

PARTNER COUNTRIES: Indonesia, Laos, Malaysia, Vietnam

PROJECT: Management of rodent pests in rice-based farming systems (AS1/1998/036)

DESCRIPTION: In many South-East Asian countries, rodents can reduce food production by eating crops before the harvest. ACIAR-funded research is helping to develop affordable forms of integrated pest management for rodents CONTACT: Dr Grant Singleton, +63 2 580 5600, g.singleton@cgiar.org

Rat traps break breeding cycles

Where there is rice, there are rats. And that means serious crop losses, especially for smallholder farmers

BY WARREN PAGE

Farmers across South-East Asia who grow lowland irrigated rice lose between 15 and 30% of their crops every year to rats. Sometimes, whole crops are destroyed when rat numbers explode.

Two species of rats are prevalent in most rice-growing areas, the ricefield rat (*Rattus argentiventer*) and the lesser ricefield rat (*R. losea*). Both have adapted their own breeding cycles to rice-crop cycles, and when it comes to numbers, rats are a potent foe.

One to two weeks before the rice matures, female rats enter oestrus. Pregnancy lasts three weeks, with average litters of 11 to 12 pups. The maturing rice crop feeds the growing pups and by six weeks they too start breeding.

Farmers have long known of the link between crop maturity and rat breeding and have devised numerous extermination methods, but ultimately to little avail.

ACIAR and CSIRO Sustainable Ecosystems began working on the problem by seeing if the link between

rice maturity and rat breeding could be broken. The key was to find a way to remove female rats before or during the early stages of the breeding cycle, so they failed to produce litters.

Chemicals such as poisons or bioagents are effective, but carry health and environmental risks. Traps can be safe and cheap, but are less effective.

An integrated ecological approach aimed at disrupting rat population dynamics began to emerge in the 1990s, with Lam Yuet Ming, of the Malaysian Agricultural Research and Development Institute, developing the trap barrier system (TBS).

The TBS encloses a crop with a water-filled moat bordered with plastic fencing. Small bunds or causeways cross the moat and lead to traps. However, the system is not cost-effective unless all farmers in an area adopt the practice—something that has proved impractical because of a range of socioeconomic, cultural and agronomic reasons.

So researchers sought to broaden their approach



PHOTOS: BRAD COLLIS

Some farmers have resorted to home-made flame throwers in their desperation to control rats. The idea is to drive a blast of hot air into burrows that have been sealed at the other end with a wire cage.

Tactics can be electrifying

There has been no shortage of imagination in the many ways farmers in South-East Asia have tried to control rats—such as the method of running a wire a few centimetres above the rice paddy water and connecting it to mains electricity.

In some areas natural rodent predators, such as snakes and birds of prey, have been released into or near rice fields. In villages cats are often used to kill rats that threaten grain-storage areas. The use of rodenticides—poisons that target rats and rodents—is also widespread. However, these often harm predators and people.

Baits or poisons placed outside rat burrows or traps are popular but not always effective. Some farmers even avoid planting a crop, creating an extended fallow period to try to starve the rats. Hungry rats do not breed, but they do migrate to more bountiful locations. They return the moment the fallow fields are replanted.

Countries trialling and adapting control systems

INDONESIA

A National Rodent Management Program was developed following ACIAR-supported research in West Java. This research was held over two-and-a-half years across four sites, with two sites established as controls. At the trial sites, yields increased by between 0.1 and 0.9 tonnes a hectare and farmers using chemicals fell to 46%. Yields at the control sites did not rise and chemical usage remained constant at 88% of farmers.

VIETNAM

As Vietnam intensified rice production in the 1990s, the area suffering losses from rodents jumped from 50,000 hectares in 1993 to 310,000 hectares in 1997. World Vision and ACIAR have successfully demonstrated IERM, which is now part of the government's rat control policy.

CAMBODIA

The adoption of IERM has been successful at a community level. Improvements to the system include the use of wax-based baits that non-target species find unpalatable.

LAOS

Refining the IERM approach to upland farming conditions in Laos is underway. Demonstrations in a number of villages have introduced farmers to the TBS concept.

BURMA (MYANMAR)

Rodent biology and taxonomy have been established, and IERM trials have been positive. Training has raised scientific capacity. Several villages involved in trials are now introducing the concept to neighbouring villages.

by developing an Integrated Ecological Rodent Management (IERM) system that combines different approaches to suit different circumstances.

Over the past decade ACIAR and CSIRO Sustainable Ecosystems have refined the concept through nine projects across five countries. Each project has worked towards identifying the types of rat species causing losses and the most appropriate methods of delivering IERM.

A focal point of IERM is still the use of the TBS in farmers' fields, except it is used to surround a small area of early-planted crop. This early crop acts as a lure, allowing farmers to trap the rats before the main crops start to mature—achieving the sought-after break between the rat-breeding and crop-maturing cycles.

A single 'lure crop' enclosed by a TBS can protect surrounding crops in a 200-metre radius. By planting several lure crops that provide overlapping protection, and using other measures such as controlled baiting and trapping near rodent habitats, villages can significantly reduce rat numbers and crop losses. ◀



The 'trap barrier system': a single 'lure crop' enclosed by a TBS can protect surrounding crops in a 200-metre radius.