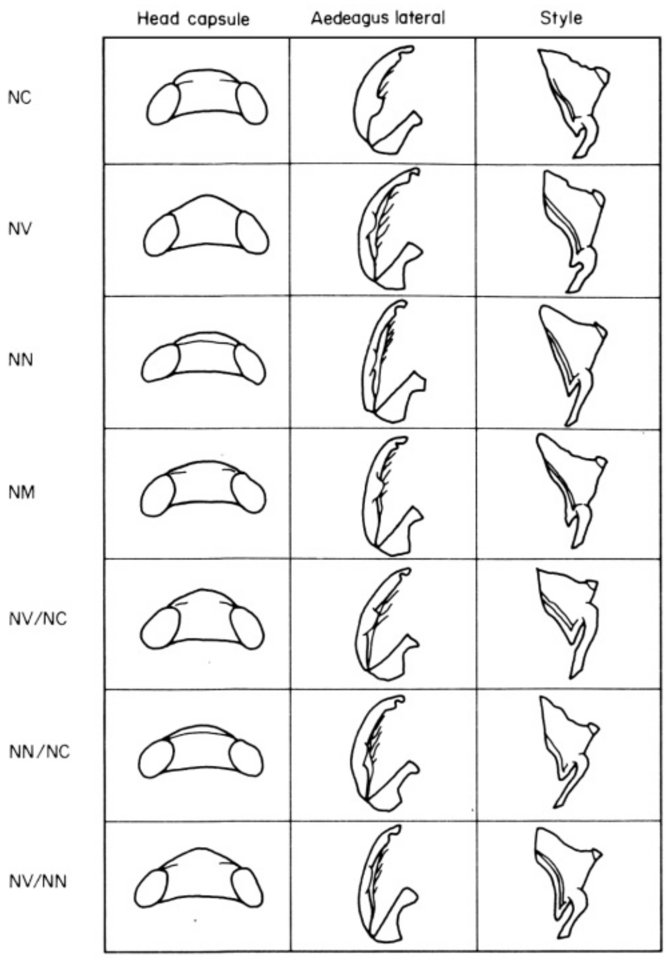

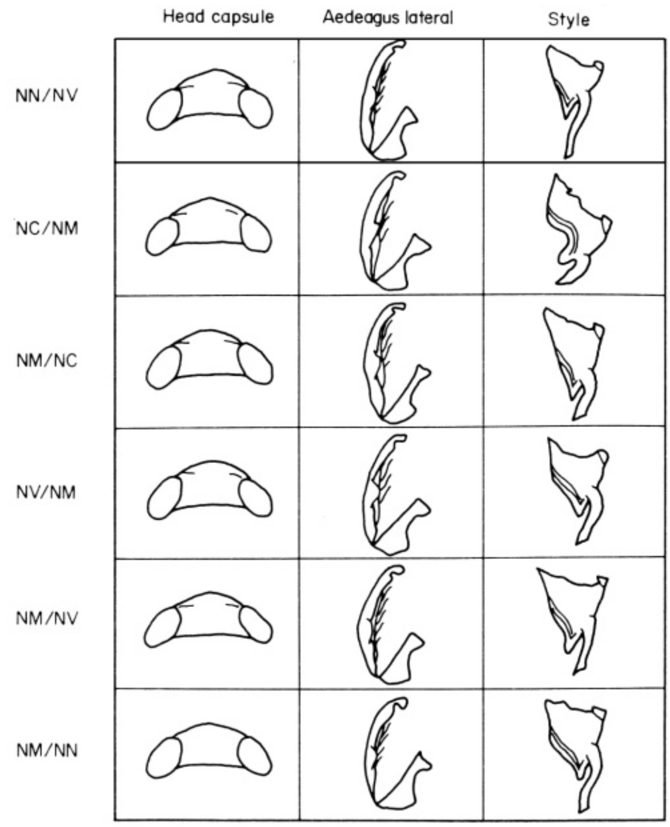

Morphology of the head capsule and male genitalia of 4 GLH species and their interspecific hybrids. NC = *N. cincticeps,* NV = *N. virescens,* NN = *N. nigropictus,* NM = *N. malayanus.*

hatchability percentage (see table). Of 12 interspecific crosses, 9 produced hybrid progeny. Females from crosses with NC females and NN and NV males and crosses between NN females and NM males laid sterile eggs. Hatching percentage was generally low among interspecific crosses. Eggs from crosses of NV females and NN males had the highest hatchability percentage (68%). Although crosses of NV females and NC males had 61% hatching percentage, the reciprocal cross produced no fertile eggs.

The figure compares external morphology of the head capsule and the internal structure of the aedeagus and style of the male genitalia of hybrid adults with those of their parents. Hybrid external morphology and genitalia were intermediate between those of the parents.

Intraspecific and interspecific feeding of whitebacked planthopper (WBPH) predators

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In rice ecosystems, predators help keep WBPH *Sogatella furcifera* (Horvath) populations below economic thresholds. Major predators include wolf spider *Lycosa pseudoannulata* Boes et Str. (Lycosidae: Araneae), mirid bug *Cyrtorhinus lividipennis* Reuter (Hemiptera: Miridae), ladybird beetle *Synharmonia octomaculata* (F.) (Coleoptera: Coccinellidae), and rove beetle *Paederus fuscipes* Curt. (Coleoptera: Staphylinidae).

Because predators feed on more than one insect species, we studied the extent to which the four adult predators feed on their own species. Each test lasted 5 d. Mortality of predators and prey was recorded daily, and dead insects were replaced after each observation.

When 10 *L. pseudoannulata* were caged together, they were cannibalistic and had 24% mortality. When 10 *C. lividipennis, S. octomaculata,* or *P. fuscipes* were caged with 1 *L. pseudoannulata,* the spider killed 60% of the *C. lividipennis* but no *S.*

Feeding rate per day of adult predator on fourth-instar WBPH,[a] IRRI, 1985.

Predator	Predators released (no.)	*S. furcifera* mortality/ predator per day
Lycosa pseudoannulata	1	5.9 a
Cyrtorhinus lividipennis	5	1.4 d
Synharmonia octomaculata	3	2.4 b
Paedems fuscipes	5	1.9 c
Check	–	0.2 e

[a] In a column, means followed by a common letter are not significantly different at 5% level by DMRT. Av of 5 observations recorded daily and 4 replications. Sixteen WBPH nymphs were released with a mouth aspirator. Dead predators and prey were replaced daily after each observation.

octomaculata or *P. fuscipes.* Except for the spider, no predator was cannibalistic. When 1 spider was caged with 10 *C. lividipennis* and 10 WBPH, *C. lividipennis* had 41% mortality and WBPH only 27%.

We also studied the feeding activity of the predators on WBPH. *L. pseudoannulata* ate the most (5.9) WBPH per day (see table). Feeding rate of the other predators ranged from 1.4 to 2.4 WBPH per day.

These laboratory studies were under conditions that may differ from those in the field, and only adult stages were tested. In the field, it is likely that intraspecific and interspecific predation also occurs at immature stages.

Effect of custard apple oil, neem Oil, and neem cake on green leafhopper (GLH) population and on tungro (RTV) infection

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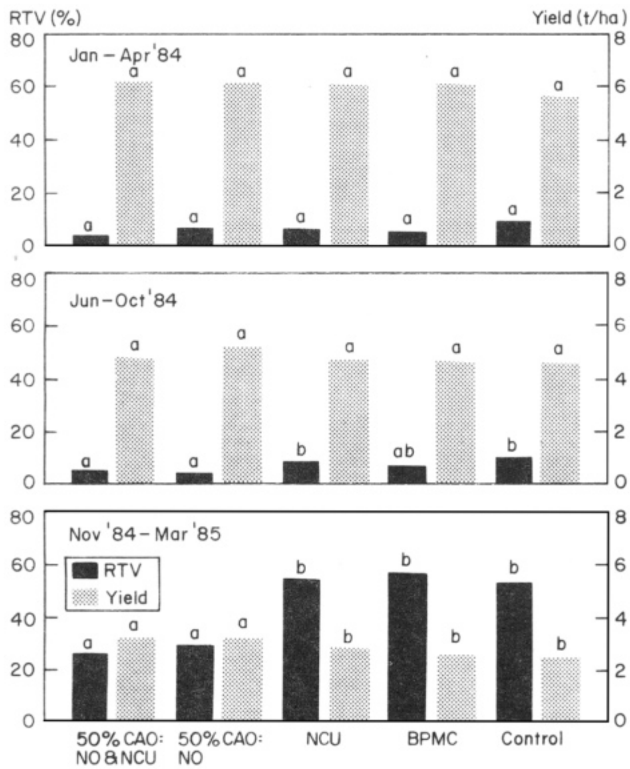
In laboratory studies at IRRI, mixtures of seed oils of custard apple *Annona squamosa* L. and neem *Azadirachta indica* A. Juss were significantly more effective in reducing GLH survival and its transmission of RTV than spray application of individual oils.

In field trials, we sprayed a 1:4 (vo1:vol) mixture of custard apple and neem seed oils at 50% concentration on RTV-susceptible IR42 plants. The mixture was applied with an ultralow-volume applicator at weekly intervals from seedling to maximum tillering stages at 8 litres/ha. A 3:10 (weight:weight) neem cake-urea mixture also was applied at 60, 30, and 30 kg N/ha at seedling stage, maximum tillering, and panicle initiation. The treated control was sprayed with BPMC at 0.75 kg ai/ha and the untreated control with the emulsifier at weekly intervals from seedling to maximum tillering.

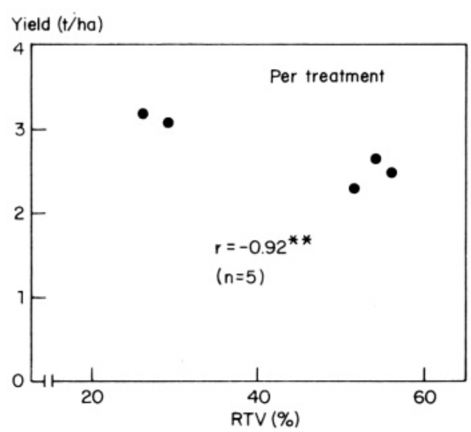
For three consecutive croppings in 1984-85, IR42 treated with the oil mixture alone or in combination with neem cake + urea had relatively low GLH populations, consistently low RTV infection, and high yields (Fig. 1). At 9% RTV infection in Jun-Oct 1985, plants with the oil mixture alone or with neem cake + urea had significantly less RTV infection than the untreated control, but yields were not significantly different.

At ^{3} = 50% RTV infection in Nov 1984-Mar 1985, test plants yielded significantly higher and had markedly lower RTV infection when they received the oil mixture alone or neem cake + urea than the insecticide-treated and the untreated controls.

The positive correlation between RTV infection and yield (Fig. 2) during this cropping period indicates that the level of RTV infection was the major yield determinant and that either the oil mixture alone or oil + neem cake + urea effectively controlled the vector and the disease. Neem cake + urea alone was ineffective.



1. Comparison of yield and RTV infection in field plots planted to RTV-susceptible IR42 and treated with either custard apple oil and neem oil (CAO:NO), neem cake + urea (NCU), their combination (CAO:NO and NCU), BPMC, or a detergent-water solution (control). Average of 4 replications. Means followed by a common letter are not significantly different at the 5% level by DMRT. IRRI, 1984-85.



2. Correlation between RTV and yield for the Nov 1984-Mar 1985 crop, IRRI.

Activation of prophenol oxidase enzyme by brown planthopper (BPH) in response to insecticide

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It has been proposed that the prophenol oxidase activation system of insects recognizes pathogens such as bacteria and fungi because it is activated by the lipopolysaccharide from bacteria and B-1, 3 glucan from fungus cell walls.