Fifty newly emerged brachypterous and macropterous *N. bakeri* males and a few females were scrutinized using standard cytological techniques for planthoppers. Data on cell cycle and cellular, nuclear, and chromosomal shapes and morphometrics are in the table.

The first meiotic division (see figure) was reductional and the second was equational. As attested by the orientation, broad spindle attachment, and parallel disjunction during anaphase I, *N. bakeri* chromosomes had diffused kinetochores or their centromeres were located along the entire length of the chromosomes.

The genomic complement was normally 2n=29 in males and 2n=30 chromosomes in females. These consisted of 28 autosomes (14 II) and a univalent X-chromosome in males and XX bivalents in females. The sex-determining mechanism was therefore XX-XO. Male morphs were heterogametic, yielding 14 I × X and 14 I + 0 sperm cells, and females were homogametic and yielded only 14 I + X ova.

Some karyological variations were observed. Meiocytes with more and less chromosomes were in the normal genomic constitution. Meiocytes with fewer chromosomes were smaller (27 µ long and wide) aneuploid cells with 6, 8, 10, 11, 12, and 13 bivalent autosomes. Those with more chromosomes were bigger (46 µ long, 38 µ wide) cells with 17, 19, and 20 bivalents.

Simple chromosome agmatoploidy could cause increased chromosome number. The holokineticity of chromosomes enabled chromosome fragments to divide and function as autonomous wholes because they have nonlocalized centromeres to direct them to the poles. Conversely, fusion of the major part of two chromosomes by reciprocal translocation reduced the chromosome number, *N. bakeri* is chromosomally polymorphic with ample genetic versatility, because of these atypical karyotypes. □

Cell cycle and cellular, nuclear, and chromosomal shapes and morphometrics of *N. bakeri.*

Stage	Shape	Length (µ)	Width (µ)
Interphase cell	Oval to circular	45	32
Nucleus	Circular	12	12
Meiosis I (see figure)			
Prophase I			
a. Leptonema cell	Oval	13-25	10-17.5
nucleus	Oval	10	8
b. Pachytene cell		15	10
c. Diplotene			
Cell	Oval	31-45	20-31
X-chromosome (a univalent)	Oval	2.2	1.5
Autosomes (14 bivalents)	Irregular	3,3,3,3,3,3, 3.5,3.5,4,4, 4,4,5,5	
d. Diakinesis			
Cell	Oval	3545	26-38
X-chromosome	Circular	2	2
Autosomes	Dumbbell	2.1,2.4,2.8, 3,3,3.1,3.4, 3.7,4,4,4.1, 4.4,4.8,4.8	
Metaphase I			
X-chromosome	Circular	2	2
Autosomes	Dumbbell	2,2,3,3,3,3.5 4,4,4,4,4.2, 4.5,4.5,4.5	
Anaphase I			
X-chromosome	Circular	2	2
Autosomes	Clump	9-11	7-8
Telophase I			
X-chromosome	Circular	2	2
Autosomes	Clump	5	3
Meiosis II			
Nuclei (4)	Almost circular	9.5	8.2

Weed hosts for *Cyrtorhinus lividipennis* (Reuter), a brown planthopper predator

Sivapragasam A., Malaysian Agricultural Research and Development Institute, P. O. Box 2301, General Post Office, Kuala Lumpur 01-02, West Malaysia

It is well documented that grasses and weeds conserve and enhance the multiplication of some important natural enemies of brown planthopper (BPH), but these grasses and weeds have not been identified.

Glasshouse studies investigated oviposition and egg hatchabflity if the mirid *Cyrtorhinus lividipennis,* an important predator of BPH eggs and adults. Potted cultures of several common weeds, collected from rice fields in Tanjung Karang, were enclosed in a 7.5- × 60-cm mylar cage and 5 freshly emerged adult mirid females were released. After about 48 hours. the insects were removed and the number of eggs laid were examined under a dissection microscope. Nymphs that hatched were counted and removed daily. When hatching terminated, plants were dissected and the number of unhatched

Oviposition and hatchability of eggs of *Cyrtorhinus lividipennis* **on some rice field weeds.**[a]

Species	Eggs laid (no)	Egg hatchability (%)
Echinochloa crus-galli	10.9 a	29.7 a
Cyperus diffusus	5.7 b	5.3 c
Brachiaria rnutica	0.4 c	2.5 c
Oryza sativa	12.7 a	53.6 b

[a]Mean values for 10 replications. Values followed by the Same letter do not differ significantly at P = 0.05.

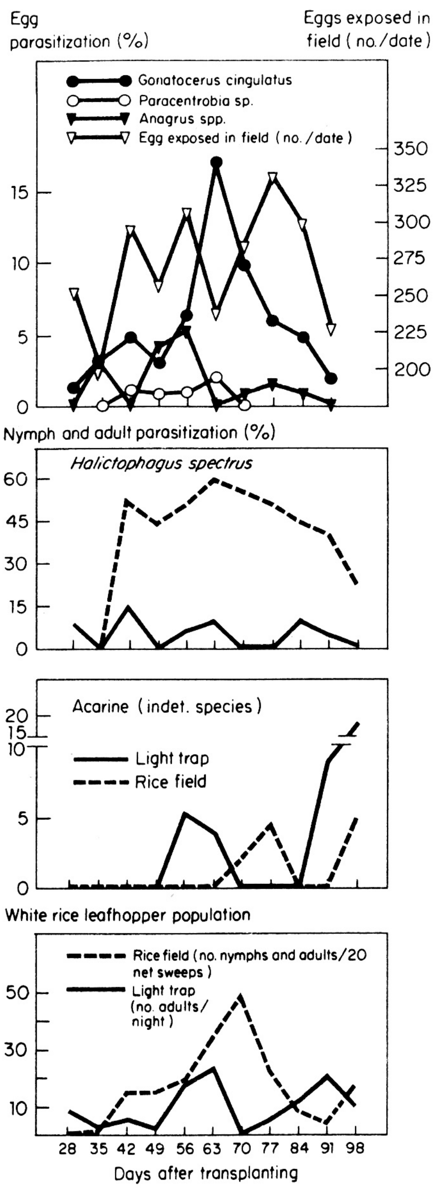
eggs was recorded. Potted MR7 rice plants were used as control.

Oviposition occurred on only three of the seven species tested (see table). The highest oviposition and hatchability were observed in *Echinochloa crus-galli.* The mirid did not oviposit on *Setaria geniculata, Sacciolepis indica, Eleusine indica,* or *Paspalum conjugatum.* □

Parasites of white rice leafhopper *Cofana spectra* (Dist.) [Hemiptera: Cicadellidae] in the Philippines

A. T. Barrion, senior research assistant; and J. A. Litsinger, entomologist, Entomology Department, IRRI

Numbers and kinds of parasites attacking the egg, nymphal, and adult stages of *Cofana spectra* (Distant) were recorded during the 1982 wet season at IRRI. Potted rice plants infested with white rice leafhopper eggs laid by a greenhouse colony were set in a rice field each week 29–98 days after transplanting. Four species of egg parasites were recovered, the most prevalent of which was a mymarid — *Gonatocerus cingulatus* Perkins — that parasitized up to 17% of eggs (see figure). *Anagrus flaveolus* Waterhouse, *A. optabilis* (Parkins) (Mymaridae), and *Paracentrobia* sp. (Trichogrammatidae) parasitized less than 6% of eggs.



Abundance of white rice leafhopper Cofana spectra (Dist.) in rice field, light trap collections, and parasitization of eggs, nymphs, or adults. IRRI, 1982 wet season.

White rice leafhopper nymphs and adults were parasitized by a strepsipteron — *Halictophagus spectrus* Yang — and an unidentified mite of the family Erythraeidae. The parasites were recovered from nymphs and adults collected from fields by sweep net and from live adults collected in a walk-in light trap. The strepsipteron parasitized 40–60% of nymphs and adults collected in the field, but parasitized less than 15% of adults collected from the light trap, perhaps indicating that parasitized hoppers are those less capable of flying. The mite occurred less consistently on hopper nymphs and adults but parasitized up to 23% of adults collected in the light trap.

The most prevalent parasites of white rice leafhopper — *G. cingulatus, H. spectrus,* and the unidentified mite — do not attack the other commonly occurring rice leafhoppers and planthoppers. The egg parasites *A. flaveolus* and *A. optabilis* are most common on the brown planthopper. *Paracentrobia* sp. has a wide host range. □

Pest management and control

WEEDS

Weed control in direct-seeded upland rice

S. B. Biswas, Plant Breeding Department, and R. C. Thakur, Agronomy Department, Himachal Pradesh Agricultural University, Palampur-176062, H. P., India

Ten herbicides were evaluated for control of weeds in upland rice at the Malan Rice Research Station during the 1977 wet season. Soil was loamy with pH 5.8; 544 kg N, 41 kg P, and 265 K available per ha; and 0.593% organic carbon. Average annual rainfall was 2,500 mm. Weeds were 14% *Echinochloa* spp., 22% other grasses, 23% *Cyperus* spp., and 41% broadleaf weeds.

Himdhan was drilled at 100 kg seed/ha in rows spaced at 20 cm. Before sowing, 40 kg each of P and K were applied. N at 100 kg/ha was applied in 3 splits at sowing, tillering, and panicle initiation. All herbicides (see table) were sprayed 6 days after sowing.

Hand weeding controlled weeds best

Effect of weed control treatments on rice grain yield, contributory yield characters, weed dry weight, and toxicity to rice plants. [a]

Treatment	Dose (kg ai/ha)	Grain yield (t/ha)	Panicles (no./m^2)	Spikelets (no./panicle)	1000-grain (g)	Toxicity[b] 25 DS	Dry wt of weeds (g/m^2)
Diethatyl	1	2 ef	167 c	89 b	24 cd	4.4 a	157 b
Butachlor	2	3 bc	156 c	107 a	25 abc	3.9 a	98 ef
Butralin	2	3 b	195 c	85 b	25 abc	1.9 c	122 cd
Piperophosl 2,4-D	2	4 a	320 ab	106 a	26 abc	1.5 c	86 f
Dinitramine	1	4 a	319 ab	110 a	27 ab	1.5 c	83 f
X 150	4	2 ef	167 c	79 bc	24 cd	2.3 bc	147 b
Oxadiazon	1	2 de	176 c	85 b	23 d	2.3 bc	125 cd
Pendimethalin	2	3 cd	189 c	82 bc	24 bcd	1.9 c	138 bc
Oxyfluorfen	2	2 f	172 c	84 b	24 cd	3.6 ab	115 de

Continued on opposite page