G @ 15 kg/ha (6.33) and Imidachloprid 17.8% SL@ 250 ml/ha (7.33) treated plots. Maximum dead hearts was recorded in untreated control (8.33 %) (Table 1).

The treatment details for the management of maize stem borer were as follows

Symbol of Treatments	Treatments		Dose	Methods of Application
	Chemical name	Trade name		
T_1	Spinosad 45% SC	Tracer	200 ml/ha	Spraying
T_2	Phorate 10G	Phorate	15 kg/ha	Broadcasting
T_3	Carbofuran 3G	Crown	20 kg/ha	Broadcasting
T_4	Bifenthrin 10% EC	Talstar	400 ml/ha	Spraying
T_5	Cartap hydrochloride 50% SP	Cargo	1 kg/ha	Spraying
T_6	Imidacloprid 17.8% SL	Jubilant	250 ml/ha	Spraying
T_7	Control	----	-	Water spraying

Table.1 Efficacy of insecticides against maize stem borer *chilo pertellus*

Treatment	Dose	Pre treatment (%)	Mean per cent reduction (%)			Mean	Per cent DH		Per cent LIR	
			After 1st spray	After 2nd spray	After 3rd spray		30 DAS	45 DAS	30 DAS	45 DAS
Spinosad 45% Sc	**200 ml/ha**	15.57 (23.12)	82.95 (65.76)	87.26 (69.26)	87.57 (69.56)	85.93	1.66	2.33	1.33	1.66
Phorate 10G	**15 kg/ha**	13.34 (20.97)	68.89 (56.08)	70.91 (57.34)	71.82 (57.92)	70.54	6.33	7.00	5.44	5.66
Carbofuran3G	**20 kg/ha**	11.12 (15.98)	72.59 (58.46)	74.23 (59.55)	75.14 (60.12)	73.98	4.66	5.00	4.33	4.66
Bifenthrin 10% EC	**400 ml/ha**	15.56 (22.09)	75.92 (60.50)	80.59 (63.84)	81.20 (64.18)	79.24	2.33	3.33	1.66	2.33
Cartap hydrochloride 50% SP	**1 Kg/ha**	13.34 (24.89)	75.53 (60.61)	77.56 (61.78)	78.17 (62.56)	77.09	3.33	3.66	2.78	3.66
Imidachloprid17.8% SL	**250 ml/ha**	17.78 (15.98)	58.50 (49.88)	61.52 (51.64)	63.06 (52.56)	61.03	7.33	7.66	6.20	6.66
Control	---	11.12 (15.34)	0.00	0.00	0.00	0.00	8.33	9.33	7.33	8.66
SE (m)		**NS**	**1.89**	**1.39**	**1.487**	1.589	**1.73**	**2.37**	**2.02**	**2.51**
CD (p = 0.005)			**5.902**	**4.34**	**4.632**	4.958	**0.55**	**0.76**	**0.65**	**0.79**

Table.2 Economics of various treatments against *C. partellus* during *Kharif*, 2014

Treatment No.	Treatment Name	Dose/ha	Yield qt/ha	Saved yield over untreated control	Value of Saved yield	Total cost of treatment	Net income (Rs./ha)	Cost Benefit Ratio
T_1	**Spinosad 45% Sc**	**200 ml/ha**	45.01	22.81	34785.00	10440.00	24345.00	1:2.33
T_2	**Phorate 10G**	**15 kg/ha**	32.63	10.43	15905.00	4680.00	11225.00	1:2.39
T_3	**Carbofuran 3G**	**20 kg/ha**	35.91	13.71	20907.00	5280.00	15627.00	1:2.95
T_4	**Bifenthrin 10% EC**	**400 ml/ha**	38.44	16.24	24766.00	2280.00	22486.00	1:9.86
T_5	**Cartap hydrochloride 50% SP**	**1 kg/ha**	36.93	14.73	22463.00	4080.00	18383.00	1:4.50
T_6	**Imidachloprid17.8% SL**	**250 ml/ha**	28.41	6.21	9470.00	2325.00	7145.00	1:3.35
T_7	**Control**	---	22.20	---	---	---	---	---

Forty five days after sowing

The minimum dead heart formation was found in treatment Spinosad 45% S.C. @ 200 ml/ha treated plots (2.33) followed by Bifenthrin 10 % E.C. @ 400 ml/ha (3.33), Cartap hydrochloride 50 % S.P. @ 1 kg/ha (3.66) and Carbofuran 3 G @ 20 kg/ha (5.00). The more dead heart were found in treatment Phorate 10 G @ 15 kg/ha (7.00) and Imidachloprid 17.8% SL @ 250 ml/ha (7.66). Maximum dead hearts was recorded in untreated control (9.33) per cent. (Table no.1) Similarly, Pal *et al.*, (2009), they recorded the damage of *C. partellus* in maize withdead hearts varied from 7.4 to 14.3 percent.

Leaf injury

Thirty days after sowing

The observation showed that the minimum leaf injury (1.33) was found in plots treated with Spinosad 45% S.C. @ 200 ml/ha and (1.66) followed by Bifenthrin 10 % E.C. @ 400 ml/ha. Other insecticides, Cartap hydrochloride 50 % S.P. @ 1 kg/ha, Carbofuran 3 G @ 20 kg/ha, Phorate 10 G @ 15 kg/ha and Imidachloprid 17.8% SL @ 250 ml/ha were recorded leaf injury rating in order of (2.78), (4.33), (5.44) and (6.20) leaf injury rating, respectively. The highest leaf injury (7.33) was recorded in the untreated control. (Table no.1)

Forty five days after sowing

The observation showed that the minimum leaf injury (1.66) was found in the plots treated with Spinosad 45% S.C. @ 200 ml/ha followed by Bifenthrin 10 % E.C. @ 400 ml/ha (2.33). Other insecticides, Cartap hydrochloride 50 % S.P. @ 1 kg/ha, Carbofuran 3 G @ 20 kg/ha, Phorate 10 G @ 15 kg/ha and Imidachloprid 17.8% SL @ 250 ml/ha leaf injury rating were recorded leaf injury rating in order of (3.66), (4.66), (5.66) and (6.66), respectively. The highest leaf injury (8.66) was recorded with untreated control (Table 1). Similarly, Pal *et al.,* (2009) reported that leaf injury rating in *kharif* shown maize was 2.1 to 7.3.

Grain yield and cost benefit ratio of different insecticidal treated plots

The maximum mean grain yield was recorded 45.01 q/ha with Spinosad treatment. Bifenthrin was the second most effective treatment, recorded 38.44 q/ha of grain yield. The other treatment in descending order were Cartap hydrochloride, Carbofuran, Phorate and Imidachloprid with grain yield of 36.93, 35.91, 32.63 and 28.41 q/ha (Table 2).

References

Ahmed, S., Saleem, M. A. and Rauf, I. 2002. Field efficacy of some bioinsecticides against maize and jowar stem borer, *Chilo partellus* (Pyralidae: Lepidoptera). *Journal of Agriculture and Biology;* 4(3): 332-334.

James, C., 2003. Global review of Commercialized Transgenic Crops features Bt Maize. *ISAAA*: Ithaca, New York.

Pal, R., Singh, G., Prasad, C. S., Ali, N., Kumar, A. and Dhaka, S. S. 2009. Field evaluation of Bio-pesticides and Bio-agent against stem borer, *Chilo partellus* (Swinhoe) in Maize. *Ann. PI. Protec. Sci.,* 17(2): 325-327.

Siddiqui, K. H., and K. K. Marwaha, 1993. The vistas of maize entomology in India, Kalyani Publishers, New Delhi, India, 185p.

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