

10 years of achievement

A CIAR's program of activities began in Vietnam in 1993 and is now entering its second decade. Initially activities focused on building scientific capacity in Vietnam. Much of this was centred on research and scientific institutions in Ho Chi Minh City and Hanoi.

Training to build scientific capacity is still a priority, though increasingly the focus is on provincial institutions.

The current strategy for Vietnam emphasises research to assist the enhancement of smallholder incomes, through crop and livestock diversification within farming systems, and by improving market access through lifting the quality of and safety of agricultural commodities.

For example, research into improving pig breeds has delivered animals now much more suited to Vietnamese conditions. An independent economic assessment estimated the net present value of this research as half a billion Australian dollars to the Vietnamese economy, with much of this going to farmers and villagers.

Other project successes include: improvements to rice-shrimp farming and inland pond and small reservoir culture fisheries, non-chemical control of rodents in rice crops, fast-growing acacias and introducing improved *Leucaena* for animal fodder, better irrigation and control of citrus pests.

Many of the technologies arising from these and other projects are being applied and capacity in R&D developed and extended through the AusAID Capacity building for Agriculture and Rural Development Program.

The initial ACIAR program and its evolution has been built on consultation and collaboration. Formal consultations are held every four years, to set research priorities. The aim is to establish the main priorities that act as the framework for subsequent, and more regular, informal talks.

The most recent of these consultations, in February this year, set a new framework of priorities for research projects and proposals, and their evaluation.

A mix of priorities emerged, with an increased focus on central Vietnam and its coastal regions. Implementing the results of earlier ACIAR-supported research, including practical measures to communicate these to farmers, is also a major priority.

Many of the research and extension priorities relate to the transition of the Vietnamese economy and agricultural sectors to a market oriented economy, and the potential for research to deliver genuine and secure returns to smallholder farmers during this transition phase.

Details are available through the ACIAR website at www.aciar.gov.au and priority areas for the coming year can be found in the ACIAR Annual Operational Plan, also available through the website (see story on page 31). ■

BREAKING THE POVERTY TRAP FOR SMALL FARMERS

By **CLAIRE MILLER**

A decade after the Vietnamese Government granted limited land rights to its people, many rural families are still struggling to break free from the poverty trap. Their plight is contributing to a widening income gap between rich and poor, country and city.

The failure of many household farms to move from subsistence farming into the cash economy can be traced to their small size and limited off-farm opportunities to earn income, according to research by Australian and Vietnamese agricultural economists. The findings have important implications as the Government considers rural development and land policies it hopes will boost rural household incomes.

The Vietnamese are a rural people. About 80 per cent of the population lives in the country, and there are more than 11 million household farms. In 1986, the Government began to deregulate and liberalise the economy. The reforms included reinstating family farms as the main unit of agricultural production rather than highly centralised collectives.

A steady overall reduction in poverty followed the economic reforms and in the past decade, Vietnam has not only achieved self-sufficiency in rice production, but has grown into the world's second-largest rice exporter.

This said, prosperity is uneven. The gap between rural and urban income is widening. Poverty is concentrated in rural areas. Landlessness and poor households with small landholdings are becoming more widespread.

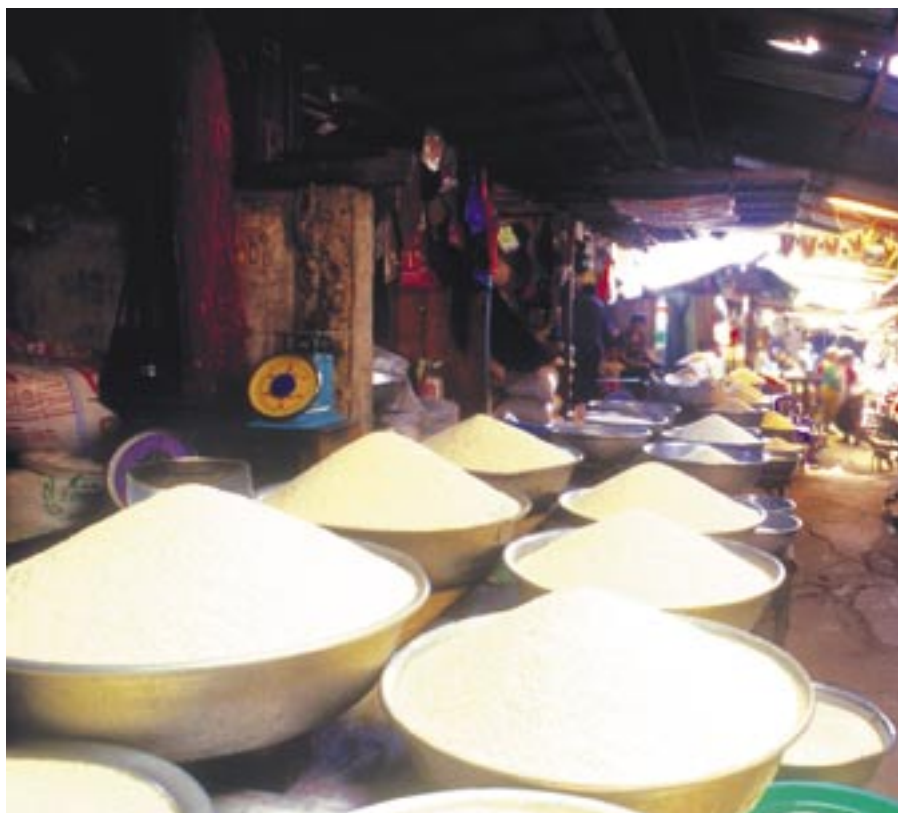
In 2000, economists from the University of Sydney and Hanoi Agricultural University surveyed 400 households in four provinces, two each in the south and north. This survey and follow-up work identified three main factors associated with rural poverty: small farms, low socio-economic status, and limited opportunities to earn off-farm income.

Equity between households was a primary objective when the Government began allocating land in 1993. It took into account land quality and household population. It was also concerned that anyone who wanted to farm could do so.

Consequently, the amount of land granted to each household is generally small. Even so, circumstances vary markedly between households, and from one province to another, underlying the need for flexible rural development policies.

For example, farms in the south typically consist of one or two plots, but in the north are spread over eight, nine or many more. The Government has encouraged consolidation, believing this will boost productivity, but the policy may disadvantage households in mountainous regions where many plots reflect different land types and crop choices, and contribute to a more diverse agriculture.

Most farms surveyed were between 0.5 and 1.5 hectares, although some were less than 0.1 hectares and others more than 10 hectares. In general, low socio-economic status was linked to smaller, less productive farms. Poor households in Ha Tay province near Hanoi have lower educational levels and about half the land area of more prosperous households. In the remote mountainous province of Yen Bai in the north west,



'VIETNAM HAS NOT ONLY ACHIEVED SELF-SUFFICIENCY IN RICE PRODUCTION, BUT HAS GROWN INTO THE WORLD'S SECOND LARGEST RICE EXPORTER.'

poor families have one-fifth the land of their richer neighbours, but their net value of production is higher per hectare. Larger farms, however, have the advantage of spare land for cash crops.

Most rural households rely on off-farm earnings to boost household income. Off-farm income sources include handicrafts, pensions and remittances, providing services, permanent and casual labour. These activities boosted the median level of total household income by 32 per cent in Ha Tay and up to 106 per cent in Binh Duong province, near Ho Chi Minh City. This shows the extent to which off-farm income contributes to raising the incomes of the poorer 50 per cent of households.

There is, therefore, an urgent need for economic reforms to stimulate more off-farm employment. Off-farm enterprise and services in rural areas are critical for poverty reduction in the future. Greater flexibility in land use is also critical. The World Bank says government production policies on commodities like rice are limiting the ability of farmers to diversify in response to market signals.

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'Farm income and income diversity on Vietnam's small household farms': paper delivered to the 48th Annual Conference of the Australian Agricultural and Resource Economics Society, 11-13 February 2004. Authors: Sally Marsh, Pham Van Hung, Nguyen Quoc Chinh and T. Gordon MacAulay.



FRUIT FLIES GET A TASTE FOR BEER

Beer is a popular choice for many Vietnamese drinkers, and it would seem that local fruit flies are partial to a drop as well – which is why the Fosters Brewery in Tien Giang Province has just built a special waste processing plant.

The plant will turn yeast waste, a by-product of beer production, into a bait to trap fruit flies.

Fruit flies are the most damaging invertebrate pest for agriculture in southeast Asia. In Vietnam, crop losses attributed to fruit flies can be 100 per cent, and farmers in some areas routinely expect to lose up to 95 per cent of each year's peach crop to these pests.

The only control that has been proven as a deterrent is to drench crops with chemical sprays. The prevention, however, is in many ways worse than the damage, with potential human health and environmental problems arising from inappropriate chemical use and residues in food. Also, other invertebrates are killed along with the flies, including natural predators of the fruit fly.

The practice also becomes a trade barrier, limiting the economic returns that should be coming from the potentially valuable horticulture industry.

Waste yeast has few uses, and can be an environmental problem. Now the development of a bait utilising waste yeast has emerged as a win-win because it also provides a use for the waste.

Australian scientists at Griffith University's International Centre for Management of Pest Fruit Flies, supported by ACIAR and the Crawford Fund, came up with an answer that was innovative and attractive to all parties, including the fruit flies.

By treating the brewery waste with heat and enzymes, it is converted into a protein which is

highly attractive to flies. When diluted with water and a minuscule amount of insecticide, the protein can be applied as a small dollop on to a tree. It is simple to apply, inexpensive to produce, and most importantly, it controls the fruit flies.

The brewery waste solution had already been proven, through an ACIAR project in Tonga that developed the waste processing technology, but several barriers had to be overcome for its use as a pest control.

The main challenge was getting the formula right to ensure the yeast waste produced at Tien Giang would attract fruit flies.

The first step was a fruit fly species survey, using traps and host fruits to collect flies and determine which were the problem species. This was important for getting the formulation right.

The other step was finding an industry partner. Fosters was keen and BASF (formerly Aventis) also became involved by providing funds.

Local farmers near the Fosters Brewery then took part in trials and training in the use of the baits.

The successful collaboration between science, government and industry culminated with the official opening of the plant, on 16 April 2004 by the Australian Ambassador to Vietnam Mr Joe Thwaites and the Chairman of the Tien Giang People's Committee.

In areas where farmers were losing hope of ever controlling the fruit fly pest, optimism has returned. ■

PROJECT:

CP/1998/005 Managing pest fruit flies to increase production of vegetable and fruit

Win-win: New fruit fly control in a protein paste made from waste brewing-yeast.



Net gain: QDPI&F researcher Bob Nissen inspects netted peach trees at Khunwang research station in northern Thailand.

CONSUMER CONCERNS DRIVE ALTERNATIVE METHODS

Consumer and environmental concerns over pesticide use and residues are driving attempts to develop alternative treatments. In Vietnam, with extensive networks of canals and watercourses running through farming land being used for producing food, for bathing and washing clothes, the possible presence of pesticide residues is a genuine issue of concern. Using baits is just one approach.

Physical barriers that exclude flies, thereby preventing them from laying eggs in fruit, provide a non-chemical *alternative* method. In countries where labour costs are low, this might involve wrapping individual fruit in paper bags to protect them from fruit fly and other insect pests. On a larger scale it might involve covering the whole tree.

As part of an ACIAR-supported project to develop a low-chill

fruit industry in Thailand, Laos and Vietnam, researchers from the Queensland Department of Primary Industries & Fisheries are testing a small-mesh netting to fully enclose individual trees when fruit are susceptible to attack. A two-millimetre mesh net made from long-lasting translucent fibre that minimises the shading factor is being used. The netting has the potential to significantly reduce pesticide usage in high-value crops.

An added benefit is that fruit quality and yields appear to be significantly increased under the exclusion netting. Fruit maturity is advanced by about 7 to 10 days due to the higher temperature under the netting. A significant increase in the number of potential markets that have fruit fly-free status is a major benefit of using total exclusion netting. ■

PROJECT:

CIM/2001/027 Adaptation of low-chill temperate fruits to Australia, Thailand, Laos and Vietnam

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STOPPING RODENT NUMBERS FROM GROWING WITH RICE CROPS

Lush rice paddies cover almost half of all agricultural areas in Vietnam, presenting an appealing picture of productive farming to locals and visitors alike.

But one local is not seen by farmers in such a positive light – the rice field rat (*Rattus argentiventer*). Each year rats spoil this idyllic image by causing preharvest losses of between five and 10 per cent.

Farmers have considered this a part of agricultural life, some devising ingenious and novel traps to capture the odd rat, but lacking a unified, village-level response.

Changes in the Vietnamese rice industry since the early 1990s have boosted rice production beyond 34 million metric tonnes (2002). In part this has been based on intensifying rice production from two to three crops a year.

Rat population cycles coincide with rice production, with young rats maturing as rice crops mature, ensuring a plentiful food source. Intensifying to three rice crops a year has provided a significant boost to rat numbers. Cropping areas with high rat damage increased from 50,000 to 310,000 hectares between 1993 and 1997 alone.

ACIAR has supported several projects addressing rat damage in rice crops throughout Southeast Asia over the past decade. These have demonstrated an integrated approach as the best solution to stopping rat damage. The combined project work, led by CSIRO, established a five-pronged approach:

- use of the Community Trap Barrier System (CBTS) – utilising a series of carefully spaced lure crops planted prior to the main cropping cycle, and surrounded by a barrier and traps to catch rats and break the breeding cycle;
- Integrated Rat Management (IRM) at the village level, including synchronising cropping and fallow periods;
- forecasting and ecology of rodent populations, such as through surveys;
- biological controls; and
- establishing a rodent network and delivering training through this.

This research formed the basis of an AusAID-funded 'Capacity-building for Agriculture and Rural Development' (CARD) project in the Mekong Delta region, facilitating Vietnamese capacity in rodent management, and a sub-project of the ACIAR–World Vision collaborative project, to facilitate farmer uptake of project results, in this case in Binh Thuanh province.

A soon-to-be-published Impact Assessment Series Report of these two projects and their ACIAR-supported predecessor have shown significant benefits flowing to Vietnam. The study determined that while the CTBS has had limited adoption, mostly on larger farms with higher rat populations and more resources, IRM has had a widespread impact.

IRM has formed the basis of both national and provincial government policies. At the national level, the Vietnamese policy directs farmers to practice IRM, including, where practical, adoption of the CTBS. At the provincial level, budget allocations for the implementation of the policy have been provided. This will result in more CTBS demonstrations and extension of IRM to other provinces. ■

PROJECT:

AS1/1998/036 Management of rodent pests in rice-based farming systems

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NEW SOYBEAN VARIETIES PROMISE A BUMPER HARVEST

Increasing Vietnam's national production of soybeans from around 200,000 tonnes a year to a million tonnes a year by 2010 is a Government goal, driven by projections in demand and being able to meet this domestically.

Bridging the significant gap between current production and what is needed to meet future demand can be helped by more suitably adapted varieties. This is the aim of an ACIAR project 'Soybean adaptation and improvement in Vietnam and Australia'.

The project has identified the genetic material to overcome the two main barriers to increased production; the very short growing season and varieties poorly matched to local conditions.

Soybean is used in Vietnam primarily as livestock feed, although it can also be used to add diversity to rice-dominated human diets. This domination impacts on the growing season of soybeans, which is usually squeezed in as an opportunity crop between rice. As a result the soybean summer growing season is very short, and does not provide enough time for the plants to mature. High seasonal rainfall, rather than full maturation, signals the end of the growing season as the soybean has to be harvested before rain causes seed quality to deteriorate.

Many varieties grown by farmers are also poorly suited to their agro-ecological conditions. This further reduces yield. Compounding these factors is lodging, when leaves and plants bend, break or sag during growth. Farmers assume lodging will occur, so the density of their planting is far below optimum – further eroding yields.

Increasing yield potential is linked to the size of a plant's canopy: the larger the canopy, the larger the yield. The canopy grows throughout the plant's life cycle, but most growth occurs during the plant's final stage – which, under Vietnamese circumstances, is shortened.

However, some soybean varieties are able to manage a truncated season through a mechanism that allows extra growth prior to the maturing stage. This is achieved through a 'long juvenile gene', which enhances the growth of some characteristics, including the canopy, in the juvenile period. Increasing the level of activity of desired traits during the juvenile growing period can compensate for the time constraint put on soy crops by farmers' rice priority and the weather.

Previous scientific research, some of it supported by ACIAR, has developed models that predict the impact of long juvenile genes on canopy and other growing conditions. Phenological characteristics of the life cycle, and the impact of long juvenile genes on these characteristics, can be used as a basis for plant selection. Characteristics examined included photoperiod (daily exposure to light) and temperature responses.

The project team accessed germplasm with desired traits, such as tolerance to frost, extreme temperatures and acidic soils, to match agro-ecological conditions. These varieties were also evaluated for the right long juvenile genetic traits and then introduced, through hybridisation, into existing lines.

Varieties tested previously in Thailand by ACIAR-supported research, and shown as suitable for Asian growing conditions, were also trialled. The trials showed that the long juvenile gene can be bred into varieties suitable for Vietnamese agro-ecological conditions, and that these will increase

potential yield by maximising growth in a shortened season.

The best of these varieties have yield potentials of between 1.4 and 2.7 tonnes per hectare. Most farmers currently use varieties which yield about 1t/ha.

An added bonus of the new varieties is their suitability for growing conditions as diverse as the northern highlands and the Red River valley, which expands the area where soybean crops can be grown.

A larger soybean harvest will give farmers much needed extra income, both through crop sales and improved animal health as more soy is utilised as feed.

The modest, but significant, yield gains may, however, just be the start. Trials in which 'best practice' (higher plant density using lodging-resistant cultivars and improved water and fertiliser use) is also being applied are showing that yields could go as high as 5t/ha.

The genetic and plant physiology mechanisms that determine traits such as adaptation for temperature and photoperiod response, drought tolerance and weathering (the viability of germination) are also well on the way to being better understood. Vietnamese scientists are involved in this work, building their knowledge and capacity so they can take over the job of incorporating desired traits into breeding lines in Vietnam.

ACIAR is now looking at the best ways to ensure that the new varieties are made widely available. One of these may be assisting in the development of a seed delivery plan that taps into Vietnamese Government and NGO initiatives at the farmer level. This and other work to encourage the release of seed to more Vietnamese farmers is likely to be supported through an extension of the project.

This additional support would also continue the development of Vietnamese scientific capabilities, passing on the mantle to Vietnam for further research and extension.

While this project has produced high hopes for soybean production in Vietnam, it also looks like having a valuable spin-off in Australia. One new variety, bred with the long juvenile gene and improved resistance to drought and weathering, has now been released in north Queensland. ■





A BETTER SWEET POTATO LEADS TO A BIGGER PIG

How do you make a pig grow faster without feeding it more food? That was the question facing researchers from Vietnam and Australia in a recent ACIAR project, also involving Indonesia. The Vietnamese component of the project is now finished, with the focus of remaining research now shifting to Indonesia.

Pigs are important for food security and vital to the domestic economy, particularly in northern and central Vietnam. Pigs are allowed to forage for food, and are also fed from crops, mainly sweet potato, to increase growth rates.

The traditional sweet potato-pig farming system has been a source of food stability, but it has been unable to provide income available from the expansion of commercial returns from raising pigs. So the beginnings of a move from a traditional to a commercial approach to raising pigs was put in place.

The big question being asked was, how can pigs grow faster when the farming system does not provide for additional food?

To maximise commercial returns, farmers need pigs to mature faster, as a way of saving input costs and time.

Management practices for growing sweet potato and raising pigs offered little hope for improvement, because they were already highly advanced.

However, one weak link identified was the sweet potato varieties, many of which have limited nutritional value to pigs.

This area was seen as the finishing touch to the transition from traditional pig raising to a more commercial enterprise. An ACIAR-supported project, involving SARDI and the International Potato Centre, addressed this issue.

The introduction of improved sweet potato varieties became the research focus in Vietnam.

Unlike the Indonesian leg of the project, little needed to be done to

improve the management practices for sweet potato-pig systems in Vietnam. Instead, two quality factors needed improvement – higher starch and protein yields.

Any increases in either would result in faster growth rates for pigs.

The improved varieties introduced and tested during the project lived up to their promise. Yield increases of root starch and leaf protein increased by 100 per cent. This resulted in pigs fed on the new varieties increasing their growth rates by 20 to 30 per cent.

The increased growth rate halved the cost of raising pigs, which is measured through the cost per kilogram of weight gained. This fell by 40 to 50 per cent, and each dong saved during growth now stays in the farmer's pocket.

Spreading the message has relied on the willingness of local farmers to pass the information on to their fellow farmers, although a manual has now been produced. Farmers and trainers have attended workshops, which has helped establish a network throughout parts of northern and central Vietnam, based on disseminating knowledge stemming from the project.

The network is also being used to distribute clones of the improved sweet potato varieties. With the commercial returns and savings on offer to farmers demand is growing quickly.

And so are the pigs. ■

Economic growth: Vietnamese pigs are now maturing faster.

PROJECT:

CIM/1995/130 Soybean variety adaptation and improvement in Vietnam and Australia

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PROJECT:

AS1/1998/054 Poverty alleviation and food security through improving the sweet potato-pig systems in Indonesia and Vietnam

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