

Retention of tungro-associated viruses by leafhoppers and its relation to rice cultivars

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Green leafhopper (GLH) *Nephotettix virescens* adults were allowed a 4-d acquisition access on TN1 plants infected with both rice tungro bacilliform virus (RTBV) and rice tungro spherical virus (RTSV) or with RTSV alone. Then each leafhopper was given a series of five 1-d inoculation access feedings in a test tube on a 6- or 7-d-old seedling of GLH-resistant IR50, IR56, or IR72 or on susceptible TN1. In the daily inoculation series for RTBV + RTSV, 80 GLH/variety were used; for RTSV alone, 112-133 GLH/variety were used. Seedlings were indexed by ELISA 4 wk after inoculation.

On the first day of daily inoculation for RTBV + RTSV, GLH transmitted both RTBV and RTSV, either together or separately, in all varieties tested (Table 1). Joint transmission was higher on TN1 than on other varieties. On the second day, GLH transmitted RTBV alone on IR50, IR56, and IR72

Table 1. Serial daily inoculation of RTBV and RTSV mixture by GLH on seedlings of 4 rice varieties. IRRI, 1989.

Variety	Virus	GLH (%) transmitting virus				
		1 d	2 d	3 d	4 d	5 d
IR50 ^a	RTBV + RTSV	5	0	0	0	0
	RTBV	27	12	0	0	0
IR56	RTBV + RTSV	9	0	0	0	0
	RTBV	25	14	0	0	0
	RTSV	5	0	0	0	0
IR72 ^a	RTBV + RTSV	5	0	0	0	0
	RTBV	22	12	0	0	0
TN1	RTBV + RTSV	22	11	0	0	0
	RTBV	43	35	29	20	9
	RTSV	6	1	0	0	0

^aShowed no RTSV infection.

and RTBV, RTBV + RTSV, or RTSV on TN1. On the third day, GLH failed to transmit either virus on all varieties except TN1. On TN1, transmission of RTBV alone continued up to day 5.

In daily inoculation for RTSV alone, GLH transmitted RTSV for only 1 d on IR50, IR56, and IR72. On TN1, GLH transmitted RTSV for 2 d (Table 2).

These results indicate that GLH-resistant varieties inoculated by GLH that had fed on plants infected with RTBV and RTSV are infected predominantly by RTBV alone. The

Table 2. Serial daily inoculation of RTSV by GLH on seedlings of 4 rice varieties. IRRI, 1989.

Variety	GLH (%) transmitting virus ^a	
	1 d	2 d
IR50	34	0
IR56	48	0
IR72	26	0
TN1	62	23

^aZero transmission on all varieties from the third to fifth day.

results also demonstrate that leafhoppers feeding on resistant varieties lose both viruses quickly. □

Further studies on green leafhopper (GLH) feeding modes and tungro transmission

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We collected a rice GLH *Nephotettix virescens* (Distant) population sample Nov 1985 from a ricefield planted to IR64 in Koronadal, southern Philippines, and reared it on IR64 seedlings for 25-26 generations. Newly emerged adult females were given an acquisition feeding on TN1 plants infected with rice tungro bacilliform virus (RTBV) + rice tungro spherical virus (RTSV) for 4 d, then starved for 2 h.

Feeding events of each viruliferous adult female on a 1-wk-old TN1 seedling were monitored for 11 min using an electronic DC chart recorder. Each insect was given a series of 10 such 11-min feedings on fresh seedlings.

In each feeding, four waveform patterns indicating probing, salivation, phloem feeding, and xylem feeding were recorded. The number of probings and the duration of salivation, phloem feeding, and xylem feeding were recorded. After the last feeding, each insect was given an overnight inoculation feeding on a TN1 seedling in a test tube to confirm infectivity. Sixteen GLH females were tested.

One month after the test, the seedlings used for monitoring feeding

events and those used for overnight inoculation were indexed by enzyme-linked immunosorbent assay.

Of the 16 GLH tested, 11 transmitted the viruses in overnight feeding. Five of them transmitted viruses only once in 10 serial feedings (see table). Average duration of phloem feeding was longer in transmitters than in nontransmitters. However, there was no clear tendency indicating that transmitters fed from the phloem longer than nontransmitters.

During the feedings with successful transmission, four of the five transmitters fed from the phloem for longer than 9 min and three of them probed only once. In some feedings with unsuccessful transmissions, the five transmitters probed only once and fed