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EVALUATION OF DIFFERENT INSECTICIDES AGAINST RICE STEM BORER AND RICE LEAF FOLDER

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To achieve the objective of effective control over insect pests of rice and enhancing its yield economically, a study was undertaken to evaluate different sprayable and granular insecticides for the control of rice stem borer and leaf folder on the rice variety Basmati-385 by the application of 5 insecticides. Of the granular insecticides, furadan application proved to be the best both in controlling the attack of stem borer and leaf folder as well as better yield per acre, while among sprayable insecticides, nurelle-D proved better for the control of these pests. The furadan application gave the maximum yield (1527 kg acre^{-1}) with cost benefit ratio of 1:6.67. In sprayables, nurelle-D gave the maximum yield (1263 kg acre^{-1}) with cost benefit ratio of 1:5.99. The monetary benefit with granulars and sprayables comes to Rs. 8250.66 and Rs. 5874.66 respectively, the difference being significantly high.

INTRODUCTION

Among other factors, low yields of rice in Pakistan 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 stem borers play havoc with rice crop every year. Leaf and plant hoppers have also attained the status of regular pests of this crop throughout the rice belt of the Punjab province (Majid et al., 1979). Recent addition of the rice leaf folder, *Cnaphalocrocis medinalis* (Gn.) to the list also poses a threat to economic production of rice in the Punjab. Damage due to rice leaf folder may sometimes go as high as 60% (Kushwaha and Singh, 1984). For the control of the insect pests of rice, the insecticides like ekalux, kilvil, lannate, padan and diazinon 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. The present studies have been undertaken to evaluate the efficacy of lorsban, decis, nurelle-D, thimet and furadan with a view to find out the efficacy of new entrants and economic control of rice insect pests.

MATERIALS AND METHODS

The experiment was laid out following randomised complete block design having six treatments and three repeats each. The plot size was 33' x 13'. The detail of treatments is as under:

T1	Lorsban 40 EC (chlorpyrifos)	@ 500 mllacre
T2	Decis-D 12.5 + 300 EC (deltamethrin + dimethoate)	@ 500 ml/acre
T3	Nurelle-D 505 EC (cypermethrin + chlorpyrifos)	@ 500 mltacre
T4	Thimet 5 CT (phorate)	@ 9 kg/acre
T5	Furadan 3 CT (carbofuron)	@ 9 kg/acre
T6	Untreated control	

Population density of insect pest complex was recorded for deciding the appropriate time of insecticide appl ication. The insecticides were applied twice. The first application of insecticides was made after 45 days of transplanting of nursery and 2nd 35 days after Ist application. The observations on percent infestation of stem borer (dead heart (DH) and white head (WH) and folded leaves were recorded 168 hr after each application.

Percent dead heart and white heads were calculated using the following formula:

$$\text{Dead heart (\%)} = \frac{\text{No. of infested tillers}}{\text{No. of total tillers}} \times \frac{\text{No. of infested hills}}{\text{No. of hills in sample area}} \times 100$$

The percentage of folded leaves was calculated by using the following formula:

$$\text{Folded leaves (\%)} = \frac{\text{No. of infested leaves (hills)}}{\text{No. of total leaves}} \times \frac{\text{No. of infested hills}}{\text{No. of hills in a sample area}} \times 100$$

Finally, the yield per plot was taken as a deciding factor regarding the efficiency of these insecticides by the following formula:

$$\text{Yield at 14\% moisture} = \text{Yield} \times 100 \times \frac{\text{Actual moisture at weighing time}}{100 - 14}$$

RESULTS AND DISCUSSION

It is apparent from Table 1 that the results with various treatments were significantly different from the untreated check. which exhibited the highest damage (1.713% OH, 3.033% WH and 3.627% folded leaves). Application of furadan gave the best results where the pest infestation was significantly the lowest (0.22% OH, 0.10% WH and 0.31% folded leaves) and the yield significantly the highest (1908 g/100 hills) of all the treatments. It was followed by nurelle-D which was significantly better than lorsban. decis-D and thimet.. Thimet proved statistically similar to lorsban and decis-D with respect to OH. WH percentage

and percentage of folded leaves and yield components were significantly higher under thimet than lorsban and decis-D, These results are similar to those of the findings of Khan and Khaliq (1989), Mustafa et al.. (1990), Mustafa and Razzaq (1991), Prasad et al.. (1995) and Singh et al.. (1995 a, b).

Paddy yield as a result of treatment with lorsban, decis-D, nurelle-D, thimet and furadan was 904.0, 823.7, 1262.6, 1048.0 and 1526.6 kg/acre respectively, against 609.86 kg/acre in case of control which showed an increase in yield of 294.14, 213.84, 652.74, 438.14 and 916.74 kg/acre respectively over control.. Maximum yield (1908 g/IOO hills) was obtained in furadan treated plots which was significantly different from all other treatments having the yield of 1578. 1310, 1130, 1030 and 762.3 g/l 00 hills respectively in case of nurelle-D, thimet, lorsban, decis-D and control.. These findings are similar to those of Khan and Khaliq (1989), Prasad et al.. (1995) and Singh et al.. (1995a).

The statistics of correlation matrix revealed negative correlation between dead heart/white head/leaf folder and yield with coefficient values of -0.846, -0.807 and 0.752 respectively.

Table 1. Comparison of mean percentage infestation of stem borer and leaf folder and yield

Treatment	Dead hearts	White head	Folded leaves	Yield
TI Lorsban	0.883 b	1.270 b	1.603 c	1130 d
T2 Decis-D	0.790 b	1.063 b	1,610 c	1030 d
T3 Nurelle-D	0.510 c	0.586 c	0.893 d	1578 b
T4 Thimet	0.803 b	1,143 b	2.677 b	1310 c
T5 Furadan	0.223 d	0.103 d	0.323 c	1908 a
T6 Control	1,713 a	3.033 a	3.627 a	762.3 c

Table 2. A correlation matrix between dead hearts, white heads, leaf folded and yield

Characters	Dead hearts	White head	Folded leaves	Yield
I. Dead hearts	1,000			
2. White heads	0.967	1.000		
3. Folded leaf	0.918	0.887	1.000	
4. Yield	-0.846	-0.807	-0.752	1.000

Table 3. Yield increase over control, benefit ac", expenses ac" and C:B ratio in Basmati-385

Treatment	Yield ac' (ke:)	Increase over control (ke:)	Benefit ac" (Rs.)	Expenses ac" (Rs.)	C:B ratio
1'1 Lorsban	904.0	294.14	2647.26	575	1:4.60
1'2 Decis-D	823.7	213.84	1924.56	1100	I: 1,75 .
T , Nurelle-D	1262.6	652.74	5874.66	980	1:5.99
T~ Thimet	1048.0	438.14	3943.26	1000	1:3.94
1', Furadan	1526.6	916.74	8250.66	1237.5	1:6.67
1'6 Control	609.86	–	–	–	–

Rate of Basmatl-385 (Paddy) = Rs. 9.00 kg '; ac-acre,

Furadan has the highest cost than all other test insecticides, but it gave the maximum reduction in rice borer and leaf folder infestation with maximum cost benefit ratio 1:6.67, while out of sprayable insecticides, nurelle-D caused the maximum reduction in infestation with I:5.94 cost benefit ratio.

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