

## Control of Rice Leafhopper, *Nephotettix virescens* (Dist.) with Insecticides in three Methods of Application

BY

M. MANI<sup>1</sup> and S. JAYARAJ<sup>2</sup>

### ABSTRACT

Two field experiments were conducted during 1972-73 and 1973-74 to test the efficacy of twelve insecticides as foliar sprays against rice leafhopper, *Nephotettix virescens* (Dist.). Fenitrothion (0.05%), monocrotophos (0.10%), parathion (0.5%), dicrotophos (0.5%), and orthene (0.30%) were found to be more toxic to the leafhopper. Two field experiments, one for seed treatment and the other for seedling root dip treatment with systemic insecticides were also conducted for the control of the pest during 1973-74. In both seed and seedling root dip treatments, methyl demeton (0.005%) and orthene (0.30%) were highly effective.

### INTRODUCTION

Leafhoppers are among serious pests of rice causing severe damage to high yielding varieties. Misra and Israel (1968) recorded eight species of leafhoppers as injurious, among which *Nephotettix virescens* (Dist.) causes serious damage. In the present investigation several new chemicals including a new organophosphate compound, orthene (O.S, dimethyl N-acetyl phosphoramidothioate) were screened for their relative efficacy in the control of the leafhopper under field conditions by foliar application and seed and seedling root dip treatments using IR 8 variety at the Agricultural College and Research Institute, Madurai.

### MATERIALS AND METHODS

1. Foliar application: Two field experiments were conducted in the first (June-September) and second (October-January) seasons of 1973-74. The trials were laid out in randomised block design with three replications. The chemicals included were: fenthion (Lebaycid), fenitrothion (Folithion), dicrotophos (Bidrin), phosphomidan (Dimecron), parathion (Folidol 605), quinalphos (Ekalux), orthene (Acphate, ortho 12520), methyl parathion + DDT (Metacid combi), toxaphene + DDT (Helio tox), endosulfan (Thiodan), monocrotophos (Nuvacron) and fenitrothion + DDT (Folithion combi). The first round of spraying was given 20 days after transplanting and the

1- Instructor in Entomology, and 2 - Director of Extension Education, T.N.A.U. Coimbatore - 641003

other three rounds at fortnightly intervals thereafter. Application of orthene S.P. mixed with sand was included in the second experiment. The population was assessed by net sweeping on 20, 27, 35, 42 and 50 days after transplanting.

2. **Seed treatment:** Dicrotophos, phosphamidon, dimethoate (Rogor), monocrotophos, methyl demeton and orthene were tested under field conditions in the seed treatment in randomised block design with three replications. The seeds were soaked in insecticides for 24 hr and sown in plots. Five counts were made on the leafhopper upto 45 days of sowing at 7-8 days interval.

3. **Seedling root dip :** Roots of 21-days old seedlings were dipped in specified concentrations of the above six insecticides for 24 hr and planted in field. A control of seedlings immersed in water was also maintained. The population was assessed upto 37 days of planting at 7-8 days interval. All the data were analysed statistically after transforming the values using Poison formula of  $\sqrt{x+0.5}$ .

## RESULTS AND DISCUSSION

1. **Foliar application :** In the first season, foliar application of fenitrothion proved significantly superior to all the other chemicals in reducing the leafhopper population. Dicrotophos, parathion and orthene also gave better control. In the second experiment, foliar sprays of monocrotophos, parathion, and orthene at

0.3 per cent were equally effective in reducing the population by 72.3, 66.3 and 67.7 per cent respectively (Table I). The present results agree with those of Pathak *et al.* (1967) who found that dimethoate, fenitrothion and phosphomidan sprays were effective against the green leafhopper. The efficacy of orthene in the control of Harlequin bug *Murugantia histrionica* (Hahn) on cabbage was reported by Rogers and Howell (1973).

2. **Seed treatment:** Among the insecticides tested, methyl demeton and orthene significantly reduced the population by 74.0 per cent from control. Orthene at 0.3, 0.2 and 0.1 per cent recorded the percentage reductions of 64.3, 60.9 and 58.2 respectively. Dicrotophos and dimethoate were useful whereas other chemicals were not effective in checking the population (Table II). The present finding on the efficacy of methyl demeton is in agreement with that reported by Rathinasamy (1972).

3. **Seedling root dip treatment:** The data presented in Table III indicate that among the insecticidal treatments methyl demeton gave a high degree of jassid control and minimised the population by 73.6 per cent from check. Orthene (0.3%) approached the efficiency of methyl demeton by recording 68.7 per cent reduction in the incidence. The efficacy of orthene against rice green leafhopper in seedling root dip was reported earlier (Anonymous, 1972).

TABLE I Effect of insecticides as foliar sprays on the population of green leafhopper under field conditions during 1973-74

First crop season of 1973-74		Second crop season of 1973-74	
Treatment	No. / 5	Treatment	No. / 5
Fenthion 0.10%	2.60 (1.69)	Fenthion 0.10%	2.00 (1.54)
Fenitrothion 0.05%	0.60 (0.95)	Fenitrothion+DDT 0.225%	2.33 (1.61)
Methyl parathion+DDT 0.20%	2.73 (1.74)	Monocrotophos 0.10%	1.20 (1.22)
Dicrotophos 0.05%	0.93 (1.11)	Endosulfan 0.05%	2.13 (1.60)
Toxaphene + DDT 0.30%	2.73 (1.68)	Parathion 0.05%	1.46 (1.32)
Phosphamidon 0.10%	3.13 (1.87)	Orthene 0.15%	1.93 (1.52)
Parathion 0.05%	1.07 (1.16)	Orthene 0.225%	1.73 (1.43)
Quinalphos 0.04%	2.33 (1.59)	Orthene 0.30 %	1.40 (1.33)
Application in between rows of plants			
Orthene 0.15%	2.00 (1.58)	Orthene 1.25 kg a.i./ha	1.86 (1.47)
Orthene 0.225%	2.00 (1.50)	Orthene 1.87 kg ..	1.73 (1.42)
Orthene 0.30%	1.73 (1.41)	Orthene 2.50 kg ..	1.66 (1.41)
Control	4.86 (2.26)	Control	4.33 (2.36)
Level of significance	0.01	Level of significance	0.01
C.D. (P=0.05)	0.09	C.D. (P=0.05)	0.18

(Figures in parentheses are transformed values)

(Mean of five periods in three replications)

TABLE II. Effect of seed treatment with systemic insecticides on the incidence of green leafhopper in the second crop season of 1973-74.

Treatment	No. of leafhoppers /5 sweeps (Period in days after treatment)						Mean*
	7	15	22	30	31	45	
Orthene 0.30 %	3.0 (1.9)	5.0 (2.4)	1.0 (1.2)	2.0 (1.6)	1.0 (1.2)	1.7 (1.5)	2.28 (1.60)
Orthene 0.20 %	3.0 (1.9)	5.3 (2.4)	1.7 (1.5)	2.0 (1.6)	1.3 (1.3)	1.7 (1.5)	2.50 (1.68)
Orthene 0.10 %	3.3 (1.9)	5.0 (2.3)	1.7 (1.5)	2.3 (1.7)	1.7 (1.5)	2.0 (1.6)	2.67 (1.73)
Dicrotophos 0.05 %	3.7 (2.0)	7.0 (2.7)	2.0 (1.6)	4.0 (2.1)	2.7 (1.8)	3.7 (2.0)	3.84 (2.03)
Phosphamidon 0.10 %	8.0 (2.9)	10.0 (3.2)	5.3 (2.7)	5.3 (2.7)	3.7 (2.0)	6.0 (2.6)	6.39 (2.59)
Dimethoate 0.2 %	3.0 (1.9)	4.7 (2.2)	3.0 (1.9)	5.0 (2.3)	3.3 (2.0)	4.0 (2.1)	3.84 (2.0)
Methyl demeton 0.005 %	1.0 (1.1)	4.3 (2.2)	1.0 (1.8)	1.7 (1.4)	0.7 (1.1)	1.3 (1.3)	1.66 (1.37)
Monocrotophos 0.02 %	6.0 (2.6)	13.0 (3.7)	5.7 (2.5)	6.3 (2.6)	4.3 (2.2)	5.7 (2.5)	6.83 (2.65)
Control	10.7 (3.3)	11.00 (3.4)	7.0 (2.7)	8.0 (2.9)	1.7 (1.5)	0.0 (0.7)	6.39 (2.42)
Mean	4.6 (2.16)	7.3 (2.71)	3.1 (1.81)	4.1 (2.06)	2.3 (1.61)	2.9 (1.82)	—

Between treatments significant at  $P=0.01$ ; C.D. ( $P=0.05$ ) 0.16

Between periods significant at  $P=0.01$ ; C.D. ( $P=0.05$ ) 0.12

Interaction between periods and treatments significant at  $P=0.05$  C.D. ( $P=0.05$ ) 0.38

(\*Mean of 18 observations; Figures in parentheses are transformed values)

TABLE III Effect of seedling root-dip with systemic insecticides on the population of green leafhopper in the second crop season of 1973-74

Treatment	No. of leafhoppers/5 sweeps (Period in days after planting)					Mean*
	7	15	22	30	37	
Orthene 0.30%	0.3 (0.9)	0.3 (0.9)	1.3 (1.3)	1.0 (1.2)	1.0 (1.2)	0.80 (1.11)
Orthene 0.20%	0.3 (0.9)	1.0 (1.2)	2.0 (1.6)	4.0 (1.6)	1.3 (1.3)	1.33 (1.31)
Orthene 0.10%	0.3 (0.9)	1.0 (1.2)	2.0 (1.6)	2.0 (1.6)	1.7 (1.8)	1.40 (1.33)
Dicrotophos 0.05%	1.0 (1.2)	1.7 (1.8)	2.7 (1.8)	2.7 (1.7)	2.0 (1.6)	2.00 (1.54)
Phosphamidon 0.10%	1.7 (1.4)	5.0 (2.4)	5.7 (2.5)	5.3 (2.4)	3.0 (1.9)	4.13 (2.11)
Dimethoate 0.02%	0.0 (0.7)	1.7 (1.4)	2.7 (1.7)	2.3 (1.7)	2.3 (1.7)	1.80 (1.43)
Methyl demeton 0.005%	0.0 (0.7)	0.0 (0.7)	1.3 (1.3)	1.0 (1.2)	1.0 (1.2)	0.67 (1.04)
Monocrotophos 0.02%	1.3 (1.3)	2.0 (1.6)	4.0 (2.1)	4.0 (2.1)	2.3 (1.7)	2.73 (1.76)
Control	1.7 (1.4)	3.0 (1.9)	4.0 (2.1)	4.0 (2.1)	0.0 (0.7)	2.54 (1.63)
Mean	0.74 (1.04)	1.37 (1.30)	2.85 (1.78)	2.70 (1.73)	1.62 (1.45)	—

Between treatments significant at  $P=0.05$ ; C.D. ( $P:0.05$ )=0.22

Between periods significant at  $P=0.05$ ; C.D. ( $P:0.05$ )=0.16

Interaction between treatments and periods Not significant.

(\*Mean of 15 observations; Figures in parentheses are transformed values)

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