Ant security guards for tropical fruits

Green ants are inherently aggressive by nature and this is proving advantageous to cashew and mango growers. They are now using the native ants to defend their high-value crops against a range of damaging insects, and saving good money by dispensing with conventional insecticide defence.

This follows years of research into the method at Charles Darwin University with funding from the Rural Industries Research and Development Corporation.

Entomologists Dr Renkang Peng and Dr Keith Christian found that green ants, while harmlessly feeding on the nectar of young cashew nuts, also protect their food resource against several serious pests, including the tea mosquito bug, mango tip borer, fruit spotting bug, leaf roller and green bug. To amplify this beneficial effect, they decided to transfer nests of the tree-dwelling green ants from native vegetation to cashew orchards and monitor the effects.

A green ant nest in a mango tree, enclosed by leaves. Only a few leaves (less than 0.4%) are affected by the nests. Renkang Peng

Ironically, the main limitation to the method was the aggression of the ants because fierce border disputes break out between ant colonies placed too close together – distracting them from the job of patrolling their cashew nuts.

The researchers overcame this by experimenting with various degrees of colony isolation and came up with a method of isolating neighbouring colonies by pruning branches connecting the orchard trees. Colonies with queens, best introduced at about two years of age, then persist for three to five years.

'The benefits of green ant control are dramatic,' says Peng. 'Compared with chemical sprays, the ant technique saves cashew growers at least $1500 per hectare per year in reduced maintenance costs, better quality cashews and much greater yields. The ants not only defend the nuts, they also clean them, resulting in more attractive, shinier nuts. There are also environmental benefits and the produce can be labelled "insecticide-free"'.

The scientists have more recently adapted the method to mangoes. The only problem is, mangoes, unlike cashews, are harvested by hand and the pickers are likely to get bitten by the ever vigilant ants.

Green tree ants destroying an insect on a mango fruit. Their defence of food resources has been put to good use by growers. Renkang Peng

The solution was to use the observation that green ants sensibly retreat to their nests during rain. Spraying the mango trees with water just before harvesting makes it safe for pickers to move in.

'Following success in northern Australia, we are now beginning to apply the green ant technique to control crop pests in Thailand and Vietnam, where chemical costs are proving prohibitive,' says Christian. The Australian Centre for International Agricultural Research is supporting the project.

● **Steve Davidson**

Contact:
Dr Renkang Peng, (08) 8946 6763,
renkang.peng@cdu.edu.au

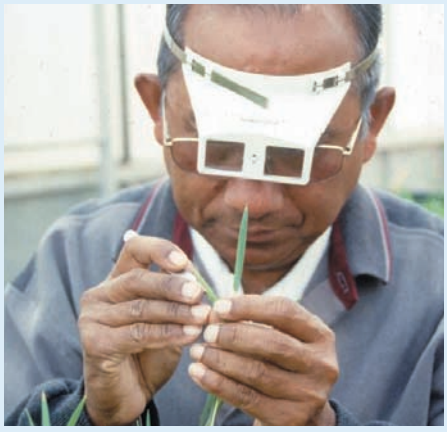
Salt water wheat from wild barley

A cereal crop that can grow profitably on Australia's salt-affected land? What are the chances? They are looking better now that a tough wild barley has something to do with it.

Funded by the Grains Research and Development Corporation, Dr Tim Colmer's team from the CRC for Plant-based Management of Dryland Salinity is trying to develop a salt- and waterlogging-tolerant cereal that would enable farmers to extend cropping onto soils with salinity levels too high for any existing cereal breeds.

The key to the research is a plant that farmers dread because it is often the first sign of salinity: *Hordeum marinum*, commonly known as 'sea barley grass'. But the researchers think the very factors that allow this species to thrive on saline land will help develop salt tolerance in wheat.

'We are screening the "wild" *Hordeum* germplasm (the reproductive genetic material) to determine which species are potential gene donors for salt- and waterlogging tolerance, and which of these can be cross-bred with bread wheat', said Dr Colmer. 'Waterlogging tolerance is important since salt affected areas are frequently waterlogged in southern Australia.



Team member Dr Rafiq Islam of Adelaide University has already made several wheat-*Hordeum marinum* hybrids. CRC for Dryland Salinity

'Our work has shown that sea barley grass is very salt tolerant, capable of growing at levels approaching seawater. It also possesses mechanisms for root aeration that contribute to waterlogging tolerance. The challenge for us is to create a successful hybrid of *Hordeum marinum* with wheat that maintains these key traits.'

Dr Colmer points out, however, that even with these advances, cropping is unlikely to be viable on severely salt-affected land, where fodders such as saltbush and salt-tolerant grasses will remain the most appropriate to grow.

More information:
CRC for Plant-based Management Dryland Salinity http://www1.crcsalinity.com/index.asp
Contact: Bruce Munday, 0417 895 249.