

MANAGEMENT OF RODENT PESTS IN SOUTHEAST ASIA

Newsletter 2: August 96

The Australian Centre for International Agricultural Research (ACIAR) funds a research project on the "Management of Rodent Pests in Southeast Asia". The project is coordinated by the Rodent Research Group of CSIRO Division of Wildlife and Ecology. This is the second of a twice yearly newsletter which reports on developments in rodent research in Asia, Indo-China and Australia.

DEVELOPMENTS IN THE ACIAR PROJECT

The second planning meeting for the ACIAR project was held in Malaysia in January 1996. Representatives from Indonesia, Malaysia, Laos, Vietnam and Australia met at the University Pertanian Malaysia (UPM) in Selangor and the Rice Research Center of the Malaysian Agricultural Research and Development Institute (MARDI) in Penang, to review progress, plan research for 1996 and exchange information.

The third meeting will be hosted by the Indonesian Research Institute for Rice (RIR) in the week beginning 17 March 1997.

DEVELOPMENTS IN THE ACIAR PROJECT

- In July 1996, a new rodent project began in the Mekong Delta and Red River regions of Vietnam. This project is funded also by ACIAR and will be integrated with the current research in Indonesia and Malaysia, having the same field protocols, communication infrastructure, research reviews and finishing date. The focus will be on factors determining rodent population growth and methods to manage this growth.

Vietnam is heavily dependent on agriculture, with 75% of its population involved

with farming. Rice is the major food crop and it annually suffers high damage from rats, particularly in the Mekong Delta region. In the 1991/92 winter/spring growing season, rats caused damage to 44,000 ha in the Mekong Delta. These losses were spread across 10 provinces and resulted in production losses of 300,000 to 400,000 tonnes of rice. The collaborative project will involve scientists from the CSIRO Rodent Research Group, the Institute of Agricultural Science of South Vietnam and the National Institute of Plant Protection.

- In May 1996, three researchers (Drs Sudarmaji, Ade Mujiati and Rahmini) from the Rodent Group of RIR in West Java, Indonesia, visited the CSIRO Division of Wildlife and Ecology's Rodent Research Group in Canberra, Australia. They completed two weeks of training in field protocols for small mammals, experimental design, data collection, collation and analysis, parasitological techniques and spatial modelling. It is hoped that their time in Australia will strengthen the ecological perspective of RIR's rodent research.

TBS RESEARCH

Lam Yuet Ming from MARDI pioneered the use of a physical barrier as a method to control rodent pests. The barriers can be made of materials such as plastic sheeting, recycled fertiliser bags or scrap metal sheets, with multiple-capture live-traps inserted at regular intervals.

Research in Malaysia by MARDI and in the Philippines by CSIRO and IRRI, indicated that a Trap Barrier System (TBS) is cost-effective if rat damage to a rice crop is greater than 30%. Given that rat damage to rice is more often around 5-25%, the current ACIAR project is examining methods to increase the efficacy and benefit of the TBS. The aim is to extend the protection provided by the TBS to the surrounding crop. This could be achieved if the crop inside the fence is made more attractive than the surrounding crop, such that rats may be drawn from large distances away.

Parallel studies are in progress at RIR, Sukamandi, West Java and at the MARDI Research Centre at Kepala Batas, Penang. We present here some PRELIMINARY results from replicated, controlled experiments at RIR. These experiments were carried out during the 1995 dry season and the 1995/96 wet season. Rice within each 25 x 25 m TBS was transplanted 3 weeks prior to the surrounding crop to increase the attractiveness to rats.

DRY SEASON 1995: The fences were in place for 95 days. There were high rat densities in the general region and a corresponding high loss of rice seedlings at transplanting.

Results:

- A total of 500 rats were captured on 4 TBSs.
- The TBS reduced rat damage inside the fence and for up to 200 m from the fence.
- Crop yields were 80-95% higher inside the TBS; 35-40% higher to a distance of 200 m from the TBS.

WET SEASON 1995/96: The fences were in place for 102 days. There were low rat densities in the general region and loss of rice to rats at transplanting was low.

Results:

- A total of 305 rats were captured in 4 TBSs.
- The TBS reduced damage inside the fence but less so outside the fence.
- Yields were 45% higher inside the TBS; 16% higher at 5 m from the TBS; 8-10% at 50-200 m from the TBS.

These results are very promising and we are now in the process of determining the cost-benefit for each of these studies.

An important lesson from this research is that close attention must be given to the quality of the construction of the fence, to its maintenance and to the positioning of traps. Once the TBS is permeable to rat movements at just one or two points, its effectiveness is greatly reduced.

PROJECT COLLABORATORS

IR ROCHMAN

Ir Rochman began his scientific career as an entomologist in 1972 when he joined the Bogor Research Institute for Food Crops (BORIF), but soon changed his research focus to rodent control. He continued his research at BORIF until his move to RIR, Sukamandi, in March 1995.

His rodent-oriented studies include the biology of Indonesian rat species, efficacy of a variety of physical and chemical control techniques and the effect of variations between farm management of irrigation, upland and tidal areas. He has lectured and supervised students at a number of Indonesian universities and has been involved in consultancies on rat problems throughout Indonesia.

The ACIAR rodent management project is fortunate to have Pak Rochman's expertise in natural history and control of rats. Within the project, his principal responsibility is to oversee Indonesian studies into the efficacy of physical control methods, in collaboration with his Malaysian and Australian counterparts. He is also in charge of breeding studies

LUKE LEUNG

Dr Luke Leung joined the CSIRO Rodent Research Group in 1995, after completing a PhD in the ecology of small mammal populations in northern Queensland. Luke's diverse scientific background includes research on fish gametes and its application for artificial fertilisation; developing a sperm bank for aquaculture; and work on vertebrate fauna surveys. His primary research interests are the ecology, taxonomy and population dynamics of small mammals. He designed his first live-trap to catch native rodents when he was nine years old.

Luke and his Indonesian colleagues are responsible for the demographic component of the ACIAR study. Their primary aim is to determine the major factors influencing the population dynamics of the Ricefield Rat. When the project began, they were not able to trap sufficient number of rats for their study. This was because the Ricefield Rat was very shy to conventional cage traps or box traps. In fact, previous ecological studies of this species were based mainly on kill samples and captive animals. Luke and his colleagues tested various trapping techniques in the field and finally developed an effective method. This method, based on the TBS (see above), uses a long drift fence to direct animals to enter cage traps set along the fence.

Using this method, Luke and his colleagues have been collecting detailed demographic data of a population of rats on a rice farm in West Java. Currently, they are looking at how the populations are affected by the growth stages of rice crops and by ricefield habitats such as irrigation channel banks, creeks and roads.

Luke is based in Canberra and when not working on rats he is assisting with the analysis of the habitat use of house mice in the Australian grain-growing regions.

OTHER RODENT RESEARCH

CONTROL OF THE RATLIKE HAMSTER IN NORTH CHINA CROPLAND Institute of Zoology, Academia Sinica, Beijing

The rat-like hamster (*Cricetulus tritin*) is a major rodent pest of the croplands of Northern China. Annual pre-harvest crop losses average 5-8% in wheat and corn crops, and 10-20% in soybean and peanut crops.

Dr Zhang Zhibin is director of the Academia Sinica's State Key Laboratory of Insect and Rodent Management in Beijing. Dr Zhibin and his staff have been studying this pest species since 1984. The group is focussing its energies on the development of a sustainable control strategy which will reduce reproductivity and re-invasion by rodents, thus keeping damage at a tolerable economic level.

Extensive field studies on the population dynamics of the hamster have been carried out and a predictive model has been developed. Predictions of imminent eruptions are now widely distributed to extension agencies in Northern China so that early preventative measures can be taken.

Additional studies include laboratory and field trials of the sterilising agent, alpha-chlorohydrin, and the development of a promising new trapping technique.

For further information, please contact Dr Zhang Zhibin, State Key Laboratory of Insect and Rodent Management, Institute of Zoology, Academia Sinica, Beijing 100080, People's Republic of CHINA.

CAN BARN OWLS CONTROL RODENTS IN OIL PALM PLANTATIONS? Ebor Research, Sime Darby Plantations, Malaysia

Oil palms are another crop which is subject to substantial losses by rat damage. The main culprits in Malaysia are *Rattus tiomanicus* and *R. rattus diardii*, which attack nursery, immature and mature plantings.

In 1992, researchers at Ebor Research, Sime Darby Plantations established a study to compare the effects of biological control using barn owls and traditional warfarin baiting on rat populations in oil palm estates.

Wax-bound baits are distributed on experimental plots in an estate near Kuala Selangor. Nest boxes were erected on other plots to encourage barn owl populations to establish and breed. Rat populations are trapped regularly and occupancy rate by barn owls is recorded. The study is ongoing but preliminary results suggest that both warfarin baiting and predation by barn owls markedly reduce palm damage by rats. However, it was 21 months before barn owls began to show an effect on rat populations. Of immense interest is whether barn owls continue to suppress rat populations to a tolerable level.

For further information, please contact
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COMING EVENTS

An **International Workshop on Rodent Biology and Integrated Pest Management** in Africa will be held from 21 to 25 October 1995, and will be hosted by the Sokoine University of Agriculture in Morogoro, Tanzania. There will be major sessions on rodent biology, ecology and behaviour, rodent zoonoses and integrated pest management, and a symposium on plague in humans.

For further information, please contact Dr Herwig Leirs, Department of Biology, University of Antwerp (RUCA), Groenenborgerlaan 171, Antwerp, B-2020, BELGIUM

A **Master's Class on Vertebrate Pest Control**, supported by the Crawford Fund, is planned for mid-April 1997. The three week intensive course will focus on rodent biology and management options, but will be considering other vertebrate pests to highlight different approaches to vertebrate pest management.

The course will be run by members of the CSIRO Rodent Research Group and the CRC for the Biological Control of Vertebrate Pest Populations, and will comprise a one week field trip, lectures, practical classes and data analysis. More information on the courses will be available in October 1996.

Recent publications available from CSIRO Rodent Research Group:

- Chambers, L.K., Singleton, G.R., and van Wensveen, M. (1996). Spatial heterogeneity in wild populations of house mice (*Mus domesticus*) on the Darling Downs, south-eastern Queensland. *Wildlife Research* **23**, 23-38.
- Singleton, G.R., and Chambers, L.K. (1996). A manipulative field experiment to examine the effect of *Capillaria hepatica* (Nematoda) on wild mouse populations in southern Australia. *International Journal for Parasitology* **26**, 383-98.

The Rodent Research Group is compiling a bibliography of information on rodent management in Asia, in the form of publications, reports, conference proceedings. A list of titles is available on request.

As compilation is ongoing, additions to the bibliography (in the form of hard copies of the documents) are welcome.

The correspondence generated from the last rodent newsletter was greatly appreciated. It is in this way that we will be able to form strong links between researchers from different institutes and from different countries.

Please direct further correspondence, comments or contributions to:

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