

# Mimosa management a case study – Melaleuca Station

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## Abstract

This paper describes the activities carried out to manage mimosa, *Mimosa pigra* L., on Melaleuca Station, Mary River region, Northern Territory, and progress so far. The property is 300 km<sup>2</sup>, 60% of which is seasonally inundated, and it initially had 10,000 ha of mimosa. A large-scale control program began in 1996 to tackle the problem in a systematic and strategic way. The long-term objectives have been to regain productive grazing lands and reduce mimosa to a manageable level. Significant progress has been made.

**Keywords:** *Mimosa pigra*, property management, weed strategy, revegetation.

## Site description

Melaleuca Station is located in the Mary River region, approximately 200 km east of Darwin in the Northern Territory (NT), Australia. It is owned by Paspaley Pearls Properties, managed for cattle production and used as a company retreat for directors and guests. The property is 300 km<sup>2</sup>, 60% of which is seasonally inundated floodplain. The Mary River flows through Melaleuca Station. This river has no mouth as it breaks up into a series of creeks and billabongs that make up the Mary River floodplains. These creek systems are a combination of salt- and freshwater, with the major creeks being salt. Most have barrages constructed across them to stop saltwater contaminating the freshwater systems. During the wet season, the whole system floods, the river is then up to 40 km wide. In the dry season, these waterways are only a few metres, and up to 50 metres, wide. The floodplain is mainly open grassland that is broken up by areas of Melaleuca forests.

## Background

Melaleuca Station was subdivided from Point Stuart Station in the early 1980s for buffalo grazing. At that time, a small infestation of mimosa, *Mimosa pigra* L., was established on the property, but little control was undertaken. Two men hand-spraying mimosa a few days per year would have controlled all mimosa on Melaleuca station at that time. In 1993, when the property was bought by Paspaley Pearls Properties, almost 33% or 10,000 ha, were infested by mimosa. At that time, the NT Government took initiatives to control mimosa on navigable channels in the lower Mary River, including clearing 2,000 ha of mimosa on Melaleuca Station.

I became manager of Melaleuca Station in 1995. Previously, I had spent five years on the nearby Opium Creek Station, and gained some initial experience with mimosa control. Faced with restricted cattle-carrying capacity on the floodplain due to the remaining 8,000 ha of mimosa and still needing to control regrowth on the 2,000 ha cleared by the government, it was decided to tackle the problem in a systematic and strategic way. A proposal gained the support of the station owners, and a large-scale mimosa control program began on Melaleuca Station in 1996.

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## Control program

### Long-term objective

The long-term objective of the program on Melaleuca Station is to clear the mimosa infestation as far as possible and regain productive land, in this case, for cattle production and environmental reasons. The goal is not necessarily to completely eradicate mimosa, as acceptable cattle production may be achieved even if some small, manageable amount of mimosa remains.

In the early stages of the program, the aim was to return the entire area of infested land to cattle production in five years. Over time, it became clear that there was a need for regular maintenance to keep cleared areas free of mimosa and this placed budgetary and time constraints on progress. It is now anticipated that it may take up to 15 years to return the entire 10,000 ha of affected land to full production.

### Program overview

In the first year of the program, a 100 m chained perimeter was established around the entire infestation to help limit spread of the weed. This was done by pulling a heavy chain across the land with two bulldozers to knock over all vegetation, which was burnt later. An initial 1,000 ha of mimosa was cleared.

In the second year, regrowth in the initial 1,000 ha was controlled and a further 500 ha cleared. The following year, regrowth had to be controlled in that 1,500 ha plus the 2,000 ha originally cleared by the government, so budgetary constraints dictated that only a further 200 ha of mimosa could be cleared. By the fifth year of the program, resources could afford only to maintain the cleared areas (spraying with herbicide to kill regrowth) and no funds remained for clearing mimosa from new areas. However, in 2001 the 2,000 ha plot cleared in 1995 was now productive grazing land, with slightly reduced maintenance costs. Consequently, the extra funds generated by cattle production on this area will enable a further 600 ha of mimosa to be cleared. The program budget, which remains at A\$250,000 per year, will be used to contain mimosa regrowth in the more recently cleared areas.

As maintenance control (controlling regrowth) costs slowly reduce over time, the program will evolve towards increased operations to control other mimosa areas. This will be done using vehicles, horses, quad bikes and minimum use of helicopters. The methods used will depend on the conditions and the density of the mimosa regrowth. Large areas will be sprayed using a spray unit on a vehicle. Wet areas will be treated

using a four-wheel motorbike, and horses will be used in areas where the native vegetation is too thick for any other method.

### Costs and resources

In addition to the manager, there are four full-time staff working on Melaleuca Station. Two men work together on the mimosa control program at any given time. The control program has a budget of A\$250,000 per year, including a government subsidy.

The equipment used in the mimosa program includes the following:

- four-wheel drive vehicles, four-wheel utility vehicles (quad-bikes), motorbikes and horses, which are used for hand-spraying mimosa regrowth and patrolling boundaries
- vehicle-mounted spray units and backpack spray units etc. are used for herbicide application
- prototype planting machines are used for distributing pasture seeds and planting pasture runners of, for example, the native grass *Hymenachne acutigluma* (Steud.), which is very good at suppressing mimosa germination
- aerial spraying of large areas of mimosa currently involves the use of three helicopters that are hired. One is used for spot spraying, the second operates close to the watering/loading point on a 10-minute reload cycle, and the third has a higher capacity and range, and operates over more distant plots.

### Control methods

The control regime for mimosa on Melaleuca Station involves the following steps.

- The infestation is tackled one plot at a time, beginning upstream, and the plot to be cleared is selected one year in advance. In the early wet season (December), the plot boundary is sprayed to create a 100 m perimeter of dead mimosa plants.
- In the late dry season (October) of the following year, the plot perimeter is chained and sprayed again, and all woody debris is stick-raked up against the green mimosa plants on the inside of the perimeter. The plot is then burnt, using Sure Fire as an accelerant. The middle of the plot is set alight first, using a helicopter, and then the boundaries are lit so the fire draws inwards. If it is a very hot fire, there will be very little regrowth afterwards. If it is a cool fire, there is likely to be more regrowth, which will then require herbicide treatment. The temperature, and hence effectiveness of the fire, depends greatly on the climatic conditions. A hot fire is achieved on a

very hot, windy day with winds of at least 30 km hr<sup>-1</sup>, air temperature of 35°C or more, and humidity less than 25%. A plot will burn unevenly, with some areas hotter than others.

- Floods arrive in the early wet season (December–January) and inundate the new seedlings, killing many of them.
- In the mid to late dry season (July–August) of the following year, when the floodplain is dry again, the entire plot is chained.
- A few months later in December, the young mimosa plants are sprayed. Large areas are sprayed using helicopters, taking care that no plants are missed. Some assisted revegetation of floodplain grasses can begin at this time, e.g. early in the wet season, when the first storms occur, but it is not the optimum time. Often the grass cannot establish itself before it is inundated by floodwaters and much of it may be washed away or drowned.
- The next year, almost two years after the fire, the main revegetation work begins (dispersal of seeds or planting of runners) as floodwaters recede (July–August). The grasses then have time to establish, particularly in floodplain channels that remain moist, before the next wet season arrives.
- After floodwaters have receded and the floodplain dries out, the vast amount of woody material remaining on the “clean” plot is piled up using a tractor-drawn stick-rake and burnt.
- Plots are then maintained clear of mimosa by spraying with herbicide. Spraying is conducted in the early years by helicopter and later by hand as fewer plants regenerate. In the sixth year of treatment, the plot is lightly grazed (one beast to two ha) in the dry season. Attention is paid to any regrowth areas of mimosa, but the plot is essentially now clear of the weed.
- The remaining area of the original infestation is patrolled regularly and young mimosa plants growing outside the main infestation are sprayed by hand to help reduce spread.

### Chemicals used

Sure Fire is used as an accelerant used when burning mimosa plots. Metsulfuron is the herbicide used for bulk spraying, e.g. aerial spraying large areas. Tebuthiuron (purchased as Graslan) in pellet form, is the most convenient herbicide for “mopping up” low-density regrowth by hand. It is not used for aerial spraying, as it kills germinating grass and slows revegetation efforts. Fluroxypyr (purchased as Starane) is also used for spot spraying. Herbicides are applied only to

seedlings on Melaleuca Station, not on mature plants. As all recommendations for herbicide rates on mimosa applied only to “old-growth” plants, several trials have been conducted in conjunction with chemical companies to determine the optimum herbicide rate for mimosa regrowth. The trials indicate that mimosa regrowth can be effectively controlled/killed with rates that are 50% of label rates. This greatly reduces the amount of herbicide applied to the floodplain, and therefore minimises costs and possible contamination of waterways. The on-label instructions for application of the herbicides are also carefully followed in order to maximise their effectiveness. For example, no spraying is conducted when the ambient temperature is over 33°C.

### Revegetation after control

The biggest problems encountered in this control program relate to revegetation. There are currently vast areas of floodplain on Melaleuca Station that have no remaining native seed bank after 10 to 20 years of mimosa infestation. Despite building various prototype, planting machines, we have not yet managed to develop an economical method to obtain enough seed of suitable species and plant them over large areas. At present, water is used to distribute seed, by planting grasses in the floodplain channels when floodwaters are receding and allowing them to establish prior to the following wet season, when flooding helps them distribute their seed across the floodplain. This is a slow process, however, and means that grasses and other floodplain plants are not present to help hinder regrowth of mimosa seedlings in the first few years after clearance.

Introduced pasture grasses *Hymenachne amplexicaulis* cv. ‘Olive’ (Rudge) Nees, (olive hymenachne), of which new plantings are now no longer recommended due to its weedy potential, *Urochloa mutica* (Forssk.) (Para grass) and *Echinochloa polystachya* (Kunth) Hitch. (Alemen or German grass) are the preferred species for revegetation. The native *H. acutigluma* grass would be used in preference if enough seed were readily available.

Another problem is that although thick grass growth on the floodplain successfully stunts the growth of mimosa seedlings, this can result in plants being fully mature and already seeding when they first appear above the grass mat. Ideally, revegetation of thick grass cover would be achieved earlier in the control program, immediately following clearance of the adult plants, thus preventing many mimosa seeds from germinating.

## Effectiveness of the control program

To monitor progress, the infestation on Melaleuca Station is mapped each year using a helicopter-mounted global positioning system. It is worth noting that no significant spread of mimosa from the main infestation has been observed since 1995. Spread has largely been contained by maintenance of the 100 m perimeter around the infestation. Where spread has occurred, it is mainly along the high-tide mark of the river, where water has carried the seed and dumped it on the river-banks.

After mimosa is cleared from the floodplain, the floodplain goes through a series of changes as it changes back to productive land. These are natural changes with vegetation colonising their own niche areas. First, a range of sedges appears. These are both shallow and deep-water varieties which are followed by a range of reeds, water-loving annuals. The next stage is native grass annuals inter-mixed with the reeds. This is then followed by native perennials with a combination of all the above.

## Lessons learnt

The key principles of mimosa control to emerge from this program include:

- clear only as much area as you can manage in subsequent years
- operate within your budget of finance, labour and resources
- pay attention to the climatic conditions in order to maximise spraying effectiveness and burning effectiveness
- be prepared for a long time frame to achieve results and have ways to measure progress

- use the natural environment to help, such as floods that kill regrowth and spread grass seed
- use seasonality to best affect in the timing of control activities
- spraying efficiency improves with experience.

## Future research needed

It would be useful to find an insect that eats enough mimosa seeds or flowers to help control the spread of the plants. Then the land could be used for cattle production, and an occasional aerial spray would be sufficient to maintain mimosa at a manageable level. The NT Government and CSIRO are currently researching biological control of mimosa, supported by the Australian Government.

Revegetation remains a key problem. Now that olive hymenachne is regarded as a serious weed, it is vital that greater resources are channelled towards finding new methods of harvesting and planting suitable grass species.

## Essential support for the program

Without the support of the NT Government's mimosa subsidy scheme, the control program on Melaleuca Station would have been much smaller and less effective. Support by the Directors of the company that owns Melaleuca Station is also essential for the program. With virtually nil economic return in the early years, the Directors showed a great deal of faith in the proposals presented and allowed experimentation with unconventional techniques to develop useful methods which now form the basis of the control program. On-ground, the program has relied on the enthusiasm and commitment of management to sustain and integrate control efforts over time.