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Efficacy of Eco-friendly Insecticides Against Rice Leaf Folder under *kharif* Rice-Crop-Ecosystem of Manipur valley

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ABSTRACT

A field experiment was conducted during Kharif, 2015 at the Entomological Research Farm of College of Agriculture, Central Agricultural University, Imphal (Manipur) to assess theefficacy of eco-friendly insecticides against Rice leaf folder (Cnaphalocrocismedinalis Guenee). Among the various eco-friendly insecticides field evaluated against the Lepidoterous pests(Acephate 50% +Imidacloprid 1.8) 51.8 SP@750 g/ha performed significantly better than rest of the insecticidal treatments with a record of minimum leaf damage incidence (1.02% LD) as against 1.42% in untreated control plot. The maximum mean extent of leaf damage (1.34% LD) was recorded in Lastraw @ 1000 ml ha^{-1}. The lower per cent mean leaf damage was also recorded in the plots treated withEMFPE @ 2500 ml/ha (1.05 % LD) and Achook @ 1500 ml/ha (1.09 % LD) which did not differ significantly from one another.

Key words: *(Cnaphalocrocismedinalis Guenee, Lepidoterous pests, Acephate, Imidacloprid.*

INTRODUCTION

Rice (*Oryza sativa*), which is the staple food of more than 60% of world population is cultivated around the world in varied edaphic and meteorological conditions starting from 49º N latitude in Czechoslovakia and as far as 35º S in New South Wales, Australia. The oil from the Rice branis a rich source of vitamin E and has received considerable attention by researchers as potential source for the developing countries. The cultivated area of rice in the is over an area of 163.19 million hectare with an annual production of about 719.3 million tonnes in which India occupies the first covering a total area of 42.5 million hectare with an productivity of 3507 kg/ha[3]. 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[1]. Nathan *et al.*[7] evaluated the effect of *Melia azedarach* L. seed extract on nutritional indices and gut enzymes acid phosphatases, alkaline phosphatases, adenosinetriphosphatases, and lactate dehydrogenase of the rice leaffolder (RLF) *Cnaphalocrocis medinalis* (Guenee) (Lepidoptera: Pyralidae).

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Larvae were fed a treated rice-leaf diet containing the seed extract and their midgut was used for enzyme determination. Laboratory experiments showed that the seed extract suppressed the larval activity of *C. medinalis* even at a low dose. Gross dietary utilization (efficiency of conversion of ingested and digested food) of RLF decreased after ingesting the treated rice-leaf diet. Food consumption, digestion, relative consumption rate, efficiency of conversion of ingested food, efficiency of conversion of digested food, and relative growth rate values declined significantly. As compared to the control, consumption of the extract containing rice-leaf diet resulted in a 69% reduction of the acid phosphatases activity, a 71% reduction of the alkaline phosphatases activity, a 46% reduction of the adenosine triphosphatases activity, and a 52% inhibition of the lactate dehydrogenase activity. Punithavalli *et al*.[8] conducted Field studies in Tamil Nadu, India, during kharif and *Rabi* seasons, to determine the efficacy of botanical insecticides against *Cnaphalocrocis medinalis* and their effects on the natural enemies in rice. Neem, sweet flag (*Acorus calamus*) and pongamia (NSP) extracts were applied to the crop when the pest surpassed the economic threshold level at 10-day intervals. Observations on reduction of pest incidence were made at the tenth day after spraying. In each treatment, before and after spraying. Results showed that, among the botanicals and microbial insecticides, 0.36% NSP recorded significantly less leaf folder damage, followed by 0.24% NSP. However, botanical mixtures mixed with microbial insecticides, such as NSP + *Bacillus thuringiensis* and NSP + spinosad showed equally effective, but non-significant difference with the botanical mixture alone. Mohapatra and Nayak[6] reported that the foliar spraying of neemazol @1 ml/lt at 60DAT and 70DAT and foliar spraying of buprofezin 25SC @ 1.5 ml/lt at 85DAT at ETL afford excellent control of major insect pests of rice leaf folder and green leafhopper. Use of eco-friendly pesticides are environmentally safe and also offer an attractive ways to completely replace the use of synthetic pesticides except in very few cases. Besides, chemicals that remains in toxic form as residues on the foliage for a short time after application is considered useful in many instances. Spraying with 1% neem oil reduces the incidence of Rice Leaf Folder, Mondal*et al*[5]. These considerations find essentiality of evaluating the newer pest control chemicals and their safer formulations that are being synthesized and made available from time to time. Availability of newer molecular insecticides with novel modes of action, higher toxicity to target pests at very low doses and less toxicity to non-target organisms, low persistence in nature has further strengthen the role of such insecticides in rice IPM. Therefore, considering the above facts, the present research work entitled "Efficacy of Eco-friendly insecticides against Rice Leaf Folder under kharif Rice-Crop-Ecosystem" has been proposed with the following aspect: Determination of the effect of nursery and post planting application with certain new Eco-friendly insecticides on the incidence of rice yellow stem borer.

MATERIALS AND METHODS

The experiment was carried-out during *Kharif* season 2015 in the Rice Research Farm of the College of Agriculture, Central Agricultural University, Iroisemba, Imphal to assess the effect of Eco-friendly insecticides on the incidence of the Rice Leaf Folder (*Cnaphalocrocis medinalis*). The location of the field experimented is situated at 24 ^{0}45' N latitude and 93 ^{0} 56' E longitude with an elevation of 790 m above the mean sea level. The soil type was clay loam in texture and acidic in reaction having p^H value of 5.5. The seedlings were at first raised in a properly nursery and the seeds were treated with Anokhi (Crabendazim 12%+ Mancozeb 63%) 75 WP @ 2g/kg of seeds. The sprouted seeds were uprooted when they attained 4 - 5 leaf stage (30 days old). Well decomposed Farm Yard Manure @ 10 tonnes per hectare was thoroughly incorporated into the soil one month prior to transplanting and NPK fertilizers were applied at the dose of

60:40:30.Seedlings were transplanted at spacing 15 x 10 cm. Randomized Block Design was used for the experiment with three replication with a plot size of 5 x 4 m^2 and untreated control in each replication. The high yielding susceptible variety 'Leimaphou (KD-2-6-3)' was used for the experiment.

RESULT AND DISCUSSION

The two spray mean leaf damage data indicated that lancergold (Acephate 50% +Imidacloprid 1.8) 51.8 SP applied @ 750g/ha performed significantly better than rest of the insecticidal treatments with a record of minimum leaf damage of 1.02 per cent as against 1.42 per cent in untreated control which was at par with EMFPE treatment recording lower mean leaf damage incidence of 1.05 per cent.The per cent mean leaf damage recorded in the plots treated with Achook @ 1500 ml/ha (1.09 % LD), pestoneem @1500 ml/ha (1.21 % LD), *Beaveria bassiana* formulation (1.30 % LD) which had non significance difference from each other. However, all the insecticidal treatments were effective in restricting the infestation due to*C.medinalis*when compared with untreated control. The Lastraw treatment did not perform satisfactorily as compared to other insecticidal treatments and proved to be least effective against this lepidopterous pest with a record of maximum mean leaf damage of 1.34 per cent .The present findings of lancergold against the pest is in conformity with the results of Jeer *et al*[4] who reported that lancergold (Acephate 50% + imidacloprid 1.8%) 51.8 SP when applied @ 621.6 g/ha was proved to be significantly superior over all other treatments with lowestleaf damage incidence by leaf folder. However the moderate efficacy of Achook in the present investigation is partially supported by the results of Chanu and Ray[2] who reported the effectiveness of Achook when applied @ 0.03g/ha & 0.06 g/han controlling Rice leaf folder.

Table 1: Relative Effect of certain ecofriendly insecticide insecticidal on the incidence of *C. medinalis* inrice var. 'Leimaphou (KD-2-6-3)' during *Kharif*, 2015

Treatment	Dose in Ml or g/ha	Mean leaf damage (%)		Pooled Mean
		1st spray	2nd spray	
Achook (Azadirachtin 1500 pmm)	1500 ml	1.00(1.22)	1.18(1.29)	1.09(1.26)
Pestoneem (Azadirachtin 1500 pmm)	1500 ml	1.14(1.28)	1.28(1.33)	1.21(1.30)
Lastraw	1000 ml	1.13(1.27)	1.53(1.42)	1.34(1.36)
EMFPE	2500 ml	1.01(1.23)	1.09(1.26)	1.05(1.24)
Baba (*B.bassiana)* 10 EC	500 ml	1.08(1.25)	1.53(1.41)	1.30(1.34)
Lancergold (Acephate 50%+ imidacloprid 1.8%) 51.8 SP	750 g	0.97(1.21)	1.07(1.25)	1.02(1.23)
Untreated control	Water	1.27(1.33)	1.69(1.51)	1.42(1.39)
CD (P=0.05)		0.09	0.10	0.11

Table 2: Efficacy of eco-friendly insecticides against *C. medinalis* during 1st spray

TREATMENT	Dose in or g/ha	[1]Average leaf damage (%)					MEAN
		1 DBA	3 DAT	7 DAT	10 DAT	15 DAT	
Achook (Azadirachtin 1500 ppm)	1500 ml	4.89(2.32)	1.10(1.26)	1.13(1.27)	0.88(1.17)	0.88(1.17)	1.00(1.22)
Pestoneem (Azadirachtin 1500 ppm)	1500 ml	5.05(2.35)	1.14(1.28)	1.18(1.29)	1.16(1.29)	1.15(1.29)	1.14(1.28)
Lastraw	1000 ml	4.54(2.24)	1.02(1.23)	1.20(1.30)	1.20(1.30)	1.09(1.26)	1.13(1.27)
EMFPE	2500 ml	5.22(2.39)	1.04(1.24)	1.04(1.24)	1.09(1.26)	0.87(1.16)	1.01(1.23)
Baba (*B.Bassiana)* 10 EC	500 ml	4.38(2.20)	1.06(1.24)	1.16(1.28)	1.07(1.25)	1.01(1.22)	1.08(1.25)
Lancergold (Acephate 50% + Imidacloprid1.8%) 51.8 SP	750g	5.01(2.34)	0.90(1.18)	1.21(1.31)	0.97(1.21)	0.80(1.13)	0.97(1.21)
Water	500 ml	5.30(2.40)	1.18(1.29)	1.33(1.35)	1.28(1.35)	1.30(1.34)	1.27(1.33)
CD(P=0.05)		NS	0.06	0.10	0.09	0.08	0.09

Figures in parentheses are $\sqrt{X+0.5}$ transformed values
[1] Average of three replications
NS= Non significance
DBA= Days before Application

Table 3: Efficacy of eco-friendly insecticides against *C.medinalis* during 2nd spray

Treatment	Dose in ml or g/ha	[1]Average leaf damage (%)				
		3 DAT	7 DAT	10 DAT	15 DAT	Mean
Achook (Azadirachtin 1500 ppm)	1500 ml	1.45(1.39)	1.10(1.26)	1.02(1.23)	1.18(1.29)	1.18(1.29)
Pestoneem (Azadirachtin 1500 ppm)	1500 ml	1.05(1.24)	1.45(1.39)	1.18(1.30)	1.45(1.39)	1.28(1.33)
Lastraw	1000 ml	1.51(1.42)	1.60(1.44)	1.48(1.41)	1.51(1.40)	1.53(1.42)
EMFPE	2500 ml	0.96(1.20)	1.17(1.29)	1.09(1.26)	1.14(1.28)	1.09(1.26)
Baba (*B.Bassiana)* 10 EC	500 ml	1.50(1.41)	1.61(1.44)	1.50(1.41)	1.50(1.41)	1.53(1.41)
Lancergold (Acephate 50% + Imidacloprid1.8%) 51.8 SP	750 g	0.84(1.16)	0.92(1.19)	1.45(1.39)	0.98(1.21)	1.07(1.25)
Water	500 ml	1.63(1.43)	1.71(1.48)	1.56(1.44)	1.71(1.48)	1.69(1.48)
CD(P=0.05)		0.08	0.11	0.09	0.12	0.10

Figures in parentheses are $\sqrt{X+0.5}$ transformed values

[1] Average of three replications

REFERENCES

1. Arora, R. and Dhaliwal, G.S., Agro-ecological changes and insect pest problems in Indian agriculture. *Indian J. Ecol.* **23:** 109-122 (1996).
2. Chanu, T.M. and Ray, D.C., Comparative efficacy of neem bio pesticides against Comparative efficacy of neem bio-pesticides against *Scirpophaga incertulas* (Walker) on Rice in Cachar District, Assam. *Ann. Pl. Protec. Sci*., **23(2):** 269-272 (2015).
3. FAO (Food and Agricultural Organization) (2015). FAOSTAT database for agriculture. Available online at faostat.fao.org/faostat/collection?Subset agriculture (2015).
4. Jeer M., Choudhary, V.K and Dixit, A. (2015).Effect of pre-mix combination of Acephate and Imidacloprid on insect pests of rice and their natural enemies. *J of Ent and Zoo. Studies* **5(3):** 1272-1278 (2017).
5. Mondal, D. and Mondal T., Efficacy of *Azadirachta indica* based biopesticides. *Res. J. sci*. **1(3):** 94-99 (2012).
6. Mohapatra, L. N. and Nayak, S.K., Evaluation of IPM module against insect pest complex of rice. *Indian J Entomo.***77 (1):** 35-38 (2015).
7. Nathan S.S., Kalaivani, K., Murugan, K. and Chung, G.P. The toxicity and physiological effect of neem limonoids on *Cnaphalocrocis medinalis* (Guenee) the rice leaffolder. *Pestic Biochem Physiol.*, **81:** 113–122 (2006).
8. Punithavalli, M., Raguraman, S., Rajkumar and M. B., Field evaluation of botanicals against, *Cnaphalocrocis medinalis* and effects on natural enemies in rice. *Ann. Pl. Protec. Sci.* **19(1):** 221-222 (2011).