RODENT RESEARCH

RODENT RESEARCH IS A BI-ANNUAL NEWSLETTER PRODUCED BY THE COMMUNITY ECOLOGY GROUP OF CSIRO SUSTAINABLE ECOSYSTEMS. THE COMMUNITY ECOLOGY GROUP AIMS TO FOSTER INTERNATIONAL LINKS BETWEEN SCIENTISTS, MANAGERS AND COMMUNICATORS INVOLVED IN PEST MANAGEMENT, RODENT CONSERVATION AND BASIC RESEARCH.

INTERNATIONAL REPORTS

LAOS

Rodent management in the uplands of Laos

A new ACIAR funded project has begun in Laos. The project is led by Peter Brown and his colleagues in the rodent research group at CSIRO Sustainable Ecosystems in collaboration with the National Rice Research Program and the Integrated Uplands Agricultural Research Program in Laos. In the uplands of SE Asia, shifting cultivation is one of the dominant production systems. The rural communities that live in these environments are amongst the poorest in Asia. Rodents are a major constraint to production of rice, maize, sorghum, etc., and farmers identify rodents as the problem they have the least control over.

This project (to be completed December 2006) in the uplands of Laos is a follow-up to a recently completed ACIAR funded project in Indonesia,

Vietnam and Laos. The main objective of the previous project was to develop sustainable and ecologically sensitive methods for rodent management. In Indonesia and Vietnam the emphasis was on assessing the effectiveness of

village level management using a community approach and the incorporation of the trap-barrier system (TBS). In Laos, variants of the TBS were assessed in shifting cultivation farming systems in rainfed upland environments, but the primary objective for Laos was to understand the species that were likely to cause damage to crops and stored food, and to understand some of the basic movements, habitat use and breeding dynamics of the key pest species on which to base control options.

The main objectives of the current project are:

- To test integrated rodent management control strategies in upland shifting cultivation systems based on our understanding of population dynamics of the key rodent pests.
- To determine the sociological and cultural factors that influence farmers' decisions on the adoption of rodent management by conducting pre- and post-surveys of knowledge, attitudes and practices (KAP).
- To compete a taxonomic rodent key for Laos and translate the key into Lao.
- To develop the capacity and involvement of government and NGO extension for establishing adoption pathways of ecologically-based rodent management.

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BANGLADESH

Update on rodent research in Bangladesh

An international research project on rodent biology and management in Bangladesh started in April 2002 with funding from the United Kingdom's Department for International Development. The project was fortunate to attract the attention of two separate funding programmes[1] which allowed the project team[2] to collect a wide variety of data to understand the rodent population ecology and to enable the development of ecologically-based rodent management strategies that could be used by rural farming communities.

Since the project's inception in 2002, activities can be summarised as proceeding in two phases: 1) an information gathering phase to improve understanding of the major ecological and anthropogenic issues and 2) an experimental phase to test new rodent management strategies. Funding for a third phase of the project has recently been awarded by the Crop Protection Programme to extend the project activities to the end of December 2005, using the additional time to encourage the dissemination of knowledge generated by the project team. The project activities have taken place southeast of Dhaka in the Districts of Comilla and Feni. A participatory research process was used to involve the entire community of each village involved with activities based around four major objectives:

- Understand the impact of rodents upon diversified rice-based systems of rural communities
- Understand the impact of existing control strategies used by small-scale farmers upon rodent population dynamics, the environment and socio-economic capital
- Develop new rodent control strategies through farmer participatory research
- Develop and disseminate policy recommendations to stakeholders involved in rodent pest control

In order to understand the impact of new rodent management and technology, the project has been designed to compare villages where interventions occur (treatment villages) with villages where no intervention occurs and the indigenous practice of the village is monitored only (control villages). Each treatment village, therefore, is paired with a control village to act as a comparison where similar agro-ecological conditions can be found. These objectives share many characteristics with recent research programmes developed in other countries, namely increasing our understanding about the ecology, behaviour and biology of rodents to develop sustainable management strategies

[1] The Crop Protection Programme (CPP) managed by NR International in the UK and the Poverty Elimination through Rice Research Assistance (PETRRA) programme managed by the IRRI Bangladesh office.

[2] The Natural Resources Institute, UK (lead organisation); the Bangladesh Rice Research Institute; the Community Ecology Group, CSIRO Sustainable Ecosystems; the Association for Integrated Development, Comilla, Bangladesh; and the Vertebrate Pest Division, Bangladesh Agricultural Research Institute.

that are adapted to local conditions.

Phase one of the project involved collecting baseline data related to rodent ecology and the anthropology of local communities. Specifically this involved gathering information on: 1) current knowledge, attitudes and practices of farmers; 2) identity of the major rodent pests; 3) the ecology of the major pests; 4) the damage to field crops; 5) the damage to stored food; 6) the damage to structures, possessions and 7) potential health risks. It is not possible within the scope of this newsletter to expand upon all these activities, and hence, the remainder of this article will focus on an issue that has been more or less ignored by international rodent researchers for some time, namely, the post-harvest impact of rodents.

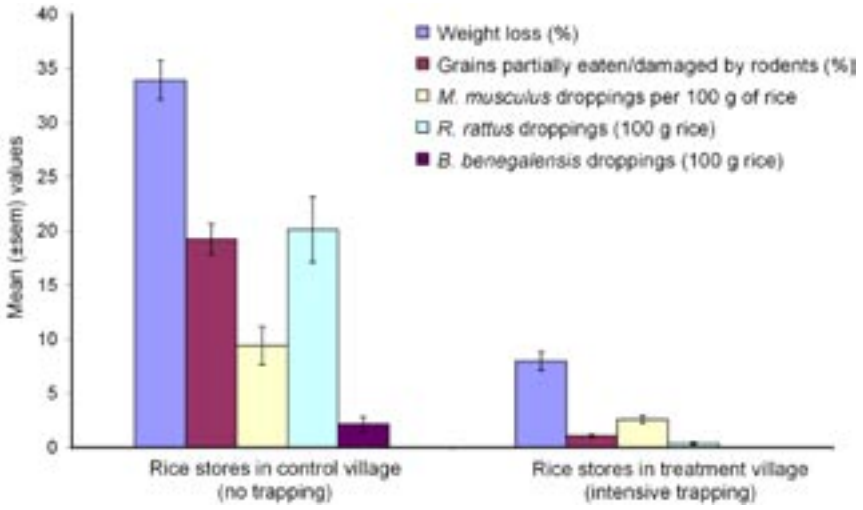

Figure 1. Comparison in the levels of grain loss, damage and contamination measured from 8kg of rice stored in open baskets placed within 13 farm stores in each of two villages that have been intensively trapping rodents (treatment) and of two villages that have not been trapping rodents (control)

Rodents and stored rice

What happens to food after it is harvested has always been a minority concern by agricultural scientists who have traditionally focussed on increasing crop yields. Although increasing concerns over international food safety have kindled a renaissance within the field of post-harvest microbiology, post-harvest science is usually viewed in developed countries as something for engineers as opposed to ecologists. However, what happens to stored food in a developing country raises a number of researchable problems for ecologists interested in the dynamics of crop damage and loss and how to best mitigate against losses in quantity and quality of stored food and protect a farmer's investment when it is at its highest value. Despite rodents being a well-known problem during the storage of grain, there have been very few attempts to assess the levels of damage that farmers routinely experience. This is certainly because it is technically challenging to design scientifically objective methods to ascertain grain loss caused by rodents under farm store conditions. The scientist either needs to build separate grain stores or somehow work with existing farmers' stores. The first option is expensive and may not provide comparable results to what occurs in farmer stores, whereas the second option may result in untrustworthy data because farm stores are dynamic systems where it is virtually impossible to monitor all inputs and outputs. Our project in Bangladesh has devised a method that attempts to address the shortcomings of both options and merge them into one, allowing the scientist to maintain good control over data collection while still using the environment of the farmer store. This has been achieved by gaining the consent of farmers to place small baskets of grain within their own stores. Farmers promise not to disturb the basket when they remove or add grain to their store so that scientific staff are able to regularly visit the basket to measure loss, damage and contamination caused by rodents. These results can be compared to measurements of damage and contamination taken directly from the farmer store, while the measurements of grain loss from the basket can be extrapolated to the loss likely to have occurred to the farmer store over the same period. These trials have been

A basket of grain used for measuring rodent damage in grain stores.

conducted over a period of five rice crop storage seasons. Over the last two storage seasons, management trials aimed at reducing the rodent population within a village have shown that the impact of rodents on rice stored at the household level can be dramatically reduced when rodents are intensively trapped with break-back traps (see Figure 1). We hope to present a detailed analysis of this research at the 3rd ICRBM in Vietnam in 2006 – see you there!

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CHILE

Rodents and Climate in Semiarid Chile: population dynamic theory and the non-additive effects of rainfall

One of the most interesting issues in population ecology is our attempts to unravel the effects of climate on the dynamics of animal populations. Many recent studies have concluded that climate can have complex (e.g., nonlinear and/or non-additive) effects on demographic rates and the feedback structure regulating population dynamics. Complexities can create problems for detecting and predicting the effects of climate change in ecological systems. I believe that some of these problems can be overcome if the structure of the underlying model can be reconciled with ecological theory, specifically population dynamic theory, and by including logical explanations of the possible effects of climate on demographic rates.

A clear example of climatic influence on population dynamics is given by the numerical fluctuations exhibited by small rodents inhabiting arid and semi-arid ecosystems of western South America (Figure 1). In arid ecosystems water is the limiting resource. After events of unusual high rains there is a subsequent chain of increases in primary productivity, plant cover, seeds and small rodents. Evidence of the influence of climatic perturbations (rainfall) in arid ecosystems is clearly observable in northern Chile, where the pulses of productivity in ephemeral cover and seeds are driven by unusual rainfall years, closely related to the ENSO climatic phenomena. In consequence, some small rodent species exhibit striking population irruptions after years of high rainfall and primary productivity. The population densities of small mammals have been monitored for almost two decades in two nearby sites (ca. 100 km apart) of north central Chile. These data sets represent a unique opportunity for comparative studies of population dynamics in order to gain an in-depth understanding of the processes regulating small rodent populations in this semiarid ecosystem. However, the fluctuations of small rodents in South America are the particular interest. First of all, because the overwhelming role of rainfall pulses in determining rodent fluctuations represents an excellent opportunity to unravel the mechanisms of climate influence on numerical fluctuations. Second, because the inclusion of climatic forces in population dynamic models represents an important challenge for ecologists.

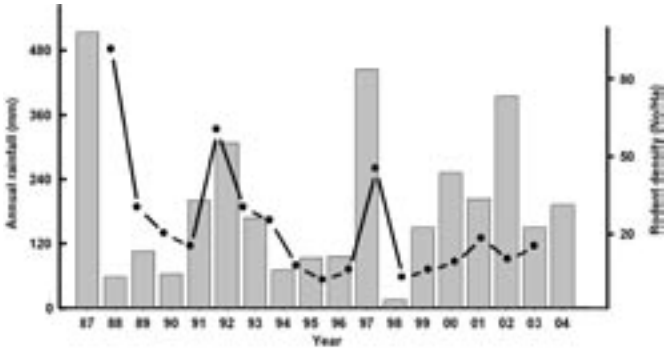

*Figure 1. Annual rainfall in semiarid Chile, near Auco in The Chinchillas Reserve (grey bars) and population index of the Darwin's leaf-eared mouse (*Phyllotis darwini*).*

In 1992, Royama in his book *Analytical Population Analysis* provided a framework for analysing and deducing the effects of exogenous (climatic) factors that can be used for understanding the role of climate in rodent fluctuations. In the simplest case climate represents an additive exogenous factor on the population dynamics. For example, factors such as rainfall may affect survival and reproduction directly, causing what Royama calls "vertical perturbation effects" in the relationship between per capita rate of change and population density. In this particular case, it is possible to evaluate the effect of climate on the per capita rate of population change

Scenes from semiarid Chile, Fray Jorge National Park. Photos courtesy of Peter Meserve.

independently of population density. Another case scenario occurs when climate influences some limiting resource. In this scenario the effect of the climatic factor can only be evaluated jointly with the effect of population density. Climate represents a non-additive force because the ratio of population density/climate will characterize the per capita share of the resources and the competition strength. This case represents what Royama calls "lateral perturbation effects". Finally, climate may have more complex influences on population dynamics, as in the case described by Royama as "non-linear perturbation effects" when changes in the exogenous factors (e.g., climate) may alter the intrinsic feedback structure of a population.

It seems that rodent fluctuations in semiarid Chile are the result of the non-additive ("lateral" and/or "non-linear" perturbations sensu Royama) effect of rainfall on demographic rates. This result is consistent with the idea that these small rodent populations are strongly food limited and rainfall represents a proxy for food availability. The ratio of density/rainfall is a proxy for the per capita shared resources. In consequence, the dominant force influencing the dynamics of rodent populations in semiarid Chile appears to be the limitation by food (represented by the non-additive effects of rainfall) and intra-specific competition. Very simple models appear to capture the essential features of the observed fluctuations and also suggest a mechanistic explanation for these fluctuations. In addition, the models support the contention that rainfall acts as a lateral perturbation through food availability, and that small rodents are limited by this indirect relationship. Our analysis does not contradict previous results in these two systems; however, it provides a much more parsimonious and theoretically pleasing interpretation. It supports the view that analyses of population data done within the framework of credible theoretical models may be useful for improving our understanding of complex population systems. Finally, the non-additive effect of rainfall on rodent dynamics suggests that we can not evaluate the effects of rainfall on population dynamics of rodents independently of rodent population size. Logistic models expressed in terms of ecological demand/offer ratios represent a very plausible theoretical model structure for representing these ecological populations.

Further reading

Lima, M., J. E., Keymer and F. M. Jaksic. 1999. ENSO-driven rainfall variability and delayed density dependence cause rodent outbreaks in western South America: linking demography and population dynamics. *American Naturalist* 153: 476-491.

Lima, M., N. Chr. Stenseth and F. M. Jaksic. 2002. Population dynamics of a South American small rodent: seasonal structure interacting with climate, density-dependence and predator effects. *Proceedings of the Royal Society of London B* 269: 2579-2586.

Lima M., N. C. Stenseth and F. M. Jaksic. 2002. Food web structure and climate effects in the dynamics of small mammals and owls in semiarid Chile. *Ecology Letters* 5:273-284.

Royama, T. 1992. *Analytical population dynamics*. (Chapman and Hall, London, UK).

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Developing sustainable rodent management strategies in rural South Africa

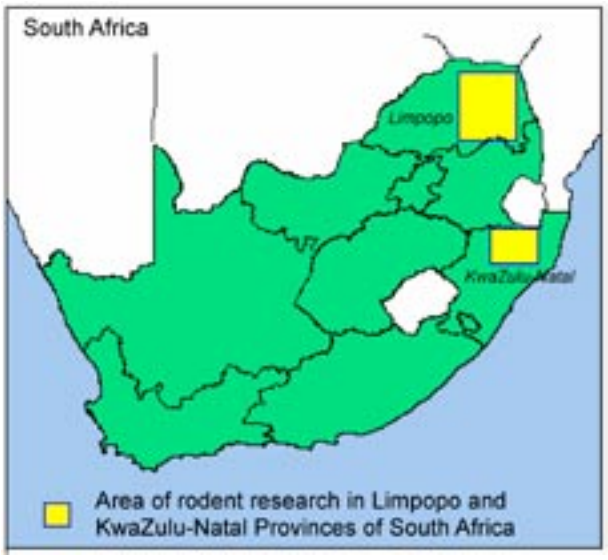
Rodents are a major cause of loss in stored produce, second only to insect damage. This was the result of a survey into post-harvest issues conducted in 2000/2001 with subsistence and small-scale farmers from six rural communities in the Limpopo Province of South Africa.

Follow-up surveys with subsistence communities on the influence of rodents on their livelihoods indicated that rodents not only damage field crops and food in storage, but also cause damage to structures and possessions, and even bite people in their sleep. Villagers did not know where these rodents came from or how many or what species they are, or what possible control options were available to them. They also lacked knowledge of post-harvest hygiene and waste management. Few farmers applied a form of rodent control and those that did had little faith in its effectiveness, or they used rodenticides in a once-off single dosage manner. Of concern in South Africa is the illegal use of aldicarb as an "acute rodenticide". Aldicarb is a nematicide with very high vertebrate toxicity (acute oral LD50 of 0,5 - 1,0 mg/kg), and despite increased restrictions on legitimate farm usage, it continues to be sold in 'black markets' for rodent control. Stories of accidental poisonings have become legend in South Africa, and although anticoagulant rodenticides are available, their use is constrained by widespread misconceptions that have been formed by acute poison usage.

The UK Department for International Development (DFID) through their Crop Protection Programme (CPP) has since funded a project to promote ecologically-based and sustainable rodent control strategies in Limpopo Province. The project is managed by the Agricultural Research Council - Plant Protection Research Institute (ARC-PPRI) and the Natural Resources Institute, UK (NRI), with the valuable co-operation of the Provincial Department of Agriculture and Environment, the University of Venda and the University of Pretoria.

A rodent trapping programme with snap traps managed by trained village volunteers had been implemented in crop fields and at homesteads since 2002. It demonstrated that intensive trapping not only effectively reduced the population of rodents in homesteads, but with continuous trapping also constrained population growth.

The multimammate rat *Mastomys natalensis* was the dominant species in both fields and homesteads (76% of catches) in the sub-tropical and mountainous northern region of Limpopo Province, while *Rattus rattus* was the dominant species in the semi-arid regions. *R. rattus* accounted for 79% of catches in the dry eastern region (bordering the Kruger National Park) and for 67% of catches in the southern region. Three *Aethomys spp.* accounted for 28% of catches at higher altitude in the south, while *Mastomys coucha* and *M. natalensis* added 10% to the total in the semi-arid regions. In the sub-tropical northern region, only 11% of catches were *R. rattus*. Fourteen species of Rodentia were collected regularly with one species as a "first recording" for southern Africa.



"Of mice and men"; the authors, government officials and village representatives in Bloublommetjieskloof.

Steve Belmain explaining to village elders how to sidestep the rat race.

Women farmers ranking rodents as a post-harvest constraint in a PRA survey conducted in KwaZulu-Natal.

Adrian Meyer contemplates the rodent proofing of an old maize granary.

Conducting a catch-mark-release trial in the sub-tropical region of Limpopo Province.

In a similar survey into post-harvest issues in the north of KwaZulu-Natal during 2003/04, participating farmers indicated rodents as their major post-harvest constraint. The rodent control project has now been extended to include KwaZulu-Natal. Training on rodent ecology and rodent control was given to agricultural extension officers and health workers with the assistance from local manufacturers and commercial pest control operators in February 2005.

Our project works in close collaboration with the Ratzooman project (Rodent Research newsletter 16 Nov 2003) led by NRI that is focussing on rodent zoonosis impacts and risk reduction in southern Africa. All Ratzooman field research activities in the Limpopo Province are conducted by PPRI.

PPRI's rodent expertise gained in the rodent control project has further led to:

- Its inclusion onto the National Plague Working Group by the Department of Health to assist in drafting a national guideline for the control of plague in South Africa.
- Re-design of a user-friendly and more effective snap trap now produced locally.
- An awareness campaign on rodents and safe rodent control through regional radio.
- Negotiations on the improvement of rodent control courses for pest control operators.

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Rodent damage in cucurbit crops

Cucurbits are cultivated as vegetable crops generally during summer months throughout the sub-tropical and tropical regions of the world. In South Asia, the period of cultivation of cucurbits falls between the two major crops of wheat and rice. Small sized (1-2 acres) fields of cucurbits generally occur interspersed among fields of these major crops. Agricultural operations such

as harrowing, irrigating, puddling etc. encourage rodent immigration to crop fields during the months of March-April to June-July. Consequently, the vegetable farmers who are generally small land-holders, may suffer serious damage to their cucurbit crops due to rodents. To date, major emphasis is on the control of rodents in cereal crops and sugarcane. However, very little attention is being paid to rodent problems in vegetable crops where rodents inflict equivalent or sometimes even more losses. The present report presents a review of the nature and extent of rodent damage in fields of cucurbit crops such as muskmelon (*Cucumis melo*), cucumber (*Cucumis sativus*), ash gourd (*Benincasa hispida*), pumpkin (*Cucurbita moschata*), sponge gourd (*Luffa cylindrical*), watermelon (*Citrullus lanatus*), summer squash (*Cucurbita pepo*), and bottle gourd (*Lagenaria scieraria*).

The major rodent species inhabiting these crops are the lesser bandicoot rat, *Bandicota bengalensis*; the Indian gerbil, *Tatera indica*; the soft furred field rat, *Millardia meltada* and the house and field mouse, *Mus spp.* *B. bengalensis* has become the predominant rodent pest in irrigated areas representing more than 50% of the total rodent population whereas *T. indica* is mainly restricted to sandy soil. Major damage to cucurbit crops was reported at fruit maturing and ripening stages usually in the months of May-June though there are some reports of rodent damage to these crops at the seedling stage. Cucurbit plants are annual and trail on the ground. Their dense foliage cover provides an excellent protective cover from predators. Rodents, by their nibbling and gnawing activities, make holes through the rinds of fruits to get their pulp and seeds. Both ripe and unripe fruits are damaged by rodents. Some fruits are damaged partially and some heavily. Both types of damage, however, reduce the market value of the fruits thus reducing the production. Also the damaged fruits quickly ferment and deteriorate thus becoming unfit for human consumption.

Rodent damage to bottle gourds (left) and watermelon (right).

High moisture content of the pulp (87-96%) of cucurbit fruits indirectly meets the water requirement of rodents in summer. Seeds of family cucurbitaceae contain high oil and protein content which are comparable in nutritive value to those of family Leguminosae. Rodent damage to musk melon at picking stage was found to vary from 5.9% to 7.3%. Rodent damage to summer squash crop grown for seed purpose was found to be 19.7% at pre-harvest stage. In ash gourd, rodent damage at pre- and post-harvest stages was found to be up to 25%. Post-harvest losses occurred when harvested fruits were left piled up in the field before being taken to market.

Farmers often carry out rodent control in these vegetable crop fields when there is visible damage. At this stage rodent control becomes difficult as rodents completely avoid rodenticide baits in the presence of ripe vegetable crops. Therefore, it has been suggested that farmers should carry out rodent control operation in cucurbit crop fields before fruit maturation stage. Moreover, since vegetable crops cover comparatively smaller areas, control operations should also be extended to adjoining cultivated and uncultivated fields to avoid immigration of rodents from such areas.

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MADAGASCAR

Ecologically based rodent management using a community trap barrier system in Madagascar

Malagasy National Parks are continually threatened by the ever expanding human population and the unsustainable farming practise of slash and burn. Dr Jukka Lehtonen, from the University of Helsinki, is currently leading a community development project in

Madagascar with the aim of developing better farmer practises. The project is supported by the Malagasy Institute for the Conservation of Tropical Environments (MICTE).

Rats are one of the major pests of rice crops in Madagascar and Dr Lehtonen and his colleagues have decided to investigate the use of the community trap barrier system (CTBS) as part of an integrated approach to control rodents. In February I travelled to Madagascar to provide advice on constructing CTBS based on our experience with CTBS in rice growing regions of South East Asia.

The trip began with a meeting at the VALBIO Research Station to determine which would be the most suitable village to set up a CTBS in the Ranomafana area. At the meeting there were 2 staff members from MICTE - Haingotiana Ramiarinjanahary (Haingo), an ecologist, and Chantal Soloniaina, a student of Sociology, as well as a representative from the University of Helsinki, scientist Outi Ovaskainen. Haingo and Chantal have been trapping rats in villages within the Ranomafana region for several months. They have also performed farmer interviews and have a good understanding of the different culture of tribes and how this may affect the success of CTBS. To choose the most suitable village we had to determine which village met the criteria for setting-up a good CTBS. Key criteria required were:

- Farmers having access to water to grow advance crop 2-3 weeks before the main crop.
- The community should work together to maintain the CTBS.
- There is chronic rat damage in rice crops
- There is a large continuous area of rice crop that is not interrupted too much by other crops or physical barriers.

Village and rice paddies of Antsiho.

The village of Antsiho was the first choice for CTBS as it met all the above criteria. According to Haingo and Chantal, Antsiho has a strong community focus, which is very important to CTBS success. After Antsiho, MICTE staff will set up additional demonstrations sites for CTBS in other villages near Ranomafana and other regions of Madagascar.

Resource Maps and Cropping Calenders

Two meetings were conducted in the village of Antsiho to develop a village Resource Map and a Cropping Calendar. The first meeting was with the men and the second was with the village women. The meetings were gender separated because the cropping duties and responsibilities of the men and women were different.

These meetings were viewed as a very useful tool for gathering information and an important component to help determine if, where, and when CTBS should be used.

Some key points and issues arising from village meetings:

- Fertiliser is key to farmer success due to nutrient poor soils. Often farmers will delay sowing until they can afford to purchase

Meetings with village men and women to develop resource map and cropping calendar.

fertiliser, causing an asynchronous cropping system. This could be an issue as CTBS relies on synchronous planting. However they managed synchronous planting for the previous season.

- Reduction in damage by Fody, a small finch like bird that is regarded as a major pest in rice crops. This year however it was not a big problem and the farmers believe the synchronous cropping program (purposely planted for the CTBS) may have had something to do with this by diluting the Fody population over a large area of similar aged crops.
- Farmers don't often use rodenticides because they are expensive and a health risk to stock and people. They did not know the poison used.
- Farmers estimate 10% annual damage from rats.
- Damage appears to be chronic. They did not mention any eruptions.
- Rats immigrate into the village post-harvest.
- The village was established in 1986 so is still a very young village.
- The farmers identified crop edges adjacent to undisturbed small bush and shrubs as key rat breeding habitats.
- Rats in this village are regarded as 'fady' (taboo). Farmers are hesitant to have any contact with rats and they definitely don't see them as a food source. [Note: the plague (*Yersina pestis*) is endemic in *Rattus rattus* in Madagascar].
- Farmers agree that a rotating system of people monitoring the CTBS is fair.
- Rats cause some damage to other food crops in the village.
- Grain is stored inside houses on the lower level. There are ongoing problems with rats and mice eating/contaminating the stored grain. Householders use live- and kill-traps for control.

Demonstration of Construction of CTBS

We built a small 15 x 15 m CTBS using string, plastic and staples provided by MICTE and locally provided wood and locally built multi capture traps. The CTBS took less than 2 hours to construct and everyone was happy with the ease of construction. Farmers were actively involved with construction and were also suggesting ways in which they can incorporate local materials to reduce the necessity of buying materials.

Pre Harvest Damage Assessment

Assessing the damage caused by pests on rice plants is an important tool to quantify the amount of yield lost. Assessment of rat damage was performed by counting the proportion of cut tillers at our sample sites. Each transect contained five sampling points where 10 plants at that point were assessed for damage. The number of cut tillers and the number of uncut tillers were

Building the community trap barrier system at Antsiho.

Table 1. Rat and fody damage estimates in Antsiho rice fields.

Site	# of Transects	Total Tillers Counted	Tillers Damaged by Rat	% Damage by Rats	Tillers damaged by Fody	% Damage by Fody
1. Paddy west of village	5	1308	144	11.0	203	15.5
2. Paddy central	3	829	77	9.3	34	4.1
3. Paddy west central	3	945	119	12.6	64	6.8
4. Paddy north edge	6	1665	149	9.0	139	8.4
Total	17	4747	489	10.3	440	9.3

recorded. Fody damage also was assessed by counting those tillers within the sample that were grazed on by fody. Fody damage is more difficult to quantify as some of the grain remained intact.

Rat and fody damage estimates in Antsiho rice fields are summarized in Table 1.

Summary

This was the first time that the CTBS was demonstrated in Madagascar and there was strong interest to trial it for a full season with the cooperation of the farmers. The MICTE staff are now developing their expertise in using the CTBS and continuing to develop their knowledge of the dynamics of the main rodent pest species.

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Conference Notices

Japan

IX International Mammalogical Congress
July 31 - August 5, 2005 Sapporo, Japan

The IX International Mammalogical Congress (IMC 9), formerly International Theriological Congress (ITC), will be held in Sapporo, Japan in 2005. The congress will address aspects of research on mammalogy including conservation and management. The congress may also provide an appropriate opportunity for meeting of IUCN/SSC specialist groups. Please visit the congress website for more information (http://www.imc9.jp).

Vietnam

3rd International Conference on Rodent Biology & Management
September, 2006 Hanoi, Vietnam

Planning for the 3rd ICRBM is progressing well. Below is a list of people agreeing to participate in the planning of this conference. We would still like representatives from south Asia, Japan, west and south Africa, Central America and South America to participate in the conference planning. Please contact one of the members of the organising committee if you have suggestings for a symposium. The first flyer and web site will be developed in the next three months.

Honorary Chairman: Professor Charles Krebs & Vietnamese counterpart (to be nominated)
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Recent Publications of the CSIRO Rodent Research Group

Brown, P. R. 2005. The effect of simulated house mouse damage to wheat in Australia. *Crop Protection* 24: 101-109.

Brown, P.R., Davies, M.J., Croft, J.D., and Singleton, G.R. 2004. Can farm management practices reduce the impact of house mouse populations on crops in an irrigated farming system? *Wildlife Research* 31: 597-604.

Davis, S., Leirs, H., Pech, R.P., Zhang, Z., Stenseth, N.C. 2004. On the economic benefit of predicting rodent outbreaks in agricultural systems. *Crop Protection* 23: 305–314.

Jacob, J., Herawati, N.A., Davis, S.A. and Singleton, G.R. 2004 The impact of sterilised females on enclosed populations of ricefield rats. *Journal of Wildlife Management* 68: 1130-1137.

Jacob, J., Matulessy, J. and Sudarmaji. 2004. The effects of imposed sterility on spatial behaviour of female ricefield rats. *Journal of Wildlife Management* 68: 1138-1144.

Korpimäki, E., Brown, P.R., Jacob, J., Pech, R.P. 2004. The Puzzles of Population Cycles and Outbreaks of Small Mammals Solved? *BioScience* 54 (12): 1071-1079.

Krebs, C.J., Kenney, A.J., Singleton, G.R., Mutze, G., Pech, R.P., Brown, P.R., and Davis, S.A. 2004. Can outbreaks of house mice in southeastern Australia be predicted by weather models? *Wildlife Research* 31 (5): 465 - 474.

Meerburg, B.G., Bonde, M.K., Brom, F.W.A., Endepols, S., Jensen, A.N., Leirs, H., Lodal, J., Singleton, G.R., Pelz, H.J., Rodenburg, T.B., and Kijlstra, A. 2004. Seeking consensus: Rodent management strategies in organic pig and poultry production in Western-Europe. *Netherlands Journal of Agricultural Sciences* 52, 195-205.

Singleton, G.R., Brown, P.R., Pech, R.P., Jacob, J., Mutze, G.J. and Krebs, C.J. 2005. One hundred years of eruptions of house mice in Australia – a natural biological curio. *Biological Journal of the Linnean Society* 84, 617-627.

Singleton, G.R., Brown, P.R. and Jacob, J. 2004. Ecologically-based rodent management – effectiveness in cropping systems in Southeast Asia. *Netherlands Journal of Agricultural Science* 52, 163-171.

Singleton, G.R., Sudarmaji, Jacob, J. and Krebs, C.J. 2005. Integrated management to reduce rodent damage to lowland rice crops in Indonesia. *Agriculture, Ecosystems and Environment* 107: 75-82.

Sutherland, D.R., Banks, P.B., Jacob, J. and Singleton, G.R. 2004. Shifting age structure of house mice during a population outbreak. *Wildlife Research* 31, 613-618.

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