

Management Plan for the control of *Mimosa pigra* Ivanhoe Station



SUMMARY

An outbreak of mimosa (*Mimosa pigra*) was detected on Ivanhoe Station during a Parkinsonia control workshop held by the WoNS Prickle Bush Coordinator and the Department of Agriculture and Food (DAFWA) Kununurra 6 November 2009 and is located at the Old Station Lagoon close to Ivanhoe Crossing.

The outbreak consists of nine distinct stands covering an area of approximately 1 ha. The source of the infestation is unlikely to be determined; however, it is thought that infested stock or machinery may be involved, in particular:

- Movement of horses from NT into the station area, or
- Use of the area for a military (Army) bivouac location.

From an incident meeting held by the DAFWA staff advise that -

- This is a small, localised infestation that can be eradicated from Western Australia consistent with the national Mimosa Management Strategy.
- Suitable management strategies can be implemented that will destroy the existing plants and manage any seedling recruitment.
- Movement off site by grazing animals can be managed by fencing and preventing further seed production.
- The location of the site is not conducive to natural movement of seeds however native animals and flooding still pose a risk.
- Herbicide treatment to existing plants to prevent seeding and ongoing treatment to subsequent germinations is the most appropriate control method
- Ivanhoe Station and DAFWA have the resources to control the infestation.

Based on these observations a management plan has been developed for the next 10 years that if implemented should result in the eradication of mimosa from Western Australia.

PURPOSE: To identify the management options available for the eradication of *Mimosa pigra* on Ivanhoe Station.

INTRODUCTION: Mimosa is a prickly woody invasive large shrub or small tree that creates dense impenetrable and extensive infestations that replace native vegetation – especially in wetlands - impacting both on the grazing industry and destroying native plant and animal communities. In the Northern Territory more than 140,000 hectares are now affected by this weed and a small infestation is located near Proserpine in Queensland.

In WA mimosa is ‘Declared’ as a P1, P2 species, to be eradicated. Prior to this discovery this weed was not known to occur in this State. It is a Weed of National Significance, with a national management strategy and subject to national coordination. The national coordinator for mimosa is Kay Bailey, who is based in Northern Territory.

MANAGEMENT OF THE IVANHOE MIMOSA INFESTATION

Timeline

The eradication of mimosa will require a long term approach with initial treatment to control existing plants, fencing to control stock movement, prevention of reproduction to prevent seed spread, and repeated inspection of the infested area to ensure that the seed bank is depleted and new germinations are destroyed.

The long term cooperation of the property owner and a commitment to assisting with the financial and physical resources from the Kimberly ZCA, with assistance from DAFWA, will be essential if this weed is to be eradicated.

Additionally Ord Land and Water (OLW) has secured funding for three years control and surveillance work through Rangelands WA and Caring For Our Country.

This management plan:

- Details the management options available for the property,
- Identifies the most suitable management options,
- Recommends an eradication program based on integrated pest management.

Resources required

Anticipated resources include the purchase or hire of the following equipment.

- Fencing equipment.
- Herbicide.
- Spraying equipment.
- Aerial surveillance – plane / helicopter
- Human resources.

Inspection

- Initial inspection by OLW, DAFWA staff and station personnel at key periods.
- Surveillance of high risk areas such as creek-lines, river systems and semi permanent / permanent water in adjacent areas (~5 km).
- Frequent treatment by contractors and/or volunteers (frequency to be determined).
- Yearly audit by DAFWA.

Management options for control of Mimosa

Prevention of spread.

Seeds of mimosa may be spread by:

- Water, through floods and along watercourses
- Animals, such as kangaroos and livestock
- Humans through clothing or vehicle / machinery movement.

Fencing the site will provide control of livestock and act as a deterrent for native animals. The physical barrier will prevent accidental movement via vehicles and machinery and will assist with restricting access to the location.

Signage is probably not required at this location, because of the remote location and low risk of public access.

The size of the fenced off area will be determined by DAFWA staff in conjunction with the station owner/manager. The fence should be a minimum of several meters from the edge of the infestation to prevent stock and people from having access to overhanging bushes/seeds, and to allow for easy access within the fenced area during eradication measures and monitoring. Surveillance and monitoring should be carried out beyond the fenced area, to allow discovery of any unfenced plants and seedlings.

Surveillance

Aerial survey using helicopter should be conducted in any area that is downstream of the infestation and may have been covered with flood waters in the last four years.

Surveillance technique recommended is 500m grids at approximately 200 feet and around 100km/hr. If trying to survey through thick canopy the grids may be reduced.

Suggested areas for aerial survey to be conducted include all known waterholes, dams and water courses where water lays for much of the year downstream of the infestation on Carlton Hill and Ivanhoe Stations until areas of high salinity are reached

A ground survey should be carried out focusing on all high risk water courses, river systems, dams and billabongs within 5 km of the infestation particularly to maximum flood height set in the past four years.

Seed bank control

Exhaustion of the seed bank is essential in order to achieve eradication. The aim is to stimulate as much residual mimosa seed as possible to germinate in the first two years of control, without letting any seedlings reach maturity. Soil disturbance such as harrowing would be suitable to stimulate seedling germination, fire is another option but plant sparsity may not allow this technique to be effective.

The review of the biology of mimosa in *The Biology of Australian Weeds* p169 – 188 by Lonsdale *et al.* (1995) provides the following information.

The maximum number of seeds produced by a *Mimosa pigra* plant has been recorded as 220,000 seeds per year, however it is preferable to speak in terms of production per unit area of canopy at 9103 seeds per m² per year

Seed dormancy has been recorded as 5 years in the laboratory and may be up to 23 years in sandy soils.

It is possible to get a flush of germinations at the start of the wet season following fire.

Monitoring must be continued at the infestation site longer than the known seed longevity to ensure that the seed bank is exhausted, and that no further germinations occur.

Non-chemical control – Mechanical, grazing, cultural etc.

The following control options have been considered for this size infestation and location. Not all are suitable, as indicated below.

a) Mechanical clearing – Not suitable in this situation

b) Grazing– Not suitable in this situation

c) Fire – **suitable but not recommended alone. To be used with herbicide control.**

- To be used after treatment with herbicide.
- Widespread use of fire as the only management tool to kill existing plants is not suitable at this site; however, if plants were burned after they have died from herbicide treatment, use of fire would be extremely useful to stimulate germination of the seed bank. Access to the site and detection of re-growth and seedlings would also be easier after burning (provided there is no dense re-growth of other plants, e.g. grasses).
- Spreading hay around the base of each of the nine stands after they have been killed by herbicide treatment using around 1 kg of dry hay per m² and burning it would raise the temperature to ~500 degrees for 2-3 minutes, followed by 5-10 minutes of ~250-300 degrees, before the fire burns down to ash.
- The area should then be treated with water to ensure that all burning material is extinguished.

This technique has been used by DAFWA staff in trials on other declared plants in WA and has proved effective in soil seed bank stimulation. (A Reeves, *pers. obs.*)

d) Cultural controls – Not suitable in this situation

e) Biological control – Not suitable in this situation

Chemical control - Herbicides

In this situation the use of herbicides would provide the most effective control of the existing plants. The plants need to be growing actively to absorb herbicide. Aerial spraying is not suitable in this situation but ground application is suitable and recommended, as follows:

Chemical	Rate	Comments
Fluroxypyr 200gm/L	300ml/100L	Foliar application when actively growing, apply to run off, use wetting agent.
Fluroxypyr 200gm/L	1:60 diesel	Basal bark or cut stump
Glyphosate 450g/L	Neat	Cut stump application
Hexazinone	50kg/ha or 5g/m ²	Seedlings and small infestations away from sensitive areas. Residual – non selective herbicide
Tebuthiuron	10kg/ha or 1m/m ²	Apply after the onset of early season storms to freshen re-growth, moisten soil and close cracks. Repeated application may be required but prior to the onset of flooding..

The Recommended initial treatment for the Ivanhoe infestation is: a spot spraying, foliar application of fluroxypyr 200g/L at 300ml/100L with appropriate the wetting agent at 500ml/100L. All plants to be sprayed to run off.

Monitoring and reporting

In addition to taking GPS readings, a star steel picket should be used to mark the centre of each clump of plants at Ivanhoe so that the exact location of the plants can be easily identified in future years.

Two aspects of the plant's biology must be taken into account when monitoring the site after eradication treatments have been applied, namely the length of time from germination to seed production, and seed longevity.

Reported measurements of time to flowering and seed production vary, but all indicate a rapid onset of flowering (as little as 2.5 months after germination, but more generally 4-5 months) with pods ripening about 3 months later. Most germination occurs towards the end of the wet season (in NT, April-July) and again around the start of the wet season (October to December), but flushes of germination may follow a fire.

Seed longevity appears to vary with soil type, but in general the seeds are long-lived due to their tough seed coat, lasting several years in the soil. The seed bank may be spent after 10-12 years, but one report – often reported – is of seeds remaining viable in sandy soil for up to 23 years.

Overall, monitoring should be repeated every 6 months to prevent new seedlings producing ripe seeds, and continued for at least 20 years.

REFERENCES:

Boustead, A (2009). *Mimosa pigra* National Best Practice Management Manual. Northern Territory Government.

Lonsdale WM, Miller IL & Forno IW (1995). The Biology of Australian Weeds, *Mimosa pigra* L. Biology of Australian Weeds Vol. 1, pp 169–88. RG & FJ Richardson, Melbourne.

Vitelli JS, Madigan BA & Worsley KJ (2006). *Mimosa pigra* in Queensland. Proc. 16th Aust. Weeds Conference, pp 251-4.

WoNS Weed Management Guide (2003). *Mimosa (Mimosa pigra)*.

Outline of Management Actions for the next 20 years

Year	Action	Timing	Who to do	Comments
Prior to wet season 2009/2010	Fence off infestation	Before wet season	Station owner	Ideally this fence should be able to prevent the entry of native, feral and stock mammals such as wallabies, pigs, horses and cattle.
	Apply herbicides	Before wet season	Station owner, DAFWA	Where possible, basal bark application to large trees and foliar spray small plants.
	Burning of site	After plant death from herbicide	Station owner, DAFWA	After plant death occurs, burn area. If needed, push up dead mimosa into piles in the areas where the main stands are. Use of additional burning material such as hay, sticks may be required. The aim is to burn as much of the surface seed as possible and encourage seedling germination. Experience shows that fire does encourage seedling germination.
	Application of soil herbicide	After burning	Station owner, DAFWA	After burning apply soil herbicide to where mature mimosa trees were present. Repeat the inspections and treatments until the site becomes inaccessible due to flooding.
End of wet season 09/10	Check for re-growth, seedlings	March/April 2010	Station owner, DAFWA	Visual inspection of site
	Treat re-growth and seedlings	March/April 2010	Station owner, DAFWA	Foliar spray if required.
Dry season 2010	Check for re-growth, seedlings	October 2010	Station owner, DAFWA	Visual inspection of site, treat if required
	Burning of site	October 2010	Station owner, DAFWA	A second burn is recommended to encourage seed germination from the seed bank.
	Application of soil herbicide	After burning, October 2010	Station owner, DAFWA, OLW	After burning apply soil herbicide to where mature mimosa trees were present. Repeat the inspections and treatments until the site becomes inaccessible due to flooding.

	Surveillance	Dry season	Station owner, DAFWA, OLW	Recommend ground survey of down-stream areas as resources allow.
End of wet season 10/11	Check for re-growth, seedlings	March/April 2011	Station owner, DAFWA, OLW	Visual inspection of site
	Treat and re-growth and seedlings	March/April 2011	Station owner, DAFWA, OLW	Foliar spray if required.
Dry season 2011	Check for re-growth, seedlings	October 2011	Station owner, DAFWA, OLW	Visual inspection of site, treat if required
	Burning of site		Station owner	Avoid burning this year forward to maintain ground cover to provide competition for any Mimosa seedlings.
	Surveillance	Dry season	Station owner, DAFWA, OLW	Recommend ground survey of down-stream areas as resources allow.
	Application of soil herbicide	Early wet season	Station owner, DAFWA, OLW	Apply soil herbicide to the sites where mature seeding mimosa trees have been present.
End of wet season 2011 / 2012	Check for re-growth, seedlings	March/April 2011	Station owner, DAFWA, OLW	Visual inspection of site
Ongoing Management				
2012 - 2030	Fence maintenance	March/April	Station owner	Ongoing
	Surveillance of site	March/April	Station owner, DAFWA, OLW (until 2013)	Visual inspection of site, be aware that NT has recorded significant germinations /seedling recruitment 15 years after the last recorded Mimosa plant had seeded
	Surveillance of site	October/November	Station owner, DAFWA, OLW (until 2013)	