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Field efficacy of some insecticides against leaf folder of rice

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ABSTRACT

Beside yellow stem borer, leaf folder Cnaphalocrocis medinalis is another important insect pest in rice.Leaf folder, which was of minor importance, assumed major pest status in the recent years causing extensive damage and considerable yield loss to the crop. The present investigation is aimed at generating information on efficacy of some insecticides against leaf folder of rice. The trial was laid out in randomized block design with three replications in variety Jaya during the dry season, 2013 and 2014 in the research farm of National Rice Research Institute, Cuttack. To study the efficacy of nine insecticides, treatments were applied at 45 and 75 days after transplanting along with untreated control. Fipronil 5% SC @ 1000 ml ha^{-1} was the best insecticide with highest yield of 6.3 and 5.75 t ha^{-1} during 2013 and 2014 respectively and was at par with bifenthrin 10% EC @ 500 ml ha^{-1}, quinalphos 25% EC @ 1500 ml ha^{-1} in increasing the grain yield and reducing leaf folder damage. All the tested insecticides i.e. fipronil 5% SC @ 1000ml/ha, bifenthrin 10% EC @ 500 ml ha^{-1}, quinalphos 25% EC @ 1500 ml ha^{-1}, dimethoate 30%EC @ 830 ml ha^{-1}, imidacloprid 17.8%SL @ 300ml ha^{-1}, lambda cyhalothrin 2.5%EC @500 ml/ha, thiamethoxam 25% WG @ 100 g ha^{-1}, flubendiamide 39.35% SC @ 50 ml ha^{-1}, acephate 75% SP @ 1000 g ha^{-1} were very effective against leaf folder as compared to control.

Key words: *Rice, insecticides, leaf folder*

One of the major constraints in achieving the desired level of rice production is the menace of insect pests which cause about 30 per cent of yield loss(Dale, 1994).Rice accounts for 80 per cent of Asians daily calorie intake as far as food security is concerned. Rice productivity in Asia, India and Odisha were 4.21, 3.3 and 2.53 t ha^{-1}, respectively (Rai, 2006). Among many insect pests which causes severe damage to rice crop, yellow stem borer (YSB), *Scirpophagain certulas* (Walker) is the most predominant pest causing serious damage in rice growing tracts of India, Bangladesh and South East Asian countries (Islam, 1996). Besides YSB, leaf folder *Cnaphalocrocis medinalis* is another important insect pest in rice. Leaf folder, which was of minor importance, assumed major pest status in the recent years causing extensive damage and considerable yield loss to the crop. Over the year, many insecticides have been recommended for the control of major insect pest of rice (Sontakke and Dash, 2000; Dash and Mukherjee, 2003; Rath, 2010, 2011 and 2012). The present investigation is aimed at generating information on efficacy of some insecticides against leaf folder of rice.

The field research trial was conducted during dry season, 2013 and 2014 in the research farm of National 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. The normal recommended dose of fertilizer *i.e.,* 80:40:40 Kg N, P_2O_5 and K_2O was applied at recommended time. Incidence of insect pest was monitored through light trap. Nine insecticide formulations *viz.,* fipronil 5% SC @ 1000 ml ha^{-1}, bifenthrin 10% EC @ 500 ml ha^{-1}, quinalphos 25% EC @ 1500 ml ha^{-1}, dimethoate 30% EC @ 830 ml ha^{-1}, imidacloprid 17.8 SL% @ 300ml ha^{-1}, lambda cyhalothrin 2.5% EC @ 500 ml/ha, thiamethoxam 25%

WG @ 100 g ha^{-1}, flubendiamide 39.35 SC% @ 50 ml/ ha and acephate 75% SP @ 1000 g ha^{-1} along with untreated control were applied at 45 and 75 days after transplanting against leaf folder of rice.

Observations on leaf folder damageat vegetative stage were recorded at 60 days after transplanting on 20 randomly selected hills per plot in each plot. Population of natural enemies was recorded by using one complete sweep net method. Grain yield data was recorded from each plot. The per cent leaf folder damage was calculated and transformed into arc sine transformation for statistical analysis and presentation in tabular form. The per cent leaf folder damage was computed as follows:

$$\% \text{ leaf folder damage} = \frac{\text{Total number of leaf folder damaged leaf in 20 hills}}{\text{Total number of leaf (damaged + healthy) in 20 hills}} \times 100$$

During 2013, the per cent leaf folder damage was found least in treatment, fipronil 5% SC @ 1000 ml ha^{-1} (2.2%) and superior to others whereas bifenthrin 10% EC @ 500 ml ha^{-1} (2.86%), quinalphus 25% EC @ 1500 ml ha^{-1} (3.5%), dimethoate 30% EC @ 830 ml ha^{-1} (3.2%), imidacloprid 17.8% SL @ 300 ml ha^{-1} (3.36%), lambda cyhalothrin 2.5% EC @ 500 ml ha^{-1} (3.43%), were statistically at par. In control the per cent leaf folder damage was 5.53%. The population of natural enemies was least (3.33) in treatment, fipronil 5% SC @ 1000ml ha^{-1} which was statistically at par with all other insecticide treatments (Table 1).

During 2014, the per cent leaf folder damage was least (1.4%) in quinalphus 25% EC @ 1500 ml ha^{-1}. The leaf folder damage was less (1.6%) in fipronil 5% SC @ 1000 ml ha^{-1} and (1.7%) in bifenthrin 10% EC @ 500 ml ha^{-1} and statistically at par. The per cent leaf folder damage was 2.1% both in dimethoate 30% EC @ 830 ml ha^{-1} and acephate 75% SP @ 1000 ml ha^{-1}. 2.3% in imidacloprid 17.8% SL @ 300 ml ha^{-1}, 2.4% inthiamethoxam 25% WG @ 100 g ha^{-1}, 2.5% in lambda cyhalothrin 2.5% EC @ 500 ml ha^{-1} and 2.8% in flubendiamide 39.35% SC @ 50 ml ha^{-1}. Where as in control the leaf folder damage was 3.8% (Table 2). The leaf folder damage was less in 2014 as compared to 2013 may be due to climatic factor. The population of natural enemies was also less during 2014 it may be due to less number of leaf folder in the field. Among chemical treatments, population of natural enemies was more (2.2) in quinalphus 25% EC @ 1500 ml ha^{-1} followed by 2.1 in bifenthrin 10% EC @ 500 ml ha^{-1} and 2.0 in fipronil 5% SC @ 1000ml ha^{-1}.

The grain yield in the treatment fipronil 5% SC

Table 1. Effect of some insecticide onleaf folder of rice and its NEs during *rabi*, 2013

Treatment	% a.i	g or ml ha^{-1}	% LF damage	NE	Yield (t ha^{-1})
Fipronil	5	1000	2.2 (8.52)f	3.33b	6.3a
Bifenthrin	10	500	2.86 (9.73)e	3.0b	5.95a
Quinalphus	25	1500	3.5 (10.24)de	3.33b	5.8a
Dimethoate	30	830	3.2 (10.28)de	2.66b	5.76a
Imidacloprid	17.8	300	3.36 (10.55)cde	3.0b	5.73a
Lambda cyhalothrin	2.5	500	3.43 (10.65)cde	3.33b	45.7a
Thiamethoxam	25	100	3.53 (10.81)cd	3.0b	5.7a
Flubendimide	39.35	50	3.93 (11.43)bc	3.33b	5.68a
Acephate	75	1000	4.2 (11.82)b	3.66b	5.45a
Control	Water	500l	5.53 (13.6)	5.0a	3.73b
CD at 5%			0.92	1.19	1.27

Data in parenthesis are angular transformed values, LF : Leaf folder and NE : Natural enemies

Table 2. Effect of some insecticide onleaf folder of rice and its NEs during *rabi*, 2014

treatment	% a.i	g or ml ha^{-1}	%LF damage	NE	Yield t ha^{-1}
Fipronil	5	1000	1.6 (7.26)f	2.0cd	5.75a
Bifenthrin	10	500	1.7 (7.49)f	2.1bc	5.62ab
Quinalphus	25	1500	1.4 (6.79)g	2.2b	5.55ab
Dimethoate	30	830	2.1 (8.33)e	1.8e	5.5b
Imidacloprid	17.8	300	2.3 (8.72)d	1.9de	5.45b
Lambda cyhalothrin	2.5	500	2.5 (9.09)c	1.2h	5.15c
Thiamethoxam	25	100	2.4 (8.91)cd	1.3gh	5.10c
Flubendimide	39.35	50	2.8 (9.63)b	1.5f	4.84d
Acephate	75	1000	2.1 (8.33)e	1.4fg	4.8d
Control	Water	500l	3.8 (11.19)a	3.3a	4.5e
CD at 5%			0.35	0.17	0.20

Data in parenthesis are angular transformed values, LF: Leaffolder and NE: Natural enemies

@ 1000 ml ha^{-1} was (6.33 & 5.75 t/ha) during 2013 and 2014, respectively, and was at par with other tested insecticide bifenthrin 10% EC @ 500 ml ha^{-1}, (5.95 & 5.62 t ha^{-1}) quinalphos 25% EC @ 1500 ml ha^{-1} (5.80 & 5.55 t ha^{-1}) during both the year. The grain yield inuntreated control, was 3.73 t ha^{-1} and 4.5 t ha^{-1} during 2013 and 2014, respectively. Earlier workers like Uthamasamy and Kuruppuchamy, 1988 and Dash et al., 1996 had similar observation like present investigation of effective control of rice insect pests by application of sprayable insecticidal formulation.

The overall results of the experiment (Table 1and 2) revealed that all the tested insecticides i.e. fipronil 5% SC @ 1000 ml ha^{-1}, bifenthrin 10% EC @ 500 ml ha^{-1}, quinalphos 25% EC @ 1500 ml/ha, dimethoate 30% @ 830 ml ha^{-1}, imidacloprid 17.8% SL @ 300ml ha^{-1}, lambda cyhalothrin 2.5% EC @ 500 ml ha^{-1}, thiamethoxam 25% WG @ 100 g ha^{-1}, flubendiamide 39.35% SC@ 50 ml ha^{-1}, acephate 75% SP @ 1000 ml ha-1 were very effective against leaf folder during both the year as compare to control. During 2013, fipronil 5% SC @ 1000ml ha^{-1} performed better than others and during 2014,quinalphus 25% EC @ 1500 ml ha^{-1} performed better than others against leaf folder.

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