This manual is sponsored by the Australian Government and supported by the Northern Territory Government’s Department of Natural Resources, Environment, The Arts and Sport (NRETAS) as well as the Environment Centre NT.

The Northern Territory Government respects Indigenous cultures and makes every attempt to ensure that this document contains no material that is offensive to Indigenous Territorians.

This manual is intended to provide information only. Readers rely upon all information contained in the manual entirely at their own risk. It is not intended to, nor does it constitute, expert advice.

While all care has been taken in the preparation of this manual, the Northern Territory Government does not accept any responsibility for any loss or damage that may result from any inaccuracy or omission in the information contained within, or for any loss or damage which may be incurred as a result of the use of any of the control techniques or products referred to in this manual.

The naming of individual products (including herbicides) does not constitute any form of preference or criticism of any competitor of, or alternative to, the named product.

© Northern Territory Government 2009

This work is copyright. Apart from any use as permitted under the Copyright Act 1968, no part may be reproduced by any process without written permission from the Northern Territory Government.

Requests and enquiries concerning reproduction and rights should be addressed to:
NRETAS
PO Box 496
Palmerston NT 0831

For copies of this manual please contact:
WoNS Coordinator
PO Box 496
Palmerston NT 0831
Acknowledgements

The Australian Government funded preparation of the manual.

Preparation of the manual was hosted by NRETAS with support from the Environment Centre NT and overseen by the National Mimosa Management Committee (NMMC).

Contributors to the case studies generously gave their time to be interviewed, including Buck Salau (Kakadu National Park), Albert Myoung (Malak Malak Land Trust), Rob Lindsay (Malak Malak Land Trust), Rita Purack (Malak Malak Land Trust), Natasha Burrows (NRETAS Biological Control Unit), Michael Schmid (NRETAS Weed Management), Jaemie Page (Greening Australia), Steve Matheson (Queensland DPI) and Colin Deveraux (Twin Hill Station).

The author also wishes to thank the NMMC, Environment Centre NT and NRETAS Weed Management Branch, particularly Michael Schmid, Renee Long and Steve Wingrave for providing their expertise and support as well as the NRETAS Biological Control Unit for providing valuable information.

Mimosa pigra
Foreword

*Mimosa pigra* is a Weed of National Significance with the ability to alter entire landscapes. Its spread throughout the Top End of the Northern Territory poses a great threat to the wetlands of that region. Perhaps of greatest concern is that mimosa has the potential to spread throughout the wetlands of north Australia. These wetlands are internationally recognised for their abundance of wildlife and provide an important place for fishing, hunting and traditional cultural activities. Mimosa also poses a great threat to the productivity of the pastoral and agricultural industries. Preventing the introduction and spread of this weed to other areas is of highest priority.

Once established, *Mimosa pigra* can be difficult to remove and a long-term commitment is required. However, this manual demonstrates that, with proper planning and the right tools, *Mimosa pigra* can be managed successfully. It will help you to identify and control mimosa as well as guide your management plan, along with advice from your local weed management agency.

The National Mimosa Management Committee is working to ensure all landholders are able to recognise and control this pest so that the wetlands of north Australia continue to thrive. I encourage you to read and refer to this manual in all your land management activities.

J.B. Forwood AM  
Chairman  
National Mimosa Management Committee
# Contents

Introduction .................................................................................................................. 6

1. Biology, distribution and impacts ........................................................................... 7
   1.1 Description ........................................................................................................... 8
   1.2 Reproduction and spread .................................................................................. 9
   1.3 Distribution ....................................................................................................... 11
   1.4 Impacts .............................................................................................................. 13

2. Managing mimosa .................................................................................................... 15
   2.1 Before you start ................................................................................................ 16
   2.2 Preventing introduction and spread ................................................................. 17
   2.3 Herbicides ......................................................................................................... 23
   2.4 Mechanical clearing ........................................................................................ 30
   2.5 Fire ..................................................................................................................... 31
   2.6 Biological control .............................................................................................. 32
   2.7 Revegetation .................................................................................................... 34
   2.8 Follow up control .............................................................................................. 34
   2.9 Best practice land management ....................................................................... 34

3. Choosing a control program ..................................................................................... 35
   3.1 Assess the infestation ....................................................................................... 36
   3.2 Assess the resources available ......................................................................... 36
   3.3 Establish objectives .......................................................................................... 36
   3.4 Choose control methods ................................................................................ 37
   3.5 Mimosa management plan templates .............................................................. 39

4. Case studies ............................................................................................................. 41
   4.1 Case Study 1: Kakadu National Park, NT ....................................................... 42
   4.2 Case Study 2: Malak Malak Land Trust, NT ................................................... 44
   4.3 Case Study 3: Peter Faust Dam, QLD ................................................................. 48
   4.4 Case Study 4: Twin Hill Station, NT ................................................................. 50
   4.5 Case Study 5: Adelaide River, NT ................................................................... 53

5. Further information ................................................................................................. 57
   5.1 What prickle bush is that? ................................................................................. 58
   5.2 National legislative status of mimosa .............................................................. 59
   5.3 Resources ......................................................................................................... 62
   5.4 References ....................................................................................................... 62
   5.5 Biocontrol agent identikit .............................................................................. 64
**Introduction**

*Mimosa pigra* is a Weed of National Significance declared in the Northern Territory, Queensland and Western Australia as a weed of highest priority for prevention of introduction and spread. Mimosa can grow in wet areas on the banks of rivers, coastal plains and floodplains.

Since it was introduced from tropical America to the Darwin Botanic Gardens in the late 1800s, mimosa has spread throughout many of the Northern Territory’s major catchments. Mimosa infestations in Australia are currently restricted to the Northern Territory and one dam near Proserpine, Queensland. However, it threatens to spread across the entire wetlands, coastal plains and river systems of northern Australia.

Northern Australia hosts some of the most intact wetland systems in the world, including several internationally significant Ramsar wetlands. Wetlands play an extremely important role in regulating nutrient and water cycles, providing habitat and food and are an important part of both Indigenous and non-Indigenous culture by providing a place for fishing, hunting and cultural activities.

Mimosa can reduce wetland habitat by outcompeting native vegetation, reducing the productivity of pastoral land and blocking the access to wetland areas by forming dense impenetrable stands with little or no understorey. It is recognised as a key threat to biodiversity, traditional land use, recreational activities, the sustainability of agriculture and tourism.

With each mature plant capable of producing hundreds of thousands of seeds, mimosa is able to spread incredibly fast. Seeds can float in waterways and floodwaters during the wet season. An infestation can double in size in just one year.

Early control is critical to preventing spread as it is difficult to eradicate once fully established. Mimosa seeds remain viable for many years, so follow up treatment requires constant vigilance and a long-term commitment to management. However, the benefits of implementing a proper mimosa control plan far outweigh the costs.

This manual is designed to help you make informed decisions about how to plan and carry out your mimosa control program. It is also designed so that landholders without significant mimosa infestations know how to recognise, monitor and prevent the establishment of mimosa on their land. This is very important as mimosa is able to spread long distances from any infestation with the aid of vehicles, boats and animals.

**A national approach**

There is a national urgency to prevent mimosa spreading from the Northern Territory to Western Australia and Queensland. This manual is consistent with the Mimosa (*Mimosa pigra*) Weeds of National Significance National Strategy (2001)\(^1\) which includes four integrated programs:

- Information and Education
- Prevention of Spread
- Research and Development
- Impact Reduction

The Mimosa strategy is consistent with the Australian Weeds Strategy (2006)\(^2\), which guides the management of Weeds of National Significance such as mimosa. The strategy emphasises early intervention and a coordinated and integrated approach to controlling weeds. The Mimosa Strategy is overseen by the National Mimosa Management Committee.

For more information about *Mimosa pigra* or any other Weed of National Significance, visit www.weeds.org.au.
CHAPTER 1
Biology, distribution and impacts
1.1 Description

*Mimosa pigra* is a prickly, branched shrub, with a stem which becomes woody as the plant matures. It can grow up to six metres high and forms dense, impenetrable stands with little to no understorey.

Feathery leaves which fold when touched give mimosa its common name of Giant Sensitive Plant. However, this is not to be confused with different species of mimosa, including the smaller varieties *Mimosa pudica*, or Common Sensitive Plant and *Mimosa invisa* (*diplotricha*), a common weed in Queensland also sometimes referred to as Giant Sensitive Plant. Adding to the confusion, *Mimosa pigra* is similar in appearance to some other woody weeds, including *Acacia farnesiana* (Mimosa Bush) and *Leucaena leucocephala* (Coffee Bush). However, if you touch the leaves, there is no mistaking *Mimosa pigra* (see Chapter 5: What prickle bush is that?).

Leaves which make up leaves occur in pairs along the branches. The branches contain large thorns (5-10mm long), with smaller thorns between leaves.

Flower heads are round, pink balls made up of about 100 tiny mauve flowers. Each pom-pom-like flower-head produces a cluster (usually 7) of long (60-80mm) olive-green seed pods which turn brown and break into segments. Each segment contains an oblong-shaped seed (4-6mm X 2mm). The seed segments are covered in many fine hairs which help it to float on water and stick to clothing or hair. Mimosa has a branching tap root 1-2 metres deep and can also form aerial roots in flooded soils.
1.2 Reproduction and spread

Mimosa reproduces via seed. One large plant can produce up to 220,000 seeds per year! Seeds can be spread by:

• water, through floods and along watercourses;
• animals, such as buffalo, pigs or kangaroos; or
• humans, through clothing, boats, cars or tractors.

You should avoid entering mimosa infested areas to reduce the risk of spread.

Mimosa favours wet places in the humid subtropical region of north Australia and could potentially spread throughout the region. Mimosa is particularly invasive on floodplains, wetlands and riverbanks. It will also grow along roadsides and in the woodlands of upper catchment areas, spreading downstream as seeds are spread through floodwater and other mechanisms.

Mimosa can spread at an alarming rate. An infestation has the ability to double in size in less than a year under favourable conditions. It can take over native vegetation and form large swathes of dense prickly stands with little to no understorey.

Lifecycle

The lifecycle of mimosa varies depending on the local climate and geography. In the Top End, mimosa generally flowers in the late build-up and early wet season (October-March) but can also flower in the dry season up until July under moist conditions. Mimosa can flower just 4 -12 months after germination, enabling it to set seed within the first year of growth. It is able to germinate year-round if soil remains moist yet not flooded, however most germination occurs at the start and end of the wet season. It generally drops its seeds in the late wet to early dry season. If dry conditions prevail, it may drop around half of its leaves in the dry season to conserve moisture.
Lifecycle of *Mimosa pigra* (Source: Northern Territory Government, 2008)
1.3 Distribution

*Mimosa pigra*, a native of central and southern America, was first brought to Australia as a curiosity plant when it was planted at Darwin Botanic Gardens in 1891. Its invasive nature was not realised until a large infestation was discovered at Adelaide River, 100km south of Darwin, in 1952. Despite attempts to contain the outbreak, mimosa soon spread rapidly downstream. Flooding and buffalo activity contributed to further spread in the 1970s, until most of the Adelaide River floodplain was covered by 1981. Mimosa is now found in most major Top End river systems, including the Adelaide, Finniss, Reynolds, Roper, Mary, Daly, East Alligator and South Alligator – displacing some 85,000ha of Top End wetlands and present in another 55,000ha (page 12: Current distribution of *Mimosa pigra*). Mimosa is present in three Ramsar Wetlands of International Significance, including Kakadu. It has also spread across to the Peron, Croker and Tiwi Islands. The only known outbreak outside of the Northern Territory was discovered in Queensland near Proserpine, however this is thought to be contained (Chapter 4: Case Study 3).

Mimosa is also a pest plant in Africa and in South-East Asia, where it threatens rice production by invading rice paddies.

**Potential distribution of Mimosa pigra**

Given its fast growth rate and ability to spread quickly, mimosa has the potential to spread across wetland areas of north Australia. The map (page 12) shows the potential distribution for mimosa in Australia considering its suitable climatic range. Up to 4 million ha of wetlands are at risk. The weed also threatens riparian zones and floodplain boundaries. Since an outbreak can occur hundreds of kilometres from a large infestation, vigilance in detecting outbreaks early is critical to stop mimosa from spreading.
Weed Management Branch, February 2009

DATA SOURCE
Current Distribution of Mimosa pigra from Weed Management Branch, Darwin and Australia’s Virtual Herbarium, February 2009

The Ecoclimatic Suitability for Mimosa pigra was developed using the CLIMEX program (Sutherst and Maywald, 1986). The CLIMEX parameters for Mimosa pigra were adapted from Heard and Forro, 1996.

Map produced by Weed Management Branch, February 2009
Department of Natural Resources, Environment, the Arts and Sport

Figure 1: Current distribution of mimosa in the Northern Territory
(Source: Northern Territory Government, 2009)

Legend
- Current / Historic Mimosa Infestations
- Catchment Boundary

Figure 2: Current and potential distribution of mimosa in Australia

Climatic Suitability for Mimosa pigra
- Unsuitable
- Marginal
- Suitable
- Optimal
1.4 Impacts

Management of mimosa can be costly and requires long-term commitment. However taking no action and allowing mimosa to spread has even greater social, economic and conservation costs. Mimosa has the ability to convert grassland and sedgeland into a prickly monoculture by outcompeting native vegetation for light, moisture and nutrients. Mimosa can also take over paperbark swamp-forests on the edges of floodplains. It threatens conservation values by reducing biodiversity and available habitat for birds and animals. Mimosa has been found to particularly reduce the number and type of waterbird species and raptor species which favour wet forest nesting sites.

Mimosa has also been identified as a key threat to:

- Pastoralism: Infestations can block access, smother productive land and hinder activities like mustering.
- Tourism and recreation: Infestations can reduce access for fishing and boating. Mimosa also threatens the wetlands of Kakadu, a popular tourist attraction and World Heritage area.
- Indigenous cultural activities: Infestations can impede hunting, fishing and the collection of bush foods such as turtles, water lilies and water chestnuts. It can also restrict access to sacred and cultural sites.

You can reduce the spread and impact of mimosa by reporting new infestations and implementing a best practice management plan on your land. To find out how, see Chapter 2.

The magpie goose is vulnerable to habitat loss caused by mimosa infestation as it nests in wetland areas
Mimosa has the ability to convert grassland into a prickly monoculture

Mimosa blocks access and smothers productive land
CHAPTER 2
Managing mimosa
2.1 Before you start

Management of *Mimosa pigra*, like most weeds, requires an integrated approach. Finding the best type, mix and timing of control methods is essential to successful control of mimosa. You need to decide whether eradication is a feasible option, or whether containment is the best outcome you can get with the available resources.

Firstly, you need to work out how big the infestation is and what resources are available to you. It is far more effective to focus on eradicating small outbreaks first as many small infestations are able to spread much faster than one large infestation. The best way to do this is to map the distribution of mimosa, develop a property plan to evaluate cost of control methods and decide which control mix is best. Your plan should also prioritise areas, such as infestations furthest upstream, watercourses, low density areas, areas of high biodiversity or places of cultural significance.

As a landholder, you have a legal responsibility to manage declared weeds such as *Mimosa pigra* on your property, according to Queensland Land Protection (Pest and Stock Route Management) Act 2002, Northern Territory Weeds Management Act and Western Australia Agricultural and Related Resources Protection Act 1976.

Your plan will be guided by existing State and Territory legislation or any local laws which may affect control methods for different regions and land use types. Find out about any relevant legislation that exists for your region by visiting your local government website or speaking with an expert (see Chapter 5 for a list of relevant Northern Territory, Western Australian, Queensland and Commonwealth legislation).

Preventing both introduction of mimosa to clean areas and spread of existing outbreaks is far more economical and effective than attempting to remove established mimosa stands. Vigilance is essential as seeds spread easily through the movement of vehicles, livestock and feral animals. Outbreaks can spread hundreds of kilometres away from major infestations. Controlling feral animals, stocking rates and maintaining strict hygiene practices will prevent a mimosa outbreak from becoming an even greater problem.

Figure 3: Mimosa management in the Northern Territory
A combination of mechanical, herbicide and biological control methods may be needed, however only some of these will work together successfully. The timing of each method is very important as it relates strongly to the seasons and lifecycle of the plant. Each method is outlined in the sections below. Fire management and revegetation also work together with control options to prevent reinfestation of mimosa.

Follow up treatment and monitoring is essential in any control program, because it is much easier to eradicate seedlings than mature plants and mimosa seeds are very persistent (can remain viable for 10-23 years). It is essential to control seedlings before they produce seeds and to return regularly to controlled areas. A study at Oenpelli in Arnhem Land found initial treatment of mimosa was successful for just 30% of outbreaks and that 20% of outbreaks required sustained control for at least seven years.

Finally, as with all weeds, best practice land management is essential to prevent reoccurrence of mimosa infestations. Managing fire, stocking rates and feral animal control will help maintain native vegetation cover and prevent mimosa seedlings from emerging.

Details of how to go about making a mimosa control plan can be found in Chapter 3. Let’s look at what your options are first.

### 2.2 Preventing introduction and spread

Preventing the introduction and spread of mimosa should be the first priority of any control plan as it is by far the most effective and cheapest control method. For example, at Twin Hill Station in the Northern Territory, land managers have successfully slowed down further spread of mimosa by reducing stocking rates in infested areas (see Chapter 4).

#### 1. Hygiene

Mimosa seeds can be spread by soil and water movement, people, vehicles, machinery and animals. Entering a mimosa-infested area should be avoided if possible to minimise the risk of spread. It is an offence to transport a declared weed, including vegetation and soil containing weed seeds. Land managers should consider other people who enter their land and how they can be managed to prevent spread of weeds.

Implementing a hygiene program for vehicles, stock and people entering areas infested by mimosa is the first step to preventing spread. Hygiene includes wash-down of vehicles such as cars and tractors. Seeds can easily become trapped in tyres, wheels, radiator grill, the undercarriage and cabin.
At Peter Faust Dam, the only recorded outbreak of mimosa in Queensland, hygiene has been maintained by establishing a wash-down area on a concrete block for vehicles entering high risk areas. Alternatively, a high pressure fire hose can be used to clean vehicles provided that it is conducted in a secure area which is contained and monitored for seed germination. Seeds can also be spread by clothing and shoes, so these need to be thoroughly cleaned after entering a mimosa-infested area.

2. Education
Informing people living on or visiting potential mimosa infested areas about the risks of spreading mimosa is also an important part of preventing spread. At Melaleuca Station Field Day, presentations were held to inform landholders from the region about mimosa control. At Peter Faust Dam, signage informs visitors about the risks of spreading mimosa and penalties for entering infested areas. A range of education materials are available from the Northern Territory Weed Management Branch to help people recognise mimosa and to inform and encourage the adoption of proper hygiene practices to prevent seed spread (see Chapter 5).

3. Quarantine of stock
It is recommended that stock from infested areas be held in a quarantine pen for at least three days to allow ingested seed to be expelled. The quarantine area should be monitored for mimosa.

Mimosa is also a target weed species of the Australian Quarantine and Inspection Service under the Northern Australia Quarantine Strategy (NAQS), which patrols Australia’s northern coastline for introduced plants and animals. Indigenous rangers in remote areas have been assisting NAQS by monitoring for new introductions of exotic diseases, plants and animals.

4. Pest control
High levels of feral animals such as pigs and buffalo can degrade wetland areas, making them more susceptible to invasion. Feral animals also spread mimosa seed through their activities. Pest control will prevent further outbreaks of mimosa. To find out more contact your relevant State or Territory department.

Damage caused to wetland areas by feral pigs make them more vulnerable to weed invasion

Discussing mimosa management at Melaleuca Station Field Day
5. Fire management
Managing fire on your property is important to maintain a competitive cover of pasture, so it is more difficult for mimosa to establish itself. If fire is not managed, very hot fires may occur which kill native grass seed in the soil, opening up areas to weed invasion. Fire can also be used as part of a control program (see 2.5).

6. Leave buffer zones around large mimosa infestations
Strictly manage cattle grazing next to mimosa infestations as this contributes to spread and reduces growth of competitive native vegetation. Maintaining a healthy ground cover by reducing stocking rates will reduce the establishment of seedlings as they emerge, preventing mimosa from taking hold. Buffer zones also need to be carefully managed for fire and feral animal control to maintain a good competitive pasture.

7. Mapping
Recording the distribution of mimosa on a property map is essential to plan effective management programs and monitor changes over time. A weed management map should show location and extent of infestations and control methods used. The data you record can also be integrated with other data, such as rainfall, topography or vegetation class using a Geographic Information System (GIS) program such as ArcView to provide a more comprehensive picture of interactions between environmental factors, disturbance and spread of mimosa. This will help you to identify resources required and prioritise management areas.

When mapping mimosa, infestations need to be classed as areas of low, medium or high density.

Low: A few scattered plants with no heavy concentrations covering less than 10% of an area.

Medium: A few scattered patches with isolated plants in between with canopy covering 11-50% of an area.

High: Dense infestations with canopy covering over 50% of an area.

There are many tools available to assist you with mapping mimosa, all varying in expense and quality. Maps should also refer to areas of high conservation, cultural or pastoral value so that these areas can be prioritised. Factors such as topography and hydrology also influence where you might concentrate your efforts.

Choose a map scale suitable to display mimosa distribution on the area of land you are managing. The type of country, nature of infestation, scale and amount of resources available will determine the right mapping tool for you. Contact your local government land management department for further information.

Planning is essential to developing your management plan

A Weeds Branch officer assists landowners with mapping mimosa in the Arafura Swamp region
**Methods for mapping mimosa**

**a) Field surveys**

Outbreaks can be mapped from the ground using a Global Positioning System (GPS) unit to record the coordinates (location) and photo points to record changes over time (usually annually). This method is highly accurate and can be used to record very small outbreaks. The disadvantage is that it is time consuming and can be limited by access during the wet season.

**b) Aerial surveys**

Aerial surveying involves flying over areas of land in a transect (following a fixed line) with a helicopter and recording the percentage of mimosa cover, or flying with no fixed flight path and recording outbreaks using a GPS. If two people are recording data at the same time, this method is reasonably accurate and time efficient. However, it is also expensive and limited to recording mature plants as seedlings are difficult to detect from the air.

**c) Aerial photography**

Aerial photography involves analysing an aerial photo of an area taken from an aeroplane or helicopter. This method only records dense infestations, is very time consuming and can be very expensive. It is not useful for recording small infestations and is often redundant as there is high cloud cover during the peak growing season.

**d) Satellite imagery**

Satellite data can be limited or expensive and often does not pick up on small or isolated infestations, which can be crucial in preventing spread. It is useful in showing broad landscape changes and can be integrated with survey data to produce more accurate results. Free maps are available from the Northern Territory Government (www.nt.gov.au/nreta/nretamaps) or GeoScience Australia (www.ga.gov.au).

**e) Existing maps**

Existing maps may also be on the public record. This could save you significant amounts of time and money. Maps are available from NT Land Information Centres (www.nt.gov.au/nretamaps).
What to map

The NT Weed Management Branch has produced Guidelines for Weed Data Collection in the Northern Territory. The guidelines describe what information to collect when mapping, controlling and monitoring weed infestations in the NT. The guidelines can be downloaded at www.nt.gov.au/weeds. The NT guidelines are based on the national guidelines published in A Field Manual for Surveying and Mapping Nationally Significant Weeds, which can be viewed at www.daff.gov.au/brs/land/weeds.

The supply of weed data to the Weed Management Branch by individuals and groups using the NT Guidelines is important to increase our knowledge of weeds within the NT. The collection of data in accordance with the Guidelines for Weed Data Collection in the Northern Territory will result in improved and consistent data quality.

Attributes to be recorded when mapping are listed below, with key attributes highlighted in red by the Australian Weeds Committee.

<table>
<thead>
<tr>
<th>Groups of information</th>
<th>What to record</th>
</tr>
</thead>
<tbody>
<tr>
<td>What, when, who, why?</td>
<td>1. Data record number (core)</td>
</tr>
<tr>
<td></td>
<td>2. Name of weed (core)</td>
</tr>
<tr>
<td></td>
<td>3. When was the site assessed (date format: dd-mon-yyyy) (core)</td>
</tr>
<tr>
<td></td>
<td>4. Who assess it? (core)</td>
</tr>
<tr>
<td></td>
<td>5. Purpose of visit (core)</td>
</tr>
<tr>
<td>Where?</td>
<td>6. Place name or locality (core)</td>
</tr>
<tr>
<td></td>
<td>7. Latitude (Northing) (core)</td>
</tr>
<tr>
<td></td>
<td>8. Longitude (Easting) (core)</td>
</tr>
<tr>
<td></td>
<td>9. Precision of latitude and longitude (core)</td>
</tr>
<tr>
<td>How much?</td>
<td>10. Area or length of plot, transect or polygon assessed (core)</td>
</tr>
<tr>
<td></td>
<td>11. Cover or density of area, transect or polygon assessed (core)</td>
</tr>
<tr>
<td>Other information</td>
<td>12. Treatment (types of control and/or eradication) (core)</td>
</tr>
<tr>
<td></td>
<td>13. Comments (core)</td>
</tr>
<tr>
<td></td>
<td>14. Number of records for the site (optional)</td>
</tr>
<tr>
<td></td>
<td>15. Land use category (optional)</td>
</tr>
</tbody>
</table>
8. Report new infestations
Reporting new infestations to alert government authorities and other landholders is vital to ensure weeds on your property are contained as soon as possible and that you have access to the proper support resources and expert advice. Most new infestations have been reported by members of the public.

It is a requirement of the Northern Territory Weeds Management Act to report new infestations within two weeks of becoming aware of them. Visit www.weeds.org.au to Report a Weed with a simple electronic form.

9. Planning
Preventing spread of mimosa requires research and long-term commitment. See Chapter 3 for more information on how to set priorities and plan for mimosa control.

10. Search and destroy small outbreaks
Focus on areas of low mimosa density and seek out small outbreaks. You will also need to monitor areas downstream of infestation where outbreaks are likely. Seedlings and isolated plants are easily removed by hand, grubbing them out with a mattock, or herbicide can be applied through foliar spray, cut stump or basal bark application (see 2.3). If removing by hand, ensure the plant’s roots and its seeds are fully removed, dried and burned in a secured area to prevent it from re-establishing.
2.3 Herbicides

Use of herbicide is effective in eradicating mimosa if sufficient time and resources are allocated for follow up control. The type of herbicide and method of application suitable will depend upon the location and size of the infestation, environmental factors, available resources and the integration of other control methods.

Application of herbicide is most effective when the plant is actively growing so it readily absorbs the chemical. The best time to use most herbicides is during active growth period before the plants have produced mature seeds. The period of active growth for mimosa varies from location to location depending on rainfall, but is generally during the early wet season to the early dry season (Chapter 1).

Other environmental factors which affect the success of herbicide application are soil and weather. Soil type, available moisture and organic matter content can affect the action of soil applied herbicides (hexazinone and tebuthiuron). Check label specifications for details. Weather conditions such as high evaporation rates, low humidity, high temperature and high winds also significantly reduce the effectiveness of herbicide and increase spray drift.

Herbicide resistance may emerge as a problem due to the continual use of a particular herbicide, or group of herbicides with the same mode of action, on a population of plants. This emphasises the importance of integrated control and use of herbicides with different modes of action.

Only herbicides registered in your State or Territory can be used to control mimosa. A list of registered herbicides for the Northern Territory is provided on page 29. It is very important that you follow the instructions on the label correctly, as incorrect application will reduce effectiveness and can have flow-on effects upon other species. Check the label as no herbicide is appropriate for every situation. Aside from the safety, environmental and economic issues, as a user of herbicides you also have a legal obligation to comply with the instructions on the label (see Chapter 5).

A permit allows a person or organisation to use an agricultural chemical product in situations that would otherwise be in contravention of the AgVet Code Act 1994 or the Agricultural and Veterinary Chemical (Control of Use) Act 2005. Permits can be issued for minor use, emergency use and research purposes. See the APVMA website for further details at www.apvma.gov.au.

It is strongly recommended that all persons using herbicides complete a ChemCert course. See the APVMA website or Charles Darwin University for details (www.cdu.edu.au).
Herbicides have various properties that can make them more or less suitable for various situations.

- **Selective herbicides** are designed to affect specific groups of plants, for example broadleaf plants including mimosa. Metsulfuron methyl (e.g. Brush Off ®) is a selective herbicide which is effective against mimosa however it won’t affect grasses if applied at the correct label rates.

- **Non-selective herbicides** are designed to affect a wide range of plant species including broadleaf plants and grasses. Hexazinone (e.g. Velpar ®) is an example of a non-selective herbicide registered for use against mimosa (in the NT). This herbicide affects most plant species within an area where it is applied.

- **Residual herbicides** are designed to affect plants over a more extended period of time. They are useful in that they are effective against plants already present, however they also give the added benefit of controlling seedlings as they emerge. Hexazinone (e.g. Velpar ®) is an example of a non-selective residual herbicide that is effective against mimosa. Tebuthiuron (e.g. Graslan ®) is a selective residual herbicide that is also effective against mimosa. Selective residual herbicides are particularly useful in that they provide effective control of the target species while also providing the added benefit of leaving useful species, such as grasses, intact.

Aerial spraying of mimosa with metsulfuron methyl leaves Melaleuca trees standing (left)
Herbicides are potentially dangerous chemicals. A ChemCert course will equip you with the skills and training necessary to avoid serious accidents and incorrect application.

It is a legal requirement and in the interest of your safety and the environment that you store, handle, mix and apply the chemical exactly according to the label.

An appropriate storage place that is cool, well-ventilated and secure should be created.

Correct safety procedures must be followed and protective clothing such as boots, overalls, gloves, mask and glasses should be worn when handling the chemical.

A respirator may be needed during close handling of the chemical.

Do not eat, drink or smoke whilst handling chemicals.

Check the weather before using an agricultural chemical.

A person who uses an agricultural chemical product has a duty of care to ensure the use does not result in harm to the health of the general public, animals, the environment or domestic or export trade in agricultural produce.

If you suspect poisoning contact the Poisons Information Centre, emergency phone (24-hour) 131 126.

Herbicide safety: Stick to the label

Figure 4: Typical herbicide label (Source: National Registration Authority)

The Signal Heading indicates how poisonous the farm chemical is.

Learn to recognise the Mode of Action letter and you will be less likely to use the farm chemical in a way that will promote pest resistance.

Observe the Withholding Period so you will not have unacceptable levels of residues in your produce.

Precaution Statements identify risks to human safety.

Material Safety Data Sheet (MSDS) contains extra hazard information and is available from the supplier.

The Batch Number allows tracking in case of defective batches. The Date of Manufacture or Expiry Date helps safeguard against the farm chemical being used when out of date and ineffective.

Contain spills immediately according to the instructions on the label.

Do not eat, drink or smoke whilst handling chemicals.

Check the weather before using an agricultural chemical.

A person who uses an agricultural chemical product has a duty of care to ensure the use does not result in harm to the health of the general public, animals, the environment or domestic or export trade in agricultural produce.

If you suspect poisoning contact the Poisons Information Centre, emergency phone (24-hour) 131 126.
Foliar spraying

Foliar spraying is the application of a fine spray of herbicide solution to leaves and stems until the point of run-off (i.e. until every leaf is wet). It is only effective if the weed is actively growing. Foliar spraying from the ground is most effective early in the wet season prior to flooding and early dry season when flood waters recede to allow access to wetlands and mimosa seedlings start to germinate. High humidity and low evaporation rates make for ideal conditions to foliar spray. The sensitive leaves of the plant mean that foliar spray can be less effective under drought conditions or immediately after rain, when the leaves may be closed.

There are a number of ways of carrying out foliar spraying, depending on the size and height of the infestation, and the available equipment. Blanket spraying using a boom spray from a tractor or four-wheel drive vehicle can be used to treat large areas completely infested with weeds, especially with selective herbicides. For large infestations that need targeted applications of herbicide, a hose and handgun can be used to spray solution from a herbicide tank and pump carried by a tractor or vehicle. Smaller infestations can be sprayed using a backpack spray unit and handgun. Spot spraying is used to treat individual weed plants or areas that have only small clumps of weed infestations.

Before spraying:

1. determine the most appropriate method of application and equipment for the situation;
2. always check for sensitive areas in the vicinity, such as houses, schools, crops and riparian areas;
3. check for predicted weather conditions, only proceed if these are favourable;
4. notify neighbours of your spraying intentions; and
5. prepare to record all necessary details of the herbicide usage.

During spraying:

1. always monitor meteorological conditions carefully and understand their effect on ‘drift hazard’;
2. don’t spray if conditions are not suitable, and stop spraying if conditions change and become unsuitable;
3. record weather conditions, herbicide and water rates, and operating details;
4. supervise all spraying, even when a contractor is employed. Provide a map marking the areas to be sprayed, buffers to be observed, sensitive crops and areas;
5. spray when temperatures are at their coolest;
6. minimise spray release height (lowest possible boom height);
2. MANAGING MIMOSA

• use the largest droplets which will give adequate spray coverage;
• always use the least-volatile formulation of herbicide available;
• maintain a down-wind buffer e.g. keep a boom width from the downwind edge of the sprayed area; and
• avoid spraying where drift can go onto crops or other non-target species or areas likely to be planted with crops and non-target species as plant damage may occur.

Unfavourable weather conditions include:

• midday turbulence: up-drafts cause rapidly shifting wind directions (spraying should stop by 11am);
• high temperatures, particularly when using herbicides which are highly volatile or susceptible to drift;
• low humidity;
• high humidity – this extends droplet life and can greatly increase the drift hazard of fine droplets;
• still (stable) conditions and where conditions favour temperature inversions;
• high winds; ideal safe wind speeds are 7–10km/h; and
• periods during, before or immediately after rain; excess water will reduce the effectiveness of your application.

Aerial spraying

Aerial spraying is the most cost effective method for large mimosa infestations, as it allows large areas to be sprayed at one time and is the only way to access large mimosa infestations. However, it is also an expensive option. To maximise effective control, limit aerial spraying to areas of infestation which can be followed up with monitoring and control for several years after treatment.

Check weather conditions before aerial spraying. High winds or high evaporation rates will make spraying unsuitable. Evaporation and drift can be controlled to an extent by changing droplet size (See ‘Before spraying’).

Mimosa treated by aerial spraying before wet season floods on Elizabeth Downs

Aerial spraying of mimosa by helicopter
**Basal bark spraying**

This method involves mixing an oil soluble herbicide in diesel and spraying the full circumference of the trunk or stem of the plant. Diesel helps the herbicide move through the bark. Basal bark spraying is an effective way to treat both juvenile and mature mimosa plants. It is less labour intensive than the cut stump method.

The whole circumference of the stem or trunk should be sprayed or painted with herbicide solution from ground level to a height of 30cm. It is important to saturate the full circumference of the trunk, and to treat every stem arising from the ground.

Basal bark spraying is a very effective control method, and a good way to tackle inaccessible areas such as steep banks. It is a well targeted form of spraying, with little to no drift, so it is also suitable for environmentally sensitive areas. This method will usually destroy plants at any time of the year, as long as the bark is not wet or too thick for the diesel to penetrate. Basal bark spraying may be particularly effective on plants that have been defoliated by biological control agents. The herbicide solution should not be applied to charred or wet stems, as water can repel the diesel mixture.

**Cut stump method**

In the cut stump method, stems are cut off completely as close to the ground as possible (no higher than 15cm above the ground) and a herbicide solution is applied to the cut stump within 15 seconds, before the cut heals over.

This can be carried out more effectively by two workers. The stems may be cut with a chainsaw, hand saw, axe, brush-cutter or machete (mature stems can be up to 15cm in diameter), and the herbicide sprayed from a knapsack, hand-held spray bottle or drench gun, or painted onto the cut stump with a brush. Use a dye in the herbicide solution to mark the stumps that have been treated.

Cut stumps must be treated immediately with herbicide, as the cut can seal and prevent the absorption of herbicide. Mimosa can regrow vigorously from untreated cut stems.

This method is most suitable for small, isolated outbreaks and is particularly appropriate in environmentally sensitive areas because it has a low impact upon the soil and no impact on surrounding native vegetation or waterways. It is most effective when the plant is actively growing.

A brushcutter is a machine which eliminates a lot of the labour out of cut stump application by automatically cutting the stump low to the ground and spraying the cut immediately with herbicide.
Soil application

Herbicides that can be applied to the soil are actively triggered by rainfall, so need to be applied to the soil prior to the onset of the wet season.

Avoid the use of soil applied herbicides where fire is eminent, as fire will cause the herbicide to become inert, thus making it ineffective. These herbicides remain active in the soil for some time, where they are taken up by both mature plants and emerging seedlings. This means they are effective in controlling mimosa in areas which may be difficult or expensive to visit regularly as it reduces the labour required.

Herbicides registered in Northern Territory for control of *Mimosa pigra*

<table>
<thead>
<tr>
<th>Chemical and concentration</th>
<th>Rate</th>
<th>Situation, method &amp; comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tebuthiuron</td>
<td>1g/m²</td>
<td>Seedling or adult (individuals or infestation)</td>
</tr>
<tr>
<td>Various trade names</td>
<td></td>
<td>• Granulated herbicide - soil applied</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Do not use within 30m of desirable trees or apply to continuous area &gt; 0.5ha</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Use higher rate on dense growth or heavy clay soils</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Do not use if fire is imminent</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Apply when there is soil moisture or prior to rain</td>
</tr>
<tr>
<td></td>
<td>5-10kg/ha</td>
<td>Seedling or adult (individuals or infestation)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Granulated herbicide - aerially applied</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Apply after the onset of storms and prior to wet season surface flooding</td>
</tr>
<tr>
<td>Fluroxypyr 200gm/L</td>
<td>300ml/100L</td>
<td>Seedling or adult (individuals or infestation)</td>
</tr>
<tr>
<td>Various trade names</td>
<td></td>
<td>• Foliar application when actively growing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Wetting agent Uptake ® required - 500ml/100L</td>
</tr>
<tr>
<td></td>
<td>3L product with 60L water/ha</td>
<td>Seedling or adult (infestations)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Aerial control</td>
</tr>
<tr>
<td></td>
<td>1:60 (diesel)</td>
<td>Seedlings or adults</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Basal bark or cut stump application method</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Foliar application when actively growing</td>
</tr>
<tr>
<td>Metsulfuron-methyl</td>
<td>60g product with 60L water/ha</td>
<td>Seedling or adult (infestations)</td>
</tr>
<tr>
<td>Various trade names</td>
<td></td>
<td>• Aerial control</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Non-ionic surfactant required 100ml/100L</td>
</tr>
<tr>
<td>Dicamba</td>
<td>Kamba 500 6L/Ha</td>
<td>Seedling or adult (infestations)</td>
</tr>
<tr>
<td>Various trade names</td>
<td></td>
<td>• Aerial control</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Use the wetting agent LI700®</td>
</tr>
<tr>
<td></td>
<td>Kamba 500 400ml/100L</td>
<td>Seedling or adult (individuals or infestation)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Foliar application when actively growing</td>
</tr>
<tr>
<td>Glyphosate</td>
<td>Neat or 25ml/L</td>
<td>Seedling or adult (individuals or infestation)</td>
</tr>
<tr>
<td>Various trade names</td>
<td></td>
<td>• Cut stump</td>
</tr>
<tr>
<td>Hexazinone</td>
<td>50kg/ha</td>
<td>Seedlings and adults (individuals and infestations)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Not recommended for use over large continuous areas as non-selective residual herbicide</td>
</tr>
</tbody>
</table>

NOTE: See Chapter 5 to find out about herbicides registered to control mimosa in QLD or WA.
2.4 Mechanical clearing

If cut down without treating, mimosa can easily resprout from the stump. Mechanical clearing of large areas should occur after an infestation is treated with herbicide to clear access for follow up control and monitoring.

For small infestations, hand pulling or grubbing can be used to remove mimosa plants but take care to ensure all roots and seeds are fully removed and destroyed.

Machinery, vehicles and equipment used in mechanical clearing must be thoroughly cleaned before and after entering a mimosa-infested area.

Heavy machinery such as tractors and dozers will cause high levels of disturbance to soil and desirable vegetation, and increase rates of seed germination (sometimes this disturbance is desirable to encourage native regeneration). In some sites, such as steep slopes, gullies, stream banks and other sensitive areas, soil disturbances should be minimised and these areas are unsuitable for mechanical controls.
2. MANAGING MIMOSA

*Stick raking*
A stick rake attached to a dozer or heavier tractor effectively removes the whole stump and root system from the ground while minimising disturbance and loss of topsoil. Avoid scraping away the topsoil between plants. Immediate revegetation with pasture or native vegetation is necessary. In some cases, disc ploughing after clearing provides a better seedbed for re-establishing pasture.

*Chaining*
Chaining is the removal of mature plants by pulling a heavy chain between two bulldozers. Chaining is most suitable for dense infestations over large areas following treatment with herbicide. Chaining woody weeds can remove the roots and provide efficient rows for burning. This option is best implemented at the end of the wet season when soil moisture is sufficient to allow efficient root removal.

*Chopper-rolling*
A heavy drum covered in blades is pulled behind a tractor to knock down and break up dead mimosa stick following herbicide control. This method is less disturbing to soil than others, reduces fire fuel load and is useful for large infestations.

*Mulching*
A tractor with a mulching instrument attached to the front breaks up dead mimosa stems into very small pieces, clearing access and leaving a layer of mulch. This provides access to emerging seedlings, protects the soil and also eliminates the need for burning, reducing carbon emissions. Suitable for large, dense infestations.

2.5 Fire
Unless treated with herbicide first, about 90% of mature plants and 50% of seedlings can regrow following fire. Dead mimosa treated with herbicide should be burned to destroy residue and clear access for follow up control.

Burning also may help promote native species and destroy viable mimosa seed in the soil. A bulldozer should be used to pile-up the treated mimosa and make it safe to burn by creating a buffer zone around the fire. It is best to burn mimosa in the dry season prior to July before fire danger becomes extremely high.

Fire management can also be used as a control method by timing fire to stimulate germination of mimosa seed in the soil, enabling it to be controlled with foliar spray. This method can be effective in reducing seed stock but there are risks involved if timing is ruined due to a change in weather conditions or the area of seedlings is too large to be properly controlled.

Fire management is important in maintaining the health of country to make it less vulnerable to weed invasion. Hot or frequent fires which clear vegetation and leave bare land can promote mimosa as fire only kills seeds in the top part of the soil and scarifying mimosa seed with fire may promote germination. Fire exclusion may help suppress seeds by maintaining native grass cover.

A permit is required to burn in fire protection zones. Check the weather prior to burning (See Chapter 5).
2.6 Biological control

Biological control uses natural enemies of *Mimosa pigra* introduced from its native range to reduce the competitive ability of plants and seed production.

The biological control program for mimosa began in 1980, when biologists made exploratory trips to the plant’s home range in Central and South America, searching for insects which specifically attack *Mimosa pigra*. These biological control agents then underwent significant testing in quarantine to establish that they are sufficiently host-specific (i.e. do not attack non-target species) and will not have any other unintended undesirable effects before they were imported into Australia, reared in laboratories and released.

Out of a possible 420 species found to attack the plant, following extensive research 15 agents have been released for mimosa since 1983, including two fungi and 13 insects. These have had varying degrees of success, with seven species successfully establishing in Australia17. Insects may attack the leaves, stems, flowers, seeds, roots or tips of the plant. *Carmenta mimosa* and *Neurostrota gunniella* were found to have the biggest impact upon mimosa infestations.

Biological control agents can slow the mimosa’s rate of spread by reducing its seed production, seedling regeneration and seedbanks.

After a mix of results following the release of 15 agents the biological control program for *Mimosa pigra* in Australia now has just one more species, *Temnacerus debilis*, currently undergoing quarantine and testing. There is hope this species will do significant damage to mimosa plants in Australia, as they breed in leaf buds and feed on leaf tips18.
<table>
<thead>
<tr>
<th>Agent</th>
<th>Type of agent</th>
<th>First released</th>
<th>Plant part attacked</th>
<th>Established?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acanthoscelides puniceus</td>
<td>beetle</td>
<td>1983</td>
<td>mature seed</td>
<td>yes</td>
</tr>
<tr>
<td>Acanthoscelides quadridentatus</td>
<td>beetle</td>
<td>1983</td>
<td>mature seed</td>
<td>no</td>
</tr>
<tr>
<td>Chlamisus mimosa</td>
<td>beetle</td>
<td>1985</td>
<td>leaves and stems</td>
<td>yes</td>
</tr>
<tr>
<td>Neurostrota gunnielia</td>
<td>moth</td>
<td>1989</td>
<td>pinnae and tips</td>
<td>yes</td>
</tr>
<tr>
<td>Carmenta mimosa</td>
<td>moth</td>
<td>1989</td>
<td>large stems</td>
<td>yes</td>
</tr>
<tr>
<td>Coelocephalapion aculeatum</td>
<td>weevil</td>
<td>1992</td>
<td>flower buds</td>
<td>no</td>
</tr>
<tr>
<td>Coelocephalapion pigrae</td>
<td>weevil</td>
<td>1994</td>
<td>flower buds and leaves</td>
<td>yes</td>
</tr>
<tr>
<td>Phloeospora mimosae-pigra</td>
<td>fungus</td>
<td>1995</td>
<td>leaves, stems and pods</td>
<td>no</td>
</tr>
<tr>
<td>Chalcodermus serripes</td>
<td>weevil</td>
<td>1996</td>
<td>green seed and tips</td>
<td>yes</td>
</tr>
<tr>
<td>Diabole cubensis</td>
<td>fungus</td>
<td>1996</td>
<td>leaves</td>
<td>no</td>
</tr>
<tr>
<td>Sibinia fastigiata</td>
<td>weevil</td>
<td>1997</td>
<td>green seed and flowers</td>
<td>no</td>
</tr>
<tr>
<td>Malacorhinus irregularis</td>
<td>beetle</td>
<td>2000</td>
<td>leaves, roots and nodules</td>
<td>yes</td>
</tr>
<tr>
<td>Macaria pallidata</td>
<td>moth</td>
<td>2002</td>
<td>leaves</td>
<td>yes</td>
</tr>
<tr>
<td>Leuciris fimbriaria</td>
<td>moth</td>
<td>2005</td>
<td>leaves</td>
<td>no</td>
</tr>
<tr>
<td>Nesaecrepida infuscata</td>
<td>beetle</td>
<td>2007</td>
<td>roots and seedlings</td>
<td>currently being released</td>
</tr>
</tbody>
</table>

Biocontrol is compatible with both herbicide and mechanical control. It is important to include it as part of an integrated control plan. You can identify which biocontrol agents exist on infestations using the agent identikit (Chapter 5).

**Moth stems the tide of mimosa**

*Carmenta mimosa* is a stem-boring moth found in Mexico, Honduras and Nicaragua. The larvae feed on and pupate inside the stems of *Mimosa pigra*. Once the larvae pupate into moths, they lay eggs on the plant and the cycle starts again.

*Carmenta mimosa* causes major stress to mimosa plants by weakening the stems. It is able to contain and sometimes reduce infestations by decreasing seed production and growth rates, reducing emerging seedlings and allowing native vegetation such as grasses and sedges to re-establish.
2.7 Revegetation

Maintaining dense ground cover will provide competition against mimosa seeds in the soil and protect the area from infestation. A treated area can be revegetated with native grasses such as native hymenachne (*Hymenachne acutigluma*) to suppress mimosa seeds still in the soil or allowed to revegetate naturally through succession. Stock should be kept out of treated areas to allow them to recover. Natural succession is also effective in suppressing seedlings where grazing pressure is reduced. Revegetation alone will not suppress all mimosa seedlings so follow up control is still required.

**NOTE:** Olive hymenachne (*Hymenachne amplexicaulis*) is a declared weed and MUST NOT BE USED for revegetation.

2.8 Follow up control

Following initial control of mimosa it is vital that management areas are regularly visited to control newly germinated seedlings. Seedlings should be treated from the ground with a foliar spray or isolated plants can be removed by hand. Monitoring sites should also be established with photo points to measure the success or failure of treatments. This gives you the ability to adapt your control methods accordingly. Since the seed can remain viable in the soil for up to 23 years, dependent on soil type, follow up control is ongoing and critical to the long-term success of your control plan.

2.9 Best practice land management

Disturbance opens up areas of land to mimosa infestation. You can manage disturbance on your land by appropriately managing stocking rates, controlling feral animals such as buffalo and pigs and managing the fire regime. This helps resist weed invasion by maintaining good cover of native vegetation and healthy stable soils.
CHAPTER 3
Choosing a control program
3.1 Assess the infestation
The control option you choose will partly depend on the nature of each infestation. Use survey and mapping methods identified in Chapter 2.2 to classify infestations according to their size, density and location.

3.2 Assess the resources available
Your control options and area of infestation you tackle will be limited by the resources available. You should only take on an area if you can control it in the long-term. Spraying an area once without follow up control is not only a waste of time and money, but will make future control efforts even more difficult. Make sure your objectives are achievable and affordable.

Planning is an essential part of integrated control. Plan for the long-term and revise your plan regularly through monitoring control sites and adapting your goals and methods if required. You can use the templates at 3.5 as a step-by-step guide to planning your integrated control program. Ensure you cost the control program and include this in the overall property financial plan.

3.3 Establish objectives
You now need to prioritise areas of infestation and consider:

- Does the area have high conservation, cultural or production value?
- Is the infestation blocking access to an important area?
- Is the area in an environmentally sensitive area, or near native species?
- Is the area steep or difficult to get to?
- Is the infestation too big to eradicate at once?
- Is the infestation at the top or bottom of the catchment?
- Is it likely to spread from here?
- Is it near a riparian zone?

Sensitive areas will require control methods such as basal bark or cut-stump which cause no off-target damage. These areas may include:

- infestations close to native vegetation;
- conservation site;
- heritage site;
- sacred site;
- riparian zones near waterways; and
- steep areas.

Examples of objectives may include eradication, prevention of seed production, containment of infestation, preventing introduction or spread, reducing impact or control of outlying areas. The objectives you choose will depend upon the resources available, as well as the location and nature of each infestation and potential for it to spread.
3.4 Choose control methods

Use the information in Chapter 2 to decide which control method is best for each location and when you intend to implement it for maximum effect. Consider whether you have sufficient information or whether further survey work is required. Record the results of each action undertaken for future reference.

Examples of integrated control methods include biological control, management of grazing pressure, feral animal management, fire management, livestock quarantine, use of machinery and use of herbicides.

Integrated weed control is essential to eradicating, containing and preventing spread or reinfestation of mimosa. Control methods need to be combined appropriately at the right time to maximise their effect and ensure mimosa infestations remain under control.

- Chemical control should be used before mechanical control to kill the mimosa before clearing and burning.
- The cleared land that is left needs to be appropriately managed, through reduced grazing rates, feral animal control and fire management, to promote natural succession with native pasture.
- Revegetation with native plants such as native hymenachne can also help provide extra competition for mimosa seedlings.
- Biocontrol agents can be used in conjunction with other control methods to reduce seed production and growth of plants.
Control methods should be timed to maximise effectiveness. A diagram is provided below as a general guide to the lifecycle of Mimosa and how it relates to control methods.

Timing of the lifecycle varies as it depends upon environmental factors such as rainfall and temperature which vary significantly from year to year.

- Wet season
  - As floodwater recedes, seeds on floodplain fringes will start to germinate. Foliar spray.
  - Burning of chained areas before 30 June.
  - Plant activity generally decreasing except moist floodplain sites. Not a suitable time for foliar spraying.

- Plant activity increasing - good timing for foliar applications and ground applied herbicides.
- Aerial control - best when plant is active and before flooding occurs.
- Wet season
3. CHOOSING A CONTROL PROGRAM

3. Foliar spraying from the ground and distribution of soil applied herbicides should occur as the growth rate and plant activity increase in October, prior to the onset of monsoonal rain.

2. Aerial spraying should occur in the early wet season before flooding occurs and seed production. Emerging seedlings can also be aerial sprayed in early dry season.

3. Spot spraying from the ground or hand pulling should occur as seedlings emerge in early dry season.

4. Ground control with foliar spray, basal bark or cut-stump can continue into the dry season as wetlands dry out and become accessible.

5. Chaining and burning of treated areas should occur in the dry season, before July when fire danger significantly increases.

6. Monitor results Use surveys and photo points to monitor the results of control actions on a regular basis. Review the success of control methods undertaken and outline follow up control methods.

3.5 Mimosa management plan templates

Create your own mimosa management plan using the following templates.

<table>
<thead>
<tr>
<th>Management areas</th>
<th>Priority rating</th>
<th>Objective</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medium</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Seasonal work plan

<table>
<thead>
<tr>
<th>Month</th>
<th>Management areas</th>
<th>Planned activities</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Plan review

<table>
<thead>
<tr>
<th>Management areas</th>
<th>Planned activities</th>
<th>Dates worked and what was done</th>
<th>Results</th>
<th>Results and changes required</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Seasonal work calendar

<table>
<thead>
<tr>
<th>Month</th>
<th>Location (management area)</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td></td>
</tr>
<tr>
<td>February</td>
<td></td>
</tr>
<tr>
<td>March</td>
<td></td>
</tr>
<tr>
<td>April</td>
<td></td>
</tr>
<tr>
<td>May</td>
<td></td>
</tr>
<tr>
<td>June</td>
<td></td>
</tr>
<tr>
<td>July</td>
<td></td>
</tr>
<tr>
<td>August</td>
<td></td>
</tr>
<tr>
<td>September</td>
<td></td>
</tr>
<tr>
<td>October</td>
<td></td>
</tr>
<tr>
<td>November</td>
<td></td>
</tr>
<tr>
<td>December</td>
<td></td>
</tr>
</tbody>
</table>
4.1 Case Study 1
Kakadu National Park, NT

Twenty-five years ago, *Mimosa pigra* began to spread throughout the floodplain and coastal areas of the World-heritage listed Kakadu National Park. Now, thanks to an ongoing control program, mimosa is restricted to small outbreaks within the Park.

Kakadu National Park is located approximately 150km east of Darwin and forms part of the Alligator River region which flows into Van Diemen Gulf. The park contains three major environments; the plateau and escarpment, savanna lowlands and floodplains. Floodplains and coastal plains cover approximately 215,000ha of the park.

Kakadu is listed as a World Heritage area for its cultural and conservation value. Kakadu’s wetlands are also recognised as internationally significant under the Ramsar Convention. The wetlands of Kakadu are an iconic tourist destination and provide dry season refuge for a prolific and diverse amount of wildlife. The wetlands include many important cultural sites, fishing and hunting areas for the traditional owners, the Bininj.

The ability of mimosa to rapidly take over wetlands threatens the habitat of waterbird species such as the magpie geese. Mimosa can also take over key Aboriginal hunting grounds for turtles and geese, as well as prevent access to fishing areas.

*Mimosa pigra* was first detected in Kakadu at the popular Yellow Waters Billabong in 1981 and later that year at Munmarlary. Despite early eradication and monitoring of the Yellow Water site, two years later a large infestation was found nearby. Its spread to other areas is thought to have been caused by humans and their vehicles. Large numbers of feral buffalo in the park were also a major cause of spread and degradation of wetland areas until the buffalo eradication program of 1985-89 dramatically reduced numbers.

In recognition of the threat mimosa posed to the biodiversity and cultural values of the park, a strategy of ‘search and destroy’ was employed to control mimosa outbreaks before they become a major problem and prevent spread of the weed to other areas.

It quickly became clear that it was not feasible to totally eradicate weeds within the park. In 1996, a Weed Management Strategy\(^\text{19}\) for the park was instigated with seven key principles:

- prevention; including wash-down facilities, implementing hygiene standards, educating staff, develop a local nursery for revegetation, educating residents and general public, liaising with adjacent landholders;
- identifying ecosystems prone to invasion;
- surveillance and early intervention;
- minimising an area’s susceptibility to invasion; including feral animal control, rehabilitation of degraded areas and appointment of Rehabilitation Officer;
- managing existing weeds;
- researching existing and potential weed problems; and
- undertaking regular reviews.

An area of about 20,000km\(^2\) is difficult to monitor, but Senior Park Ranger Buck Salau says that a zero tolerance policy combined with constant monitoring and vigilance is the key to controlling *Mimosa pigra*. A team of four full-time weed officers regularly check floodplain areas for mimosa in four wheel drives and quad bikes during the dry season, or air boats during the wet season. Early eradication is critical, so the monitoring program runs year-round.

*Seeds are placed in a bin ready for burning*
Small plants are hand pulled or grubbed out. Larger plants are sprayed with herbicide using spray units. If a plant has seeded, all seeds are carefully collected and then burned on site with a very hot fire to destroy them. Graslan® (tebuthiuron) is used to provide protection during the early wet season when access by both land and water is impossible. Aerial surveys are also carried out regularly. Buck estimates that about $600,000 is spent each year on staff, vehicles, helicopters, airboats and herbicides.

Despite the cost, controlling small outbreaks is much cheaper than trying to control large infestations. Because of a history of controlling mimosa, rangers are able to focus on search and control of small mimosa outbreaks, at an average cost of $2/ha (1996). In comparison, control of a large infestation on the Oenpelli floodplain in Arnhem Land cost $200/ha each year over a five-year period (1991-1996) and control efforts are still continuing today20.

Buck says the continued support of traditional owners has been critical to the success of the program. “The traditional owners are very aware of the threat it poses to the wetlands, to hunting. If they find a plant, they will report it to us.” He recounts how the Gagadju Association instigated the idea for a mimosa program when the weed was first detected in the park. The support of land managers has meant a large amount of resources have been committed to allow year-round surveillance of the park and ensure mimosa does not get out of control.

“We have a zero tolerance policy. Even just one plant can cause big problems a short time later. Sometimes you find plants in the strangest of places. If it is wet, it can grow there.”

Constant monitoring is needed since the seeds can remain viable in some soils for up to 23 years. Buck describes how the mimosa teams return to mimosa sites to kill any seedlings which may have germinated. “We mark plots where we find mimosa with a picket, GPS the location and keep coming back. Sometimes we find nothing, but you can find plants, years and years later. It is an ongoing program.”

Buck explains that Kakadu National Park educates tour guides, junior rangers and seasonal rangers about mimosa so they can pass on their knowledge to members of the public and raise awareness of the weed. The mimosa management team also get together with people from Aboriginal communities such as Oenpelli to share knowledge and experience.

Buck says they have been lucky in having the support of management to employ four dedicated staff on the job, 12 months of the year and this has been the key to the program’s success. Despite the large amount of resources required, the costs of allowing mimosa to spread unchecked are many times greater. He sees mimosa management as a problem that will not go away, but with constant vigilance and control, it can at least be restricted to small outbreaks and the prolific wildlife of Kakadu’s wetlands will not be threatened by this tenacious weed.

Kakadu National Park Rangers get wet to remove a mimosa plant on the floodplains
4.2 Case Study 2
Malak Malak Land Trust, NT

For Malak Malak people, their country has a spiritual significance which ties them to its past and future. It is also a place for hunting and gathering bush tucker including wallabies, goanna, fish and turtles. The invasion of *Mimosa pigra* at the Daly River floodplains threatens the habitat of wetland species and prevents access to important hunting and fishing areas.

Malak Malak Land Trust lies in the Daly River Region, 220km south of Darwin, just west of Litchfield National Park.

Albert Myoung is Senior Ranger and elder of the Malak Malak. He has been managing mimosa on country since he discovered a small infestation in the mid1990s which quickly grew into a large thicket.

Albert’s mimosa story began when a visiting Weeds Officer, came to Malak Malak country to find out whether mimosa had infested the region.

“The officer showed me a picture, and he said, ‘have you seen this?’ and I recognised it from the photo, I said ‘yeah I’ve seen some, never seen them before.’” Albert describes how Weeds Officers showed him how to cut and paste mimosa as well as to use a knapsack and hand gun to spray. Albert initially tried controlling mimosa by concentrating on the largest infestation at Parngala, an important hunting ground, but it was hard work doing it all by hand. The weed continued to spread to other areas, making it practically impossible to control effectively from the ground with only a small team of rangers.

Albert noticed the drastic impact mimosa had on the land within just a few years. “Parngala used to be good hunting for wallaby, turtle, goanna and magpie goose. Mimosa is a no-good weed for this country.” He describes how pest control is important in controlling mimosa.

“Buffalo, horses and pigs – they make it worse! We’d like to get rid of the buffalo, but it’s too much for us, too dangerous. Pigs are alright – we eat pigs for tucker.”

Malak Malak is surrounded by the pastoral properties of Tipperary, Elizabeth Downs and Litchfield Station. It also includes some freehold blocks of land used for mango crops or small-scale tourism operations which cater for visitors who come to the Daly River to fish. Avid recreational fishers travel across the country every April to take part in the annual Barra Nationals.
These days Rob Lindsay coordinates the Malak Malak ranger group; responsible for managing the land trust against weeds, pests and fire. He says the variety of land uses in the region means good cooperation is needed to control mimosa effectively and prevent it from spreading. However, different priorities of landholders make coordination a real challenge. “You can see areas where mimosa is not being controlled and it has spread on to Malak Malak land.”

Albert describes how they are keeping cattle out of mimosa-infested areas to prevent spread. Rob says the fence provides a good buffer zone to prevent spread and also allow access for ground control. “Once you’ve got a boundary you can work along the boundary and move in to shrink the infestation.”

In 1998, Malak Malak signed the Mimosa Services and Funding Agreement (MSFA) with the Indigenous Land Corporation, Northern Land Council, Tiwi Land Council and Northern Territory Government. The agreement has allowed the rangers to access funding for resources such as herbicides and hire of a helicopter for aerial spraying and surveying. The NT Weed Management Branch have provided advice and assistance to Albert, resulting in a Weed Management Plan which prioritises management areas and has been successful in making weed control methods more effective through integrated management and timing. The Branch also provided training in mimosa ground control methods for Malak Malak rangers.

The MSFA funds were put towards aerial spraying large infestations which could not be controlled from the ground. The dead mimosa was then bulldozed to enable access for repeat aerial spraying and ground control of seedlings. Ground control takes place in the dry season since access is restricted in the wet season when much of the wetland areas are inundated for 3-6 months. Most recently, the group installed an 11,000 litre water tank and storage area on site to load a helicopter in the early wet season for aerial control operations.
Impressively, Albert and his team of rangers cleared a helicopter landing site by hand to allow access to the site when surrounding areas are flooded. He says the site will be very useful when the Parngala area is aerial sprayed in December after seedlings emerge with the first rains. “Now if it gets too wet here it’s all ready to go, they can come in with the chopper”.

Regional Weeds Officer, Michael Schmid, says they plan to follow up this treatment in April when floodwaters recede and seedlings are exposed once more. The water tank also means that access to water will be provided year-round, particularly during the dry season when the rangers come out to do ground control.

Perhaps the biggest challenge for Albert is attracting young Malak Malak out to country to work. “They come here and stay a few weeks, but then they go back to Darwin!” The rangers stay with Albert and his family, as there is a lack of accommodation at their small outstation of Maddaingya. “We need to be able to provide a house, then we could get someone to stay, but we don’t have the money.”

Malak Malak Ranger Coordinator Rob Lindsay says persistence is the key to managing mimosa. “It’s such a big area, it really is a long-term thing. We focus on one area, get on top of that then move on to another area.”

He says managing the top of each catchment to prevent downstream spread of seeds is vital. “We go up a creek until we find the last plant – that’s where you need to start, at the top of the creek.”

Rob says they’ve found chemical control works well in conjunction with other methods. To increase efficiency of ground spraying, they plan to upgrade their current spray kit. “There is a big spray unit which can hold about 400 litres which can be towed behind a quad bike. Otherwise we have to go back to refill every 70 litres.”

Albert and Rob say that at first they underestimated the amount of damage mimosa could do to the landscape. “It only took a few years to spread, we didn’t know it was so bad, that it had the potential to wreck country. It really is a shock to see how quickly it comes up once it rains. You need to come back all the time.”
4. CASE STUDIES

Back at Maddaingya, the Malak Malak women are rearing and releasing macaria (*Macaria pallidata*), a biological control agent which eats mimosa leaves, as part of a trial with the Weed Management Branch Biological Control Section. Albert’s sister Rita Purack describes how they rear the moth larvae in cages to keep them away from ants, and take them out to the trial site when they become large pupae. Once released, the pupae become moths a few days later and go on to lay eggs on another mimosa plant. “At first we didn’t know how to do it properly, but then Natasha taught us properly how to do it and now we do it ourselves.”

The Biocontrol group is redistributing macaria in the Daly, Docherty and Moyle catchments to enhance biological control in these areas.

Weed Sciences Technical Officer Natasha Burrows says so far the project at Malak Malak is going very well. “We have had some excellent results with six colonies reared so far and they have also seen larvae at the release site. At the moment the Malak Malak women are releasing agents on their own land. Hopefully if they keep going we can collect agents reared by them and redistribute it to other lands in the region.”

Although the project has not yet been going long enough for it to have had an effect on the infestation, the moth is known to be effective in reducing the mimosa’s competitive advantage. “Elsewhere we have seen mimosa stands totally defoliated. Macaria doesn’t kill the plant but it does stop it from producing seed and makes it more vulnerable to the effects of fire and mechanical control.” Natasha says that since macaria defoliates the plant, foliar sprays will not be effective. Instead, infestations affected by macaria can be burned or cleared by chaining.
4.3 Case Study 3

Peter Faust Dam, QLD

If this infestation had not been quickly controlled, mimosa would have cost the community, the environment and the Queensland economy. It poses a great threat to the productivity of cane farming and cattle grazing, both major industries in the region. Popular recreation and tourism activities such as water-skiing, fishing and camping would also be compromised if mimosa was allowed to spread throughout the region.

In April 2002, mimosa seedlings were found extensively throughout the area, many within Melaleuca spp. stands. Some areas were found to have up to 400 mimosa plants per 25m². A 17km access road was bulldozed to spray the mimosa infestations with mefuron-methyl. Areas of melaleuca stands containing mimosa were also cleared so the seedlings could be detected and controlled. Wash-down sites and hygiene guidelines were established to prevent further spread by vehicle and cattle movement. The Management Group decided to undertake monthly inspections of the area and three annual surveys of the entire dam perimeter²¹.

A state-wide education program was launched to raise awareness of the risks of spreading mimosa. Local landholders were trained in identifying and controlling mimosa. A land management program including feral pig control and fire management was also established to prevent further spread.

Principal Land Protection Officer, Steve Matheson, said the location of the infestation at the headwaters of the Proserpine River meant there was a high risk of spread. Without proper control, the mimosa infestation poses a threat to the agriculture, recreational fishing and tourism sectors as well as waterbird habitat.
It had the opportunity to spread throughout the catchment and down the Proserpine River. There are a lot of wetlands in the area and it’s the right climate for it to spread."

In September 2002 a survey of the entire dam perimeter found seedlings but only two mature plants. The most recent survey in 2008 found just four plants. No mature plants have been detected since 2004. Two people are currently employed full-time to survey and control the area. Plants are pulled out by hand where possible, or foliar sprayed. “Every plant they see is pulled out and destroyed. The dam is used for agricultural irrigation and drinking water – we need to be very careful with what we can use.”

The Peter Faust Dam is an important site for recreational fishing and tourism. Steve says fishers have recognised what they have to lose if mimosa is allowed to get out of control and have been very supportive of hygiene practices such as the wash-down.

“We did consider closing the dam to fishing – that would have had a big impact on recreational fishers, so they use both wash-down facilities.”

Steve says that support from local and State governments has been crucial to the success of the program, which now costs about $200,000 a year. “State and local ownership have made sure this project has worked, there is great cooperation between the Whitsunday Regional Council and the Queensland Government.”

He has found constant vigilance and monitoring is the key to controlling mimosa. “You can’t turn your back on it for a couple of months – if you do, you end up with seeding plants there straight away – you need to do diligent surveys, be prepared to wade out into waist deep water.” But finding people to do the job has been a problem. “We have trouble attracting and retaining staff as it is a very hands-on, very hot and tedious job – retention of staff is our biggest issue.”

Steve says that it is critical landholders and managers can readily identify and report mimosa infestations immediately. “Be aware of this pest and please, don’t try to hide it from us – make sure you tell us straight away. Always keep an eye around the edge of water bodies on your property, particularly if it is used by recreational fishers.”

He says that at Peter Faust Dam, although they will be monitoring for mimosa for many years to come, he is pleased with the success of the program. He encourages Northern Territory landholders with mimosa on their property to make sure they control it properly. “Don’t let it get away – get rid of it, be diligent and stop any opportunity for it to spread.”

“The washdown station at Peter Faust Dam is well utilised by visitors
4.4 Case Study 4
Twin Hill Station, NT

In the early 1980s, mimosa threatened to take over Twin Hill Station’s wetlands – blocking access to billabongs and taking over important native habitat.

Twin Hill Station is a pastoral property located on Wagait Aboriginal Land in the Finniss River catchment. The station shares its boundary with the Aboriginal clans of Werat and Wadjigan as well as Litchfield National Park, a popular day trip 100km south-west of Darwin.

Mimosa threatened to take over the area’s wetlands in the early 1980s – blocking access to billabongs and taking over important native habitat. An integrated management program has allowed the land managers to gain control over mimosa on the property, with the assistance and support of local agencies.

Twin Hill Station manager Colin Deveraux clearly remembers when *Mimosa pigra* started becoming a problem for the area in the early 1980s. “We couldn’t get to our favourite fishing spots because mimosa prevented access to the bank.

It started taking over roads, blocking access. Then we noticed when we went hunting, feral buffalo and pigs were hiding in these infestations – it was getting worse!”

Colin and his family started experimenting with control methods, trying to find a way to eradicate the mimosa thickets which threatened the biodiversity, cultural values and productive values of the property. “We tried all sorts of things – I remember buying a flamethrower! At first it would work, but it would come back the next year twice as thick. Then we started to learn from the government about the different chemicals you could use. We adopted some of their methods and started achieving results a couple of years later.”

Twin Hill is home to several threatened species, including the rare grass owl. Colin explains the area is so rich in wildlife it is listed as a Wetland of National Importance. “Mimosa displaces plants and habitat for all native animals of the floodplains, including turtles, fish, crocodiles and birds.” The area is also Aboriginal land of significance to the white eagle (Rak Mak Mak Marrananggu) people. “Mimosa can swallow up whole billabongs – it makes it very hard to pass on cultural knowledge when this ‘curtain’ has been placed over everything.”

The floodplains are an abundant source of traditional foods such as the long-necked turtle and magpie goose. “Mimosa replaced magpie geese nesting areas, causing the population to decline until we reclaimed the floodplain.

A severe mimosa infestation at Twin Hill Station
Now we’ve got the highest goose population we’ve seen since we’ve had mimosa. The short and long-necked turtles dropped off but now they’re making a comeback.” Colin adds that since gaining control over mimosa, the saltwater crocodile nesting habitat has increased to the point where they need to harvest eggs to keep the crocodile population from getting out of control.

Cattle production at Twin Hill Station is the major enterprise for the White Eagle Aboriginal Corporation. Mimosa threatens cattle production by shading out cattle feed, blocking access and taking over productive land. Colin explains how the station’s stocking rates have improved dramatically since large amounts of mimosa have been removed and paddocks have been allowed to revegetate. “Hospital paddocks, we call them.

We allow these areas make their comeback – we let nature take its course as the native grass seeds wash down and regenerate naturally. The native grasses came back and now you wouldn’t know there was mimosa ever there. That is our secret. We use grass like a blanket to cover the soil, but if a pig digs it up the mimosa seeds will germinate straight away.” Feral pigs are managed through shooting. “Recently my son Calvin shot 300 pigs in six weeks!”

The Corporation prioritise areas for control and monitoring by identifying habitats vulnerable to invasion, identifying vectors of spread, analysing hydrological patterns to identify high-risk areas, limiting soil disturbance in wetland areas and establishing buffer zones around large infestations.

Fire management is also an important part of mimosa control at Twin Hill. Colin has found that mimosa increases the intensity of fires, killing any nearby Melaleuca trees. “Fires around here go down into the deep cracks of the black clay floodplain soils, so they can emerge in another location by travelling under ground. Grazing helps prevent fires by reducing the fuel load. We like to say we live off the top half of our grass.”

Colin says that after 14 years of controlling mimosa on the property, they are now at the stage where they can hand pull any seedlings detected, using basal bark methods if the plant is too big.

**Magpie goose**

Now we’ve got the highest goose population we’ve seen since we’ve had mimosa. The short and long-necked turtles dropped off but now they’re making a comeback.” Colin adds that since gaining control over mimosa, the saltwater crocodile nesting habitat has increased to the point where they need to harvest eggs to keep the crocodile population from getting out of control.

Cattle production at Twin Hill Station is the major enterprise for the White Eagle Aboriginal Corporation. Mimosa threatens cattle production by shading out cattle feed, blocking access and taking over productive land. Colin explains how the station’s stocking rates have improved dramatically since large amounts of mimosa have been removed and paddocks have been allowed to revegetate. “Hospital paddocks, we call them.

We allow these areas make their comeback – we let nature take its course as the native grass seeds wash down and regenerate naturally. The native grasses came back and now you wouldn’t know there was mimosa ever there. That is our secret. We use grass like a blanket to cover the soil, but if a pig digs it up the mimosa seeds will germinate straight away.” Feral pigs are managed through shooting. “Recently my son Calvin shot 300 pigs in six weeks!”

The Corporation prioritise areas for control and monitoring by identifying habitats vulnerable to invasion, identifying vectors of spread, analysing hydrological patterns to identify high-risk areas, limiting soil disturbance in wetland areas and establishing buffer zones around large infestations.

Fire management is also an important part of mimosa control at Twin Hill. Colin has found that mimosa increases the intensity of fires, killing any nearby Melaleuca trees. “Fires around here go down into the deep cracks of the black clay floodplain soils, so they can emerge in another location by travelling under ground. Grazing helps prevent fires by reducing the fuel load. We like to say we live off the top half of our grass.”

Colin says that after 14 years of controlling mimosa on the property, they are now at the stage where they can hand pull any seedlings detected, using basal bark methods if the plant is too big.

**Feral pigs disturb wetlands, making them more vulnerable to weeds such as mimosa**
“You have to come back every year – you need a map of the area and you’ve got to keep records of where you went, when and what you did.”

“The Northern Territory Government work with us – they have supplied us with equipment and advice. We also participated in a control trial which attempted to identify how different control methods – chemical, fire or mechanical – could be married up with biocontrol. They found that using a suite of control options gave the best result – depending on the nature of your floodplain. ‘Integrated Control’ was the name they gave it.

“The researchers noticed that after fire you get massive regeneration of seed when it is stimulated with fire, which can easily then be aerial sprayed. They also found biocontrol agents were more effective on seedlings than mature plants. We’ve received most of the biocontrol agents they released. I’ve noticed that biocontrol has slowed down growth of mimosa – it is not as tall, vigorous or dense and has longer growth periods. It’s not a short-term solution, but it might work in the future.”

Colin says that although they have successfully removed the large mimosa infestations, they need to monitor sites every year as there is still seedlings coming through. “You need to get in with the aerial spraying when you’ve just got a bit of rain to get things going, before the wet season floods, around mid-November.

It’s a lot of money to outlay and you’ve only got a small window of opportunity when it is susceptible to the herbicide.”

Apart from aerial spraying, a large component of the Twin Hills control program is foliar spraying from the ground. The opportunity to do this is limited by access. “Once the rains come, you can’t get out on to floodplains again until July/August. Even quad bikes can’t cope with this country – we have specialised vehicles so they don’t bog easily.” Large areas are aerial sprayed from an aeroplane, which is followed up by helicopter. Colin says they don’t use mechanical clearing or fire to remove the dead mimosa material as they’ve found it breaks down after about three years.

Colin estimates it costs them about $150,000 a year to control approximately 10,000 hectares of land, which he considers a worthwhile investment. “If we hadn’t had a weeds program, mimosa was in the process of colonising everything!”

“The hardest part is to begin a program – you need to realise the area you target this year needs to be budgeted for the next five years. It’s no good targeting it all in one lump because there is a seedbank in the soil which doesn’t diminish for at least five years! In some areas we’ve found mimosa has come back 20 years later.”

He finds the biggest problem is encouraging neighbouring landholders to do the same. “You can fly up to the boundary and there is a wall of mimosa as they are not managing it on their property.” Now, thanks to a NT Cattlemen’s Association grant, they have created a 100m buffer zone at the boundary to prevent mimosa seeds spreading into Twin Hill. “Now the grass has grown up so the mimosa seeds hit the grass and get stuck, but floodwaters can still take the seeds kilometres away as they float.” Colin is assisting his neighbours by training some of the land managers in mimosa control so they can learn from their experience at Twin Hill.

An infestation at Twin Hills before and after treatment with herbicide

The same area is now clear of mimosa, allowing access to the billabong
4.5 Case Study 5
Adelaide River, NT

Mimosa was first recognised as a serious problem when a large infestation was found at the Adelaide River in the 1950s and it continues to be controlled today.

The Adelaide River catchment is a mosaic of different land-types, including Aboriginal land, pastoral properties, freehold land and vacant crown land. The area is used for a variety of activities including tourism, grazing, hunting and fishing. This presents a complex challenge for prevention of spread and control of mimosa, requiring good cooperation between agencies and land holders.

Vacant Crown Land (VCL) is land owned by the Commonwealth and managed by the Northern Territory Government under the Crown Lands Act. The land is managed by government agencies to ensure it does not assist the spread of weeds and pests. Adelaide River VCL is managed by the Department of Planning and Infrastructure with assistance from the Department of Natural Resources, Environment, The Arts and Sport Weed Management Branch (Weeds Branch).

The land includes large sections of the Adelaide River adjacent to land managed by Coomalie Council at Adelaide River township. Pockets of VCL throughout the catchment also share boundaries with freehold landholders, Djukbinj National Park and pastoral landholders. Mimosa infestations occur all along the river and surrounding areas, from upstream of the Adelaide River township through to the floodplains beyond the Arnhem Highway.

Mimosa outcompetes native vegetation, forming dense monocultures in the watercourses and floodplain of the Adelaide River. Infestations threaten the viability of activities on the river, such as fishing and wildlife cruises, as well as reducing habitat available to native flora and fauna.

A local landholder checks out a mimosa infestation at Little Finniss River (J.Page)

Map of land tenure in Adelaide River region showing VCL (in pink)
Regional Weeds Officer, Michael Schmid, describes how the diversity of land-uses and land managers in the region mean a coordinated approach is needed to manage mimosa effectively.

The Weeds Branch, Department of Planning and Infrastructure, Greening Australia and Coomalie Council are working with landholders and Indigenous groups to develop a catchment wide approach and avoid reinfestation by seeds carried downstream.

Recreational fishers and hunters are encouraged to thoroughly inspect their boats and vehicles for seeds before leaving the area to avoid spreading seed. The Weeds Branch also work with nearby pastoralists to ensure they control mimosa on their land effectively by concentrating on upstream infestations, managing stocking rates near infestations and maintaining good grass cover.

Michael says every landholder must control their patch for weeds. “Significant reductions in mimosa have been achieved however this is dependent on a coordinated effort with every landholder properly managing the weed on their property.”

Biodiversity Conservation Officer of Greening Australia NT Jaemie Page describes how both the Adelaide and Finniss Rivers originate from small springs and creeks in the escarpment country around the Coomalie Council region. “The area comprises hundreds of freehold blocks managed by many landowners with different capacity and motivation to manage mimosa on their land. In many cases blocks are vacant so no management is occurring.”

Access to mimosa-infested tributaries in the area is often difficult. Mimosa plants grow intertwined with bamboo and other riparian plants, making them difficult to locate and control.

Jaemie reports how many land managers in the region have found foliar spraying with glyphosate as effective as broad leaf sprays and much safer to use for landowners with less experience in using herbicides. “Basal bark and cut-stump with broad leaf herbicide and diesel are both used, but cut-stumping is preferred as it uses less diesel than basal bark, reducing transport costs and the risk of pollution.”

Back at the Weeds Branch, Michael Schmid explains how they designed a VCL Adelaide River Weed Management Plan. “We conducted aerial surveys to map the distribution of mimosa.
We then allocated management areas according to the size, density and location of each infestation and worked out what areas could be tackled first given the available budget. Control methods for each management area were determined by the nature of each management area. “For example, if it’s a large infestation, we would be looking to do aerial spraying in the early wet season, then send out a contractor to do follow-up ground control before the plants seed and as new seedlings germinate in the early dry season.”

Michael adds that follow up control is crucial to break the seed cycle. “The VCL program on the Adelaide River has been very successful because it has been coordinated and well timed. Timing is everything when it comes to controlling mimosa.”

Local contractor Geoff Baker describes how his team goes in on the ground to foliar spray seedlings once the Weeds Branch have carried out aerial spraying and cleared the dead mimosa. “We use Brushoff® which is relatively economical but we’ve found Starane® is much more effective. We also use Graslan® for isolated infestations early in the wet season and record waypoints of larger infestations to target for aerial spraying. We have found soil-applied herbicide to be very effective and quicker than foliar spray and can be used when plants are not actively growing.”

Geoff says he has noticed wildlife returning to the area after mimosa control. “The billabongs have come back to life where we have been concentrating control efforts near Marrakai Crossing. Three years ago the water was stagnant and slimy – now that the mimosa has gone, the billabongs are full of water lilies, ducks, waterbirds and fish.”

This billabong at Marrakai Crossing has come back to life just 12 months after the mimosa infestation choking its banks was treated.
New technology may help clear up wetlands

A problem for managers is removing the dead mimosa material following herbicide treatment, to make way for follow up control. “Access to seedlings is difficult with the dead stick there – we need to get rid of it so the contractors can get in for ground control.”

The standard method is to use bulldozers to either chain and windrow or pile up the dead mimosa and burn it. Now a unique machine which mulches dead mimosa on site is currently being trialled by the Weeds Branch in the Adelaide River region to find out how it weighs up against other methods of mechanical control.

Regional Weeds Officer Michael Schmid says, depending on how much it costs, the new technology looks promising. “The main advantage is that we don’t have to burn, which reduces carbon emissions, returns the organic matter to the soil and means the area is less vulnerable to erosion. Other advantages are that the mulcher is easy to clean and allows you to leave native trees standing. However, further investigation is required to determine how the costs compare to other methods. If it is very expensive, mulching may not be viable, particularly for large areas.”
5.1 What prickle bush is that?

(Source: Biosecurity Queensland (2007) Fact Sheet: Identification of Prickle Bushes, Queensland Department of Primary Industries and Fisheries)

<table>
<thead>
<tr>
<th></th>
<th>Prickly Acacia (Acacia nilotica)</th>
<th>Mesquite (Prosopis spp.)</th>
<th>Parkinsonia (Parkinsonia aculeata)</th>
<th>Mimosa Bush (Acacia farnesiana)</th>
<th>Mimosa (Mimosa pigra)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Photo</strong></td>
<td><img src="image1" alt="Image" /></td>
<td><img src="image2" alt="Image" /></td>
<td><img src="image3" alt="Image" /></td>
<td><img src="image4" alt="Image" /></td>
<td><img src="image5" alt="Image" /></td>
</tr>
<tr>
<td><strong>Pod shape</strong></td>
<td>Up to 23cm, long with constrictions between seeds</td>
<td>Up to 20cm long, slight constrictions between seeds; straight or slightly curved</td>
<td>Up to 10cm long, long thin constrictions between seeds; straight</td>
<td>Cigar-shaped, up to 6cm long and slightly curved</td>
<td>3-8cm long, one seeded, bristled segments which fall away from the pod leaving a skeletal outline</td>
</tr>
<tr>
<td><strong>Flowers</strong></td>
<td>Ball-shaped, golden yellow, about 1cm across</td>
<td>Greenish-cream flower spike 5-8cm long and cylindrical in shape</td>
<td>5 petals mainly yellow except one which has an orange spot</td>
<td>Ball-shaped, golden yellow, about 1cm across</td>
<td>Round, fluffy, pink or mauve balls, 1-2cm across</td>
</tr>
<tr>
<td><strong>Pod colour, hairs</strong></td>
<td>Blue-grey, fine hairs</td>
<td>Straw coloured, sometimes purple; no hairs</td>
<td>Straw coloured pod; no hairs</td>
<td>Brown to black; no hairs</td>
<td>Brown when mature; covered in dense bristles</td>
</tr>
<tr>
<td><strong>Leaves</strong></td>
<td>Leaves fernlike; 4 to 10 pairs of leaves, often overlapping</td>
<td>Leaves fernlike; 1 to 3 pairs of leaves, often with a gap between leaves</td>
<td>Leaves with long flattened leaf stalk with tiny oblong leaflets along each side</td>
<td>Leaves fernlike; 2 to 4 pairs of leaves with a gap between leaves</td>
<td>Central leaf stalk is prickly, 20-25cm long. Each leaf contains about 15 opposite segments 5cm long</td>
</tr>
<tr>
<td><strong>Leaflets</strong></td>
<td>10 to 25 pairs or leaflets</td>
<td>10 to 14 pairs or leaflets</td>
<td>-</td>
<td>8 to 18 pairs of leaflets</td>
<td>Leaf segments are divided into pairs or leaflets which fold when touched.</td>
</tr>
<tr>
<td><strong>Tree shape</strong></td>
<td>Spreading tree to 10m tall</td>
<td>Variable shape, usually a spreading tree to 15m tall</td>
<td>Small tree or shrub usually to 5m tall</td>
<td>Usually rounded shrub to 3m tall</td>
<td>Multi-branched shrub to 5-6m</td>
</tr>
<tr>
<td><strong>Bark</strong></td>
<td>Bark on saplings has tinge of orange and/or green. Mature trees have dark rough bark</td>
<td>Bark rough, grey; smooth dark red or green on small branches</td>
<td>Bark smooth and green, straw coloured and lightly textured at base of older trees</td>
<td>Bark grey with prominent white spots</td>
<td>Stems are green at first, becoming woody, initially covered with thick hairs</td>
</tr>
<tr>
<td><strong>Branch shape</strong></td>
<td>Branches more or less straight</td>
<td>Branches zigzag shaped</td>
<td>Branches slightly zigzagged</td>
<td>Branches zigzag shaped</td>
<td>Branches more or less straight</td>
</tr>
</tbody>
</table>
5.2 National legislative status of mimosa

**NT** – Class A & C or Class B & C depending on location under the *Weeds Management Act*. A=to be eradicated south of 14°S latitude, B=spread to be controlled north of 14°S latitude and C=not to be introduced to the Territory.

**QLD** – Class 1 plant under the *Land Protection (Pest and Stock Route Management) Act 2002*.

**WA** – P1 and P2 state wide under the *Agricultural and Related Resources Protection Act 1976* prohibits movement and aims to eradicate.

**NSW** – Class 1 State Prohibited Weed under the *Noxious Weeds Act 1993* aims to eradicate any incursions. Class 1 are also notifiable weeds.

**SA** – Class 1 under the *Natural Resource Management Act 2004*.

**VIC** – State Prohibited Weed under the *Catchment and Land Protection Act 1994*.

**TAS** – Declared plant (prohibited) under the *Weed Management Act 1999*.

**ACT** - Category 4 (Prohibited pest plant, propagation and supply prohibited) under the *Pest Plants and Animal Act 2005*.

Although it is the responsibility of each jurisdiction (Australian Government, State and Territory Governments) to administer their respective legislation, it is the responsibility of every land manager or individual to be aware of legislation that may impact upon them, and to act in accordance with this legislation.

5.2.1 Australian Government

*Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)*


*Quarantine Act 1908*: www.daff.gov.au/aqis/quarantine/legislation/quarantine administered by the Australian Government Department of Agriculture, Fisheries and Forestry, enables the Australian Quarantine and Inspection Service to physically prevent the introduction of weeds through the inspection of incoming luggage, cargo, mail, animals and plants and their products.

*Biological Control Act 1984*: http://www.austlii.edu.au/au/legis/cth/consol_act/bca1984186/enables a weed to be declared a target for biological control, or a weed control agent to be identified.

Under the Australian Constitution, responsibility for the use and management of land rests primarily with the states and territories. Each State and Territory has legislation covering the control of some serious (noxious) weeds and the movement of weeds and weed seeds, including crop seeds and stock feed. The legislation empowers governments to compel landholders and occupiers to control certain weeds and to prevent their movement and spread.

The acute or immediate toxicity of herbicide is required by law to be communicated in the Poisons Schedule (or poison warnings) which appear on the label of a product. Herbicides are classified into four categories on the basis of their potential toxicity to the user. The Poison Schedule will largely determine the safety directions and first aid instructions that appear on the label.

### Poisons schedule

<table>
<thead>
<tr>
<th>Poison schedule</th>
<th>Toxicity</th>
<th>Signal heading</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unscheduled</td>
<td>Very low toxicity</td>
<td>No heading required</td>
</tr>
<tr>
<td>Schedule 5</td>
<td>Slightly toxic</td>
<td>Caution</td>
</tr>
<tr>
<td>Schedule 6</td>
<td>Moderately toxic</td>
<td>Poison</td>
</tr>
<tr>
<td>Schedule 7</td>
<td>Dangerous</td>
<td>Highly toxic poison</td>
</tr>
</tbody>
</table>
5.2.2 Northern Territory
Northern Territory Department of Natural Resources, Environment, The Arts and Sport: www.nt.gov.au/nretas

The links below provide a summary of the weed management information for the Northern Territory.
• Weeds Management Act
• Weeds Management Regulations
• Territory Parks and Wildlife Conservation Act
• Fisheries Act
• Agricultural and Veterinary Chemicals (Control of Use) Act

Weed prevention
Both owners and occupiers of land are required to take all reasonable measures to prevent their land being infested with a declared weed.

Spread prevention
All land users are required to prevent the spread of a declared or potential weed. This requirement applies on and off your own property.

Advising of outbreaks
Where a declared weed is identified in an area that it has previously not been found, the person responsible for the land has 14 days to notify the Weed Management Branch (NRETAS) of its presence – see contact details on page 3.

Weed disposal
It is illegal to transport declared weeds. You should dispose of any weed material on site. Burning will destroy vegetative plant material and also render most seeds unviable. As some hard coated seeds may survive, on-site deep burial may also be required. On site burial of seeds, and/or plant material, is an effective option if material is placed at a depth sufficient to prevent emergence of vegetative shoots or seedlings.

Burning
Burning is not permitted within a fire protection zone without a permit. Any management incorporating burning should be in accordance with the Bushfires Act. Please phone the Bushfires Council on 8922 0844 or 8976 0098 with any fire management/planning enquiries.

Compliance with a Weed Management Plan
The owner and occupier of land on which a declared weed or potential weed is present must comply with a weed management plan relating to the weed. For example if you have mimosa on your property you must comply with relevant aspects of the plan.

Monitoring by government officials
The Minister may appoint a Weed Management Officer or authorised person (‘Officers’), who is empowered to investigate suspected breaches of the Act. Officers have a number of powers under the Act, including entering and searching properties, documenting findings and, if necessary, ordering the owner or occupier of the land to control or eradicate declared or potential weeds. They are also able to order the owner or person in control of vehicle, boat or animal to remove or destroy any weed material.

Can I be fined?
An individual who is found guilty of non-compliance with the Act may be subject to a penalty of between $5,000 and $50,000. A body corporate may be fined between $25,000 and $250,000. On-the-spot fines of up to $200 for an individual or $1000 for a body corporate may also be issued.

Weed Management Branch contact details
Darwin Ph: 08 8999 4567
Fax: 08 8999 4445

Biological Control Unit Ph: 08 8999 2327
Fax: 08 8999 2015

Katherine Ph: 08 8973 8107
Fax: 08 8973 8122

Timber Creek Ph: 08 8975 0307
Fax: 08 8975 0319

Borroloola Ph: 08 8975 8752
Fax: 08 8975 8752

Email: weedinfo.nretas@nt.gov.au
Website: www.nt.gov.au/weeds/

If you suspect poisoning, please contact the Poisons Information Centre
Emergency phone 131 126 (24-hour)
5.2.3 Queensland

The links below provide a summary of the weed management information for Queensland.

**Relevant agencies**
- Queensland Department of Natural Resources and Water: www.nrw.qld.gov.au
- Queensland Environmental Protection Agency: www.epa.qld.gov.au
- Department of Primary Industries and Fisheries: 13 25 23.
  www.dpi.qld.gov.au

**Relevant legislation**
- Land Protection (Pest and Stock Route Management) Act 2002
- Local Government Act 1993
- Land Act 1994
- Nature Conservation Act 1992
- Forestry Act 1959
  www.legislation.qld.gov.au

**Use of agricultural chemicals**

**Agricultural Chemical User's Manual**

**Mapping and surveying**
www.nrw.qld.gov.au/mapping

It is an offence to sell mimosa and it must be controlled where found. It is also an offence to introduce, keep, or supply or transport this plant without a permit issued by the Department of Primary Industries and Fisheries, attracting fines of up to $60 000.

If you have seen mimosa please contact your local Council Pest Management/ Environmental Officer or your local Department of Primary Industries and Fisheries Land Protection Officer on 13 25 23.

5.2.4 Western Australia

The links below provide a summary of the weed management information for Western Australia.

**Relevant agencies**
- Western Australia Department of Agriculture and Food: www.agric.wa.gov.au
- Western Australia Department of Environment and Conservation: www.naturebase.net
- Western Australian Quarantine and Inspection Service: www.agric.wa.gov.au/quarantine
- Agline: Phone 1300 725 572

**Relevant legislation**
- Agricultural and Related Resources Protection Act 1976
- Plant Diseases Act 1989
- Conservation and Land Management Act 1984
  www.slp.wa.gov.au

**Declared plants of WA: Giant sensitive plant (Mimosa pigra)**
Category: P1, P2
Location: for the whole of the State

Control Codes and Landholder Obligations

**P1 REQUIREMENTS**

*Prohibits movement*

The movement of plants or their seeds is prohibited within the State.
This prohibits the movement of contaminated machinery and produce including livestock and fodder.

**P2 REQUIREMENTS**

*Aim is to eradicate infestation*

Treat all plants to destroy and prevent propagation each year until no plants remain. The infested area must be managed in such a way that prevents the spread of seed or plant parts on or in livestock, fodder, grain, vehicles and/or machinery.

**Relevant herbicide information for Mimosa pigra**
5.3 Resources

Australian Pesticides and Veterinary Medicines Authority: www.apvma.gov.au/index.asp
Charles Darwin University: www.cdu.edu.au
Savannas Explorer: www.savanna.org.au
North Australian Land Manager: www.landmanager.org.au
Northern Land Council: www.nlc.org.au
North Australian Fire Information: www.firenorth.org.au
Tropical Savannas CRC: www.savanna.cdu.au

5.4 References


13. National Registration Authority for Agricultural and Veterinary Chemicals (2001). *What’s behind the label of that farm chemical you’re about to use?* : National Registration Authority.


5.5 Biocontrol agent identikit

Stem-boring moth
(Carmenta mimosa)

**Identification:** Adults have a black body with cream/white stripes. Wings are clear with black veins and black edges. The adults look like wasps.

**Effects:** Caterpillars feed inside the stems. This can make branches die or break off, or just make the plant too sick to produce many seeds.

**First released:** 1989  
**Current situation:** Carmenta is found on most mimosa infestations throughout the Top End. It is the most effective agent we have against mimosa.

Leaf and tip-boring moth
(Neurostrota gunniella)

**Identification:** Tiny brown moth with a white stripe down its back.

**Effects:** Young caterpillars feed inside the leaves. When they grow bigger, they feed inside the thin green stems. This makes stems and young plants grow more slowly.

**First released:** 1989  
**Current situation:** This moth is on nearly every mimosa plant in the Northern Territory.

Root, seed and leaf-feeding beetle
(Malacorhinus irregularis)

**Identification:** Small, shiny, bright orange beetle with black patches on its wings.

**Effects:** Adults eat leaves and seedlings. The larvae live in the soil and eat seeds, roots, seedlings and root nodules. This leads to fewer seedlings.

**First released:** 2000  
**Current situation:** This beetle is widely established and, at times, causes severe damage to the mimosa.

Leaf-feeding moth
(Macaria pallidata)

**Identification:** Small creamy coloured moth with brown spots and markings on its wings. The caterpillars are brown or green.

**Effects:** The caterpillars feed on the leaves of mimosa. In large numbers they can completely defoliate a stand of mimosa. This leads to less seed being produced and the reduced canopy cover allows fire to penetrate further into a mimosa infestation.

**First released:** 2002  
**Current situation:** Macaria are well established on the Mary, Finniss and Adelaide River Catchments and caused almost complete defoliation of patches of mimosa on the Mary River in early 2007.
5. FURTHER INFORMATION

**Leaf-feeding moth**  
(*Leuciris fimbriaria*)

**Identification:** Small white moth with gold edging around the wings. The larvae are bright green with long white stripes.

**Effects:** This insect is similar to macaria as the larvae eat the leaves of the mimosa.

**First released:** 2004  
**Current situation:** There has been no sign that this moth has established although it was released in large numbers. Please contact Biocontrol if you see this moth.

**Root, seedling and leaf-feeding beetle**  
(*Nesaecrepida infuscata*) commonly referred to as the Mimosa flea beetle

**Identification:** Tiny golden-brown beetle about 2mm long.

**Effects:** This insect is similar to Malacorhinus. The adults feed on the leaves and the larvae feed on the roots and seedlings of mimosa.

**First released:** 2007  
**Current situation:** Biocontrol officers are still rearing and releasing this insect.

**Native Insects**

There are several native Australian insects that attack mimosa. The two most common and damaging are:

- Stem boring moth (*Maroga setiotricha*)
- Stem girdling beetle (*Platyomopsis* sp.)