

# FATAL ATTRACTION

Fruit flies in Vietnam are coming to a groggy end. Brad Collis reports on how a chance meeting helped deliver the solution to farmers' battle against devastating losses to the pests

**N**guyen Van Dung has been travelling a hard road in recent years – but a road that millions of people aspire to travel. Nguyen has been treading the rutted route out of poverty. Over the past decade, Nguyen and his neighbours in the Chau Thanh district in Vietnam's Mekong Delta region have been putting behind them the culture and knowledge of traditional rice farming to become fruit growers.

It epitomises the aspirations that numerous aid and rural development agencies have had for years: to move people from subsistence monocultures into more diverse and higher-value agriculture.

But for the individual families and their villages it is an obstacle-strewn step into the unknown. It is a gamble that begins with some very hard years as rice-growing land is sacrificed for fruit trees that are going to take several years before they produce a crop; and this is in addition to the overriding challenge of learning a whole new way of farming.

But six years after Nguyen made the change, the difficult transition years are now just a memory and he considers himself to be basking in good fortune. He is no longer growing a crop merely to feed his family and collect a meagre income from local rice markets. Instead, he has a bountiful milk fruit and saboche orchard and, even more significantly, he now knows that he has only begun to explore the potential of his 1.5-hectare farm.

Nguyen, like his neighbours, had been losing up to 90 per cent of the crop to fruit flies because there was neither the local knowledge nor the practical tools for combating the voracious pest. Fruit fly had not been an issue for them as rice farmers and while pesticides might at first seem a straightforward answer, they are problematic in a landscape where open water has both farming and domestic applications.

What was needed – and what has been developed with Australian help – was a low-cost bait that was specific to particular pest fruit fly species and safe for both users and the environment.

As is so often the case, serendipity played an important role in delivering good science, and in the case of the fruit fly problem that was holding back Vietnam's horticultural ambitions it came in the form of one of Australia's iconic beer labels – Foster's.

The Australian brewer had moved into Vietnam in 1997, a few years before ACIAR began supporting a project led by Griffith University's Professor Dick Drew to tackle the fruit fly pest.

Farmers were becoming disillusioned and the whole diversification program – which was also seeking to give upland farmers a substitute for opium production – was in danger of collapsing.

The initial ACIAR project quickly sought to build up a comprehensive knowledge of the pest species and then to develop suitable controls. Shortly after the project started, Professor Drew found himself sitting on a plane with the managing director of Foster's Vietnam, Gary Bett, who is now Foster's Brewing International's senior vice president for Greater Asia.

Professor Drew asked Gary Bett what the company planned to do with its waste yeast, and so began a five-year collaboration that culminated in May this year with the commercialisation of a low-cost and effective yeast-based fruit fly bait.

The 'SOFRI Protein' bait, using beer waste reprocessed in a purpose-built facility at the Foster's Tien Giang Brewery outside Ho Chi Minh City, is the result of the ACIAR project initiated by Professor Drew and run by his Griffith University colleague Dr S. Vijaysegaran.

Several barriers had to be overcome, in particular getting the formula right to ensure the yeast waste produced at Tien Giang would attract the fruit flies that were causing the damage. The first step was conducting a survey of fruit fly species, using traps and a collection of host fruits throughout Vietnam, to determine which species was the problem. This was crucial to developing the right formulation.

The bait's commercialisation by the Cantho Pesticide Company (CPC) represents the culmination of a project that is seen not just as a measure of the success of the research, but as also reflecting the confidence that everyone has in fruit growers' own increasing commercial capacities – the fact they are able to pay for agronomic inputs.

Under the commercial arrangements that have now replaced the ACIAR-supported research and trials, Foster's Vietnam sells its processed yeast waste (protein mix) to CPC, which packages the product with a pesticide recommended by the International Centre for the Management of Pest Fruit Flies at Griffith University and the South Vietnam Fruit Research Institute (SOFRI).

Farmers mix the pesticide and protein mix into a water-based spray-on solution, which is applied in low volumes as a tiny spot to each tree in a fruit orchard, starting at fruit set and repeated weekly until harvest. The pest fruit flies are soon attracted to the spots where the spray has been applied and killed before they can lay their eggs in fruits. It is accurate, simple, inexpensive, environmentally friendly and puts a waste product to good use.

The protein bait is made by treating the initial beer waste with heat and enzymes, which remove the alcohol and convert the spent yeast into a protein that is highly attractive to the fruit flies. When diluted with water and a small amount of insecticide the protein can be applied as a spot on a tree, sufficient to kill flies with negligible impact on the landscape and useful insect predators.

Nguyen Van Dung has been trialling the bait for the past two years and says his farm income has risen by some 70 million dong (about \$5000); money that he is now investing back into his farm for further crop improvement. "It is giving my family a more reliable future," he says.

Mr Le Van Ri, chairman of the Horticultural Association in Kim Son commune in the Chau Thanh district of Tien Giang province, says the SOFRI Protein bait is not only reducing crop damage and



Mekong Delta fruit grower Nguyen Van Dung in his orchard, which he says will provide a more reliable future for his family.

PHOTOS BY BRAD COLLIS

lifting incomes, but the project has also had the effect of raising farmers' understanding of environmental impacts; something that will be increasingly important as they aspire to higher-value markets with strict food quality requirements.

Le Van Ri says his association's 3700 members now have 1200 hectares of orchards and the long-term goal is to produce fruit of a high enough quality to export.

There is still a distance to travel to reach this target, but SOFRI director Dr Nguyen Minh Chau is confident that day will come, citing the development of the country's export rice sector as an example.

"In 1975 we set out to take rice from subsistence farming to an export industry in 25 years – and we started exporting in 1990," he points out. Vietnam is now the world's second-largest rice exporter. "We started our fruit industry with a similar goal in 1994 and I think we are on target to developing fruit that is suitable for export in another decade from now."

The managing director of Foster's Vietnam, Jake Jacobs, says the company has been enthusiastic about the fruit fly bait project since its inception. He describes the outcome as a very creative solution to a significant rural problem.

Mr Jacobs says spent yeast used to be incorporated into livestock feed, but the fruit fly bait is a way to add real value to the local community and its environment. "Of course the big question is: do Vietnamese fruit flies like any beer, or do they really prefer Foster's?"

Vietnam is in the final stages of joining the World Trade Organization, which will link it to global markets but also require it to conform with the stringent rules and regulations that govern international trade.

Researcher Dr Vijaysegaran says the 'clean, green' fruit fly control technology introduced by the ACIAR project is an important development in this ongoing transition from traditional rice farming to a modern export-oriented fruit industry in Vietnam. ◀



Le Van Ri, chairman of the Horticultural Association in Kim Son commune in the of Chau Thanh district.



Dr Vijaysegaran (right) with collaborating SOFRI researcher Dr Nguyen Van Hoa at the Foster's Vietnam yeast reprocessing plant.

# YEAST MEETS PEST



CONTRACT SIGNING  
CEREMONY OF  
PROTEIN BAIT PROJECT  
**ACIAR**

Dr S. Vijaysegaran with, on the left, the raw yeast waste, and on the right, the protein bait after the waste has been processed and the alcohol removed.

BRAD COLLIS

## Extensive trials of the SOFRI Protein bait have seen farmers' incomes rise fourfold. Brad Collis reports

In the lead-up to the protein bait project in Vietnam using spent brewery yeast, protein bait sprays had already been tested elsewhere in South-East Asia and Australia. For example, from 1986 to 1992 an ACIAR project in collaboration with the Malaysian Agricultural Research and Development Institute (MARDI) developed a beer yeast waste protein formulation called PROMAR, which controlled fruit fly in starfruit, soursops and chilli. However, the bait was not fully commercialised.

In 1995–96, an ACIAR project in collaboration with the Ministry of Agriculture in Tonga developed another beer yeast waste protein formulation and constructed a small prototype yeast protein production plant to provide Tongan farmers with protein bait.

In the ACIAR fruit fly project in Vietnam from 2001 to 2005, efforts were 'up-scaled' and the first fully commercial protein bait factory producing protein bait from beer waste was established at Foster's Tien Giang Brewery in the Mekong Delta.

This protein bait is known by the commercial name of SOFRI Protein 10DD and is now marketed by the Cantho Pesticide Company in South Vietnam.

Under ACIAR's Vietnam project, experiments were carried out in Tien Giang, Dong Thap and Ben Tre provinces to determine the efficacy of the SOFRI Protein bait in controlling *Bactrocera dorsalis* and *B. cucurbiata* on fruit trees and cucurbit crops.

Extensive testing, both in the laboratory and in the field, was conducted on various concentrations and formulations of SOFRI Protein. Laboratory tests involved counting the number of laboratory-reared adult flies attracted to the test bait and to a water control placed on opposite sides of a 30-centimetre cage. In the field, attractancy was assessed by applying a small spot (20 to 50 millilitres) of the test bait (plus insecticide) to foliage. A white groundsheet was placed under the treated foliage and the number of flies attracted and killed was counted.

These attractancy trials showed that SOFRI Protein, although not as attractive as some other insect lures, was still a good bait when used on its own in the field. The optimum application rate of SOFRI Protein was 100 to 150ml per litre of water.

Various trials showed that the protein bait needs to be used across a wide area for orchards to be protected to a level where damage is less than five per cent. When baits were used in small plots or farms, adult flies breeding in neighbouring untreated farms or orchards were still able to inflict significant damage on treated orchards. However, when protein baits were used over a wider area to cover a large number of farms or an entire village or hamlet, excellent fly control was achieved.

### Milk fruit

Milk fruit is a popular tropical fruit indigenous to Vietnam and Cambodia. It derives its name from its fragrantly sweet and milky white juice. The most popular way to enjoy the fruit is to squeeze the tough fruit until it becomes tender, so that the juice mixes with the meat of the fruit. A small hole is then cut at the top so the juice can be sucked out.

Two large-scale orchard trials were implemented, one on peach in the north and another on Barbados cherry in the Mekong Delta. The trials assessed the level of fruit fly control and also collected data on the increased yield and income achieved by farmers using the protein bait spot spray technique.

In Son La province, where peach was introduced to the poor H'Mong hill tribe people in the early 1990s, heavy fruit fly infestation in tree-ripe fruits has forced farmers for the past 10 to 15 years to harvest immature green fruits to avoid losses to fruit flies. Farmers obtained a low price of about 1000 dong per kilo of fruit and have considered cutting down their trees, or returning to their old undesirable practices (growing opium poppies).

Following trials over 35 hectares of peach with SOFRI Protein spot sprays, farmers harvested ripe peaches for the first time in more than 10 years of cultivating the crop – achieving higher yields and higher prices – and this was without resorting to dangerous insecticide cover sprays. Their fruit is now snapped up by wholesale buyers from Hanoi.

In 2005, trials were conducted over a larger area of 60 hectares of peach and the results were even more spectacular. The successful peach crop in the previous year (2004) had driven the price of ripe peach to 4000 dong per kilo, as a result of which the poor H'Mong farmers increased their incomes to 40 million dong (A\$3347) per hectare in 2005.

In Go Cong province, Barbados cherry is a major crop that is processed, frozen and exported to Japan – but suffers yield losses of up to 70 per cent because of fruit fly.

A control program using a combination of SOFRI Protein bait sprays and methyl eugenol mats (Bactromats) has reduced the average level of damage to less than four per cent.

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### Saboche (also known as Sapodilla)

Saboche is an egg-shaped fruit with a sweet pulp that, depending on the variety, can taste like peach, banana or apple. Two popular species are grown in Vietnam: orange pulp and white-yellow pulp saboche.

