Research Paper :

Efficacy of some insecticides and neem formulations against brown plant hopper, *Nilaparvata lungens* Stal in rice

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SUMMARY

Efficacy of four insecticides and four neem formulations against brown plant hopper, *Nilaparvata lungens* Stal was evaluated during *Kharif* 2006-2007. It was observed that as chemical insecticide, monocrotophos was most effective in reducing the pest population, being 28.26, 24.73, 21.60 and 18.06 BPH/5 sweeps after 24, 48, 72 and 120 hours of application, respectively, as compared to all other treatments and control. As neem formulations, the application of neem product, neemarin was also proved effective against BPH having 31.53, 30.33, 28.73 and 28.26 population /5 sweeps, respectively in comparison to other neem products and control provided 42.46, 44.26, 46.60 and 48.60 population.

Key words : Brown plant hopper, *Nilaparvata lugens*, Efficacy, Neem products

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Rice is a stable food of the people in India. Large scale cultivation of high yielding, high fertilizer responsive rice varieties coupled with assured irrigation have increased the severity of insect pests in India. The rice plant is subjected to attack by more than 100 species of insects, 20 of them can cause economic damage. The brown plant hopper, *Nilaparvata lungens* is one of the most serious pests of rice (Mohan *et al*., 1991). Several species are serious pests of rice in many areas. They frequently occur in numbers and are enough to cause complete drying of the crop or "hopper burn", the more alarming species is brown plant hopper.

Since, indiscriminate and incessant use of conventional insecticides causes mammalian hazards and side effects like pest resurgence of insect to insecticides, secondary pest outbreaks, side effects on other live forms, hence, some plant derivatives were assessed which have no residual toxicity.

MATERIALS AND METHODS

The investigations was carried out during *Kharif* 2006 with the objective to determine the efficacy of certain neem products and insecticides in form of emulsifiable concentrate on rice against *Nilaparvata lungens*. The experiment was conducted at New Dairy Farm, Kalyanpur, C.S.A.University of Agriculture and Technology, Kanpur.

The experiment was laid out in Randomized Block Design having nine treatments and three replications, the plot size being 5 x 5 m and distance between plot to plot and replications kept 0.5 and 1.0 m, respectively. The variety used was Basmati 1.

Name of insecticides, Neem formulation and their concentration

Name of insecticides	Formulation	Concentration (%)
Monocrotophos	40 EC	0.04
Endosulfan	35 EC	0.07
Malathion	50 EC	0.05
Quinalphos	25 EC	0.25
Neemarin	300 ppm	2
Achook	300 ppm	2
Nimbicidine	300 ppm	2
Nembicidane	300 ppm	2

Preparation of spray material:

The spray material was prepared by directly mixing of desired quantity in water (600-1000 lit/ha). The desired quantity of insecticides and neem formulations were measured with the help of measuring cylinder and mixed in water required to spray.

Observations recorded:

All treatments were applied 45 days after

transplanting and data on damaged plants population under various treatments were collected after 24, 48, 72 and 120 hours of insecticidal application by taking five standard net sweeping (to and fro) at five selected places in each plot and were averaged. The yield data for experimental plots were recorded individually.

All the data, except yield were transformed in the formula $\sqrt{x} - 0.5$ subjected to the statistical analysis and critical difference between the population at different intervals was calculated. The mean of original data was calculated as percentage reduction over control with the following formula (Abotts, 1925):

$$\text{Percentage reduction} = \frac{(C - T) \times 100}{C}$$

where, C = Population of control plot
T = Population of treated plot

RESULTS AND DISCUSSION

Observations (Table 1) on effectiveness of insecticides against *Nilaparvata lungens* indicated that monocrotophos was most effective in reducing the pest population, being 28.26, 24.73, 21.60 and 18.06 BHP/5 sweeps after 24, 48, 72 and 120 hours of application, respectively as compared to all other insecticides, neem formulation and control. It is evident that the spraying of endosulfan and quinalphos, were also effective in minimizing, up to 29.86, 27.53, 24.26, 20.93 and 30.06, 27.80, 24.40, 21.40 population BHP/ 5 sweeps, respectively after 24, 48, 72 and 120 hours. The application of neemarin was also proved effective against BHP by providing 31.53, 30.33, 28.73 and 28.26 population /5 sweeps as compared to achook, nimbicidine, nembicidane and control. These results are supported by the findings of Panda *et al.* (1996) and Dash and Mukherjee (2009). It is evident from Table 2 that the spraying of monocrotophos provided 24.9 q/ha highest and 44.76 per

Table 1: Efficacy of insecticides and neem products against BPH

Treatments	Formulation	Concentration in per cent	Mean number of BPH/5 sweeps			
			After 24 hrs.	After 48 hrs.	After 72 hrs.	After 120 hrs.
Monocrotophos	40 EC	0.04	28.26 (5.36)	24.73 (5.02)	21.60 (4.70)	18.06 (4.30)
Malathion	50 EC	0.05	30.33 (5.55)	28.26 (5.36)	24.73 (5.03)	21.73 (4.71)
Quinalphos	25 EC	0.25	30.06 (5.53)	27.80 (5.31)	24.40 (4.99)	21.40 (4.67)
Endosulfan	35 EC	0.07	29.86 (5.50)	27.53 (5.29)	24.26 (4.97)	20.93 (4.69)
Neemarin	300ppm	2	31.53 (5.69)	30.33 (5.55)	28.73 (5.40)	28.26 (5.36)
Nimbicidine	300ppm	2	32.13 (5.72)	30.73 (5.98)	29.80 (5.50)	29.20 (5.45)
Nembicidane	300ppm	2	32.33 (5.72)	30.73 (5.58)	29.80 (5.50)	29.20 (5.45)
Achook	300ppm	2	31.66 (5.67)	31.60 (5.66)	29.13 (5.44)	28.66 (5.40)
Control	-	-	42.46 (6.55)	44.26 (6.69)	46.60 (6.86)	48.60 (7.00)
S.E. ±			0.0755	0.0991	0.0973	0.840
C.D. (P=0.05)			0.160	0.210	0.206	0.178

Figure in parenthesis are angular transformed values

Table 2 : Efficacy of insecticides and neem products on grain yield

Treatments	Formulation	Conc. in per cent	Average yield kg/ha	Average yield q/ha	Percentage increase over control	Increase yield in q/ha over control
Monocrotophos	40 EC	0.04	6.225	24.90	44.76	7.70
Malathion	50 EC	0.05	5.950	23.80	38.37	6.60
Quinalphos	25 EC	0.25	6.050	24.20	40.60	7.00
Endosulfan	35 EC	0.07	6.050	24.20	40.60	7.00
Neemarin	300ppm	2	5.00	20.00	16.27	2.80
Nimbicidine	300ppm	2	4.925	19.70	14.53	2.54
Nembicidane	300ppm	2	4.800	19.20	11.62	2.00
Achook	300ppm	2	4.950	19.80	15.11	2.60
Control	-	-	4.300	17.20	-	-
S.E. ±			0.209	-	-	-
C.D. (P=0.05)			0.444	-	-	-

cent increased grain yield over control as compared to all other treatments. The spraying of endosulfan, quinalphos and malathion also provided 40.60, 40.60 and 38.37 per cent increased yield over control and produced 24.20, 24.20 and 23.80 q/ha higher grain yield, respectively. The application of neemarin also provided 20.00 q/ha grain yield as compared to 17.20 q/ha grain yield of control. Present results are supported by the finding of Panda *et al.* (1996) who investigated that 0.05% monocrotophos was effective against BPH and provided highest grain yield. Elanchezhian *et al.* (2008) observed the effect of Lambda cyhalothrin formulation which was compared with chloropyriphos and monocrotophos and found significant for pest control.

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