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Field Efficacy of Certain Chemical Insecticides against Rice Leaf Folder, *Cnaphalocrocis medinalis* Guenee

Pramod Kumar Kaiwart*, Ashwani Kumar, Hadi Husain Khan and Ramkinkar Sahu

Department of Entomology, Sam Higginbottom University of Agriculture, Technology and Sciences, Allahabad, U.P., India
**Corresponding author*

A B S T R A C T

The present investigation entitled "Efficacy of certain chemical insecticides against leaf folder, *Cnaphalocrocis medinalis* Guenee." was conducted during July, 2015 at Agricultural research farm, SHIATS, Allahabad. The occurrence of leaf folder commenced from 33rd standard week (August 2nd week) with an average 1.54 % infestation. The leaf folder infestation increased and gradually reached peak level of 7.62 % infestation at 38th standard week (September 3rd week). Thereafter, declined trend was observed due to fall of maximum and minimum temperatures as optimum weather condition are decreasing. Therefore, Per cent infestation was positively correlated with the maximum temperature. Hence decline of temperature lead to the decline of the leaf folder infestation. The two sprays were taken for the management of leaf folder. The data on the percent infestation of leaf folder after first and second spray revealed that all the chemical treatments were significantly superior over control. Among all the treatments lowest per cent infestation of leaf folder was recorded in Monocrotophos (1.07) followed by Dimethoate (1.39), Fipronil (1.46), Imidacloprid (1.56), Malathion (1.80), Cartap hydrochloride (1.88), Spinosad (2.28) as compared to control (6.49). At pooled data all the treatments were at par with each other except control, but within this first four treatments *i.e.* Monocrotophos, Dimethoate, Fipronil and Imidacloprid were best superior treatments in the management of rice leaf folder. The yields among the treatment were significant. The highest yield was recorded in T_1 Monocrotophos (43.500 q/ha) followed by T_6 Imidacloprid (42.500 q/ha), T_7 Dimethoat (40.400) T_2 Spinosad (39.800), T_5 Fipronil (39.600 q/ha), T_3 Malathion (38.20 q/ha), T_4 Cartap hydrochloride (38.00 q/ha) as compared to control T_0 (25.500 q/ha). When cost benefit ratio was worked out, interesting result was achieved. Among the treatment studied, the best and most economical treatment was T_1 Monocrotophos (1:3.16), followed by T_7 Dimethote (1:2.95), T_6 Imidacloprid (1:2.82), T_4 Cartap Hydrochloride (1:2.47), T_3 Malathion (1:2.75), T_2 Spinosad (1:2.38), T5 Fipronil (1:2.31) as compared to control T_o (1:2.03).

Keywords

Insecticides, Rice (*Oryza sativa*), Rice leaf folder (*Cnaphalocrocis medinalis*), Seasonal incidence.

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Introduction

Rice is the world's most important food cereal crop and a main food source for more than a third of the world's population. More than 90 % of the world's rice is cultivated and consumed in Asia where 60 % of the world's people live. Rice provide about 35 to 60 % of the calories consumed by 3 billion Asians (Khus, 1997).

Rice leaf folder, *Cnaphalocrocis medinalis* (Guen. Pyralidae Lepidoptera) was considered as pests of minor importance have increased in abundance in late 1980's and have become major pests in many parts world (Ahmed *et al.,* 2010). Rice leaf folder is the most widely distributed and found foliage feeder in rice. An increase in *C. medinalis* population could be attributed to the large scale cultivation of high yielding varieties, excessive usage of nitrogenous fertilizers and continuous use of insecticides that created resistance against this pest. This insect has attained the status of major pest during the last few years (Shah *et al.,* 2008).

Materials and Methods

The present investigation was conducted at the Central Research Farm of Sam Higginbottom Institute of Agriculture, Technology and Sciences, Allahabad, Uttar Pradesh during *Kharif* season 2015. To study the efficacy of newer insecticides trial was laid out in RBD block design with 8 treatments, replicated four times. The "IR6444" hybrid variety of rice was used and a healthy crop was raised by following all the recommended agronomical practices. The plot size was 5m x 5m and the spacing between rows and plants was maintained at 20 and 10 cm, respectively.

For efficacy of insecticidal treatments, the observations were recorded from 10 plants selected at random. Observations on the efficacy of newer insecticides were recorded before 1 day spraying and on 2nd day, 7th day and 14th day after insecticidal application. Finally yield was recorded for every treatment to calculate cost benefit ratio.

Results and Discussion

The pests appeared on 32 standard week (August 2nd week) on rice crop with an average infestation per cent 1.54 of leaf folder (Table 1). The leaf folder infestation increased and gradually reached peak level of 7.62 per cent on 38th standard week (September 3rd week). At that time, average max temperature was 35.65°C and minimum temperature was 28.05°C, maximum relative humidity was 86.28 % and minimum 55.71 %, average wind velocity was 2.17 km/ hour and average sun shine hour was 7.11 hours.

These findings can be supported with the work of Netam and Gupta (2015) and Kumar *et al.,* (2013) who stated that the peak population was observed in 32nd to 40th standard week.

Ram *et al.,* (2014) reported positive correlation between the pest population and maximum temperature in. Similarly, Chakraborty *et al.,* (2011) reported the infestation of leaf folder showed negative correlation with rainfall and relative humidity in northern part of West Bengal.

The data on the pooled mean percent leaf infestation of first and second spray revealed that all the chemical treatments were significantly superior over control (Table 2). Among all the treatments lowest percent infestation of leaf folder was recorded in Monocrotophos (1.07), Dimethoate (1.39), Fipronil (1.46), Imidacloprid (1.56), Malathion (1.80), Cartap hydrochloride (1.88), Spinosad (2.28) as compared to control (6.49). Per cent infestation reduction of leaf folder recorded at 1st and 2nd spray after insecticidal applications of Monocrotophos was found significantly superior (76.02 %) followed by Imidacloprid (68.67 %) as compared to other treatments Dimethoate (67.10 %), Fipronil (66.53 %), Cartap hydrochloride (64.83 %), Spinosad (58.21 %) and Malathion (58.68 %) respectively. Similar findings have been reported by Alvi (2003), Dey (2012) and Chakraborty *et al.,* (2011) (Table 3).

Table.1 Seasonal incidence of rice leaf folder

		Temperature		Humidity				
Weeks	Infestation %	Max	Min	Max	Min	Rain fall	Wind velocity (km/hr)	Sunshine (hr/day)
31	0.02	35.97	27.74	92.45	53.42	5.00	1.33	5.34
32	1.54	34.22	27.42	92.35	52.36	0.00	1.25	5.12
33	2.98	33.12	27.55	92.45	55.25	0.00	1.24	4.52
34	3.45	33.22	27.00	92.85	58.28	12.48	1.28	4.80
35	4.92	35.45	27.42	90.71	54.85	11.85	2.22	5.74
36	5.80	36.42	27.20	89.71	45.42	0.00	2.55	7.97
37	6.48	37.48	27.37	86.71	47.14	0.00	1.68	8.70
38	7.08	35.65	28.05	86.28	55.71	0.60	2.17	7.11
39	7.62	36.42	27.80	90.71	47.14	0.20	1.71	7.17
40	6.02	36.11	27.80	89.00	50.14	0.00	1.84	8.45
41	3.28	35.77	27.82	90.00	51.57	0.00	1.56	8.68
42	2.89	35.85	23.88	78.28	51.40	0.00	1.35	8.57
43	2.32	36.00	20.57	93.00	50.71	0.00	0.96	8.65
44	1.21	35.25	19.71	91.57	29.71	0.64	0.71	6.65
45	0.560	33.57	20.08	90.71	57.00	0.00	0.51	8.30
46	0.250	32.22	20.18	89.42	52.21	0.18	0.48	8.54
r =		.572	-0.186	-0.355	-0.536	-0.515	-0.391	0.860
t =		2.698	-0.732	-1.471	-2.461	-2.325	-1.643	6.532
		S	NS	NS	S	S	NS	S

Table.2 Efficacy of certain chemical insecticides against rice leaf folder during *kharif* season 2015

Treatment	**Leaf folder infestation percent per hill**						
	First Spray				**Second Spray**		
	Pre-treatments	**3 DAS**	**7 DAS**	**14 DAS**	**3 DAS**	**7 DAS**	**14 DAS**
Control	4.92	5.24	5.80	6.48	6.72	7.08	7.62
Monocrotophos	5.86	1.28	1.48	1.96	0.48	0.52	0.69
Spinosad	6.08	2.91	3.23	3.48	1.08	1.38	1.62
Malathion	5.78	1.98	2.02	2.32	1.28	1.48	1.71
Cartap hydrochloride	5.8	2.68	2.76	2.95	0.76	0.97	1.18
Fipronil	5.87	1.98	2.08	2.21	0.67	0.82	0.98
Imidacloprid	5.24	2.04	2.36	2.58	0.67	0.79	0.96
Diamehoate	4.92	1.86	1.68	2.12	0.95	0.78	0.98
F- test	NS	S	S	S	S	S	S
S. Ed. (±)	0.34	0.19	0.13	0.25	0.20	0.17	0.25
C. D. (P = 0.05)	0.70	0.39	0.28	0.53	0.42	0.35	0.52

Table.3 Per cent population reduction of leaf folder (1st and 2nd Spray)

Per cent population reduction per hill				
	Treatment	**1st spray**	**2nd spray**	**Pooled**
T0	Control	00	00	00
T1	Monocrotophos	77.91	74.13	76.02
T2	Spinosad	59.63	56.79	58.21
T3	Malathion	55.97	61.40	58.68
T4	Cartap hydrochloride	62.98	66.69	64.83
T5	Fipronil	68.20	65.05	66.53
T6	Imidacloprid	70.20	67.14	68.67
T7	Diamehoate	69.51	64.69	67.10

Table.4 Pooled mean of leaf infestation by leaf folder during *kharif* season of 2015 and its effect on yield and cost benefit ratio

Treatments	**Leaf infestation per hill**		**Pooled mean of leaf infestation**	**Yield of q/ha**	**Cost Benefit ratio**
	Mean of 1st Spray	**Mean of 2nd Spray**			
Control	5.84	7.14	6.49	25.500	1:2.03
Monocrotophos	1.57	0.56	1.07	43.500	1:3.16
Spinosad	3.20	1.36	2.28	39.800	1:2.38
Malathion	2.10	1.49	1.80	38.200	1:2.75
Cartap hydrochloride	2.79	0.97	1.88	38.000	1:2.47
Fipronil	2.09	0.82	1.46	39.600	1:2.31
Imidacloprid	2.32	0.80	1.56	42.500	1:2.82
Diamehoate	1.88	0.90	1.39	40.500	1:2.95
F- test	S	S	S		
S. Ed. (±)	0.485	2.165	1.148		
C. D. (P = 0.05)	1.029	4.590	2.434		

The yields among the treatment were significant. The highest yield was recorded in T_1 Monocrotophos (43.500 q/ha) followed by T_6 Imidacloprid (42.500 q/ha), T_7 Dimethoate (40.400 q/ha) T2 Spinosad (39.800 q/ha), T_5 Fipronil (39.600 q/ha), T_3 Malathion (38.20 q/ha), T_4 Cartap hydrochloride (38.00 q/ha) as compared to control T_0 (25.500 q/ha) (Table 4). When cost benefit ratio was worked out, interesting result was achieved. Among the treatment studied, the best and most economical treatment was T1 (1:3.16), followed by T_7 (1:2.95), T_6 (1:2.82), T_4 (1:2.47), T_3 (1:2.75), T_2 (1:2.38), T_5 (1:2.31) as compared to control T_0 (1:2.03). The highest yield and benefit cost ratio was recorded in T_1 Monocrotophos (43.500 q/ha and 1:3.24 respectively) supported by Mahal *et al.*, (2008), Devi and Singh (2016). Next most effective treatment was T_6 Imidacloprid (42.500 q/ha and 1:3.18 respectively), this was supported by Devi and Singh (2016).

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