

## No more 'bonsai' banana trees?

Cultivating banana trees in Canberra's decidedly un-tropical climate might seem — no pun intended — a fruitless endeavour, but for Dr Paul Wellings and Mr Peter Hart, of the CSIRO Division of Entomology, it was a vital first step in aiding people thousands of kilometres east of Australia's capital city... in the Kingdom of Tonga.

Sponsored by the Australian Centre for International Agricultural Research (ACIAR), Dr Wellings and Mr Hart began work in 1989, growing banana trees in the Division's glasshouses, then collecting specimens of the banana aphid, *Pentalonia nigronervosa*, in northern Queensland.

This small, soft-bodied pest occurs throughout the Pacific and, because it carries bunchy-top virus, is responsible for serious crop losses.

Bunchy-top virus creates a virtual *bonsai* banana, stunting the tree's growth and deforming its leaves. The tree fails to grow and fails to produce fruit: a significant problem in Pacific nations where bananas and plantains (cooking bananas) constitute an important part of the local economy.

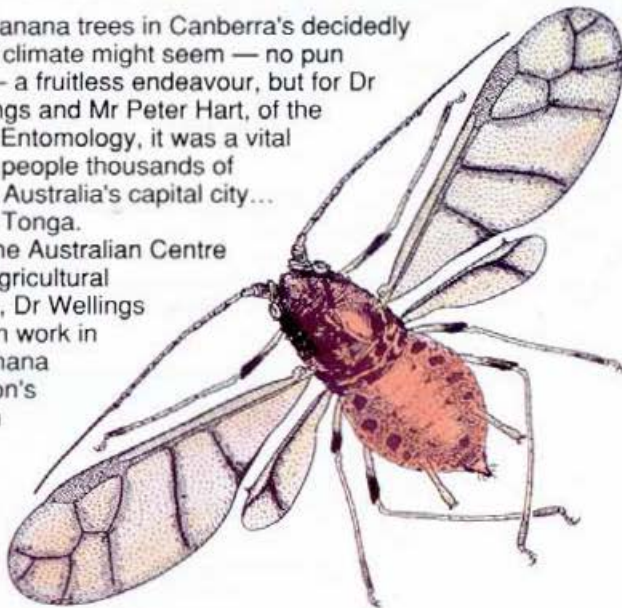
The scientists also collected specimens of *Aphidius colemani*, a 2-mm-long parasitic wasp — found in Australia but not in Tonga — that lays its eggs in banana aphids (as well as other species). The egg hatches inside its living food supply; when the larva pupates the host dies, turning into a 'mummy' that protects the wasp pupa until it is ready to emerge.

In Australia, control of bunchy-top virus in banana plantations is achieved mainly through destruction of infested plants, insecticides and tissue culture of virus-free banana plants, but none of these options is viable in Tonga: insecticides are too expensive, destruction is impossible to implement throughout the country, given the land-ownership structure and the number of islands in the Kingdom, and virus-free plants quickly become infested because the aphid is unchecked.

The introduction of a parasite thus offers the best means of controlling, if not eliminating, a pest of serious economic proportions, and this strategy is to be supported by planting virus-free trees as pest numbers dwindle.

Dr Wellings and Mr Hart first cultivated banana plants using tissue-culture techniques, then bred banana aphids in controlled conditions (in ideal conditions, a new generation emerges every 9 days) before introducing *Aphidius* wasps to the infested plants.

Mummified aphids were collected from the banana leaves for the flight to Tongatapu, the Kingdom's main island. On arrival at the Tongan Ministry of Agriculture, Fisheries and Forests (MAFF) Vaini Research Station, Dr Wellings and Mr Hart erected special lightweight, prefabricated emergence cages and began rearing the parasites as they emerged.



The aphid, and a heavily-infested banana plant.

P. Wellings



Dr Paul Wellings with Tonga MAFF officials at the first release of parasitic wasps.

Working with Mr Pila Kami, a MAFF biological control officer responsible for the aphid control project, the scientists next selected several banana plantations as release sites. At each they placed small banana trees containing a mixture of 'clean' aphids, parasitised aphids and mummies, so emerging wasps would attack laboratory aphids before moving about the plantation in search of further populations in which to lay their eggs.

Mr Hart spent several weeks at Vaini training MAFF officers to take over planting, rearing and release schedules. Continued releases are vital: the researchers must await long-term field studies to see whether there has been any downward trend in the pest's populations.

However, Dr Wellings is cautiously optimistic that, like many a South Seas traveller, *A. colemani* will find the Polynesian life-style irresistible.

Carson Creagh