## Stem-borer with promise

A hopeful sign has emerged in the battle to control one of Australia's worst plant pests, the giant sensitive plant (*Mimosa pigra*). A stem-boring moth, released as a potential biological control agent in 1989, appears to be causing large reductions in its seed production.

*M. pigra*, a native of Central and South America and a pest in Asia and Africa as well as Australia, has spread rapidly in the wetlands south and east of Darwin since the 1970s (see *Ecos* 65, spring 1990). A fast-growing plant and prolific seed-producer, the weed has a prodigious capacity to prosper in tropical coastal areas. As its seed remains viable in water and can float, dispersal across the Top End floodplains is quick and easy.

Now established in an arc spanning 450 km from the Moyle River in the west to Oenpelli in the east, *M. pigra* is causing environmental devastation over some 800 sq. km. Hundreds of thousands of dollars are spent each year to stop it gaining a foothold in Kakadu National Park; this involves constant monitoring, and eradication of any plants that appear.

The weed — a woody, prickly plant — grows in dense stands up to 6 metres tall. Virtually nothing else grows where it has invaded, resulting in the disappearance of native plant communities and the animals that depend on them. Water-birds appear to have suffered most.

Recognising the seriousness of the problem, in 1990 the federal government allocated $1·25 million in additional funding for research on biological control of the weed. The research is part of an integrated control program, involving both biological and chemical methods, being conducted by CSIRO and the Northern Territory Department of Primary Industry and Fisheries.

So far, six potential biological control agents, collected in the weed's home range, have been released in the Top End — with more to come. An ecologist with the CSIRO research team, Dr Mark Lonsdale of the Division of Entomology, reports that the moth that seems to be cutting seed production, *Neurostrota gunniella*, is now very widespread: 'We can't find any plants without it'. The moth's larvae burrow up the stem as it grows, close to the tip.

On a range of sites, Dr Lonsdale and his team have found a strong negative correlation between seed output and population of the moth, suggesting that the insect is reducing seed numbers by up to 60%. Experiments, involving the use of insecticides to keep some plants moth-free, are now under way to test whether the moth is indeed responsible for this measured variation in seed production.

However successful it turns out to be, though, this moth will not be enough on its own to either destroy existing stands of *M. pigra* or stop the plant's spread. Other control agents will have to contribute, and so far two seed-feeding beetles, a stem-feeding beetle, another stem-boring moth (which attacks large woody stems) and, most recently, a flower-feeding weevil have been released.

Two fungal pathogens of the weed are likely to join them soon, one effective in the Wet and the other in the dry season. The CSIRO team is hopeful that these will have a considerable impact.

As for *M. pigra* itself, apart from an outbreak at Oenpelli in western Arnhem Land its eastward progress has so far been halted at the western boundary of Kakadu National Park. Spread within the areas affected has slowed, probably mainly because the weed has almost reached its limits in these river systems.

Dr Lonsdale believes preventing its spread from Oenpelli is vital, because its subsequent progress through Arnhem Land, around the Gulf of Carpentaria and into Queensland would be very hard to stop.

Continued vigilance is essential. One *M. pigra* plant was found recently 150 km east of Oenpelli, probably the product of a seed carried by a bird. Some suspect that birds such as spoonbills — which wade in mud that, in infested areas, can contain as many as 10 000 *M. pigra* seeds per sq. m — may contribute to its spread. Vehicles and feral buffalo are probably the other main agents of dispersal between river systems.

### *Ecos* moves

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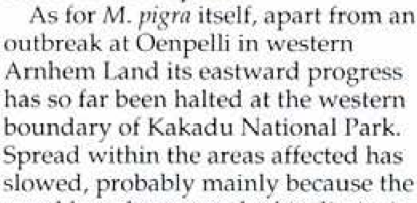


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## Flood control by ants

While termites form the broad base on which the food chain of arid Australia rests (see *Ecos* 71 and 73), the region's diverse collection of ants — a step or two further along the chain — is just as important. Some desert ants scavenge on seeds, fruits or animal remains; some are out-and-out carnivores (in some cases preying on termites); but all of them also provide a food resource for other insects, for reptiles such as thorny devils and for birds and mammals.

Mulga ants are curious members of the genus *Polyrhachis*, which occurs widely throughout Australia, the Orient and the Middle East. They are invariably associated with the grey-green shrubs of mulga (*Acacia aneura*), and their odd, circular nests are a common sight on the hard-packed red earth of central Australia. Little is known about their natural history, but scientists at the CSIRO Division of Wildlife and Ecology's Centre for Arid Zone Research in Alice Springs are beginning, in their spare time, to unearth some intriguing facts about how these centimetre-long ants live.

Dr Stephen Morton noticed that apparently two similar species of mulga ants inhabit the area north of Alice Springs, each of which surrounds its nest with a distinctive circular 'fence' — rather like the thorny *boma* or *kraal* African herdsmen build to protect their cattle from nocturnal predators — of mulga phyllodes. Both species collect thousands of fallen phyllodes and build rings, 10 to 15 centimetres high, around their nest entrances with internal and external diameters of 20 cm and 50 cm. But while one species has a single, funnel-like nest entrance (some 5 cm in diameter) in the centre of the ring, the other constructs several smaller holes that join up beneath the surface.

Mulga ants are nocturnal and omnivorous, scavenging dead insects, seeds and fruits and carrying these below ground to a complex, up to a metre in length, of tunnels and storage rooms. Mr Kevin Jones revealed this subterranean architecture by pouring liquid latex into nests, then allowing it to set and carefully excavating the resulting cast.

Dr Morton has found no significant differences in nest structure between the two species (nor, indeed, between the nests of mulga ants and those of other arid-zone species), but he believes he might have discovered why they build their bizarre enclosures. Because the red earth of the centre does not readily absorb water, he suspects the mulga ants build miniature levees simply to prevent their nests flooding during arid Australia's infrequent heavy rains.


**Write to Letters, *Ecos*, PO Box 89, East Melbourne, Vic. 3002.**

## Travelling trees

We refer to the article 'Australian Trees Abroad' in *Ecos* No. 72, winter 1992.

Where is the profit in ventures in which Australian expertise and national genetic resources are donated to other nations? Has CSIRO discarded its banner of commercialise or perish? Do we negotiate exchange agreements and joint venture arrangements to maintain equity?

Are we by the generosity of the Department of Foreign Affairs and these modern-day Baron von Muellers prohibiting for all time the development of profitable economic ventures within Australia?

Are we yet again to import the equivalent of the improved macadamia, telopea (Kiwi rose) and eucalypt from countries to whom we have donated these and other valuable resources, but this time, the ultimate irony, genetic resources developed and paid for by Australians!

The activities of the Tree Seed Centre could be turned towards activities that benefit local industry. Not that the export of Australian plants is always so laudable for the recipients even. Consider the cases of the Australian weeds abroad in Florida (melaleuca) and in Africa (acacia). Will the acacias planted to control the weed (*Imperata*) turn out to be even more intractable than the weed they are replacing?

Perhaps the skills within the group could also be used to assist developing nations to explore and develop their own genetic resources, a matter of urgent priority. In this way the developing nation would gain, Australia would gain not only extended recognition for its technical skills but also access to genetic resources for our industries and mankind would gain – Win, Win, Win!

**Dr David T. Bell**
**Professor John Considine**
University of Western Australia

Comments by Dr Chris Harwood and Mr Tim Vercoe, of the Australian Tree Seed Centre.

• The Centre provides small research seedlots free of charge to developing country government research organisations and *bona fide* local non-government organisations through the AIDAB-funded 'Seeds of Australian Trees' project. Commercial overseas users, including those in developing countries — such as private companies establishing forest plantations — purchase seed from the Centre at commercial rates. They also have the option of purchasing from one of the many Australian private seed-collecting firms; Australian tree and shrub seed exports total about $10 million a year.

• The seed we collect from natural populations cannot be made patentable or subject to plant variety rights. The Centre assists Australian industry and researchers to improve major species such as *Eucalyptus globulus*, and to develop salt-tolerant, insect-resistant and high-oil-yielding clones, by making thorough and well-documented collections of wild populations from which to select and breed.

• The tropical acacias that show promise for *Imperata* control are light-demanding and cannot invade undisturbed rainforest. They are relatively short-lived species and make an ideal nurse crop for replanting local, shade-tolerant rainforest species once the weedy grasses are killed off.

• The Centre does assist developing nations to explore and develop their own genetic resources. For example, over the past 4 years, 13 trainees have each spent 2 months with the Centre learning techniques of seed collection and handling, and tree seed centre management.

• Many of the world's poorest developing countries are already heavily dependent on Australian tree species for their supplies of fuel-wood, timber and building materials. Better productivity and utilisation of these species, achieved with the assistance of Australian scientists, improves living standards of the rural poor and reduces harvesting pressure on diminishing native forests.

• Every Australian benefits every day from genetic resources transferred to this country, often without direct recompense to the country of ultimate origin. For example, within the past 40 years Australia has imported large collections of *Pinus pinaster*, *P. radiata* and *P. caribaea* to build up a major industrial resource. Agriculture also continues to benefit from imported genetic resources: cattle from Africa are but one recent example. Increasingly important programs to control weeds and pests in Australia by biological means are largely based on genetic resources from other countries.

• The biogeographical chance that has endowed Australia with a remarkably useful flora provides a notable opportunity to offer cost-effective development assistance in which we have a special relative advantage. We refer Dr Bell and Professor Considine to Derek Tribe's 'Doing Well by Doing Good', published by the Crawford Foundation in 1991, for a thorough analysis of the many and important benefits that Australia derives from agricultural and forestry collaboration with developing nations.

## Koala research

The CSIRO Division of Wildlife and Ecology gratefully acknowledges the financial support of the Australian Koala Foundation for Dr Stephen Cork's research on diet and habitat quality for koalas in relation to soil fertility, described in *Ecos* 73.