



# *Rothamsted International*

*Sharing research excellence for agriculture in less developed countries*

**Newsletter December 2007**

Rothamsted International is appreciative of the continuing support of its many donors and supporters. We aim to keep all interested parties informed of the news and success of our two Fellowship schemes and of Rothamsted Research projects with links to Developing & Emerging countries.

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The coconut palm is cherished in India as 'Kalpa uriksha', meaning  
**"the Tree of Life"**

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# Rothamsted International Fellowship Scheme (RIFS)

## Current Fellows and their Projects

### Dr Murali GOPAL

*Working towards increasing coconut yields and improving the productivity of small-scale Indian farmers*

Murali is from the Central Plantation Crops Research Institute (CPCRI) in Kasaragod, Kerala, India and has been working with Prof. Phil Brookes in the Soil Science Department. His project involves evaluating the effect of coconut leaf vermi-compost on soil microbial biomass, diversity and fertility.



In India, the coconut palm is valued as the 'Tree of Life' (Kalpa uriksha) due to the multi-purpose value of every component part. The seed is highly nutritious, the roots of medicinal value and the trunk & leaves provide material for cottage industries as well as a source of building materials. Coconut is a significant plantation crop on which the livelihood of around 10 million Indians is dependent. It also adds annually \$1.2 -1.6 billion to the Indian economy which underlines its importance.

However, the coconut and its companion crops are perennial in nature and continuously exhaust the nutrients from the soil. Replenishment of nutrients is therefore essential. The inability of the farmers to afford expensive chemical fertilizers combined with naturally infertile soil drastically affects the yield of the crops. Therefore it has become imperative to develop simple technologies to address the soil fertility problems.



In the 1990's a project developing technologies for recycling the abundant coconut biomass wastes into organic manure was initiated at CPCRI in Kerala, India. An indigenous strain of earthworm *Eudrilus* sp. (commonly called African Night Crawler) collected from the Institute farm showed good efficiency at consuming the lignin rich coconut leaves and converting the wastes to vermi-compost (see photo left). In 1998 the vermi-composting technology for recycling coconut leaf litter using the *Eudrilus* sp. was standardized. Soon, the technology spread rapidly to many of the coconut growing states in India.

This Rothamsted International Fellowship project is aimed at studying the composition of vermi-compost and the nutrients it supplies to plants on addition to soil. Besides this, information on the dynamics of the resulting soil microbial community and its relation to changes in soil fertility are being investigated. Knowledge gained on the timing of nutrient release to plants during biomass turnover will enable the possibility of synchronizing the release of nutrients with crop needs. This knowledge is essential for increasing the productivity of coconut-based farm units and thus improving the livelihood of the farmers and others dependent upon coconut.

### Dr Shereen ELBANNA

*Semio-chemicals and management of aphid pests*

Shereen is a Lecturer in Entomology at the Suez Canal University, Egypt and has been working with Dr Tony Hooper in the Department of Biological Chemistry. Her project involves isolating and characterising the non-volatile plant allelochemicals from the spindle tree (*Euonymus europaeus*) that stimulate the reproduction of the aphid, *Aphis fabae*. Aphids are one of the most important crop pests in Egypt and understanding the semio-chemicals involved in insect-host plant interactions can contribute to new methods of crop management.



## Rothamsted International Fellowship Scheme (RIFS)

### Dr Lanqin XIA

#### *Genetics of soluble dietary fibre in wheat*

Lanqin is from the Institute of Crop Science, CAAS, China and has been working with Prof. Peter Shewry in the Plant Science Department. Her Fellowship is enabling her to study the isolation and functional analysis of genes controlling the soluble dietary fibre in wheat grain. Foods high in soluble dietary fibre have the potential to improve human health and lower the risk of serious non-infectious diseases. She has been involved in meetings to establish collaborative links between the Institute of Crop Science and Rothamsted Research.



### Dr Yuhong SU

#### *Environmental chemistry & soil remediation*

Yuhong, from Xinjiang University, China, has been working with Prof. Steve McGrath & Dr Fangjie Zhao in the Soil Science Department. She has been assessing the bio-availability of polycyclic aromatic hydrocarbon (PAH) compounds in soils and their potential for phytoremediation. PAHs are a group of persistent organic pollutants released to the environment through burning coal, petroleum production and combustion. Sewage sludge is a significant source of PAH to agricultural soils and which bind strongly to organic matter. Their bio-availability to the food chain is a little understood key issue that is being investigated in this project.



### Dr Lun Guang YAO

#### *Genetics of insect odour-binding proteins*

Lun Guang is the most recent Fellow to arrive at Rothamsted Research. He is from the China-UK, NNU-Rothamsted Joint Laboratory of Insect Biology at Nanyang Normal University in China. Lun Guang is working with Dr Jing-Jiang Zhou in the Department of Biological Chemistry. His project is using high efficiency gene transfer and expression to investigate insect odorant-binding protein. The development of an alternative protein expression system would allow future study of the effects of OBP genes on insect behaviour and the specificity of olfactory response to host odours. This knowledge will lead to biological strategies for reducing the anthropophily (the tendency to feed on humans) of disease-vectoring insects and thus decrease the incidence and spread of mosquito-borne diseases.

## RIFS Alumni

The RI team maintain contact with many Fellowship alumni. This year, there were visits from five ex-RI fellows, which continue the partnerships developed during their Fellowship:

**Dr Carol Moraes** from CENARGEN-EMBRAPA, Brazil had a highly successful RI Fellowship during 2005/6. She returned to Rothamsted for an 8-week visit, working with Dr Mike Birkett in the Biological Chemistry Department. The aim of Carol's visit was to develop the existing collaborative research on *cis*-jasmone induced signalling in soybean, *Glycine max*, a major Brazilian crop, and also to develop new areas of collaborative research on the chemical ecology of major soybean pests. Progress with these studies illustrates a vibrant, fruitful collaboration between EMBRAPA and Rothamsted, which arose from Carol's RI Fellowship, and which will move forward in 2008 with a planned joint workshop to be held in Brazilia.

**Dr Marcos Resende**, from Brazil, visited Robin Thomson whilst attending a conference in London.

**Dr Shengyi Liu**, from China, visited the Plant Pathology & Microbiology Department with a delegation.

**Dr Oktay Gurkan**, from Turkey, visited Graham Moores, Biological Chemistry Department.

**Dr Alexander Konarev**, from Russia, visited Peter Shewry for 12 months with an Underwood grant.

**Dr Naomi Tangonan & Dr Wasana Wijesuriya** corresponded with RI about the International Natural Rubber Conference in Vietnam where they both presented papers. These two women scientists shared the same flat at Lawes Court when they were RI Fellows in 1997 and have stayed in touch ever since.

**Dr Qudsia Tahseen** worked at the University of California, Riverside, in USA for 3 months funded by a prestigious overseas Fellowship sponsored by the Indian Government. On her return she has been elected Fellow of the Indian Academy of Science, Bangalore, which is a great honour.

# African Fellows Programme (AFP)

This scheme, funded by the Gatsby Charitable Foundation and administered by RI, aims to increase capacity building and training in agricultural science by providing short-term Fellowships to work with a research group at European laboratories. It encompasses both arable and livestock research.

## New Fellows and their projects

### Dr Gelagay AYELET

#### *Control strategies for Foot & Mouth Disease in Ethiopia*

Gelagay is from the National Veterinary Institute in Ethiopia and his Fellowship is based at the Institute for Animal Health at Pirbright. He is working with Dr Madhuchhanda Mahapatra on the molecular epidemiology of foot and mouth disease (FMD) virus circulating in Ethiopia. This aims to enable the selection of vaccine strains for the development of control strategies for FMD in Ethiopia.

### Dr Esron KARIMURIBO

#### *Mastitis resistance in Tanzanian cattle improving milk quality and supply for human consumption*

Esron is from the Sokoine University of Agriculture in Tanzania. He has been based at the Moredun Research Institute in Scotland with Dr Keith Ballingall. He is working on the molecular genetic investigation of mastitis resistance mechanisms in Maasai and Boran cattle in Tanzania. His work aims to contribute towards a control strategy involving selection of animals for cross-breeding.

## Returning Fellows include:

### Dr Bonto FABURAY

#### *Vaccine to control 'Heart-water' disease in Gambia livestock*

Bonto came from the International Trypanotolerance Centre (ITC) in the Gambia. He worked with Prof. Frans Jongejan at the University of Utrecht, the Netherlands, on the attenuated '*Ehrlichia ruminarium*' vaccine to control Heart-water in small-holder livestock production systems in the Gambia. His study revealed multiple genotypes of the causative agent and identification of a local stock for cross-protection studies.

### Charles SSEKYEWA

#### *Studies of the viruses causing tomato disease in Uganda*

Charles is from the Martyrs University in Uganda and was based at The Centre for Arid Zone Studies (CAZS) at the University of Wales at Bangor. He worked with Dr Katherine Steele and investigated the molecular characterisation of Tomato Leaf Curl Disease viruses in Uganda. Vegetables such as tomatoes play an important role in Uganda in supplementing the diet and increasing the income of small-scale farmers. Charles plans to continue links with CAZS and is developing further collaborative links with Dr Yaima Arocha of the Global Plant Clinic at Rothamsted.

### Fassil YIMAMU-KEBEDE

#### *Screening of salt-tolerant lentils in Ethiopia to combat drought intolerance*

Fassil is from the Mekelle University in Ethiopia. He was also based at the University of Wales at Bangor with Dr Philip Hollington. This project involved screening lentils for salinity and boron tolerance. Drought is a severe problem in Ethiopia and as much land is irrigated, many areas suffer with salt deposits due to high evaporation rates. Lentils provide about 60% of the dietary protein for the rural population and are particularly salt-sensitive.

### Marius EKUE

#### *Genetic Diversity of an endogenous agro-forestry species in Benin*

Marius is from the University of Abomey-Calavi in Benin and had a Fellowship at Goettingen University with Prof. Reiner Finkeldey. He explored the genetic diversity of the endogenous agro-forestry species, *Blighia sapida*, in Benin. His key results showed high levels of genetic diversity & low levels of genetic differentiation and that ongoing domestication did not severely restrict genetic diversity. He and his supervisor are seeking to expand their joint activities. The supervisor commented "the RI programme is very useful and unique in Europe since it offers opportunities for applied research in cooperation with African partners. The support of RI is gratefully acknowledged".

### Edward YEBOAH

#### *Modelling soil organic matter under sub-Saharan farming systems*

Edward is from the Soil Research Institute in Kumasi, Ghana and had his Fellowship with Dr Saran Sohi of the Soil Science Department at Rothamsted Research. Rapid declines in soil organic matter are a key factor in falling crop productivity in Africa. He tested the Rothamsted ROTH C carbon model under the environmental conditions of Ghana for management scenarios of interest. In the face of climate change, this could be used in management strategies for increasing food security under different farming systems prevalent in sub-Saharan Africa.

## International Visits

### Inward

#### RI Fellow for the Communication of Science January 2007

Rothamsted International hosted John Liu, RI Fellow for the Communication of Science (2006-2008) and Director of the Environmental Education Media Centre, at Rothamsted in January and July. During his visit in January, he presented his film entitled *"Earth's hope: poverty, desertification and climate change"* documenting landscape restoration in the Loess plateau in Northern China where previously degraded areas have been transformed through an understanding of the ecological functions of biodiversity, hydrology and soil. A spectator wrote to us after his presentation saying "This was a very effective communication ... which allowed the enormity of the scale and success of the project to be communicated in a powerful way". John Liu is developing further projects in collaboration with Dr David Powlson of the Soil Science Department. He is turning his attention to Africa, exploring the possibilities of combating desertification in Uganda and Ethiopia.

### Outward

#### ICARDA visit April 2007

Rothamsted Research scientists visited ICARDA (the International Centre for Agricultural Research in the Dry Areas), Syria in April 2007 to sign a memorandum of understanding (MoU) that acknowledges ongoing research collaborations and to enable future projects common to both institute research targets. This was funded by a BBSRC-ISIS grant. The visit was very constructive and scientists were able to identify areas of common interest for immediate and long-term research collaborations. A return visit by a delegation from ICARDA is being planned by Dimah Habash-Bailey in February 2008.

#### Joint China-UK workshop

Prof. Phil Brookes of the Soil Science Department was joint organiser of a Joint China-UK (BBSRC) workshop on the 'evaluation of soil microbial parameters as indicators of soil quality' in Beijing in October of this year. Several Rothamsted scientists participated in this very successful workshop.

#### The UK-Brazil Year of Science and Innovation, March 2007

Prof John Lucas, Head of the Plant Pathology & Microbiology Department, made a visit to Brazil with Sir David King (The government's Chief Scientific Advisor) as part of this scheme launched by the Brazilian Ministry of Science & Technology and the British Government. John is pictured here outside the Amazon Biotechnology Centre (CBA), Manaus. CBA is a government sponsored organisation created to promote the economic and sustainable use of Amazonian biodiversity. This 'Year of Science' aims to promote the relationship between the British & Brazilian scientific communities, facilitating the sharing of knowledge aiming to establish ongoing partnerships.



Prof. Lucas's visit was preceded by a visit made by Stephen James, accompanied by Tony Hooper, to draw up a Memorandum of Understanding with EMBRAPA (The Brazilian Agricultural Research Corporation). Encouraging links with Brazilian scientists were reinforced when Rothamsted Research signed MoU's with both EMBRAPA and IAPAR (Institute of Agronomy at Parana) during the visit. Since then, Prof. John Pickett and Dr Mike Birkett have visited Brazil to take forward discussions on joint work on semio-chemicals.

## Rothamsted Research projects linked to less developed countries

In 2007, there have been 42 projects supervised by Rothamsted Research scientists that have links with less developed countries. During this year there have also been 57 visiting workers registered at Rothamsted Research from 22 countries across the world. Twenty three of these visiting scientists have come from countries with developing and emerging economies (Brazil 1, Bulgaria 2, Chile 2, China 10, Egypt 1, Ghana 1, India 6, Poland 1, Russia 1, Syria 1) showing the extent to which Rothamsted Research continues to maintain international links and collaborative projects.

### CROSS REGION

#### Global Plant Clinic (GPC)



Dr Yaima Arocha (with camera) held a 'Regional GPC Course on molecular diagnosis of phytoplasmas and viruses' in October at the National Agricultural Research Laboratories, IITA (International Institute of Tropical Agriculture), Kampala, Uganda. There were 13 participants from Uganda, Kenya and the DR Congo. This is part of an ongoing programme of Mobile Plant Clinics.

Rothamsted Research has unique taxonomic expertise in fungi, bacteria & nematodes and the GPC is run in collaboration with CABI, Reading & CSL, York. The Global Plant Clinic provides comprehensive support in disease identification and management in over 50 developing and emerging countries with a diagnostic and advisory service for disease problems on all tropical crops. It works with scientists, technicians and farmers providing diagnostic advice, training, knowledge transfer and capacity building through mobile plant clinics.

### LATIN AMERICA

#### Mosquito control in Peruvian Amazon

Since 2004, Dr Greg Devine (back row, third from right) of the Plant & Invertebrate Ecology Department has been on extended sabbatical in Peru. He is resident in Iquitos, a large isolated city in the centre of the Peruvian Amazon. He has been leading a project examining novel larvicides for the control of *Aedes aegypti*, the dengue fever vector of the region.

The work is in partnership with the US Navy's Medical Research Center Detachment (NMRCD), the University of California in Davis and the local health authorities. The results have been well received at several meetings of the American Society of Tropical Medicine amongst others. In 2006, Greg stepped in as the programme director of the NMRCD Iquitos technical team, during a six month gap when no other entomologist was available.



Greg also helps train entomologists from local institutions using a small amount of CDC (Centers for Disease Control) funding. In the coming year this fund will help poorly resourced local technicians to carry out a number of experimental studies assessing the effect of insecticide-treated bed-nets on the biting behavior of the local malaria vector *Anopheles darlingi*.

## Rothamsted Research projects linked to less developed countries

### CHINA

#### Soil environmental science

Prof. David Powlson (middle) is involved in a new project aimed at reducing atmospheric and aquatic nitrogen pollution originating from overuse of N fertiliser in Chinese agriculture. A key aspect of the project is to develop more effective ways of communicating information on judicious nitrogen use to farmers, so social scientists and economists are taking part. A novel aspect is the involvement of farmer associations, a new development in China, which are seen as a new means of delivering technical information to farmers.



### AFRICA

#### “Push-Pull”



The Chemical Ecology Group in partnership with ICIPE (Kenya) has developed a habitat management strategy which manipulates cereal crop habitat to control stem-borer insect pests and the weed *Striga*. The approach relies on a carefully selected combination of companion crops planted around and among maize or sorghum plants. Trap crop Napier grasses, planted in the border around the main crop, attract invading adult moths. These grasses provide the "pull" in the "push-pull" strategy. Plants such as Desmodium provide the "push" in the intercropping scheme, planted between the crop rows, and emitting chemicals that repel stem-borer moths. Being a low-growing plant it does not interfere with the growth of the main crop. It maintains soil stability, serves as a highly nutritious animal feed and improves soil fertility through nitrogen-fixation. Crucially,

root exudates from it provide effective suppression of *Striga*. The push-pull system has been widely adopted by small-scale farmers in Kenya.

### INDIA

#### Indo-UK collaboration on oilseed crops

Dr Nash Nashaat (far right) of the Plant Pathogen & Microbiology Department has been leader of this project in India since 1998. Oilseeds crops are hugely important for the economy of India and other neighbouring South Asian countries and are widespread in small farm systems. The productivity in these countries is far below that of the world average due to disease and insect pests, vulnerability to drought, low inputs and poor soil. Climatic changes have the potential to worsen the situation. The project success so far includes the development of drought-tolerant and disease-resistant breeding lines of rapeseed-mustard crops and the deployment of new varieties in marginal rain-fed traditional and non-traditional areas across seven states in India. This has involved the participation of over 2,000 Indian farmers in 92 villages in research trials. Training programmes have been conducted in the villages, farmers have visited Indian institutions and scientists from partner institutions in India have made visits to Rothamsted Research. This dissemination of results with regional activities and workshops has been a key element of the work and its accomplishment.



## Wider News

### VSNI LAUNCH GenStat Discovery Edition 3 (GD3)

In 2003, VSNI., the developers of the GenStat statistical software package, originally launched the GenStat Discovery Edition (GDE) available at no cost for non-commercial use in Africa. Based on its success, VSNI released the GDE to developing countries throughout the world. Now, four years later, VSNI introduce an updated version. In November, Stewart Andrews, the CEO of VSNI visited the University of Nairobi, Kenya, and Makerere University, Kampala, Uganda to launch GenStat Discovery Edition 3. This is a free data analysis software programme available to non-commercial organisations throughout the developing world. The launch was in conjunction with RUFORUM, the Regional Universities Forum for Capacity Building in Agriculture. The new version includes features such as menus for analysis of circular data for climatology research - vital in empowering African countries to combat the negative effects of climate change. [www.vsni.co.uk](http://www.vsni.co.uk)

### BRAZILIAN GENE BANK NOW SIXTH IN THE WORLD

One hundred thousand samples of seeds from 500 different plant species are now housed by the gene bank of the Brazilian Agricultural Research Corporation (EMBRAPA), which makes this facility the sixth largest in the world. Several indigenous communities, such as the Krahô, Guarani, and Indians from the Xingu region, have benefited from the unit. The purpose of the gene bank is not only to conserve seeds and return them to the population to sustain the use of traditional, local varieties, but also to work with the genetic material to improve its quality. It aims to perform studies to identify useful genes to develop novel crops with desirable characteristics, such as resistance to illnesses and tolerance to cold, adapted to the different regions of Brazil. [www.scidev.net/news](http://www.scidev.net/news)

### MILLENNIUM VILLAGES

The Millennium Villages is a project commissioned by the United Nations aiming to end extreme poverty by working with the poor, village by village, throughout Africa. It intends to provide affordable science-based solutions to help people lift themselves out of extreme poverty. The Millennium Villages are based on a single powerful idea; that impoverished villages can transform themselves and meet the 'Millennium Development Goals' if they are empowered with proven, powerful, practical technologies. By investing in health, food production, education, access to clean water and essential infrastructure, these community-led interventions will enable impoverished villages to escape extreme poverty, something that currently affects over 1 billion people worldwide.

[www.unmilleniumproject.org](http://www.unmilleniumproject.org)

## Local Links

### School Visit by RI-AFP Fellow

Dr Edward Yeboah, RI-AFP Fellow from Ghana (below, with Primary School children), gave a presentation to a local school in Harpenden about his project and the way of life for school children in



Ghana. They learnt about why the soil was 'poor' in Ghana and how his research could help fix it. They were fascinated to hear that in his home country children must complete various chores such as collecting water before the school day. They also learnt about Ghanaian food crops and typical meals.

### Talks

A series of presentations about Rothamsted Research and Rothamsted International were given to a variety of local organisations including the Hitchin Branch of the 'University of the Third Age'. If you would like a similar event for your club or organisation then please contact us.

### Rothamsted International Film Club

Local fundraising continues through the RI Film Club. It has been operating for 5 years now and shows popular and alternative films on a monthly basis at the Rothamsted Conference Centre. Proceeds are donated to the Rothamsted International Fellowship Scheme. Anyone may join this club and if you would like to do so then please contact Gill Tattersfield (email: [gill.tatt@aol.com](mailto:gill.tatt@aol.com)).

### ISSA

The International Staff & Students Association goes from strength to strength. It is an important component of life at Rothamsted for scientists and visitors from overseas. This year it has arranged a variety of social events ranging from a visit to London, to a 'Bangers & Mash' evening.

### Fundraising

Rothamsted International is a not-for-profit charity organisation dependent on donations to support RI Fellowships. We rely on the generosity of donors to continue expanding the work empowering people in developing countries to progress towards sustainable rural development.



If you would like to request an item be included in the next newsletter, then please contact Sarah Perrvman at Rothamsted International