

# Rice shortfall spells trouble for rodents

A team of 'rat-busters' will begin research on rice farms in South-East Asia in January 1995 to seek ways of preventing crop losses that inhibit the region's capacity to feed its people. Scientists from the Division of Wildlife and Ecology's Rodent Research Group will join Malaysian and Indonesian researchers to study the factors affecting rodent population growth and investigate potential management techniques, including biological control.

The urgent need for research was highlighted in a report on rodent pests in South-East Asia by CSIRO's Dr Grant Singleton and Dr David Petch (now with BIOSIS Research), and funded by the Australian Centre for International Agricultural Research (ACIAR).

Rats are a major constraint to agricultural production in South-East Asia, the report says. Rice provides 35-60% of food for Asia's three billion inhabitants, but losses caused by rodents in rice regions are estimated at between 5% and 15%. In some countries, such as India, the losses are even higher.

Asia's population was 3.1 billion in 1990 and is likely to increase to four billion by 2025. To feed the population in 2025, rice production will need to rise by 70%. Given the impact of rats on rice, there is a pressing need to improve rodent pest management.

The Management of Rodent Pests in South-East Asia project involves CSIRO, Maros Research Institute for Food Crops in Indonesia, the Malaysian Agricultural Research and Development Institute and the University Pertanian Malaysia in Malaysia. Funding is from ACIAR. The project team aims to understand why rat populations fluctuate; assess traditional and physical controls; survey the helminths and viruses of South-East Asian rats to see whether there are potential biological controls; develop a pilot management strategy; and educate farm communities.

Preventing crop losses is also an aim of the Rodent Research Group's work in Australia. For local grain growers, however, mice, not rats, are the major culprits. The group is conducting a three-pronged attack against the house mouse (*Mus domesticus*) involving predictive modelling for plague forecasting; assessing farm management practices to

reduce mouse damage; and investigating the prospects for biological control.

House mouse plagues occur irregularly in southern and eastern Australia, on average once in four years. According to the Bureau of Resource Sciences, the 1993 mouse plagues in Victoria and South Australia cost grain growers \$60.6 million. In January 1993, CSIRO forecast the potential of a mouse plague in autumn 1994. This enabled the Victorian Government to make informed decisions regarding plague control practices, especially the use of chemicals.

Successful mouse plague forecasting relies on models based on vast sets of environmental and demographic data. CSIRO has compiled such a data set for the Victorian Mallee since 1982 and data from the Riverina in New South Wales and the Darling Downs in Queensland to improve forecasting in these areas.

## Monitoring farm practices

In the past 10 years grain growers in Victoria's Wimmera and Mallee regions have changed their farming practices, adopting 'conservation farming' methods such as minimum tillage, direct drilling and stubble retention. They have also sown more crops in greater diversity. It is suspected these changes have increased the intensity and duration of mouse plagues. If so, management practices may need to be modified in years when plagues are forecast.

A three-year project to assess best farm management practices to reduce mouse damage in these regions has been funded by the Bureau of Resource Sciences Vertebrate Pest Program. The Rodent Research Group, Agriculture Victoria and farmers are working collectively in this research.

The project aims to educate growers about how mouse plagues develop and to provide cost-effective, environmentally-safe management practices for when mice are in the early stages of plague. It will critically evaluate farms that employ practices to reduce the effect of mice against farms that do not.

An advisory panel of growers and state government representatives from around Australia meet to determine the farm management practices for the next



CSIRO's Rodent Research Group is seeking ways of protecting crops from rodents.

growing season. These practices include strategic baiting of key habitats and practices that reduce food and shelter for mice (such as clearing fencelines and grazing stubble). At each field site, the changes in food supply will be monitored. Potential economic losses at various crop phases will also be estimated.

## Biological control

Little is known about the susceptibility of house mice to disease. Surveys and laboratory trials of internal parasites and viruses conducted by the Rodent Research Group have led to field trials of a liver parasite in Queensland and Victoria (funded by the Grains Research and Development Corporation). The parasite established in field populations and reduced the survival of infected mice, but the level of transmission to uninfected mice was too low to substantially lower mouse populations.

The scientists are now examining interactions between viruses and mouse populations with colleagues from the University of WA, the University of British Columbia in Canada and Yale University in the US. They are interested in the establishment, persistence and spread of viruses showing promise as biological controls. This requires an in-depth understanding of the habitat use and movement patterns of mice.

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