Research Paper

ADVANCE RESEARCH JOURNAL OF
CROP
IMPROVEMENT
Volume 3 | Issue 2 | December, 2012 | 118-121

Efficacy of different insecticides for controlling the rice leaf folder (*Cnaphalocrocis medinalis* Guenee)

UTPAL DEY, B.B. SARKAR[1], D.N. DHUTRAJ[1] AND S.L. BADGUJAR[1]

AUTHORS' INFO

Associated Co-author :
[1]Central for ODL in Research and Training in Agriculture, IGNOU, AGARTALA (TRIPURA) INDIA

Author for correspondence :
UTPAL DEY
Department of Plant Pathology, Mahatma Phule Krishi Vidyapeeth, Rahuri, AHMEDNAGAR (M.S.) INDIA
Email : utpaldey86@gmail.com

ABSTRACT : Field experiments were conducted to evaluate the efficacy of different pesticides, botanicals and bioagents against the rice leaffolder, *Cnaphalocrocis medinalis* Guenee. The results indicated that the activity of *C. medinalis* lasted from second week of August to the last week of October during *Kharif* 2011. The peak of its activity was observed in the second fortnight of September during the crop season. The efficacy of insecticides, carbofuran 3G (Furadan), monocrotophos (Nuvacron 40WSE), phorate 10G (Thimet 5 CT), malathion 57 EC (Malathion), roxion 40 EC (Dimethoate), lorsban 40 EC (Chlorpyrifos), arrivo 10 EC (Cypermethrin), neem seed kernel extract (NSKE) and neem oil were evaluated against rice leaf-folder. All the insecticides caused 71.22 to 96.62 per cent mortality of the pest after 24 hours of spray. Insecticide treated plots invariably yielded higher than the control. The highest yield (3471.17 kg ha^{-1}) was recorded with cvarbofuran 3G (Furadan) application and the lowest with arrivo 10 EC (Cypermethrin) (3211.50 kg ha^{-1}) as compared to control (3096.00 kg ha^{-1}).In regulating the use of these insecticides to rice, considerations should be given to the large amount of these insecticides released to the rice ecosystem and availability of alternate more safer insecticides for the leaffolder management.

Key Words : Insecticides, Rice, Leaffolder, Crop pest

How to cite this paper : Dey, Utpal, Sarkar, B.B., Dhutraj, D.N. and Badgujar, S.L. (2012). Efficacy of different insecticides for controlling the rice leaf folder (*Cnaphalocrocis medinalis* Guenee), *Adv. Res. J. Crop Improv.*, **3** (2) : 118-121.

Paper History : Received : 12.07.2012; **Revised :** 14.09.2012; **Accepted :** 04.11.2012

Among other factors, low yields of rice in India due to damages by insect pests are the major constraints. About 128 species of insects have been reported attacking the rice crop. Of these 15 to 20 insect species are known to be the pests of paramount importance and are regularly noticed in tropical Asia. Rice leaf folder, *Cnaphalocrocis medinalis*(Gn.) to the list also poses a threat to economic production of rice belt in state Tripura. The rice leaf folder, *Cnaphalocrocis medinalis* Guenee earlier considered as a minor pest of rice in many Asian countries, appears to have become increasingly important with the spread of high yielding rice varieties and accompanying changes in cultural practices. Infestation usually occurs during late growth stages of the rice crop. The young larvae feed on open leaves but later feed inside the rolled leaf formed by folding the leaf longitudinally with a sticky substance. The larvae fold the leaves and scrape the green tissues of the leaves from within and cause scorching and leaf drying. Each larva is capable of destroying several leaves by its feeding (Upadhyay*et al.*, 1975). This activity disturbs the photosynthesis and plant growth and ultimately yield is reduced. The success of the crop, therefore, depends upon effective control of this pest. Sellamal Murugesan and Chelliah (1983) reported that a 10 per cent increase in flag leaf damage by the leaffolder reduces grain yield by 0.13 g per tiller and the number of fully – filled grains by 4.5 per cent. Damage due to rice leaf folder may sometimes go as high as 60 per cent (Kushwaha and Singh, 1984).

Field studies conducted by Pawan *et al.* (1996) in Bihar, India showed that infestation of rice leaf folder ranged from 1.4 to 33.2 per cent from July to October with minimum level of infestation in July (1.8-2.9%) and maximum in September (17.9-33.2%) followed by August (7.6-16.2%). For the control of the insect pests of rice, the insecticides like ekalux, kilvil, lannate, pad an anddiazinon have been tried and recommended by Panda and Shi (1989), Khan and Khaliq (1989). Mustafa *et al*. (1990), Mustafa and Razzaq (1991), Biswas and Mandal (1992), Prasad *et al*. (1995), Sharma and Singh (1995), Singh *et al*. (1995 a, b) during the last two decades.Khan *et al*. (1989) studied the biology, chemical control and varietal preference of rice leaf folder and found that larval damage and larval population differed significantly among different rice varieties. Application of lorsban, sumithion, methyl parathion, denital and thiodan gave more than 90 per cent mortality of the insect larvae and were statistically at par in controlling the rice leaf-folder. Ramasubbaiah *et al.* (1980) tested fenthion, phosphamidin, fenitrothion, endosulphondimethoate, quinalphos, diazinon and carbaryl against *C.medinalis* and reported that all insecticides gave effective control. Saroja and Raju (1982) studied the effect of some foliar insecticides against leaf folder and found that cypermethrin and fanvalerate provided effectwise control and increased the yield of rice significantly. Therefore, the present investigation was taken up to study the efficacy of different formulations against rice leaf folder and to get insecticide residues free grains.

RESEARCH PROCEDURE

Field trials were conducted during *Kharif* 2011 with five treatments replicated four times to evaluate the efficacy of different insecticide formulation against the rice leaf folder, *C. medinalis* on a ruling rice variety ADT 43. The experiment was laid out in a Randomized Complete Block Design. The size of the experimental plot was 5m x 4m. The spacing adopted in this trial was 20cm x15 cm. The insecticides were sprayed with the help of knapsack sprayer when the attack of leaf folder reached two larvae per plant. Mortality of the insect larvae were calculated by counting the number of larvae from randomly selected 10 hills from each treatment 24 hours before and after the application of insecticides. The performance of each insecticide was based on the mortality of the pest after 24 h after spray and the yield. The yield of each plot was recorded and expressed in kg/plot. The structure of the treatments used in this study is given in Table 1 and 2.

RESEARCH ANALYSIS AND REASONING

The study revealed that on mortality caused by the insecticides during *Kharif* 2011 is presented in Table 1. The

Table 1 : Effect of various insecticides on the larval population and mortality of rice leaf-folder, *C. medinalis*

Insecticides	Doses	No. of larvae		Mortality (%)
		Before spray	After spray	
T_1- Carbofuran 3G (Furadan)	9 kg/acre	2.96	0.10	96.62
T_2- Monocrotophos (Nuvacron 40WSE)	1.25 L/ha	3.12	0.11	96.47
T_3- Phorate 10G (Thimet 5 CT)	9 kg/acre	2.71	0.16	94.09
T_4- Malathion 57 EC (Malathion)	2.50 L/ha	2.43	0.61	74.89
T_5- Roxion 40 EC (Dimethoate)	0.875 L/ha	3.18	0.19	94.03
T_6-Lorsban 40 EC (Chlorpyrifos)	500 ml/acre	2.71	0.17	93.73
T_7-Arrivo 10 EC (Cypermethrin)	0.625 L/ha	1.86	0.36	80.65
T_8- NSKE	@5%	2.78	0.80	71.22
T_9-Neem oil	@0.5%	2.17	0.59	72.81
T_{10}-Untreated control	-	2.11	1.98	6.16
S.E.±	-	0.06	0.05	0.04
C.D. (P = 0.05)	-	0.19	0.16	0.12
C.V. 5%	-	5.70	5.18	5.51

Table 2 : Economics of control operations of rice leaf-folder, *C. medinalis*on rice crop

Insecticides	Increase in yield over control (kg)	Yield (kgha^{-1})
T_1- Carbofuran 3G (Furadan)	375.17	3471.17
T_2- Monocrotophos (Nuvacron 40WSE)	374.34	3470.34
T_3- Phorate 10G (Thimet 5 CT)	350.19	3446.19
T_4- Malathion 57 EC (Malathion)	153.23	3249.23
T_5- Roxion 40 EC (Dimethoate)	347.67	3443.67
T_6- Lorsban 40 EC (Chlorpyrifos)	335.12	3431.12
T_7-Arrivo 10 EC (Cypermethrin)	203.75	3299.75
T_8- NSKE	115.50	3211.50
T_9- Neem oil	135.78	3231.78
T_{10}-Untreated control	-	3096.00
S.E.±	-	1.72
C.D. (P = 0.05)	-	5.15
CV at 5%	-	6.81

mortality of the pest ranged from 71.22 to 96.62 per cent in treated plots. Carbofuran 3G (Furadan) gave the highest (96.62%) mortality followed by monocrotophos (Nuvacron 40WSE) (96.47%), phorate 10G (Thimet 5 CT) (94.09%), roxion 40 EC (Dimethoate) (94.03%) arrivo 10 EC (Cypermethrin) (80.65%), malathion 57 EC (Malathion) (74.89 %), neem oil (72.81%)and NSKE (71.22%).The mortality caused by these insecticides was statistically at par. Malathion gave significantly lower mortality (74.89 % for the year 2011) than the former pesticides. These results are comparable with those of Khan *et al*. (1989) who observed more than 90 per cent mortality of the rice leaf-folder after the application of various insecticides. Our results are in partial agreement with those of Mishra *et al*. (1998) who observed that monocrotophos and cypermethrin gave good control of rice leaf-folder and were at par statistically.

All insecticidal treatments significantly out yielded the untreated plots (Table 2). The highest paddy yield was obtained with the application of carbofuran 3G (Furadan) (3471.17 kg ha^{-1}) followed by monocrotophos (Nuvacron 40WSE) (3470.34 kg ha^{-1}), phorate 10G (Thimet 5 CT) (3446.19 kg ha-^{1}), roxion 40EC (Dimethoate) (3443.67 kg ha^{-1}) arrivo 10 EC (Cypermethrin) (3299.75 kg ha-^{1}), malathion 57EC (Malathion) (3249.23 kg ha^{-1}), neem oil (3231.78kg ha^{-1})and NSKE (3211.50 kg ha^{-1}).These treatments were, however, at par statistically. The yield obtained by the application of Malathion (3249.23 kg ha^{-1}) was statistically lower than those of other insecticidal treatments.These results are similar to those of Saroja and Raju (1982 a, b) who obtained similar increase in yield by controlling *C. medinalis* damage by the application of synthetic pyrethroids.

It is evident that exposure to botanical insecticides in the larval diet has significant effects on the activity of several enzymes found in the late instar larvae and adult *C.medinalis*. Botanical insecticides such as neem may interfere with the production of certain types of proteins. This activity is apparently strongest during pupation; pupae were very susceptible after larvae were exposed to the botanical insecticides. Previous reports by several groups found that treatment with neem and botanical insecticides induced similar signs of toxicity (Senthil *et al*., 1999, Smirle *et al*., 1996). Active principles present in neem and NSKE(azadirachtin etc.) are responsible for such effects. The adult physiology is thus impaired after larvae are exposed to botanical insecticides and bacterial toxin. These botanical insecticides may, therefore, serve as effective alternatives to conventional synthetic insecticides in the control of agricultural pests.

LITERATURE CITED

Biswas, A.K. and Mandal, S.K. (1992). Evaluation of prophylactic insecticidal measures against insect pests of paddy in seed bed. *Crop Res. (Hisar)*, **5**(1): 141-145.

Khan, M.R., Ahmad, M. and Ahmad, S. (1989). Some studies on biology, chemical control and varietal preference of rice leaf folder, *Cnaphalocrocis medinalis*. *Pakistan J. Agri. Sci.*, **26**: 253–63.

Khan, L. and Khaliq, A. (1989). Field evaluation of some granular insecticides for the control of rice stem borers. *Pak. J. Sci. Indust. Res.*, **32** (12): 824.

Kushwaha, K.S. and Singh, R. (1984). Leaf folder outbreak in Haryana, India. *I.R.R.N.*, **9**(6): 20.

Mishra, B.K., Senapati, B. and Mishra, P.R. (1998). Chemical control of rice leaf folder, *Cnaphalocrocis medinalis*in. *Orissa. J. Insect Sci.*, **11**: 137–140.

Mustafa, G..M., Razzaq, A. and Munir, M. (1990). Comparative efficacy of some ernulsifiableconcentrates applied in paddy water as sand mix against rice borers. Ann. Rept. AARI., Faisalabad, 1989-90: pp. 44-46.

Mustafa, G. and Razzaq, M.A. (1991). Efficacy of different doses of granular insecticides against rice borers. Ann. Rept. AARI, Faisalabad, 1990-91: pp. 42-43.

Panda, S.K. and Shi, N. (1989). Chemical control of white backed plant hopper. *I.R.R.N.*, **13**(3): 40-41.

Prasad, A., Premchand and Prasad, D. (1995). Evaluation of some newer insecticides for the control of rice leaf folder, *Cnaphalocrocis medinalis* Guen. *Indian J. Entomol.*, **57**(4): 424-426.

Ramasubbaiah, K., Rao, P.S. and Rao, A.G. (1980). Nature of damager and control of rice leaf folder. *Indian J. Enomol.*, **42** : 214–217.

Saroja, R. and Raju, N. (1982a). An effect of foliar insecticides on rice stem borers and leaf folders. *Int. Rice Res. News*, **7**:14.

Saroja, R. and Raju, N. (1982 b). Synthetic pyrethroids for controlling leaf folders on rice. *Int. Rice Res. News*, **7** : 15.

Sellamal Murugesan and Chelliah, S. (1983). Rice yield losses caused by leaffolder damage to the flag leaf. *Internat. Rice Res. News Letter*, **9**(4):18.

Senthil Nathan, S., Murugan, K. and Kalaivani, K. (1999) Effect of azadirachtin and *Bacillus thuringiensis*(Berliner) on the behavioral and physiological response of *Cnaphalocrocis medinalis* Guen´ee (Rice leaffolder). In: Murugan, K. [Ed.] Proc. National Symp. on Biological Control of Insects in Agriculture, Forestry, Medicine and Veterinary Science (Coimbatore, TN, India), 1:31-35.

Sharma, D.R. and Singh, D.P. (1995). Ovicidal effect of some insecticides against rice stem borer *Scirpophaga incertulus Walker. J. Insect Sci.*, **8**(1): 114-115.

Singh, P.P., Rao, R. and Singh, K.M. (1995b). Efficacy and economics of some insecticides against rice stem borer *Scirpophagain certulus*Walker. *J. Appl. Biol*., **3** (1-2): 36-41.

Singh, S., Kushwaha, K.S., Sharma, P.D. and Singh, S. (1995a). Resurgence of rice leaf folder *Cnaphalocrocis medinalis* Guen due to application of carbofurongranules. *Indian J. Entomol*., **57**(4): 366-372.

Smirle, M.J., Lowery, D.T. and Zurowski, C.L. (1996). Infuence of neem oil on detoxication enzyme activity in the oblique banded leafroller, *Choristoneura rosaceana*. *Pest. Biochem. Physiol.,* **56**:220-230.

Upadhyay, V. R., Desai, N. D., and Shah, A. H. (1975). Extent of damage and varietal susceptibility by rice leaf folder, *Cnaphalocrocis medinalis* Guenee (Lepidoptera: Noctuidae) in Gujarat. *Pesticides,* **9**: 27-28.

****