

Country Profile

**East Timor**

**November 2005**

The Australian Centre for International Agricultural Research (ACIAR) operates as part of Australia's international development cooperation program, with a mission to achieve more productive and sustainable agricultural systems, for the benefit of developing countries and Australia. ACIAR commissions collaborative research between Australian and developing country researchers in areas where Australia has special research competence. It also administers Australia's contribution to the International Agricultural Research Centres.

© 2005 Australian Centre for International Agricultural Research  
GPO Box 1571 Canberra ACT Australia 2601

ACIAR. *Country Profile: East Timor*. 2005.

ISSN 1833-170X (print)

Additional copies of this publication are available from ACIAR office—

In Australia:

Communications Program Manager

Tel: 61 2 62170500

Fax: 61 2 6217 0501

Email: [comms@aciar.gov.au](mailto:comms@aciar.gov.au)

Postal address:

GPO Box 1571

Canberra ACT 2601

Website: [www.aciar.gov.au](http://www.aciar.gov.au)

Printed by Elect Printing, Canberra

# Contents

|  |    |
|--|----|
| Preface                                    | 5  |
| East Timor report 2004-05                  | 7  |
| East Timor plan 2005-06                    | 9  |
| Active projects at 30 June 2005            | 11 |
| Concluded projects at 30 June 2005         | 19 |
| Projects under development at 30 June 2005 | 22 |
| ACIAR publications                         | 23 |



# Preface

The ACIAR Country Profiles are designed as a snapshot of the collaborative research being carried out between Australia and our key partner countries and regions. This publication contains short summaries of both bilateral and multilateral projects involving East Timor that were active at 30 June 2005. At that time there were 3 active bilateral projects and 1 active multilateral project, the latter being led by an international agricultural research centre. There was another 1 project under development, which is expected to commence in 2005–06 financial year.

This publication also sets out the key outputs and outcomes from 1 project completed at 30 June 2005.

In addition to these project summaries, the publication provides an extract from our 2004–05 Annual Report covering East Timor, and our near-term program as set out in the 2005–06 Annual Operational Plan.

Our intention is to produce a similar compilation of summaries each year and distribute them to key stakeholders in East Timor and in Australia.

We hope you find the publication useful as a record of the ongoing progress and achievements of ACIAR's collaborative agricultural research and development program with East Timor. For information on ACIAR's overall program, our website at [www.aciar.gov.au](http://www.aciar.gov.au) is a key gateway to our operations.



Peter Core  
Director

November 2005



# East Timor Report 2004–05

(extract from ACIAR Annual Report 2004–05)

|   |           |
|---|-----------|
| Active projects in 2004–05                      | 4         |
| AOP budgeted expenditure in 2004–05             | \$500,000 |
| Actual bilateral country expenditure in 2004–05 | \$522,340 |
| Bilateral country expenditure in 2003–04        | \$285,402 |
| Bilateral country expenditure in 2002–03        | \$681,219 |

| Key performance indicators  | Performance 2004–05   |
|---|---|
| <ul style="list-style-type: none"> <li>Expansion of program through initiation of two new projects in areas of high priority to East Timor</li> </ul>                               | New projects on cassava varietal selection and introduction, and management of weeds of significance commenced.   |
| <ul style="list-style-type: none"> <li>Opportunities for linkage to AusAID rural development program activities explored</li> </ul>   | Major joint program designed, co-funded by AusAID and ACIAR, for commencement early in 2005–06.   |
| <ul style="list-style-type: none"> <li>Consolidation of crop varietal selection gains to arrive at 'best bet' varieties of maize, rice, cassava, sweet potato and peanut</li> </ul> | Consistently higher yielding lines of each crop identified, with issues relating to the acceptability of yellow versus white maize, consistency of rice performance, bitterness of cassava, multiplication rates of sweet potato and adaptability of peanut still to be resolved. |
| <ul style="list-style-type: none"> <li>At least 70 per cent of the former Indonesian agriculture syllabus redesigned to specifically meet East Timorese needs</li> </ul>            | New curriculum, unit guides and workbooks have been developed for most technical subjects, with completion of some natural resource management and socioeconomic units pending.   |

## Position

Agriculture provides a livelihood for more than 80 per cent of East Timorese and is also an important source of export income, specifically through coffee. The similarities between East Timorese and northern Australian conditions and production systems offer Australia a comparative advantage in research. ACIAR began working with East Timor in 2000, with the first projects beginning early in 2001. Current projects aim to help achieve food security, alleviate poverty and build local agricultural research capacity in the field and the laboratory.

## Achievements

The *Seeds of Life* project is now in its concluding stages. A number of **improved varieties of staple food crops** have performed well in field trials in a variety of lowland and highland settings around East Timor. Varieties of sweet potato, maize, rice, peanut and cassava deemed suitable are now being tested in farmer participatory research. Wider scale production of seed for suitable varieties will follow in the *Seeds of Life 2* program. Some farmers have already gained access to improved seed through involvement in the project.

Three sweet potato varieties yielding between 33.7 tonnes per hectare and 19.7 t/ha have been identified. These **levels of yield are the highest recorded** in East Timor. Four varieties that performed well in local conditions have been selected. Maize varieties tested during the project have yielded as high as 6 t/ha. In some areas varieties resistant to the major disease downy mildew have been trialled, resulting in yields between 4.5 and 6.5 t/ha. Many rice varieties have yielded well—the

best those with resistance to stem borer. One borer-resistant variety has been well received in a number of field trials.

Two peanut varieties, one suitable for cultivation throughout the country and a second suitable for the Baucau region where iron chlorosis is widespread, have been identified. Several suitable cassava varieties, based on a combination of yield, taste and starch content, have been identified. Many of these superior varieties are being recommended to the Ministry of Agriculture, Forestry and Fisheries, for **large-scale production of material to distribute to farmers.**

Restoration of the Agriculture Faculty at the University of East Timor has been of an important achievement. The project team and East Timorese University staff have **developed the greater part of a new agriculture curriculum** that will equip students to identify and solve problems in a farming systems context. This new approach, departing from the Indonesian model designed to produce graduates ready for the public service, has focused on applied on-farm research as the means to overcoming problems. Fifteen new unit outlines and a range of teaching materials have been developed.

The restored laboratory facilities at the Hera Field Station are now shared by the Education Faculty to provide practical sessions for science students. A number of foreign donors also use the laboratory in their project activities. Senior animal science students have trained more than 500 people throughout the country in aspects of livestock management. Many of the trainees are former resistance fighters provided with cattle to help them integrate back into the community.

#### **Rebuilding agriculture for a new country**

If East Timor's agricultural sector is to reach and maintain food self-sufficiency then research capacity will need to be strengthened. Following independence in 1999 most of the infrastructure at the country's only University was destroyed and the mostly Indonesian staff returned home.

The task of rebuilding the Agriculture Faculty at the National University of East Timor fell to the Dean of the Faculty, Flavian Soares. He and his staff came together with Australian partners through an ACIAR-supported project that mobilised Australian agricultural research capacity to begin rebuilding.

Curtin University was commissioned to lead a project for the Rehabilitation of the Agriculture Faculty of the National University of East Timor. Charles Darwin University, the University of Queensland and Sydney University have also been involved.

One of the major challenges has been to shift the curriculum away from a rote-learning of information approach to developing skills and applying these in a problem-solving context. The approach was favoured by the East Timorese faculty members, who recognised the need for graduates to pass on benefits in the field.

'We started by looking at what type of graduates would be needed back in the villages. After graduation these students main role will be to train farmers, to lift our farming systems to a higher level. We are facing the need, and the opportunity, to think differently,' said Dean Soares.

Through the enthusiasm and dedication of the East Timorese and Australians involved in the project these changes are being implemented, along with the new facilities. Four hundred students are enrolled this year in agriculture courses. The first groups of graduates are now delivering training on improved livestock management in villages.

For Dean Soares life is about to change again, as he moves from teacher to student. He is soon to begin a Masters degree at the University of Queensland as part of an ACIAR-supported John Allwright Fellowship.

Two new projects also commenced during the year. The first, to improve cassava production, is also active in Indonesia. The second project, focused solely on East Timor is introducing the biocontrol agents against *Chromolaena odorata* that have proven successful in PNG and Indonesia.

# East Timor Plan 2005–06

(extract from ACIAR Annual Operational Plan 2005–06)

|                                   |                   |                             |        |
|-----------------------------------|-------------------|-----------------------------|--------|
| GNI per capita <sup>1</sup>       | AUD 663           | Bilateral actual 2003–04    | \$0.3m |
| Population <sup>2</sup>           | 0.7 million       | Bilateral forecast 2004–05  | \$0.5m |
| Population 2025/2050 <sup>3</sup> | 1.2 / 1.4 million | Bilateral budget 2005–06*   | \$0.6m |
| Active bilateral projects         | 2                 | Multilateral budget 2005–06 | \$0.1m |
| Active multilateral projects      | 1                 |                             |        |

\*Does not include proposed AusAID co-investment of \$1.24m (budget 2005–06) in ‘Seeds of Life 2’ project.

## Medium-term strategy

ACIAR has a program in East Timor focused on food security, poverty reduction, and capacity building. These are immediate needs for East Timor to support recovery from the trauma of the 1999 independence struggle and the development of a new nation. The focus is on applied assistance as R&D capacity and infrastructure are being developed. The outcomes from the initial projects on introduction and evaluation of higher-yielding staple crops and on rehabilitation of the University agriculture faculty will provide a base for further development efforts supported by Australia (ACIAR and AusAID) and other donors, and aligned with the Sector Investment Programs of the East Timor government.

## Key performance indicators (2005–06)

- Implementation arrangements for scaled up ‘Seeds of Life’ project successfully undertaken
- New small projects facility established to support leading agricultural researchers
- Initial successful production of weed biocontrol insects in East Timor

## Position

Agriculture provides both a livelihood for >80% of East Timorese and also one of the main sources of export income (through coffee). Australia has a comparative advantage in East Timorese agriculture in several ways, including proximity, similarity of climatic and production systems to Australia’s semi-arid and humid tropics, and relevant experience of Australian agricultural scientists in nearby regions.

Two projects commenced in early 2001:

- Improved crop production through introduction, testing and distribution of improved planting material of major staple crops; and
- Rehabilitation of the agriculture faculty at East Timor University.

During 2004–05, ACIAR built on these initial investments, and a major collaborative effort with AusAID, extending the work on planting material of major crops, is under way. New projects on Siam weed control and cassava production commenced.

<sup>1</sup> Source: Commonwealth of Australia, *Australia’s Overseas Aid Program 2005–06*, Statement by Minister Alexander Downer, May 2005.

<sup>2</sup> Source: United Nations Population Division, 2004, *World Population to 2300*.

<sup>3</sup> Source: United Nations Population Division, 2003, *World Population Prospects: The 2002 Revision*.

### **Indicative priorities**

Priorities for collaboration are determined through discussions, interactions and visits between scientists and research managers from East Timor, ACIAR and Australian research institutions. ACIAR and AusAID also sponsored an international conference in East Timor in October 2002, which discussed priorities for collaboration in cropping, livestock, fisheries and forestry. We will address a small number of priorities within this framework, and partner capacity will be crucial in determining future collaboration. Whilst the program will remain small, further assistance may be considered in special areas of need.

It is expected that there may be further opportunities to build on and consolidate the two initial projects on better adapted crops and agricultural faculty upgrading.

Possible new areas for collaboration to be developed in 2005–06 may include:

- Constraints on production and analysis and improvement of market chains for major commodities
- Assessment and development of management plans for offshore fisheries resources
- Development of feed resource and reproductive management strategies for cattle and buffalo
- Land capacity assessment and mapping to reduce risk in cropping and grazing
- Integrated control of weeds affecting food crop production and grazing

### **Key program managers**

Mr John Cullen, Crop Improvement and Management  
Dr Bill Winter, Livestock Production Systems

# Active projects

at 30 June 2005

## Bilateral

|              |   |    |
|--------------|---|----|
| CIM/2003/014 | Seeds of Life 2   | 12 |
| LPS/2000/164 | Rehabilitation of the Agriculture Faculty of the National University of East Timor          | 13 |
| LPS/2003/028 | Biological control of two major weeds affecting crop and livestock production in East Timor | 15 |

## Multilateral

|              |   |    |
|--------------|---|----|
| CIM/2003/066 | Enhancing the adoption of improved cassava production and utilisation systems in Indonesia and East Timor | 17 |
|--------------|---|----|

:

**Project CIM/2003/014: Seeds of Life 2**

|   |   |
|---|---|
| <b>Overseas Collaborating Countries</b> | East Timor  |
| <b>Commissioned Organisation</b>        | University of Western Australia, Centre for Legumes and Mediterranean Agriculture, Australia  |
| <b>Project Leader</b>                   | Dr Harry Nesbitt<br>Phone: 08 6488 2505<br>Fax: 08 6488 1140<br>Email: h.nesbit@bigpond.net.au  |
| <b>Collaborating Institutions</b>       | Australian National University, Australia<br>Ministry of Agriculture, Forestry and Fisheries, East Timor<br>Seeds of Life 2 Program, East Timor |
| <b>Project Budget</b>                   | \$7,402,300   |
| <b>Project Duration</b>                 | 01/09/2005 to 31/08/2010  |
| <b>ACIAR Research Program Manager</b>   | Mr John Cullen  |

**Project background and objectives**

ACIAR's initial Seeds of Life (SOL) project identified improved varieties of staple food crops: sweet potato; maize; cassava; peanuts, and irrigated rice. All are needed to replace seed and planting material lost after the upheaval of independence in 1999. Since that time food security in East Timor has been fragile. Two factors have combined with this lost infrastructure to create this situation, a relatively small cropping area of around 336,000 ha for 140,000 rural households, and varieties of crops that were low in yield and productivity, many being poorly suited to the growing environments where they were planted. Farmers rely on good growing seasons to ensure sufficient food, but the reliance on rain means not every season provides sufficient returns. After poor seasons malnutrition levels rise considerably and are a constant in some areas regardless of the adequacy of seasonal conditions. The World Food Programme estimated in May 2004 that 90 per cent of all East Timorese households experience food shortages each year. Matching seed varieties to local conditions, to overcome drought, pests and diseases will substantially boost yields. Through the initial Seeds of Life project superior varieties of maize, cassava, sweet potato and irrigated rice were trialled, identifying those that were better adapted to local conditions and tolerant of biotic (pests, diseases) and abiotic (drought, fertility) stresses. This project also began establishing a small scientific and extension base for cropping.

The follow-on SOL 2 project, undertaken in conjunction with AusAID, will build on this foundation to continue testing new lines for those most suitable to fit local farming systems. How well they will perform under farmer-managed conditions is important for future adoption. On-farm trials are a key objective of the project to ensure that farmers have input into the development and adaptation of farming systems to support new varieties. This work will dovetail into activities designed to strengthen seed production, storage and distribution. Medium scale seed production will be undertaken to support dissemination, with 10 per cent of farmers in selected districts expected to receive seed by the end of the project. The involvement of farmers and researchers in testing will also help in identifying and developing improvements in crop management, and will significantly boost East Timor's research and extension capacity in cropping. Project personnel from East Timor and Australia will also coordinate relevant activities to correspond with and enhance those of other aid and development initiatives.

**Project progress****Year 1 (01/09/2005 – 30/08/2006)**

The first project Annual Report is due late in 2006

## **Project LPS/2000/164: Rehabilitation of the Agriculture Faculty of the National University of East Timor**

|   |  |
|---|--|
| <b>Overseas Collaborating Countries</b> | East Timor   |
| <b>Commissioned Organisation</b>        | Curtin University of Technology, Muresk Institute, Australia   |
| <b>Project Leader</b>                   | Associate Professor John Janes<br>Phone: 08 9690 1584<br>Fax: 08 9690 1500<br>Email: j.janes@curtin.edu.au   |
| <b>Collaborating Institutions</b>       | University of Queensland, Australia<br>Charles Darwin University, Australia<br>University of Sydney, Australia<br>University of Timor Loro Sae, East Timor |
| <b>Project Budget</b>                   | \$1,163,479  |
| <b>Project Duration</b>                 | 01/01/2001 to 31/12/2005<br>(Project extended from 01/01/2004 to 31/12/2005)   |
| <b>ACIAR Research Program Manager</b>   | Dr Bill Winter   |

### **Project background and objectives**

The resource and human capital base of the National University of East Timor was devastated following independence in 1999. To aid the rehabilitation of the University, ACIAR has supported the re-establishment of the Faculty of Agriculture through a 'twinning arrangement' with agricultural faculties from selected Australian universities. The suite of activities supported includes: training for staff of the new faculty; assistance with agriculture curriculum design; rehabilitation of the University experimental farm; re-development of an agriculture library collection, and assistance with the information technology requirements in agriculture. Key objectives of the project include: development of an institutional capacity base to sustain its programs long-term and effective engagement of East Timorese academic staff and students in the promotion of innovative research and development. The establishment of a suite of small research projects will provide a framework for interaction around which many of the other activities (including student projects) could be based, as well as international linkages.

### **Project progress**

#### **Year 4 (01/01/2004-31/12/2004)**

The basis for the development of training programs to enhance teaching, research and extension skills in University staff is linked to the educational process — identifying the attributes required of graduates by stakeholders. This aims to deliver the skills needed by staff to assist in appropriate curriculum development and teaching methodology to facilitate student learning.

*Educational Capacity Development* Curriculum development is an ongoing process. Three curriculum workshops have been conducted by the project in association with the University and staff of the Faculty during the life of this project. The latest on 30 - 31 October 2004 recommended curriculum modification to encourage further development of student problem solving skills through implementation of a student centred approach to teaching. An important part of this process is to facilitate student understanding of East Timor Farming/Agribusiness systems; and the development of problem identification and problem solving skills by relating the teaching to the improvement of local farming systems.

This teaching practice will provide the environment that will enhance the development of cognitive ability of the students and the development of attitudes and values which will assist graduates to communicate with the rural community.

Outlines have been developed in 75% - 80% of units as a result of this program and more recently the University requirement to meet a Higher Education certification standard. Study guides have been developed for 14 units: the agronomy department developing 3 soils units, animal science department

6 units and the socioeconomics department 4 units. A further 8 units are under development in the Faculty.

*Research Capacity Development* The development of staff research capacity has been delivered through the process of defining industry needs through consultation with stakeholders. Staff selected research topics based on priorities, available equipment and funding. These were written into research proposals, designing and implementing the research, collecting and analysing data and for reporting the results.

A workshop was conducted with stakeholders included the Faculty staff, Australian collaborators, NGOs, the National Coffee Cooperative, and a farmer organisation and aid agencies at Hera in July to define the agricultural research priorities in the areas of agronomy, animal production and socioeconomics. Two small research projects were defined in each of the areas as follows:

#### **Agronomy**

- Baseline data on soils in alley cropping along a slope transect
- Identification of high yielding and suitable local varieties of corn (Appendix 2.3)

#### **Animal Science**

- A study of the village poultry production system
- A study of the meat production chain (Appendix 2-1)

#### **Socioeconomics**

- Analysis of Farmers Behaviour and Adoption of Technology in Rice Farming System in Maliana and Manatuto
- Prospects for Vanilla Agribusiness Development in Ermera and Manufahi (Appendix 2-2)

#### **Progress**

- Proposals have been submitted and funded; the projects have been designed and implemented.
- Data collection and analysis is currently in process.
- Workshops were conducted to develop staff capacity in research design, writing proposals and experimental methods covering the following topics:
  - Designing Research and Preparing a Project Proposal for Funding Application
  - Sampling and Sampling Techniques
  - Designing a Questionnaire
  - Pretesting the questionnaire
  - Experimental Designs
  - Data Entry and Analysis Using SPSS

*Strengthen the teaching skills, particularly in socio-economics, and English comprehension* Currently there are three levels of English language training running due to different levels of ability and the arrival of new staff some of whom the faculty want to be included in English language training. The training has assisted in developing sufficient language skills to be able to converse with international scientists, a vital part of building capacity.

## Project LPS/2003/028: Biological control of two major weeds affecting crop and livestock production in East Timor

|   |  |
|---|--|
| <b>Overseas Collaborating Countries</b> | East Timor   |
| <b>Commissioned Organisation</b>        | Charles Darwin University, Australia   |
| <b>Project Leader</b>                   | Ms Tania Paul<br>Phone: 08 8946 6176 or , or mobile 0438 617 600<br>Fax: 08 8946 6690<br>Email: tania.paul@cdu.edu.au  |
| <b>Collaborating Institutions</b>       | National University of Timor Loro Sae, East Timor<br>Ministry of Agriculture, Forestry and Fisheries, East Timor<br>CRC for Australian Weed Management, Australia<br>Department of Infrastructure, Planning and Environment, Australia |
| <b>Project Budget</b>                   | \$327,382  |
| <b>Project Duration</b>                 | 01/07/2004 to 30/06/2007   |
| <b>ACIAR Research Program Manager</b>   | Dr Bill Winter   |

### Project background and objectives

Agriculture is still the main source of food security and income for many people in East Timor. Cropping and livestock productivity are threatened by the encroachment into cropping and pasture lands of two invasive weeds; *Chromolaena odorata* and *Mimosa invisa*. Both weeds 'choke' productive lands by forming dense thickets and by spreading rapidly once established in an area.

*Chromolaena* (also known as Siam weed) rapidly invades grasslands and if left unchecked will completely replace native vegetation. Cattle and goats cannot be left to feed on Siam weed as the presence of pyrrolizidine alkaloids (naturally occurring chemical compounds) in the weed progressively destroy the animals' liver. This results in eventual death. *Mimosa invisa* (*M. diplotricha*) is a serious pest and threat to croplands, especially the staple food maize. Livestock grazing on the weed have also been reported to have been poisoned. Both weeds are a serious threat to native plants and biodiversity, including in natural *Eucalyptus alba* savannas and open grasslands of the Los Palos district.

Biological control agents against both weeds exist and have been proven to be effective elsewhere in Southeast Asia. The stem gall fly, *Cecidochares connexa* for Siam weed and a sap sucking psyllid *Heteropsylla spincelosa* for *M. diplotricha* will be collected from sites in West Timor and Queensland respectively. Both will then be distributed and monitored with the psyllid first established at the University Agricultural Farm in Hera, prior to release.

The project aims to provide long term control of two serious weeds (*Chromolaena odorata* and *Mimosa invisa*). An associated goal is to develop MAFF staff, UNTL staff and student and rural community knowledge and understanding of biological control as a pest management option by implementing an efficient, low technology method of collecting and disseminating the stem gall fly for *Chromolaena* and the sap sucking psyllid for *M. diplotricha* control.

### Project progress

#### Year 1 (01/07/2004-30/06/2005)

*Training of MAFF and UNTL staff and students in biological control theory and practice.* Four East Timorese staff from the project attended the short course Biological Control of Tropical Weeds held at the University of Qld in April. The course was jointly offered by CSIRO Entomology, Queensland Department of Natural Resources & Mines, and the University of Queensland.

*Community socialisation/awareness raising of biological control program* Project personnel met with the local people from the Tibar area to gauge their willingness to be involved in the project. The outcome was an acceptance from the community to host a site for the project. During the trip to identify potential sites, informal meetings and discussions were held with landholders about the

project and their involvement. Further socialisation and awareness raising is planned for later in this dry season.

*Introduction of Stem Gall Fly, C. connexa.* During February 2005, the project team identified sites for monitoring and releases of the stem gall fly. There were two types of sites selected. The first is a monitoring site where insects will be released over several seasons. These sites will be monitored for the life of the project by project team members and UNTL agriculture students, in order to determine the establishment of the insects and to document the impact. These sites were selected based on the abundance and density of chomoleana present, and the willingness of the landholder/s to be involved and protect the site from burning.

The second type of site was a release-only site. Once the stem gall flies have established at the four original sites, galls will be collected from the original sites and released at these more remote sites in order to accelerate the establishment, spread and impact of the gall fly over as wide an area as possible. Sites were selected at both ends of East Timor, and on the south coast. These sites were identified on the basis of density and abundance of chromolaena present and reports from farmers experiencing problems with the weed.

Project members checked border areas with West Timor for stem gall flies in the hope that the flies released in the Atambua area in West Timor (in an earlier project) had reached the border, and galls could be collected within Timor Leste. No galls were located, even at the closest point to previous releases in West Timor which indicates that the stem gall fly did not establish from releases conducted near Atambua area in 1998.

During March 2005, three members of the project team travelled to Lae, Papua New Guinea where, with the assistance of the ACIAR chromolaena project in PNG over 2000 galls containing stem gall flies were collected for transport to Timor Leste. The PNG team also demonstrated collection and release methods, and rearing techniques.

These galls were then released at the four sites in Timor Leste, with the release methods being demonstrated to other members of the project team. The team has reported sightings of adult insects on the chromolaena plants at the sites. Due to the extended dry season, no galls are expected to form at the release and monitoring sites until the next wet season, (Nov-Dec 2005).

*Introduction of Sap Sucking Psyllid, H.spinulosa* It is planned to introduce this biocontrol agent during 2006 in collaboration with Michael Day from DNR& M Qld. Preparations for the establishment of a nursery site at the Hera university farm will commence towards the end of the dry season, (Oct-Nov 2005).

*Introduction of other biological control agents as required* The project will also investigate the potential and possibility of introducing the *Calligrapha pantherina* beetle for the control of *Sida acuta* as it is a fairly simple and self-sustaining agent once established.

The leaf miner fly has been introduced to Lae, PNG with the chromolaena project staff there developing rearing, release and collection methods. Once these have been established and the results of trials proven successful, this project will commence preparations to import this biocontrol agent.

### **Project CIM/2003/066: Enhancing the adoption of improved cassava production and utilisation systems in Indonesia and East Timor**

|   |   |
|---|---|
| <b>Overseas Collaborating Countries</b> | East Timor, Indonesia   |
| <b>Commissioned Organisation</b>        | International Centre for Tropical Agriculture, Thailand   |
| <b>Project Leader</b>                   | Dr Reinhardt Howeler<br>Phone: 66 2 5797551<br>Fax: 66 2 9405541<br>Email: <a href="mailto:ciat_bangkok@cgiar.org">ciat_bangkok@cgiar.org</a> , <a href="mailto:r.howeler@cgiar.org">r.howeler@cgiar.org</a>  |
| <b>Collaborating Institutions</b>       | Brawijaya University, Indonesia<br>Research Institute for Legumes and Tuber Crops, Indonesia<br>Assessment Institute for Agricultural Technology, East Java, Indonesia<br>Indonesian Center for Food Crops Research and Development, Indonesia<br>Ministry of Agriculture, Forestry and Fisheries, East Timor<br>Center for Soil and Agroclimate Research, Indonesia<br>National University of Timor Loro Sae, East Timor |
| <b>Project Budget</b>                   | \$397,914   |
| <b>Project Duration</b>                 | 02/09/2004 to 30/06/2007  |
| <b>ACIAR Research Program Manager</b>   | Mr John Cullen  |

### **Project background and objectives**

Cassava is an important crop both in Indonesia and East Timor. In Indonesia it is grown mainly for off-farm sale to processors. In the past decade, however, Indonesia has gone from a net cassava chip exporter to importer. East Timorese farmers grow cassava for on-farm and household use, boosting food availability when needed. In both countries cassava is the third most important crop, after rice and maize.

Another trait common to both countries is that cassava yields well below expectations. On-station testing in Indonesia of improved breeding lines have yielded up to 58t/ha, compared to current varieties averaging around 14t/ha. Similarly in East Timor, yields of around 40t/ha have been achieved, ten times above the average 4t/ha. Yields of up to 100t/ha, one of the highest for any region in the world, have been reported at one East Timorese site.

Although originating in Latin America cassava is well suited to Asian growing conditions. It is drought tolerant and still grows in poor soils, and is relatively disease and pest free. Despite this low yields persist in Indonesia and East Timor. Indonesia plants more area to cassava than Thailand yet produces less cassava from good growing conditions. Delivering improved varieties, well suited to local growing conditions, directly to farmers is dependent on demonstrating improved yields are possible and achievable.

The overall goal of the project is to increase the productivity of cassava-based cropping systems through the widespread adoption of higher yielding cassava varieties of superior nutritional quality, and improved cultural practices that increase yields while protecting the soil from erosion and nutrient depletion. The specific objectives of the project are:

- to support national institutions in conducting strategic and applied research in cassava production and on-farm utilisation that will overcome important constraints identified at the farm level.
- to develop, with farmers, new high-yielding cassava varieties of superior nutritional quality, improved crop management practices that increase yields and maintain the soil resource, and better utilisation through on-farm animal feeding of roots and leaves.
- to disseminate new technologies at the local, provincial and national level using farmer participatory extension methodologies.
- to strengthen inter-institutional collaboration and the capacity for farmer participatory research in national institutes and selected farm communities.

In East Timor a new cassava starch factory is scheduled to be built in 2006 along the south coast, possibly in Suai, with a daily capacity to produce 100 tonnes of starch. This requires at least 400 tonnes of fresh roots per day or 120,000 tonnes per year; three times East Timor's current production. This is the first major agro-industry in East Timor and is expected to change cassava's role from a minor food security crop to a major industrial and export crop, which can supply the country with foreign exchange, increase farmers' income, provide employment, and enhance rural development.

## **Project progress**

### **Year 1 (02/09/2004-01/09/2005)**

The first year's activities focussed on making the necessary institutional arrangements for implementing the project. In Indonesia the project could build on previous collaborative cassava experiments and farmer participatory research (FPR) activities, while in East Timor on participation with cassava in the Seeds-of-Life (SOL-1) project. Previous experiments in both countries established "demonstration plots" where farmers from the surrounding area could participate. Trials were used for the evaluation and selection of the varieties or technologies being tested, using the farmers' own criteria for selection. In Lampung province of Indonesia, where cassava is used mainly for starch extraction, farmers selected mainly for high yield, and to a lesser extent, high starch content. Unfortunately, most of these selected varieties or breeding lines still had insufficient planting material for wide-spread testing in FPR trials. In Yogyakarta province, where cassava is grown for human consumption and some processing, farmers selected mainly for high yield and good taste (sweetness). In Lampung, farmers also evaluated the treatments in a long-term fertilizer trial, which clearly showed the importance of application of K, and to a lesser extent N and P, to maintain high yields of cassava and prevent nutrient depletion of the soil. In the two sites in East Timor where cassava is almost exclusively used for human consumption, farmers selected mainly sweet varieties with good tastes and texture, almost irrespective of yield or starch content. Their selection criteria may change in the future as the utilization of cassava roots (and leaves) diversifies. The experience pointed clearly to the importance of involving farmers, and possibly traders, in the selection of new varieties.

The two cassava variety trials harvested in East Timor produced high yields and fairly high starch contents at the high-elevation site in Aileu, and very high yields but low starch contents at the low elevation site in Betano. The soil in the latter site is fertile but extremely deficient in micronutrients, especially Fe and Zn, which seriously affects the growth of some varieties, especially the two local ones, but not that of others. At this site further investigation is needed to address the serious problems of low plant stand (either due to poor or poorly conserved planting material), extreme micronutrient deficiencies, inadequate soil moisture after planting, or excessive weed competition (due to untimely weeding). The high soil fertility, high temperatures and a shorter dry season makes this a near optimum site to produce high cassava yields. In Fatomaca, in the northeastern part of East Timor, cassava growth was very poor this year, most likely due to a heavy infestation of termites in the original planting material. Research may be needed to develop better ways of storing planting material during the long dry season to prevent termite infestations.

The FPR trials planted with farmers in this first year of the project were generally limited. In Indonesia this was mainly due to a lack of planting material of the farmer-selected varieties and breeding lines, especially in Lampung and Yogyakarta, and in East Timor due to lack of experience in conducting this type of trials with farmers. This is usually the case during the first year in a new country.

# Concluded Projects

30 June 2005

## Multilateral

|              |                            |    |
|--------------|----------------------------|----|
| CIM/2000/160 | Seeds of Life - East Timor | 20 |
|--------------|----------------------------|----|

**Project CIM/2000/160: Seeds of Life - East Timor**

|   |  |
|---|--|
| <b>Overseas Collaborating Countries</b> | East Timor   |
| <b>Commissioned Organisation</b>        | Seeds of Life 2 Program, c/o Ministry of Agriculture, Forestry and Fisheries, East Timor   |
| <b>Project Leader</b>                   | Mr Rob Williams<br>Phone: +670 7234601<br>Fax: +670 390325121<br>Email: robwilliams1@inet.net.au   |
| <b>Collaborating Institutions</b>       | Ministry of Agriculture, Fisheries and Forestry, East Timor<br>International Maize and Wheat Improvement Centre, Mexico<br>International Centre for Tropical Agriculture, Colombia<br>International Rice Research Institute, Philippines<br>International Crops Research Institute for the Semi Arid Tropics, India<br>International Potato Centre, Peru |
| <b>Project Budget</b>                   | \$430,060  |
| <b>Project Duration</b>                 | 01/07/2000 to 30/09/2005<br>(Project extended from 01/07/2003 to 30/09/2005)   |
| <b>ACIAR Research Program Manager</b>   | Mr John Cullen   |

**Project background and objectives**

East Timor has a population of almost one million people, occupying half the island of Timor. Eighty per cent of the population, an estimated 139,000 households, rely on agriculture, with cropping providing most of the staple food intake.

Food security has been fragile since that time. The low-level of crop yields, well below that of comparative regions elsewhere has been a major factor in this fragility. Improving crop yields would be a significant step towards reducing widespread malnutrition. Crop yields have been low due to the varieties grown being poorly adapted to local growing conditions. Many of these varieties were of Indonesian origin or of local origin, but without the benefits of recent breeding improvements.

The civil disruption and damage to infrastructure, institutions and research facilities following independence also extended to seed stocks. The resulting shortage of planting material and poor suitability of emergency supplies revealed the need to find improved varieties.

ACIAR's Seeds of Life project aimed to improve food security through the introduction, testing and initial distribution to farmers of improved germplasm of the major food crops: sweet potato; maize; cassava; peanuts, and irrigated rice.

**Project outcomes**

Several lines of each crop, suitable for local conditions and with improved yield for the characteristics of particular areas, have been identified. Many of these have been tested or are in the process of being tested in farmer participatory research. This is based on formulating 'best-bet' varietal recommendations with those farmers involved evaluating these.

Wider scale bulking up of seed for suitable varieties will be undertaken in the follow-on Seeds of Life 2 project. Some farmers have, however, already gained access to improved seed through involvement in the project.

Sweet potato – three varieties yielding between 33.7 tons per hectare and 19.7 t/ha have been identified. These levels of yield are the highest recorded in East Timor. Based on research conducted during the project four varieties that performed well in local conditions have been selected. These will be central in future work to bulk up seed stocks.

Maize – local yields of the maize traditionally grown in East Timor average around 1.5t/ha. Varieties tested during the project have yielded as high as 6 t/ha. In some areas varieties resistant to downy mildew disease have been trialled, resulting in yields between 4.5 and 6.5 t/ha, dependent on the agro-ecological zone. Downy mildew is a major disease that can substantially reduce yields. Both the white maize traditionally grown and newer yellow varieties have been trialled.

Rice – trials are underway at both upland and lowland irrigated sites of suitable varieties. Many varieties have yielded well, the best those with resistance to stem borer, indicating the need for this resistance. One borer resistant variety has been well received in a number of field trials.

Peanut – two varieties, one suitable for cultivation throughout the country and a second suitable for the Baucau region, where iron chlorosis is widespread, have been identified.

Cassava – several suitable varieties, based on a combination of yield, taste and starch content, have been identified. Farmers have been involved in growing and taste-testing varieties, with a number of varieties identified for future trials and use.

Selection of potato and bean varieties has been delayed, to allow the under-resourced partners in East Timor to focus on the main crops (see above) grown.

Many of the suitable varieties identified are being recommended to the Ministry of Agriculture, Forestry and Fisheries, for scaling up and distribution. These varieties appear well adapted to local conditions, have tolerance or resistance to pests and diseases (biotic stresses) and have demonstrated a sufficient level of tolerance to drought and soil (abiotic) stresses.

A number of MAFF staff have also received some training and grounding in crop evaluation and trial methodology. This has provided a foundation from which further cropping research capacity can be built. ACIAR, together with AusAID, will use this foundation in Seeds of Life 2, the follow-on project. This will aim to disseminate the best varieties, and trial these along with crop management methods and improvements on research stations and farms. This is a critical step in making the best available seed widely available to farmers throughout East Timor and beginning to improve the food security situation in the country.

# Projects under development

at 30 June 2005

## **Bilateral**

LPS/2003/004 Timor Leste agricultural R&D facility

# ACIAR publications

This list is a selection of titles from ACIAR's range of scientific publications which are available in hard copy by emailing [comms@aciar.gov.au](mailto:comms@aciar.gov.au), and may also be downloaded from ACIAR's website, [www.aciar.gov.au](http://www.aciar.gov.au).

## Monographs

- 06 Chemistry of Tropical Root Crops: significance for nutrition and agriculture in the Pacific
- 12 Biological Control – Pacific Prospects: Supplement 1
- 20 Biological Control – Pacific Prospects: Supplement 2
- 28 The Economics of Papua New Guinea Tuna Fisheries
- 32 Working with Mycorrhizas in Forestry and Agriculture
- 33 Illustrated Guide to the Identification of Banana Varieties in the South Pacific
- 40 Essential Oils of Tropical *Asteromyrtus*, *Callistemon* and *Melaleuca* Species
- 44 The Major Invertebrate Pests and Weeds of Agriculture and Plantation Forestry in Southern and Western Pacific
- 45 Report on ACIAR-Funded Research on Viroids and Viruses of Coconut Palm and Other Tropical Monocotyledons 1985-1993
- 48 Nutrient Disorders of Sweet Potato
- 52 Improving Smallholder Farming Systems in *Imperata* Areas of Southeast Asia
- 54 Survey Toolbox for Livestock Diseases: practical techniques for developing countries
- 58 Understanding Animal Health in Southeast Asia
- 66 A Review of Papua New Guinea's Red Meat Industry
- 76 Plant Genetic Resources in the Pacific
- 80 Setting Policy Priorities for the Development of Tree Crop Industries in Papua New Guinea
- 81 Policy Options for the Tree Crop Industries in Papua New Guinea
- 83 How to Unravel and Solve Soil Fertility Problems
- 85 Fruits of Oceania
- 94 Survey Toolbox for Aquatic Animal Diseases: A Practical Manual and Software Package
- 99 Developing agricultural solutions with smallholder farmers
- 101 The Coconut Odyssey: the bounteous possibilities of the tree of life
- 102 Lantana: Current Management, Status and Future Prospects
- 108 Pig Husbandry in New Guinea: a literature review and bibliography
- 109 Community Based Resource Planning: Studies from Zimbabwe and Northern Australia
- 113 Worm Control for Small Ruminants in Tropical Asia

## Proceedings

- 13 Bacterial Wilt Disease in Asia and the South Pacific
- 53 Coconut Improvement in the South Pacific
- 57 Leucaena - Opportunities and Limitations
- 66 Bluetongue Disease in the Asia-Pacific Region
- 69 South Pacific Indigenous Nuts
- 91 Fire Management
- 97 *Hypsipyla* Shoot Borers in Meliaceae
- 99 Food Security for Papua New Guinea
- 112 Breeding for Drought Resistant Peanuts
- 113 Agriculture: New directions for a new nation East Timor (Timor-Leste)

## Technical Reports

- 14 Transport of Vegetables in Papua New Guinea
- 15 Marketing Perspectives on a Potential Pacific Spice Industry
- 18 Post-Flask Management of Tissue-cultured Bananas
- 21 Production of Pathogen-tested Sweet Potato
- 50 Mapping Land Resource Potential and Agricultural Pressure in Papua New Guinea
- 55 Chromolaena in the Asia-Pacific Region

**ACIAR Working Papers**

53 Priorities for Pig Research in Southeast Asia and the Pacific to 2010

56 Agricultural research and poverty alleviation: some international perspectives