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Field evaluation of cyazypyr against yellow stem borer and gall midge infesting rice in western Odisha

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ABSTRACT

Field trials conducted during wet seasons of 2010 and 2011 at Regional Research and Technology Transfer Station, Chiplima, Sambalpur to evaluate the efficacy of a new molecule cyazypyr (HGW 86 10%OD) against yellow stem borer and gall midge infesting rice revealed that the test compound at 100 and 120 g a.i. ha^{-1} was highly effective in reducing stem borer incidence (71.01 to 88.80 per cent reduction over control during the period of study), whereas, the compound exercised a moderate effect on gall midge (57.7 to 58.01 per cent reduction over control). The check insecticides like monocrotophos and triazophos were observed to be less effective than the test compound.

Key words: *cyazypyr, efficacy, rice, yellow stem borer, gall midge*

The yellow stem borer, *Scirpophaga incertulas* (Walker) and rice gall midge, *Orseolia oryzae* Wood-Masson are two major insect pests of rice in Odisha and more serious particularly in Western Odisha. The assured irrigation system that attracts the farmers to take up 2-3 crops of rice round the year stands as the principal cause of high incidence of these pests. Even though, the gall midge which is principally a wet season pest, also has recently made its appearance during summer season which in near future may be a threat to the rice growers of the belt. The conventional pesticides which the farmers are mostly relying upon till date are constantly losing their importance as a result of which there is a growing demand by the farmers for new insecticide molecules. The pesticide industries are constantly adding new molecules to the insecticide pool with higher selectivity and target specificity which need to be tested over locations before being recommended. Keeping this in view, a new molecule cyazypyr (HGW 86 10% OD) formulated by DuPont India Pvt. Ltd was tested at Research Farm of All India Co-ordinated Rice Improvement Project, Regional Research and Technology Transfer Station, Chiplima, Sambalpur, Odisha, during wet season 2010 and 2011 against yellow stem borer and gall midge infesting rice.

MATERIALS AND METHODS

Twenty one day old rice seedlings of a susceptible variety Jaya was transplanted in wet seasons of 2010 and 2011 with all recommended agronomic practices in a plot size of (5 x 4) m^2 with a spacing of (20 x 10) cm with three replications arranged in a randomized block design.The test molecule cyazypyr (HGW 86 10% OD) was applied at 40, 60, 80, 100 and 120 g a.i. ha^{-1} along with two check insecticides *viz.,* monocrotophos and triazophos both applied at 500 g a.i. ha^{-1} and a control treatment (no spray). All the treatments were imposed at 15, 30, 50 and 65 days after transplanting (DAT) in both the years. Observations on stem borer incidence like per cent dead heart (% DH) and gall midge incidence as per cent silver shoot (% SS) were recorded at 1 day before second spray and at 10 days after each spray during both the years. Data on per cent white ear head (% WEH) was recorded 7 days before harvest from 10 randomly selected hills plot^{1-} replication^{-1}. Plot wise grain yield was computed from each plot leaving two border rows from each side of the plot and expressed as q ha^{-1} after necessary conversion. All the data were subjected to statistical analysis as per RBD procedure.

RESULTS AND DISCUSSION

During wet season 2010 at one day before second spray, the % DH was above ETL in untreated control (5.34%) while in rest of the treatments the corresponding values ranged from 2.96 to 3.41 per cent (Table 1). After 10 days of second spray the %DH in cyazypyr treatments ranged from 2.01 in cyazypyr @ 120 g a.i. ha^{-1} to 2.82 in cyazypyr @ 80 g a.i. ha^{-1} while the check insecticides registered 3.29 to 4.55% DH as against 7.53% DH in untreated control. More or less a similar trend was observed 10 days after third spray while 10 days after 4th spray, cyazypyr @ 120 g a.i. ha^{-1} registered the lowest % DH (1.20) having no significant difference with other dosages. The new molecule caused 61.17 to 71.01% reduction in stem borer incidence as compared to check insecticides. In wet season 2011, the test chemical at its highest doze caused a mere incidence of 1.37% DH after 10 days of fourth spray which remained at par with only cyazypyr @ 100 g a.i. ha^{-1}. During 2011, the check insecticides were inferior even from the lowest doze of the test compound. The % reduction in stem borer was higher in cyazypyr @ 120 g a.i. ha^{-1} followed by cyazypyr @ 100 g a.i. ha^{-1}.

The treatment cyazypyr @ 120 g a.i. ha^{-1} accounted for only 11.10% WEH which was at par with cyazypyr @ 100g a.i. ha^{-1} (12.45%) in 2010 while cyazypyr @ 120g a.i. ha^{-1} was superior in 2011 resulting in 9.34% WEH which was significantly different from rest of the dosages and check insecticides.

Incidence of gall midge (% SS) was found to be more in 2010 as compared to 2011(Table 2). During wet season 2010 and 2011, at 1 day before second spray the % SS had already crossed the ETL in all the treatments and even at 10 DAS of 2nd spray, none of the treatments could restrict gall midge incidence during both the years of study. The test insecticide at its highest doze (cyazypyr @ 120 g a.i. ha^{-1}) could bring the % SS below ETL at 10 days after third spray in 2011 only while at 10 days after fourth spray monocrotophos treatment (Triazophos 40 EC@ 500 g a.i. ha^{-1}) registered 3.44% SS in 2010 and 4.42% SS in 2011, respectively. cyazypyr at highest doze (cyazypyr @ 120 g a.i. ha^{-1}) registered lowest incidence (3.94% SS) in 2010 and during 2011, the test insecticide except at its lowest doze (cyazypyr @ 40 g a.i. ha^{-1}) registered 2.26 % SS (cyazypyr @ 120 g a.i. ha^{-1}) to 4.14 % SS in

Table 1. Effect of cyazypyr on stem borer infesting rice during wet season, 2010 and 2011 at Chiplima

Treatment	Stem borer incidence during wet sason, 2010					% reduction over control	% WEH	Stem borer incidence during wet season, 2011					% reduction over control	% WEH
	% DH at							% DH at						
	1 DBS	10 DAS						1 DBS	10 DAS					
	2nd spray	2nd spray	3rd spray	4thspray	Mean			2nd spray	2nd spray	3rd spray	4thspray	Mean		
Cyazypyr @ 40 g a.i. ha^{-1}	3.22	2.69	3.90	2.17	2.92	61.17	13.62	1.90	2.58	4.67	2.71	3.32	59.06	21.04
Cyazypyr @ 60 g a.i. ha^{-1}	3.24	2.42	4.17	2.07	2.88	61.70	13.35	2.02	1.54	3.51	2.26	2.44	69.91	14.98
Cyazypyr @ 80 g a.i. ha^{-1}	2.29	2.82	3.60	1.66	2.69	64.22	13.86	2.33	1.83	2.35	2.12	2.10	74.10	12.71
Cyazypyr @ 100 g a.i. ha^{-1}	3.19	2.03	3.68	1.48	2.39	68.18	12.45	2.22	1.52	2.23	1.63	1.79	77.93	12.38
Cyazypyr @ 120 g a.i. ha^{-1}	3.41	2.01	3.35	1.20	2.18	71.01	11.10	1.86	1.36	1.93	1.37	1.55	88.80	09.34
Monocrotophos 36WSC@500 g a.i. ha^{-1}	2.96	3.29	4.11	2.89	2.76	63.29	17.36	2.57	3.30	4.32	3.27	3.63	55.24	12.14
Triazophos 40 EC@ 500 g a.i. ha^{-1}	3.32	4.55	5.85	3.68	4.69	37.63	21.30	2.76	4.95	4.71	3.18	4.28	47.22	14.31
Untreated Control	5.34	7.53	9.36	5.68	7.52	-	36.28	3.57	8.31	9.63	6.38	8.11	-	28.83
CD (P<0.05)	1.38	1.36	1.42	1.09	-	-	04.27	-	1.60	1.24	1.70	-	-	03.73

DBS-Days before spraying, DAS-Days after spraying

Table 2. Effect of cyazypyr on gall midge infesting rice during wet season, 2010 and 2011 at Chiplima

Treatment	Gall midge incidence during wet season, 2010					% reduction over control	Gall midge incidence during wet season, 2011					% reduction over control
	% SS at						% SS at					
	1 DBS	10 DAS					1 DBS	10 DAS				
	2nd spray	2nd spray	3rd spray	4th spray	Mean		2nd spray	2nd spray	3rd spray	4th spray	Mean	
Cyazypyr @ 40 g a.i. ha^{-1}	20.16	10.02	07.39	06.08	07.83	39.67	10.89	08.53	07.88	05.84	07.42	35.81
Cyazypyr @ 60 g a.i. ha^{-1}	15.94	09.45	06.87	05.48	07.27	43.99	09.91	08.07	08.10	04.07	05.41	53.20
Cyazypyr @ 80 g a.i. ha^{-1}	15.54	09.54	06.17	05.44	07.05	45.68	09.76	07.64	07.11	04.14	06.30	45.50
Cyazypyr @ 100 g a.i. ha^{-1}	16.28	06.98	05.99	04.43	05.80	55.31	09.92	06.95	06.11	02.78	05.28	54.32
Cyazypyr @ 120 g a.i. ha^{-1}	15.90	07.02	05.40	03.94	05.45	58.01	09.70	07.48	04.92	02.26	04.89	57.70
Monocrotophos 36 WSC@ 500 g a.i. ha^{-1}	14.27	10.25	07.35	05.86	07.82	39.75	11.50	10.14	08.24	05.39	07.92	31.75
Triazophos 40 EC@ 500 g a.i. ha^{-1}	14.59	06.92	06.73	03.44	05.70	56.08	11.09	09.47	06.93	04.42	06.94	39.96
Untreated Control	16.97	17.27	13.38	08.28	12.98	-	11.80	13.49	12.39	08.79	11.56	-
CD (P<0.05)	-	02.39	01.39	01.00	-		-	02.73	02.49	02.18	-	-

DBS-Days before spraying, DAS-Days after spraying

cyazypyr @ 80 g a.i. ha^{-1}. The % reduction by the test compound varied from 39.67 to 58.01% in 2010 while the same resulted in 35.81 to 57.70 per cent in 2011. Thus the test compound was moderately effective against gall midge.

During both the years, cyazypyr @ 120 g a.i. ha^{-1} registered highest grain yield of 3.92 and 6.77 t ha^{-1} which was significantly different than rest of its other dosages and the check insecticide (Table 3). The test compound at its two higher dosages was observed to be more potential than the check insecticides.

Table 3. Effect of cyazypyr on grain yield in rice during wet season, 2010 and 2011 at Chiplima

Treatment	Grain Yield (t ha^{-1})	
	2010	2011
Cyazypyr @ 40 g a.i. ha^{-1}	2.47	5.62
Cyazypyr @ 60 g a.i. ha^{-1}	2.62	5.98
Cyazypyr @ 80 g a.i. ha^{-1}	2.87	6.24
Cyazypyr @ 100 g a.i. ha^{-1}	3.26	6.52
Cyazypyr @ 120 g a.i. ha^{-1}	3.92	6.77
Monocrotophos 36 WSC @ 500 g a.i. ha^{-1}	2.72	5.49
Triazophos 40 EC @ 500 g a.i. ha^{-1}	2.89	4.69
Untreated Control	1.98	2.98
CD (P<0.05)	0.44	0.21

Literature on the efficacy of cyazypyr on rice insect pests is scanty. However, Fortner *et al.* (2010) have found that cyazypyr was effective in controlling rice water weevil in Arkansas rice. The efficacy of the test compound has been studied by Mandal (2012) who reported that cyazypyr was effective in controlling tomato pests. Misra and Mukherjee (2012) have also studied the effectiveness of cyazypyr in controlling *Aphis gossypii* Glover, 1877 infesting tomato.

Thus, it can be concluded that the anthranilic diamide compound, cyazypyr @ 120 g a.i. ha^{-1} was the best treatment followed by the same insecticide @ 100 g a.i. ha^{-1} in giving good control of yellow stem borer, whereas, it was fairly good against gall midge infesting rice.

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