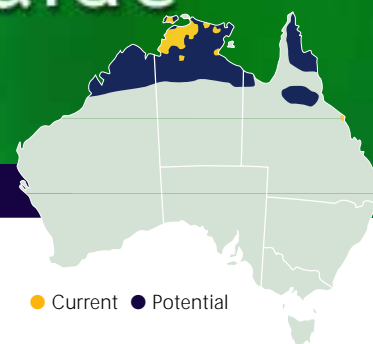


Weed Management Guide

Mimosa – *Mimosa pigra*



Mimosa (*Mimosa pigra*)

The problem

Mimosa is a *Weed of National Significance*. It is regarded as one of the worst weeds in Australia because of its invasiveness, potential for spread, and economic and environmental impacts.

Mimosa forms dense stands that replace all native vegetation on the ecologically and economically valuable wetlands of the Top End of northern Australia. Mimosa invasion threatens the production, cultural and conservation values of wetlands, and reduces the scope for exploitation of resources by land users. Pastoralists are affected because the inedible and thorny mimosa smothers and replaces grasslands, blocks access to stock watering points and hinders mustering. Additionally, the harvesting of bush foods by indigenous people is hampered by mimosa.

In environmental terms, nationally and internationally significant wetlands are threatened by mimosa, which reduces the biodiversity of plant and animal life on the floodplains by outcompeting native plants and reducing available habitat for animals.

Although currently limited in distribution, if left unchecked mimosa has the potential to dominate wetlands across the whole of northern Australia.

The weed

Mimosa is a branched prickly shrub, growing up to 6 m. The stem is greenish in young plants but becomes woody as



Mimosa invading wetlands on the Adelaide River floodplain, NT.
Photo: Colin G. Wilson

the plant matures. The fernlike green leaves, which fold together at night or when touched, are made up of many fine leaflets and occur in pairs along branches. Larger thorns (5–10 mm long) are found on the stem, with smaller thorns on branches between leaves. Round flower heads (10–20 mm in diameter) are composed of 100 pink–mauve individual flowers. Each flower head produces between 10 and 20 olive-green seed pods, 60–80 mm long, which turn brown and break into segments when mature. Each segment contains an oblong-shaped seed, 4–6 mm long and 2 mm wide. The seed segments, which are covered with many fine hairs, float on water and adhere to clothing or hair. The root is a branching taproot, reaching to between 1 and 2 m depth.

Key points

- Preventing the spread of mimosa is essential in protecting northern wetlands.
- Once established, mimosa is very difficult to control.
- Prevent mimosa spread by using effective quarantine, hygiene and monitoring, and by controlling feral animals.
- Control mimosa in small patches before it seeds by hand pulling, bulldozing or spraying herbicides.
- Larger infestations should be sprayed from the air. Follow-up will be required.
- Biological control agents (eg moths and weevils) also help to control mimosa in the long term.



Growth calendar

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Flowering	■	■	■	■	■	■	■	■	■			
Pod formation		■	■	■	■	■	■	■				
Seed drop		■	■	■	■	■	■	■	■			
Germination	■	■	■	■	■	■	■	■	■	■	■	■

■ General growth pattern ■ Growth pattern in wet years

Mimosa can germinate year round if the soil is moist but not flooded. However, most germination takes place at the start and end of the wet season. Growth in seedlings is rapid, and flowering occurs between 4 and 12 months after germination. The main flowering season is January–March but flowering can be extended into the dry season under moist conditions. Seeding occurs approximately five weeks after flowering and fruits ripen after about three months. Most seeds germinate when first wetted although a tough, impermeable coating allows some seeds to remain viable in sandy soil for over 20 years. Mimosa grows extremely quickly, and in ideal conditions infestations double in size every 18 months.

How it spreads

Mimosa mainly reproduces via seeds. Large plants can produce vast amounts of seeds, up to 220,000 per year. Mimosa seeds are typically dispersed in two main ways: carried downstream during flooding or transported by animals or machinery. Animals can spread seeds in their droppings (eg cattle, horses) or in mud attached to their bodies (eg kangaroos, pigs, buffalo). Humans transport seed attached to their clothing or equipment (eg boats, cars, tractors) after contact with an infestation. Therefore, appropriate care and routine

hygiene measures (ie washdowns, inspections) should be used after contact with mimosa. Non-essential activities should not be conducted in mimosa patches to limit the likelihood of spread.

Mimosa was first brought into the Northern Territory to the Darwin Botanic Gardens around 1891. Its spread around Darwin over the next 60 years was not particularly conspicuous, until a large infestation was discovered in 1952 at Adelaide River, 100 km south of Darwin. It was then correctly identified as *Mimosa pigra*, and its invasive tendencies were revealed as it spread downstream. It is believed that sand contaminated with



Mimosa mainly flowers during the wet season. Photo: Colin G. Wilson

seeds was removed from the Adelaide River in the 1950s and used around the Top End in commercial building operations. Mimosa has since spread to some of the main river systems (Finniss, Reynolds, Mary, Daly, East Alligator and South Alligator) in the Top End. It is now present as far as the Victoria River in the west and the Phelp River (in Arnhem Land) in the east. A mimosa outbreak was discovered near Proserpine in northern Queensland in February 2001.

Where it grows

Wet places in the humid and sub-humid tropics are the most ideal habitats for mimosa. It occurs along roadsides, watercourses and seasonally inundated wetlands. It is found on a wide variety of soils and is tolerant of flooding.

Mimosa is native to tropical America but is now a serious weed in Africa, India, South-East Asia and some Pacific islands. It occurs on wetlands across northern Australia, occupying about 85,000 ha of the Top End.

Potential distribution

Much of northern Australia is climatically suited to mimosa. The infestation at Proserpine, which is outside of its projected distribution, indicates that it may actually be able to survive further south than its potential distribution suggests.



Ripe mimosa seed pods ready to drop at Finniss River, NT, in July. Photo: Colin G. Wilson

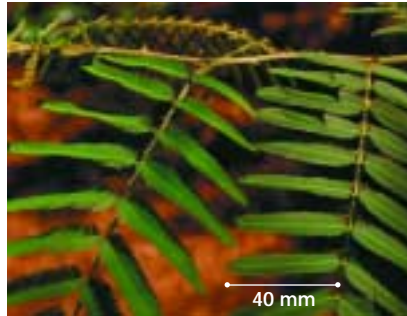


What to do about it

The spread of mimosa must be prevented by careful management

Preventing its introduction is the most cost-effective strategy in dealing with mimosa. Its main weedy attributes – an invasive nature, vigorous growth rate, high fertility and durable seeds – make control difficult and expensive. Reducing the spread of mimosa requires careful management of infestations. Soil or sand (which could contain mimosa seeds) should not be removed from infested areas. Any transport vehicle or machinery used in infested areas should be thoroughly cleaned before moving to other areas. Also, stock from infested areas should be held for at least eight days to allow all ingested seeds to be expelled, and the holding pen must be monitored for mimosa. Existing infestations should be monitored and feral animals, which are known to transport seeds and create conditions suitable for germination, should be controlled.

If mimosa is introduced into an area, then prevention of spread is the next highest priority. Mapping, planning and allocation of sufficient resources are essential management tools. The spread of mimosa in the monsoon season due to floodwaters can be restricted by retaining vegetation cover, which impedes seed movement. Vegetation cover is best managed by controlled stocking and judicious use of fire.



Mimosa is also called the giant sensitive plant, because its leaves constrict when touched (*right*). Photo: Colin G. Wilson



Report new occurrences of mimosa to the relevant local council or state or territory government agency.

Control mimosa with integrated weed management

Recent research and field experience in the Northern Territory indicates that mimosa can be managed through careful and systematic control efforts. An integrated approach using several weed management techniques is the most effective way to deal with dense infestations of mimosa. However, the characteristics of the infestation (eg size, density, location, position within the catchment) and the availability of resources will determine the most appropriate course that control should take.

Small outbreaks can be controlled with physical/mechanical and/or chemical control

Single plants or small outbreaks of mimosa can be removed by hand pulling or grubbing, ensuring that as many roots as possible are removed. There are a

variety of effective herbicides that can also be used to eradicate new or small outbreaks. For smaller infestations spraying the entire plant from a backpack sprayer with an appropriate, registered herbicide will kill mimosa if applied correctly. All treated plant material should be burnt to ensure it does not regrow, and these sites should be checked regularly for new plants over a number of years.

Larger infestations should be attacked with chemical control

The integrated approach to large infestations of mimosa commences with treatment with a registered herbicide, most effectively with an aerial application. Early morning application is most effective because of higher humidity, which allows better delivery of the herbicide to the plants and better uptake by the leaves. Although aerial spraying kills adult trees, it is expensive and regrowth of germinated seeds can be prolific. Up to five years of spraying is likely to be required on severe infestations.

Granular herbicides target roots and should be placed near mimosa bushes before rain is likely to occur. However, the effectiveness of root-absorbed herbicides varies with soil and land types. Consult your state or territory government agency to determine the most appropriate herbicide for your local conditions. Although residual herbicides provide some protection from future germination of mimosa seeds, the growth of other preferred trees and shrubs will also be inhibited if their roots encroach into the treated area.



Community control of mimosa at Black Jungle, near Darwin, NT. Photo: Colin G. Wilson

Weed control contacts

State / Territory	Department	Phone	Email	Website
NT	Dept of Infrastructure, Planning and Environment	(08) 8999 5511	weedinfo.ipe@nt.gov.au	www.nt.gov.au
Qld	Dept of Natural Resources and Mines	(07) 3896 3111	enquiries@nrm.qld.gov.au	www.nrm.qld.gov.au
WA	Dept of Agriculture	(08) 9368 3333	enquiries@agric.wa.gov.au	www.agric.wa.gov.au
Australia wide	Australian Pesticides and Veterinary Medicines Authority	(02) 6272 5852	contact@apvma.gov.au	www.apvma.gov.au

For up-to-date information on which herbicides are registered to control mimosa and the best application methods and dosages, contact your state or territory weed management agency or local council. This information varies from state to state and from time to time. Contact details are listed above, including contacts for the Australian Pesticides and Veterinary Medicines Authority, which hosts the PUBCRIS database. This database contains information on all herbicides that are registered for use on weeds in each Australian state and territory.

When using herbicides always read the label and follow instructions carefully. Particular care should be taken when using herbicides near waterways because rainfall running off the land into waterways can carry herbicides with it. Permits from state or territory Environment Protection Authorities may be required if herbicides are to be sprayed on riverbanks or directly onto the water.



Controlling large stands with bulldozers and fire. Photo: NT Government



Adult *Carmenta mimosa* moths mating on a mimosa stem. The grubs tunnel into the stems. Photo: Colin G. Wilson

Larger infestations – mechanical follow-ups and strategic use of fire

Following herbicide treatment, dead mimosa stems should be mechanically cleared and burnt. Chaining is a common clearing method in which two bulldozers pull a heavy chain between plants. Burning is an inexpensive way of clearing debris, improving access and killing surface seeds or at least breaking the dormancy stage.

Sufficiently hot fires can kill mature mimosa or at least damage it so that follow-up control treatment is more effective. The outer edge of a mimosa stand is first killed with herbicides and then crushed by a bulldozer. When the dead mimosa is burned under warm, windy conditions, the entire infestation can be destroyed. Permits may be required to light fires or conduct mechanical

control if native species will be affected – check with your local council or state or territory weed management agency.

Rolling, raking or back-ploughing dead mimosa also assists in its removal. Mechanical clearing could also be used prior to herbicide application to improve accessibility to large infestations. Sites will require regular follow-up monitoring, similar to a 'search and destroy' approach used in Kakadu National Park (see case study).

Release biological control agents at the start of treatment

Biological control can be initiated at any stage of the overall process. Best results will be obtained when biocontrol agents are released at the commencement of mimosa control because these agents require a long time to be effective. Bio-control agents will survive other control

treatments or will readily re-establish themselves in treated areas.

All parts of the plant – the seeds, flowers, leaves, tips, branches and roots – have been targeted with at least one biological control species. So far, 13 agents (insects and fungi) have been released. This work is part of the Northern Territory Government / CSIRO joint project 'Biological control of *Mimosa pigra* and integration with other control options', funded by the Commonwealth Government's Natural Heritage Trust. Four of these species have become effective in controlling mimosa by reducing seed production and the size of the seedbank, and occasionally killing adult plants. The most successful insects are those that can feed on mimosa all year round, notably stem miners.

In the long term biocontrol on its own offers the only cost-effective control option for treating very large infestations of mimosa because of the high costs of chemicals, machinery and labour. However, the present biocontrol agents are very slow acting and may provide effective control only after several decades. If more rapid treatment is required, biocontrol should be used in conjunction with mechanical and chemical methods as part of an integrated management plan. Biocontrol agents are very effective in attacking mimosa regrowth and seedlings in areas that have been already treated.



The 'search and destroy' mission for mimosa in Kakadu National Park

Parks Australia North and its predecessors have adopted a zero tolerance for mimosa within Kakadu National Park. They use a 'search and destroy' approach to mimosa combined with regular (three times a year) monitoring of 260 plots on floodplains that have previously contained mimosa.

Four full-time staff use a variety of transportation (air boats, quad bikes, 4WDs) to monitor nearly 10,000 square kilometres, at a total annual cost of approximately \$500,000. This is equivalent to just over \$2 per hectare.

Rangers use herbicides (both spraying and soil application) to control adult

plants and hand pulling to remove seedlings. If a seeding plant is discovered, any seed that can be recovered is collected and later incinerated, and the ground is burnt using fuel to try to kill any seed mixed into the soil. In addition to treating mimosa infestations, feral animals (eg pigs and buffalo) that spread mimosa are controlled by shooting. Every visit to every plot is recorded on a database.

Presently, there are no known large infestations of mimosa in Kakadu National Park, a far cry from when mimosa control commenced 22 years ago by fencing off and chemically treating several large infestations. However, it is clear that this

will be an ongoing problem for the park, because mimosa is present on both the eastern and western borders of Kakadu. Additionally, even after 22 years, new seedlings are still emerging from old plots, indicating that the seed remains viable for at least this time period. Even with such a dedicated and costly effort to control mimosa, the number of new infestations found every year remains fairly constant.

The complete eradication of mimosa in Kakadu National Park is therefore a long-term program, which is crucial to the maintenance of the World Heritage wetlands of Kakadu.



Mimosa stands outcompete virtually all other forms of vegetation.
Photo: Colin G. Wilson

Revegetation can reduce mimosa regrowth

Revegetation is the final stage of the integrated management cycle. If necessary a native pasture grass which can outcompete mimosa, such as native hymenachne (*Hymenachne acutigluma*), could be sown at the site. However, do not revegetate with olive hymenachne (*Hymenachne amplexicaulis*), which is a weedy pasture grass that invades wetlands. Sowing the native grass will help reduce the numbers and growth rate of mimosa seedlings. Pastures should

not be overgrazed because this can help promote the growth of weeds, like mimosa, that are not grazed by stock.

Repeats, follow-up and monitoring to keep on top of mimosa

Note that the integrated management of mimosa is a cyclical process and may require many repeats of the cycle before the weed is controlled. Aerial spraying may need to be repeated several times, and then followed up by a coordinated long-term ground-based program that

should include some form of mechanical and chemical control. Biological methods will aid the successful control of larger infestations. The site should be checked on an ongoing basis to ensure that any viable seeds remaining in the seedbank have not germinated. As the Kakadu example shows, constant vigilance is required.

Legislation

Landholders are required by law to control mimosa where it occurs in the Northern Territory and Queensland. In parts of the Northern Territory where eradication is not feasible, its spread must be controlled. The introduction of mimosa is banned in Western Australia.

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Maps: Australian Weeds Committee.



How to control mimosa

Quick reference guide

For small outbreaks...

Very small outbreaks of mimosa (only a few plants) can be controlled by removing plants by hand, making sure as many roots as possible are removed. Herbicides can also be sprayed all over the plant. Small infestations should be revisited annually to ensure there is no regrowth.

...and for large

Larger infestations require a more comprehensive approach, and may involve three or four different techniques used together. When no other methods of control are available, a slow but inexpensive way to control mimosa is through the use of biological control agents – introduced insects which attack mimosa and its seeds.

For faster control combine biological control with the aerial application of herbicide, followed by the mechanical clearing (by chaining) of treated mimosa.

Using fire

Burning of chemically or mechanically treated stands will also help with mimosa control by further stressing live plants, improving access and breaking seed dormancy, but may also stimulate seedling germination. Therefore, follow-up control action will be required. Biological methods are particularly effective in controlling regrowth and seedlings at this stage.

Revegetation

Fast growing grasses can help reduce the spread of seed by floodwaters and prevent the establishment and growth of mimosa seedlings. Pasture grasses should be sown where necessary and not overgrazed.

Follow-up

Follow-up control must be undertaken on all mimosa stands. Repeat the chemical,

mechanical and burning treatments, and ensure biocontrol agents are still present, until mimosa is eliminated or can be effectively managed.



Infestation in the Adelaide River, NT, in April. Photo: Colin G. Wilson

Control options

Type of infestation	Biological	Chemical	Mechanical	Physical
Small (few plants, small area)	Not suitable.	Spot spraying by hand with registered herbicide.	Not suitable.	Hand grubbing (remove roots and burn plant).
Medium (medium density, medium total area)	Release of biological control agents.	Spot spraying by hand with registered herbicide.	Chaining, rolling, raking or back-ploughing, then burning.	Follow-up control of seedlings – could include physical removal.
Large (many plants, many ha)	Step 1. Release of biological control agents.	Step 2. Aerial spraying with registered herbicide.	Step 3. Attack with chaining, rolling or raking. Use fire to kill any regrowth and break seed dormancy. Go to step 2 if necessary.	Follow-up control of seedlings – could include physical removal.

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