

Avoiding the traps of crop protection

Brad Collis reports on a project team encountering some unusual hazards

When it comes to applying research results to farming practices, a degree of farmer resistance is normal, especially if there are new costs. But a reluctance to clean up farms because a messy, overgrown site is easier to booby trap must be one of the more unusual reasons for farmers to balk at change.

Nonetheless, this was an explanation given by farmers to Dr Edward Liew and his team who have been researching diseases that have been damaging clove and vanilla yields in North Sulawesi, in eastern Indonesia.

“We confirmed that the stem and root rot affecting vanilla yields is caused by the fungal

pathogen *Fusarium oxysporum f.sp. vanillae*, and that farm sanitation, such as removing diseased plant material is one control option,” explains Dr Liew. “However, theft is also a serious concern for farmers – almost more of a problem than disease, so farmers deliberately keep their farms looking ‘jungly’ and potentially dangerous.

“We discovered some even booby-trap their crops ... which freaked us out a bit.”

Dr Liew says another anti-theft practice among farmers is to carve their initials on each vanilla pod – a very labour-intensive exercise, but it underscores the value of the crop to the region’s farmers, and how the follow-up extension work will have to grapple with issues a bit more com-

plex than straightforward farm sanitation.

Dr Liew, from the University of Sydney, was coordinator of the recently completed four-year project to diagnose and control soilborne fungal diseases of plants in eastern Indonesia.

Project leader was Professor Lester Burgess from the University of Sydney, and collaborating institutions were the Sam Ratulangi University, Indonesia, and the Sydney Botanic Gardens.

The project concentrated on cloves, vanilla and corn, although corn became less of a priority during the course of the project because stalk and cob rot did not emerge as a significant problem for the region.

Aside from pinpointing the cause of reductions in vanilla yields, which can be as much as 73 per cent, Dr Liew says the most significant outcome of the project was the identification of another fungal pathogen, *Ceratocystis polychroma*, as the agent of clove yield losses. This fungal pathogen was taxonomically described as a new species.

More than 90 per cent of clove trees on surveyed farms were infected, at severity levels ranging from 43 to 72 per cent.

The pathogen is associated with the clove trunk borer *Hexamitodera semivelutina*, found in this region. Although infection of this disease occurs mainly on wounds caused by the trunk borer, it was also shown to occur on mechanical wounds, and researchers noticed the disease can potentially be spread by all insects inhabiting or foraging within the trunk borer galleries.

Ceratocystis polychroma was also shown to have a high level of genetic diversity.

Strategies developed to reduce the extent of this disease include the control of the trunk borers, eliminating insects in general within borer galleries, farm sanitation and sealing trunk wounds. The use of fungicides has been ruled out as not being cost-effective.

Dr Liew says cloves and vanilla are the second most important cash crops in North Sulawesi after coconut, so anything that decreases production has a high impact on farmers.

“This is also why a big chunk of the budget was channelled into training and building a basic laboratory; so that we could put in place ongoing, local plant pathology expertise.

“And one of the best ways to train people is to research real problems alongside the trainees – which is what we did. This is much more effective than simply transferring an established technology from Australia.”

A new phase of the project has just begun to develop effective extension services to help farmers utilise the results of fungal pathogen research.

The soil pathogen project team heading out on a field trip to collect disease samples and set up field experiments on clove trees. Back: Bertu Assa, Frans Rondonuwu, Arthur Pinaria and Guntur Manengkey. Front: Joppy (farmer), Vivi Montong and Edward Liew.

