

MANAGEMENT OF RODENT PESTS IN SOUTHEAST ASIA

Newsletter 3: March 1997

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 third of a twice yearly newsletter which reports on developments in rodent research in Asia, Indo-China and Australia.

DEVELOPMENTS IN THE ACIAR PROJECT

A training course on techniques for rodent management was run by CSIRO and Institute for Agricultural Sciences of South Vietnam (IAS) in November 96 in the Mekong delta in Vietnam. The course was attended by 25 people, with representatives from IAS, National Institute for Plant Protection (NIPP), Can Tho University and provincial Plant Protection Departments from the Mekong delta region.

The course comprised a theoretical component (introducing the participants to concepts and principles used in the various components of the ACIAR rodent management project) and a practical component (introducing techniques used for population dynamics, physical control and taxonomic studies, along with skills used for data collation, storage and summary).

DEVELOPMENTS IN THE ACIAR PROJECT

- In January 1997, Mr Nguyen Quy Hung from the IAS and Dr Tran Quang Tan from the NIPP visited the CSIRO Division of Wildlife and Ecology's Rodent Research Group in Canberra, Australia. During their stay, they studied methods employed by the CSIRO Rodent Research Group in their field research on rodent control in Australia, including radio-tracking, sero-sampling for antibodies to viruses, capture-mark-release trapping and assessing breeding performance of live and autopsied mice. They inspected field study sites for discussion on design and layout of population studies. There were also sessions on experimental design, data collection, collation and analysis and future directions for rodent research in Vietnam.

NEWS FROM THE DANISH PEST INFESTATION LABORATORY

On December 1, 1996, Dr Herwig Leirs left the University of Antwerp, Belgium, to take up the position as Head of the Mammal Department in the Danish Pest Infestation Laboratory.

Dr Leirs reports that the objectives of the institute are to carry out research of pest species with a view to optimising pest control while at the same time paying attention to its impact on the environment, to examine alternative control methods and to contribute to the distribution of results.

The fundamental topics which Dr Leirs hopes to develop in the department are population dynamics (descriptive, experimental and modelling), dispersal behaviour, zoonosis epidemiology and taxonomy. On the applied side, the Danish group will work on outbreak forecasting, control techniques, efficacy of rodenticides and rodenticide resistance. One interesting research topic is the simultaneous control of rodents and their ectoparasites (by mixing systemic insecticides with rodenticide baits).

Dr Leirs will continue his studies of rodent pests in eastern Africa. His contact details follow:

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VIRAL-VECTORED IMMUNOCONTRACEPTION

An innovative approach to pest management

Lisa Chambers is a researcher with the CSIRO Rodent Research Group and the Cooperative Research Centre for Vertebrate Biocontrol. She provides the following introduction to the concept of immunosuppression for rodent pests.

Pest animals, including rodent pests, are well known for their high breeding rate. If poisons or traps are used to kill them, the animals which remain or move in from other areas can quickly replace these killed animals by producing offspring, returning the population to its original level. An effective way of controlling these species would be to target their reproduction.

This is the basis of a new method being developed in Australia by the Vertebrate Biocontrol Centre based in Canberra. The method is called **viral-vectored immunosuppression**. The method uses the animal's immune system ("immuno") to make them infertile ("contraception") and the agent used to do this is spread through a wild population using a virus ("viral-vectored").

The basic idea is that the immune system is "tricked" into recognising the cells involved in reproduction (the egg and the sperm) as foreign to the body in the same way that diseases such as viruses and bacteria are recognised as foreign. This is done by introducing a protein found from either the sperm or the egg that is important for fertilisation, into a part of the body where this protein is normally never found (for example, the digestive tract or the body cavity). The immune system produces antibodies against the protein and these circulate through the body looking for similar proteins with which to bind. Eventually, they reach the reproductive tract where they attach onto the egg or sperm at the site where they will combine during fertilisation. Therefore, fertilisation is blocked and the animal is now infertile.

INTERNATIONAL WORKSHOP ON RODENT BIOLOGY AND INTEGRATED PEST MANAGEMENT IN AFRICA

Sokoine University, Morogoro, Tanzania

Dr Grant Singleton leads the CSIRO Rodent Research Group which is based in Canberra, Australia. He provides the following report on the workshop.

This workshop was organised as a forum to discuss the results of a project funded by the European Union on “Rodent biology and integrated pest management in agriculture and public health in East Africa”. This project began in 1994 and was preceded by a study on the biology and habitat use of the multi-mammate rat, *Mastomys natalensis*. The current project includes studies of population ecology, control techniques and forecasting, combined control of rodents and ectoparasites, and the epidemiology of rodent borne zoonoses. The participants of the project come from Tanzania, Ethiopia, Norway, Denmark and Belgium.

The workshop was attended by approximately 60 scientists and students from 26 countries. Although the emphasis was on applied aspects of rodent biology in eastern Africa, scientists and rodent control officers were invited to attend the workshop and share their experiences in rodent research and control. One of the four days was a workshop on plague epidemiology and other rodent borne zoonoses.

There was a large variety in topics covered from pollen in the diet of rodents, detailed accounts of the systematics of various rodent genera, population ecological studies, the use of contraception for the management of rodents, the role of rats in various viral and parasitological disease of humans, to a report on the reproductive characteristics and growth rates of the grass-cutter rat which is selectively bred for human consumption.

I was interested particularly in what lessons we could learn to assist with the development of rodent management in Southeast Asia.

- Taxonomically there is considerably more known about the African rodents than those in SE Asia, yet gaps in taxonomy were identified plus there were reports of sibling species which are chromosomally distinct but morphologically can only be separated after many cranial and dental measurements. In one interesting case, one sibling species is an important reservoir for plague but rarely transfers it to humans. In contrast, the other species has occasional epidemics of plague leading to high death rates in the rats and subsequent high infections in humans (fleas fleeing dead rats to humans). This case clearly underlined the need for sound taxonomic studies of rodent pests before embarking on their management.
- The cornerstone of the EU-funded project is a long term (>10 years) capture-mark-release population study of the multi-mammate rat. Modelling of these data indicated that a 25% reduction in survival of each cohort per 2-4 weeks is required to significantly reduce the rate of increase of the rat population. When rat numbers are high (the principal time when Tanzanian farmers conduct rat control) a 50% reduction in numbers would not affect population growth. These

results highlighted the need for detailed, long-term, data sets for developing effective management strategies for rodent pests. Interestingly, the authors lamented the lack of good data sets on the dynamics of rodent populations in east Africa (they wished their data set covered a longer period) and made a special plea for wildlife biologists to make special efforts to establish and maintain core population studies.

There were also some interesting parallels between rodent studies in east Africa and SE Asia.

- There is still a strong emphasis on descriptive studies of rodent pest populations. This is disappointing because it indicates that many hypotheses are being developed but few are being critically evaluated using replicated, experimental field studies. Of 71 papers and posters only six reported on experimental studies, three of which were from Australia and Indonesia.
- There were relatively few young African scientists at the conference. Apparently this reflected the poor infra-structure for teaching prospective university students the theory and practice of wildlife management of vertebrates.

In summary, this was a most rewarding conference to attend. The Tanzanians were excellent hosts and we are looking forward to forging stronger links between African, Asian and Australian rodent biologists.

And for those wanting an update on plague diagnosis and prevention, we can tell you that a cheap chromatographic assay system for humans will be available soon. In the interim do not rely on vaccinations for prevention; antibiotics generally provide better protection. So no more yearly, 5 ml injections into the posterior for this reporter - what a disappointment!

For those interested in finding out more about this conference, a special issue of the Belgian Journal of Zoology will cover papers presented at the workshop. More details of this issue will be reported in the next newsletter.

THE CHINESE NATIONAL RODENT PROJECT 1996-2000

Dr Zhang Zhibin is the vice-director of China's National Key Laboratory of Pest Insect and Rodent Management and the coordinator of the national rodent project. He provides the following report on the current five year program.

The seven most serious pest rodents, which are distributed in seven provinces, were selected as the research targets. The goals of this project are to establish prediction models and to develop new control techniques and sustainable management strategies for these seven species.

Researchers will set up 7 demonstration areas (about 20 000 hectares). A manual of agricultural rodent control is being prepared. Local government officers, farmers and scientists are collaborating to enhance organised rodent control on a large scale. It is estimated that 300 000 hectares of farmland will benefit from this project

A brief description of the seven research areas are given here:

1. Ratlike hamster project in Hebei Province

The ratlike hamster (*Cricetulus triton*) is the major rodent pest to grain production of several provinces in Northern China. Peanut, soybean, corn and vegetables are worst affected. Several monitoring sites on population dynamics have been established for 14 years.

2. Striped hamster project in Shandong Province.

The striped hamster (*C. barabensis*), which is much smaller than the ratlike hamster, causes similar damage to crops and vegetables in Shandong province, northern China.

3. Chinese zokor project in Shanxi province.

Shanxi province is located in the loess plateau in northwest China. Corn is the major crop in the region and is severely damaged by the Chinese zokor (*Myospalax fontanieri*).

4. Norway rat project in Hunan province.

Hunan province is located near the Yantze River. Rice is the major crop in this region, with the Norway rat (*Rattus norvegicus*) one of its most serious rodent pests.

5. Himalayan rat project in Sichuan province

Sichuan province is rich in rice. The Himalayan rat (*Rattus nitidus*) causes high losses to rice production in this province.

6. Lesser ricefield rat project in Guangdong province

Guandong province is located in southern China. The climate is mostly subtropical. Rice and sugarcane are major crops in this region. The lesser ricefield rat (*Rattus losea*) and the bandicoot rat (*Bandicoot indica*) are serious pests in this province.

7. Clawed jird project in Inner Mongolia

Corn is the major crop in the agricultural area of Inner Mongolia where the climate is very dry. The clawed jird (*Meriones unguiculatus*) is a desert species, but is responsible for much damage to cropland in this region.

COMING EVENTS

A Crawford Fund Master Class in Vertebrate Pest Management is to be held at the CSIRO Division of Wildlife and Ecology in Canberra from 17 October to 7 November 1997.

The Master Class aims to train managers and scientists in best practice vertebrate pest management, with an emphasis on rodent pest management. Participants will learn the latest principles and techniques for managing the agricultural and environmental impacts of vertebrate pests through lectures, field classes and case studies.

For further information and participation forms, please contact the CSIRO Rodent Research Group.

The third annual coordination meeting of the ACIAR-funded project on Management of Rats in SE Asia will be held in Bogor, Indonesia from March 18-21. There will be delegates attending from Australia, China, Indonesia, Laos, Malaysia, Vietnam and IRRI (Philippines). The hosts will be the Central Research Institute for Food Crops (Agricultural Agency for Research and Development), Bogor, and the Research Institute for Rice, Sukamandi. A report on this meeting will appear in the next newsletter.

The 7th International Theriological Congress, Acapulco, Mexico, September 8-15, 1997.

Herwig Leirs and Grant Singleton will be co-convening a Symposium on "*Biology and Management of Rodent Pests*"

The tentative list of speakers and topics for this symposium is as follows:

- "Rat population ecology in Indonesia".
Luke Leung (CSIRO, Australia)
- "Climatic factors in northern hemisphere rodent population cycles: implications for pest control".
Francis Saucy (University of Fribourg, Switzerland)
- "Integrated pest management of rodents in sugarcane fields, Mexico".
Victor Sanchez Cordero Davila (UNAM, Mexico)

- “Population studies and management of rodents on the Galapagos Isles”
Gillian Key (MAFF, UK)
- “Population modelling: theoretical support for design of control strategies”.
Nils Stenseth (University of Oslo, Norway)
- “Immunocontraception in rodent control: population simulations”.
Lisa Chambers (CSIRO, Australia)
- “Artificial *Sarcocystis* infection for controlling field and commensal rodents”.
Thomas Jäkel (Hohenheim University, Germany)
- “Simulating and forecasting African *Mastomys* populations”.
Herwig Leirs (DPIL, Denmark)
- Behavioural and physiological approaches to control of soudano-sahelian rodents.
Bruno Sicard (ORSTOM, Mali)

There may also be a presentation on:

- Rats in China: population studies and models.
Zhang Zhibin (Academia Sinica and National Rodent Control, China)

Rodent biologists attending this conference are invited to present a poster during the poster session linked to this symposium. For further information contact Dr Herwig Leirs or Dr Grant Singleton (contact information for both is given elsewhere in the newsletter).

Please direct further correspondence, comments or contributions to:

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This newsletter presents the personal views of the individual authors and not necessarily those of ACIAR, CSIRO or collaborators in the project, “Management of Rodent Pests in Southeast Asia”.

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