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Research Article

Efficacy of Different Insecticides against Rice Leaf Folder (*Cnaphalorosis medinalis*) Under Field Conditions

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Abstract

The experiment was conducted at the field of Rice Research Institute Dokri, Larkana, Pakistan to evaluate the efficacy of different insecticides against Rice Leaf folder (*Cnaphalocrosis medinalis*) under field conditions, different insecticides were applied on recommended dose. The experiment was conducted in RCBD design with 3 Replications and 5 Treatments. The leaf damage and insect pest population were observed before spray and 1,3,5,7 and 14 days respectively. The results shown that all the treated plots reduced damage minimized insect pest population and increased yield at significant level compare to control. Minimum damage of leaves was recorded in T-03 Belt 480SC (3.76%) leaves/Plant compare to T-05 Control (28.96%) leaves/plant. The results revealed that the 1st application reduced population at significant level up to seven days but population started rebuilding among all treated plots Maximum control was observed in T-03 Notice 0.22/Plant on 5-DAA & 0.24/Plant on 7-DAA. Similarly, the 2nd application also produced desirable results against Rice leaf folder population at significant level among all treated plots except control plots. Maximum controlled was observed in T-3 Belt 480SC, 0.24, 0.5 and 0.54/plant in 5-DAA, 7-DAA and 14-DAA respectively. Maximum yield increase in T-03 Belt 480SC (20.47%), followed by T-01 Notice (19.21). Results shown that the pest appearance the time of booting caused more damage to flag leave, at the time of flowering reduced gain filling and ultimately yield losses were observed.

Keywords: Rice; Insecticides; efficacy; Rice leaf folder; control

Introduction

Rice (*Oryza sativa* L.) is the most important staple food in Asia. More than 90% of the world's rice is grown and consumed in Asia, where 60% of the world's population lives. (Guyer *et al* 1998). Low yields of rice in Pakistan due to damages by insect pests (Majid *et al*., 1979). More than 100 insect species are known to attack the rice crop of which 20 species are considered highly important that results in economic damage (Arora and Dhaliwal,1996) Gall midge (*Orseola oryzae*), white backed plant hopper (*Sogatodes oryzae*), white backed plant hopper (*Sogatella furciferra*), yellow stem borer (*Sciropophaga isertalas*), and brown plant hopper (*Nilaparvata lugens*) and leaf floder (*Cnaphalocrosis medinalis*) are the common insect pests attacking Rice crop (vivek 2009). Rice leaf folder (*Cnaphalocrocis medinalis*) shift from minor to major pest. (Kulshreshtha *et al*., 1970; Litsinger, 1989). Now, known as a serious rice pest in Asia. Geoff *et al*. (2011) Economic injury levels at the heading stage were 4.2% damaged leaves

and 1.3 larva per plant. (Heong 1994). Rice leaf folder (*C. medinalis*) larvae cause conspicuous injury by folding leaves and scraping off the green mesophyll tissue, and farmers usually respond by applying insecticides, even at very low infestation levels (Heong *et al*., 1994). Infestation levels are usually reported only as percentage injured leaves and few studies deal with factors affecting population densities. (Kraker *et al*., 1999). Larva forms a protective feeding chamber by folding a leaf blade to gather and glues it with silk strands and feed on leaf tissues. Longitudinal white and transparent streaks on leaf blades are created. Thus, the damage is done by reducing chlorophyll from leaves ultimately effects on yield. Farmers are applying different type of insecticides for managing rice leaf folder in their fields; some of them are mixing two chemicals together as well. But mostly they are use traditional insecticides such as Lambda cyhalothrin on regular basis in our area which has sudden knock down effect but the results are not reported as long as they should be, Fepronil is one of the common chemicals used for lepidopteron insects but in granular farm, this experiment was design to evaluate some new insecticides with new formulation comparing old ones to find out the best one for the management of Rice leaf folder (*C. medinalis*) under field conditions.

Materials and Methods

The experiment was conducted at Rice Research Institute, Dokri, Larkana, Pakistan in Kharif 2017-18. The experiment was conducted in RCBD design with 3 replications and five treatments four different insecticides were applied to evaluate the efficacy of insecticides again Rice leaf folder (*Cnaphalocrosis medinalis*) under field conditions (Table 1). Rice crop nursery sown on 10th June 2017 and transplanted in the month of July on 17th, 2017.

Insect pest scouting was started as the moths of the pest appeared in the field; data was recorded per plant damage in percentage by counting infested leaves/folded leaves/plant. With formula:

$$\frac{\text{Infested Leaves/plant} - \text{Total leaves X 100}}{\text{Total leaves/Plant}}$$

Insect pest larvae were also counted from damaged/folded leaves before application. Data were recorded before Spraying insecticides, one day after application (1DAA) three days after application (3DAA), five days after application (5DAA), seven days after application (7DAA), fourteen days after application (14DAA). Again, repeated application after 15 days and recorded data in similar pattern for evaluation the efficacy of different insecticides against Rice leaf folder RLF (*C. medinalis*) under field conditions, yield parameters were also recorded to find most effective insecticide.

Results and Discussion

The experiment was conducted at the field of Rice Research Institute Dokri, Larkana Pakistan for evaluation the efficacy of different insecticides against Rice Leaf folder (*Cnaphalocrosis medinalis*) under field conditions, different insecticides were applied on recommended dose. The leaf damage was observed before spray and 1,3,5,7 and 14 days respectively (Table 2). Leaf damage has direct proportion with insect pest population. Maximum leaf damage was observed in control (35%), Minimum damage was observed in T3- Notice (2.74%), followed by T-1 Notice (3.13) after 1st spray.

Table 1: Details of insecticides, formulations & active ingredients used during experiment.

S.N.	Insecticides	Formulation	Active Ingredient	Dose/A
01	Notice	5 SC	Fepronil	480ml
02	Boxer	2.5 EC	Lambda cyhalothrin	250ml
03	Belt	480 SC	Flubendamide	25ml
04	Timer	1.9 EC	Emmamectin Benzoate	200ml
05	Control	-	-	-

* SC= Soluble Concentration, EC= Emulsifiable Concentration

Table 2: Mean of Leaf damage by Rice Leaf folder (*Cnaphalocrosis medinalis*) after 1st spray.

S.N.	Treatment	BS	01-DAA	03-DAA	05- DAA	07- DAA	14- DAA
01	Notice 5% SC	14.65	15.11	15.54	15.7	15.2	15.11
02	Boxer 1.5EC	15.22	15.5	15.9	16.4	16.8	17.4
03	Belt 480SC	17.5	17.56	17.88	17.98	16.22	17.98
04	Timer 1.9EC	14.88	15.2	15.32	15.54	15.5	15.55
05	Control	12.11	13.11	13.66	14.98	15.5	16.44

* B.S= Before Spray * DAA= Days After Application

Maximum leaf damage was observed in T-05 Control (22.18%), Minimum damage was observed in T3- (4.78%), followed by T-1 Notice (6.49) after 2nd spray. It was observed that during 2nd spray temperature gone in the month of November and leaves were more damaged the month of October; compare to the month of November after 2nd spray was done (Table 3).

Overall results shown that the Minimum damage of leaves was done in T-03 Belt 480SC (3.76% leaves/Plant) followed by T-01 Notice 5%SC, (4.81leaves/plant) where maximum damage was recorded in T-05 Control (28.96% leaves/plant). Overall mean shown that all the treatment performed better than control/check (where no insecticide applied against rice leaf folder (*C. medinalis*). See Table 4 and Fig. 1.

The results revealed that the 1st application reduced population at significant level up to seven days but population started rebuilding among all treated plots except T-2 Boxer 1.5EC, it was observed that population rebuilding in T-2 Boxer 1.5EC started on 5th day of application. Maximum control was observed in Notice 0.9/Plant (1-DAA), 0.54/Plant (3-DAA) 0.22/Plant (5-DAA), 0.24/Plant (7-DAA), 0.87/Plant (14-DAA) followed by Belt 480SC, 0.98, 0.25, 0.65, 0.98/plant 1-DAA, 3-DAA,5-DAA,7-DAA and 14-DAA respectively see Fig. 2.

Table 3: Mean of Leaf damage by Rice Leaf folder (*C. medinalis*) after 2nd spray.

S.N.	Treatment	BS	01-DAA	03-DAA	05- DAA	07- DAA	14- DAA
01	Notice 5SC	15.4	15.8	15.9	16.4	16.39	16.4
02	Boxer 1.5EC	16.88	16.87	17.22	17.3	17.56	18.4
03	Belt 480SC	14.22	14.28	14.34	14.45	14.87	14.9
04	Timer 1.9EC	13.22	13.4	13.45	13.25	13.56	14.23
05	Control	12.44	13.65	14.4	14.65	14.88	15.2

* B.S= Before Spray * DAA= Days After Application

Table 4: Over all Mean and SD of Leaf damage by Rice Leaf folder (*C. medinalis*) both sprays

S.N.	Treatment	1st Application	2nd Application	Mean & SD
01	Notice 5% SC	3.13	6.49	4.81 ± 2.37
02	Boxer 1.5EC	14.32	10.51	12.415 ± 2.69
03	Belt 480SC	2.74	4.78	3.76 ± 1.44
04	Timer 1.9EC	4.5	7.63	6.065 ± 2.21
05	Control	35.75	22.18	28.965 ± 9.59

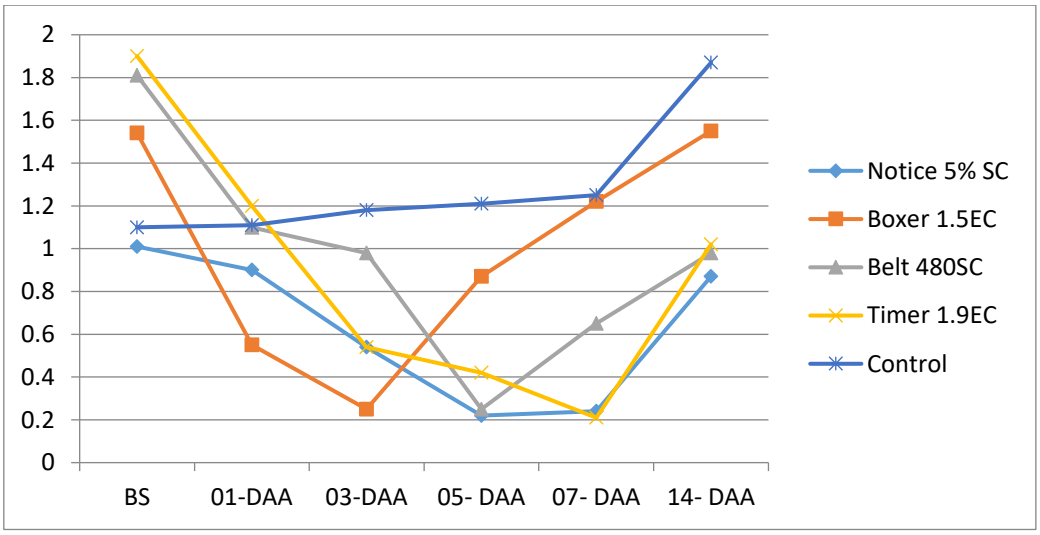

Fig. 1. Mean of Rice leaf folder (*C. medinalis*) before and after 1st spray.

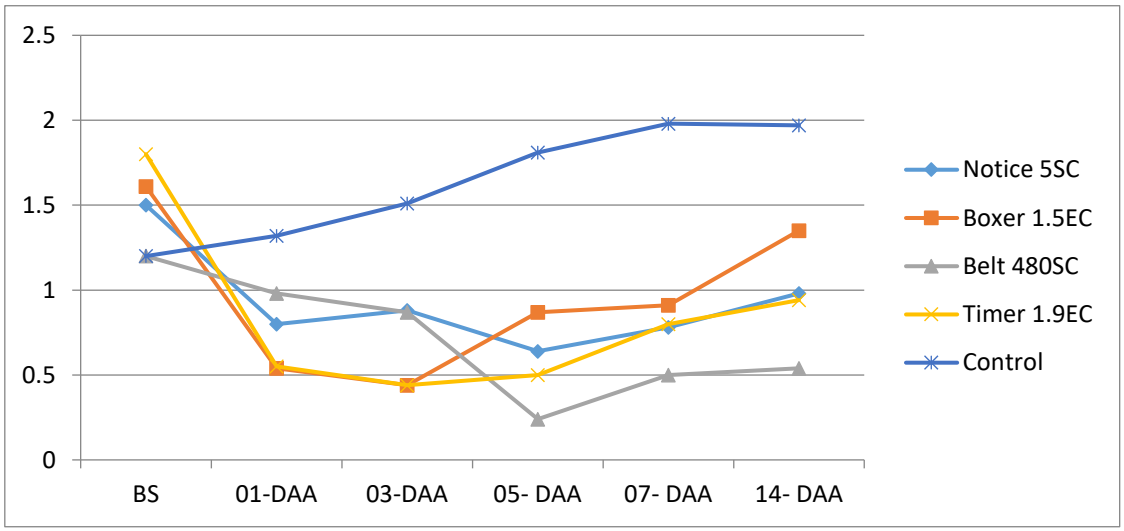

Fig. 2. Mean of Rice leaf folder (*C. medinalis*) before and after 2nd spray.

Table 5: Mean of Grain filling, Yield and Yield increase percentage comparing with control

S.N.	Treatment	Grain filled In %	Yield Kg/Acre	Yield Increase %
01	Notice 5% SC @ 480ml/Acre	86.77	2683.25	19.21
02	Boxer 1.5EC @ 150ml/Acre	83.43	2398.00	6.54
03	Belt 480SC @ 25ml/Acre	90.27	2711.50	20.47
04	Timer 1.9EC @ 200ml/Acre	77.87	2576.25	14.46
05	Control	72.12	2250.75	-

Similarly, the 2nd application also produced desirable results against Rice leaf folder population at significant level among all treated plots except control plots. Results shown that T-2 Boxer 1.5 EC reduced population rapidly but it started developing after 3days of application. Maximum controlled was observed in T-3 Belt 480SC, 0.98, 0.87, 0.24, 0.5 and 0.54/plant in 1-DAA, 3-DAA, 5-DAA, 7-DAA and 14-DAA respectively in Fig. 2. Padmavathi *et al.* (2013) also evaluated that Rice leaf folder larva folds the leaf and scrapes the green tissue from within the fold resulting in scorching and drying of the leaves. Larval density had differentially influenced effective leaf area of rice crop. Jamshed *et al.* (2000) studied that all the insecticides significantly reduced the damage by rice stem borer as compared to the control. The insecticides also significantly reduced the mean per cent folding of leaves by rice leaf folder. Kraker *et al.* (1999) studied leaf injury due to rice leaf folder larvae became visible after four weeks after transplanting. The number of injured leaves per hill peaked around flowering, and decreased towards maturity due to leaf senescence peak levels of injured leaves per hill ranged from 0.7 to 10.6, and were higher in the wet season.

Results of the experiment shown that the pest apprence the time of booting, more damage is done to flag leaves at the time of flowering reduced gain filling and ultimately yield losses were observed. Maximum yield increase in T-03 Belt 480SC (20.47%), followed by T-01 Notice (19.21). Padmavathi *et al* (2013) also observed that at flowering stage, flag leaf area damage of above 25% resulted in more than 50% unfilled grains over control, indicating direct effect of yield reduction in rice.

Author's Contribution

Junaid Ahmed Soomro and Ghulam Qadeer Junejo performed Data acquisition, Muhammad Haroon Hulio Conception, design and Critical revision of the manuscript as for important intellectual content, Shabana Naz Mazari Analysis and interpretation of data and Drafting of the manuscript and Abdul Samad Soomro Conception and design, Drafting and Final approval of the manuscript.

Conflict of interest

The authors declare that there is no conflict of interest with present publication.

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References

Arora R and Dhaliwal GS (1996) Agroecological changes and insect pest problems in Indian agriculture. *Indian J. Ecol*. 23: 109-122.

Geoff M, Gurr Donna MY, Read Josie, Lynn A, Catindig, Jiuan Cheng, Jian Liu, La Pham and Lan Kong (2012) Parasitoids of the rice leaffolder *Cnaphalocrocis medinalis* and prospects for enhancing biological control with nectar plants 14:1 1-12. DOI: 10.1111/j.1461-9563.2011.00550.x

Guyer D, Tuttle A, Rouse S, Volrath S, Johnson M, Potter S, Gorlach J, Goff, S, Crossland L, and Ward E (1998) Activation of latent 171 transgenes in Arabidopsis using a hybrid transcription factor. *Genetics* 149, 633-639.

Heong KL, Escalada MM & Vo Mai (1994) An analysis of insecticide use in rice: case studies in the Philippines and Vietnam. *International Journal of Pest Management* 40, 173–178. DOI: 10.1080/09670879409371878

Jamshed Iqbal**,** Liaqatullah Khan**,** Masood Khan Khattak**,** Agha Shah Hussain and Khalid Abdullah (2000) Comparative Efficacy of Some Insecticides Against Rice Stem Borers (*Tryporyza incertulus* wik. And *T. innotata*wik.) and Leaf Folder (*Cnaphalocrocis medinalis*) in D.I. Khan, *Pakistan. Pakistan Journal of Biological Sciences* **3**(1): 110-113. DOI: 10.3923/pjbs.2000.110.113

Kraker J, Van de A, Huis K L, Heong, JC, Van Lenteren and Rabbinge R. (1999) Population dynamics of rice leaffolders (Lepidoptera: Pyralidae) and their natural enemies in irrigated rice in the Philippines. *Bulletin of Entomological Research* 89, 411–421. DOI: 10.1017/S0007485399000541

Kulshreshtha JP, MB Kalode, PS Prakasa, Rao BC Misra & A Varma (1970) High yielding varieties and the resulting changes in the pattern of rice pests in India. *Oryza* 7, 61–64.

Litsinger, JA, Canapi BL, Bandong JP, Dela Cruz, CG, Apostol RF, Pantua PC, Lumaban MD, Alviola III, AL Raymundo, F Libetario, EM Loevinsohn, ME & Joshi RC (1987) Rice crop loss from insect pests in wetland and dryland environments of Asia with emphasis on the Philippines. *Insect Science and its Applications* 8, 677–692. DOI: 10.1017/S1742758400022785

Majid A, MA Makhdoomi and IA Dar (1979). Occurrence and control of white-backed plant hopper in the Punjab of Pakistan. *IRRN* 4(I) 17.

Padmavath Ch, IG Katti, AP Padmakumari, SR Voleti, LV Subba Rao (2013) The effect of leaffolder *Cnaphalocrocis medinalis* (Guenee) [Lepidoptera: Pyralidae] injury on the plant physiology and yield loss in rice. *Journal of Applied Entomology* 137**(**4) 249-256. DOI: 10.1111/j.1439-0418.2012.01741.x

Vivek (2009) Integrated Pest Management (IPM) in Rice http://agropedia.iitk.ac.in/content/ integrated-pest-management-rice.