Journal of Pharmacognosy and Phytochemistry

Available online at www.phytojournal.com

E-ISSN: 2278-4136
P-ISSN: 2349-8234
JPP 2018; 7(3): 2219-2221
Received: 19-03-2018
Accepted: 24-04-2018

Sudipta Padhan
Department of Entomology and Agricultural Zoology, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi, Uttar Pradesh, India

M Raghuraman
Department of Entomology and Agricultural Zoology, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi, Uttar Pradesh, India

Correspondence
Sudipta Padhan
Department of Entomology and Agricultural Zoology, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi, Uttar Pradesh, India

Bio-efficacy of newer insecticides against rice leaf folder (*Cnaphalocrocis medinalis* Guenee) in Varanasi region

Sudipta Padhan and M Raghuraman

Abstract
Field trials were conducted during *kharif* season, 2016-17 with rice variety HUBR 10-9 to determine the bioefficacy of certain newer insecticides against rice leaf folder, *Cnaphalocrocis medinalis* Guenee. Results revealed that among all the insecticides after first spraying Thiocyclam Hydrogen oxalate (4%G) @500g a.i. per ha was found to be the most effective in both the sprays with a maximum reduction as 8.33 percent damage by insects per 10 hills and pymetrozine 150g a.i. per ha. was minimum reduction as 10.08 percent damage by insects per 10 hills. The mean per cent incidence in untreated control (13.57/ 10 hills) while after second spraying thiocyclam hydrogen oxalate (4%G) @ 500g a.i. per ha. One with a maximum reduction in mean per cent incidence of *Cnaphalocrocis medinalis* (5.25/10 hills), and pymetrozine 150g a.i. per ha. was minimum reduction as 9.60 percent damage by insects per 10 hills. The mean per cent incidence in untreated control was 17.48 / 10 hills. Thiocyclam hydrogen oxalate was observed to be best and the plots treated which realized a yield of 7.69 tonn/ha, but the yield in kg per plot obtained from cratap hydrochloride (7.19 tonn/ha), pymetrozine (6.69 tonn/ha) dinotefuron (6.24 tonn/ha) and, were statistically on par.

Keywords: rice leaf folder (*Cnaphalocrocis medinalis* Guenee). newer insecticides, bioefficacy.

Introduction
Rice is life and considered most important among the cereals. Rice (*Oryza sativa* L.) is the world's second most important cereal crop, feeding about 50% of the world population and provides 19% of the global calories intake (Anonymous, 2014). The Rice leaf folder *Cnaphalocrocis medinalis* (Guenee), the major pest of rice feed on rice leaves; hinder the photosynthesis of the leaves resulting in the reduction of rice yield. They feed inside the folded leaf creating longitudinal white and transparent streaks on the blade. Indiscriminate use nitrogenous fertilizers and mismanagement of insecticides have been attributed as the causes of this minor pest gaining major pest status (Dhaliwal *et al.*, 1979) [1]. Yield loss caused by leaf folder reported to the extent of 5 to 25 per cent (Kulgagod *et al.*, 2011) [2]. Judicious use of insecticides and alternation of chemicals with different mode of action are suggested to reduce insecticide resistance. So, the newer insecticide molecules with diversified mode of action against these pests will significantly play a vital role in the insecticide resistance management. Keeping these conditions in view present study was focused on bio-efficacy of newer insecticides group along with the conventional insecticides against major insect pests of rice.

Materials and Methods
The research trial was complemented during *kharif* season of 2015-16, at the Agricultural Research Farm, B.H.U. Varanasi district of Uttar Pradesh. The variety under supervision was HUBR 10-9. Field experiment was put up in Randomized Block Design (RBD) with 3 replications and 8 treatments including untreated control during *kharif* 2016 to evaluate the bio-efficacy of certain insecticides against insect pests in rice crop. Twenty eight day old seedlings were transplanted in the experimental plots at a spacing of 20 × 15 cm. Experiment was conducted in an area of 250 m^2, which was divided into four blocks each of 2m wide and 22.5 m long. These blocks were further divided into 8 plots, each of 3m long and 2 m wide with a gap of 0.5m between the two plots. To study the efficacy of insecticide, pest population was recorded in different phase i.e. before and after spray. In case of Rice leaf folder, the damaged leaves and total leaves from 10 randomly selected hills were observed in each plot at 1st, 3rd, 7th, 10th and 14th day after spray. The percentage of leaf damage was calculated as follows.

$$\text{Percent Incidence} = \frac{\text{Number of damaged leaves}}{\text{Total number of leaves}} \text{ X } 100$$

After drying of the crop threshing of the paddy was done and after that individual plot yield was recorded 5 days after harvesting. The yields of respective plots were exploited in quintal per hectare. The per cent increase in yield over control in various treatments was calculated by using the following formula.

$$\% \text{ increase of yield in treatment over control} = \frac{\text{Yield in treatment - Yield in control}}{\text{Yield in control}} \text{ X } 100$$

Result and Discussion

Effect of insecticidal treatments against *C. medinalis* on rice

First spray

Comparative efficacy of different new insecticide molecules namely Dinotefuran, Pymetrozine in two formulations viz., 20%SG and 50%WP, Thiocyclam Hydrogen Oxalate 4%G and Cartap hydrochloride 4%GR were studied on major insect pests of paddy. The percent damage recorded on one day prior to the spray was in the range of 11.04 to 11.99 / 10 hills. Initially (3rd Day after spray) i.e. least per cent incidence was observed in the Cartap hydrochloride and Thiocyclam hydrogen oxalate treated treatment i.e. 10.32 and 9.96 respectively. Per cent incidence in the neem treated plot was found to be 10.75 (Table 1). A week after spray mean per cent incidence was found least in Cartap hydrochloride and Thiocyclam hydrogen oxalate treated plot (7.47 and 7.28). Maximum incidence of leaf folder was found in Dinotefuran i.e. 9.50%. Per cent incidences of leaf folder in Neem treated plot were 8.81.10th Day after spray mean per cent incidence was found least in Cartap hydrochloride and Thiocyclam hydrogen oxalate treated plot (8.05% and 7.74%). Maximum incidence of leaf folder was found in pymetrozine i.e. 10.34/10hills. Two week after spray least per cent incidence was found in the Thiocyclam hydrogen oxalate treated plot i.e. 8.34 (Table 1). Highest numbers of leaf folder were found in Dinotefuran treated plots.

Second spray

The percent damage recorded on one day prior to the spray was in the range of 8.68 to 15.41/ 10 hill (Table 2)**.** 3rd Day after spray least per cent incidence was observed in the Cartap hydrochloride and Thiocyclam Hydrogen oxalate treated treatment i.e. 7.80 and 7.25 respectively. Per cent incidence in the neem treated plot was found to be 8.65 (Table 2). A week after spray mean per cent incidence was found least in Cartap hydrochloride and Thiocyclam hydrogen oxalate treated plot (5.04 and 4.22). Maximum incidences of leaf folder were found in Pymetrozine i.e. 9.08. Per cent incidence of leaf folder in Neem treated plot were 7.30. 10th Day after spray mean per cent incidence was found least in Cartap hydrochloride and Thiocyclam hydrogen oxalate treated plot. The values were found to be 5.44 and 4.43 respectively (Table-2). Two week after spray least per cent incidence was found in the Thiocyclam hydrogen oxalate treated plots i.e. 5.11 (Table-2). Highest numbers of leaf folder were found in Pymetrozine treated plots. However Dhawan and Suri (2010) [4] when they found that thiocyclam hydrogen oxalate (500g ai./ha) treated plot shown least per cent incidence of rice leaf folder. Similar results were also obtained by Aulakh *et al.* (2016) that Cartap hydrochloride also control paddy leaf folder effectively.

Influence of insecticidal treatment on paddy yield

The Thiocyclam hydrogen oxalate was observed to be best and the plots treated by this chemical gave a yield of 7.69 tonn/ha, but the yield obtained was at par with Cartap hydrochloride (7.19 tonn/ha), Pymetrozine (6.69 tonn/ha), Dinotefuran (6.24 tonn/ha) and Neem was 6.43 tonn/ha. In control plot the yield was 3.86 tonn/ha. This clearly shows that all insecticidal treatments gave good results when compared with control. However, the per cent increase over control of 49.80 from Thiocyclam hydrogen oxalate treated plot was best among all insecticidal treatments and remaining insecticidal treatments on the basis of per cent increase over control were observed to be in following order: Thiocyclam hydrogen oxalate (4.62) > Cartap hydrochloride (4.32) > Pymetrozine 150g (4.02) > Pymetrozine 200g (3.96) > Neem (3.86) > Dinotefuran 200g (3.75) > Control (2.32) (Table-3). These results are in accordance with Dhawan (2010) [4] who reported that Thiocyclam hydrogen oxalate treated plot produced more yield than other newer group of insecticide like Cartap hydrochloride.

The experiment reveals that application of newer insecticide like thiocyclam hydrogen oxalate was effective against rice leaf folder. Such compounds can be used in the pest management strategy to achieve the desired control. Making insect management decisions based on established treatments rather than applying treatments based on schedules or presence or absence of pests is a proven method of reducing insect management costs. Effective use of the newer insecticides coupled after intensive scouting to obtain accurate estimates of per cent incidences of various pest species present in a field will lead to sustainable managements of rice insect pests.

Table 1: Effect of insecticidal treatment against *C. medinalis* after 1st insecticidal spray

Treatment	Dose g a.i./ha	Mean % damage /10 hills one day before spray	Mean % damage/10 hills at different days after 1st insecticidal spray				
			3DAS	7DAS	10DAS	14DAS	Overall Mean
Dinotefuron	200g	11.15(19.47)	11.04(19.38)	9.40(17.84)	9.88(18.31)	10.02(18.41)	10.08(18.41)
Pymetrozine	150g	11.99(20.25)	11.69(19.98)	10.06(18.48)	10.34(18.75)	10.87(19.24)	10.74(19.11)
Cratap Hydrochloride	750g	11.29(19.61)	10.32(18.70)	7.47(15.85)	8.05(16.47)	8.85(17.30)	8.67(17.08)
Pymetrozine	200g	11.41(19.72)	10.75(19.12)	9.57(18.01)	9.75(18.18)	10.26(18.67)	10.08(18.49)
Dinotefuron	150g	11.68(19.97)	11.41(19.73)	9.50(17.94)	9.05(17.50)	9.81(18.24)	9.94(18.35)
Thiocyclam Hydrogen oxalate	500g	11.50(19.81)	9.96(19.36)	7.28(15.64)	7.74(16.13)	8.34(16.78)	8.33(16.97)
Neem	2L/ha	11.06(19.40)	10.78(19.16)	8.81(17.25)	8.21(16.64)	8.78(17.23)	9.15(17.57)
Control	-	11.85(20.12)	11.96(20.20)	13.37(21.44)	14.14(22.08)	14.82(22.63)	13.57(21.58)
C.D.	-	-	0.43	0.77	0.63	0.732	-
SE(m)	-	0.46	0.572	0.252	0.206	0.239	-

*Mean of three replication, ** Figures of the parenthesis are angular transformed values, DAS - Days after spray

Table 2: Effect of insecticidal treatment against *C. medinalis* after 2nd insecticidal spray

Treatment	Dose g a.i./ha	Mean % damage / 10 hills one day before spray	Mean % damage/10 hills at different days after 2nd insecticidal spray				
			3DAS	7DAS	10DAS	14DAS	Overall Mean
Dinotefuron	200g	10.05(18.47)	9.79(18.22)	7.79(16.19)	8.23(16.64)	8.86(17.31)	8.67(17.09)
Pymetrozine	150g	11.14(19.49)	10.41(18.81)	9.08(17.53)	9.24(17.69)	9.68(18.11)	9.60(18.03)
Cratap Hydrochloride	750g	8.84(17.28)	7.80(16.21)	5.04(12.97)	5.44(13.47)	5.87(14.01)	6.04(14.16)
Pymetrozine	200g	10.4(18.80)	9.84(18.27)	8.30(16.73)	8.45(16.89)	9.12(17.57)	8.93(17.36)
Dinotefuron	150g	9.97(18.40)	9.55(17.98)	7.88(16.29)	7.54(15.92)	7.97(16.39)	8.23(16.64)
Thiocyclam Hydrogen oxalate	500g	8.68(17.11)	7.25(15.62)	4.22(11.85)	4.43(12.13)	5.11(13.05)	5.25(13.16)
Neem	2l/ha	9.17(17.61)	8.65(17.09)	7.30(15.66)	7.04(15.38)	7.44(15.82)	7.61(15.98)
Control	-	15.41(23.10)	16.08(23.63)	17.10(24.42)	17.58(24.77)	19.15(25.94)	17.48(24.69)
C.D.	-	0.88	0.567	0.62	0.60	0.551	-
SE(m)	-	0.28	0.185	0.203	0.196	0.180	-

*Mean of three replication, ** Figures of the parenthesis are angular transformed values, DAS - Days After Spray

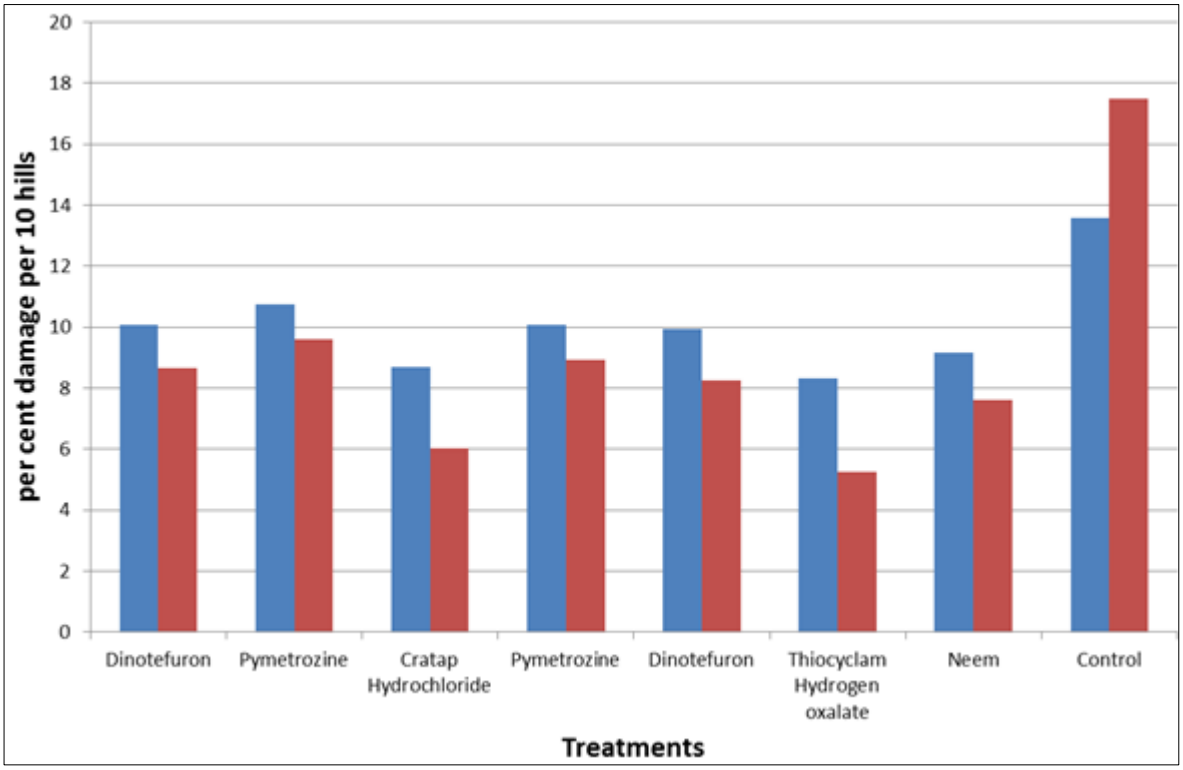

Fig 1: Response of insecticidal treatments against *C. medinalis* on paddy

Table 3: Impact of insecticidal treatments on paddy yield

Treatment	Dose g a.i./ha	Yield (Kg/plot)	Yield (tonn/ha)	%Increase over control
Dinotefuran	200g	3.75	6.24	38.14
Pymetrozine	150g	4.02	6.69	42.30
Cratap Hydrochloride	750g	4.32	7.19	46.31
Pymetrozine	200g	3.96	6.59	41.42
Dinotefuran	150g	3.64	6.06	36.30
Thiocyclam Hydrogen oxalate	500g	4.62	7.69	49.80
Neem	2l/ha	3.86	6.43	39.96
Control	--	2.32	3.86	--

*Mean of three replication

References

1. Dhaliwal GS, Shahi HN, Gill PS, Maskina MS. Field reaction of rice varieties to leaf folder at various nitrogen levels. Int. Rice Res. Newsl. 1979; 4:7.
2. Kulgagod SD, Hegade GV, Nayak AS, Vastrad PS. Hugar and Basavanagoud, K..Evaluation of insecticides and bio-rationales against yellow stem borer and leaf folder in rice crop. Karnataka J Agric. Sci. 2011; 24(2):244-246.
3. Suri KS. Bioefficacy of Some Insecticides against Rice Stem borers and Leaffolder Infesting Rice in Punjab. Pesticide Research Journal. 2011; 23(2):190-193.
4. Dhawan AK, Mahal MS, Sarao PS, Virk JS, Singh R, Kaur R. Efficacy of Thiocyclam Hydrogen Oxalate as Foliar Sprays against Stem borers and Leaf folder in Rice. Indian Journal of Plant Protection. 2010; 38(2):166-169.