

News from the frontline

CSIRO Entomology is involved in biological control projects for eight environmental weeds: St John's wort, horehound, Scotch broom, bitou bush/boneseed, arum lily, bridal creeper, water hyacinth and *Mimosa pigra*. Five of the projects are run by the CRC for Weed Management Systems.

All these plants were deliberately introduced to Australia either as herbal remedies, as ornamentals or for land management purposes. They are now all major weeds which have collectively spread across hundreds of thousands of hectares. St John's wort, horehound and scotch broom are moving into agricultural regions. Here is an update on the projects.

Water hyacinth

A program on freshwater floating aquatic weeds, implemented by CSIRO Entomology in the 1970s, has seen biological control successes over salvinia, alligator weed and water lettuce in Australia. The program now targets water hyacinth, the world's



Water hyacinth.

most serious floating aquatic weed. Four introduced agents – two weevils and two moths – have been successful in tropical regions, with increasing success in northern New South Wales. The program also involves technology transfer to a number of African countries.

Mimosa pigra

Mimosa pigra is one of Australia's worst weeds of conservation areas and a major biological threat to Kakadu National Park. It escaped from the Darwin Botanic Gardens in the late 1800s and has transformed species-rich tropical wetlands into monotonous tall shrublands in which little of the native fauna and flora can survive. It covers more than 80 000 hectares of wetlands in the Northern Territory and has the potential to spread throughout Australia's



Helicopter spraying of *Mimosa pigra* in the Northern Territory.
Inset: Flowers of *Mimosa pigra*.



tropics. To date nine insects species and two fungal pathogens have been released, all with varying levels of establishment and damage. Other insects are under evaluation.

Mimosa is included in the National Weeds Strategy's recently announced WONS list (Weeds of National Significance) and in 1998 \$2.1 million of National Heritage Trust funding was awarded to the program. The Australian Centre for International Agricultural Research funds several projects, extending the research to Malaysia, Indonesia, Thailand and Vietnam, all of which have significant problems with this weed.

Bitou bush

Bitou bush was accidentally introduced from South Africa, then deliberately used to stabilise sand dunes after mineral mining. A close relative, boneseed, was introduced as a garden ornamental and both now occupy large areas of NSW, Victoria and South Australia. Seven insect species have been released, but only two are well established and spreading. The most damaging insect is still being tested under field conditions in South Africa. Whether this agent can be released in Australia is yet to be determined. A rust fungus is also under investigation.

Scotch broom

Scotch broom was deliberately introduced from Europe because of its attractive yellow flowers. It infests parts of NSW, Victoria,

CSIRO Entomology works with a number of organisations in order to manage its biological control programs. For the programs mentioned in this article, thanks go to the Cooperative Research Centre for Weed Management Systems, NSW Agriculture, Victorian Department of Natural Resources and Environment (Keith Turnbull Research Institute), Northern Territory Department of Primary Industry and Fisheries, National Parks and Wildlife Service of NSW, Environmental Trusts, State Forests of NSW, Hunter Pastoral Company, Federal Government, ACIAR, AusAID, Royal Australian Navy, Swan Catchment Group, Environmental Weeds Action Group.



John Hosking

Above: Dr Andy Sheppard of CSIRO Entomology among a Scotch broom infestation at the Barrington Tops, NSW. The entire 80 000 hectares of broom infesting the Barrington Tops is thought to have arisen from a single garden plant.

Above right: The beetle, *Chrysolina quadrigemina*, one of 12 agents released to control St John's wort, is having sporadic success.

Tasmania and South Australia and is becoming a significant weed of pasture in some areas. Three agents have been released and another is in quarantine undergoing host-specificity testing. The seed-feeding beetle shows the most potential to combat broom populations in Australia.

CSIRO and its collaborators are undertaking a four-country comparative study of the natural enemies of Scotch broom and their influence on its population dynamics. Australian studies will focus on how disturbance and eucalypt cover, and insects already in Australia, affect the reproduction, establishment and spread of broom.



Andi Walker

Above: Louise Morin receives the first shipment of the bridal creeper rust, *Puccinia myrsiphylli*, outside the CSIRO Black Mountain Quarantine Facility at Canberra.

Right: A very important agent. The official release of the seed fly, *Mesoclanis polana*, on bitou bush at Illuka Bluff, NSW.



Bridal creeper

A multi-pronged attack is in store for bridal creeper, a South African species that is a major environmental weed in southern Australia. Bridal creeper was brought to Australia during the 1870s as a popular florists' product and soon become established in the wild. Efforts to control the weed by burning, herbicide spraying and manual removal are limited in their effectiveness. At CSIRO quarantine facilities in Canberra and Perth, three insects, (a leafhopper, a leaf beetle and a seed wasp), and a rust fungus, are being tested for host specificity. An application for the release of the leafhopper is being prepared.

St John's wort

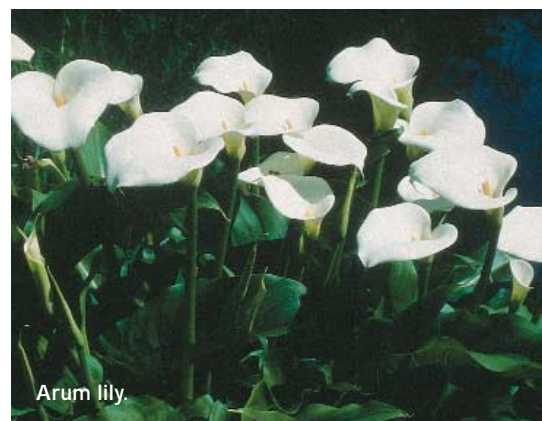
St John's wort was probably introduced many times and at several locations in Australia between the 1850s and 1880s. By the 1900s was a problem weed. The plant, sometimes used as a medicinal herb, can be toxic to grazing animals. The weed has persisted despite attempts to control it for more than 60 years, possibly due in part to the

longevity of its seeds, which can remain dormant for 20 years. Since 1930, 12 agents have been released in the field. Of these, the beetle *Chrysolina quadrigemina*, while effective, does not do well in shaded areas and its success seems to be sporadic. The mite, *Aculus hyperici*, released in 1991, is having some success in regions of NSW and Victoria.

Arum lily

Arum lily came to Australia from South Africa and is used extensively as an ornamental plant. The lily is a major weed of coastal nature reserves and national parks in South Western Australia. So far no seed pre-dating insects have been found in its native South Africa. Research is being conducted into potential pathogens (fungi and disease) of the lily.

This information was compiled by Christina Zisis, Sharon Corey and Kate Smith. For more information on the biological control of weeds contact Sharon Corey (02) 6246 4136, fax (02) 6246 4177, sharon.corey@ento.csiro.au.



Arum lily



NSW Agriculture