ASSESSING A BIOCONTROL AGENT FOR JATROPHA GOSSYPIIFOLIA

Locations	Australia, Trinidad and Tobago, United Kingdom
Dates	01/07/2008 - Ongoing

Summary

Jatropha gossypiifolia (bellyache bush) is a major invasive plant in northern Australia. Previous biocontrol efforts have focused on insects but the Australian Government is now also keen to explore fungal pathogens. As experts, CABI is carrying out safety and efficacy experiments with the rust pathogen *Phakopsora jatrophicola* using a strain originating from Trinidad. Results will help the Australian authorities decide whether this rust is suitable for biocontrol of *J. gossypiifolia* in Australia.

The problem

Jatropha gossypiifolia, commonly called bellyache bush, is a perennial shrub that belongs to the Eurphorbiaceae family. It was introduced to Australia in the late 19th century for medicinal and ornamental purposes but is native to the Caribbean rim and islands. The plant has now however become a serious invader in northern Australia's rangeland and it's spreading.

The weed forms dense thickets and poses a major threat to native biodiversity and the productivity of the land it's invaded. All parts of the plant, particularly the seeds, are toxic to both livestock and humans. *Jatropha gossypiifolia* has therefore been declared a noxious weed in many parts of Australia and since 1996 has been the target of a biological control programme that has focused on insect agents. In 2008 however, the Department of Agriculture and Fisheries (DAF) (formerly the Department of Employment, Economic Development and Innovation, DEEDI), Queensland, decided to also consider fungal pathogens as potential biocontrol agents.

What we are doing

As experts in fungal pathogens for weed biological control, CABI is researching the *Phakopsora jatrophicola* rust as a potential biocontrol agent for *J. gossypiifolia* in Australia. This rust damages the weed in its native range in the Neotropics where it helps to keep the plant under control. The team is looking at the biology of the agent, its ability to cause disease (pathogenicity) and how specific it is.

We tested a strain of the rust from Trinidad against 40 non-target plant species under quarantine conditions. Out of these, only six – three *Jatropha* species (*J. curcas, J. multifida* and *J. integerrima*) and three native Australian species (*Aleurites moluccana, A. rockinghamensis* and *Beyeria viscosa*) were attacked by the rust and, to varying degrees, could support the rust's spore formation (sporulation).

The potential risk posed by the fungus to these three native Australian plant species, as well as the biofuel species *J. curcas* was further explored by assessing their responses to differing rust spore concentrations (dose-response). To assess the likelihood of them becoming infected under natural conditions a field experiment was established in the grounds of the University of the West Indies, Trinidad, in collaboration with CABI's centre in the Caribbean, and facilitated by the responsible Trinidadian authorities.

Field trials in Trinidad concluded that the two Aleurites species are not considered to be part of the field host-range of the rust and are unlikely to be at risk if the rust was released into Australia. For *B. viscosa*, in a field situation, this non-target species may be subject to some attack by the Jatropha rust but the rust is unlikely to sustain itself on this Australian native.

The focus of the research going forward is to determine the life-cycle of the rust, to confirm whether the rust can complete its development on just *J. gossypiifolia*, or whether it needs an alternative host.

Results so far

Tests show that the rust fungus, *P. jatrophicola*, is specific and experimental research indicates that the rust could be autoecious, i.e. it can complete its life cycle on just *J. gossypiifolia*.

A release application for the rust will be prepared together with Australian counterparts at DAF which will detail all research undertaken with the agent. This document will inform a decision by the Australian quarantine authorities as to whether the pathogen is suitable as a biocontrol agent and whether to grant permission for its import and release.

Donors

Department of Agriculture and Fisheries (DAF)

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