



# ***WAR AGAINST RATS!***

## **MANAGEMENT OF RODENT PESTS IN SOUTHEAST ASIA**

### **Newsletter 6 (August 1998)**

*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 Wildlife and Ecology.*

## **DEVELOPMENTS IN THE ACIAR PROJECT**

*The first 4 years of the ACIAR project is drawing to a close. A proposal for a new project beginning in January 1999 is under consideration.*

The 4-year multi-country project on Rodent management in Southeast Asia will finish in December 1998. The principal aims of the project were to develop a good understanding of the biology and habitat use by rats in rice eco-systems, and to assess and strengthen some of the current management approaches.

Key outputs and conclusions from the previous projects were:

- Development of a "second generation" method of physical control (plastic fence plus traps) based on the use of a trap-crop planted three weeks earlier than the surrounding crop.

- That food quality, availability of nesting sites and human activities, such as land preparation, were key factors limiting rat populations.
- Banks wider than 400 mm and higher than 400 mm were the primary breeding habitats for the rice-field rat.
- The discovery that breeding by rats commenced prior to maximum tillering of rice crops; this led to an important re-evaluation of what triggers breeding by rats.
- The size of the home range of rats was linked to their breeding season. When the rats were breeding the mean home range was 0.06 ha for females and 0.79 ha for males. In the non-breeding season the home ranges increased substantially, to around 1.8 ha for females and from 2 to 3.6 ha for males.
- Protocols were developed for integrated management of rodents for West Java, Peninsula Malaysia, and the Mekong and Red River Deltas. Research outputs from the ecological studies identified optimal timing, location and scale of actions and whether they were consistent with goals of sustainable agriculture, minimal environmental impact and humaneness.
- Disease studies of the rice field rat in Indonesia and Malaysia identified 10 species of helminth, 5 viruses, 1 mycoplasma and antibodies to leptospirosis. The most significant finding was the presence of antibodies to a Hantavirus and to leptospirosis, and high prevalence of *Angiostrongylus cantonensis* (lungworm) and *Capillaria hepatica* (liver nematode), which are all potential zoonotic agents.

A new project proposal is under consideration by ACIAR. The focus is on developing ecologically-based management of rats at the village level. The main study sites will be in West Java Indonesia, through collaboration with the Research Institute for Rice at Sukamandi, and in the Red River Delta, through collaboration with the National Institute for Plant Protection. Other collaborative projects will be developed with the Department of Agriculture and Extension in Laos, and the University of Putra, Malaysia. The 4-year project is planned to begin in January 1999.

### **Fourth Project Planning Meeting of the ACIAR project IRRI, Philippines April 6-8, 1998**

The fourth Project Planning Meeting of the ACIAR project, Management of Rodent Pests in Southeast Asia, was held at the International Rice Research Institute (IRRI) in April, earlier this year. This meeting involved 25 participants from nine countries, and provided a valuable opportunity for the exchange of information and ideas on rodent management.

The meeting was opened by Dr Robert Havener, Director General of IRRI, followed by keynote addresses from Dr John Copland (ACIAR), Dr K.L. Heong (IRRI) and Dr Grant Singleton (CSIRO). Dr Singleton provided an overview of the highlights of the past three years of the ACIAR project, reminding those involved in the project just how far we had all come.

*Some of the participants in the fourth project planning meeting at IRRI*



The countries involved in the present project reported on their five key findings since 1995, recommended practices for farmers to adopt for the management of rats, and their research priorities for the next three years. Laos, who has observer status with the ACIAR project, also presented an update.



*Participants enjoying the cocktail dinner hosted by IRRI mice(immunocontraception).*

We also heard progress on the management of mouse populations in Australia. This included a demonstration by Mr Peter Brown (CSIRO) of MOUSER - an information transfer and decision support system for the management of mouse plagues, and a presentation by Dr Lyn Hinds (CSIRO) on recent developments in the fertility control of

In addition, we were privileged to be audience to presentations from four countries not directly involved in the ACIAR project, but similarly involved in rodent management. These were “Rodent Management in Thailand” by Ms Puangtong Boonsong (Department of Agriculture, Thailand), “Rodent Pests – farmer perceptions in the Philippines” by Mrs Melanda Hoque (NCP, Philippines), “Saving Rice from Rats” by Dr Gary Jahn (Cambodia-IRRI-Australia project, Cambodia), and “Rodent management in eastern Africa – challenges and prospects for the future” by Dr Herwig Leirs (Danish Pest Infestation Laboratory, Denmark).

One of the major actions to emerge from this meeting was the development of a Rodent Ecology Working Group. The Working Group will function under the umbrella of the IRRI IPM Network, coordinated by Dr K.L.Heong at IRRI. The Rodent Ecology Working Group will be initially coordinated by Dr Grant Singleton at CSIRO, Australia, and as a first step, CSIRO has established a Rodent Pest Network “bulletin board” – an e-mail network (see the following page for more information on the network).

Overall the meeting was a success, and we would like to thank IRRI for their excellent hospitality over the three days of this meeting.





*Participants at the Fourth Project Planning Meeting*

*Top Row: Dr M.Mortimer, Dr Ken Schoenly, Dr Gary Jahn, Drs Sudarmaji, Dr Grant Singleton, Mr Nguyen Quy Hung, Dr John Schiller, Dr Mark Bell, Dr Luke Leung  
Centre Row: Mr Peter Brown, Dr Nguyen Van Tuat, Mr Onechanh Bounnaphol, Dr John Copland, Dr K.L.Heong, Mr Lam Yuet Ming, Dr Hilario Justo, Dr Herwig Leirs  
Seated: Ms Cecilia Honrado, Dr Lyn Hinds, Ms Puangtong Boonsong, Dr Robert Havener, Dr Melanda Hoque, Ms Wilma Cuaterno, Ms Alison Mills, Ms Monica van Wensveen*

## **RODENT PEST NETWORK**



The Rodent Pest Network is the first step of a newly formed Rodent Ecology Working Group, which will function under the umbrella of the IRRI IPM network, coordinated by Dr K.L.Heong at IRRI. This network is an e-mail "bulletin board", which is currently based at CSIRO, Australia.

This bulletin board aims to overcome some of the problems associated with isolation and collaboration by maintaining communication between the many people who are involved or interested in rodents as pests.

The Rodent Pest Network bulletin board is an e-mail network which allows anyone on the mailing list to send and receive messages to and from all other members of the network.

To subscribe to the Rodent Pest Network bulletin board, simply send an e-mail message To: [MajorDomo@dwe.csiro.au](mailto:MajorDomo@dwe.csiro.au) with the message body: subscribe rodent-pest-network

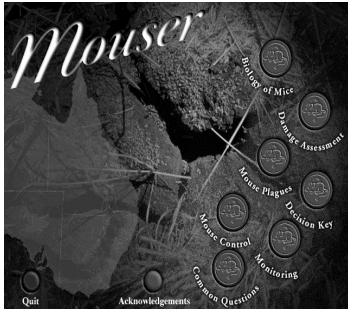
To send a message, update or announcement to the Rodent Pest Network bulletin board, simply send the message To: [rodent-pest-network@dwe.csiro.au](mailto:rodent-pest-network@dwe.csiro.au)

If you are having any problems, or have any queries about the bulletin board, please e-mail [amanda.lewis@dwe.csiro.au](mailto:amanda.lewis@dwe.csiro.au)

## RODENT RESEARCH AROUND THE WORLD

### AUSTRALIA

#### **MOUSER CD-ROM: *An information transfer and decision support system for the management of outbreaking mouse populations, known as mouse plagues***



Prototype software, in the form of a CD-ROM, has been developed to provide individual growers, grower groups and State Government Departments in Australia, with appropriate tools for the management of mouse plagues. The software provides access to the latest expert knowledge on the biology and management of mouse plagues. It includes details on the population dynamics and ecology of the house

mouse, *Mus domesticus*, in grain-growing regions and general information on the impacts of mouse plagues in Australia. Currently such information is available in disparate publications, many of which are not readily accessible by growers. A decision key has been developed to allow growers to make informed decisions about appropriate management practices to reduce the impact of mice. The software will provide a compilation of this information and will be an important management tool. The software features video footage, pictures, graphics and hot links. The prototype has been developed in collaboration with the CRC for Tropical Pest Management.

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### VIETNAM

The National Institute of Plant Protection (NIPP) have developed their research program on rats for the years 1998 to 2000. The research will be conducted in 10 different provinces throughout the country, over different climates and topography. NIPP hopes that the data they collect from this research will provide them with a good understanding of the biology, species composition, impacts and control of rat populations. Their main objective is to develop solutions for rat control in Vietnam. Through their links with the ACIAR program, they hope that their findings will have spill-over benefits for other countries in Southeast Asia.

From April 14 to 17, NIPP held training activities in Hai hung province for selected candidates from various plant protection stations in the Northern Provinces.

The rodent research group at NIPP has completed a report based on the preliminary results of research conducted on rat populations in Thanh khuong - Thuan thanh - Ha bac province. This research involved identification of rat species present, population dynamics in different habitats, the breeding activities of *Rattus argentiventer*, and control methods available for rats. This received "excellent report" status from the Government of Vietnam, for which the group should be congratulated.

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TBS in Vietnamese rice fields



### THAILAND

#### **Bait Shyness of the Malaysian Wood Rat, (*Rattus tiomanicus*), to Zinc Phosphide**

Kornkaew Suasa-ard Puangtong Boonsong Sermakdi Hongnark Yuvaluk Khoprasert

Eighty adult Malaysian Wood rats, *Rattus tiomanicus*, were initially offered 0.1% zinc phosphide in bait (consisting of 44% unpolished rice, 44% broken rice, 5% shrimp, 5% fish meal and 2% oil palm) in a non-choice laboratory test for one day. All rats survived. Four groups (n=10) of these surviving rats were subsequently offered zinc phosphide bait at 0.8% at the intervals of one month, two months, three months, and four months following initial baiting. Results showed the number of rats surviving subsequent baiting to be 90%, 90%, 30% and 20%, respectively. A further four groups (n=10) of rats which survived baiting at 0.1% were offered zinc phosphide bait at 1% at the intervals of one month, two months, three months and four months following initial baiting. Survival for these rats was 70%, 30%, 10% and 10%, respectively.

(From a paper presented at the 10<sup>th</sup> Insects and Animal Pests Conference in Prachaub Kirikhan province, Thailand, in 1996)

***Pathogenic Effects of the coccidian Protozoan, Sarcosystis singaporensis in the great Bandicoot, Bandicota indica, and the Norway Rat, Rattus norvegicus***

Yuvaluk Khoprasert Thomas Jaekel Vijaya Sihabutr Sermsak Hongnark

*Note: Sarcosystis singaporensis* is a cyst-forming coccidian with an obligate heteroxenous life cycle between snakes as the definitive host (eg. *Python reticulatus*), and rats as intermediate hosts (of the genera *Rattus* and *Bandicota*). It is endemic in the southeast Asian region and is being examined as a potential biological control agent for rats (Jaekel et al, 1996).

The pathogenic effects of three different isolates of the coccidian protozoon, *Sarcocystis singaporensis*, on the great bandicoot, *Bandicota indica*, and the Norway rat, *Rattus norvegicus*, were investigated in the laboratory of the Agricultural Zoology Research Group. Two of the tested isolates, S2 and S3, had been maintained in the laboratory of the Institute of Parasitology of the University of Hohenheim, Germany, for more than 15 years. The third isolate, S5, was obtained from a wild-caught reticulated python in 1996 in Thailand. Sporocysts, the infective material, were orally applied to rats using a stomach tube at doses of  $2 \times 10^4$ ,  $5 \times 10^4$ ,  $1 \times 10^5$ ,  $2 \times 10^5$ , and  $5 \times 10^5$ .

Sporocyst doses of  $2 \times 10^5$  and higher of the S2-isolate killed bandicoot rats. In contrast, doses of  $5 \times 10^4$  sporocysts of the other isolates (S3, S5) were lethal to the rodents. They died between 11 and 16 days after infection. Only one out of six Norway rats infected with  $1 \times 10^5$  or more sporocysts of isolate S2 died. The isolate S5 was more pathogenic for Norway rats, because doses of only  $2 \times 10^4$  sporocysts killed these rodents between 9 and 19 days.

Most rats showed clinical symptoms two to four days before they died. Symptoms included anorexia, wet eyes, dyspnoea, diarrhoea, and apathy. Following dissection of the rats, it could be seen that the lungs were oedematous and haemorrhagic, and the thoracic cavity was filled with exudate. The stomach and the intestine were swollen and contained yellowish fluid. Haemorrhage on mesenteries and occasionally on the liver and in the urine bladder was also seen. In histological sections, many schizonts were found in capillary endothelial cells of alveolar septa of the lungs and cardiac muscle.

In conclusion, the results indicate that the recently isolated sporocysts (S5) from the wild in Thailand were the most pathogenic. Thus prolonged passage of the parasite through snakes and rats in the laboratory could have been responsible for a reduction in virulence.

*(From the 1996 Annual Report of the Division of Entomology and Zoology, Department of Agriculture, Thailand)*

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## Rodent Research in Tanzania

Serious rodent problems have been reported in East Africa since the last century, where outbreaks of field rodents have sometimes led to losses of over 80% of the standing crop. In addition, rodent-borne diseases, including plague and leptospirosis, have caused considerable public health problems. The most common species are rats of the genus *Mastomys*, which weigh on average 40 g, and have an average litter size of around 10 young. In some years, these small rats can reach densities of up to 1000 individuals per



hectare.

Since the beginning of the 1980's, intensive rodent research has been carried out in Morogoro (Tanzania), at the Sokoine University of Agriculture Rodent Research Unit and the Ministry of Agriculture Rodent Control Centre. Belgian and Danish scientists participate in the research. The research activities are based on the strong belief that improved rodent management strategies require a sound knowledge of the biology and population ecology of the target species. It is of prime concern to understand why rodents become a pest problem under particular conditions, so that such problems can be avoided.

The ongoing research work in Morogoro is multidisciplinary and diverse. Basically, it addresses the following questions:

- Which rodent species occur in Tanzania and what does their phylogeny teach us about zoogeography and speciation?
- What biological, socio-cultural and epidemiological factors are important for the persistence of human plague in NE-Tanzania? What is the composition of the local rodent fauna? And how is the ecology of rodent ectoparasites linked to the rodent ecology and disease transmission?



- How widespread is leptospirosis in different parts of Tanzania?
- How is the demography of *Mastomys natalensis* affected by rainfall patterns? And how can this information be reworked into a population dynamics model that can be used to forecast rodent outbreaks or simulate possible management strategies?
- What is the importance of predation pressure for rodent population dynamics? Is it helpful for managing rodent populations by making an area more attractive for predators?
- How does the spatial structure of the landscape (fallow land, maize fields and mosaic structures) interact with rodent population dynamics?

At a more applied level, research interests focus at:

- Forecasting outbreaks of field rodents
- Simultaneous control of rats and flea ectoparasites for managing the plague
- Optimised baits for chemical rodent control
- Ecological-based rodent management.

The present staff of the rodent centers in Morogoro contains seven scientists (including one foreign post-doc and two foreign PhD-students); three Tanzanian graduate students have recently been admitted. These are supported by 20 technical staff at various levels. There is a strong collaboration between the research centres of Morogoro, the University of Antwerp (Belgium) and the Danish Pest Infestation Laboratory, Lyngby (Denmark). Wider collaboration with other research centres in the world is being sought.

*Dr Leirs at the study site in Morogoro – watching a*



*“controlled” burn*

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## CAMBODIA

### **When Birds Sing at Midnight**

Sitting up in bed he heard the chirping of a thousand birds. He shook himself awake and looked out the window, but saw nothing in the blackness. Picking up the flashlight he went outside, shining the light in the trees as he walked. Lowering the beam to his rice paddy he found the source of the chirping: a seething river of rats. In horror he ran back to the house. In the morning, his rice and the rats were gone.

The story was familiar enough. After every wet season flood in October, we'd hear farmers in southern Cambodia describe the rat outbreaks. Apparently the floodwaters drive the rats into the higher villages. Over the past 7 years Cambodia has suffered an average pre-harvest loss of 3000 tons of rice/year to rats; enough rice to feed over 12,000 people for a year. The most recent rat outbreak, in 1996, destroyed over 12,600 tons of Cambodian rice; enough



to feed more than 50,000 people for a year. While 34% of Cambodian rice farmers report rat problems, only 13% attempt rat management. Like the weather, rat infestations are often regarded by farmers as a force that cannot be controlled.

*Rice farmers and their families preparing for a rat hunt in southern Cambodia*

Following the rodent management conference at the International Rice Research Institute (IRRI), the Cambodia-IRRI-Australia Project (CIAP) was approached by the Catholic Relief Services (CRS) about rat problems in Svay Rieng province, in southern Cambodia. Khmer and international CIAP staff joined with CRS to interview farmers in Svay Teap district of Svay Rieng. We learned that most of the farmers in this area thought that the rats were indigenous populations that live in the forest, sisal, bunds, and weedy areas during the dry season. In contrast, farmers in Kampong Ro (another district of Svay Rieng), think that rats migrate from Vietnam, which borders Svay Teap and Kampong Ro.

Through group discussions we found that farmers were trying to control rats, but without success. They had been trained in the use of rat fences in farmer field schools, but discovered that rat fences were too expensive to use. We ran through a simple set of calculations comparing the value of wet season rice to the cost of materials in the local market and discovered that the cost of a rat fence generally exceeded the value of the crop. No one had ever heard of planting an early crop and fencing it in as a trap crop. The last rat control campaign was a government-sponsored rat hunt some 15 years ago, when

villagers were paid for rat tails. Some farmers dug out the rat burrows in their own fields, and a few set home-made traps.

A number of farmers used rat bait but complained that it was not very effective. No farmers pre-baited. Baits were only left out for the night and collected in the morning to prevent domestic animals from getting poisoned. We purchased the same zinc phosphide as the farmers and gave them to the Division of Agricultural Toxic Substances of the Department of Agriculture in Thailand for analysis. The purple bait was completely fake, and the black powder contained about 10% zinc phosphide, though the label indicated it was 80% zinc phosphide.

Further investigations revealed that some farmers in neighboring provinces were using the trap-barrier system (TBS) on early-wet season (EWS) crops, which are more valuable and more susceptible to rat damage. In these cases the value of the crops easily surpassed the value of the rat fence.



Since then, CIAP and CRS have purchased TBS for EWS crops in three villages. The villagers constructed the traps and put up the fences after receiving instructions. Rat hunts will be conducted in these 3 villages as well. Later in the season, improved baiting and trapping methods will be taught to these villagers as a group, encouraging synchronous, community-based rat control.

*Villagers in Cambodia building a rat fence with traps around an early wet season trap crop*

In 3 other villages we will teach some farmers how to control rats in their own fields only. Rat damage and populations will be monitored by farmers in all 6 of these villages and compared to 3 neighboring villages where no improved rat management was introduced.

The farmers, CIAP, and CRS are learning as we go. We'll keep you informed as the study progresses.



*Khmer villagers*

*building rat traps for a rat fence*

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## OTHER NEWS

### ***Salamat Jalan to Monica van Wensveen***

Monica has been the editor of this newsletter since its inception. The first newsletter had a print run of 35 and was sent to about 20 institutions in 10 countries. The last newsletter had a print run of 175 and was sent to over 75 institutions in 32 countries. This is testimony to Monica's energies and efforts in making the communication element of our ACIAR project a success.

The newsletter is but one legacy of her involvement in the CSIRO Rodent Research Group. Monica began with the Rodent Group in 1989 and played a pivotal role in the establishment of our collaborative linkages in Southeast Asia. For those of you who have had the fortune to meet Monica, I am sure that you would agree that she has been an excellent ambassador for CSIRO and ACIAR, and for rodent pest research in developing countries.

Monica has pursued her interest in communication by taking up a position as Communication Officer with CSIRO. Monica is still with CSIRO Wildlife Research so those visiting our Division will have the opportunity to renew acquaintances. I am sure that you all join me in wishing her well in her new career.



*Monica van Wensveen (left) and Alison Mills (centre) with Dr Lyn Hinds at the recent project planning meeting held at IRRI*

### ***Welcome to Alison and Amanda***

Alison Mills has replaced Monica in the ACIAR project. We welcome Alison who among her tasks has taken on the role of editor of this newsletter. Alison is involved also with the research projects in Indonesia and Vietnam.

Amanda Lewis has returned to the CSIRO Rodent Research Group after a 6 month absence. Welcome back Amanda! Amanda is currently assisting with research on managing mouse plagues in Australia. If the new ACIAR project is approved she will spend about a third of her time assisting with research on rodent pests in Asia. In the interim, Amanda has taken on the role of managing the e-mail bulletin board for the Rodent Ecology Network (see article in this newsletter).

## RECENT PUBLICATIONS OF THE RODENT RESEARCH GROUP

Brown, P.R., Singleton, G.R., Kearns, B., and Griffiths, J. (1997). Evaluation and Cost-Effectiveness of Strychnine for Control of Wild House Mouse (*Mus domesticus*) Populations in Victoria. *Wildlife Research* **24**, 159-172

Singleton, G.R. (1997). Integrated management of rodents: A southeast Asian and Australian perspective. *Belgian Journal of Zoology* **127**, 157-169.

Chambers, L.K., Singleton, G.R., and Hood, G.M. (1997). Immunocontraception as a potential control method of wild rodent populations. *Belgian Journal of Zoology* **127**, 145-156.

Singleton, G.R., Sudarmaji and Sadeli Suriapermana (1998) An experimental field study to evaluate a trap-barrier system and fumigation for controlling the rice field rat, *Rattus argentiventer*, in rice crops in West Java. *Crop Protection* **17**, 55-64.

## COMING EVENTS

The International Conference on Rodent Biology and Management will be held in Beijing, China from 5-9 October. This conference is being organised by the Institute of Zoology, Chinese Academy of Sciences and CSIRO Wildlife and Ecology, Australia. Information about this conference is available at the website <http://www.dwe.csiro.au/research/progv/rodents/> A report outlining the proceedings of the conference will appear in the next War Against Rats newsletter.

### ***Update on the Conference on Rodent Biology and Management....***

There has been an excellent response to the conference. There are about 140 people registered with over half of these from outside China. The array of papers is impressive and we look forward to a stimulating and enjoyable meeting. People are still encouraged to register. All the time spots for oral papers are allocated but we will be accepting poster presentations until mid September.

Please refer to the proposed schedule for sessions of the International Conference on Rodent Biology and Management, which appears on the following page....

**PROPOSED SCHEDULE FOR SESSIONS OF 98'ICRBM**

	<b>Oct.5, 1998 (Monday)</b>		<b>Oct. 6, 1998 (Tuesday)</b>		
8:30-10:00	Registration (until 9:00) Opening ceremony (9-10:00)		Plenary 3 – Singleton (45 min)		8:30-9:15
			Plenary 4 – Mills (45 min)		9:15-10:00
<b>10:00-10:30</b>	<b>Morning tea</b>		<b>Morning tea and poster viewing</b>		<b>10:00-11:00</b>
10:30-11:30	CONF KEYNOTE ADDRESS Charles Krebs		Symp C Management I (3x30 min)		11:00-12:30
11:30-12:15	Plenary 2- Macdonald				
<b>12:15-13:30</b>	<b>Lunch</b>		<b>Lunch</b>		<b>12:30-13:30</b>
13:30-15:00	Symp A Population (3x30 min)	Symp F Behavior (3x30 min)	Symp C Management I (3x30 min)	Symp. G Diseases (3x30 min)	13:30-15:00
<b>15:00-15:30</b>	<b>Afternoon tea &amp; coffee</b>		<b>Afternoon tea and coffee</b>		<b>15:00-15:30</b>
15:30-16:50	Symp A (4x20 min)	Symp F (4x20 min)	Symp C (4x20 min)	Symp G (4x20 min)	15:30-16:50
17:00-17:50	Rodent damage group		Resistance group		17:00-18:00
18:30-20:00	<b>Welcome reception</b>				
	<b>Oct.8, 1998 (Thursday)</b>		<b>Oct. 9, 1998 (Friday)</b>		
8:30-10:00	Plenary-5 Nolte Plenary-6 Zhibin		Plenary 3 - Dickman (45 minutes)		8:30-9:15
			Plenary 4 - Brown(45 minutes)		9:15-10:00
<b>10:00-11:00</b>	<b>Morning tea and poster viewing</b>		<b>Morning tea and poster viewing</b>		<b>10:00-11:00</b>
11:00-12:30	Symp D Management II (1x40 Buckle, 2 x25 min)	Symp B Physiology (1x40 Hume, 2x25 min)	Symp E Olfactory (3x30 min)	Symp H Ecosystem (3x30 min)	11:00-12:30
<b>12:30-13:30</b>	<b>Lunch</b>		<b>Lunch</b>		<b>12:30-13:30</b>
13:30-15:00	Symp D (3x30 min)	Symp A (3x30 min)	Symp E (3x30 min)	Symp C (3x30 min)	13:30-15:00
<b>15:00-15:30</b>	<b>Afternoon tea &amp; coffee</b>		<b>Afternoon tea and coffee</b>		<b>15:00-15:30</b>
15:30-16:50	Symp D (4x20 min)	Symp A (4x20 min)	Symp E (4x20 min)	Symp C (4x20 min)	15:30-16:50
17:00-18:00	Rice-field group	Olfactory group	Closing ceremony		17:00-17:40
			<b>Conference dinner</b>		19:00

Note: It is a free day for local tour on October 7, Wednesday, 1998.

Please direct further correspondence, comments and 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"*

Ó CSIRO Division of Wildlife and Ecology