

# Pest management and control DISEASES

## Effect of meteorological factors on symptomatology and acquisition of rice tungro virus by *Nephotettix virescens*

G. Mohana Rao, research scholar and A. Anjaneyulu, virologist, Division of Plant Pathology, Central Rice Research Institute, Cuttack-753 006, India

The effect of meteorological factors on symptomatology and acquisition of rice tungro virus by *Nephotettix virescens* in rice cultivars Taichung Native 1 (TN1), Jaya, and IR20 was studied for 2 years in monthly periodical plantings in the nethouse.

TN1 showed the most Severe symptoms. During monsoon season (July-October) the older leaves exhibited bright orange discoloration. Summer (March-June) and winter (November-February) symptoms were not so severe. Infected plants did not recover from the infection and were stunted.

Jaya exhibited severe symptoms during early stages, but infected plants recovered and produced new green foliage within a month. Recovered foliage

showed no chlorosis during summer and monsoon, but exhibited slight chlorosis during winter. IR20 infection was most Severe during winter, and symptoms resembled those of Taichung Native 1. Infected plants showed no leaf discoloration during other seasons, but they were stunted.

The average percentages of stunting were 50.5 (summer), 40.4 (monsoon), and 48.6 (winter) in TN1; 37.0, 37.2, and 54.3 in Jaya; and 19.8, 12.6, and 29.2 in IR20. In IR20 the percentage of stunting was negatively correlated with maximum and minimum temperatures, relative humidity, and rainfall and positively correlated with hours of sunshine (see table). In Jaya, stunting was negatively correlated with maximum and minimum temperatures. There were no significant correlations for TN1. During the period of study temperature varied from 27.0 to 37.1°C (maximum) and 12.0 to 26.4°C (minimum). Relative humidity varied from 60 to 87%, rainfall from 0.0 to 15.5 mm/day, and sunshine from 3.4 to 9.9 hours.

Incubation period in the host varied slightly between the cultivars but signifi-

cantly between seasons. The mean incubation period was 5.7, 5.8, and 11.4 days during summer, monsoon, and winter in TN1; 5.9, 5.8, and 11.4 in Jaya; and 7.8, 7.0, and 12.5 in IR20. In all cultivars incubation period was negatively correlated with maximum and minimum temperatures, relative humidity, and rainfall and positively correlated with hours of sunshine.

*N. virescens* carried more virus from TN 1 and Jaya than from IR20, as evidenced by the number of viruliferous leafhoppers. Weather did not affect virus acquisition from TN1. In Jaya and particularly in IR20, the vector acquired more virus in winter than in other seasons. The average percentages of viruliferous leafhoppers were 57.7, 50.7, and 57.1 during summer, monsoon, and winter in TN1; 57.3, 58.9, and 68.7 in Jaya; and 0.9, 2.1, and 14.2 in IR20. In IR20, the percentage of viruliferous leafhoppers was negatively correlated with maximum and minimum temperatures, relative humidity, and rainfall and positively correlated with hours of sunshine. There were no significant correlations in TN1 and Jaya. ✎

Relationship<sup>a</sup> between weather and percentage of stunting, incubation period, and viruliferous *N. virescens*, Cuttack, India.

	Correlation coefficients								
	% stunting			Incubation period			% viruliferous leafhoppers		
	TN1	Jaya	IR20	TN1	Jaya	IR20	TN1	Jaya	IR20
Maximum temperature	0.106	-0.563**	-0.434*	-0.731**	-0.695**	-0.644**	-0.205	-0.299	-0.702**
Minimum temperature	-0.128	-0.658**	-0.771**	-0.893**	-0.879**	-0.854**	-0.260	-0.263	-0.856**
Relative humidity	-0.228	-0.219	-0.757**	-0.572**	-0.595**	-0.626**	0.022	-0.200	-0.483*
Rainfall	-0.259	-0.245	-0.718**	-0.509*	-0.516**	-0.535**	-0.149	-0.094	-0.431*
Sunshine hours	0.296	0.224	0.696**	0.491*	0.503*	0.515*	0.111	0.017	0.437*

<sup>a</sup>\*Significant at P = 0.05, \*\*significant at P = 0.01.

## Insecticide control of rice tungro virus disease

M. K. Satapathy, research scholar, and A. Anjaneyulu, virologist, Division of Plant Pathology, Central Rice Research Institute, Cuttack 753006, India

Rice tungro virus is transmitted by leafhopper vectors *Nephotettix virescens*

and *N. nigropictus*. The disease can be reduced by controlling vectors with insecticides. Six emulsifiable concentrate insecticides — cypermethrin, FMC 35001, phosphamidon, demeton-o-methyl sulphoxide, ofunack, and dichlorvos — and one wettable powder, acephate, were field tested for control of tungro and its vectors.

Cypermethrin (0.05% concentration)

and the other insecticides (0.1% concentration) were applied by foliar spray to Taichung Native 1 (susceptible) and Ratna (tolerant) at 10-day intervals, beginning 10 days after transplanting (DT) and ending 50 DT. The experiment used a randomized block design with three replications. Seed was sown 10 August and transplanted 10 September to coincide with natural *Nepho-*

*tettix* occurrence. Three diseased Jaya tillers were planted in the middle of each plot at 10 DT to serve as initial virus inoculum source.

All insecticide-treated plots showed reduced disease incidence and vector populations. Cypermethrin reduced disease incidence and increased grain yields most effectively (see table). No adults or

nymphs were found in cypermethrin-treated plots. Acephate, FMC 35001, phosphamidon, and demeton-o-methyl sulphoxide were also effective when sprayed on Ratna.

A strong negative correlation between disease incidence and grain yield ( $-0.614^{**}$  for Taichung Native 1 and  $-0.508^{**}$  for Ratna) indicated that tun-

gro virus disease was the primary cause of reduced yield in the insecticide-treated plots. The positive correlation between disease incidence and leafhopper population ( $r = 0.893^{**}$  for Taichung Native 1, and  $0.971^{**}$  for Ratna) shows the disease is spread primarily by *N.*

*virescens*. 

**Disease incidence, gain yield, and leafhopper population of insecticide-treated Taichung Native 1 (T) and Ratna (R),<sup>a</sup> Cuttack, India.**

Treatment	Disease incidence (%)		Grain yield (t/ha)		Leafhoppers (no./20 hills) <sup>b</sup>			
					Adults		Nymphs	
	T	R	T	R	T	R	T	R
Cypermethrin	3.0 a	0.3 a	5.3 a	6.6 a	0.0 a	0.0 a	0.0 a	0.0 a
FMC 35001	50.8 c	3.4 b	1.4 c	5.0 b	33.7 c	13.7 b	0.7 a	1.3 ab
Phosphamidon	56.7 d	6.1 c	1.1 de	4.4 bcd	38.7 cd	14.7 b	1.3 ab	1.0 ab
Demeton-o-methyl sulphoxide	58.1 d	4.5 bc	1.2 cd	4.5 bc	40.0 cd	16.0 bc	6.0 bc	0.0 a
Ofunack	71.5 e	12.5 d	0.9 ef	4.0 cd	42.3 d	18.7 c	8.7 c	0.7 ab
Dichlorvos	73.1 e	11.2 d	0.9 f	3.6 d	46.0 d	23.0 d	33.3 d	2.7 ab
Acephate	31.2 b	2.8 b	1.8 b	5.0 b	22.7 b	15.3 bc	0.7 a	0.7 ab
Control	100.0 f	51.5 e	0.3 g	2.7 e	68.7 e	41.3 e	48.7 e	12.0 c


<sup>a</sup>Values followed by a common letter do not differ significantly by Duncan's multiple range test ( $P = 0.05$ ). <sup>b</sup>Av values of 3 replications.

### Effect of pruning on rice bacterial blight

A. K. Durra and A. Rafey, Ranchi Agricultural College, Birsa Agricultural University Ranchi, India

At the Ranchi Agricultural College Farm, a brown gora crop with excessive vegetative growth, caused by residual nitrogenous manure, was pruned 50%, 50 days after sowing, to avoid lodging.

Within 2 weeks the pruned crop was severely affected by bacterial blight. Pruned plants had an infection rate of 7 by the Standard Evaluation System for Rice. Adjacent unpruned brown gora had disease severity 3.


Cutting leaves with unsterilized sickles disseminated the pathogen from naturally infected leaves by causing penetration through pruning injury. 

### Scald susceptibility of cultivars grown at different nitrogen levels

A. K. Misra and S. C. Mathur, Plant Pathology, Division, Central Rice Research Institute (CRRI), Cuttack 753 006, Orissa, India

Incidence of leaf scald caused by *Rhynchosporium oryzae* Hashioka & Yokogi

(= *Gerlachia oryzae* [Hashioka & Yokogi] W. Gams), perfect stage *Mono-graphella albescens* (Thum.) in 25 rice cultivars receiving 50, 100, 150, and 200 kg N/ha was recorded at CRRI farm October-November 1981. IR28 and Pankaj were leaf scald resistant at all nitrogen levels. Eight cultivars were moderately resistant, eight were moderately

susceptible, and seven were susceptible (see table). Susceptibility to leaf scald increased with nitrogen levels. No cultivar was susceptible up to 100 kg N/ha. During the second and third weeks of October, when disease development was maximum, mean minimum temperature was  $22.5^{\circ}\text{C}$  and mean relative humidity was 77%. 

**Scald susceptibility of 25 rice cultivars grown at different nitrogen levels at CRRI, Cuttack, India.**

Cultivar	Disease score <sup>a</sup> (0-9) at given nitrogen level			
	50 kg/ha	100 kg/ha	150 kg/ha	200 kg/ha
<i>Resistant</i>				
IR28	0	0	0	0
Pankaj	1	1	1	1
<i>Moderately resistant</i>				
CR294-548-1	0	1	1	3
CR318-549, Jagannath	0	1	3	3
RTN68, IR8	0	3	3	3
CR316-639-1, IR36	1	3	3	3
CR188-10	3	3	3	3
<i>Moderately susceptible</i>				
CR318-548-7, CR319-644-2	1	3	3	5
CR316-639-2, PR106, Ramkrishna	1	3	5	5
PR107	3	3	5	5
CR318-461, BG90-2	3	5	5	5
<i>Susceptible</i>				
CR294-548-3	1	1	7	7
CR294-548-2, CR315-621	1	3	7	7
CR294-28-1	1	5	7	7
IR2071-178-3, IET4141	3	5	7	7
Jaya	5	5	7	7

<sup>a</sup>1 = resistant, 3 = moderately resistant, 5 = moderately susceptible, 7 = susceptible.