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Efficacy of Different Insecticides against Rice Earhead Bug, *Leptocorisa acuta* (Thunberg) (Hemiptera : Alydidae)

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ABSTRACT: The field experiment for the study of "Efficacy of different insecticides against rice earhead bug, *Leptocorisa acuta* (Thunberg) (Hemiptera : Alydidae)" was carried out at Department of Agronomy, College of Agriculture, Dapoli, Dist. Ratnagiri, during *Kharif* 2022-23. The efficacy Buprofezin, Deltamethrin, Dinetofuran, Flonicamid, Imidacloprid, Spriromesifen, Sulphoxaflor was evaluated. Flonicamid was found superior and most effective in controlling rice earhead bug. This was followed by Spiromesifen, Buprofezin, Dinetofuran, Deltamethrin, Imidacloprid and Sulphoxaflor. All the treatments were significantly better over control.

Keywords: Rice, Rice earhead bug, Leptocorisa acuta, Efficacy, insecticides.

INTRODUCTION

Rice, *Oryza sativa* (Linn) is one of the important cereal crops, being the staple food for more than 65 per cent of the world's population. It is cultivated in almost all the tropical, subtropical and temperate countries of the world. Asia produces and consumes more than 92 per cent of the world's rice. Rice accounts for almost one-fourth of total planted area and feeds more than half of the Indian population. Because of the importance of rice, the United Nations selected 2004 as the International Year of Rice. Asia's rice production is mostly dependent on irrigated rice fields, which generate approx, ultimately three fourth of all rice harvested. Rice is farmed on 441.56 lakh ha in India, with an annual production of 104.99 million t (Indiastat.com 2022-23). Rice is grown in Maharashtra on an area of 551 lakh ha, with a yield of 34.31 lakh t and a productivity of 3012 kg ha^{-1} (Indiastat.com, 2018-19). In Konkan with an annual production of roughly 1.52 million tonnes and an average productivity of around 2930 kg ha^{-1}, rice is grown on an area of 0.39 million hectares. In comparison to Western Maharashtra, Marathwada, and Vidarbha, the Konkan region has a larger area, more production and higher average productivity. The five districts that make up the Konkan region are Sindhudurg, Palghar, Raigad, Thane, and Ratnagiri. The highest production of rice in the Konkan region is produced on 0.31 million hectares of land in Raigad districts with 3500 kg ha^{-1}, Sindhudurg has the highest productivity in the Konkan region. According to Anonymous (2020b), Thane have the lowest area (0.05 million hectares), 0.11 million tonnes of production and 1667 kg of productivity per hectare. Rice is attacked by several insect pests from nursery to harvest, which cause severe yield loss across the countries. Rice earhead bug, *Leptocorisa* spp. (Hemiptera: Alydidae), is a major pest of rice (Rao and Prakash, 1995). Both nymphs and adults cause harm by feeding on the sap of milky grain and making them partially or entirely chaffy under heavy infestation. A small yellowish brown spot developed at the feeding site, which later grew to form a yellowish brown elliptical spot with a greyish centre. When disturbed, both nymphs and adults expel a strong buggy odour. Rice earhead bug is a sporadic pest of rice and one of the most serious pests of rice in India, reducing yield by up to 30 per cent at times. Adults are slender and brown-green, measuring 19-16 mm in length. The younger instars are pale in colour. The antennae of the nymphs are long. The elder instars are yellowish green and are 1.8-6.2 mm long. The eggs are oblong, lustrous, and reddish brown and they are laid in batches of 10-20 along the midrib on the upper surface of the leaf in one to three rows (Tiwari *et al.,* 2014). The earhead bug complex, which includes *L. acuta, L. oratorius, L.*

lepida, and L. varicornis, is the most economically important insect pest attacking rice crops. According to recent research, *L. oratorius* is more widespread in the south, west, and east, whereas *L. acuta* is more abundant in the north. The management of rice earhead bug is also important, therefore the present study was carried out to know the efficacy of insecticides against rice earhead bug infesting rice in Konkan region.

MATERIAL AND METHODS

Location. The experiment for the efficacy of different insecticides against rice earhead bug Leptocorisa acuta (Thunberg) (Hemiptera : Alydidae) was conducted at Department of Agronomy, Dr. BSKKV, Dapoli, Dist. Ratnagiri during kharif season of 2022-23.

Experimental details. An Experiment was laid in Randomized Block Design (RBD) with three replications. The experiment consisted of eight treatments (seven insecticidal treatments and one as untreated control) and three replications. Thus, there were 24 blocks of treatments. All treatments were randomly allocated in each replication. Ratnagiri-1 variety of rice was used for the study.

Method and period of insecticide application. The quantity of spray suspension required for spraying was calculated by spraying water over the controlled plots before the application of insecticides. The spray suspension of desired quantity was prepared against pests on field and spraying was done.

The spraying of insecticides was done. Spraying was applied when the incidence was noticed. The observations were recorded on ten randomly selected hills in each treatment.

Methods of recording observations. The observations were recorded on 10 randomly selected plants in each replication by counting number of earhead bugs per hill. The pre-count observations were made on a day before spray, and post count observations were recorded on number earhead bugs/hill at 1st, 3rd, 5th and 10th days after spray.

The mean data on population of earhead bugs were processed after suitable transformation and were subjected to ANOVA.

Statistical methods. The data obtained from all of the treatments were statistically analyzed statistically by applying technique of analysis of variance as applicable in Randomized Block Design (RBD) and presented. The mean, standard error (S.E.) and critical difference (C.D.) at 5 per cent probability was worked out for comparison between treatments. The results are given in table and depicted by graphs and figures wherever necessary.

RESULTS AND DISCUSSION

A. Evaluate the efficacy of insecticides against rice earhead bug, L. acuta

The data pertaining to the efficacy of different insecticides against rice earhead bug on 1st , 3rd , 5th and 10th days after spray are presented in the Table 1 and in fig. 1.

Precount. One day before the application of insecticides, there were 1.60 to 2.10 rice earhead bugs/hills. The pest was observed to be distributed very uniformly across the rice crop, as evidenced by the observation that the mean number of earhead bugs on ten selected plants across treatments was not significant.

Spraying. The observations recorded one day after the spraying of insecticide showed that the population ranged between 0.63 to 1.80 earhead bugs/hills. The observations indicated that all the treatments were recorded significantly less earhead bug population as compared to untreated control. The treatment T_4 (Flonicamid 50% WG @ 0.3gm) was found to be the most effective, which recorded least 0.63 mean earhead bugs/hill, followed by T_6 (Spiromesifen 22.9% SC @ 0.8ml) which recorded 0.92 earhead bugs/hill, followed by T_1 (Buprofezin 25% SC @ 2ml) which recorded 1.12 earhead bugs/hill. The treatments, T_5 and T_3 (Imidacloprid 17.8% SL @ 0.2ml and Dinetofuran 20% SG @ 0.3gm) were at par with each other recorded 1.27 and 1.32 mean earhead bugs/hill. The treatment T_2 (Deltamethrin 11% EC @ 0.3ml) recorded 1.48 earhead bugs/hill and was at par with T_7 (Sulphoxaflor 24% SC @ 0.8ml) which recorded 1.56 earhead bugs/hill. The untreated control records highest 1.80 earhead bug population than all other treatments.

The observations recorded on third day after the spraying of insecticides that all the treatments were recorded significantly less earhead bug population as compared to untreated control. The mean earhead bug population ranged from 0.42 to 1.40. The treatment T_4 (Flonicamid 50% WG @ 0.3gm) was found to be most effective treatment which recorded 0.42 mean population of earhead bugs/hill and followed by T_6 (Spiromesifen 22.9% SC @ 0.8ml) which recorded 0.51 earhead bugs/hill. The treatments T_1 and T_3 (Buprofezin 25% SC @ 2ml and Dinetofuran 20% SG @ 0.3gm) which recorded 0.63 and 0.67 earhead bugs/hill and were at par with each other. The treatment T_2 (Deltamethrin 11% EC @ 0.3ml) which recorded 0.75 earhead bugs/hill and was at par with treatment T_5 (Imidacloprid 17.8% SL @ 0.2ml) which recorded 0.81 earhead bugs/hill and it was followed by T_7 (Sulphoxaflor 24% SC @ 0.8ml) which recorded 0.87 mean earhead bugs/hill. The untreated control recorded 1.40 highest mean earhead bug population.

Fifth day after spraying the observations indicated that all the treatments were recorded significantly less earhead bug population as compared to untreated control. The mean earhead bug population ranged from 0.51 to 1.56. The treatment T_4 (Flonicamid 50% WG @ 0.3g) was found to be the most effective treatment which recorded 0.51 earhead bug population was at par with T_6 (Spiromesifen 22.9% SC @ 0.8ml) which recorded 0.56 earhead bugs/hill. The treatment T_2 (Deltamethrin 11% EC @ 0.3ml) which recorded 0.62 earhead bugs/hill and was at par with T_1 (Buprofezin 25% SC @ 2ml) which recorded 0.69 earhead bugs/hill. The treatment T_3 (Dinetofuran 20% SG @ 0.3g) which recorded 0.71 earhead bugs/hill. The treatments T_5 and T_7 (Imidacloprid 17.8% SL @ 0.2ml and Sulphoxaflor 24% SC @ 0.8ml) were at par with each other which recorded 0.89 and 0.91 earhead bugs/hill. The untreated control recorded 1.56 highest mean earhead bug population.

Table 1: Efficacy of different insecticides against rice earhead bug, *L. acuta.*

Sr. No.	Treatment	Dose per litre	Mean infestation of rice earhead bugs/hill					
			Precount	1 DAS	3 DAS	5 DAS	10 DAS	overall mean
1.	Buprofezin 25% SC @ 2 ml	2ml	1.8 (1.68)	1.12 (1.46)	0.63 (1.28)	0.69 (1.30)	0.31 (1.14)	0.91 (1.38)
2.	Deltamethrin 11% EC @ 0.3 ml	0.3ml	1.86 (1.70)	1.48 (1.58)	0.75 (1.33)	0.62 (1.27)	0.42 (1.19)	1.02 (1.43)
3.	Dinetofuran 20% SG @ 0.3 gm	0.3g	1.92 (1.71)	1.32 (1.52)	0.67 (1.29)	0.71 (1.31)	0.36 (1.17)	1.00 (1.41)
4.	Flonicamid 50% WG @ 0.3 gm	0.3g	1.6 (1.61)	0.63 (1.28)	0.42 (1.19)	0.51 (1.23)	0.09 (1.04)	0.65 (1.28)
5.	Imidacloprid 17.8% SL @ 0.2 ml	0.2ml	1.8 (1.67)	1.27 (1.51)	0.81 (1.35)	0.89 (1.37)	0.49 (1.22)	1.05 (1.43)
6.	Spiromesifen 22.9% SC @ 0.8 ml	0.8ml	1.6 (1.61)	0.92 (1.39)	0.51 (1.23)	0.56 (1.25)	0.25 (1.12)	0.77 (1.33)
7.	Sulphoxaflor 24% SC @ 0.8 ml	0.8ml	1.9 (1.70)	1.56 (1.60)	0.87 (1.37)	0.91 (1.38)	0.51 (1.23)	1.15 (1.47)
8.	Untreated Control	-	2.1 (1.76)	1.8 (1.67)	1.4 (1.55)	1.56 (1.60)	1.27 (1.51)	1.63 (1.62)
CD (p =0.05)			**0.02**	**0.01**	**0.01**	**0.01**	**0.01**	**0.01**
S.E.(m±)			**NS**	**0.04**	**0.03**	**0.03**	**0.02**	**0.04**

* Figures in parenthesis are √n+1 values ** DAS: Days After Spraying

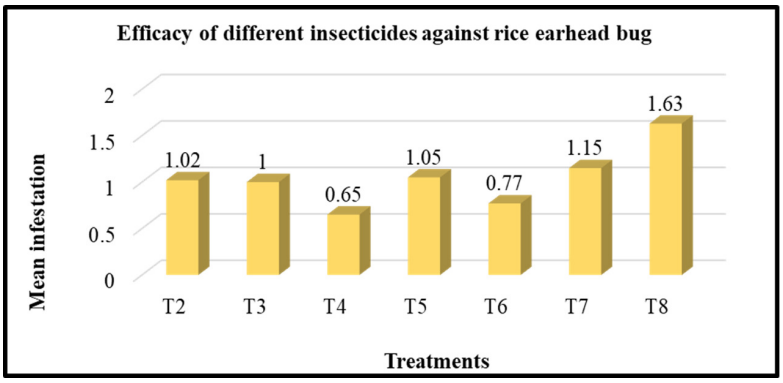

Fig. 1. Efficacy of different insecticides against rice earhead bug, *L. acuta.*

The observations recorded at tenth day after spraying indicated that all the treatments were recorded significantly less earhead bug population as compared to untreated control. The mean earhead bug population ranged between 0.09 to 1.27. The treatment T_4 (Flonicamid 50% WG @ 0.3g) was found to be the most effective treatment which recorded 0.09 earhead bugs/hill. The treatment T_6 (Spiromesifen 22.9% SC @0.8ml) which recorded 0.25 earhead bugs/hill and was at par with T_1 (Buprofezin 25% SC @ 2ml) which recorded 0.31 earhead bugs/hill. The treatments T_3 and T_2 (Dinetofuran 20% SG @ 0.3g and Deltamethrin 11% EC @ 0.3ml) was at par with each other which recorded 0.36 and 0.42 earhead bugs/hill. The treatment T_5 (Imidacloprid 17.8% SL @ 0.2ml) which recorded 0.49 earhead bugs/hill and was at par with T_7 (Sulphoxaflor 24% SC @ 0.8ml) which recorded 0.51 earhead bugs/hill. The untreated control recorded 1.27 highest earhead bug population.

The result of overall mean earhead bug population after spraying ranged from 0.65 to 1.63 indicated that all the treatments were significantly less earhead bug population as compared to the untreated control. The data revealed that among all the treatments T_4 (Flonicamid 50% WG @ 0.3g) was found to be superior treatment which recorded 0.65 mean earhead bug population. The next best treatment was T_6 (Spiromesifen 22.9% SC @ 0.8ml) with 0.77 earhead bugs/hill. The next best treatments were T_1 and T_3 (Buprofezin 25% SC @ 2ml and Dinetofuran 20% SG @ 0.3g) was at par with each other which recorded 0.91 and 1.0 earhead bugs/hill. The treatments T_2 (Deltamethrin 11% EC @ 0.3ml), T_5 (Imidacloprid 17.8% SL @ 0.2ml) and T_7 (Sulphoxaflor 24% SC @ 0.8ml) were at par with each other which recorded 1.02, 1.05 and 1.15 earhead bugs/hill, respectively while the maximum earhead bug population 1.63 was recorded in untreated control.

Present results were discussed in the light of following workers.

Our reports were in conformity with the Srinivas *et al.* (2022); Seni *et al.* (2019) ; Pankaj *et al.* (2020) that Flonicamid @ 50g ai/ ha was the most effective in controlling the sucking pests. Buprofezin 25SC @

700ml ha^{-1}, Dinotefuron 20 SG @ 200 ml/ha and Monocrotophos 36 SL @ 1390ml ha^{-1} were effective against rice stemborer and gundhi bug also in agreement with findings of Rath, 2011 and 2012. Baruah *et al*. (2016) reported that the Buprofezin was also effective in reducing rice earhead bug population. Sharma *et al*. (2019) who found that the plots treated with Fipronil 5 per cent + Buprofezin 20 SC recorded the lowest number of earhead bug population (2.10 and 3.51 nos./5 sweep nets) after first and second insecticidal sprays respectively.

CONCLUSIONS

The data on cumulative mean rice earhead bug population after spraying indicated that all the treatments were recorded significantly less earhead bug population as compared to untreated control. The mean earhead bug population ranged from 0.65 to 1.63 per hill. The studies on the bio-efficacy of various insecticides against rice earhead bug indicated that T_4 (Flonicamid 50% WG @ 0.3g) was found to be most effective treatment against rice earhead bug with an incidence of 0.65 earhead bugs/hill at 10 days after spraying. This was followed by T_6 (Spiromesifen 22.9% SC @ 0.8ml) which recorded 0.77 earhead bugs/hill. The next best treatments were T_1 and T_3 (Buprofezin 25% SC @ 2ml and Dinetofuran 20% SG @ 0.3g) were at par with each other which recorded 0.91 and 1.00 eahead bugs/hill, respectively. The next best treatments in descending order were T_2, T_5 and T_7 (Deltamethrin 11% EC @ 0.3ml, Imidacloprid 17.8% SL @ 0.2ml and Sulphoxaflor 24% SC @ 0.8ml) and were at par with each other scoring 1.02, 1.05 and 1.15 earhead bugs/hill, respectively. The maximum infestation 1.63 earhead bugs/hill was noticed in untreated control.

The efficacy Buprofezin, Deltamethrin, Dinetofuran, Flonicamid, Imidacloprid, Spriromesifen, Sulphoxaflor was evaluated against rice earhead bug. The least mean population of rice earhead bug 0.65 /hill was observed in the plot treated with Flonicamid. The treatment Flonicamid 50 WG was found superior and most effective in controlling infestation of rice earhead bug.

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