FIELD EFFICACY OF SOME NEONICOTINOD INSECTICIDES AGAINST PLANTHOPPERS UNDER WET LAND RICE

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ABSTRACT: Field experiments were conducted at APRRI, Maruteru to study the efficacy of some insecticides against planthoppers (BPH and WBPH) in rice. Among the insecticides, the granular formulations, phosphamidon 10 G and carbofuran 3 G @ 1000 g a.i./ha were ineffective and among the spray formulations, imidacloprid 200 SL, imidacloprid 70 WG and imidacloprid 350 SC @ 25 g a.i./ha and clothianidin 50 WDG @ 12 g a.i./ha were effective in reducing the build up of planthoppers. Highest grain yields were recorded in bifenthrin 10 EC @ 60 g a.i./ha and was on par with clothianidin 50 WDG @ 12 g a.i./ha, imidacloprid 350 SC and imidacloprid 70 WG @ 25 g a.i./ha and treated check monocrotophos 36 WSC @ 500 g a.i./ha. Highest number of natural enemies was observed in untreated control and phosphamidon 10 G treated plots.

Keywords: Rice, neonicotinoids, planthoppers, bio-efficacy.

Introduction: Among the insect pests of rice, the brown planthopper, *Nilaparvata lugens* stal and white backed planthopper, *Sogatella furcifera* Horvarth (Delphacidae: Homoptera) occur both in wet and dry seasons of the Krishna – Godavari deltas and inflicting considerable damage to the crop (Kalode and Krishnaiah, 1990). Insecticides are one of the major dependable tools to suppress the build up of planthoppers (Krishnaiah AND Kalode (1988), Krishnaiah *et al*., (2002) and Varma *et al*., (2003)). The extensive use of insecticides against planthoppers may pose the problems of insecticide resistance and resurgence (Sarupa *et al*., 1998 and Padmakumari *et al*., 2002).

Therefore, it is necessary to generate information on new insecticide molecules against planthoppers from time to time to have a wider choice of chemicals. Hence, the present study was conducted to evaluate certain insecticides against planthoppers in rice.

Materials And Methods: Field experiments were conducted at Andhra Pradesh Rice Research Institute, Maruteru during *Kharif* 2003 and *Rabi* 2003-04 under irrigated rice, to evaluate the efficacy of some new insecticides against planthoppers. The trials were laid out in a randomized block design with thirteen treatments and replicated four times. Swarna (MTU 7029) and IR 64 were the subject varieties during *Kharif* and *Rabi* respectively. The individual plots were separated by bunds and channels to prevent any seepage from one plot to another. Two to three seedlings per each hill were planted with a spacing of 20 x 15 cm during *Kharif* and 15 x 15 cm in *Rabi*. Normal agronomic practices recommended were adopted. A spray fluid of 500 litres/ha was used in case of spray formulations to ensure thorough coverage of the crop canopy with the help of knapsack sprayer and the granular insecticides were mixed with sand @ 25 kg/ha and broadcasted to ensure uniform distribution in the field. Enough care was taken to prevent drift from one plot to another. The test insecticides were applied at once when the planthopper population exceeds ETL.

The data on planthoppers (BPH and WBPH) and natural enemies (spiders and mirid bugs) on 10 randomly selected hills from each plot were recorded at one day before and five and ten days after the insecticides application. The data was subjected to statistical scrutiny after square root transformations and the means were separated by LSD method (Cochran and Cox, 1957). The grain yields from the net plot were collected and computed to yield in kg/ha and summarized results presented in tables 1 and 2.

Results And Discussion Planthoppers: *KHARIF* 2003: The planthopper population was moderate during the study. The results of the data in table 1 indicated that among the treatments, the two granular formulations viz., phosphamidon 10 G and carbofuran 3G and among the spray formulations profenophos 50 EC and L-cyhalothrin 2.5 SC at both the doses tested were inferior in minimizing the planthopper population. While, imidacloprid 200 SL @ 25 g a.i./ha and imidacloprid 70WG @ 25 g a.i./ha were most effective in reducing the planthopper population compared to the treated check monocrotophos 36 WSC @ 500 g a.i./ha and was followed by imidacloprid 350 SC @ 25 g a.i./ha and clothianidin 50 WDG @ 10 g a.i./ha at five days after the treatment.

At ten days after the treatment, three formulations of imidacloprid viz., imidacloprid 200 SL, imidacloprid 70 WG and imidacloprid 350 SC @ 25 g a.i./ha and clothianidin 50 WDG @ 10 g a.i./ha were most effective in reducing the planthopper population than the treated check monocrotophos 36 WSC @ 500 g a.i./ha and was followed by profenophos 40 EC + cypermethrin 4 EC @ 440 g a.i./ha and profenophos 50 EC @ 500 g a.i./ha. All the other treatments were inferior in reducing the planthopper population. The overall per cent reduction of planthoppers

among the insecticides over the untreated control revealed that imidacloprid 200 SL @ 25 g a.i./ha recorded highest per cent reduction (93.82%) and was followed by imidacloprid 70 WG @ 25 g a.i./ha (92.35%), imidacloprid 350 SC @ 25 g a.i./ha (91.26%) and clothianidin 50 WDG @ 10 g a.i./ha (90.49%).

***RABI* 2003-04:** The results of the data during *Rabi* 2003-04 are summarized and presented in table 2. The results showed that all the treatments except phosphamidon 10 G were effective in reducing the planthopper population at five days after the treatment. At ten days after the treatment the three formulations of imidacloprid viz., imidacloprid 70 WG, imidacloprid 200 SL and imidacloprid 350 SC @ 25 g a.i./ha and clothianidin 50 WDG @ 12 g a.i./ha significantly reduced the planthopper population than the untreated control. Phosphamidon 10 G @ 1000 g a.i./ha recorded more number of planthoppers than the untreated plots.

The overall results indicated that imidacloprid 70 WG @ 25 g a.i./ha was superior in reducing the planthopper population (77.38%) and was followed by clothianidin 50 WDG @ 12 g (72.14%), imidacloprid 350 SC (69.62%) and imidacloprid 200 SL (68.95%) @ 25 g a.i./ha.

On the basis of results obtained in both the seasons in the present study, it can be concluded that among the insecticides tested, the neonicotinoids viz., the three formulations of imidacloprid (imidacloprid 200 SL, imidacloprid 70 WG and imidacloprid 350 SC) and clothianidin 50 WDG were superior in reducing the build up of planthopper population as shown in tables 1 and 2. Similar results with neonicotinoids against rice planthoppers were observed earlier by Bhavani and Rao (2005), DRR (1998), Krishnaiah *et al.,* (2003), Krishnaiah *et al*., (2004) and Mao and Liang (1995).

Grain Yields: The yield differences among the different treatments were not significant during *Kharif* 2003. However, bifenthrin 10 EC @ 60 g a.i./ha treated plots recorded highest grain yield and was on par with clothianidin 50 WDG @ 12 g a.i./ha, imidacloprid 350 SC @ 25 g a.i./ha and the treated check 36 WSC @ 500 g a.i./ha. All the other treatments recorded lower grain yields.

Natural Enemies: The untreated control and phosphamidon 10 G treated plots recorded higher number of mirid bugs and spiders than the other treatments during both the seasons.

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Table 1. Efficacy of some insecticides on planthoppers and natural enemies, *Kharif* 2003

S. No.	Pariculars of the treatment	Dose g a.i./h	Planthopper population/			% Population reduction over control			Natural Mirid bugs	Grain yield kg/ha
			BT	5 DAT	10	5	10	Mean		
1	Phosphamidon 10 G	1000	141	208	386.0	44.09	27.16	35.62	78	4837
2	Carbofuran 3 G	1000	169	210	284.0	43.55	46.44	44.99	38	5595
3	Imidacloprid 350 SC	25	105	37.0	40.0	90.05	92.48	91.26	22	5586
4	Imidacloprid 70 WG	25	105	26.0	44.0	93.01	91.69	92.35	19	5560
5	Imidacloprid 200 SL	25	115	20.0	37.0	94.62	93.02	93.82	52	5573
6	Clothianidin 50WDG	10	104	37.0	48.0	90.05	90.94	90.49	21	5332
7	Profenophos 50 EC	500	135	129.0	213.0	65.32	59.81	62.56	36	5352
8	Profenophos 40 EC+ cypermethrin	440	118	88.0	144.0	76.34	72.83	74.58	26	5697
9	Chlorpyriphos 50 + cypermethrin 5	344	157	115.0	242.0	69.09	54.33	61.71	32	5404
10	L-cyhalothrin 2.5 SC	12.5	148	151.0	245.0	59.4	53.77	56.58	29	5208
11	L-cyhalothrin 2.5 SC	10	194	212.0	287.0	43.0	45.84	44.42	30	5228
12	Monocrotophos 36 WSC	500	172	102.0	161.0	72.58	69.62	71.10	38	5280
13	Untreated control	-	138	372.0	530.0	-	-	-	46	5072
	F-test		NS	Sig	Sig				-	NS
	CD (0.05)		-	4.44	3.69					-
	CV (%)		16.32	31.24	20.5				-	9.7

Figures in parenthesis are square root transformed values BT: Before treatment DAT: Days after the treatment

Table 2. Efficacy of some insecticides on planthoppers and natural enemies, *Rabi* 2003-04

S.No.	Pariculars of the treatment	Dose g a.i./ha	Planthopper population/10 hills			% Population reduction over			Natural enemies/10		Grain yield
			BT	5 DAT	10 DAT	5DAT	10 DAT	Mean	Mirid	Spiders	
1	Phosphamidon 10 G	1000	12.5	82.8	1736	-1.22	-71.03	-36.12	21.8	25.8	3689
2	Carbofuran 3 G	1000	16.3	39.8	556	51.35	45.22	48.28	10.0	19.5	4438
3	Imidacloprid 350 SC	25	14.0	36.0	170	56.00	83.25	69.62	2.3	16.8	5122
4	Imidacloprid 70 WG	25	6.3	27.5	119	66.38	88.27	77.38	6.3	20.8	4778
5	Imidacloprid 200 SL	25	16.5	38.3	155	53.18	84.72	68.95	4.8	14.5	4378
6	Clothianidin 50WDG	12	14.3	46.8	131	57.20	87.09	72.14	2.8	12.0	5172
7	Clothianidin 50WDG	10	14.0	31.5	211	42.79	79.21	61.05	3.8	21.3	4141
8	RIL 038 20 WDG	50	8.5	29.5	413	63.94	59.31	61.63	8.3	22.8	4624
9	Bifenthrin 10 EC	60	12.3	28.0	675	65.77	33.49	49.63	12.3	18.0	5416
10	L-cyhalothrin 2.5 SC	12.5	23.3	43.5	367	46.82	63.84	55.33	10.8	22.0	4663
11	L-cyhalothrin 2.5 SC	10	14.0	27.5	1018	66.38	-0.29	33.04	14.8	15.8	4479
12	Monocrotophos	500	11.3	35.8	526	43.76	48.48	45.97	9.8	17.0	4907
13	Untreated control	-	17.8	81.8	1015	-	-	-	30.5	24.0	3641
	F-test		NS	Sig	Sig				-	-	Sig
	CD (0.05)		-	2.05	12.9						899
	CV (%)		29.07	23.4	46.1				-	-	13.7

Figures in parenthesis are square root transformed values BT: Before treatment DAT: Days after the treatment

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