Australian Government
Australian Centre for International Agricultural Research

ISSUE FOUR 2015
aciar.gov.au

partners

IN RESEARCH FOR DEVELOPMENT

INDONESIA

FACES OF PROGRESS

DEVELOPMENT, INNOVATION AND ADAPTATION

BY **H.E. MR NADJIB RIPHAT KESOEMA**
Indonesian Ambassador to Australia

As the largest archipelagic country in the world, Indonesia is endowed with two million square kilometres of land spread over 17,000 islands big and small, as well as six million square kilometres of sea. With a territory as wide as Europe, Indonesia links the Indian Ocean with the Pacific Ocean, and it links Asia with Australia. A number of studies projected various promising futures for Indonesia: a McKinsey report wrote that it will have a 135 million consuming class by 2030 and a 2015 PwC report estimated that Indonesia will be the fourth largest economy in the world by 2050.

However, the accuracy of that forecast will very much depend on the contribution of the agricultural sector to the national economy. The agricultural sector plays a central role in Indonesia's drive to develop its economy and to realise its full potential. The sector is the main driver in creating jobs, reducing poverty, raising welfare and sustaining environmentally friendly development.

Indonesia's policy priorities in the agricultural sector are designed, among others, to achieve sufficient domestic supply in key commodities and food security while addressing the challenges of increasing demand and boosting productivity. About 40% of Indonesia's workforce earns their living from agriculture. However, the sector contributes about 14% to the country's GDP, indicating a low level of labour productivity compared with other sectors such as manufacturing or services. Rural areas in Indonesia are still home to 60% of the poor and where many depend on the agriculture sector for employment.

To reduce poverty, Indonesia is focusing on reversing the years of stagnation and low productivity that have plagued the sector since the 1990s. Growth in the sector will very much depend on continuous development, innovation and adaptation.

In that context, I am delighted that ACIAR has been collaborating with Indonesia for the past 30 years. Much like its overall economy and its agricultural research, Australia's agricultural sector is advanced and innovative. ACIAR has a crucial role in linking world-class research in Australia to its partners in Indonesia and to convert knowledge into programs that demolish barriers to production and introduce technologies and innovation that boost productivity. I am confident that future collaboration with ACIAR will open up more opportunities to many more Indonesian smallholder farmers to enable them to become more competitive with further value-added processing and increased export.

The people featured in this publication, many of them smallholder farmers, realised their opportunity and improved their livelihood as a direct result of the outstanding work of Australian scientists and agencies in cooperation with their Indonesian partners. Achieving Indonesia's development goals will depend on replicating the success of the smallholder farmers like the ones in these pages all around the archipelago. ■

PHOTO: AUSTRALIAN NATIONAL MARITIME MUSEUM

THE AGRICULTURAL SECTOR PLAYS A CENTRAL ROLE IN INDONESIA'S DRIVE TO DEVELOP ITS ECONOMY AND TO REALISE ITS FULL POTENTIAL.

INDONESIA'S R&D POWERHOUSE: IAARD

Developing locally relevant technologies that boost agricultural production and improve the welfare of smallholder farmers is at the heart of the work of the Indonesian Agency for Agricultural Research and Development (IAARD).

Through its support of agricultural R&D in Indonesia, ACIAR has been collaborating with IAARD and other major Indonesian organisations, such as the Forestry Research and Development Agency and the Agency for Marine Affairs and Fisheries Research and Development (AMAFRAD), for almost 30 years.

Established in 1974, IAARD functions under the Indonesian Ministry of Agriculture as the largest operator of agricultural research development activities in Indonesia. It comprises several research centres, research institutes and assessment institutes, including laboratories and experimental fields spread across the country.

IAARD's R&D activities are as widespread as Indonesia's agriculture sector, from food and cash crops to horticulture and livestock, veterinary science, soil and agro-climatic research, agro-socioeconomic studies, machinery development, post-harvest technologies and biotechnology.

Jointly, IAARD and ACIAR conduct research into technologies, systems and models that can support efficient farming systems. These include improved plant varieties, vaccines, biological pesticides and mechanisation. The organisations also combine to develop policy recommendations, establish national and international networks, and improve the quality of agricultural R&D through capacity development.

Some of the collaborative efforts between IAARD and ACIAR are profiled in the following pages, such as work to empower women through farmer groups in Aceh (pages 21 to 23). The two organisations are also working together on several projects aimed at improving quality and productivity in crop-livestock systems in Indonesia. IAARD provided invaluable support in helping to produce this issue of *Partners*.

NETWORKS FOR GROWTH

BY **H.E. MR PAUL GRIGSON**
Australian Ambassador to Indonesia

As Indonesia celebrates its 70 years as an independent nation, it is timely to reflect on how the republic has developed its economy to be among the world's top 20. Australia has been a longstanding and committed partner in building Indonesia's economic resilience, with a particular focus on boosting productivity in the agriculture sector. Together, our two countries continue to seek ways to boost economic growth and help prepare rural communities for economic shocks. More recently, this work has included facilitating private-sector-led investment in innovative agricultural practices to boost farmer productivity and competitiveness.

Such progress has been made possible through the collaborative work of organisations such as ACIAR, Australia's specialist agricultural research for development agency together with its Indonesian partners. This issue of *Partners* magazine reflects on our development partnership with Indonesia and the integral role of Australian agricultural research in building the capacity of farmers, and in turn creating networks of scientists from both countries. Importantly, this issue tells the personal stories of farmers who are the face of Indonesia's vast agriculture sector.

Australia's support to Indonesia through the work of ACIAR is helping address some of Indonesia's most complex rural development challenges. ACIAR's programs aim to raise incomes for the rural poor by introducing new cultivation techniques, providing access to seeds and fertilisers, and opening up market and investment opportunities. The results tell us that this approach is working.

Indonesian smallholders have trialled and launched innovations to the egg and poultry production system that minimise food safety risks throughout the supply chain. The project culminated in the creation of the now-popular 'Healthy Farm' brand of chilled chickens and fresh eggs for Indonesian supermarkets and provided a test of what it takes to develop a clean supply chain. Another project on wood processing in Jepara, Central Java, has helped the timber industry by increasing the utilisation of timber from young plantations in the production of furniture for domestic and export markets.

ACIAR will continue to work with Indonesia to define agricultural research priorities, and to implement programs and projects that embed activities within value chains and at the farming-community level. Our joint researchers work with a wide range of stakeholders, including farmers, the private sector, NGOs, extension services and policymakers.

Indonesia's size and proximity to Australia mean increased prosperity, stability and growth in Indonesia is in the interests of both our nations, as well as the broader region. In the years to come, Indonesia is expected to see rapid growth, and the challenge that lies ahead is to ensure this leads to increased prosperity for all Indonesians. ■

THIS ISSUE OF *PARTNERS* MAGAZINE REFLECTS ON OUR DEVELOPMENT PARTNERSHIP WITH INDONESIA, AND THE INTEGRAL ROLE OF AUSTRALIAN AGRICULTURAL RESEARCH IN BUILDING THE CAPACITY OF FARMERS, AND IN TURN CREATING NETWORKS OF SCIENTISTS FROM BOTH COUNTRIES.

Dr Tanda Panjaitan and farmer from the village of Gemel.

Dr Marthen Mullik and Dr Gusti Jelantik of Nusa Cendana University, who have been working with legumes and cattle.

A REGIONAL LEADER

It is my pleasure to introduce this issue of *Partners in Research for Development* magazine, which has a focus on our near neighbour, Indonesia. ACIAR has been working with Indonesia for 30 years, with substantial benefits flowing to farmers and the agriculture sector as a whole through the development of tested technologies and innovations, and delivering these to benefit local communities and businesses.

Furthermore, recent evidence from Indonesia shows that returns on public investment in agricultural research are substantial and sustained, with an estimated real rate of return of 13% from increased investment.

The strong friendships that result from collaboration between Indonesian and Australian scientists, officials and agencies are reflected in the outstanding work they have delivered as described within the pages of this magazine.

ACIAR's people-to-people connections are the foundation of our ongoing friendship with Indonesia and this issue of *Partners* highlights several of these important connections.

ACIAR rightly prides itself on the common experiences, knowledge exchange and relationships it has developed between research partners and stakeholders in Indonesia.

By working with our partners such as the Forestry Research and Development Agency, the Agency for Marine Affairs and Fisheries Research and Development, and the Indonesian Agency for Agricultural Research and Development, we have been able to strengthen our programs and projects.

By forging these relationships, ACIAR has been able to build a shared understanding and trust leading to the development of new technologies, knowledge, policies and practices. Our projects are engaging the private sector as the engine room of growth in agriculture.

ACIAR looks forward to continued collaboration delivering benefits to both of our countries. By working together as partners, Indonesia and Australia are creating opportunities for our countries' peoples and ensuring a brighter future for our children. ■

THE STRONG FRIENDSHIPS THAT RESULT FROM COLLABORATION BETWEEN INDONESIAN AND AUSTRALIAN SCIENTISTS, OFFICIALS AND AGENCIES ARE REFLECTED IN THE OUTSTANDING WORK THEY HAVE DELIVERED.

Dr Nick Austin
CEO of ACIAR

PHOTO: MICHAEL HALLIDAY

The Livestock Department team in Labangka, Sumbawa.

ACIAR
aciar.gov.au

partners
IN RESEARCH FOR DEVELOPMENT

Partners in Research for Development is the flagship publication of the Australian Centre for International Agricultural Research (ACIAR). *Partners* presents articles that summarise results from ACIAR-sponsored research projects and puts ACIAR research initiatives into perspective. Technical enquiries will be passed on to the appropriate researchers for reply. Reprinting of articles, either whole or in part, is welcomed, provided that the source is acknowledged.
This publication is freely available from ACIAR's website at aciar.gov.au. It is also freely available on request from ACIAR. The use of a trade name does not constitute any endorsement of, or discrimination against, any product by ACIAR.

For further information contact:
ACIAR Communications and Stakeholder Engagement,
+61 2 6217 0500

Letters from readers are welcome and should be addressed to:
The Editor
Partners in Research for Development, ACIAR
GPO Box 1571, Canberra ACT 2601, Australia

Email: **aciar@aciar.gov.au**
YouTube: **www.youtube.com/user/ACIARprojects**

Photos: **All photos taken in Indonesia by Paul Jones unless otherwise credited**

ISSN 1031-1009 (Print)
ISSN 1839-616X (Online)

Managing editor: **Brad Collis**, Coretext Pty Ltd, coretext.com.au
Editor: **Dr Gio Braidotti**, Coretext Pty Ltd, coretext.com.au

Design and production: **Tim Claeys**, Coretext Pty Ltd, +61 3 9670 1168

CORETEXT

Mixed Sources
Product group from well-managed forests and other controlled sources
www.fsc.org Cert no. SGS-COC-006660
© 1996 Forest Stewardship Council

Australian Centre for International Agricultural Research (ACIAR), aciar.gov.au
GPO Box 1571, Canberra ACT 2601, Australia

THIS ISSUE ...

A JOURNEY THROUGH INDONESIA

BY **PAUL JONES**

When ACIAR called me about documenting agricultural projects taking place in Indonesia I was excited. Like many Australians, I had frequented the shores of Indonesia. I had been to Bali! How different can the rest of the country be? I was in for one big, pleasant surprise.

Indonesia is the world's largest archipelago, with thousands of islands and hundreds of tribes and ethnicities. Indonesia is a diverse and colourful nation. The country is home to more than 249 million people, making it the fourth most populous nation in the world. It has a range of different terrains including volcanoes and lush rainforests, arid savanna, swamps and irrigated rice fields, so it is hard to imagine a more appropriate national motto than *Bhinneka Tunggal Ika*—Unity in Diversity.

The first thing I noticed about Indonesia is that it is a country of contrast: from dense green forests to red dusty sun-baked fields, from economic wealth to poverty, from densely populated cities to rural isolation.

My first stop was Jakarta, Indonesia's capital, a bustling modern city of more than 12 million people, making it one of the world's largest cities. I was amazed how vast the city was and how much traffic congested the streets. It takes an enormous amount of time to get anywhere in Jakarta. Like most cities, it was not built to accommodate cars, and the mix of cars with motor scooters results in perpetual gridlock.

Bali, on the other hand, is bathed in another kind of beauty, complete with lush mountains, white beaches, blue waters and … well, throngs of tourists. But I was not in Indonesia to have a holiday; I was there to work.

In a huge and fertile country such as Indonesia, there is a widespread agricultural sector in each region. Indonesia is a large growth and production centre for vegetables, livestock and aquaculture.

Australia and Indonesia have an effective development partnership that is changing millions of lives by improving health and education outcomes, boosting economic growth, and improving livelihoods for low-income smallholder producers.

Agricultural research has an important role in addressing these policy priorities. ACIAR has been supporting Indonesia for 30 years, with substantial benefits flowing to farmers and the agricultural sector.

Due to the location of ACIAR's projects, I travelled to some of the poorest regions as well as the more developed provinces.

I had the privilege of meeting with agricultural organisations, project leaders, scientists, agronomists, economists and everyday farmers. I also witnessed ACIAR-funded projects that were improving livelihoods, including ensuring food and nutritional security through enhanced productivity and food quality.

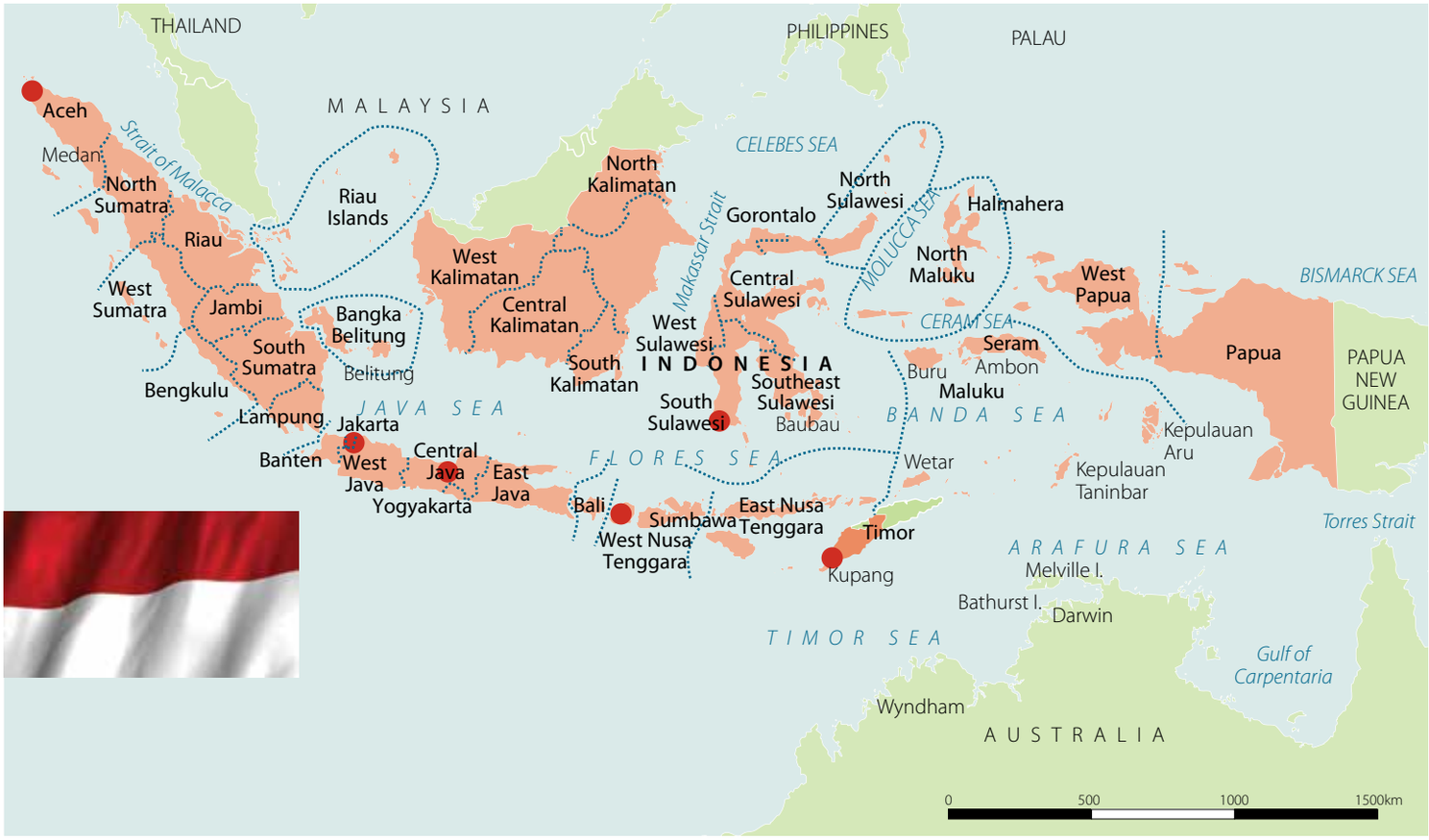
I documented livestock production in West Timor, the profitability and competitiveness of Indonesian agriculture in Sumatra, smallholder aquaculture systems in Lombok and enhanced livelihoods from forestry products in Java, just to name a few.

Here, I must thank ACIAR for the opportunity to travel to and document these projects in Indonesia. And a special thank you to the professional ACIAR staff in Indonesia—Mirah Nuryati, Maria Ludwina and Yudhie—without whom my work would not have been possible.

Arguably, Indonesia is the most varied and interesting country I have visited. Spread over three time zones, it is as wide as Europe and, with more than 17,000 islands, it has some of the most diverse human cultures, flora and fauna known to humankind.

A country of contrast was my first impression of Indonesia. But I believe I could go back many times and still be pleasantly surprised. ■

Over the past 25 years, Paul Jones has worked as a staff photographer for the ***Sydney Morning Herald*** and the ***Australian Financial Review*** and as a freelancer for ***The Australian***, ***London Sunday Times***, ***The Guardian***, Associated Press and Agence France-Presse. His association with ***Partners*** magazine began in 2012 when Paul was sponsored by ACIAR to visit project sites in Papua New Guinea. His report resulted in the first of ***Partners*** magazine's in-country special reports.


THAILAND
PHILIPPINES
PALAU
MALAYSIA
Aceh
Medan
Strait of Malacca
North Sumatra
Riau
Riau Islands
West Sumatra
Jambi
Bangka Belitung
Belitung
South Sumatra
Bengkulu
Lampung
Jakarta
Banten
West Java
Central Java
East Java
Yogyakarta
JAVA SEA
CELEBES SEA
North Kalimantan
West Kalimantan
Central Kalimantan
South Kalimantan
Makassar Strait
Gorontalo
North Sulawesi
Halmahera
MOLUCCA SEA
North Maluku
Central Sulawesi
West Sulawesi
INDONESIA
South Sulawesi
Southeast Sulawesi
Baubau
FLORES SEA
Bali
Sumbawa
West Nusa Tenggara
East Nusa Tenggara
Timor
Kupang
Wetar
BANDA SEA
Buru
Seram
Ambon
Maluku
West Papua
BISMARCK SEA
CERAM SEA
Papua
PAPUA NEW GUINEA
Kepulauan Aru
Kepulauan Tanimbar
Torres Strait
ARAFURA SEA
Melville I.
Bathurst I.
Darwin
TIMOR SEA
Gulf of Carpentaria
Wyndham
AUSTRALIA
0
500
1000
1500km

ABUNDANT SEAFOOD FROM IDLE PONDS

ACIAR works closely with Indonesian agencies to increase fish production from aquaculture and, along the way, helps build sustainable production systems

BY **PAUL JONES**

Wild-capture fisheries and aquaculture are important industries for Indonesia. ACIAR has worked collaboratively to help build capacity in wild-capture fish monitoring and management in support of Indonesia's strategy to stabilise the production from wild-capture fisheries and increase seafood production through aquaculture.

Working together through a suite of ACIAR-funded projects, scientists are delivering a range of benefits and potential solutions to the issues threatening the long-term viability of seafood production chains.

Brackishwater pond—or 'tambak'—aquaculture of shrimp in Indonesia is a leading industry and livelihood activity in coastal areas. However, many small-scale farmers struggle to continue farming shrimp, with competition from other countries, diseases and environmental problems contributing to poor profitability.

ACIAR is addressing disease and environmental problems created by prawn farming in acidic soils through project work in the Sulawesi region of Indonesia.

One of ACIAR's completed projects worked with aquaculture farmers to produce the first healthy shrimp to be farmed in almost three years. The potential to diversify brackishwater pond

A fish farmer and breeder throws a net to catch tilapia at the ACIAR aquaculture ponds near the town of Bireuen, Sumatra. Brackishwater pond (tambak) aquaculture in Indonesia is an important livelihood activity in coastal areas. The ACIAR project will test and evaluate the economic viability of alternative commodities for brackishwater pond culture such as tilapia.

production beyond shrimp has been identified as the key to boosting productivity and profitability for smallholders. ACIAR is trialling and evaluating the economic viability of alternative commodities for brackishwater pond culture such as tilapia, milkfish, rabbitfish, crabs and seaweed.

Evaluation trials are underway in South Sulawesi and Aceh provinces on the island of Sumatra.

BRACKISHWATER PONDS IN SUMATRA

The rise in aquaculture production in Indonesia is good news for lovers of fresh and local produce. It is also good news for rural communities because aquaculture helps the local economy.

Among the easiest and most profitable fish to farm is tilapia, known in the food business as 'aquatic chicken' for its culinary versatility. For farmers too, tilapia is the ideal fish to farm as the fish have an omnivorous diet, ideal mode of reproduction, tolerance to high stocking density and rapid growth.

When grown out in ponds at low density, tilapia will survive on plants and organisms growing naturally in the pond. At higher densities, they are usually fed pellets made largely of vegetable produce and they gain weight rapidly. Topping off the benefits, there is no tilapia season; fish are available year-round and market demand exceeds supply, keeping prices high.

On the outskirts of the city of Bireuen, in Aceh province on the island of Sumatra, Fadli, a local 'key farmer' and seed production operator, shows off the ACIAR tilapia nursery and seed distribution site at Pulo Naleung.

"Just one pair of tilapia will lay 300 to 1000 eggs a month," Fadli says, showing off one of his prized female fish. "At this ACIAR project site, we look at the reproduction of the tilapia including broodstock management and fry nursing."

Males and females are mixed in the spawning ponds to produce fry. After 14 days, the fry are separated from their parents and then transferred to other ponds, from where they are sold to farmers in surrounding villages or even adjacent districts.

For Hasanuddin, the field project coordinator for the ACIAR diversification project and staff member at the Indonesian Brackishwater Aquaculture Development Centre at Ujung Batee, aquaculture represents a key growth area for Indonesia.

"We are encouraging farmers to look at alternatives to shrimp production in brackishwater," Hasanuddin says.

Over 100,000 smallholders across Indonesia use traditional methods to produce shrimp in more than 200,000 hectares of brackishwater ponds. Many of these small-scale farmers struggle to continue farming shrimp. Viral diseases cause crop losses, and input costs (particularly for feed) are rising while prices for shrimp are declining due to strong competition in a global marketplace.

"Our aim here is for the farmers to produce good-quality tilapia seed and then sell on the fish to other aquaculture farmers," Hasanuddin says.

Coastal aquaculture makes a significant contribution to the livelihood of many households, and this is a major factor in its rapid expansion throughout Indonesia.

Farmed tilapia is promoted as good for human health and for the environment at a time when many marine stocks have been seriously depleted.

Breeding stock at the ACIAR aquaculture ponds.

TILAPIA FARMING IN SULAWESI

Tilapia is making its way into Indonesian coastal aquaculture, with help from ACIAR projects on adapting tilapia—a freshwater fish—to brackishwater environments and improvements in farming efficiency.

Far from Aceh, on the island of Sulawesi in Indonesia's east, Mike Rimmer, project manager for ACIAR's aquaculture diversification project, is confident about the future of tilapia aquaculture.

He believes tilapia aquaculture will only grow in importance because it provides food and jobs in a world of declining fish stocks and rising population.

"Our real objective is to develop and evaluate simple production diversification options for small-scale pond farmers in South Sulawesi and Aceh," Mike Rimmer says.

"Another advantage of farming tilapia is that it's ecologically sustainable and relatively cheap to produce."

As the call for midday prayer trills in the distance, field officer Dasep Hasbullah points out tilapia fish in brackishwater ponds at an ACIAR trial site located about 100 kilometres north of Makassar, South Sulawesi.

"Here we trial selectively bred strains of tilapia," he says, explaining that the ponds at these trial sites contain mixed fish: tilapia and milkfish.

"Sometimes the tilapia fish in the ponds have died due to high salinity," he says.

"So now we are co-culturing milkfish and tilapia together. This reduces the risk for farmers, as the milkfish survive even in high salinities."

The milkfish is another important seafood in Indonesia. Its ability to thrive in varying water conditions makes it an ideal fish to be grown in the confines of inland ponds, with harvest occurring when the fish grow to 20–40 centimetres in length. However, its market price is lower than tilapia so, for farmers with less saline ponds, tilapia is the better option.

The main goal is to increase the income for farmers who, for a range of reasons, are unable to farm shrimp in their brackishwater ponds.

Socioeconomic survey data from South Sulawesi indicates that 53% of farming households have a total monthly income less than A$60.

In Aceh, about 50% of farming households fall below the poverty threshold.

Social benefits will accrue from increased social stability due to improved employment opportunities in rural areas and greater access to seafood, with resultant health benefits. ■

Field project coordinator Hasanuddin.

Mike Rimmer and Dasep Hasbullah.

PROJECT INFORMATION

FIS/2007/124:
DIVERSIFICATION OF SMALLHOLDER COASTAL AQUACULTURE IN INDONESIA

With many brackishwater pond aquaculture enterprises in Indonesia going out of production or producing only limited quantities of shrimp, ACIAR-funded research partnered with Indonesia to find the reasons for this decline.

Research revealed that while small-scale shrimp farms predominate in South Sulawesi, they only contribute about 5% of total provincial shrimp production. While some farms now use better management practices to overcome production constraints, successful implementation depends on meeting specific site-related, socioeconomic and logistical criteria and a large proportion of farms are expected to fail to meet this criteria. As a result, a need was identified for alternative production strategies.

This project tests the economic viability of alternative commodities for brackishwater pond culture such as tilapia, milkfish, rabbitfish, crabs and seaweed. It involves evaluation trials in South Sulawesi and Aceh provinces that build on previous and ongoing ACIAR projects.

The work will also encompass mariculture (the cultivation of marine organisms) development on offshore islands of Aceh province, particularly Pulau Simuelue, and growth trials with grouper in collaboration with the fish seed production centre on Pulau Simuelue to promote the use of more sustainable culture practices developed in other ACIAR-supported work.

OUR INDONESIAN PARTNERS

- Brackishwater Aquaculture Development Centres, Takalar and Ujung Batee
- Directorate-General of Aquaculture
- Gadjah Mada University
- Hasanuddin University
- Research Institute for Coastal Aquaculture

COMMISSIONED ORGANISATION

- Faculty of Veterinary Science, University of Sydney

Project leader: Professor Richard Whittington, richardw@camden.usyd.edu.au

SMALLHOLDER TREES CAN SUSTAIN A TIMBER INDUSTRY

ACIAR's forestry research program manager, Tony Bartlett, recently visited Indonesia to attend a final review of an ACIAR project on timber value chains. Here he describes the project outcomes

On the Indonesian island of Java, many farmers are planting teak and mahogany as an integrated part of their farming system. Pak Warto from Gunungkidul has been planting teak for more than 30 years and has seen a major transformation of the landscape as farmers began planting trees. His 30-year-old teak trees are worth about three million rupiah (A$279) each if he sold them now. They were planted around the edge of a field he inherited and which he has since planted with teak.

For the past five years, ACIAR has been supporting research into the value chains and processing of high-value timbers grown in Java by farmers such as Pak Warto under two interrelated forestry projects.

Research on value chains is important because farmers are likely to receive higher prices for their timber if the wood processors are able to enhance the value of the finished wood products.

Of the two ACIAR projects on mahogany and teak furniture, one particularly worked to improve value chain efficiency and enhance livelihoods. The research was managed by the Center for International Forestry Research (CIFOR) and involved partners from the Indonesian Forest Research and Development Agency and the Bogor Agricultural University.

Project activities in the town of Jepara involved the large furniture industry, which contributes 26% of the town's economy. The project involves 12,000 small-to-medium enterprises (SMEs) that process 0.9 million cubic metres of timber each year.

Research under this project has resulted in a comprehensive understanding of the complexity of the value chain in both the domestic and international marketplaces, as well as the problems faced by the small-scale businesses that make up 92% of the furniture industry.

Pak Warto from Gunungkidul has been planting teak for more than 30 years and has seen a major transformation of the landscape since farmers began planting trees.

Examples of high-quality furniture and wooden products manufactured in Jepara.

Subsequent research supported the implementation of four strategies for the Jepara furniture industry value chain: 'moving up', 'collaborating down', 'green furniture' and 'small-scale association'.

Recently, the extent to which project achievements have helped to further these strategies were examined when ACIAR held the end-of-project review. ACIAR met members of the Jepara Small-scale Furniture Producers Association (APKJ)—an organisation established with the project's support. The association commenced in 2009 with 60 members and now has 126 members, with many of these representing 10 SMEs.

Impact assessment found that member companies have shown improved wood supply and furniture production, expanded markets, enhanced sales and profits, with the relative

Small-diameter logs from smallholder growers possess different wood properties for furniture manufacturers compared with large-diameter logs harvested from natural forests.

changes being up to 50% greater for APKJ members compared with non-APKJ members.

The chair of APKJ indicated that collaborative mechanisms helped them all to understand the complexities of the value chain, make improvements to the flow of products and their marketing as well as implement systems to improve the safety of their workers.

He said the most important outcome was giving these small businesses a voice with policymakers, particularly in enabling them to provide comment on the practicality of new regulations. Another significant—and perhaps unexpected—impact has been the success achieved in influencing policymakers.

Indonesia has a system of decentralised government that undertakes the development of 'roadmaps' or strategic plans. The ACIAR project supported a process whereby stakeholders came together to develop a roadmap for the Jepara furniture industry.

The output from this process has the strong support of the Bupati (or head) of the Jepara District Government, Hendro Martojo, and the Parliament is in the process of preparing a House Initiative District Regulation to support implementation of the roadmap. They also intend to develop a second regulation to support enhanced occupational health and safety of workers.

ENHANCED SMALLHOLDER PARTICIPATION

The Jepara furniture industry is undergoing enormous change, creating the need for significant research and development support.

When I visited Jepara in October 2011, I was told by some furniture manufacturers that previously about 80% of the logs they were using were large-diameter logs sourced from natural forests—areas that were being converted to oil palm or timber plantations—or from the government teak plantations (Perhutani).

Due to changes in government policies and overharvesting of the Perhutani plantations, these days about 70% of the furniture manufacturers' log supplies are small-diameter logs sourced from smallholder growers.

These small-diameter logs have different wood properties to the larger logs and often the furniture manufacturers do not have adequate knowledge about how to best process them.

Also, there is international concern about illegal logging and many international markets—including the USA, Europe and Australia—have put in place systems that require importers of timber products to demonstrate that the wood products have come from legal sources.

These systems were designed for wood products illegally sourced from natural forests, but they also apply to wood grown by farmers in agroforestry systems. Most small enterprises do not have the capacity or resources to deal with this new requirement.

The ACIAR project has assisted some members of APKJ to achieve certification under the Indonesian Timber Legality Verification system. Certification allows them to continue to market their furniture products into international markets.

As Jepara continues to produce a wide range of exquisite and good-quality furniture and wooden

PROJECT INFORMATION

ACIAR's Forestry program contributes to poverty alleviation and natural resource conservation and rehabilitation through scientific support for the establishment, management and sustainable use of forests. The program is headed by Tony Bartlett, who joined ACIAR in July 2010 from the then Department of Agriculture, Fisheries and Forestry where he held senior executive responsibility for Australian Government natural resource management programs and policy. Mr Bartlett was recognised for his contribution to Australian and international forestry by being awarded a Centenary Medal in 2003.

OUR INDONESIAN PARTNERS:

- Bogor Agricultural University
- Center for Forest Biotechnology and Tree Improvement
- Center for International Forestry Research
- District Planning and Development Agency
- Forest Research and Development Agency
- Forum Rembug Klaster
- Gadjah Mada University
- Jepara Small-scale Furniture Producers Association (APKJ)
- Technical College of Wood Technology

COMMISSIONED ORGANISATION:

- CSIRO Forestry and Forest Products, Australia

For further information contact Tony Bartlett: tony.bartlett@aciar.gov.au

artefacts, it is important that ACIAR supports research that ensures these products find their way into high-value markets.

THE SECOND ACIAR PROJECT

ACIAR has another project based in Jepara that is supporting the Indonesian furniture industry by enhancing value-adding from teak and mahogany plantations.

This project also supports agroforestry research that enables farmers who grow high-value timbers—such as teak and mahogany—to receive equitable returns from timber sales.

The project has done an excellent job in disseminating its outputs via a wide range of media. Two innovative and interesting examples are:

- CIFOR's seven-minute video on the survival of Jepara furniture (http://youtube.com/watch?v=Mw6TOjFzlqA); and
- an informative article in the Indonesian publication *Tempo* (www.cifor.org/fileadmin/subsites/fvc/Tempo_Magazine.pdf). ■

ADDING VALUE TO THE GOOD OIL

Melaleuca is an important plant species for Indonesia, particularly due to the extraction of cajuput oil, which provides an important source of employment in Java. Almost every household has a bottle of cajuput oil that is widely used as a medicine for various illnesses, much as tea-tree oil is used in Australia.

A former ACIAR project implemented a breeding strategy for *Melaleuca cajuputi* ssp. *cajuputi* to improve oil yields and oil qualities of cajuput. The project formed part of the response to the need to replace the plantations on which the Indonesian cajuput oil industry depends. A comparative study of the industry that examined yields pre-project and expected yields post-project predicted gains of 20% in growth traits and 20% in oil concentration. The resulting increase in oil yield was between 62 and 86 kilograms per hectare, an improvement of A$240/ha at the distillery gate. The project also contributed significantly to capacity building within the Center for Forest Biotechnology and Tree Improvement, particularly to developing the skills of staff in the tree breeding and floral biology research groups.

Today, molecular geneticists such as Eko Hardiyanto (pictured above) carry on making genetic gain, seeking to almost double the oil output from Java's 26,000 hectares of mixed-farming cajuput plantations where farmers are allowed to work the land, plant and harvest test crops, but also earn wages by harvesting cajuput leaves for the oil distilleries.

– PAUL JONES

THE CRAWFORD FUND CONFERENCE

From 10 to 12 August, the Crawford Fund held its annual conference on food security at Parliament House in Canberra. This year, the conference's theme was 'The business of food security: profitability, sustainability and risk'. The conference connected with business and government to explore new directions in research, discuss public policy and develop a new generation of public–private partnerships.

Further information about the conference is available on the Crawford Fund website: www.crawfordfund.org/events/2015-conference

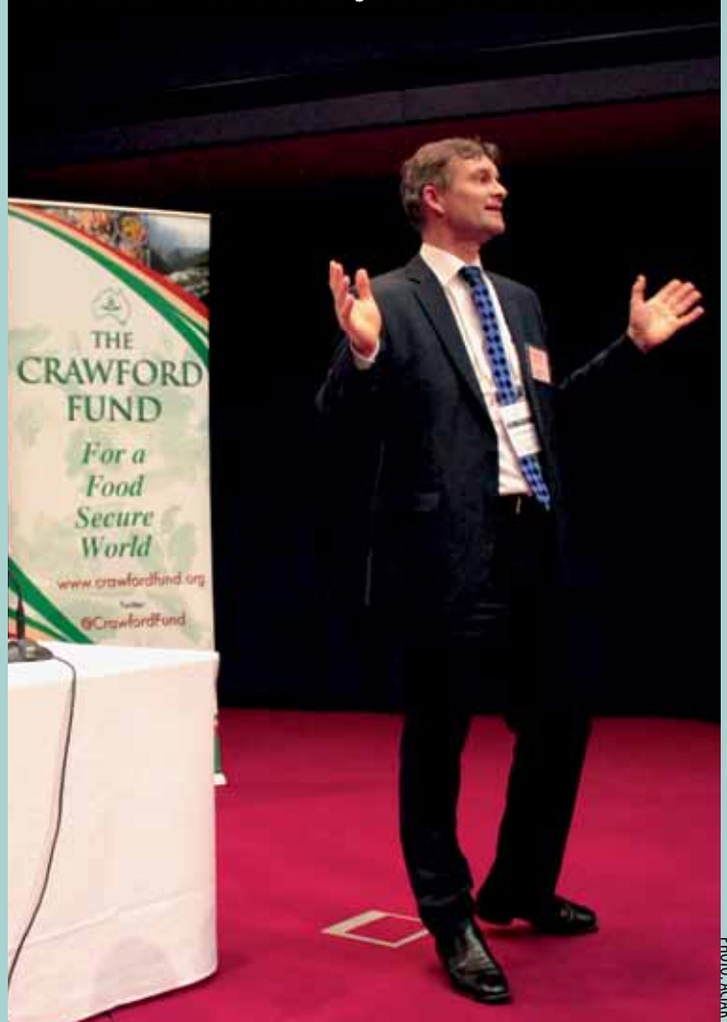


PHOTO: ACIAR

Dr Jim Woodhill, principal sector specialist from the Australian Department of Foreign Affairs and Trade, facilitates an afternoon discussion panel at the conference.

INTERNATIONAL CONFERENCE OF AGRICULTURAL ECONOMISTS

The 29th International Conference of Agricultural Economists (ICAE) was held in Milan, Italy, from 8 to 14 August. This year's theme was 'Agriculture in an interconnected world', and it provided an opportunity to explore the widespread adoption of new communication technologies and unprecedented changes in global agriculture. ACIAR supported 17 attendees at the event as part of its capacity-building activities.

Further information about the event is available through the ICAE 2015 website: www.icae2015.org

PHOTO: ACIAR

Participants at the Youth in Ag market day.

YOUTH AG-SUMMIT

One hundred young leaders aged 18 to 25 travelled to Canberra in August to participate in the 2015 Youth Ag-Summit. Participants from 33 countries came together to develop innovative actions to tackle global food challenges. During the summit, young leaders connected with each other, listened to inspirational speakers, exchanged ideas and experienced local agriculture during field trips. One of the outcomes from the event was the 'Canberra Youth Ag Declaration', which was presented to the United Nations Committee on World Food Security in Rome on 14 October.

A two-minute closing video is available through the Youth Ag-Summit website: www.youthagsummit.com/event-blog

PHOTO: ACIAR

The Minister for Foreign Affairs, the Hon. Julie Bishop MP, meets with ACIAR's Policy Advisory Council and Commission at Parliament House.

ACIAR COMMISSION AND POLICY ADVISORY COUNCIL MEET IN CANBERRA

During the week of 14 to 18 September, ACIAR hosted the ACIAR Commission for its 32nd meeting and ACIAR's Policy Advisory Council for its 34th meeting. This was followed by a study tour of regional New South Wales and Victoria visiting some of ACIAR's key research, agriculture and agribusiness partners in Wagga Wagga, Albury, Shepparton and Bundoora.

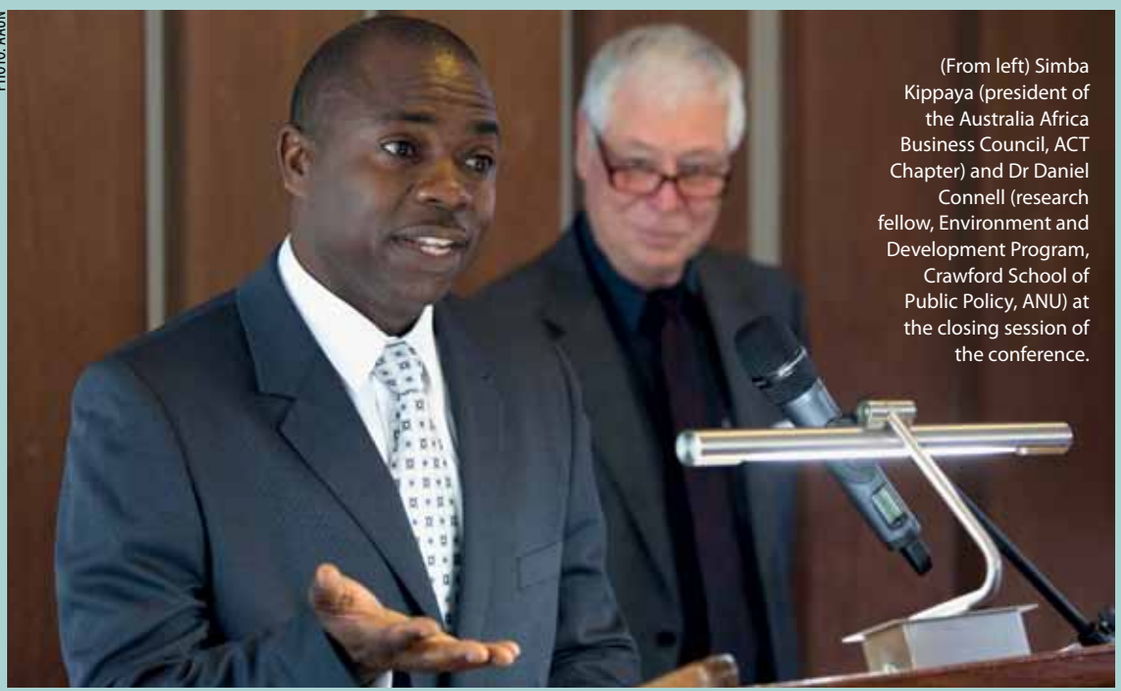
For further information, please see the media releases on the ACIAR website: http://aciar.gov.au/media-release

THE AUSTRALIA–AFRICA UNIVERSITIES NETWORK CONFERENCE

The Australia–Africa Universities Network (AAUN) Conference was held at the Australian National University in Canberra from 26 to 28 August as a forum to facilitate information sharing between the continents and develop strategic partnerships in business, academia and governments. There were three key themes this year: investment and business promotion; education, science and technology in Africa; and health, nutrition and food security.

Further details of the conference can be found on the AAUN website: http://aaun.edu.au/2015/06/australia-africa-conference-aac-26-28-august-2015-canberra

PHOTO: AAUN



(From left) Simba Kippaya (president of the Australia Africa Business Council, ACT Chapter) and Dr Daniel Connell (research fellow, Environment and Development Program, Crawford School of Public Policy, ANU) at the closing session of the conference.

Anika Molesworth

YOUNG FARMER OF THE YEAR: ANIKA MOLESWORTH

ACIAR would like to congratulate Anika Molesworth for being awarded 'Young farmer of the year 2015' by the Kondinin Group and ABC Rural. Ms Molesworth has been involved in several ACIAR projects including CSE/2009/004 'Developing improved farming and marketing systems in rainfed regions of southern Lao PDR' and CSE/2014/086 'Crop–livestock systems platform for capacity building, testing practices, commercialisation and community learning'. Ms Molesworth spent three months working with the project team in Savannakhet, Lao PDR, as a volunteer from November 2014 to February 2015. She then travelled again to Savannakhet in July as a visiting scholar to complete data collection on use of crop residues in crop–livestock systems. Ms Molesworth will use this research in writing her thesis for her Masters in Sustainable Agriculture at Charles Sturt University to focus on using crop residue in integrated crop–livestock systems for improved climate resilience.

SATU INDUK SATU ANAK SATU TAHUN – THE THREE 'S' APPROACH TO CATTLE

Smallholder enterprises are vital to increasing beef production in Indonesia and they are receiving assistance through a research program that addresses the constraints farmers face in realising the industry's potential

In West Timor, Indonesia, maize is a major component of the traditional food resource; but, yields are poor due to inadequate crop nutrition and crop husbandry, and variable climate. This project will evaluate forage legumes for integration into maize cropping and assess their potential as dry season fodder to lift animal production.

BY **PAUL JONES AND WARREN PAGE**

One calf per cow per year. This simple goal highlights both the challenge and the possibility to lift cattle production in Indonesia. Indonesia's cattle producers are largely smallholder farmers who see their cattle as a financial safety net. When times are tough and household needs are great, cattle are sold for income. Under this traditional approach, one calf is born every 18 to 24 months.

Growing and maintaining cattle demands feed resources that are not widely available, particularly to poor farmers. So cattle are not considered profitable by many smallholders.

Yet, beef demand in Indonesia is increasing significantly due to a growing urban middle class. A McKinsey report—*The archipelago economy: Unleashing Indonesia's potential*—estimates that by 2030 the consuming class will swell by 90 million people to 135 million.

The potential for growth in this market is significant. Demand for beef is growing at 4% a year and in the current Indonesian diet each person consumes about two kilograms of beef a year. Domestic demand therefore presents enormous opportunities for poor Indonesian farming communities to improve their own income and living standards by expanding and intensifying traditionally meagre cattle-rearing activities.

In rural areas such as the village of Genggelang, North Lombok, cattle numbers had been dropping due to poor farmers selling their cattle for short-term income. This left them with no cattle for the long term, nor a base on which to build a profitable industry.

Murdah is the secretary of the Ngiring Datu farmers group and, like many farmers in Lombok, did not realise that cattle could bring more profit and better living conditions for the whole community.

Murdah has been participating in an ACIAR project working to improve reproductive performance of cows and to develop improved fattening regimes for Bali cattle, which comprise one-third of the national herd. The faster cattle can be fattened, the sooner they can be sold. Fatter cows are healthier and more likely to conceive more often. "The biggest advantage with this project is now we have healthy calves every year," Murdah says. "We have more income and more cattle. The village uses the money to send our children to school, build and repair our houses and we can buy more cattle."

The project is one of a program, extending back two decades, between the Indonesian Government and ACIAR. The heart of the program lies in lifting cattle production via a series of integrated projects, focusing on reproductive performance and improved feeding systems.

Throughout the cattle program's two-decade life span, project partners from Indonesia and Australia have identified a range of approaches to deliver resilient, low-labour-intensity solutions that result in cattle using high-quality and sustainable livestock feed sources.

The key component running through the program has been the idea of increasing cattle production by a calf for each cow every year. The Bahasa version—Satu Induk Satu Anak Satu Tahun—literally means "One Cow One Calf One Year" and is often referred to as the three Ss, or 3S. Breaking down the components needed to achieve 3S reveals the key challenges: improving the condition of cows, enhancing the chances of conception each year and combating calf mortality.

REDUCING MORTALITY RATES

In the small village of Genggelang, Dr Dahlanuddin looks over newborn calves. Dr Dahlanuddin and his fellow project team members have been working to ensure these calves have the best chance of survival.

Calf mortality remains a major constraint in the lowered levels of cattle productivity in Indonesia.

Dr Dahlanuddin is working with Murdah and his fellow farmers from the Ngiring Datu farmers group to lift productivity throughout the cattle production system. While there are high levels of calf mortality, farmers remain hesitant to devoting labour and resources to cattle production. Poor

nutrition of cows is a major contributing factor. With traditional approaches, calves are unable to get all the nutrients they need as their mothers (dams) are underfed. The calves struggle for nutrients and have poor growth rates.

Past ACIAR research has identified under-nutrition in calves during their first six months as a contributor to lowered body weight throughout their lives. Feeding supplements to dams did not alleviate this issue.

The solution was to wean calves earlier, feed available supplements to the calves and reduce the demand on cows nursing their young. Mortality rates were significantly reduced and in many areas dropped from 33% to zero.

A project to improve calf survival in West Timor villages, led by Dr Gusti Jelantik, also had promising results. The project was conducted entirely on smallholder farms, with the overall objective of developing methods of reducing calf mortality.

The project team introduced a feed supplement consisting of grass hay and concentrate (rice bran, cornmeal, leucaena legume leaf and fish meal) formulated to contain 18% crude protein. This supplement was given to calves in the morning while confined to calf pens.

Dr Jelantik highlighted that "when the project started, we had calf mortality rates of more than 30%," and "at the conclusion of the project, and after providing feed supplements to calves, we reduced that rate to 2%."

In Oefafi village in West Timor, cattle rearing is now an important income earner. The combination of feeds, early weaning and fattening of calves has been adopted and is helping to improve villagers' lives.

FEEDING FOR BREEDING

Dr Dahlanuddin is part of a team working to replicate this success in several low-input cattle production systems across eastern Indonesia. "The project looks at increasing the calving rate, reducing mortality and increasing the growth rate of the cows," he says.

One of the challenges in low-input systems is returning dams to a suitable condition to conceive again. The lower the available feed resources, the longer the time taken. For nursing dams that time usually begins once calves are weaned.

Earlier weaning has a dual effect: allowing cows to eat to recover condition without diverting that nutrition to milk production and accelerating the time until a cow's individual condition is suitable for conception. When the latter occurs within a year, the goal of one calf per cow per year can be reached.

The idea of 3S has taken hold in villages where ACIAR projects have been successful because farmers are quick to realise the strength of the combined approach the program introduces. A change in mindset means many smallholder farmers in Indonesia are now viewing cattle as far more than a safety net or living bank, but as a viable business opportunity, especially in supplying the growing market for beef.

For smallholders such as Murdah, the benefits are tangible: income to fund children's education, housing, access to health services and debt repayment. For others, such as Dr Jelatnik, there is a pride in delivering those benefits. They are playing a role in the transformation of the rural economies of Indonesia, opening the way to a better future for many. ■

Dr Dahlanuddin

PROJECT INFORMATION

PROJECTS CONTRIBUTING TO ACIAR'S CATTLE PRODUCTIVITY WORK:

- LPS/2014/022: Heifer-calf and fattening strategies—Indonesia
- LPS/2013/021: Straw cow 2: Indonesia
- LPS/2012/064: Integrating herbaceous forage legumes into crop and livestock systems in East Nusa Tenggara, Indonesia
- LPS/2008/054: Improving smallholder cattle fattening systems based on forage tree legume diets in eastern Indonesia and northern Australia
- LPS/2008/038: Improving reproductive performance of cows and performance of fattening cattle in low input systems of Indonesia and northern Australia
- LPS/2006/003: Integrating forage legumes into the maize cropping systems of West Timor
- LPS/2006/005: Evaluating strategies to improve calf survival in West Timor villages
- LPS/2004/005: Improving smallholder crop-livestock systems in eastern Indonesia
- LPS/2004/023: Strategies to increase growth of the weaned Bali calf

OUR INDONESIAN PARTNERS:

- Assessment Institute for Agricultural Technology, East Nusa Tenggara, Lampung, Nusa Tenggara Barat, South Sulawesi and Southeast Sulawesi
- Beef Cattle Research Institute
- Department of Agriculture and Livestock, Central Lombok District
- Haluoleo University
- Hasanuddin University
- Indonesian Centre for Animal Research and Development
- Tadulako University
- University of Mataram
- University of Nusa Cendana

COMMISSIONED ORGANISATIONS:

- CSIRO Sustainable Ecosystems
- University of Queensland

Idris, treasurer for the Genggelang Group of farmers.

For further information, please contact ACIAR research program manager for livestock production systems:
Dr Werner Stür, werner.stur@aciar.gov.au

BEEFING UP CATTLE NUTRITION WITH TREES

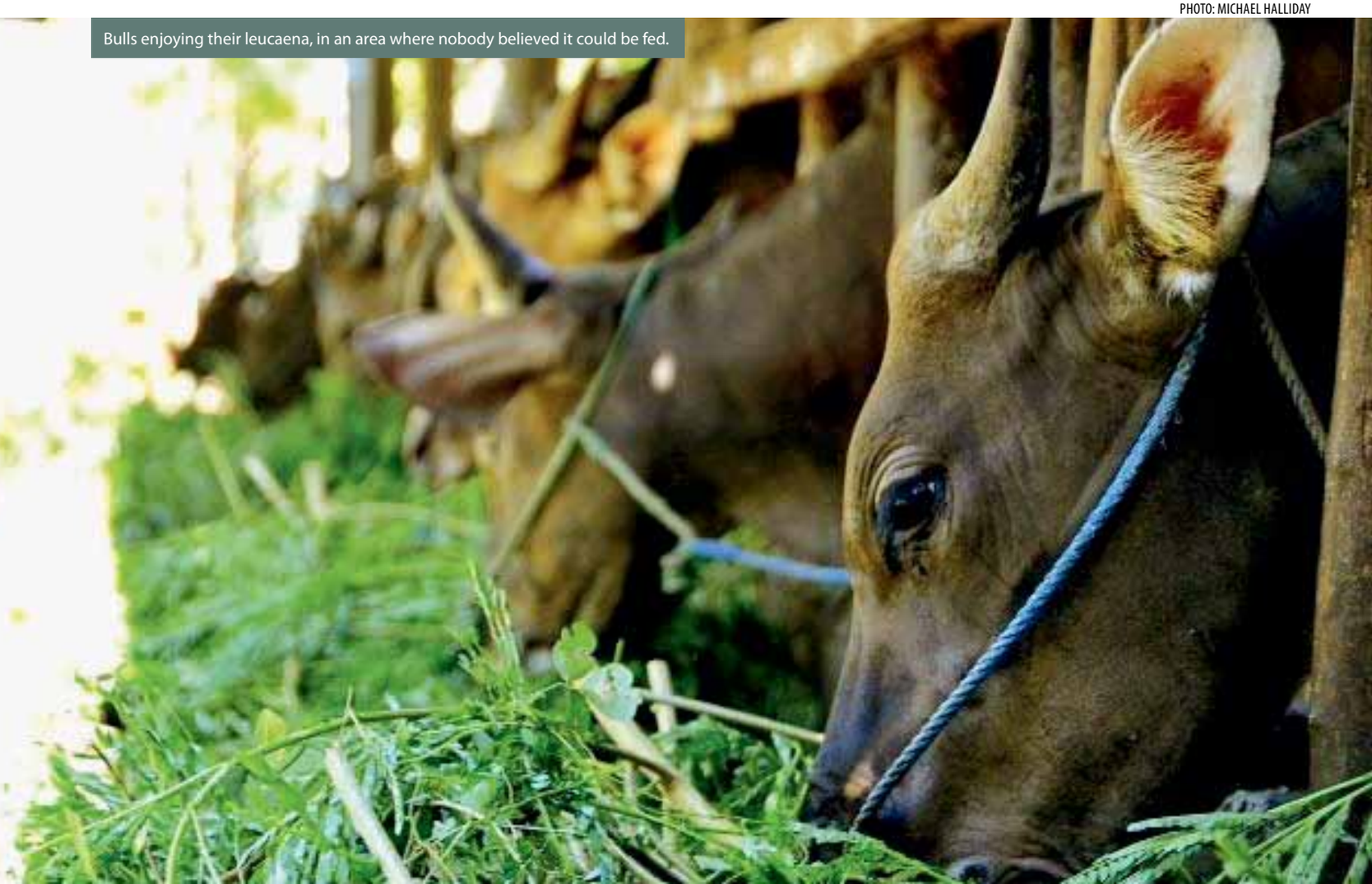
BY **KATE LANGFORD**

"NUTRITION IS THE MOST IMPORTANT LIMITING FACTOR IN CATTLE PRODUCTION IN EASTERN INDONESIA," SAYS MICHAEL HALLIDAY, RESEARCHER AT THE UNIVERSITY OF QUEENSLAND. RESEARCH TEAM LEADER ASSOCIATE PROFESSOR MAX SHELTON ADDS THAT "IF NUTRITION CAN BE IMPROVED, CATTLE SALES CAN INCREASE AND THIS IS THE BEST WAY TO IMPROVE RURAL LIVELIHOODS".

Michael Halliday and Associate Professor Max Shelton are collaborators on an ACIAR project working with farmers in East and West Nusa Tenggara in Indonesia. They believe they have the answer to dramatically improving cattle nutrition—and it can be found on trees.

"Forage tree legumes are uniquely suited to smallholder farming systems," Mr Halliday explains. "They can easily be incorporated by

PHOTO: MICHAEL HALLIDAY



Bulls enjoying their leucaena, in an area where nobody believed it could be fed.

farmers to provide high-quality, protein-rich feed for livestock."

Forage tree legumes (FTLs) do not need to be replanted every year and they regrow quickly. Their foliage is easily transported and harvested, and the multipurpose trees can also provide timber and fuel in addition to fodder. Being trees, they are deep-rooted and remain green in the dry season when grasses are in short supply. Most importantly, when fed to cattle, FTLs significantly increase weight and health.

FTLs are not new to Indonesia. Many farmers are already making use of two species: *Sesbania grandiflora*, which is indigenous, and *Leucaena leucocephala*, which has been introduced. For the past four years, Indonesian and Australian researchers have been investigating where and how farmers in Nusa Tenggara use these species, and are working on maximising their potential.

"We did not want to introduce new species; rather, we wanted to work with legumes that are familiar to farmers: to find out what works, what are the barriers preventing adoption by others and what can be done to scale-up these technologies," Mr Halliday says.

In particular the researchers, together with Indonesian project leaders Dr Tanda Panjaitan, Dr Dahlanuddin, Dr Jacob Nulik and Mrs Debora Kana Hau, are focusing on the role of FTLs in the fattening phase of cattle production and how they

PHOTO: MAX SHELTON

Legume seeds ready for planting in West Timor.

PROJECT INFORMATION

LPS/2008/054:
IMPROVING SMALLHOLDER CATTLE FATTENING SYSTEMS BASED ON FORAGE TREE LEGUME DIETS IN EASTERN INDONESIA AND NORTHERN AUSTRALIA

OUR INDONESIAN PARTNERS:

- Assessment Institute for Agricultural Technology, East Nusa Tenggara
- Assessment Institute for Agricultural Technology, West Nusa Tenggara
- University of Mataram

COMMISSIONED ORGANISATION:

- University of Queensland

Project leader: Associate Professor Max Shelton, m.shelton@uq.edu.au

PHOTO: MAX SHELTON

A farmer preparing forage in Lombok.

PHOTO: MAX SHELTON

PHOTO: MICHAEL HALLIDAY

Mr Halliday says farmers and government still do not appreciate the importance of forage quality, of which FTL leaves are superior.

can generate higher earnings for smallholders who grow two breeds of beef cattle: Bali cattle (*Bos javanicus*) and Ongole (*Bos indicus*).

"We know there is a lot of potential for forage tree legumes but we have not seen a great deal of adoption in smallholder systems until it was demonstrated by this project," says Dr Werner Stür, ACIAR's research program manager for livestock production systems. "This project is giving us proof of the benefits and demonstrating how uptake can be improved."

Of the nearly 15 million beef cattle raised in Indonesia, 60% are raised by smallholder farmers and 14% of that market is in Nusa Tenggara. With beef consumption predicted to rise markedly in coming years, and Indonesia aiming to achieve self-sufficiency in the beef industry, improving cattle nutrition is vital to the sector. Poor nutrition can lead to a range of health and production issues.

In the past, grasses have been the main focus of efforts to improve cattle nutrition. Mr Halliday says farmers and government still do not appreciate the importance of forage quality, of which FTL leaves are superior. The ACIAR project team is hoping to change this by improving practices in areas where FTLs are already being used and demonstrating their benefits.

In Central Lombok, smallholder farming systems generally comprise rice paddies surrounded by bunds on which sesbania is grown. The leaves of sesbania, when fed to cattle, give a three to five-fold increase in quality when compared with rice straw. Although lack of available land to plant sesbania limits the amount fed to cattle, Mr Halliday says there is still an opportunity to enhance productivity by using the limited FTL more efficiently and by improving housing and hygiene.

On the island of Sumbawa, a large number of Balinese farmers have long been focusing their efforts on leucaena-fed cattle production. It was here that Indonesian researchers found the village of Jatisari, one of the best examples of the successful and profitable use of leucaena for bull fattening. Many farmers in Jatisari are feeding their cattle 100% leucaena and bulls fatten quickly on this diet, making them easy to market.

The ACIAR project has introduced measures aimed at improving the adoption of FTLs in Nusa Tenggara. Monthly weighing is offered to farmers to demonstrate how FTLs can increase liveweight gains two to threefold. The most successful farmers achieve weight gains over 800 grams per day during short-term fattening—close to the genetic potential for Bali cattle. Seed nurseries are being established to ensure a ready supply of quality seed to meet the growing demand as the success of the project spreads.

The ACIAR project has also benefited producers in both Australia and Indonesia as new research is overcoming the issue of toxicity in leucaena, which has previously been a barrier to adoption.

Mr Halliday says the ACIAR project is demonstrating how FTLs can halve labour in cattle-rearing and double liveweight gain. A flow-on benefit of a cut-and-carry FLT system is improved cattle housing, which improves hygiene and makes it easier to control pests and diseases. Mr Halliday attributes much of the success of the project to the calibre of the Indonesian project leaders and the enthusiasm of the successful young field researchers.

These staff will be critical to further efforts towards up-scaling and adoption. Seven demonstration sites are already up and running and 15 training videos are in production to assist in village-based training sessions. The project team is now training staff of local institutions and extension workers to ensure the project has a lasting legacy.

Mr Halliday estimates that by the end of the project (mid 2016) they will have worked with more than 1,500 farmers in West and East Nusa Tenggara who will have planted more than 400,000 FTLs. They will also have distributed more than 2,000 kilograms of the Tarramba variety of leucaena seed to farmers.

"When farmers see they can double or even triple cattle productivity by overcoming nutrition issues, obviously they will want access to this technology." ■

WELLBEING GROWS AROUND COMMUNAL VEGETABLE GARDENS

The presence of women in farming activities is widespread. Part of ACIAR's project in the tsunami-affected Aceh region focuses on establishing and supporting women's farming groups, which are earning extra income marketing vegetable crops such as tomatoes and cucumbers

BY **PAUL JONES**

The Indian Ocean tsunami of December 2004 left indelible scars on the landscape of Nanggroe Aceh Darussalam province in Indonesia. Some of these scars continue to heal and, in doing so, are changing the way people live.

After the tsunami two projects were funded by ACIAR that addressed soil and agronomic production constraints arising from the tsunami and emphasised capacity-building activities at the regional and farmer level.

Together these projects have created opportunities to guide the development of more profitable and resilient farming systems.

One group of people in particular have found their lives changing with these opportunities—women working the agricultural fields near Banda Aceh in Sumatra.

With hoe in hand and surrounded by needle-like cliffs, palm trees and grazing cows, the women

Zainabon, head of the Aceh women farming group (called Seeding of Hope) with other farmers in the field. In the province of Nanggroe Aceh Darussalam (NAD) in Indonesia there is an opportunity to guide the development of more profitable and resilient farming systems following from the Indian Ocean tsunami of December 2004. As part of ACIAR's commitment to tsunami recovery in NAD, it funded projects that addressed soil and agronomic production constraints arising from the tsunami and emphasised capacity-building activities at the regional and farmer level.

"The women farming groups have had a variety of benefits, most notable would be the social and economic benefits for each community."

– Teuku Iskandar

farmers' group leader Zainabon takes a short break in the shade of a mango tree. Women such as Zainabon are the hidden faces of agriculture in Indonesia.

"There are about 25 women in our group and we grow all kinds of crops depending on the season," Zainabon says as she starts a list that includes tomatoes, peanuts, snake beans, cucumbers and watermelons, to name a few.

The Balai Pengkajian Teknologi Pertanian (BPTP) is the delivery partner in the ACIAR project working to restore agricultural livelihoods in Aceh. Part of the ACIAR project focuses on establishing and supporting women's farming groups.

Since Aceh's Women in Agriculture program began in 2009 with eight groups, more than 30 village farming groups have been formed involving more than 700 female farmers. Each group consists of 10 to 25 women working together to grow vegetables on shared plots and in home gardens. The produce is then sold to traders or consumed by the farmers in the home.

Each farmer group manages its own income from sales, with some of the profits distributed among members and some invested back into the group's agricultural activities.

The presence of women in farming activities, especially in rural areas, is widespread. Of the 21 million family smallholder farmers working in the Indonesian agricultural and forestry sector, almost 41% are women—almost half of all agriculture's human resources.

Working closely with the women farmer groups in Aceh is Ferizal, the local coordinator at BPTP. He says female farmers are involved in almost all the agricultural processes in Indonesia.

"The ACIAR project is very good, it has improved agricultural productivity and empowered farmers, particularly through women's groups," Ferizal says.

"Although you may see men usually plough the fields and drive draught animals, women do most of the work involved in sowing, weeding, fertilising and harvesting the staple crops. Women's contribution to secondary crops, such as vegetables, is even greater."

Teuku Iskandar, the former director of BPTP Aceh, believes the project has achieved successful outcomes to-date.

"The women farming groups have had a variety of benefits, most notable would be the social and economic benefits for each community," Teuku Iskandar says.

Zainabon confirms that she has more money for her family as a result of the project but she also greatly values the friendships with the other women and the opportunity to share experiences and knowledge.

"The most important thing for me is the knowledge I gain because knowledge for me is a never-ending process," Zainabon says.

Thirty-five women's farming groups comprising 742 members are gaining similar knowledge about farming, including producing vegetables for the household instead of purchasing them, resulting in an average saving of 150,000 rupiah (A$14) per month. Shared income is used to provide loans.

Village farming groups comprising 359 farmers are gaining direct access to advice on planting systems, new varieties, fertiliser management and soil test kits. Adoption of improved fertiliser management by farmers at two sites has already resulted in an average saving of 400,000 rupiah (A$37) per hectare. ■

PROJECT INFORMATION

SMCN/2007/040:
BUILDING MORE PROFITABLE AND RESILIENT FARMING SYSTEMS IN NANGGROE ACEH DARUSSALAM AND NEW SOUTH WALES

A review of damage to agricultural land and production systems in Nanggroe Aceh Darussalam, Indonesia, quickly followed the December 2004 Indian Ocean tsunami. The review also assessed production constraints on mixed farming with rice/legume rotations.

Constraints were found to include limited access to irrigation water, seasonal climate variability, suboptimal soil fertility, use of unsuitable varieties, poor seed quality, poor forage quality and lack of participation in marketing.

A set of research activities has included a range of on-farm trials that evaluated innovations such as improved varieties, different rotations and animal feeding or housing technology in districts on the east and west coast of Nanggroe Aceh Darussalam. The analysis included the coastal farming systems and market supply chain for crops in five districts of the province.

Included in the project is support for the formation of women's grower groups and the opportunity for Indonesia to develop the capacity of extension staff to understand the diverse farming systems of these districts and to help farmers manage climatic and market variability.

In Australia, the project will contribute to understanding how to manage the more resistant forms of soil organic carbon and their impact on using limited water and nutrient supplies.

OUR INDONESIAN PARTNERS:

- Assessment Institute for Agricultural Technology, Aceh
- Indonesian Center for Rice Research
- Indonesian Legume and Tuber Crops Research Institute
- Indonesian Soil Research Institute

COMMISSIONED ORGANISATION:

- New South Wales Department of Primary Industries

Project leader: Dr Peter Slavich, peter.slavich@dpi.nse.gov.au

Ferizal, ACIAR project leader and staff member from Balai Pengkajian Teknologi Pertanian, Nanggroe Aceh Darussalam (NAD), with women farmers in the province of NAD in Indonesia.

PROSPERITY THROUGH SUSTAINABLE FORESTRY

Java's planted teak forests and the associated furniture industries play an important role in the livelihood of farm families and regional economies while also providing important environmental services

BY **PAUL JONES**

Community-based commercial forestry (CBCF) links tree production on farming or communal forest land to generating income by selling timber to commercial enterprises. It is one promising option in combining forest conservation with rural development, community empowerment and poverty-reduction objectives.

Having once been fully forested—and home to nearly one-fifth of the world's forest biodiversity—parts of Indonesia have been deforested, yet planting trees can provide improved livelihood and environmental benefits.

An estimated 23% of Indonesia's population live in, and are reliant on, forests for their livelihood.

The Indonesian government is working to reduce deforestation, build plantation estates to supply the timber industry and reduce rural poverty. CBCF is one component of the strategy to achieve these goals. ACIAR has brought together a team of Australian, Indonesian and rural development workers with expertise in forestry, rural community development, socioeconomic analysis, program evaluation and management, and community engagement to tackle the challenges of implementing sustainable CBCF.

The project aims to analyse the social dimensions of three dominant business models used in CBCF in Indonesia and design a framework

Anis Fauzi (right) a tree breeder with the Forestry Research and Development Agency in Yogyakarta, with local forest ranger Suroto. Community-based commercial forestry has emerged as a strategy to combine forest conservation with rural development and community empowerment, with the aim of fostering community involvement in half of the commercial forestry enterprise by 2016.

to help farmers assess the livelihood outcomes from forestry investment decisions.

THE TEAK CONNECTION

Indonesia is well known for its planted teak forests and the furniture industries of Java. Today there are more than 12,000 wood processing factories around Jepara in Java alone. These factories use planted teak and mahogany grown by smallholder farmers.

Many farmers have incorporated teak plantings into their agricultural systems. In the Gunungkidul region, near Yogyakarta, more than two-thirds of the forest area is planted to teak, with more than 60% of this owned by smallholder farmers in holdings of less than one hectare.

Smallholder farmers use and sell their timber in several different ways but are not always well-informed about the choices CBCF can offer. Trees can be grown in ways that do not conflict with cash crops and food production and that provide fuel wood as well as fodder for cattle. The trees are also good for maintaining soil integrity by preventing erosion. Planted trees can be a good source of income for the community's livelihood.

Also smallholder farmers can plant forests of trees for the commercial timber market. In this approach, tree growing can take on the characteristics of a crop where there is a market for wood products such as timber for furniture, poles, fuel wood and for production of paper. Companies contract with farmers for supply of these products, providing a steady source of income and other benefits to the farming community.

Tree breeder Anis Fauzi, at the Forestry Research and Development Agency's Centre for Forest Biotechnology and Tree Improvement, believes there are challenges to overcome with village forests.

"One constraint is you will see the output of mature trees after several years, it's not instant," he says. "Sometimes the farmer cannot see the benefits of this process." However, Mr Fauzi is very positive for the future.

Mr Fauzi hopes these community forests will continue to expand and become an economic source for rural communities.

"Expansion would improve people's welfare. The forests would not only be protected but also have benefits for the local people."

CBCF plays an important role in the livelihood of farm families in the project's study areas. While timbers such as teak are not necessarily the largest source of annual income, they serve an important function of providing a substantial amount of money when large expenditures are needed in the household. ■

PROJECT INFORMATION

FST/2008/030:
OVERCOMING CONSTRAINTS TO COMMUNITY-BASED COMMERCIAL FORESTRY IN INDONESIA

Given that 23% of the population live among and depend upon forests for at least part of their daily livelihood, the multiple tiers of government in Indonesia are working to ensure that community-based commercial forestry (CBCF) becomes an effective policy and management strategy. A major constraint is knowledge. There is little evidence to suggest that remote farmer forest groups have the market knowledge and business expertise to make sound investment decisions, raising concerns that CBCF may trap a new generation of farmers in a cycle of poverty.

By evaluating the dominant business models of CBCF, the optimum conditions for effective and sustainable CBCF implementation can be identified. They can then be used to inform a broader understanding of how to optimise the socioeconomic and policy settings of the strategy, and influence priority stakeholders.

INDONESIAN PARTNERS:

- Center for International Forestry Research
- Forestry Research and Development Agency
- Gadjah Mada University
- Trees4Trees
- World Wide Fund for Nature

COMMISSIONED ORGANISATION:

- Fenner School of Environment and Society, Australian National University

Project leader: Dr Digby Race, drace@csu.edu.au

A BIGGER BITE OF BAWANG GORENG

Science students working with plant pathologist Siti Subandiyah at Gadjah Mada University, looking at and testing samples of shallot plants.

Farmers tending fields in Central Java. The most important vegetable crops grown in Indonesia, and particularly lowland coastal production, are the true shallot and chilli. These crops are usually grown in rotation with rice but are far more valuable crops and are increasingly in high demand.

With its distinctive flavours, Javanese cuisine reserves a vital role for shallots and chilli, with demand growing but supply lagging. A large survey of farming practices is providing the basis to improve productivity, job opportunities and poverty alleviation

BY **PAUL JONES**

Shallots and chilli have pride of place in Javanese cuisine. This position offers farmers an important source of income, job opportunity and poverty alleviation, the more so with increasing demand for both vegetables. The potential is based on a rising population, especially in urban areas.

Increasing the profitability of smallholder shallot and chilli production in Java can be achieved by improving seed quality and availability as well as reducing the disease burden for these vegetables.

Like garlic, shallots are formed in clusters of offsets with a head composed of multiple cloves. The shallots are often chopped finely, then fried until golden brown, resulting in tiny crispy shallot chips called bawang goreng (fried onions) that can be bought ready-made from grocery stores and supermarkets.

The shallots are often used as an elementary spice in cooking and can also accompany cucumbers when pickled in mild vinegar solution.

ACIAR project leader and plant pathologist Siti Subandiyah from Gadjah Mada University in

Endang Sulistyaningsih looking over flowering shallots. After the plants have flowered, she will harvest the seeds.

(Above and below left) Female farmers sorting shallots for market.

PROJECT INFORMATION

HORT/2009/056:
SUSTAINABLE PRODUCTIVITY IMPROVEMENTS IN ALLIUM AND SOLANACEOUS VEGETABLE CROPS IN INDONESIA

The most important vegetable crops grown in Indonesia, particularly in lowland coastal production, are the shallot and chilli. These crops are usually grown in rotation with rice but are far more valuable crops and are increasingly in high demand.

They offer an opportunity for small farms to generate extra income, increase farm profitability and shift away from subsistence production. However, the yield and profitability of shallot and chilli production is severely limited by a range of agronomic constraints. Raising the productivity of these cropping systems can further opportunities for smallholders.

Examining the entire value chain, from farm to supermarket, is helping develop a package of improvements, from disease control recommendations to matching quality to market needs.

OUR INDONESIAN PARTNERS:

- Bogor Agricultural University
- Gadjah Mada University
- Indonesian Vegetable Research Institute

COMMISSIONED ORGANISATION:

- Queensland Department of Agriculture and Fisheries

Project leader: Dr Stephen Harper, stephen.harper@daf.qld.gov.au

Yogyakarta, Central Java, says the farmers around Yogyakarta usually grow shallots and chilli twice a year in the dry season and rice during the wet season.

As she walks through shallot and chilli fields, Siti Subandiyah is followed by a throng of students. The students collect data on current farmer practices in shallot and chilli farming including varieties, seed supply, fertiliser and pesticide use.

They also look at market chains for shallot seed and consumption patterns.

"The students I work with look at everything from soil analysis to disease and pests," Siti Subandiyah says.

"We catalogue all our findings and this contributes to the project that aims towards raising the productivity of alliums—shallot and garlic—and chilli and capsicum cropping systems especially in Central Java. I must say, they are all keen and very talented."

Also working with the project is Endang Sulistyaningsih who is focused on seed quality. Studies have found that farms using superior seeds for shallot production earned much higher profits compared with those using poor-quality seed. One of the problems is local versus imported seeds. The profits from planting local seeds were high; however, the profits from imported seeds were double those from local seeds.

"We have been working on improving seed quality," she says. "So far, social profits of the farms using imported seeds were two-and-one-half times better than those from the farms using local seeds. Here at the university we are continuing our research into improving local seed quality." ■

INDONESIA— CURRENT PROJECTS

ADP/2014/011 – Contributing to Indonesia's sustainable agricultural research strategy

AGB/2009/060 – Improved market integration for high-value fruit and vegetable production systems in Indonesia

AGB/2010/099 – Evaluating smallholder livelihoods and sustainability in Indonesian coffee and cocoa value chains

AGB/2012/048 – Review of regional beef markets and trade in China and South-East Asia

AGB/2012/055 – Indonesian seed potato value chains: analysis of development opportunities

AGB/2012/056 and AGB/2012/078 – Innovative agribusiness opportunities for profitable and sustainable cassava value chains in South-East Asia

AGB/2012/094 – Development of profitable and sustainable seed potato value chains in Indonesia

AGB/2014/031 – Supporting capacity building for research on improving market integration for high-value fruit and vegetable and dairy production systems in Indonesia

AGB/2014/033 – Supporting capacity building for research on improving market integration for dairy production systems in Indonesia

AGB/2015/015 – Regional mango markets and trade flow study – Asia and Pacific

AH/2015/002 – Using Apis melifera and A. cerana in landless and subsistence agricultural communities in Timor-Leste and Indonesia

CIM/2014/024 – Identification and validation of functional markers from diverse germplasm to reduce chalk in rice breeding materials

FIS/2007/124 – Diversification of smallholder coastal aquaculture in Indonesia

FIS/2009/059 – Developing research capacity for management of Indonesia's pelagic fisheries resources

FIS/2010/101 – Improving fish-health management and production protocols in marine finfish aquaculture in Indonesia and Australia

FIS/2014/059 – Expanding spiny lobster aquaculture in Indonesia

FIS/2014/104 – Small-scale fisheries in Indonesia: benefits to households, the roles of women and opportunities for improving livelihoods

FST/2008/030 – Overcoming constraints to community-based commercial forestry in Indonesia

FST/2012/039 – Development of production and marketing strategies for timber and non-timber forest products to improve smallholders' livelihoods in Indonesia

FST/2012/040 – Enhancing smallholder benefits from reduced emissions from deforestation and forest degradation in Indonesia

FST/2014/064 – Maximising productivity and profitability of eucalypts and acacias in Indonesia and Vietnam

FST/2014/068 – Management strategies for plantation diseases in Indonesia and Vietnam

FST/2015/007 – Developing the use of DNA markers for teak from community forests in Indonesia

HORT/2008/041 – Area-wide management of pest fruit flies in an Indonesian mango production system

HORT/2009/056 – Sustainable productivity improvements in allium and solanaceous vegetable crops in Indonesia and subtropical Australia

HORT/2012/083 – Management of sugarcane streak mosaic in Indonesia and Australia

LPS/2008/038 – Improving reproductive outcomes of cows and performance of fattened cattle in low-input systems of Indonesia and northern Australia

LPS/2008/054 – Improving smallholder cattle-fattening systems based on diets of forage tree legumes in eastern Indonesia and northern Australia

LPS/2012/064 – Forage legumes in grain cropping systems in eastern Indonesia

LPS/2013/004 – Improving beef supply and smallholder livelihoods in Indonesia (IndoBeef)

LPS/2013/017 – Improving nutrition during pregnancy and lactation to achieve production targets for Bali cattle

LPS/2013/020 – Adoption processes to enhance uptake of forage tree legumes in Indonesia

LPS/2014/022 – Heifer-calf and fattening strategies—Indonesia

LPS/2014/034 – Economic analysis of cattle-fattening systems based on forage tree legume diets in eastern Indonesia

SMAR/2008/025 – Improved seaweed culture and postharvest waste utilisation in South-East Asia

SMCN/2012/103 – More-profitable and resilient farming systems in Aceh Darussalam and New South Wales

PROPOSED PROJECTS

AGB/2012/099 – Improving milk supply, competitiveness and livelihoods in smallholder dairy chains in Indonesia

AH/2012/065 – A regional approach to enhance smallholder pig systems in Timor-Leste and eastern Indonesia

LPS/2013/021 – Profitable supplementary feeding strategies for fattening smallholder cattle in eastern Indonesia

LPS/2015/017 – Fodder markets in East Java

Further information about ACIAR's projects in Indonesia can be found in ACIAR's latest Annual Operational Plan: **http://aciar.gov.au/publication/aop2015–16** or the ACIAR website: **http://aciar.gov.au/country/indonesia**

STAFF NEWS – NEW APPOINTMENTS

ACIAR is delighted to announce the appointment of Dr Jayne Curnow as research program manager for agricultural systems management (ASEM). Jayne is a social scientist with expertise in international development, program management and anthropology.

Jayne comes to us from the International Water Management Institute, Sri Lanka, where she has led, *inter alia*, a project mapping gender data and statistics related to water and agriculture with research teams in the Volta, Nile, Ganges and Mekong river basins. She was previously a lecturer in anthropology and development studies at the University of Adelaide; qualitative evaluation coordinator with the World Bank in Indonesia; program manager with the Australian Department of Health and Ageing; and has worked for extended periods with several non-government organisations in Timor Leste on gender-based violence.

Recently appointed to the position of manager of external engagement and media presence, Andy Heaney brings to ACIAR a wealth of experience in government communications and public affairs coupled with a diverse skills set honed over 10 years working in the community cultural development sector.

Andy comes to ACIAR from the Australian Department of the Environment, where he was responsible for publications and media content management and public affairs support to flagship programs including Caring for Our Country, Great Barrier Reef Trust and Working on Country.

Before working for the Department of the Environment, Andy managed the ACT Community Arts Office, working extensively with multicultural, Indigenous and disability communities to generate diverse and visible arts activity. Prior to this he was manager of Lead On, a youth capacity-building organisation based in regional New South Wales where he established an innovative program using the arts and pop culture as an engagement tool to involve marginalised young people in partnership projects with community groups, government and business to deliver positive social and personal outcomes for all stakeholders.

Also joining the communications and stakeholder engagement team, Laura Carew is the new corporate engagement and communications officer. Before joining ACIAR, Laura worked in the corporate communication section at the Australian Department of Defence. Prior to that, Laura was at the Australian Department of Health where she worked in international health policy. She has a bachelor's degree in international communication.

NEW VIDEO

In June 2015, ACIAR hosted a two-day event marking the completion of the first phase of its Pacific Agribusiness Research for Development Initiative (PARDI). ACIAR captured the event with a video, which is now available through ACIAR's YouTube channel: https://youtu.be/RLg6NSp-kZ4

NEW PUBLICATIONS

For details on ACIAR's scientific publications series and corporate publications please visit: http://aciar.gov.au/publication/latest

CORPORATE PUBLICATIONS

Corporate Plan 2015-2019
http://aciar.gov.au/publication/corporateplan2015

Annual Operational Plan 2015-16
AOP2015-16
http://aciar.gov.au/publication/aop2015-16

Position Paper: ACIAR's engagement with Non-Government Organisations
http://aciar.gov.au/publication/positionpaperngo

SCIENTIFIC PUBLICATION

Scoping Study: Evaluation and Targeting of Formal and Informal Capacity Building in ACIAR Training and Research Programs
G.D. Gray, J. Mullen and J. De Meyer
http://aciar.gov.au/publication/scopingstudycapacitybuilding

Sustainable Management of Soil in Oil Palm Plantings
Webb M.J., Nelson P.N., Bessou C., Caliman, J.P. and Sutarta E.S. (eds)
PR144
http://aciar.gov.au/publication/pr144

ACIAR'S DISTRIBUTION POLICY

ACIAR provides complimentary copies of its publications to developing-country libraries, institutions, researchers and administrators with involvement in agriculture in developing countries in ACIAR's operating areas, and to scientists involved in ACIAR projects. For enquiries about complimentary copies, please contact ACIAR's Communications and Stakeholder Engagement team, **aciar@aciar.gov.au**.

For other customers, please use our online ordering facility at **aciar.gov.au** or direct enquiries to our distributors, Canprint Communications, PO Box 7472, Canberra BC, ACT 2610, Australia, phone +61 2 6295 4422, fax +61 2 6295 4473, aciar@infoservices.com.au.

Copies of most publications are available as free downloads from the ACIAR website **aciar.gov.au**.

KEEP UP TO DATE

Our website, e-newsletter and social media will keep you up to date with ACIAR's activities, publications and events.

Website: http://aciar.gov.au
E-news: subscribe through our website homepage
Blog: http://aciarblog.blogspot.com.au
Twitter: https://twitter.com/ACIARAustralia
YouTube: www.youtube.com/user/ACIARprojects
Facebook: www.facebook.com/ACIARAustralia

PHOTO: PAUL JONES

ACIAR'S VISION

ACIAR looks to a world where poverty has been reduced and the livelihoods of many improved through more productive and sustainable agriculture emerging from collaborative international research.

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.

Back cover: Farmers and family members from the village of Gemel. Working with ACIAR, the farmers are looking at improving reproductive performance of cows and performance of fattening cattle in low-input systems of Indonesia. One of the best prospects for providing a high-quality protein supplement to ruminants on poor-quality diets, especially in the dry season, is to expand the use of forage tree legumes.

Front cover: Faces of progress
PHOTOS: PAUL JONES

ACIAR
aciar.gov.au
Australian Aid