Insect resistance

Whitebacked planthopper populations on rice cultivars

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Whitebacked planthopper (WBPH) *Sogatella furcifera* (Horvath) infestations occur throughout Haryana from the first week of September to harvest. Infested fields show hopperburn patches from late September.

Sixteen medium-duration (135-140 days) rice cultivars were evaluated during 1978 kharif for reaction to WBPH. They were grown in a randomized block design at 20- × 15cm spacing replicated 4 times. Jaya was included as a susceptible check.

Populations ranged from 17 to 222 nymphs/ hill (see table). Variety RP79-8-3-2-1 had the lowest number of WBPH nymphs/hill, PR 106 had the highest. Of 16 cultivars tested, 9 developed hopperburn patches in one or more replications. Cultivars CRl2-178 and PR 106 showed high susceptibility. Local cultivar HAU4-63-3 was less susceptible than many of the cultivars tested. Resistant cultivars are now in minikit trials.

Resistance of rice cultivars to whitebacked planthopper at Kaul, India.

Variety	Cross	Nymphs/hill[a]	
		x + 0.5	Av
RP979-583-2-1-1	RPA5981/Sona	4.17 a	17.075
PAU41-356-1-5	Phulpattas 72/mut. 65	5.79 b	33.15
RP975-284-2-2	Sona/RPW6-13	6.22 bc	38.475
RP6-516-33-6-1	TKM6/IR28	6.76 cd	45.275
Jaya	TNl/T141	6.79 cd	45.875
RP6-516-29-1	TKM6/IR8	6.98 d	48.375
RP6-1899-254	TKM6/IR8	7.17 de	51.225
Sona	GEB24/TN1	8.42 ef	70.725
HAU4-63-3	IR8/Jhona 349	8.73 f	76.025
PAU41-306-1-2	Phulpattas 72/mut. 65	8.80 f	77.25
RP6-516-34-1-8	TKM6/IR8	9.55 g	90.775
UPR70-30-42	IR8/Bas 370	9.74 g	94.475
PAU32-15-2	Bas 370/IR480-5	10.13 gh	102.25
RP633-519-1-3-4	IRI/KBJ-1//IR22	10.54 h	110.725
CR12-178	IR8/CR1014	13.69 i	187.167
PR106	IR8/Peta^5//Bellepatna	14.89 i	221.625

[a]Av of 4 replications. Means followed by the same letter are not significantly different among themselves. Data transformed to x + 0.5.

Taxonomy of Asian and African rice gall midges

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It had been assumed until recently that the rice gall midge in Africa is the same species as the Asian rice gall midge *Orseolia oryzae* (Wood-Mason). Joint studies in 1981 by the Commonwealth Institute of Entomology and the USDA Systematic Entomology Laboratory of a series of reared adults with associated larvae and pupae collected by Dr. J. Etienne, ISRA-Ziguinchor, from rice in Senegal show that the African rice gall midge is a morphologically distinct species. A formal description is being prepared.

A technique for preparation of brown planthopper chromosomes

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Chromosome cytology has been used to determine subtle cytotaxonomic differences between related species, sibling species, subspecies, and biotypes. A simple and rapid technique for preparing meiotic chromosomes is needed to examine and compare large insect samples, especially in studies of insect systematics and evolution. A technique developed at IRRI proved useful in preparing and studying brown planthopper chromosomes. The procedure has three steps.

1. Fixing and dissecting insects — Fifth-instar nymphs and newly emerged males collected from stock cultures at 0700 h are fixed in glass vials containing Carnoy's fluid — 1 part 99.7% glacial acetic acid and 3 parts 95% ethyl alcohol — for at least 2 minutes. A fixed insect is then dissected in a drop of Ringer's solution on a clean glass slide. The head and thorax are discarded and the abdomen is dorsally incised to extract the tiny, translucent testes.
2. Staining, mounting, and labeling — The testes are submerged in a drop of 2% aceto-orcein or carmine solution for 2 minutes. With a fine-tipped, curved needle, each testis is macerated on a clean slide with a drop of 2% aceto-orcein. The cells are kept from drying out by adding a drop of 45% acetic acid. All debris are discarded.

A clean cover slip is placed over the

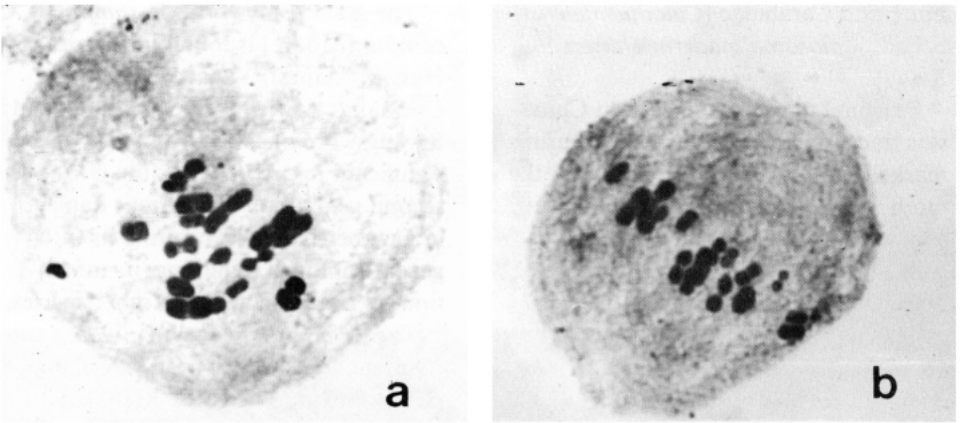
macerated testis and the testis is pressed through blotting paper to ensure adequate spread of the cells. Moderate pressure can be applied with a blunt pencil eraser to flatten the cells. The slide is examined under high magnification of a light microscope to ascertain if cells have spread and if the stain has been absorbed by cell nuclei. Extra stain can be removed by adding a few drops of 45% acetic acid on one side of the cover slip and withdrawing the excess fluid from the opposite side using an absorbent.

The preparation is passed over an alcohol lamp flame 3 to 4 times to hasten destaining and to clear the cytoplasm.

A temporary mount is maintained by sealing or ringing the cover slip with paraffin wax. For a permanent mount, the paraffin seal is carefully removed with xylene and the slide subjected to 95% alcohol for 5 minutes, 70% alcohol for 5 minutes, xylene for 5 minutes, and xylene for another 5 minutes. The cover slip is then removed and a drop of Canada balsam is put on the spot where the cover slip came. A new cover slip is placed on the preparation. The removed cover slip receives another drop of Canada balsam and is placed on the left side of the glass slide. The prepared slide is dried on a slide warmer and cleaned with xylene.

Mounted slides are labeled on the right side with specimen identification, stage of cell division, date of preparation, and worker's name.

3. Detection of M-phase — Physical and metabolic activities of growing cells are cyclic, characterized by four more or less distinct stages — Gl-, S-, G2-, and M-phases — which are regular and repetitive as long as a cell is growing and dividing. Chromosomes undergoing different meiotic stages are detected during the M-phase, which usually lasts an hour. The specific M-phase for brachypterous 5th-instar and newly emerged males of brown planthopper biotype 1 was 0700-0800 h, after which a majority of the sex cells were observed to undergo interphase or active metabolic phases (Gl-, S-, and G2-phases) (see figure).



Meiotic chromosomes of brown planthopper biotype 1 males. a. Late diakinesis or prometaphase 1 chromosomes. b. Metaphase I chromosomes in testicular cells, IRRI, 1981.

Distribution, seasonal occurrence, and natural enemies of armyworm attacking rice in China

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Eight noctuid species of rice armyworm belonging to two genera, *Mythimna* and *Spodoptera,* are found in China: *Mythimna separata* (Walker), *M. loreyi* (Duponchel), *M. compta* (Moore), *M. zeae* (Duponchel), *Spodoptera mauritia* Boisduval, *S. depravata* (Butler), *S. abyssinia* Guenée, and *S. pecten* Guenée. *M. separata* is the most important.

The oriental armyworm *Mythimna separata* (Walker) has been recorded from Hianan Island of Kwangtung Province to Heilungkiang Province.

South of latitude 33° N (January isotherm 0° C), *M. separata* can hibernate in winter (see table). Between 27 and 33° N, larvae generally overwinter with pupae. Sometimes they feed lightly on cereal plants, but the rate of develop ment is slow. South of 27° N (January isotherm 80° C), it infests wheat severely in winter.

Parasites and predators include Tachinidae [*Cuphocera varia* (Fabricius), *Linnaemya compta* (Fallen), *L. zachvatkini* Zimin, *Servillia planiforceps* Chao, *Siphona cristata* Fabricius, *Actia silacea* Meigen, *Exorista japonica* (Townsend), *E. fallax* Meigen, *Bessa selecta frugax* Rondani, *Carcelia excisa* (Fallen), *Drino inconspicua* Meigen, *Pales pavida* Meigen, *Pseudogonia rufifrons* (Wiedemann), *Turanogonia chinensis* (Wiedemann)], Braconidae [*Apanteles ruficrus* (Haliday), *Meteorus sp.*], Ichneumonidae [*Charops bicolor* Szepligeti, *Vulgichneumon leucaniae* Uchida, *Camposcopus* sp., *Netelia* sp.],

Number of generations and seasonal occurrence of *Mythimna separata* in China.

Generations per year	Seasonal occurrence	Host plants	Latitude
2-3	Jun-Jul	Wheat, maize, rice, sorghum, millet	North of 39° N
3-4	Jul-Aug	Wheat, maize, rice, sorghum, millet	36-29° N
4-5	Apr-May	Wheat, maize, rice, millet	33-36° N
5-6	Sep-Oct	Rice, maize	27-33° N
	Mar-Apr	Wheat	
6-7	Jan-Apr	Wheat	South of 27° N
	Sep-Oct	Rice, maize, sugarcane	