SHORT COMMUNICATION Oryza Vol. 51 No.4, 2014 (324-326)

Field evaluation of selected insecticides against insect pests of wet season transplanted rice

PC Rath*, S Lenka, SD Mohapatra and M Jena

ICAR-Nentral Rice Research Institute, Cuttack-753006, Odisha, India
****e-mail: pc67rath@rediffmail.com***

ABSTRACT

Eleven insecticides including a new insecticide sulfoxaflor 24SC and standard insecticide monocrotophos 36SL were evaluated in the field against yellow stem borer and rice gundhi bug during wet season of 2011 and 2012. Plots treated with imidacloprid 17.8 SL @ 500 g a.i. ha^{-1} recorded lowest (3.6%) dead heart (DH), 3.6% white ear head (WEH), 6.5% grain damage due to gundhi bug and highest grain yield i.e., 5.18 t ha^{-1} in cv Jaya followed by sulfoxaflor 24 SC @ 90 g a.i. ha^{-1} (4.61 t ha^{-1}), thiamethoxam 25WG@ 25 g a.i. ha^{-1} (4.58 t ha^{-1}) and triazophos 40EC @ 450 g a.i. ha^{-1} (4.56 t ha^{-1}) during 2011. Similar trend was also observed in 2012. During both the years, all the insecticides significantly reduced stem borer and gundhi bug damage over control. The standard insecticide monocrotophos 36SL@500 g a.i. ha^{-1} was found superior to the new insecticide sulfoxaflor 24SC at lower dose i.e. 75 g a.i. ha^{-1} against yellow stem borer and gundhi bug damage.

Key words: *insecticide, evaluation, rice, stem borer, gundhi bug*

Stem borers damage the rice plants from seedling to maturity, in all ecosystems. Rice stem borers are of major economic significance causing 25-30% loss to rice crop (Senapati and Panda, 1999). Yellow stem borer (YSB), *Scirpophaga incertulas* (Walk.) is the most predominant of these causing serious damage in rice including autumn (boro) rice (Misra *et al*, 2005). Gundhi bug (*Leptocorisa varicornis* Fab.*)* is a serious pest of rice and sometimes reduces yield by as much as 30%. Various chemical insecticides have been recommended to control the rice bugs. Application of various granular and sprayable insecticide formulations gives effective control of rice pests. However, resistance to existing insecticides is an on-going problem that requires the development of new insect control tools. The sulfoximines, as exemplified by sulfoxaflor represent a new class of insecticides. Sulfoxaflor exhibits a high degree of efficacy against a wide range of sap-feeding insects, including those resistant to neonicotinoids and other insecticides (Sparks *et al*. 2013). The present investigation is aimed at generating information on efficacy of newer insecticides against these prevailing pests in wet season rice.

Field trials were conducted during wet season 2011 and 2012 at the research farm of Central Rice Research Institute, Cuttack. The trial was laid out in randomized block design with three replications. Two seedlings per hill of variety Jaya were transplanted at a spacing of 20 x 15 cm. Individual plots (5 x 4 m) were separated by bunds and channels to regulate water flow. Eight insecticide formulations at the dose specied against each *viz*., imidacloprid 17.8 SL @ 50 g a.i. ha^{-1}, thiamethoxam 25 @75 g a.i. ha^{-1}, acephate 95 SG @ 560 g a.i. ha^{-1}, acephate 75 SP @ 600 g a.i. ha^{-1}, dinotefuran 20 SG @ 30 g a.i. and 40 g a.i. ha^{-1}, triazophos 40 EC @ 250 g a.i. ha^{-1}, new insecticide sulfoxaflor 24 SC 75 g a.i. ha^{-1} and 90 g a.i. ha^{-1} with standard insecticide check monocrotophos 36 SL @ 500 g a.i. ha^{-1} and the insect growth regulator buprofezin 25 SC @ 175 g a.i. ha^{-1}, (Table 1) were evaluated against major insect pests of rice. Treatments were applied at 50 and 75 days after transplanting when dead heart and gundhi bugs were seen in the field. Gundhi bug damage was calculated by counting total grain to infested grains in the 20 panicles sampled from each plot. Dead heart (DH) and white ear head (WEH)

Table 1. Bio-efficacy of some new insecticide against insect pest of rice during wet season 2011 and 2012

Treatments	Doseg a.i. ha^{-1}	% DH		% WEH		% grain damage by gundhi bug		Yield (t ha^{-1})	
		2011	2012	2011	2012	2011	2012	2011	2012
Sulfoxaflor 24 SC	75	6.1 (14.3)	5.8 (13.93)	5.8 (13.93)	5.76 (13.88)	11.2 (19.55)	15.43 (23.12)	3.91	3.83
Sulfoxaflor 24 SC	90	4.06 (11.62)	3.5 (11.78)	3.8 (11.24)	3.62 (10.97)	7.33 (15.70)	10.40 (18.81)	4.61	4.59
Acephate 95SG	560	4.93 (12.83)	5.2 (13.18)	4.86 (12.74)	5.4 (13.43)	9.6 (18.05)	13.00 (21.13)	4.18	4.17
Acephate 75SP	600	5.5 (13.56)	5.53 (13.58)	5.4 (13.43)	5.6 (13.68)	10.4 (18.81)	13.61 (21.64)	4.00	4.05
Dinotefuran 20SG	30	5.6 (13.68)	5.66 (13.75)	5.6 (13.68)	5.66 (13.75)	10.63 (19.03)	14.87 (22.68)	3.95	3.92
Dinotefuran 20SG	40	4.93 (12.81)	5.4 (13.43)	5.2 (13.18)	5.53 (13.58)	10.0 (18.43)	13.06 (21.14)	4.11	4.15
Thiamethoxam 25WG	25	4.2 (11.82)	4.26 (11.82)	4.1 (11.68)	4.3 (11.97)	8.16 (16.60)	10.63 (19.03)	4.58	4.55
Triazophos 40EC	250	4.3 (11.97)	4.2 (11.82)	4.3 (11.97)	4.5 (12.24)	8.66 (17.12)	11.2 (19.55)	4.56	4.51
Buprofezin 25SC	175	4.7 (12.52)	4.86 (12.74)	4.6 (12.38)	5.2 (13.18)	9.4 (17.85)	12.78 (21.02)	4.23	4.30
Imidacloprid 17.8SL	50	3.6 (10.93)	3.3 (10.46)	3.6 (10.93)	3.87 (11.35)	6.5 (14.76)	9.95 (18.38)	5.18	5.12
Monocrotophos 36SL	500	4.6 (12.38)	4.7 (12.52)	4.3 (11.96)	4.86 (12.74)	9.16 (17.62)	12.37 (20.57)	4.36	4.42
Control		8.53 (16.96)	8.76 (17.21)	8.43 (16.87)	8.96 (17.41)	14.93 (22.73)	20.16 (26.65)	3.13	3.11
CD (P<0.05)		0.69	0.54	0.37	0.51	0.34	0.64	0.66	0.57

Data in the parentheses are angular transformed values

observations were taken from 20 hills from each plot. Grain yield data were recorded from each plot. The data were subjected to statistical analysis after suitable transformation. Observations on stem borer damage at vegetative stage were recorded after 10 days of treatment. Pre-harvest observation on stem borer damage was recorded by counting the ear bearing tillers and number of (WEH).

During 2011, damage due to YSB at vegetative stage (DH) varied from 3.6 to 6.1%, while at heading stage 3.6 to 5.8% (WEH) in insecticide treated plots. In the control plot extent of DH and WEH was 8.53% and 8.43%, respectively. The gundhi bug damage ranged between 6.5 to 11.2% and grain yield was 3.91 to 5.18 t ha^{-1} in insecticide treated plot as compared to 14.93% and 3.13 t ha^{-1} in the control plot (Table 1).

Results of the experiment revealed that imidacloprid 17.8 SL @ 50 g a.i. ha^{-1} recorded lowest percentage of dead heart (3.6%), white ear head (3.6%), gundhi bug damage (6.5%) and highest grain yield of 5.18 t ha^{-1} followed by the treatment with sulfoxaflor 24SC @ 90 g a.i. ha^{-1} giving 4.61 t ha^{-1} and thiamethoxam 25WG @ 25 g a.i. ha^{-1} giving 4.58 t ha^{-1}. The yield recorded under imidacloprid treatment was at par with that of sulfoxaflor 24 SC @ 90 g a.i.ha^{-1}, thiamethoxam 25 WG @ 25 g ha^{-1} and triazophos 40EC @ 250 g a.i. ha^{-1}. All the insecticides were found very effective against stem borer and gundhibug. In the control plot recorded , 8.53% DH, 8.43% WEH damage and 14.93% gundhi bug damage and the grain yield was 3.13 t ha^{-1}. Result of the experiment during wet season 2012 revealed that imidacloprid 17.8 SL@ 50 g a.i. ha^{-1} recorded lowest percentage of DH (3.3%), WEH (3.87%), gundhi bug damage (9.95 %) and highest grain yield of 5.12 t ha^{-1} followed by the treatment sulfoxaflor 24 SC @ 90 g a.i. ha^{-1} (yield 4.59 t/ha) and thiamethoxam 25WG @ 25 g a.i. ha^{-1}(yield 4.55t ha^{-1}), and triazophos 40% @ 250 g a.i. ha^{-1} (yield 4.51 t ha^{-1}). All the insecticides were found significantly effective against stem borer and gundhi bug. In the control plot, borer damage was highest (*i.e.*, 8.76% DH, 8.96% WEH) and gundhi bug damage (20.16%) and the grain yield was lowest (3.11 t ha^{-1}).

The present findings corroborate the findings of Rath *et al*. (2010) who reported that most of the new insecticides were effective in controlling the stem borer incidence. Buprofezin 25SC @ 700ml ha^{-1}, acephate 95SG@ 592 ml ha^{-1}, dinotefuron 20 SG @ 200 ml/ha and monocrotophos 36 SL @ 1390ml ha^{-1} were effective against rice stemborer and gundhibug also in agreement with findings of Rath, 2011 and 2012. Mishra (2003) also reported that imidacloprid 200 SL @ 50 g a.i.ha^{-1} proved significantly effective in controlling gundhi bug as compared to control.

Applications of new insecticides for control of rice gundhi bug were advocated by Singh (1993) which support the present finding. The check insecticide monocrotophos 36 SL 500 g a.i. ha^{-1} was found superior to new insecticide at lower dose i.e. sulfoxaflor 24 SC @ 75 g ha^{-1} against stem borer and gundhi bug damage during both the years of study. Tiwari *et al*. (2014) also recorded minimum grain damage (11.1%) in plots treated with monocrotophos

Based on the results it can be concluded that all the insecticides tested, significantly reduced damage due to yellow stem borer and gundhi bug. The treatment imidacloprid recorded highest grain yield during both the years which is significantly superior to the standard insecticide monocrotophos and was at par with thiamethoxam, triazophos and the new insecticide sulfoxaflor. The new insecticide at low dose sulfoxaflor 24 SC @ 75 g a.i. ha^{-1} is inferior to standard insecticide in its efficacy against stem borer and gundhi bug.

REFERENCES

Misra AK, Singh SPN and Parwez A 2005.Incidence of yellow stem borer, *Scirpophaga incertulas* (Walker) in different cultivars of *boro* rice (*Oryza sativa* L.) at different crop stages.Oryza,42 (4): 329-332

Misra HP, 2003. Evaluation of new insecticides against rice gundhi bug. Indian Journal of Plant Protection, 31(2):107-108

Rath LK, Mohapatra RN, Nayak US and Tripathy P 2010. Evaluation of new molecules against yellow stem borer infesting rice. Abstract in National symposium on emerging trends in pest management strategies under changing climatic scenario 20-21, December, held at OUAT Bhubaneswar, Odisha.pp.145

Rath PC 2011.Testing of some new insecticides against insect pest of rice. J. Plant Prot. & Environ. 8(1):31-33

Rath PC 2012. Field evaluation of newer insecticides against insect pest of rice. *Indian Journal of Plant Protection*, 40(2):148-149

Senapati B and SK Panda 1999. Rice stem borers : insect pests of cereals and their management. Eds. Anand Prakash and Jagadiswami Rao. AZRA publs. Cuttack. India, pp: 2-18.

Singh YP 1993. Bio-efficacy and residues of phorate and quinalphos in upland paddy at medium high altitude. Indian Journal of Plant Protection,21:39-43

Sparks TC, Watson GB , Loso MR, Geng C, Babcock JM, Thomas JD 2013. Sulfoxaflor and the sulfoximine insecticides: Chemistry, mode of action and basis for efficacy on resistant insects, Pesticide Biochemistry and Physiology 107 (1) : 1-7

Tiwari A, Pandey JP, Tripathi K, Pandey D, Pandey B and Shukla N 2014. Effectiveness of Insecticides and Biopesticides against Gundhi Bug on Rice Crop in District Rewa (M. P.), India . International Journal of Scientific and Research Publications 4 (1), January 2014: 1-4.