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partners
IN RESEARCH FOR DEVELOPMENT

25 YEARS IN VIETNAM

Researchers and farmers survey a vegetable trial in Lao Cai province. Photo: Dao Van Nui

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15,000 TONNE OYSTER INDUSTRY BOOM p 28

AUSTRALIA AND VIETNAM – WORKING TOGETHER IN AGRICULTURE

Cooperation in agriculture has been a very important part of Australia's relationship with Vietnam throughout the 44 years of diplomatic links between the two countries.

By H.E. MR CRAIG **CHITTICK**
Australian Ambassador to Vietnam

Australia's specialised agricultural research agency, the Australian Centre for International Agricultural Research (ACIAR), came on board in 1993 and has played a key role since then. I have had the pleasure of visiting several ACIAR projects over the last year, and have been impressed by what I have seen. I am very pleased that we can share some of these stories more widely through this issue of Partners magazine.

The last decades have seen great change in Vietnam, not least in the agriculture sector. Policy reform has paved the way for investment and expansion of livestock, fisheries, forestry and cropping, and this has played a significant role in the country's economic growth. I am proud of the support that Australia has provided during this period, and notably the specialised technical support through ACIAR.

Under the guidance of a small team of agricultural experts at ACIAR, Australian and Vietnamese scientists have completed more than 170 projects, leading to significant advances in fisheries, forestry, crop and livestock production, natural resource management, climate change adaptation, and policy. These advances have had many and diverse impacts, on the economy at different levels, but perhaps most importantly on the lives of farmers, their families and communities.

> **"INNOVATION IS AT THE HEART OF ALL ACIAR PARTNERSHIPS, WHICH SEEK NEW WAYS OF WORKING IN CROP AND CROP–LIVESTOCK SYSTEMS, FORESTRY AND AQUACULTURE, WHILE ACIAR'S TRAINING PROGRAMS BUILD VITAL NEW SKILLSETS TO FERTILISE INNOVATION."**

Australia has extensive research and production experience which it has been able to share with Vietnamese counterparts. This includes expertise in horticulture and livestock production and marketing, food quality and safety assurance, water saving practices, plantation forest management and aquaculture. We believe that there is significant benefit for both Australia and Vietnam to continue to nurture agricultural research exchange. Over 90 Vietnamese scientists involved in ACIAR projects have received formal training in Australia as part of their PhD and Master programs, as well as for leadership and research management, and are now playing an important role in these research partnerships.

The areas where we collaborate are the result of careful planning, with wide consultation to ensure that they reflect each country's agriculture priorities and objectives, and areas of common interest. Earlier this year, these consultations came to fruition with the *Australia in Vietnam Agriculture Strategy*, which was launched by Senator the Hon. Anne Ruston, Australia's Assistant Minister for Agriculture and Water Resources in Can Tho on 24 August 2017. The strategy sets out the framework for our agricultural relationship across the two missions in Hanoi and Ho Chi Minh City, and covers all Australian Government agencies in Vietnam. It identifies economic, innovation and security priorities for both nations in the coming years.

You will see these priorities reflected in ACIAR's own 10-year strategy for agricultural research in Vietnam, also launched this year. Under the economic priorities, ACIAR is aiming to increase small farmers' incomes with stronger market engagement. Innovation is at the heart of all ACIAR partnerships, which seek new ways of working in crop and crop–livestock systems, forestry and aquaculture, while ACIAR's training programs build vital new skillsets to fertilise innovation. Food safety and climate change are among the themes that reflect shared security priorities.

These frameworks set the scene for a new phase in our partnership in agriculture – one that will bring mutual benefits through trade, investment, development cooperation, and education and training, and continue to strengthen relations between our two countries. I am delighted to commend this issue of Partners, and wish you good reading.

A SPECIAL PARTNERSHIP

It is my pleasure to write an introduction to this issue of Partners magazine. The magazine is timely, as in 2018 we will mark 25 years of cooperation between ACIAR and Vietnam.

By Dr LÊ QUỐC **DOANH**
Deputy Minister of Agriculture and Rural Development, Vietnam

Over the last few decades, Vietnam's agriculture has been constantly innovating, developing, and achieving important successes. From a struggling agricultural country that had to import food, Vietnam has become a major exporter of agricultural products, contributing to food security for the region and the world. Many Vietnamese agricultural products have become popular outside the country, such as seafood, rice, coffee, tea, cashew, black pepper, rubber, cassava, and most recently some fruits. Agriculture provides employment for about 40% of the population and in recent years has contributed about 20% of GDP, which is significant for social stability. These results could not have been possible without the support of international friends, including the Australian Government via ACIAR.

ACIAR is a special partner of Vietnam in agricultural research and development. More than 170 projects funded by ACIAR in Vietnam cover almost all research areas: forestry, fisheries, soil management and crop nutrition, livestock production, agribusiness and policy for agricultural development. About 40 projects are currently under implementation.

The collaboration and knowledge sharing from Australia and the world through ACIAR have promoted research capacity in Vietnam, brought advances in science and technology, and contributed to poverty reduction. The positive impacts of these partnerships are witnessed in research and development of acacia and eucalyptus plantation forest; rapid expansion of the oyster industry; and the successful market engagement for vegetables and fruits from the northwest region, to give just three examples.

Current and future projects funded by ACIAR in Vietnam in the next 10 years will address challenges to food safety, adaptation to climate change, efficiency of farming systems, enhancement of market linkages, and higher value for agricultural products. These priorities were highlighted in the strategy for collaboration between ACIAR and Vietnam for the period 2017–27, which was recently approved by the two governments.

I hope that ACIAR in particular, and the Australian Government in general, will continue to support Vietnam in overcoming new challenges from, for example, climate change and the depletion of the natural resources that sustain agricultural productivity. Australia's support, along with other international partners, will help Vietnam increase the competitiveness of agricultural products produced by our smallholder farmers in regional and international markets, increasing farmers' incomes and creating a better environment for all.

I believe the stories in this issue of Partners magazine provide evidence for the long-term and effective cooperation between ACIAR and Vietnamese partners.

"I BELIEVE THE STORIES IN THIS ISSUE OF PARTNERS MAGAZINE PROVIDE EVIDENCE FOR THE LONG-TERM AND EFFECTIVE COOPERATION BETWEEN ACIAR AND VIETNAMESE PARTNERS."

From highlands to deltas, agricultural solutions that are responding to change

This issue of Partners celebrates our work and partnership with Vietnam, where ACIAR has been working for 25 years. Much has changed over that time, but our relationship has been consistently strong, based on mutual respect and a sharing of agricultural expertise and knowledge between our countries. More than 170 collaborative projects provide ample evidence for this.

By Prof. Andrew **CAMPBELL**
CEO, ACIAR

In August, ACIAR formalised a new strategy for agricultural research in Vietnam by signing a Letter of Intent with the Ministry of Agriculture and Rural Development of Vietnam. Our sincere thanks to all partners who contributed to developing the strategy and who attended the signing ceremony in Can Tho city.

The stories in this issue highlight some of our current projects in Vietnam. Just a glance at the contents list on the facing page immediately gives an idea of the diversity of food security and natural resource management challenges in Vietnam, and our joint efforts to tackle them. From the northwest highlands to the Mekong Delta, our research teams are moving through forests, orchards, cattle and pig farms and rice systems, finding solutions to the real problems people are facing, against a changing economy and environment.

As Vietnam's economy grows, our agribusiness research helps to ensure that smallholders, including women and ethnic minority groups, can meaningfully participate and benefit. The two agribusiness stories focus on the northwest highlands, and tell how growers of vegetables and fruits in this cool-climate region are starting to better target and supply markets in the region, especially in the cities. This area has long struggled to compete nationally, but with support it is beginning to capitalise on its advantages of climate and proximity to Hanoi. The next story also focuses on the northwest, and reinforces the need for environmental sustainability as systems become more intensive.

This region is of special interest to ACIAR and the Vietnamese Government, because of the unique challenges that have resulted in high levels of poverty and marginalisation of ethnic groups. The publication of this issue has been timed to coincide with the 'Mountains of Opportunity' symposium in Hanoi, that will showcase ACIAR research in North-West Vietnam. I am keenly looking forward to attending this showcase in one of my favourite cities. The symposium is designed to inform government, donors, research organisations and agribusiness about the opportunities for inclusive agriculture-led economic growth in mountainous regions.

The new 10-year strategy for our work in Vietnam agreed between ACIAR and our Vietnam partners identifies six main themes where we will focus our joint efforts. The first theme is food safety, and the next two stories illustrate how we have already laid some groundwork. Pork is the most commonly eaten meat in Vietnam, and building a safe supply chain will not only reassure consumers but will also safeguard livelihoods across the pork sector. Our Agriculture Development Policy Research Program is also supporting this theme, with the launch of a project on policy analysis for food safety and trade.

Climate change is the second theme in our new strategy, and agroforestry is one way to build resilience to a changing and variable climate, as the first forestry story illustrates. The second forestry story tells of ACIAR's long-standing support for acacia breeding in Vietnam, where acacia plantations now cover two million hectares. Forestry remains a key theme in our new strategy.

Three stories from the coastal regions span several of the key themes – namely climate change, soil fertility and crop efficiency, and aquaculture. Rice farmers in the Mekong Delta are struggling to deal with the impacts of sea level rise, and the resulting salinity of soils and water. Researchers are working with the farmers to develop alternative strategies or new ways of working that will allow them to maintain productive systems. Similarly in the central coast region, where farmers are facing water shortages as well as having to manage sandy soils, some simple technologies have been shown to work for mango and peanut farmers.

We wrap up this issue with a great success story – the rapid expansion of the Vietnamese oyster industry following ACIAR's first aquaculture project in the country, 10 years ago. From developing hatchery techniques in that first project, to today's focus on a breeding program to support the growing industry, this has been an exemplary investment, with benefits accruing in Australia's own industry as well as in Vietnam.

As we move into the next phase of our partnership with Vietnam, we can be sure that we have already built sound foundations for future work. Most importantly, these foundations rest on the partnerships that have been established through the years – the research teams that bring together Vietnamese, Australian and international expertise to tackle agricultural challenges against a background of change.

Vietnam is a very important partner for ACIAR. It is very heartening to see its transition from being a recipient of aid, to being a proactive partner in the collaborative development and delivery of well-targeted research projects, many of which involve direct investment from Vietnam alongside Australia.

The articles in this edition of Partners provide a small snapshot of our work in Vietnam over 25 years, and I'm delighted to commend them to you.

> **"AS WE MOVE INTO THE NEXT PHASE OF OUR PARTNERSHIP WITH VIETNAM, WE CAN BE SURE THAT WE HAVE ALREADY BUILT SOUND FOUNDATIONS FOR FUTURE WORK."**

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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.
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ACIAR–VIETNAM 10 YEAR STRATEGY LAUNCHED

In August ACIAR formalised its strategy for agricultural research in Vietnam by signing a Letter of Intent with the Ministry of Agriculture and Rural Development of Vietnam. Our sincere thanks to all partners who contributed to developing the strategy and who attended the signing ceremony in Can Tho city.

The strategy will guide all ACIAR research in Vietnam over the next ten years from 2017 to 2027. Please see the strategy to design your projects to align with its priorities.

ACIAR has supported research collaboration in agriculture, forestry and fisheries with Vietnam since 1993, valued at AUD$100 million across 170 projects. Vietnam is now in the middle of a major transition from lower to middle income status, but still faces many challenges to ensure sustainable and equitable growth. In response ACIAR and its counterparts in Vietnam have developed a ten year strategy for research collaboration (2017–2027) to address the increasingly complex problems and opportunities facing smallholder agriculture, fisheries and forestry systems in Vietnam.

This strategy acknowledges how the relationship between ACIAR and Vietnam has grown from donor-recipient to partnership, to co-investment and possibly, through this period, to trilateral collaboration. The strategy expresses the desire of both parties to join

The ACIAR team and research and development partners from Australia and Vietnam met between August 2016 and March 2017, with a final conference held in Hanoi on 6 March, to discuss the collaborative research strategy for agricultural development over the next decade. The final consultation workshop was co-chaired by Dr Le Quoc Doanh, Vice Minister of Agriculture and Rural Development, and H.E. Mr Craig Chittick OAM, Australian Ambassador to Vietnam. The participants included senior officials from ACIAR and the Australian Embassy, the Vietnamese Ministry of Agriculture and Rural Development, the Ministry of Science and Technology, the Ministry of Planning and Investment, and representatives from research institutes, universities, private sector and NGOs.

with the private sector, wherever possible, to catalyse opportunities for the rural and urban poor through inclusive agribusiness systems. It also highlights a strong focus on transformational opportunities for women in research, agribusiness systems and on-farm.

This strategy not only establishes the most important priorities for research collaboration between ACIAR and Vietnam but also reaffirms the importance of building research capacity through well-designed projects set in the context of long term partnerships.

Towards the end of the implementation of this strategy, both parties will commission a review of the partnerships, the strategy and its outcomes to inform decisions about future collaboration after 2027.

In this strategy, the term 'agriculture' should be read to include crops, livestock, forestry and fisheries and 'agricultural research' includes the supporting areas of research that are essential to developing equitable and sustainable livelihoods in those sectors (especially policy, agribusiness, natural resource management and social science research).

Peter Horne, general manager for country programs for ACIAR and Lê Quốc Doanh, deputy minister for Agriculture and Rural Development, sign a letter of intent to enhance bilateral cooperation in agricultural research in Cần Thơ in August.

Trade

TEN-YEAR GOALS

The research themes outlined in this Strategy will contribute to the following ten-year goals:

(i) Long-term international partnerships in research and technology development established and sustained.

(ii) Improved capacity of Vietnam researchers, research managers and development partners to support sustainable and equitable growth through agricultural research.

(iii) Improved skills, livelihoods and incomes of smallholder farmers, including ethnic minorities in mountainous areas of Tay Nguyen and Tay Bac, supported by knowledge networks that allow profitable engagement in domestic and international markets.

(iv) Improved human health and nutrition through research on integrated farming systems, nutrition-sensitive agriculture and one health.

Development cooperation

ACIAR:

A$100m 24 years
170 projects

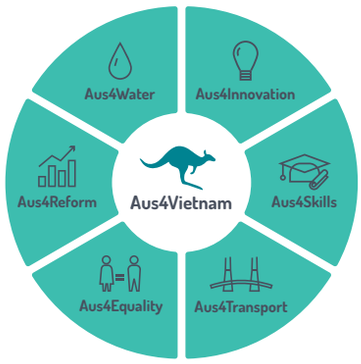
Current projects are focussing on:

- Agribusiness
- Fisheries
- Forestry
- Agricultural Development Policy
- Livestock production systems and animal health
- Soil management and crop nutrition

A$125m in support for clean water and sanitation +
A$20m Aus4Water program

A$6.5m for **Aus4Reform** includes developing competitive agriculture factor and product markets

A$35m Aus4Equality program focussing on agriculture and tourism in Son La and Lao Cai



23 Australian Government supported volunteers working in agriculture and related sectors since 2012

$146m for **Aus4Skills** includes improving skills in the agriculture sector

A$2.8m for disaster risk management

Technical collaboration in: remote diagnostics, quarantine treatments, food safety, global trade rules, electronic certification.

(v) Improved quality and safety of meat, fish, vegetables and fruit for domestic consumption.
(vi) Deeper knowledge of markets that assist in prevention or mitigation of economic shocks for participants in the agricultural supply chains.
(vii) Reduced inputs of chemicals and fertiliser per unit of production with a cleaner environment, safer produce, improved soil health, and more profitable sustainable production systems.
(viii) Improved resource use efficiency, producing more food with fewer resources.
(ix) Practices implemented and policy-makers informed to manage climate change impacts in agriculture.

RESEARCH THEMES

Six research themes will form the basis of research collaboration under this Strategy to 2027:

1. Food safety
2. Climate change
3. Improving soil fertility and the efficiency of crop and crop-livestock systems
4. Improved market knowledge, access to markets, and skills for better policy analyses
5. Improving the value from forests
6. Aquaculture

These will guide the direction of the research collaboration noting that it is likely that not all the priorities identified here can be funded.

PARTNERSHIPS

Apart from the strong relationships that ACIAR will broker between research agencies in Vietnam and agencies in Australia and internationally, projects will seek to build broad-based partnerships with the private sector and non-government organisations (NGOs). In some cases, these may be research partnerships (such as involving private sector innovation in value chain research) and in others the projects will engage early with next users of research.

There are only a small number of independent agricultural services providing agricultural knowledge to farmers in Vietnam. ACIAR will seek opportunities to support the emergence of high quality private service provision to smallholders using the knowledge and technology outputs of ACIAR projects.

ACIAR will support public-private partnership forums between the two countries to share research results and implement public-private partnership initiatives.

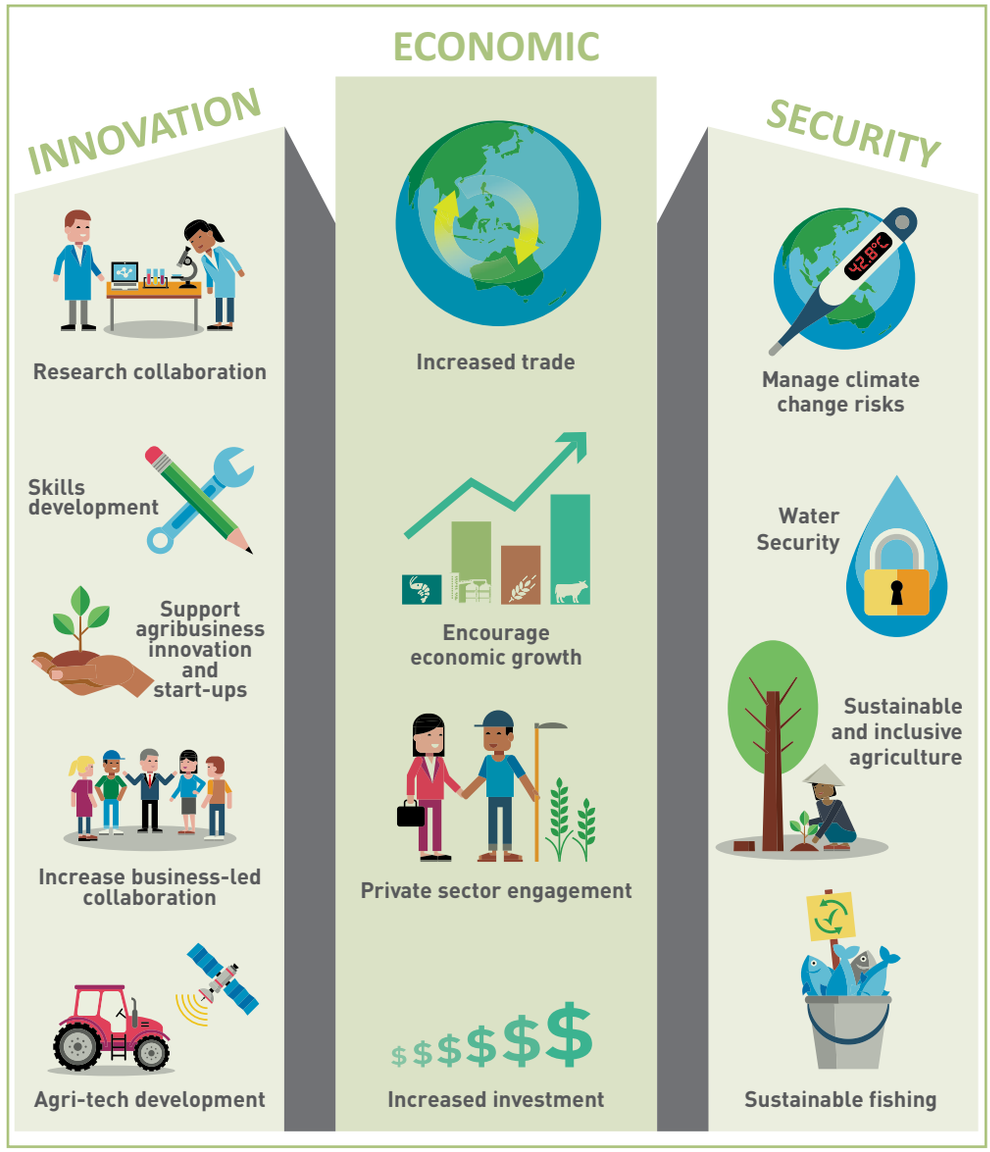
To read more about these themes, the geographic foci, cross cutting issues of gender, equity, capacity building, funding, monitoring and evaluation, please visit:

English: http://vietnam.embassy.gov.au/hnoi/ACIAR_Strategy.html

Vietnamese: http://vietnam.embassy.gov.au/hnoivietnamese/Chien_luoc_ACIAR.html

The Strategy (pdf) can be downloaded from Google Drive: https://goo.gl/c217GK

Stay up to date with all ACIAR Vietnam news via the Facebook site https://www.facebook.com/groups/262637884233190/



Prioritising gender and social inclusion in Vietnam

By Nozomi **KAWARAZUKA**

Crosscutting gender research, capacity building and networking aim to enhance value chains for women and ethnic minority groups

KEY POINTS

- A small research activity (SRA) is working with ten ACIAR projects in Vietnam and Southeast Asia, to understand constraints and opportunities linked to gender and social relationships that might contribute to adoption of new technologies and improved value chains.
- The SRA came out of a gender workshop held in Vietnam in October 2016, where it was agreed that a meta-project approach would be more effective for learning and uptake of gender research and principles.

PHOTO: VU NGOC LINH

On 13-15 September 2017, CARE International in Vietnam together with ISDS conducted a training workshop on integration of gender and social aspects for staff working on ACIAR funded agricultural research projects. This activity is under the project "Integrating gender and social inclusion into agricultural value chain research in Vietnam" co-implemented by the International Potato Center (CIP), Institute of Social Development Studies, CARE International in Vietnam, and Oxfam in Vietnam.

Gender roles and expectations, and other social relationships, affect the everyday decisions people make. This is true of smallholder farmers' decisions on, for example, crop changes, adoption of new technologies and interactions with other value chain actors. Overlooking gender and other social issues may therefore jeopardise project results and outcomes, and may also lead to unexpected impacts such as increased gender inequality.

Farming systems and agricultural supply chains in Vietnam and throughout South-East Asia are undergoing rapid change, such as increased commercialisation and market integration, feminisation of agriculture and migration of youth. These changes are impacting differently on ethnic minority communities living in the mountainous region. They are also affecting traditional gender roles and social relations.

Acknowledging the convergence of these critical issues ACIAR, together with the International Center for Tropical Agriculture (CIAT), convened a gender workshop in Vietnam in October 2016 (https://aciargenderlens.wordpress.com). The participants included leaders of ACIAR projects in Vietnam, project partners, local gender experts and CGIAR researchers involved with the projects. Over two days, the group had animated discussions exploring ways to mainstream gender into existing and planned project activities; to foster knowledge sharing; to identify synergies and opportunities for co-investment; and to identify strategic gender research to strengthen ACIAR activities in Vietnam.

A META-PROJECT APPROACH

There was a clear consensus from the workshop that rather than a gender expert working for a single project for a limited period, a coordinated meta-project approach would be more effective for widespread learning and uptake of gender research and principles. The direct result of this is a 'small research activity' (SRA), 'Integrating gender and social inclusion into agricultural value-chain research in Vietnam' (AGB/2017/008) which began in July. The SRA is working with ten ACIAR projects in Vietnam and Southeast Asia, and is seeking to understand constraints and opportunities linked to gender and social relationships that might contribute to adoption of new technologies for more sustainable intensification, and enhance value chains for ethnic minority women and men. Activities are covering gender research, capacity building and networking.

The SRA team has set up a website at https://genderinagr.wordpress.com/ which serves as a knowledge hub. Several training events have so far been carried out – details of these and future events are all on the website. The team is also networking through its Facebook page, https://www.facebook.com/GenderinAgr/

The participating projects originate from different ACIAR research programs (Agribusiness, Agricultural Systems Management, Livestock Production Systems, and Soil Management and Crop Nutrition) and cover diverse aspects of agriculture in Vietnam and Southeast Asia, highlighting the crosscutting relevance of gender, social relationships and inclusion. Common interests of all the projects identified in the workshop are: (1) ethnic minorities – understanding cultural and ecological specificities; (2) social and gender aspects of value chains – understanding different value chain systems by commodities and learning from these different systems; (3) changes in livelihoods – understanding ongoing changes in farming systems, gendered migration patterns and subsequent changes in gender divisions of labour.

The SRA is led by the International Potato Center with three partner organisations, the Institute of Social Development Studies, Care International Vietnam and Oxfam Vietnam.

ACIAR PROJECT: AGB/2017/008, Integrating gender and social inclusion into agricultural value-chain research in Vietnam

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https://genderinagr.wordpress.com/ https://www.facebook.com/GenderinAgr/

PHOTO: ANH DUC NGUYEN

Quality vegetables find their markets

By Anne **MOORHEAD**

Smallholder vegetable farmers in the northwest, including women and ethnic minorities, are participating in new value chains that respond to markets in the region and further afield in Hanoi

KEY POINTS

- ACIAR has funded a suite of projects to support poor vegetable farmers in the northwest highlands and improve their access to local and regional markets.
- Working together in groups, rather than individually, helps farmers to access the markets, for example in groups they are better able to guarantee consistent supply and quality, and can share transport costs.
- One project that has developed a value chain supplying accredited safe vegetables to outlets in Hanoi is transferring its successful model to Myanmar.

The northwest highlands region of Vietnam has some advantages when it comes to growing vegetables. The good soils and temperate climate allow cultivation of a range of vegetables that are in high demand in the nearby cities, especially Hanoi. In a country where food safety is a worry for many people, vegetables from the region are perceived to be safe compared, for example, to those imported from China which are believed by many to carry a pesticide risk. And the tourist industry in the Lao Cai area has recently seen a boost following the opening of the Hanoi–Lao Cai highway, increasing the local demand for vegetables.

The region is also one of the poorest in Vietnam, with about 40% of people below the poverty line, rising to 70% among the Mung, Nung and Dao ethnic minorities in the region.

This intersection of need and opportunity is the definitive place where ACIAR works. It is therefore no surprise that the centre has funded several projects here over recent years, aimed at supporting smallholder

farmers, particularly women and ethnic minority groups, to access vegetable markets. Results are starting to accrue.

MARKET ANALYSIS – AND RE-ANALYSIS

The University of Adelaide and the Vietnam Women's Union together lead a project that focuses on horticultural value chains in Lao Cai province ('Towards more profitable and sustainable vegetable production systems in north-western Vietnam', AGB/2012/059). The project, which has components on market analysis and chain strengthening, as well as improving farming systems and building farmers' skills, began in 2014. It hasn't all been plain sailing.

"The project context changed in ways we didn't expect" explains Dale Yi who leads the project for the University of Adelaide. "We've had to adapt as things changed."

The Hanoi–Lao Cai highway opened in September 2014, halving the 280 km journey between the city and the highlands to around 3 hours. The project anticipated improved access to Hanoi's markets – but the bigger impact has turned out to be the growth in number of tourists from the city to the highlands. "Suddenly the bigger market opportunity is the local one, feeding the tourists", says Dr Yi.

The team revisited the market analysis, and will present the results at the North-West Vietnam Research Symposium in Hanoi in November. "We re-examined the markets and

LEFT: *Informal street markets are a popular outlet for buying fresh fruit and vegetables.*

BELOW: *Farmer in Ta Niet Village Moc Chau trimming shallots destined for markets in Hanoi.*

PHOTO: GORDON ROGERS

Opportunities in changing markets

By Nikki **DUMBRELL** and Wendy **UMBERGER**

Food expenditures and consumption in urban Vietnam are changing. This follows changes in the commercial food environment – influenced by the increasingly open economy and the introduction of modern retail outlets such as supermarkets – as well as increasing disposable incomes and improved access to information about food production methods, health and nutrition. To provide insights into these changes, earlier this year ACIAR funding supported a comprehensive study of 2,000 urban households' food expenditure, consumption patterns, and food purchasing behaviour and preferences.

Early results from the study show that urban consumers are concerned about food safety, and are increasingly using modern retail outlets (e.g. supermarkets, hypermarkets and mini-markets) rather than traditional outlets (e.g. street markets and 'wet' markets) because they perceive these to provide more reliable 'safe' food.

Of 1,700 households surveyed in Ho Chi Minh City and Hanoi, 30% stated 'food is safe to eat' as a main reason for purchasing food from supermarkets, whereas only 1.8% said the same for 'wet' markets. Freshness rather than food safety was cited as a major motivation to shop at 'wet' markets. Eighty-three percent were willing to pay an average premium of 26% for water spinach that is certified as 'safe', and 87% of the sample were willing to pay an average premium of 23% for certified 'safe' tomatoes.

Consumers are also increasing their consumption of certain foods. For example, since 2011 30% of consumers said they had increased their household consumption of pork and 20% had increased their consumption of beef and fish and seafood. This change mirrors the share of households reporting increases in average incomes during this period.

Consumption of milk and milk products is also increasing (30% are consuming more now than five years ago) and much of this change would have been observable at supermarkets (44% of expenditures on milk and milk products are spent at modern outlets). Stores such as supermarkets are important outlets for other food items as well, e.g. 36% of expenditures on processed foods and 26% of expenditures on beverages are spent at modern outlets.

Though traditional outlets continue to hold the large majority of market share for rice, fruit, vegetables, meats and eggs, consumers are seeking specific meats, fruits and vegetables from modern outlets. These are typically imported and may not be available elsewhere, or consumers may prefer to buy them at modern outlets due to improved (or perceptions of improved) quality or safety standards. For example, 27% of pear, 25% of peach, 19% of apples, and 12% of tomato expenditures occur at modern retail outlets.

OPPORTUNITIES FOR SMALLHOLDERS

Understanding what consumers want can guide farmers and other actors on the value chain both in producing the right products, and also differentiating their products based on attributes of importance to consumers (e.g. safety, origin). Also, the food safety concerns revealed by this study demonstrate the need for smallholders to increasingly meet certain safety and quality standards. Into the future if smallholders cannot provide 'safe' food or communicate to consumers that food is safe (through labels, certifications, etc.) they risk losing market share to large-scale commercial farmers or imports that can meet these consumer demands.

The results of this study also reveal opportunities for growth. For example, a growing share of the tomatoes in the Vietnamese market is imported, and this research revealed that consumers are concerned about the safety of tomatoes. If smallholder producers could grow high-quality, certified safe tomatoes throughout the year there may be market opportunities for them to exploit. The consumer and market information collected in this study is being used by a number of ACIAR-funded projects to identify opportunities for smallholders to grow vegetables, fruits and beef and sell them into differentiated and high-value markets. For example, one of the vegetable projects (AGB/2012/059) is developing branded vegetable products to address market opportunities and design interventions for farmers and farmer groups in Lao Cai Province to establish market links in Hanoi and other urban areas in the northwest region.

ACIAR PROJECTS: AGB/2015/029 A strategic approach to pro-poor consumer research in the Mekong region – extended analyses and AGB/2012/059 Towards more profitable and sustainable vegetable farming systems in north western Vietnam.

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WEBSITE: https://www.adelaide.edu.au/global-food/research/international-development/vietnam-consumer-survey/

PHOTO: JESMIN RUPA

PHOTO: JESMIN RUPA

TOP: *Certified VietGAP vegetables for sale in Hanoi.*

LEFT: *'Safe food, good taste' labelled tomatoes in Hanoi.*

RIGHT: *Ms Luyen farmer leader from Tu Nhien village with Fivimart supermarket manager inspecting Moc Chau produce in Hanoi*

the chains supplying them, and their strengths and weaknesses. We found two models that are successfully servicing the high-end markets – cooperatives and what we call 'collector-coordinated chains'," says Dr Yi. Collector-coordinated chains are defined by a marketing intermediary who coordinates transactions between a small network of 20–30 producers and high-end buyers in Lao Cai.

It is clear that working together in groups, rather than individually, helps farmers to access these valuable markets. As a group, farmers are much better able to guarantee consistent supply and quality, and can share transport costs, for example. The project has been supporting development of cooperatives, particularly for women farmers, as reported previously in Partners.

MOC CHAU SAFE VEGETABLES

Another project ('Improved market engagement for counter-seasonal vegetable producers in

Getting the balance right– soils and crop nutrition

By Tran **MINH TIEN**

Production of quality vegetables in the highlands of Vietnam depends on healthy, well-managed soils and effective crop nutrition. However, these areas have received very little research attention, particularly in relation to the indigenous Vietnamese vegetables. ACIAR project AGB/2012/059 has a component that is identifying and addressing key soil and crop nutrition constraints to vegetable production in Sa Pa and Bac Ha, areas with highly weathered acidic soils.

We have carried out comprehensive soil and plant analyses. On-farm partial nutrient budget surveys of key vegetable crops, including H'mong mustard, cabbage, kohlrabi and cai bap xoe, showed that farmers were applying more than twice the optimum amount of nitrogen, phosphorus and potassium to their crops. Fertiliser application represents about a third of the vegetable farmers' costs, so improvements in this can greatly improve farmer livelihoods. Farmer trials have been carried out to help farmers understand the importance of applying optimal amounts of nutrients.

Soil surveys and subsequent trials showed that soil acidity is not a major issue since farmers routinely apply enough lime to maintain soils above the required pH. We also found that the soil-borne pathogen that causes clubroot in brassicas (Plasmodiophora brassicae) is managed with a combination of liming and chemical control, hence more lime is applied if this disease is present.

A survey of plant foliage from cabbage crops across the region showed that low levels of micronutrients might be limiting crop growth rates. Field assessment trials went on to identify zinc, boron and copper supply as limitations to crop productivity. More detailed research is now focused on this issue.

PHOTO: GORDON ROGERS

north-western Vietnam', AGB/2009/053) targeted a specific and lucrative market and value chain – the supply of accredited safe vegetables from Moc Chau in the highlands to Hanoi, where demand for these is growing. Also reported recently in Partners, the focus is on temperate vegetables such as beans, cabbage and tomato, and supply during the summer months when it is too hot to grow these vegetables on the lowlands closer to the city.

The latest figures are impressive. In 2016, 87 project farmers – 71% of them women and 10% from the ethnic Muong, Thai and Hmong minority – produced about 690 tonnes of accredited safe vegetables in the Moc Chau villages of Tu Nhien, Ta Niet, An Thai and Van Ho. Production volume grew at an average of 45% per year between 2013 and 2016, with the area under these vegetables increasing from 4 hectares in 2012 to 30 hectares in 2016.

The production figures translate to good incomes for the farmers. In Van Ho district for example, one Hmong farmer has recorded a net income from vegetables of 116 million VND (A$6,500)/hectare/year, an increase of 480% on the 20 million dong (A$1,100) per hectare per year from rice cultivation.

Again, working together in groups such as cooperatives is the key to successfully reaching this high-end market. Certification adds a layer of complexity to the work of farmers, but groups can support their members to comply with the additional requirements, including providing essential information and training.

Four farmer groups were established in Moc Chau under the project, which moved into a second phase in 2017 with a new project launch ('Improving livelihoods in Myanmar and Vietnam through vegetable value chains', AGB/2014/035). Six additional farmer groups have since been established, with a total of 170 farmers now participating. The new project is also starting similar work in Myanmar, aiming to transfer the accredited safe vegetable model, with the added benefit of lessons learned in Vietnam.

The project team is helping Moc Chau farmer groups gain safe vegetable and VietGAP accreditation (the Vietnamese Good Agricultural Practice standard). A regional trademark, 'Moc Chau Safe Vegetables' (*Rau An Toan Moc Chau*), has also been registered. The project team is also looking at traceability, and how this can be managed efficiently and reliably, so that it is workable for farmers as well as ensuring credibility for the scheme. The team is assessing the feasibility of barcodes and QR codes, and plans to evaluate the potential for using MAD – mobile acquired data – for streamlining the acquisition and storage of the crop data required for traceability.

PHOTO: GORDON ROGERS

Mr Duyen, a farmer from Ta Niet Village in Moc Chau, with his tomato crop.

ACIAR PROJECTS: AGB/2012/059, Towards more profitable and sustainable vegetable production systems in north-western Vietnam; AGB/2009/053, Improved market engagement for counter-seasonal vegetable producers in north-western Vietnam; AGB/2014/035, Improving livelihoods in Myanmar and Vietnam through vegetable value chains

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HIGHLAND ORCHARDS BEAR FRUIT

By Anne **MOORHEAD**

Fruit growers in the northwest highlands are learning to target their markets, and are reaping the rewards

KEY POINTS

- ACIAR has been working on fruit projects on the highlands since 2009, supporting growers to achieve both economic and environmental benefits from their trees.
- Some growers have been able to triple their prices by targeting the best markets for ripe or unripe fruit, or for different grades of fruit.
- A new pear industry is set to capitalise on lessons learned from the plum business.

Some agriculture projects move more quickly than others. With cool-climate fruits, there is no fast-tracking – fruit trees can't be hurried in their growth and fruiting cycles. "Even if everything happens perfectly, we're looking at 10 years to get any real results from a tree fruit project", says Dr Oleg Nicetic of the University of Queensland, who leads ACIAR's temperate fruit project in the northwest highlands of Vietnam.

The highlands have the perfect climate for growing fruit such as plums, peaches and pears, and the fruit sell very well in the cities, as well as across the border in China before their own season begins. Fruit trees also play a valuable role in erosion control on the mountain slopes. Together, these benefits make the time investment worthwhile.

Tam Hoa plum trees have been grown in the highlands region for several decades and are an important source of income for smallholder farmers. Plum farmers in the Moc Chau region typically have about a hectare planted with about 250–300 trees; but many others have fewer trees grown alongside other crops such as maize. In 2016 there was a total area of 1,450 hectares of plums in Moc Chau region, producing about 16,700 tonnes.

Without much understanding of the markets for the plums, and generally poor orchard management, farmers have seen very variable returns for their efforts over the years. In the early 2000s, when overproduction caused prices to plunge, many farmers decided to cut their losses, and their trees. More recently, prices have picked up again with growing demand both within Vietnam and from China. If farmers can access these markets, the earning potential is high.

RIPE FOR THE PICKING

"We could see there was a huge opportunity, if farmers could better understand and therefore target the markets for the plums", explains Dr Nicetic. "We started working on this in 2009, and we're now seeing some very good results."

There are different markets for ripe and unripe plums, and by targeting them farmers can plan their harvesting and get the best prices for both. Similarly, if farmers grade their plums they can get premium prices for top-quality plums in modern retail outlets in the cities; or they can choose to direct large volumes of ungraded plums to traditional markets which also brings reliable income.

As an example of the good results, farmers involved in the project in Moc Chau have been

Na Ka valley in Moc Chau, also known as plum valley.

PHOTO: OLEG NICETIC

PHOTO: NINH XUAN TRUNG

Selling Tam Hoa plums the traditional way in Bac Ha.

able to increase the supply of quality plums to modern retailers from three tonnes in 2011 to nearly 42 tonnes in 2017. Some have also been able to triple their price. And according to Dr Nicetic, "There is big growth potential in this high-end market. Consumers in the cities are demanding more quality and safe fruit, and the 42 tonnes represents considerably less than 1% of Moc Chau's harvest."

Markets are fickle, and over the long term farmers need to learn how to anticipate and respond to changes. The project is supporting farmers to develop their market research skills, as well as building value chain links and improving information flows that will contribute to sustainability.

SEEKING SOLUTIONS

Being able to respond to markets depends on a reliable supply of good fruit, which in turn depends on good orchard management and production practices, and ideally a range of plum varieties. Yet despite more than 40 projects funded by various donors and aimed at improving production and introducing new varieties, there has been surprisingly little advance on these fronts. The latest ACIAR project carried out a study to try and understand why, and find solutions.

"We found various issues, but notably a lack of communication between stakeholders, and poor linkages with other local initiatives", says Dr Nicetic. "We're now helping to set up forums for stakeholders to get together and talk." The project team is also helping develop strategic plans for development of the fruit industry. As knowledge about the industry grows, and the private sector becomes more involved, this should drive better production practices, nursery development, and availability of more varieties.

NEW FRUIT ON THE BLOCK – PEARS

With plums, the researchers have had to work with an established industry and features that were not ideal, such as heavy reliance on one variety. The recent introduction of pears provides an opportunity to steer the new pear business, and capitalise on lessons from the plum industry. "We'd like to see a more controlled development, based on a range of suitable varieties that give an extended season so that farmers can compete in domestic and regional markets" says Dr Nicetic.

About 540 hectares are currently planted with grafted pear seedlings, with an additional 250 hectares planned by 2020. It will take some years for the trees to come into full production, but if the industry expansion is well managed, it will be worth the wait.

PHOTO: BUI QUANG DUAN.

Premium fruit – Tam Hoa plums for sale in a supermarket in Hanoi.

ACIAR PROJECTS: AGB/2008/002, Improved market engagement for sustainable upland production systems in the north-western highlands of Vietnam; AGB/2012/060, Improving smallholder incomes in the north-western highlands of Vietnam by increasing access and competitiveness in regional temperate and subtropical fruit markets

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Boosting mango trade from the south

By Robin E. **ROBERTS**

Mangoes represent a significant income opportunity for smallholder farmers in southern Vietnam. Improving mango productivity and competitiveness offers a significant opportunity to improve incomes and livelihoods of thousands of farming households.

However, the market is currently characterised by low value production and a weak and fragmented supply chain with limited links to processing and export. A new ACIAR project ('Improving smallholder farmer incomes through strategic market development in mango supply chains in southern Vietnam', AGB/2012/061) aims to address these issues through a collaborative whole-of-chain research and development approach.

Over the next three and a half years, a Vietnamese and international research team will work together to improve mango production practices and capabilities in the southern provinces of Dong Thap and Tien Giang, and mango trade links to both Ho Chi Minh City and Hanoi.

A standout feature of this project is its highly collaborative approach, bringing together experts in mango production, post-harvest, value chain analysis, economics, consumer behaviour and market development. The research team will identify and use strategic opportunities to increase the production capacity and market competitiveness of smallholder mango farmers in southern Vietnam. These opportunities could include off-season cultivation through the use of flowering manipulation techniques, improved postharvest handling and management, and access to processed fruit value chains.

Close cooperation with private sector fruit processors will be essential in extracting the maximum possible value from mango production by smallholder farmers. Importantly, our collaborative research project also aims to improve the capacity of Vietnamese partner institute researchers and foster greater public and private sector engagement, industry stakeholder linkages and knowledge sharing within the mango industry in southern Vietnam.

Smallholder mango farming in southern Vietnam is dominated by women, who typically have less than one hectare under mango cultivation. Our research and development efforts will strive to deliver real income and livelihood benefits to these famers and their families. In the first stage, it is expected that at least 270 mango farmers in the Dong Thap and Tien Giang provinces will participate in the project.

This is the first stage of a 10-year research and development program to improve mango production, supply and trade profitability from southern Vietnam, and we look forward to reporting results and impacts as this work progresses.

PHOTO: STEPHEN IVES

Cattle in Toa Tinh Commune, Tuan Giao District, Dien Bien.

TAKING A HOLISTIC VIEW OF CATTLE FARMING IN THE NORTHWEST

By Anne **MOORHEAD**

A new project is mobilising findings from earlier and current projects to develop crop–cattle systems that work in the harsh reality of the mountains

KEY POINTS

- Current crop–livestock systems in northwest Vietnam are unsustainable, with unproductive cattle, declining soil fertility and severe erosion on many slopes.
- A new ACIAR project is pursuing an integrated approach to improve these systems, supporting farmers to realise opportunities presented by valuable beef markets while also addressing environmental challenges.

The hardships of life in the mountainous northwest of Vietnam have provided the impetus for many research projects, funded by ACIAR and others. However, results have so far been limited and it remains one of the poorest regions in the country. A project launched earlier this year, 'Intensification of beef cattle production in upland cropping systems in Northwest Vietnam', aims to draw on findings from other projects and apply them in a whole-farm approach which, it is hoped, will lead to real change.

REALITY CHECK

The project is starting with a series of analyses, so that the team begins with a good understanding of the farming families, their needs and priorities, and the resources available to them. Depending on the findings, various strategies will then be developed and trialled with the farmers. "The challenge is to support the farmers to find new ways of working that respond to changing economy and markets, but are also sustainable in this difficult environment", explains project leader Stephen Ives.

Beef cattle are an important part of the highland farming system, but grazing competes with food crops on the limited farmable land, and cattle are often underfed. An earlier ACIAR project ('Overcoming technical and market constraints to the emergence of profitable beef enterprises in the north-western highlands of Vietnam', LPS/2008/049), developed some cattle feeding and management solutions, but uptake of these has been limited.

There has been an increase in maize growing in the region, to supply feed markets in China and other parts of Asia, but maize is notoriously associated with soil erosion and loss of fertility, and this is adding to farmers' problems. Again, an earlier project ('Improved market engagement for sustainable upland production systems in the north-western highlands of Vietnam', AGB/2008/002) attempted to address this by developing forage hedgerows that reduce erosion, but again uptake has not been as hoped.

A more positive change – an increasing demand for beef in the more affluent cities – could benefit the highland farmers, but they have difficulties in understanding and responding to the distant markets.

AN INTEGRATED APPROACH

Against this reality, the new project is aiming for an integrated approach that addresses the many challenges while opening up opportunities for farming families. "We hope that this more holistic approach will help overcome barriers that have limited adoption of improved practices up to now", says Dr Ives.

More efficient cattle feeding systems that don't damage the environment will provide the foundation for moving forward. To achieve this, as well as drawing on earlier results, the project is working closely with another ACIAR-funded project on 'Improving maize-based farming systems on sloping lands in Vietnam and Lao PDR' (SMCN/2014/049). The two projects are sharing team members to ensure a tight collaboration.

With healthier cattle, farmers will be much better placed to supply distant beef markets – a key opportunity for them. The project aims to support market access for the farmers in different ways, for example by improving information exchange and linkages with traders, and supporting the government to develop effective policy and regulations.

The farming families are at the heart of this project. As well as improving overall livelihoods, the project is looking at gender equity and allocation of farming tasks, with the aim of increasing time available for non-farming activities for women and education for children.

A researcher's experiences in Central Vietnam

By Lydia **TURNER**

I'm a social researcher with the Dairy Centre of the Tasmanian Institute of Agriculture (TIA), and I'm particularly interested in the space between what we can prove to be 'best practices' as scientists, and what farmers are able and willing to do on their farms. My research involves getting a better understanding of where farmers are at, what their needs are, and how they make decisions and learn, and using this knowledge to inform our research and extension approaches in TIA.

Over the last three years I have been involved in the ACIAR project, 'Developing productive and profitable smallholder beef enterprises in Central Vietnam' (LPS/2012/062). Here are some of the things I've learned.

Smallholder farmers in Central Vietnam typically have only a handful of cattle and small plots of land, where they also grow a number of different crops. They are traditionally cattle keepers – maintaining cattle with often low-quality feed. A lot of this feed is found on roadsides, with someone from the household walking with the cows for several hours every day. The cattle are sold when money is needed. This project has been supporting these farmers in becoming cattle producers. On the same amount of land, they learn how to grow and manage high-quality feed, house their cattle, and feed them so that their nutritional and production needs are met. Smallholders begin to take control over when they sell their cattle, and for how much.

The impact of farmers feeding and managing their cattle so that calving intervals are shorter and consistent, so that cattle can be sold regularly and at higher prices due to their improved condition, is life changing. In addition, farmers can more than halve the time spent on cattle management through implementing improved feeding practices, and can re-allocate their labour to significantly increase the income of the household.

Ms Lien from a farming household in our project told me: "When my mother had to go grazing cattle, I had to cook the lunch. For this reason, I sometimes went to school late and spent a part of my learning time on cooking meals. But now, my mother can cook the meal for my family because she no longer needs to take the cattle grazing, and I can spend my time learning."

I have also learned about the importance of relationships. Through these projects our Vietnamese colleagues have become our friends. And it is obvious how genuine relationships enhance the capacity building efforts at every level of these projects. We see how relationships between local extension officers, farmers and project team members accelerate knowledge transfer within communities. Within our project, we have seen how friendships between colleagues help increase confidence, how providing support improves morale and increases perseverance, and how these areas then directly influence the building of academic capacity.

In these small communities, farmers live very close together, and have a strong sense of social responsibility. They share what they know and have with neighbours, relatives and friends. Some of the farmers who have been involved in the project have informally shared their knowledge and resources with others (and the quality of this scale out has been high). These influential farmers have also been used proactively in the project, involved in farm cross visits between villages to accelerate adoption.

Adoption on a wider scale is also dependent on local extension people having the knowledge and resources to facilitate this form of training in other villages after the project ends – and this is the current focus of the project in its final year.

Through a step-by-step process, Ms Lien's family and many others learn new knowledge, apply and adapt it on their farms, and then share it with other farmers. We do surveys and collect narratives to measure impact, but the ripple effect in their communities and surrounding villages is immeasurable.

PHOTO: STEPHEN IVES

With healthy cattle, farmers will be much better placed to supply distant beef markets.

ACIAR PROJECT: LPS/2015/037, Intensification of beef cattle production in upland cropping systems in Northwest Vietnam.

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IMPROVING VIETNAM'S PORK INDUSTRY – PHASE II

By Werner **STÜR** and Anna **OKELLO**

Continuing efforts to improve food safety for pork consumers are seeking 'light-touch' interventions that can be applied at critical control points along the pork value chain

KEY POINTS

- The new SafePORK project builds on the findings of PigRISK, which mapped and assessed food safety along the pork value chain and developed methods for quantitative risk assessment.
- SafePORK is developing and evaluating 'light-touch' market-based approaches to reduce food safety risks while safeguarding livelihoods across the pork sector.
- Smallholder production systems are not necessarily more hazardous than commercial supermarket-oriented supply chains – smallholder producers have some effective risk mitigation strategies.

PHOTO: ILRI/STEVIE MANN

Farmer Ma Thi Puong feeds her pigs on her farm near the northern town of Mieu Vac, Vietnam.

The International Livestock Research Institute (ILRI) and ACIAR recently began a new project SafePORK, following the completion in September of the PigRISK project, which focused on improving food safety along the pork value chain in Vietnam.

Improving the safety of pork products is of growing importance to both the government and consumers in Vietnam, however interventions to improve food safety must make economic sense to the farmer, butcher and meat trader involved in growing, processing and marketing pigs.

PigRISK commenced in 2012. Over 80% of pigs are raised by small farmers and the pork is sold in traditional wet markets. Approximately one in five consumers fall ill each year due to pork-borne *Salmonella*, costing millions of dollars to the Vietnamese health sector. Forty-four percent of all pork sold in wet markets was found to be contaminated by *Salmonella*, arising from a variety of hazards along the pork value chain.

PigRISK mapped and produced a descriptive analysis of the smallholder pork value chain, and assessed food safety along the chain. The project also developed models that provided quantitative risk assessment and estimated the burden of disease associated with pathogens in the pork value chain.

Having identified food safety risks the new SafePORK project, which commenced in October and is led by Dr Fred Unger of ILRI, is developing and evaluating 'light-touch' market-based approaches to reduce food safety risks, while safeguarding livelihoods across the pork sector.

There is a perception in many parts of the world that smallholder production systems supplying local wet markets pose a higher risk to food safety compared to commercial supermarket-oriented supply chains. However this is not always the case. Early morning slaughter on the same day as the sale of the pork is a good example of risk mitigation strategies employed by smallholder producers. A key factor in the design of practical interventions to improve food safety is to identify unsafe, hazardous value chain practices and quantify the possible health risk of being exposed to hazards.

The Government of Vietnam is committed to addressing food safety concerns in a number of livestock value chains in the country. ACIAR-funded research in smallholder pig production in Vietnam has made a significant contribution to better understand and quantify the perceived risks of smallholder pig production in Vietnam. The SafePORK project will build on the knowledge base supplied by quantitative risk assessments to gauge light-touch interventions at critical control points along the smallholder pork value chain. Central to these interventions will be the requirement for a strong economic justification in order to motivate change in the current systems.

Key foci of the SafePORK project include assessing selected food safety initiatives using a newly developed risk assessment tool, consideration of gender and economic factors that promote cultural and behavioural changes, and tailored needs-based training to be developed and delivered for a range of stakeholders.

In addition to smallholder farmers, SafePORK researchers are also engaging with recently emerging food systems, including high quality organic outlets and industrial zone canteens that supply large volumes of food.

These interventions in the pork value chain will also include inexpensive tests that detect the presence of food-borne pathogens and assess the feasibility of portable ozone machines for safe and effective disinfection. Traders will also be trained and certified in food safety.

PHOTO: ILRI/HANH LE

Pork on sale in a wet market.

ACIAR PROJECTS: LPS/2016/143, Market-based approaches to improving the safety of pork in Vietnam (SafePORK)
LPS/2010/047, Reducing disease risks and improving food safety in smallholder pig value chains in Vietnam (PigRISK)

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PHOTO: GORDON ROGERS

ACIAR is supporting safe food in Vietnam through several research projects and support for policy development. Pictured: Ms Thanh from Fresh Studio and Ms Luyen from Tu Nhien village in Moc Chau.

Policy support for safe food

By Elizabeth **PETERSEN**

A new ACIAR project is supporting development of an effective policy framework for food safety in Vietnam's local and international markets

KEY POINTS

- Food safety is a priority for Vietnam, and a key theme in the new ACIAR Vietnam research strategy.
- Food safety needs government intervention in the form of careful and targeted policies, but without over-regulating.
- The new project aims to develop capacity in policy analysis, to move towards improved domestic food safety and associated improved public health, and contribute to increased international and domestic trade.

ACIAR's Agricultural Development Policy program is working to support Vietnamese policy makers in navigating the complex policy arena as the country moves into a new economic phase. Food safety is a priority for Vietnam, and one that is identified as a key theme in ACIAR's newly agreed Vietnam strategy. Our new project, on 'Policy analysis of food safety and trade in Vietnam', is therefore very timely. The project aims to develop capacity in policy analysis and engage with key stakeholders and policy makers to enhance food safety in Vietnam's local and international markets.

Food safety has been a priority in Vietnam since 1990 but the number of food poisoning outbreaks has barely diminished. In 2010 there were 175 outbreaks reported involving over 5,000 people with 51 deaths, similar to levels in 2000. Most (61%) food poisoning episodes occur in the family home. The melamine milk crisis in China in 2008 raised awareness in Vietnam about the importance of food safety. Vietnam imports food from China, and also exports to China, and having safe food standards will support trade between both countries.

While many types of economic activity can best be left to the market, food safety is one area where government intervention may be required. Producing safe food adds a premium, so that safe food will generally be more expensive. Left to the market, unsafe (low cost) producers will drive out safe (higher cost) producers. In such cases the government can usefully intervene by providing standards and product certification to inform consumers.

STANDARDS AND REGULATIONS – A BALANCED APPROACH

The adoption of science-based international food safety standards can help manage food safety risk and improve the predictability of and access to domestic and global food and feed supply chains. An example is the international food standards developed by the Codex Alimentarius Commission which are set from the perspective of allowable residues and contaminants. However the use of standards should be balanced, as enforcing overly strict standards can reduce access to markets.

Careful and targeted implementation of policies relating to food safety, without over-regulating, is likely to increase the safety of food consumed domestically, as well as opening opportunities for international trade which will also lead to food security through poverty alleviation.

Project activities will include:

- identifying the extent and frequency of foodborne illnesses, and estimation of their economic costs;
- identification and analysis of existing policies relating to food safety and trade in Vietnam;
- analysis of value chains for focus commodities, and identification of points of food safety risks along the chain;
- identifying constraints, barriers and opportunities for improving food safety standards in domestic and international markets;
- training on key tools for food safety policy analysis;
- engaging with the public and private sectors to develop recommended policy options; and
- supporting dissemination of food safety and policy information.

While the project is in the early stages, expected impacts are increased international and domestic trade; social impacts through increased trust in the safety of domestic food safety and associated improved public health, income and livelihoods; and environmental impacts through reduced pesticide and other chemical use.

ACIAR PROJECT: ADP/2016/140, Policy analysis of food safety and trade in Vietnam

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PHOTO: TONY BARTLETT

The current farming systems in northwest Vietnam are contributing to widespread soil erosion.

Impacts through agroforestry in northwest Vietnam

By Tony **BARTLETT**

KEY POINTS

- The Agroforestry for Livelihoods project has developed eight agroforestry systems to provide farmers with options that are appropriate to different sites, available markets and farmers' attitudes to risk.
- The agroforestry systems have multiple components so that farmers can earn income while their trees are growing.
- The work is being scaled up through 'exemplary landscapes'.

Farmers are being offered a choice of agroforestry options to help them move towards more sustainable and resilient systems

In the northwest of Vietnam the predominant farming system practised on large areas of very steep land involves monocropping of hybrid maize, which is mostly used for animal feed. This approach results in widespread soil erosion, a progressive decline in crop productivity and ongoing degradation of remnant forests.

The implementation of appropriate market-based agroforestry systems offers significant opportunities to enhance returns from more sustainable and resilient farming systems in this region. ACIAR's Agroforestry for Livelihoods (AFLi) project, managed through the World Agroforestry Centre, has developed eight agroforestry systems in order to provide farmers with choices that are appropriate to different sites, available markets and farmers' attitudes to risk.

One of the obvious challenges for farmers is the time required for trees to produce commercial products. ACIAR research in many countries has shown that the essence of a good agroforestry system is one where there are multiple components so that farmers can earn income while their trees are growing.

At Sonh Thinh in Văn Chấn District, Mr Tien has adopted an agroforestry system involving late-fruiting longan, fodder grass and maize on his farm. By his third year with this system he was already earning more and his increased fodder meant he could support two additional cattle. The AFLi researchers have also shown that soil loss on Mr Tien's farm has been reduced from 36 tonnes per hectare under monocropping to 20 tonnes per hectare under agroforestry, returning a saving of US$250 per year to Mr Tien from the reduced loss of nitrogen, phosphorus and potassium. According to the Soils and Fertilizers Institute of Vietnam, over US$1 billion is wasted annually is wasted on fertilisation, with large portions of that waste attributable to erosion.

At Co Noi in Mai Sơn District, Mr Bang is trialling a complex agroforestry system involving plum trees, coffee, soybeans, fodder

grass and teak. After two years his income had more than doubled to VND 57 million per hectare, even though he was not yet earning any income from the fruit or timber trees.

AGROFORESTRY FOR CLIMATE RESILIENCE

In a changing climate, farming systems will need to be more resilient to extreme weather events. Agroforestry can help to achieve this.

In March 2016, high areas of the northwest suffered unusually severe snow storms. In the village of Toa Tinh in the Tuân Giáo District, ten cattle perished, which was a significant loss to the local farming community.

Project leader Dr Nguyen La has worked with farmers in this area to introduce a fodder grass and Son Tra (the H'mong apple) agroforestry system. The grafted Son Tra began fruiting at 2.5 years and those farmers who had adopted this agroforestry system did not lose any cattle during the snow storm because they now had sufficient fodder to feed their cattle.


PHOTO: TONY BARTLETT

The project team and farmers discussing options in Co Noi.


PHOTO: TONY BARTLETT

Fodder grass contours and young fruit trees provide an exemplary landscape in Na Ban village.

> **"OVERALL, THE FUTURE LOOKS VERY BRIGHT FOR EXPANSION OF AGROFORESTRY IN NORTHWESTERN VIETNAM AND ACIAR IS NOW FUNDING A SECOND PHASE OF THIS IMPORTANT PROJECT."**

While these early results are encouraging, the challenge is to replicate and scale up. Dr Nguyen La is working with the Department of Agriculture and Rural Development (DARD) and local communities to scale up adoption of agroforestry through 'exemplary landscapes'. At Na Ban village, 31 households have established a 50 hectare exemplary landscape. Dr Nguyen says "the process involves establishing dual rows of fodder grass planted along the contour, together with a variety of fruit trees, including late-fruiting longan, plum, mango, lemon and pomelo." Already 50 km of fodder grass lines and 20,000 trees have been planted by the community.

Overall, the future looks very bright for expansion of agroforestry in northwestern Vietnam and ACIAR is now funding a second phase of this important project. The Vietnamese partners in the project are: Institute of Forestry Research and Development (IFRAD; formerly known as Northern Mountainous Agriculture and Forestry Science Institute); Vietnamese Academy of Forest Sciences; Soils and Fertilizers Research Institute; Tay Bac University and the Department of Agriculture and Rural Development from Son La, Yen Bai and Dien Bien Provinces. Scientists from Australia's Southern Cross University are also contributing.

ACIAR PROJECTS: FST/2010/034, Agroforestry for livelihoods of smallholder farmers in northwestern Vietnam; FST/2016/152, Developing and promoting market-based agroforestry and forest rehabilitation options for northwest Vietnam

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ACACIA BREEDING IN VIETNAM

By Chris **HARWOOD** and Nguyen **DUC KIEN**

ACIAR has been a long-term supporter of Vietnam's acacia breeding program, brokering a research partnership between Vietnam's Academy of Forest Sciences, CSIRO and the University of Tasmania

PHOTO: TONY BARTLETT

KEY POINTS

- Vietnam has about two million hectares of acacia plantations, over half of which is owned and managed by smallholders.
- The acacia industry depends on a tree breeding program that has been supported by ACIAR for several decades.

ACIAR has been instrumental in helping Vietnam build its acacia plantations. The first acacia trees were introduced from Australia to Vietnam around the late 1980s, following an ACIAR project that initially focused on Malaysia. There are now about two million hectares of acacia plantations in Vietnam, with over half of this owned and managed by household growers. Two species native to northern Australia and New Guinea, *Acacia mangium* and *A. auriculiformis,* and their hybrids, account for over 99% of this area.

Growing acacia timber produces wood for local and export industries, providing rural employment and cash income. More than 250,000 smallholder farmers are involved in this industry, with the products going to the export woodchip, domestic pulp and panel, as well as furniture manufacturing industries.

The continuing success of Vietnam's acacia industry depends on strong investment in tree breeding to provide genetically improved planting stock. Acacia breeding in Vietnam has progressed under a long-term scientific partnership between the Institute of Forest Tree Improvement and Biotechnology (IFTIB) of Vietnam's Academy of Forest Sciences, the Commonwealth Scientific and Industrial Research Organisation (CSIRO) and the University of Tasmania. This partnership has been supported by a series of ACIAR projects that commenced in 1993.

A broad genetic base for breeding was established in the 1990s when field trials identified the provenances – the regions within the species' natural ranges – that had the best performing trees. Hundreds of seed families were collected by CSIRO in these provenances, and they were planted out in trials. Some of these trials were developed into seed orchards, and seed from the best trees was collected for the next generation of breeding. This work is now into its third generation; and new scientific approaches are being deployed to enhance genetic gains.

Vietnam has been very successful in developing clonal propagation, using tissue culture and rooted cutting techniques. This has enabled the very best individuals of *Acacia auriculiformis* and *Acacia* hybrid (but not *A. mangium*) to be mass propagated for plantations. Beginning in the 1990s, a small number of outstanding *Acacia* hybrid clones were developed and these have since been widely planted. Under ACIAR project FST/2008/007, hybrid breeding was expanded and many new clones with excellent performance have now been identified. Improving tolerance to known diseases of *Acacia* such as *Ceratocystis* stem wilt is also an important breeding objective, and tolerant individuals are sought in nursery and field trials.

Another innovation has been polyploid breeding. Tetraploid lines of *A. mangium*, *A. auriculiformis* and *Acacia* hybrid are created by application of colchicine, and they are then hand-crossed with diploid lines to produce triploids, some of which are vigorous with favourable wood properties. The triploid clones have another advantage – in contrast to diploid acacias, they produce little or no seed, thereby limiting the potential for these trees to become 'exotic weeds'. Through polyploid breeding, advanced-generation hybrids incorporating the best traits of the two parent species in desired proportions can now be produced and mass propagated for growers.

Molecular markers have been developed for acacias and are now routinely used for hybrid identification, improving the efficiency of the breeding program by confirming that desired crosses have been achieved, checking triploid status and determining the genetic distances among selected trees to aid breeding decisions.

Advanced improvement of acacias requires deep scientific insight and high levels of technical skill. IFTIB scientists have been able to develop their capabilities through their ongoing association with Australian research partners. Three have completed postgraduate training with John Allwright Fellowships at the University of Tasmania. Although their ACIAR project finished in 2015, CSIRO and University of Tasmania tree breeders Chris Harwood, Rod Griffin and Jane Harbard maintain active research contact with their Vietnamese collaborators.

LEFT: *Acacia timber heading to market.*

BELOW: *IFTIB staff examine a trial of triploid clone X101 in northern Vietnam.*

PHOTO: CHRIS HARWOOD/CHECK

ACIAR PROJECTS:
FST/1992/027, Australian acacias for sustainable development in China, Vietnam and Australia
FST/1993/010, Physiology and genetics of Acacia auriculiformis
FST/1993/118, Seeds of Australian trees project
FST/1998/096, Domestication of Australian trees for reforestation and agroforestry in developing countries
FST/2003/002, Development and evaluation of sterile triploids and polyploidy breeding methodologies for commercial species of Acacia in Vietnam, South Africa and Australia
FST/2008/007, Advanced breeding and deployment methods for tropical acacias

MORE INFORMATION:
Tony Bartlett, ACIAR Forestry Research Program Manager; tony.bartlett@aciar.gov.au

Seeking options for adaptation in the Mekong River Delta

By Jason **CONDON**

As climate and other factors impact the extensive rice-based systems of the Mekong Delta, farmers urgently need alternative crops and new management systems

KEY POINTS

- During 2016 some provinces in the Delta region reported yield losses of dry-season rice of 70%, with 30% of rice farms experiencing total crop failure.
- There is a strong farmer-led demand for diversification away from dry-season rice.

The Mekong River Delta produces more than 50% of Vietnam's rice and is known as the nation's rice bowl. Changes in upstream water management, combined with climate impacts, are currently affecting farmer livelihoods and rural communities in the Delta. Without solutions, these changes also threaten national food security.

Reduced stream flow, land subsidence due to groundwater exploitation and sea level rise have all contributed to increased salt intrusion into the vast canal systems of the Mekong Delta. Farmers urgently need new options to allow them to continue growing rice and other crops under these difficult conditions.

With research support from ACIAR, farmers in coastal areas are diversifying by incorporating shrimp farming with their rice crop (see page 26). However further inland, where two and three rice crops per year are normally grown, dry-season rice is now very unreliable. During 2016 some provinces in the Delta region reported yield losses of dry-season rice of 70%, with 30% of rice farms experiencing total crop failure.

The ACIAR project 'Climate change affecting land use in the Mekong Delta: adaptation of rice-based cropping systems (CLUES)', which ended in 2015, recommended research into crop diversification, for example trialling upland crops in place of dry-season rice. Local government extension officers in affected provinces now recommend farmers not grow rice in the dry season, which is having negative impacts on livelihoods. This has created a strong farmer-led demand for diversification away from dry-season rice in affected regions.


PHOTO: JASON CONDON

Salt-affected rice crop in Soc Trang Province.


PHOTO: JASON CONDON

Local farmers in Long My District, Hau Giang Province are seeking crop diversification options.

STAKEHOLDERS SPEAK OUT

In order to understand the challenges faced by farmers, agribusinesses and the local government, an ACIAR-funded workshop was hosted in February 2017 by Can Tho University. Stakeholders from across the Mekong River Delta shared their experiences of climate change impacts, the success of strategies they have implemented, and their priorities for agricultural research to help them meet these challenges.

The outcome of this workshop and subsequent focus group meetings with stakeholders was clear. Farmers seek crops, and soil management options, that reduce salinity or its effects, use less water, and that have products that are marketable. Local government staff are seeking technical packages to support the extension of successful adaptation options, such as alternative crops to rice in the dry season. Private industry is seeking enterprises of sufficient scale and reliability to warrant investment. Importantly, all stakeholders stated that plant, water, soil and market research is required. "All four are required for success – if only three are addressed, we will not succeed" was the summarising consensus.

This project is an ACIAR-funded collaboration of a multi-disciplinary research team from Charles Sturt University, Can Tho University, Murdoch University, University of New England, NSW Department of Primary Industries, An Giang University, the Provincial Departments of Agriculture and Rural Development and the Loc Troi Group, Vietnam.

ACIAR PROJECT: SMCN/2016/019, Crop diversification challenges in the changing environment of the Mekong Delta, Vietnam

MORE INFORMATION: Dr Jason Condon, Charles Sturt University; jcondon@csu.edu.au


PHOTO: SURENDER MANN

LEFT: *Mango under drip irrigation.*

BELOW: *Simple technology – a mini-pan for water scheduling.*


PHOTO: SURENDER MANN

Simple technologies improve yields on sandy soils

By Surender **MANN**

Peanut and mango farmers in the central coast region are experimenting with water-saving techniques and balanced nutrients

KEY POINTS

- Water-saving and balanced nutrient technologies for peanut and mango have been developed through extensive research and demonstrations on farmers' fields.
- The peanut technologies have been approved for extension and adoption by farmers, while assessment of the mango technologies is under way.

Farming communities in the south central coastal region of Vietnam face many challenges relating to infertile sandy soils and water shortages. Since 2007, four projects supported by A$5.4 million from ACIAR have focused on seeking solutions.

The region relies heavily on groundwater for crop irrigation during the dry season, but inefficient irrigation techniques lead to water wastage, nutrient leaching, faster depletion of groundwater and high labour requirements. Given that droughts and floods are common, this region needs resilient agricultural systems that are able to cope with adverse climatic conditions.

A research partnership led by Murdoch University and the Agriculture Science Institute for South Central Vietnam (ASISOV) is introducing technologies that address nutrient and water use efficiency, especially for groundwater-dependent crops grown on sandy soils.

Water-saving and balanced nutrient technologies for peanut and mango have been developed through extensive research and demonstrations on farmers' fields. The peanut technologies have been assessed by the Department for Agriculture and Rural Development (DARD) in Binh Dinh and approved for further extension and adoption by farmers, while assessment of the mango technologies is under way.

The water-saving technology uses a mini-pan to measure the rate of water evaporation, and irrigation with sprinklers (peanut and vegetables) or drippers (mango). Nutrients are applied in the form of inorganic and organic fertilisers, at balanced rates. Used together, these technologies have given increased yields while using less water. For example, experiments and demonstrations with peanut in Binh Dinh province have shown that, on average, using sprinklers and the mini-pan with balanced nutrients (90 and 30 kg/hectare of potassium and sulphur, respectively), water use decreased by 32% while yield increased by approximately 12%. This was as compared to current farmer practice (using a hose, no mini-pan, 60 kg/hectare of potassium and no sulphur). Water savings of more than 70% were observed using a sprinkler and mini-pan as compared to flooding, again for peanut.

Also in Binh Dinh province, mango farmers irrigating using a hose with the mini-pan saved 49% of their water while increasing mango yield by 1.6 tonnes/ha. Irrigating using drippers with the mini-pan saved 54% water and increased yield by 3.4 tonnes/ha. In addition, the overall quality of the mango fruits improved, leading to higher market prices. Building on these achievements, ASISOV is now testing 'drip fertigation'.

The project is also investigating the groundwater and surface water resources in Phu Cat district of Binh Dinh, and developing a water balance model that will guide choice of crops for water saving on sandy soils, identify the effects of water-saving technologies for crop production, and determine the likely effects of climate change in this region on water availability.

ACIAR PROJECT: SMCN/2012/069, Integrated water, soil and nutrient management for sustainable farming systems in south central coastal Vietnam and Australia

MORE INFORMATION: Professor Richard Bell, Murdoch University; r.bell@murdoch.edu.au

Rice and shrimp farming in the Mekong Delta

By Jes **SAMMUT**

Improved management practices are helping rice–shrimp farmers improve their yields despite high salinity

KEY POINTS

- The rice–shrimp farming system, developed to manage high salinity during the dry season, is under threat from increasing salinity now also affecting wet season farming.
- An ACIAR project is exploring ways to improve yields of both rice and shrimp under these conditions.

People have farmed rice in the Mekong Delta for centuries. More recently, farmers near the coast have diversified their rice systems by also growing shrimp, either concurrently or in rotation with the rice. This makes the most of the available resources during the dry season, when salinity is too high to grow rice.

Rice is grown on a platform during the wet season when salinity is usually low. Shrimp are grown in the surrounding ditch and other water compartments on the farm in the dry season when salinity is high, but can be grown during the wet season if the shrimp are acclimatised.

In recent years however, even in the wet season salinity levels in soil and water have been too high for rice, causing crop losses or very low yields. ACIAR project SMCN/2010/083, 'Improving the sustainability of rice-shrimp farming systems in the Mekong Delta, Vietnam', has been helping farmers find solutions.

The project is exploring ways to improve yields of both rice and shrimp. For example, rice yields improved with modified rice platform techniques, changing the timing of planting, and using salt-tolerant rice varieties. Fertiliser costs have also been reduced by using waste from the shrimp farming.

At Tan Bang Commune in Camau Province, where some of these practices have been tested, trial farms are getting rice yields up to five times higher than nearby farms that use traditional methods. Farmers are noticing the results of the research and are eager to apply the better management practices. With the help of the Department of Agriculture and Rural Development (DARD), the project team is promoting the improved practices across four rice–shrimp farming provinces.

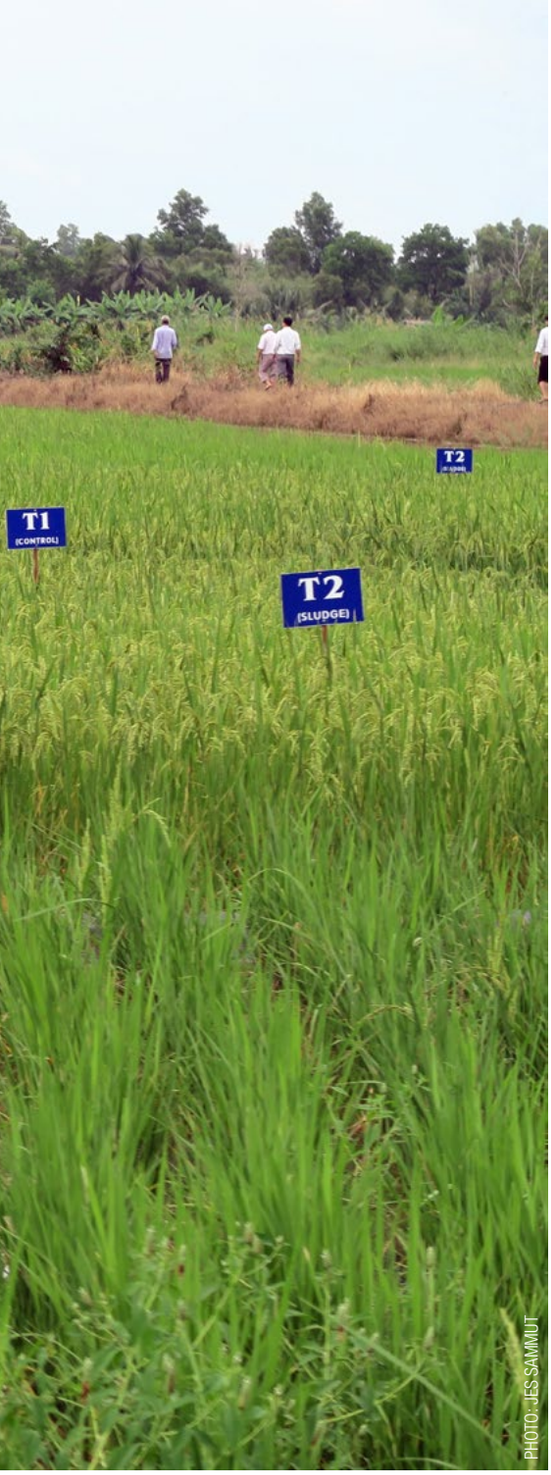


PHOTO: JES SAMMUT


PHOTO: JES SAMMUT

Mrs Thao from Tan Bang Commune has become a lead farmer and inspires men and women to farm rice and shrimp using better management practices.

Improving shrimp production has been more challenging, because of the high water temperatures, low dissolved oxygen concentrations and low natural food production for the shrimp. The team is investigating alternative practices to be tested in the next phase of the project, including levels of intensification, species selection, and modifying the farm design.

The project's success lies with its research partnership model, capacity building activities and regular engagement with stakeholders. There are six research agencies working together to design and implement field trials, to analyse and write up data, and share findings with farmers. Farmers contribute knowledge and participate in the trials – they are part of the team. Some of the women farmers involved in the project are now taking a lead role in rice and shrimp farming, inspiring other women to become involved.

Research capacity building activities have increased skills and knowledge across all agencies with benefits to Australian and Vietnamese students and project staff. Partnerships with extension agencies and farmers have facilitated information transfer, built trust between farmers and researchers, and enabled the project to test management practices on farms rather than just under controlled laboratory conditions. Improving yields and profitability, and helping farmers and managers make better decisions on what should be farmed where and when, will be key impacts from this project.

ACIAR PROJECT: SMCN/2010/083, Improving the sustainability of rice-shrimp farming systems in the Mekong Delta, Vietnam

MORE INFORMATION: Dr Jesmond Sammut, University of New South Wales; j.sammut@unsw.edu.au


PHOTO: JES SAMMUT

TOP: *A trial testing the use of sludge, accumulated during shrimp farming, as fertiliser for the rice.*

RIGHT: *Selecting rice varieties that are best suited to the rice–shrimp systems. Varieties are tested for salt tolerance, growth performance and rice quality.*

OYSTERS – FEEDING A NEW INDUSTRY

By Anne **MOORHEAD**

Australian expertise in mollusc aquaculture has helped Vietnam develop a rapidly growing industry, with coastal communities heavily involved

KEY POINTS

- The oyster industry in Vietnam, almost non-existent prior to 2007, now produces more than 15,000 tonnes of oysters a year.
- The majority of the oysters are produced by small farmers in coastal communities; while others are making a living from processing and marketing the oysters.
- Industry expansion is underpinned by a breeding program and environmental monitoring to support food safety.

Twelve years ago Dr Wayne O'Connor set off to Vietnam on a scoping mission for ACIAR's fisheries program, seeking new areas for investment. Today, an oyster industry that produces more than 15,000 tonnes a year – out-stripping Australia's own industry – is evidence that some good decisions came out of the trip.

"There was no oyster industry in northern Vietnam before the first ACIAR project, which started two years later in 2007", explains Dr O'Connor, a bivalve mollusc expert with the New South Wales Department of Primary Industries. "We were optimistic about the project – but we've been amazed by how quickly things have progressed." National production has tripled since this work was first reported in Partners in 2011.

In 2007, the Research Institute for Aquaculture 1 (RIA1) in northeast Vietnam had already set its sights on high-value species and products, such as oysters and clams, and was keen to draw on Australian expertise in this field. Over the next few years, the project supported exchange visits between the two countries, allowing technicians from the RIA1 hatchery to improve their skills at the Port Stephens Fisheries Institute in New South Wales. This included training on algal culturing, spawning and nursery techniques, according to Hatchery Director Dr Le Than Luu.

LEFT: *Oyster rafts in Ha Long Bay.*

RIGHT: *About 3,000 people now work in the oyster industry.*

PHOTO: WAYNE O'CONNOR

PHOTO: WAYNE O'CONNOR

In parallel, the project helped upgrade the Vietnamese hatchery for oyster production, and developed a low-technology grow-out system that was accessible to even the poorest communities.

"People can buy just a few strings of oysters from the hatchery, so it's affordable", says Dr O'Connor. "They hang them in the water to grow, and keep an eye on them while they carry on with their other activities. Oysters are filter feeders, so they feed themselves. It's mostly straightforward – that's one of the reasons it has spread so quickly."

Another reason for the very rapid development of the industry is the strong demand for 'luxury' foods from the expanding middle class and tourism sector in Vietnam. The market has easily absorbed all the oysters produced so far, and the demand shows no signs of abating.

Today, an estimated 70% of Vietnam's oysters are grown by small producers in coastal communities, particularly in Hai Phong and Quang Ninh provinces. Some large commercial companies have also responded to the opportunity, and there are now also private hatcheries supplying oysters for grow-out. The industry employs some 3,000 people, including those working in processing and marketing.

SUPPORTING AN EXPANDING INDUSTRY

But the work of the research team is not yet done. Survival and growth of the oysters in Vietnam are relatively low, and researchers believe they can be improved. The latest ACIAR project, 'Enhancing bivalve production in northern Vietnam and Australia', also led by Dr O'Connor, is addressing this with a breeding program to enhance the genetic stock, for example increasing resistance to diseases. The program has established oyster 'families' with known 'pedigrees', and carries out controlled breeding to enhance the genetic mix. The project team hopes to improve oyster survival and performance by supplying these genetically improved oysters to the hatcheries.

Another important area currently under research is food safety and environmental monitoring – both vital as the industry expands. A water monitoring program has been put in place that routinely collects data on risk factors such as heavy metals and algal toxins; and an audit was recently carried out on oyster industry practices to identify where improvements can be made that reduce risks to human health.

The growth of the oyster industry in Vietnam is a great success story for all project partners in Australia and Vietnam. "Given the rapid expansion, we're working to keep up with safety and sustainability issues, to ensure lasting impact", concludes Dr O'Connor.

ACIAR PROJECTS: FIS/2010/100, Enhancing bivalve production in northern Vietnam and Australia; FIS/2005/114, Building bivalve hatchery production capacity in Vietnam and Australia

MORE INFORMATION: Dr Wayne O'Connor, NSW Department of Primary Industries | DPI Fisheries, Wayne.O'Connor@dpi.nsw.gov.au

An aquaculture legacy

With a growing aquaculture sector, as seen in Vietnam over recent years, comes the need for readily available good-quality aquafeeds. This in turn depends on effective collaboration between researchers, aquaculture producers and the private sector, to develop a successful and responsive aquafeed industry.

An ACIAR project that ran from 2009 to 2014 can claim one of the most important regional meetings on aquafeed as its legacy. Project FIS/2006/141, 'Improving feed sustainability for marine aquaculture in Vietnam and Australia', established the annual Regional Aquafeed Forum in 2009, and the 9th Forum was held in September this year. The forum is now recognised as one of the most important events in the aquafeed industry.

The 9th Regional Aquafeed Forum, hosted by Research Institute for Aquaculture No. 2 (RIA2), focused on 'Aquaculture nutrition, feed ingredients, and better feeding management in aquaculture'.

The Forum has the mission of promoting collaborative research and exchange among researchers, the aquafeed industry and aquaculture producers in the region. The event attracts 100–150 participants each year, from all countries in the region. It provides an opportunity for leading experts to present the latest achievements and information in the aquafeed nutrition field. It also provides a platform for aquaculture nutritionists, feed mill managers, and feed ingredient suppliers to present their research and innovative technologies that will play a critical role in meeting the challenge of supplying high-quality feed to the growing aquaculture sector.

Addressing child under-nutrition in Lao Cai

By Christian **GENOVA II**

"*Do vegetable farmers reap what they sow*?"

"*Of course*," many of you might answer, but what if the question relates with nutrition? "*Does smallholder vegetable production lead to improved diets?*"

This is what my PhD research aims to unravel.

This question has important implications because child undernutrition is a persistent problem in northwest Vietnam. It especially affects resource-poor households belonging to different ethnic minority groups. Using a unique dataset of 510 rural households in Lao Cai province, I aim to find empirical evidence linking vegetable production and improved diets and nutrition, based on a simple hypothesis: households producing vegetables eat what they grow, leading to improved diets and better child health outcomes.

Christian (fifth person from the left in black sweater) and Hien Nguyen (third person from the left, in blue long-sleeves) from the Vietnam Women's Union, conducting focus group discussion with vegetable farmers in 11A village, Sapa commune during the baseline study in May 2014.

Using several indicators that measure vegetable diversity, market engagement and women's empowerment in agriculture, I drew an association between smallholder vegetable production and improved child dietary diversity. The next step is to find the relationship between vegetable production and child health outcomes in order to develop solutions to child under-nutrition that are resource-efficient and encourage local participation.

One of the highlights of my research in the province was the ethnographic (participant observation) study with my translator and guide, Pham Toan. We embarked on a six-week immersion, staying in one household each week to document the consumption and shopping behaviours of six households. This included what time they start preparing food, who brought the ingredients or cooked food, where they sourced it, portion sizes and who are the main decision-makers in food preparation/selection. We also enquired about district market days to see how this impacted consumption patterns.

PHOTO SOURCE: PHAM TOAN

Christian assists a Tay housewife in Nam Cay 2 village, Bac Ha Town, to carry maize back to her home for dinner.

The hospitality and generosity of our hosts were humbling, certainly memories that will be cherished forever.

Christian is a PhD candidate at the Centre for Global Food and Resources, the University of Adelaide, under the supervision of Prof Wendy Umberger, Dr Suzie Newman, and Dr Alexandra Peralta. He is one of the PhD students working on consumption-related studies under the project AGB/2012/059 'Towards more profitable and sustainable vegetable farming systems in north-western Vietnam' (pages 6-9), together with Jesmin Rupa and Nguyen Anh Duc.

Moving from science to the social sciences – my new career

By Elya **RICHARDSON**

Time flies when you're having fun! I recently realised it's already been three years since the start of my international Ag research journey. What began as a mild interest in international agriculture at the beginning of my undergraduate degree has developed into a career that feeds my passion.

My first taste of international research was with ACIAR in 2015 in northwest Vietnam for my honours project. My project was: *Improving Cassava Root Silage Production for Smallholder Beef Cattle Producers in NW Vietnam*. The result of numerous experiments, hours in the lab, two trips to Vietnam and a lengthy thesis concluded that chopping and drying cassava roots for six hours could improve the ensiling process. Although this statement doesn't truly capture the impact and outcomes of my honours studies, the experience opened my eyes to a new culture, challenged my world view and shaped my career choice.

I'm now eleven months into my PhD at University of Tasmania where I'm investigating the *Impact of Primary School Programs on the Uptake and Dissemination of Improved Agricultural Practices to the Farming Household in International Research Projects*.

I'll be evaluating and building a story around three previous programs run in three different countries, each of which used a different mode of teaching and learning. In Vietnam the training was conducted via interactive activity stations, in Cambodia a storybook and in Laos they used clowns. In November 2017 I'll travel to Vietnam to start building the foundation for my fieldwork in 2018.

It has taken some adjusting to move from the sciences into the social sciences. The first few months were especially challenging, learning a lot of new words I didn't understand! I was new to social research and education, so I had a lot of catching up to do. To learn more about agricultural education, I visited two farm schools in Tasmania and attended teacher Professional Development days for engaging students in the learning of Science, Technology, Engineering and Mathematics (STEM).

The highlight of the PhD journey thus far was presenting at the Crawford Fund's forum at Government House "Tasmania Doing Well by Doing Good," which generated a lot of interest in my project in Vietnam and beyond.

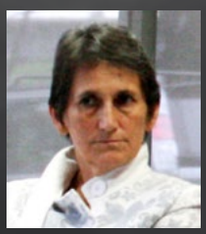
Throughout my research journey I've met some wonderful people and am grateful for the continued support and opportunities I've received through ACIAR, the Crawford Fund and RAID. If you have experience in this research area I'd love to hear from you!

elya.richardson@utas.edu.au

Impact of a School Based Program an Intervention Activity for Managing Forage Production - Vietnam 2013. Children participating in forage growing activity.

We welcome

Dr Dan Walker to the new role of ACIAR's Chief Scientist. This new position is a key element of the new ten-year strategy, and is designed to improve the strategic science focus of our portfolio. Dan will oversee the science quality of our research portfolio, provide leadership for Research Program Managers, and lead our impact assessment, monitoring and evaluation work.



Dr Robyn Johnston, our new RPM Water and Climate. Some will know Robyn from her most recent posting as Principal Researcher with the International Water Management Institute (IWMI) and IWMI's lead officer in Myanmar. Robyn has 30 years' experience in water and land resources research, with an emphasis on cross-disciplinary approaches, and integration of scientific, economic and social information to tackle management and policy questions. Dr Evan Christen has left the Water Resources portfolio in great shape and is assisting Robyn with the transition.

Dr Ann Fleming, our new Fisheries RPM. Ann comes to us from Monash University, where she was a research development specialist for the last two years. For the six years prior to that she was the Manager of Aquaculture in NT Fisheries, and from 1996 to 2006 she was Assistant Leader and then Leader of the Abalone Aquaculture Program for the Fisheries Research and Development Corporation (FRDC). Dr Chris Barlow now transitions from the RPM role in which he has served ACIAR with distinction for eight years, to a new contract role supporting ACIAR Fisheries research.

Dr Anna Okello, who joins ACIAR as our new Associate RPM – Animal Health. Anna may be known to some of you as she has worked on ACIAR projects in the past, having been the in-country coordinator of an ACIAR-funded One Health Smallholder Pig Systems Project (AH/2009/001) in Lao PDR from 2012 to 2015.

We farewell

Dr Bruce Champ joined the newly established ACIAR in 1983, as head of its Grain Storage Research Program. Bruce was made for the job, not just because of his enormous expertise and formidable experience, but also because of his quiet confidence and ability to work with all sorts of people.

These things came together in his leadership of a dynamic program in the ACIAR model, involving research groups in Australia and partner agencies in countries in Southeast Asia and later in India and China. The program's research identified inadequate drying and storage after harvest as the major problems facing the industry and developed economically feasible strategies to overcome them. It also determined that fumigation was the optimal approach for insect control in stored grain in the region, which led to the development of a new code for the safe and effective fumigation of grain. With equal rigour and enthusiasm, in 1989 Bruce expanded the focus of the program from durable to perishable commodities such as fruit and vegetables, with the renamed Postharvest Technology Program.

Spreading the word was built into Bruce's DNA. He was editor of at least 10 major proceedings, and other publications arising from his work with ACIAR. He played a central role in bringing to Canberra in 1994 the 6th International Working Conference on Stored-product Protection. He promoted ACIAR support for the biennial ASEAN Postharvest Technology Seminars; and publication of the ACIAR Postharvest Newsletter, which was distributed globally from 1984¬ to 2003.

The respect and admiration for Bruce by researchers in his program at home and abroad were obvious throughout his term at ACIAR, and strong and enduring bonds of friendship were forged that lasted well beyond his retirement in 1995. In 2003, Bruce was elected a Member of the Order of Australia, 'For service to agricultural research and entomology, particularly through the development of stored grain insect control'.

Ed Highley and Greg Johnson

Bruce Champ AM BAgrSc DIC PhD *5 July 1930 – 18 October 2017*

ISSUE 4, 2017 - VIETNAM

Photo: project team

Inception meeting for the intensification of beef cattle production in upland cropping systems in northwest Vietnam (LPS/2015/037) on 9 March 2017, Dien Bien city.

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. We also administer Australia's contribution to the International Agricultural Research Centres.

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