International Journal of Pharmaceutical Research and Applications
Volume 8, Issue 6 Nov-Dec 2023, pp: 16-19 www.ijprajournal.com ISSN: 2249-7781

Studies on the effectiveness of superimposing various insecticides against the pink stem borer (Sesamia inference) in wheat crop

Megha R. Raikar[1*], P. S. Tippannavar[2], Shekharappa[3], Suma Biradar[4] and I.K. Kalappanavar[5]

[1*]*PhD Scholar, Department of Entomology, College of Agriculture, University of Agricultural Sciences, Dharwad 580005, Karnataka, India.*

[2] *Professor of Entomology & Sr. Farm Superintendent, Department of Entomology, University of Agricultural Sciences, Dharwad 580005, Karnataka, India.*

[3] *Associate Director of Research (HQ), Professor and University HoD, Department of Entomology, College of Agriculture, University of Agricultural Sciences, Dharwad 580005, Karnataka, India.*

[4] *Principal Scientist, AICRP on wheat, College of Agriculture, University of Agricultural Sciences, Dharwad 580005, Karnataka, India.*

[5]*Dean(Agri), College of Agriculture, Vijayapur, Department of Pathology, College of Agriculture, University of Agricultural Sciences, Dharwad 580005, Karnataka, India.*

Submitted: 01-11-2023 Accepted: 12-11-2023

ABSTRACT

A field experiment was conducted in a Main Agricultural Research Station, during 2021-22 and 2022-23 to study the impact of superimposing various insecticides against the pink stem borer (Sesamia inference) in wheat crop. The analysis of pooled data revealed that, the soil application of Chlorantraniliprole 0.4 % G @ 8 Kg/ha + Chlorantraniliprole 18.5 % SC @ 0.15 ml/l+ Cypermethrin 10 % EC @ 0.5 ml/l followed by Fipronil 0.3 % G @ 8 Kg/ha + Chlorantraniliprole 18.5 % SC @ 0.15 ml/l+ Cypermethrin 10 % EC @ 0.5 ml/l proved their supremacy by documenting mean per cent dead heart of 2.60and 2.73 per cent, respectively. Similarly same treatments recorded 87.65 and 78.64 during 2021-22, 87.27 and 77.37 per cent reduction over control 2022-23, respectively.

Key words: Pink stem borer, insecticides, dead heart

I. INTRODUCTION

Wheat (Triticumaestivum L.) is the second most important cereal crop of India and plays a vital role in food and nutritional security of the country. Nearly 55 per cent of the world population depends on wheat to meet out 20 per cent of calories intake. It is one of the major food grains of the country and a staple food of the people of North India, where people have preference for chapatti. Introduction of Mexican semi-dwarfs, followed by locally bred semi-dwarfs and development and adoption of management technologies resulted in dramatic increases in yield and total production. Photo-insensitivity of the modern varieties had permitted diversification and intensification of wheat-based cropping systems (Anon., 2014).

The pink stem borer Sesamiainferens (Walker) (Lepidoptera: Noctuidae) is an oriental species that occur in the Indian subcontinent, China, Pakistan, Japan, Taiwan, Indonesia, Solomon Islands, Southeast and East Asia. It is originally a pest of rice (Pathak and Khan, 1994), but became an established pest of wheat due to adoption of tillage system of sowing of wheat crop in North-Western plains of India and causes major damage by feeding inside the stem causing dead hearts at tillering stage and empty white heads at earhead ripening stage and ultimately reduced yield by more than 11 per cent in India (Saxenaet al, 1972). Signs of damage in wheat were similar to those recorded in rice and damage caused by larvae of this insect is expressed as “dead hearts” at seedling stage and “white ears” at earhead stage (Deol, 2002). Using the different tools of Integrated Pest Management (IPM) i.e cultural control, mechanical control, biological control and chemical control may help to manage this new emerging pest of cereals. Proper date of sowing may helpful to escape the pest occurrence by breaking the synchronization between crop stage and pest appearance. Resistant/ tolerant varieties are more effective than chemical control as damaging stage ie., larvae is hidden inside the stem (Baladhiyaet al., 2018). Systematic study pertaining to pink stem borer of wheat is lacking and this insect pest is affecting economic part of

International Journal of Pharmaceutical Research and Applications
Volume 8, Issue 6 Nov-Dec 2023, pp: 16-19 www.ijprajournal.com ISSN: 2249-7781

crop so it is taking major prominence in recent years. In this regard present study is undertaken.

II. MATERIAL AND METHODS

The study was conducted at Main Agricultural Research Station (MARS), Dharwad during Rabi season 2022-23 under irrigated conditions. All the crop production technologies were adopted as per the package of practice except plant protection measures against target insect pests. Fish meal trap without poison was used to attract the adult shoot flies to the experimental area. The studies on management of shoot fly and stem borer were carried out with fourteen treatments replicated thrice in randomized block design to test the efficacy of insecticides against stem borer. Observations on dead heart incidence due to shoot fly was recorded at a day before imposition of treatment and five, ten and fifteen days after treatment by selecting 100 plants randomly in each treatment and per cent dead heart was calculated by using the formula:

$$\text{Per cent dead heart} = \frac{\text{No. of plants showing dead heart}}{\text{Total no. of plants observed}} \times 100$$

All the data collected in each experiment were subjected to the suitable transformations to analyses. The analysis were done by using RBD excel design and values were analysed using Duccans Multiple Range Test (DMRT) in M-STAT software (Gomez and Gomez 1984).

III. RESULTS AND DISCUSSION

Considering the mean and pooled data of both the seasons, observations on superimposition of variousinsecticidal treatments revealed that, T12 and T13 confirmed their superiority by registering 1.65 and 1.70 percent dead heart, respectively. While, T10 (2.90%), T11 (3.17%), T8 (3.66), T6 (3.68), T9 (4.16%), and T8 (4.26%) were the next best treatments and on level with each other. Efficiency of all the treatments depicted in percent reduction over control data where maximum per cent reduction was witnessed in T12 (87.65 %) T13 (87.27 %), T10 (78.29 %) and T11 (76.27 %). However, next best treatments were, T8, T6, T9 and T7 were also found effective 72.63, 72.47, 68.85 and 68.11 per cent reduction over control. Remarkably least effective treatments were T1 and T2 with 9.18 and 8.80 per cent reduction over control.

Mean of all the observations revealed that, T12 and T13 confirmed its superiority by registering 3.55 and 3.76 percent dead heart, respectively. While, T11 (5.27 %), T10 (5.52 %), T6 (6.28 %), T8 (6.30 %), T9 (6.34 %), T3 (6.48 %) and T8 (6.84 %) were the next best treatments and on level with each other superior over untreated check (16.61 %). Pooled data on stem borer infestation revealed that, T12 and T13 recorded 3.55 and 3.76 per cent dead heart followed by T10 (4.21 %), T11 (4.22 %), T6 (4.98 %), T8 (4.98 %), T9 (5.25 %) and T7 (5.55 %) which were on par with each other which were comparable with untreated check.

Table 1. Evaluation of insecticides against stem borer (Sesamia inference) in wheat during (pooled data of 2021-22 and 2022-23)

Tr No.	Treatments details	Dead heart (%)			Percent ROC	
		Mean		Pooled		
		2021-22	2022-23		2021-22	2022-23
T1	Thiamethoxam 30 % FS @ 5 g/Kg	12.13 (20.36)^{d}	13.69 (18.56)^{ef}	12.91 (21.02)^{d}	9.18	17.58
T2	Tetraniliprole 480 FS 6.25 g/Kg	12.18 (20.41)^{d}	13.15 (18.53)^{ef}	12.66 (20.81)^{d}	8.80	20.86
T3	Chlorantraniliprole 0.4 % G @ 8 Kg/ha	4.76 (12.53)^{cd}	6.48 (11.94)^{c}	5.62 (13.66)^{b}	64.35	60.97
T4	Fipronil 0.3 % G @ 8 Kg/ha	4.95 (12.85)^{cd}	6.93 (13.01)^{de}	5.94 (14.09)^{b}	62.92	58.28
T5	Cypermethrin 10 % EC @ 0.5 ml/l	5.15 (13.04)^{cd}	7.41 (13.44)^{de}	6.28 (14.49)^{c}	61.45	55.37

T6	T1+ Chlorantraniliprole 18.5 % SC @ 0.15 ml/l	3.68 (11.06)[bc]	6.28 (12.24)[bcd]	4.98 (12.84)[ab]	72.47	62.21
T7	T1 + Cypermethrin 10 % EC @ 0.5 ml/l	4.26 (11.91)[bc]	6.84 (12.88)[bcd]	5.55 (13.58)[ab]	68.11	58.84
T8	T2 + Chlorantraniliprole 18.5 % SC @ 0.15 ml/l	3.66 (11.02)[bc]	6.30 (12.31)[bcd]	4.98 (12.75)[ab]	72.63	62.10
T9	T2 + Cypermethrin 10 % EC @ 0.5 ml/l	4.16 (11.77)[bc]	6.34 (11.62)[c]	5.25 (13.20)[ab]	68.85	61.81
T10	T1 + Chlorantraniliprole 18.5 % SC @ 0.15 ml/l+ Cypermethrin 10 % EC @ 0.5 ml/l	2.90 (9.80)[b]	5.52 (10.43)[bc]	4.21 (11.78)[ab]	78.29	66.79
T11	T2 + Chlorantraniliprole 18.5 % SC @ 0.15 ml/l+ Cypermethrin 10 % EC @ 0.5 ml/l	3.17 (10.25)[bc]	5.27 (10.06)[ab]	4.22 (11.76)[ab]	76.27	68.27
T12	T3+ Chlorantraniliprole 18.5 % SC @ 0.15 ml/l+ Cypermethrin 10 % EC @ 0.5 ml/l	1.65 (7.38)[a]	3.55 (7.83)[a]	2.60 (9.24)[a]	87.65	78.64
T13	T4 + Chlorantraniliprole 18.5 % SC @ 0.15 ml/l+ Cypermethrin 10 % EC @ 0.5 ml/l	1.70 (7.49)[a]	3.76 (8.32)[a]	2.73 (9.44)[a]	87.27	77.37
T14	Untreated Check	13.36 (21.35)[d]	16.61 (21.55)[f]	14.98 (22.73)[d]	-	-
	S.Em. ±	0.69	0.68	0.70	-	-
	CD (P=0.05)	2.10	2.08	2.12	-	-
	CV (%)	9.30	10.86	8.41	-	-

DBS: Days Before Spray DAS: Days After Spraying
ROC : Reduction over control
*Figures in parentheses are arcsine transformed values

Means followed by same alphabet in a column do not differ significantly (0.05) by DMRT

Pooled data on per cent dead heart of stem borer S. inference on 2021-22 and 2022-23 revealed that, T12 and T13 proved their efficiency by recording 2.60 and 2.73 per cent, respectively. While, T10 (4.21 %), T11 (4.22 %), T6 (6.92 %), T8 (4.98 %), T9 (5.25 %) and T13 (5.55 %) were also proved to best treatments and also found on par with each other and superior over untreated check. Efficiency of all the treatments depicted in percent reduction over control data where maximum per cent reduction was demonstrated in T12 (78.64 %) T13 (77.37 %), T11 (68.27 %) and T10 (66.79 %). However, seed treatment followed by spray with single insecticide also demonstrated effective results in case of T6, T8, T9, T3, and T7 with 62.21, 62.10, 61.81, 60.97 and 58.84 per cent, respectively. While, least effective treatments are T2 and T1 with 20.86 and 17.58 per cent reduction over control.

In present study better management for pink stem borer in soil application followed by tank mixed spray of two insecticides which has given satisfactory control. For soil application their should be enough soil moisture for getting complete benefit of granular insecticides and many of the researches proved the efficiency of granular insecticides particular against lepidopteran pests. According to Sachanet al. (2018) chlorantraniliprole 18.5 SC @ 150 mL ha–1 was an effective treatment in reducing the stem borer infestation and obtained higher grain yield. Sarao and Cheema (2014) reported that chlorantraniliprole (Ferterra) @ 40 g a.i. ha^{-1} significantly reduced the dead heart and white ear head damage in rice. Niranjanet al. (2018) reported the effectiveness of chlorantraniliprole, fipronil and cartap hydrochloride granules against stem borer.

Similar studies were also carried out by Arundhati S, (2018) against pink stem borer in finger millet, application of Cartap hydrochloride (4% GR) @20kg/ha applied in the soil at 30 days after sowing (DAS) performed best against pink stem borer and recorded 3.2% dead heart, 4.9% white ear head and highest incremental yield (7.9 q/ha). In another study, the granular insecticide molecules showed minimum leaf injury rating with carbofuran (3.00) which was at par with flubendamide (3.23) followed by thiamethoxam (3.43), emamectin benzoate (3.57), rynaxypyr (4.03) and cartap hydrochloride (4.17) treated plots against pink stem borer (Yogeshet al., 2017).

Many researchers also emphasised the practicality of seed treatment and foliar spray against stem borer, with Mashwaniet al. (2011) revealed the relative efficacy of seed dressers, granules, and foliar formulations against maize stem borer (C. partellus). Two field trials revealed that seed treatments with thiomethoxam 70WS and imidacloprid 70WS at 5 g/kg seed were much more effective than alternative application techniques. Imidacloprid and thiamethoxam reduced C. partellus by 97.30 and 88.00%, respectively.

IV. CONCLUSION

Among various treatments for the management pink stem borer T12 (Chlorantraniliprole 0.4 % G @ 8kg/ha + Chlorantraniliprole 18.5 % SC @ 0.15 + Cypermethrin 10 % EC @ 0.5 ml/l and T13 (Fipronil 0.3 % G @ 8 kg/ha + Chlorantraniliprole 18.5 % SC @ 0.15 + Cypermethrin 10 % EC @ 0.5 ml/l with 2.60 and 2.73 per cent dead heart, respectively and gave better results over other treatments. Hence soil application followed by foliar spray proved their efficacy by providing low dead heart and per cent reduction over control.

REFERENCES

[1]. Anonymous, Wheat Cultivation in India Pocket Guide, Extension Bulletin: 52, Directorate of Wheat Research, Karnal, Haryana, 2014, pp 134-139.

[2]. Saxena R C, Mathur Y K and Sharma S K. Varietal susceptibility of wheat against pink borer, Sesamiainferens Walker (Lepidoptera: Noctuidae). Labdev. Journal of Science and Technology, 1972: 10-52.

[3]. Deol GS, Latest trends for insect-pest management in wheat. Proceedings of Specialized Workshop on Identification and Management of Weeds, Insect-Pests and Diseases in Wheat. CETWPT, Panjab Agricultural University, Ludhiana. 2002: 256-262.

[4]. Baladhiya HC, DB Sisodiya and NP Pathan, A review on pink stem borer, Sesamiainferens Walker: A threat to cereals, Journal of Entomology and Zoology Studies 2018, 6(3): 1235-1239.

[5]. Gomez K A and Gomez AA, Statistical Procedures for Agricultural Research. 2nd Edition, John Wiley and Sons, New York, 1984, pp 680.

[6]. Sachan SK, Kashyap AK, Sharma R, Verma KD and Singh HR, Efficacy of some novel insecticides against yellow stem borer, Scirpophagaincertulas (Walker) in basmati rice. Journal of Pharmacognosy and Phytochemistry, 2018,1: 195-197.

[7]. Sarao P S and Cheema HK, Efficacy of ferterra 0.4% GR (chlorantraniliprole) against stem borers and leaf folder insect-pests of basmati rice. Journal of Environmental Biology, 2014, 35: 815-819.

[8]. Niranjan HP, Suja G and Shobha Y B, Evaluation of the efficacy of new generation granular insecticides against rice yellow stem borer, Scirpophagaincertulas (Walker) in Thiruvananthapuram District, Kerala, India. International Journal of Current Microbiology and Applied Sciences, 2018, 7(10): 374-379.

[9]. Arundhati S, Management of pink stem borer (Sesamiainferens walker) in finger millet (Eleusinecoracanagaertn). Journal of Entomology and Zoology Studies,2018, 6(5): 491-495.

[10]. Yogesh K S, AkashNirmal, Rupesh K G, Manmohan S B and Pankaj B, Insect pest succession on hybrid maize and management of pink stem borer, Sesamiainferens Walker. Journal of Pharmacognosy and Phytochemistry,2017, SP1: 143-150.

[11]. Mashwani M A, Ullah F, Sattar S, Ahmad S and Anwar Khan M., Efficacy of different insecticides against maize stem borer, ChilopartellusSwinhoe (lepidoptera; pyralidae) at Peshawar and swat valleys of Khyber pakhtunkhwa, PakistanSarhad. Journal of Agriculture,2011, 27(3):459-465.