The procedure takes 1.5 d. From 500 g infected plants without roots, current methods yielded 1 ml of purified preparation with an absorbance at 260 m ranging from 1.0 to 2.8. With 300 g materials, the modified method yielded 1 ml, with absorbance ranging from 13 to 20. The ratio of absorbance at 260 nm and 280 nm of the purified virus ranged from 1.70 to 1.75.

Purified preparations were injected into rabbits, and antiserum with a titer of 1/1280 in the ring interface precipitin test was obtained.

We also attempted to improve the purification method for rice tungro bacilliform virus (RTBV). Without using driselase and organic solvent, the virus yield was not significantly improved. The rabbit antiserum to RTBV had a titer of 1/640. The antisera did not cross-react and did not react with healthy rice extracts in ELISA and the latex test. □

Insect management

Severe outbreak of green leafhopper (GLH) in Cuddapah District, Andhra Pradesh, India

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Nearly 50,000 ha of transplanted-irrigated rice is grown in Cuddapah district in wet season. Predominant cropping is rice followed by groundnut during winter-summer in canal water area, and a single rice crop in tankfed areas depending on rainfall. Main cultivars are Phalguna, Mahsuri, and NLR9672, with some NLR9674, IET7575, IR50, and IR20. Low humidity, high temperature, and scant rainfall (400-500 mm) reduce insect and disease incidence.

Cuddapah received good rainfall the last 2 wk of Oct and first 2 wk of Nov 1984, when hopperburn and numerous GLH were observed in 30-40% of cropped area on most cultivars. This was the first report of GLH outbreak from Cuddapah. The crop was in tillering to active tillering phases. A 15-village survey showed nymphs and adults (30-150/ hill), with adults more numerous.

IR20 and IR50 had fewer GLH and no hopperburn (see table). Phalguna, Mahsuri, NLR9672, and NLR9674 showed hopperburn in patches. Mahsuri showed 100-150 GLH/hill. IET7575, a brown planthopper-resistant variety, had 20-40/ hill.

This outbreak appeared due to migration from adjoining Mellore district after harvest of the 1984 summer rice crop (May-Aug) where about 20,000 ha were devastated by tungro (RTV).

The early crop, planted in late Aug, escaped infestation but the late crop showed severe infestation. Despite heavy GLH population, there was no RTV, even though adjacent Mellore and Prakasam districts had severe RTV the same season. □

Severity of GLH on common rice cultivars in farmers' fields in A. P., India, 1984.

Cultivar	Crop phase	GLH (no./hill)
Mahsuri	Active tillering	100-150
Phalguna	Active tillering	30-55
IET1515	Active tillering	20-40
NLR9612	Initial tillering	45-75
NLR9674	Initial tillering	45-75
IR50	Panicle emergence	10-15
IR20	Grain hardening	5-10

Parasitoids of leaffolder (LF) pupae from Haryana, India

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Four parasitoids of pupae of rice LF *Cnaphalocrocis medinalis* (Guenée) were recorded at RRS during 1987 kharif. They were *Xanthopimpla flavolineata* (Cameron), *Xanthopimpla* sp. (Ichneumonidae), *Brachymeria* sp. nr. *lasus* (Walker) (Chalcididae), and *Tetrastichus ayyari* Rohwer (Eulophidae). Parasitism rates are shown in the table. □

Parasitism rates of 4 parasitoids of LF pupae. Haryana, India, 1987.

Days after transplanting	Parasitism (%)			
	Xanthopimpla flavolineata	*Xanthopimpla* sp.	*Brachymeria lasus*	*Tetrastichus ayyari*
55	23.3	–	–	–
65	7.5	1.0	1.5	2.5
75	10.7	2.0	–	–
85	20.0	–	–	–

An expert system for insecticide control of brown planthopper (BPH)

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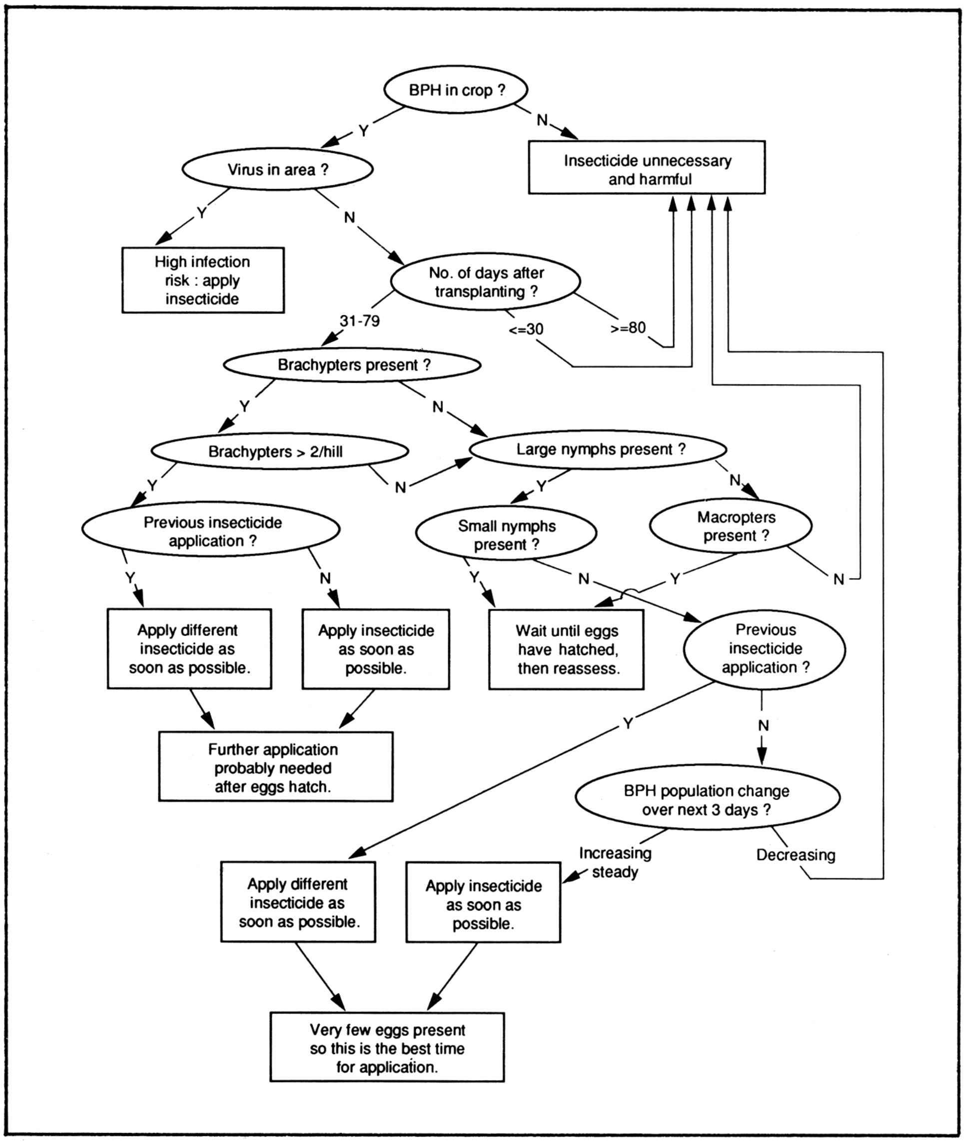
Using insecticides to control BPH can promote rather than limit BPH population development. Insecticides can kill natural enemies that keep BPH populations below serious levels. Insecticides must be used only when this natural balance has been lost, and then must be timed carefully.

An expert system (see figure) can show when insecticide use is appropriate. Expert systems are computer programs that offer information or advice as a human expert would. They can improve decisionmaking in agriculture, either directly or as a training device.

The system, built using an expert system shell (Crystal), searches for the appropriate recommendation. The computer asks the user questions, via a series of interactive screens (starting at the top of the figure). The answers lead to a recommendation.

The expert system is programmed to recommend that insecticides be applied against BPH only in certain circumstances, at particular stages of crop growth. For example, if only large nymphs are present between 31 and 79 d after transplanting and insecticide was previously applied, the computer program assumes that natural enemy action has been disrupted and that the absence of small nymphs reflects absence of eggs—therefore it is the best time to spray. The computer suggests an alternative insecticide because nymphs now present may be resistant to the previous insecticide.

Any expert system requires considerable refinement and development before it manages effectively. This one needs detailed advice about insecticides and application methods, integrated with advice for controlling other pests, in tune with local conditions. It shows the potential value of the technique in pest management. A version in PROLOG will be available shortly, for comments, on receipt of an IBM MSDOS formatted 5.25” diskette. □



A search graph representing an expert system designed to identify insecticide application tactics for BPH control. A recommendation (rectangular) may be reached by a variety of routes, depending upon the answers, often a simple yes (Y) or no (N), to a series of questions (oval).

Effect of neem on yeast-like symbionts (YLS) harbored by brown planthopper (BPH)

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In the biology of many homopterous insects, endosymbionts seem to fulfill the lipid and sterol requirements of sap-sucking insects, such as planthoppers, which feed on sugar and amino acid-rich, but lipid-deficient, phloem photosynthates. Endosymbionts also evidently produce antibiotic defense substances. If endosymbionts are killed by heat treatment, the insect body becomes covered with mold. We tested whether exposure of BPH nymphs to rice plants treated with neem seed derivatives would affect the YLS populations that BPH harbor.

Treatments were 20-d-old IR20 plants sprayed with various neem preparations (see table), IR20 seedlings grown in soil where a neem cake-coated urea mixture (1:1 wt/wt) had been incorporated, and untreated plants as control. Each of treated and control plants was then infested with 25 first-instar BPH nymphs. Insect survival was recorded at 4-d intervals.

When nymphs reached the fifth-instar stage, they were collected, weighed individually, and homogenized with 0.8% saline solution to a known volume. Aliquots of homogenates were taken using Thoma pipettes. An improved Neubauer hemocytometer (Weber, England) was used under a phase