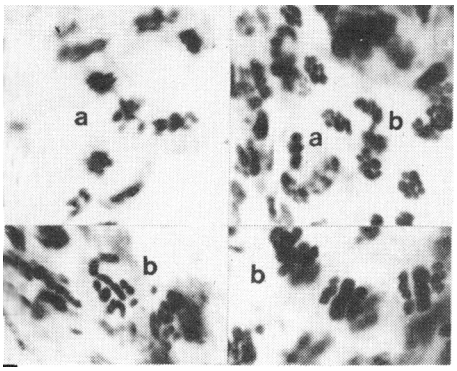


Meiotic chromosomes of male progeny derived from *N. virescens* parents caged on TN1 rice plants treated with 500 and 2,500 ppm NSB, IRRI, 1987. a) Metaphase arrest, b) chromosome stickiness and elongation.

parents (set table). The arrest of metaphase I stage in meiotic chromosomes of primary spermatocytes (see figure) was most evident at 500 and 2,500 ppm NSB. Of 450 meiocytes, about 40-60% were at first metaphase. The meiotic cells of progeny derived from treated parents lacked the ample spindle fibers needed for normal disjunction of chromosomes during succeeding stages of spermatogenesis. About 18 and 21% chromosomal abnormalities were caused in treatments with 500 and 2,500 ppm NSB, respectively. At 500 ppm, meiotic cells showed 10% chromosome elongation and 8% reduction in chromosome number due to autosomal stickiness and fusions. At 2,500 ppm, chromosome elongations were 13% and chromosome fusions 8%. The reduced reproductive fitness of *N. virescens* caged on rice plants treated with neem derivatives can be attributed to cellular and chromosomal dysfunctions during spermatogenesis, leading to nonviability and senescence of sperm cells. □

Thrips control at tillering of transplanted rice

S. Murugesan, M.S. Venugopal, and M. Bharathi, Tamil Nadu Rice Research Institute (TRRI), Aduthurai 612101, Tamil Nadu, India

Rice thrips *Stenchaetothrips biformis* Bagnall causes severe damage to seedlings in the nursery and to the transplanted crop in the main field at tillering. We evaluated 5 new insecticides — 3 granular and 2 spray formulations — for thrips control in a field experiment during thaladi season (Oct 86–Feb 87). Checks were carbofuran 3G and phosalone 35 EC. Rice variety IR20 was grown. Insecticides were applied at 20 d after transplanting (DT) and at 40 DT, if thrips incidence was found.

Table 1. Effect of new insecticides on thrips control. TRRI, Aduthurai, India, 1986.

Insecticide	Dose (kg ai/ha)	Thrips[a] (no./10 hand passes) at 3 DAT
Chlorpyrifos 10 G	1.0	14.8 ab
Cartap4G	1.5	16.3 b
Ethoprop 10 G	1.5	13.5 ab
Carbofuran 3 G (standard check)	1.0	14.0 ab
Chlorpyrifos 40 EC	0.5	13.5 ab
Dadeci 5.9 EC (decamethrin 150 g + buprofezin 9 g)	0.09	15.3 ab
Phosalone 35 EC (standard check)	0.5	12.5 a
No insecticide (untreated check)		22.0 c

[a] Mean of 3 replications. Means followed by a common letter are not significantly different at the 5% level, baaed on CD value. DAT = days after treatment.

Table 2. Effect of granular and spray formulations of insecticides on thrips control. TRRI, Aduthurai, India, 1986.

Insecticide	Dose (kg ai/ha)	Thrips[a] (no./10 hand passes) at 3 DAT
Phosphamidon 85 EC	0.5	13 ab
Monocrotophos 40 EC	0.5	14 ab
Chlorpyrifos 20 EC	0.5	9 a
Quinalphos 25 EC	0.5	17 ab
Endosulfan 35 EC	0.5	20 bc
Phosalone 35 EC	0.5	17 ab
Carbofuran 3 G	1.0	34 c
Chlorpyrifos 10 G	1.0	20 bc
BHC 10 D 25 kg/ha		18 ab
No insecticide (untreated check)		25 bc

[a] Mean of 3 replications. Means followed by a common letter are not significantly different at the 5% level based on CD value. DAT = days after treatment.

In a second field experiment, insecticides commonly used to control different rice pests were evaluated for thrips control. They were applied at 38 DT if thrips population and damage were observed.

Thrips populations were sampled by a field worker passing his wet palm over leaves at 10 places/plot; damage was sampled by counting total and affected leaves on 10 hills/plot at 3 and 14 d after first insecticide application.

Spray formulations of chlorpyrifos 40 EC at 0.5 kg ai/ha and Dadeci 5.9 EC at 0.09 kg ai/ha, and granular ethoprop at 1.5 kg ai/ ha were as effective as the standard checks for controlling thrips damage (Table 1).

Chlorpyrifos 20 EC at 0.5 kg ai/ ha significantly reduced thrips populations 3 d after spraying (Table 2). □

Cytogenetic effects of neem seed kernel extract (NSKE) on brown planthopper (BPH) *Nilaparvata lugens* spermatocytes

R.C. Saxena and A.A. Barrion, Entomology Department, IRRI

Exposure to neem *Azadirachta indica* seed derivatives is known to reduce the reproductive potential of several insect pest species. We investigated the effect on reproductive fitness of first generation male progeny of BPH male and female parents caged on rice plants sprayed with 100 or 500 ppm of aqueous NSKE.

Primary and secondary spermatocytes of BPH progeny collected from NSKE-treated and untreated plants were examined using the lacto-aceto-orcein squash technique. Frequency of meiotic cells was significantly less in progeny collected from NSKE-treated plants.

Frequency of nonmeiocytes was not affected. Therefore, the meiotic index was significantly reduced (see table).

The majority of the primary spermatocytes in control male progeny had 15 bivalent chromosomes. In the progeny exposed to 100 ppm of NSKE, the primary spermatocytes had reduced numbers of homologs. Of 225 cells examined at diakinesis, 28% contained fewer bivalents: 1% of the cells had 11 bivalents, 3% had 12 bivalents, 5% had 13 bivalents, and 19% had 14 bivalents. The reduction in chromosome number was due to centric fusions, and stickiness of bivalents was a common feature (Fig. la, e, f). At metaphase I, one or two autosomes lagged behind the equatorial clumping (Fig. 1b, c).

Secondary spermatocytes in the progeny exposed to NSKE also had fewer univalents than those in the control progeny. Some univalents were elongated. Anomalies were detected in late telophase II cells - the tetrads failed to undergo complete cytokinesis (Fig. 1d). The significance of these abnormalities is not known.

Chromosomal defects also occurred in primary and secondary spermatocytes of progeny exposed to 500 ppm of NSKE. More centric fusions resulted in 39% abnormal chromosome counts during diakinesis: 2% had 9 bivalents, 2% had 10 bivalents, 4% had 11 bivalents, 3% had 12 bivalents, 14% had 13 bivalents, and 14% had 14 bivalents. The fused homologs were highly heterochromatic.

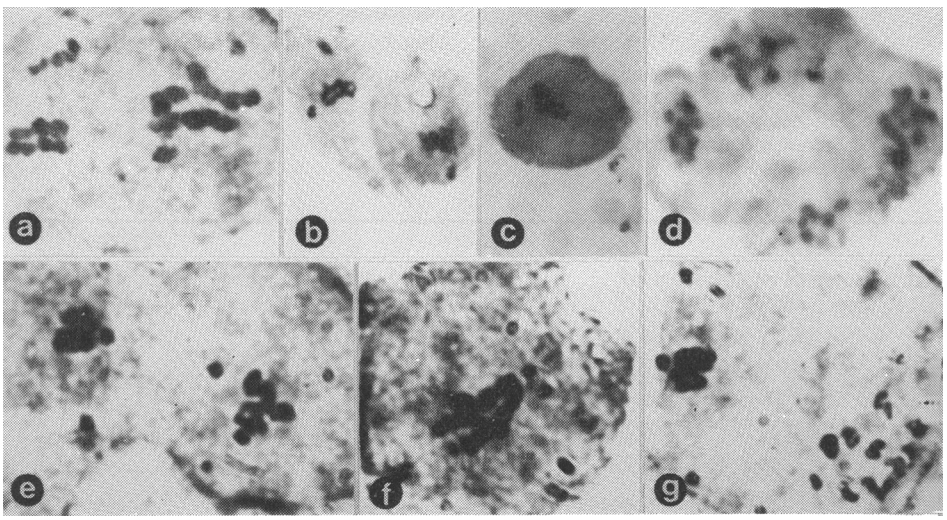
In addition to these abnormalities, 5 cells contained 18 relatively smaller chromosomes, possibly as a result of fragmentation. A few cells possessed elongated chromosomes. Also, there were unique localized clumpings at the lower polar ends of primary spermatocytes (Fig. 1g).

The chromosomal abnormalities led to inviability of gametes and reduced the insemination potential of first generation male progeny exposed to NSKE. □

Mean frequencies and indices of BPH males in first generation progeny collected from NSKE-treated and untreated rice plants.[a] IRRI, 1987.

Treatment (ppm NSKE)	Meiocytes (no.)	Nonmeiocytes (no.)	Meiotic index
100	82.1 b	220.6 a	0.278 b
500	80.6 b	273.3 a	0.224 b
0 (control)	232.1 a	374.6 a	0.384 a

[a]In a column, means followed by e common letter are not significantly different at 1% level by *t*-test. Based on 10 replications, 1 male/replication.



Spermatocytes of first-generation male BPH progeny collected from rice plants sprayed with 100 ppm (a-f) and 500 ppm (g) of NSKE. Magnification, 1000× (oil immersion).

Outbreak of whitebacked planthopper (WBPH) near Annamalainagar, South India

G. Shankar and P. Barkoran, Entomology Department, Faculty of Agriculture, Annamalai University, Annamahinagar 608002, India

WBPH *Sogatella furcifera* (Horvath) is a relatively lesser known insect pest compared with brown planthopper (BPH) in this part of Tamil Nadu. But in December 1986, a severe outbreak of WBPH occurred in a village 3 km from Annamalainagar. It affected about 50 ha of transplanted IR20 and IR50, the latter being more seriously affected. Early planted fields were the worst affected. We observed about 250-300 WBPH nymphs and adults/hill and 40-45 BPH/hill. The WBPH were mostly macropterous. They crowded on leaf blades also.

The reasons for the flare-up of planthoppers, especially WBPH, could be either failure of the farmers to notice them on time or favorable weather conditions for insect buildup.

The input of pesticides has always been minimal and possibly never exceeded two applications of organophosphates. □

Effect of temperature, sustenance, and mating on rice armyworm reproduction

R. Singh, Entomology Department, Haryana Agricultural University (HAU), Hisar 125004, India

Adults of rice armyworm *Mythimna separata* (Wlk.) from a mass culture raised in the laboratory were used in 3 sets of experiments conducted at 15, 18, 20, 25, and 30 °C temperatures and 55-80% relative humidity in BOD incubators. For each set, 10 pairs (female + male) of adults were tested