

## Effectiveness of Different Insecticides Against White-Backed Plant Hopper, *Sogatella furcifera* (Horv.) on Rice Crop

Imtiaz A. Nizamani, Muzaffar A. Talpur and Khalid H. Qureshi  
Department of Plant Protection, Sindh Agriculture University, Tandojam-70060, Sindh, Pakistan

**Abstract:** An experiment was laid out to evaluate the effectiveness of different insecticides against white-backed plant hopper on rice crop at Entomology Section, Rice Research Institute Dokri, during summer, 2000. Five insecticides namely Thioluxan 50EC (endosulfan) at 600 ml/ac, Tamaron 60SL (methamidophos) at 400 ml/ac, Procuron 400EC (profenofos) at 500 ml/ac, Curacron 500EC (profenofos) at 250 ml/ac and Trend 60SL (methamidophos) at 400 ml/ac were tried and compared with an un-treated control. It was found that all insecticides reduced population of white-backed plant hopper significantly at 24, 48-hours and one-week of post-treatment and increased paddy yield over check plot. However, Procuron found to be significantly more effective in contrast to rest of the product tested.

**Key words:** White-backed plant hopper, chemical control, paddy yield, dokri

### Introduction

Rice (*Oryza sativa* L.) is the second most widely grown cereal crop in the world. The total area devoted to rice is less than only that sown wheat. In Pakistan rice is cultivated on an area of about 2515 thousand hectares with an annual production of 5155 thousand tones. In Sindh province rice is cultivated on an area of 690 thousand hectares with a production of 2123 thousand tones (Anonymous, 2000).

Rice crop is suffering heavy losses due to the activity of many insect pests, these include rice water-weevils, rice leaf minors, rice armyworms, rice stem borers, rice bugs and various species of leaf hoppers such as, *Sogata* spp., *Nilaparvata* spp., *Cicadella* spp. and *Nephotettix* spp. are wide spread pests of rice. By sucking sap of the plants, they slow down the growth and reduce the number of size of the panicles. In addition to the direct damage which they do to the plants, they serve as vectors of a number of destructive virus diseases (Angladette, 1966). However (Majid and Rahman, 1984) reported that rice plant at the nursery stage suffer from rice stem borer and grass hopper usually called as "Toka". At the crop stage NR-6 mainly suffers from white-backed plant hopper, leaf roller and hispa, whereas Basmati suffers mostly from stem borer.

In a study (Anonymous, 1998) found that rice varieties i.e., IRRI-8, IRRI-6, and KS-282 were more attractive than BAS-370, BAS-385 and BAS-198 to white-backed plant hopper, *Sogatella furcifera* (Horv.). The varieties preferred for feeding were also preferred for oviposition. Hence, the Basmati varieties carried significantly lower population for this pest than IRRI varieties. There is a dire need to manage rice crop by adopting suitable pest control strategy. Among various pest management practices, chemical control is easier and less time dependent in contrast to other methods. Therefore, an attempt was made to assess the effectiveness of different insecticides against white-backed plant hopper on rice crop.

### Materials and Methods

In order to determine the effectiveness of different insecticides against white-backed plant hopper on rice crop, an experiment was conducted in the experimental area of Entomology Section, Rice Research Institute Dokri, during summer, 2000. Seedlings of a rice variety IRRI-6 were planted in rows 30 cm Randomized Complete Block Design was laid out. A 8x7 m<sup>2</sup> net plot area was maintained.

**Insecticides and their application:** Five insecticides were tried and compared with an untreated plot control viz., Thioluxan 50EC (endosulfan) at 600 ml/ac, Tamaron 60SL (methamidophos) at 400 ml/ac, Procuron 400EC (profenofos) at 500 ml/ac, Curacron 500EC (profenofos) at 250 ml/ac and Trend 60SL (methamidophos) at 400 ml/ac. Before application of each insecticide, the spray tank was washed carefully to avoid mixture. A power sprayer was used for application of each insecticide. The spraying was practiced at Economic Threshold Level (ETL). The spraying was made in the morning hours (Oudejans, 1991).

**Observation on white-backed plant hoppers population:** For recording observations on pest both adults and nymphs were counted from 10-plants, selected from each treatment. Pre-treatment count was made 1-day before application, while post-treatment population recorded after 24, 48-hours and one week interval. Effectiveness percentage insecticides was Tabulated according to (Henderson and Tilton (1955).

$$\% \text{ mortality} = 1 - \frac{\text{Ta} \times \text{Cb}}{\text{Ca} \times \text{Tb}} \times 100$$

### Where

- Tb No. of WBPH in the treated plots before treatment  
Ta No. of WBPH in the treated plots after treatment.  
Cb WBPH population in the control plots before treatment  
Ca WBPH population in the control plots after treatment.

**At maturity the crop was harvested:** Threshed and yield was obtained on pre-treatment basis then further tabulated as yield/ha. All the collected data were subjected to statistical analysis to see the superiority of treatment mean LSD (Least Significant Difference) tests was applied, following (Gomez and Gomez (1984).

### Results and Discussion

ANOVA (Table 1) depicted that differences in effectiveness of percentage of various insecticides against white-backed plant hopper on rice crop among the insecticidal treatments were significant (P < 0.01) after 24, 48-hours and one week of application. The result presented in Table 2 indicated that all the

Table 1: ANOVA corresponding to various sources of variation for effectiveness of different insecticides against white-backed plant hopper on rice crop.

Source of variation	d.f	Mean Squares		
		After 24 hours	After 48 hours	After one week
Replications	3	3.094 NS	6.569 NS	2.556 NS
Insecticidal treatments	4	22.343**	81.724**	17.786**
Error	12	1.819	3.864	2.130
Total	19			

\*\* = Significant at P < 0.01

NS = Non significant

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Table 2: Mean efficacy of different insecticides against white-backed plant hopper on rice crop.

Insecticides	Pre-treatment Population/ hill	Time intervals after			Paddy yield kg / plot)	Calculated yield (kg / plot)
		24 hrs	48 hrs	one week		
Thioluxan 50EC. at 600 ml/ac	3.82a	72.63c	81.60c	78.68b	14.21bc	2538
Tamaron 60EC at 400 ml/ac	3.56a	75.28b	84.24b	81.64b	15.53a	2773
Procuron 400EC at 250 ml/ac	3.83a	81.13a	89.31a	85.30a	16.62a	2968
Curacron 500EC at 250 ml/ac	3.91a	70.38c	79.50c	72.50c	13.81c	2466
Trend 60SL at 400 ml/ac	3.89a	66.49d	73.78d	69.02c	13.23c	2363
Control (un-treated)	3.81a	-	-	-	8.71d	1555
S.E. ±	0.391	1.032	0.927	1.390	0.540	
L.S.D. at P<0.05	-	2.250	2.020	3.030	1.090	
L.S.D. at P<0.01	-	3.148	2.826	4.239	1.430	

Values followed by similar letters do not differ significantly at alpha = 0.05

one week of application. The result presented in Table 2 indicated that all the insecticides provided excellent control of white-backed plant hopper population after 24 hours of application. Procuron gave the highest mortality of the pest population (81.13%) followed by Tamaron (75.28%), Thioluxan (72.63%), Curacron (70.38%) and Trend (66.49%). Similarly all the products showed better performance against the pest population at 48-hours of application. The highest mortality of the pest population indicated that Procuron gave significantly more effective (85.30%) followed by Tamaron (81.64%), Thioluxan (78.68%), Curacron (72.50%) and Trend (69.02%). However, Tamaron was slightly increased in effectiveness than Thioluxan at 48-hours and it is continuously ranked in same order upto one-week. Procuron continued to be the most effective among all other under field conditions on the efficacy of different insecticides in insect pest of rice crop, therefore, the results could not be discussed in detail. Haq *et al.* (1991) also reported that the organophosphate compounds were comparatively more effective than botanical compounds in controlling white-backed plant hopper on rice crop. Research conducted earlier by Anonymous (1999) reported that the overall performance of the results manifest that Procuron and Tamaron were comparatively more effective and persistent insecticides against white-backed plant hopper on rice when in endemic form.

**Yield:** The greater reduction of pest resulting in maximum paddy yield (2968 kg/ha) although all insecticidal treatment produced greater paddy yields when compared with un-treated check plot, but remained at par to Procuron. Research conducted earlier by Anonymous (1999) reported that white-backed plant hopper is the economic pest of rice crop, and can be controlled effectively by the application of Procuron. On the basis of this study it may

be argued that all the insecticides tried reduced population of white-backed plant hopper significantly at 24-48 hours and one week of application. The reduction in pest resulting in increased paddy yield, however, plots treated with Procuron found to be more effective in reducing pest which in turn caused significantly higher paddy yield when compared with other insecticidal treatments.

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