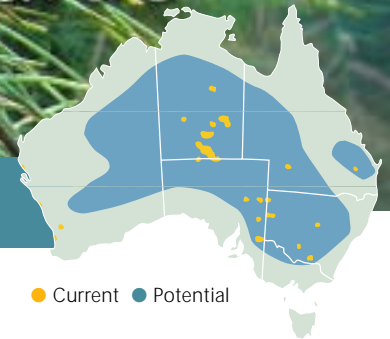


Weed Management Guide

Athel pine or tamarisk –
Tamarix aphylla



Athel pine or tamarisk (*Tamarix aphylla*)

The problem

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

Athel pine affects the pastoral industry by forming dense stands along inland rivers. It consumes water more quickly than native plants, thereby reducing the number and quality of watering holes. It concentrates salt, which is excreted by its leaves. This makes the ground beneath athel pines more salty and excludes native pasture grasses and other salt-sensitive plants. It can change river flow patterns and cause overland flooding and bank erosion.

It is harder and more expensive to muster cattle in athel pine infestations. Because they are drought tolerant and fire resistant, athel pines decrease the frequency of fires and alter vegetation structure. Infestations reduce the cultural and aesthetic value of affected land and may impact on tourism in the region.

There are several other *Tamarix* species, all commonly known as tamarisks, that are weeds in Australia.

The weed

Athel pine is a spreading tree to 15 m with pendulous, jointed branches. Immature trees have light grey trunks and stems. Mature trees have a thick,



Athel pine has infested hundreds of kilometres of the Finke River in central Australia.
Photo: Colin G. Wilson

rough, dark grey to black bark, and grey-brown stems, and can be up to 1 m in diameter. The minute, dull green leaves superficially resemble pine tree 'needles'. However, athel pine is misleadingly named as it is a flowering plant, not closely related to true pine trees (conifers).

Its small flowers are pinkish-white without stalks, growing on 30–40 mm long spikes from the ends of the previous year's branches. The fruit is bell shaped with a hairy tuft, and contains numerous small cylindrical seeds. The seeds have a tuft of fine hairs which assists wind dispersal. The trees have strong woody roots which penetrate and spread deeply throughout the soil.

Key points

- Athel pine, planted for shade, shelter and erosion control throughout arid and semi-arid Australia, can escape cultivation and naturalise, especially around riverine habitats.
- It causes significant environmental and economic damage by using up valuable water resources, hindering mustering, and altering vegetation and river structure.
- New infestations should be prevented because control is difficult and costly.
- Mechanical and chemical methods are the main control options. Care must be taken using either method around waterways.

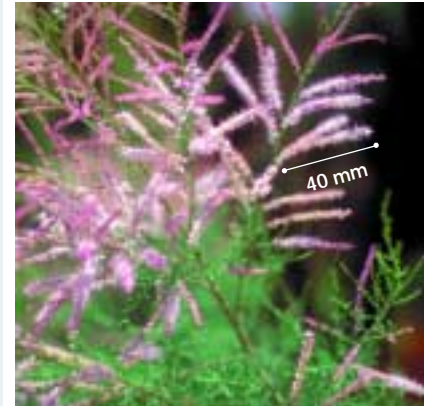


Growth calendar

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

■ General growth pattern

After flowering in summer, athel pine seeds drop in autumn. Germination occurs soon after seed drop. After one year's growth, seedlings are typically 600–1000 mm in height. They continue to grow rapidly, between 2 and 5 m in a year in suitable conditions. Flowering normally takes place in about the third year and continues annually thereafter.



Tamarix ramosissima, or salt cedar, is closely related to athel pine and is similar in appearance. It is known to hybridise with *T. aphylla* in the USA.

Photo: Colin G. Wilson

How it spreads

Athel pine can reproduce by dropping seeds or, more commonly, by revegetation of plant parts. Although athel pine seeds die quickly if not kept moist, they are easily dispersed by both wind and water and may also be spread by animals. A single tree can produce thousands of seeds every year.

Athel pine is classified as a 'sleeper' weed because it was present in Australia for some time before it became weedy. A native of northern Africa and Asia, it was first introduced into Whyalla, South Australia, in 1930 via California. Since

then it has been extensively planted as shade and wind breaks and for erosion control around rural South Australia, New South Wales, Queensland, Western Australia, and the Barkly Tablelands and Alice Springs regions of the Northern Territory.

The worst infestations of athel pine occur along 600 km of the Finke River in Central Australia near Alice Springs. The explosion in its abundance and range is thought to have been caused by large floods in the 1970s and 1980s, which washed seeds and vegetation downstream and provided the moist conditions required for germination.

Its habit of making nearby soil saltier may be assisting its expansion because it thrives in saline conditions.

Other athel pine outbreaks have occurred throughout inland Australia since the 1990s at Starvation Lake and Tilcha Flow (SA), Burnett and Darling Downs regions (Qld) and Menindie Lakes (NSW). Infestations on the Gascoyne and Avon Rivers (WA) have recently been shown to include both athel pine (*Tamarix aphylla*) and another weedy tamarisk species *Tamarix parviflora*.

Where it grows

Athel pine is drought resistant and is well suited to arid and semi-arid rangelands. It is tolerant of saline and alkaline soils and, although it flourishes best in and around rivers, is not restricted to the riverine environment. It has escaped cultivation and become naturalised in all mainland states and territories except Victoria.

Potential distribution

Based on climate, athel pine could potentially infest inland watercourses throughout Australia, including parts of northwestern Victoria. A few infestations exist outside of the projected distribution, perhaps surviving on below-ground water resources.



Flower buds near Carnarvon, WA, in early February.
Photo: John Stretch

Do not confuse athel pine with native she-oaks

Athel pines resemble native she-oaks (*Casuarina* and *Allocasuarina* species), which are found in similar locations. Although both have needle-like 'leaves', they may be distinguished by careful examination of the needles and fruit. The segments of she-oak needles are 5–10 mm long, whereas the segments on athel pine needles are only 1–2 mm long. The hard, woody casuarina fruit resembles a small pine cone, whereas athel pine fruit is tiny and bell shaped. Additionally, athel pine flowers (white–pink, growing at the end of stems) are conspicuous during the summer.



The segments of athel pine needles are only 1–2 mm long.
Photo: Les Tanner

What to do about it

Prevention of spread—plant other species instead

Preventing the further spread of athel pine in Australia is critical to the successful management of this problem. As part of the prevention of spread measures, the planting of athel pine for windbreaks, shade or erosion control is now actively discouraged. Weedy *Tamarix* species should not be imported or further planted, and alternative species should be used. Generally, a native *Casuarina* or *Allocasuarina* species will make a good alternative, especially for windbreaks. However, local councils or state/territory government agencies will be able to provide appropriate advice.



The drooping needles are superficially similar to native *Casuarina* and *Allocasuarina* species.
Photo: John Gavin

Control athel pine near rivers

Athel pine needs to be carefully controlled to ensure that it does not escape cultivation. Its potential to threaten environmental integrity and human interests, especially in the extensive arid and semi-arid parts of Australia, warrants an aggressive management approach.

Athel pine in the upper catchments of rivers are the highest priority for control

Experience clearly indicates that athel pine spreads fastest along waterways, especially when summer flooding aids the downstream dispersal of vegetative material and germination of seeds. Therefore, mature athel pines in the uppermost parts of catchments are the highest priority for eradication. Control can then focus on downstream infestations. The lowest priority for control are mature trees away from water.

Early control efforts

Athel pine was not formally recognised as a weed in Australia until the late 1980s when control attempts first examined its susceptibility to different herbicides and different application techniques. In the mid 1990s mechanical control was attempted on the Finke River, and since then integrated control methods using both mechanical and chemical means have been used to combat the spread of athel pine.

Remove seedlings by hand and mature trees mechanically

Seedlings can be easily removed by hand in sandy ground, and large trees can be removed by ripping and bulldozing, taking care to remove as much of the root system as possible. A large bulldozer is required if the trees are fully grown. If possible the area should be deep ripped to bring any root material to the surface and, where appropriate, a suitable pasture should be sown to outcompete any regrowth of athel pine. Otherwise, care must be taken to reduce the amount of soil covering felled stems and exposed roots as they may re-shoot. Follow-up treatments will be required as some re-shooting is likely. Permits may be required to conduct mechanical control if native species will be affected. Weed control contacts (see table p. 4) will be able to provide relevant advice.

Herbicides may be better suited where erosion is a problem

Herbicides may be used as part of the follow-up to initial mechanical control, and are preferred in sensitive environments (eg riverbanks) where mechanical control may damage non-target species and cause erosion and habitat loss.

Herbicide control generally entails treating each stem separately.

Weed control contacts

State / Territory	Department	Phone	Email	Website
ACT	Environment ACT	(02) 6207 9777	EnvironmentACT@act.gov.au	www.environment.act.gov.au
NSW	NSW Agriculture	1800 680 244	weeds@agric.nsw.gov.au	www.agric.nsw.gov.au
NT	Dept of Infrastructure, Planning and Environment	(08) 8999 5511	weedinfo.ipe@nt.gov.au	www.nt.gov.au
Qld	Dept of Natural Resources and Mines	(07) 3896 3111	enquiries@nrm.qld.gov.au	www.nrm.qld.gov.au
SA	Dept of Water, Land and Biodiversity Conservation	(08) 8303 9500	apc@saugov.sa.gov.au	www.dwlbc.sa.gov.au
Vic	Dept of Primary Industries/Dept of Sustainability and Environment	136 186	customer.service@dpi.vic.gov.au	www.dpi.vic.gov.au www.dse.vic.gov.au
WA	Dept of Agriculture	(08) 9368 3333	enquiries@agric.wa.gov.au	www.agric.wa.gov.au
Australia wide	Australian Pesticides and Veterinary Medicines Authority	(02) 6272 5852	contact@apvma.gov.au	www.apvma.gov.au

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

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

An appropriate registered herbicide can be applied in several different ways. Frilling, where small notches are cut into the bark until the white sapwood is reached and herbicide is injected immediately into the notches, has been used successfully in the Carnarvon area. There should be about 50 mm between notches, and drenching guns or veterinary syringes can be used to deliver herbicide into each notch. An alternative approach with larger stems is the cut-stump technique, where the main stem is cut off by chainsaw and the stump is immediately painted with herbicide. Care must be taken to reach as close to the roots as possible.

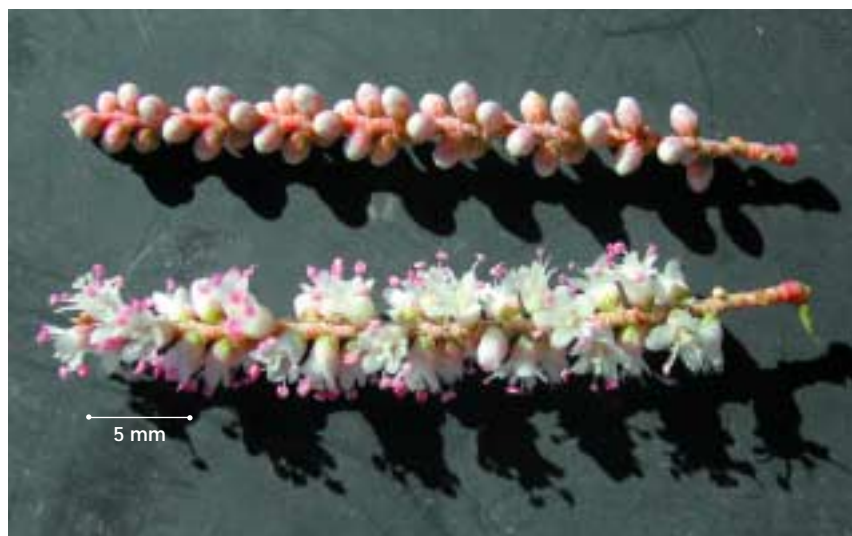
Smaller trees that have not developed rough bark can be treated by the basal bark technique, which involves soaking the circumference of the stem, to a height of 250 mm above soil level, with herbicide to the point of run-off. Very small stems can be snapped or cut, and herbicide applied to the stem. Foliar spray over the entire plant is effective on small trees (less than 2 m). However, the impacts on non-target species (both natives and crops) prevent this method being used in the Carnarvon area.

Other weedy tamarisk species

There are other closely related species, such as *Tamarix parviflora* and *Tamarix ramosissima*, present in Australia that have shown weedy tendencies in New South Wales and Western Australia. These species are considered major pests in the United States and are known to hybridise with athel pine, producing an evergreen hybrid with an extended flowering season. Attention should be also given to these species to ensure future impacts are avoided.

Biological control

Experience in the United States with tamarisks may also help to provide solutions for controlling athel pine in Australia. For example, the US Department of Agriculture has introduced biological control agents against some tamarisk species. Although there are currently no biological control agents being investigated for use in Australia, this option remains a desirable part of any integrated weed management control program.



Flowers and fruit from Bingara, NSW, in February.
Photo: Les Tanner



Athel pine on the Finke River in Central Australia

The Finke River is an ancient river system. It rises in the West Macdonnell Ranges, about 150 km west of Alice Springs, and may reach Lake Eyre during extreme floods. The Finke River only flows irregularly but is nevertheless important from environmental, economic and cultural perspectives. It provides habitat and refuge for a wide range of plants and animals, supports valuable grazing lands and is a significant component of European and Aboriginal cultural heritage.

Athel pine was first planted around homesteads, communities and bores in the region in the 1940s and 1950s as shelter from the sun and wind. However, it was not until the 1970s and 1980s that the true weedy potential of this species was recognised, by which time an infestation had developed along 600 km of the Finke River. This period of sudden and rapid expansion corresponded to several large summer floods, which are thought to have provided the perfect environment for seed germination and establishment.

Following the recognition of the detrimental impacts of athel pine to the environment and economy, it was declared a noxious weed in the Northern Territory in 1988. In 1989 the Northern Territory Government tested the

effectiveness and suitability of different herbicides and application methods on athel pine in the Finke River. Stem injection was found to give a greater percentage of kills than basal bark application.

In March 1994 the mechanical control of athel pine was investigated at Horseshoe Bend Station with a 200 hp bulldozer and a 3 m blade plough. This trial was successful and was followed up by more control work with a larger bulldozer and 4 m blade plough over a 25 km stretch of infestation. Approximately 10–20 % of mature trees survived this treatment, and follow-up mechanical and chemical control was used to treat the scattered regrowth.

A strategic approach targeting upstream infestations of the Finke with integrated chemical and mechanical control was then initiated. By 1998 a distance of some 130 km of the upper Finke River from Glen Helen Gorge to the Stuart Highway had been treated. Since then, sections downstream of the Stuart Highway have been further controlled, and follow-up chemical control of seedlings and regrowth is ongoing.

The latest efforts were part of a cooperative project aimed at controlling the remaining 400 km of Northern Territory



Finke River athel pine infestation after blade ploughing.

Photo: John Gavin

infestation downstream of the Stuart Highway. The project 'Eradication of athel pine from the Finke River' involved the Northern Territory Government, Centralian Land Management Association, landholders and community groups (Landcare and Bushcare), and was funded through the Commonwealth Government's Natural Heritage Trust.

Extensive flooding in the Finke River between 2000 and 2002 resulted in the establishment of a large number of seedlings spread over an expanded range. This increase in the athel pine infestation will require a significant effort to control.

Legislation

It is illegal to introduce athel pine into the Northern Territory, and its spread must be controlled by landholders in the Northern Territory and Queensland. Its status as a weed is under consideration in other states, notably New South Wales and Western Australia. Check with your local council or state/territory government agency about the latest requirements for athel pine control.

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Maps: Australian Weeds Committee.



Bulldozers of at least 200 hp are required to pull large blade ploughs.
Photo: John Gavin



Although tamarisks have been planted to control erosion, especially in highly saline soils, this practice is now discouraged.
Photo: John Stretch

How to control athel pine

Quick reference guide

Do not plant athel pine

Athel pine is difficult and expensive to control when it escapes cultivation and becomes naturalised. To prevent its further spread, it should not be planted.

Target upstream infestations first...

As athel pine tends to spread downstream, upper catchment infestations should be targeted for control and eradication. Control should then focus on downstream infestations and isolated shade trees away from watercourses.

...using mechanical and chemical control

Heavy infestations of mature athel pine can be controlled by combining mechanical and chemical control:

- Mechanical control has been used most extensively on the Finke River,

where bulldozers are used to remove trees and roots.

- Two main chemical control methods (frilling and cut-stump) are effective especially when stems are treated immediately. Use only registered herbicides and follow instructions on the label.

Seedlings can be easily removed by hand or sprayed with a registered herbicide if there is no risk to other species.

Take care near waterways

Care must be taken when treating athel pine alongside rivers and in riverbeds:

- Mechanical control can impact on non-target species, especially when heavy machinery is used. Additionally, any soil disturbance can actually promote weed species and/or contribute to erosion.
- Chemicals can also affect non-target species and be washed into waterways.

Ongoing follow-up is required

Follow-up control will be required to treat plants that survive initial treatment. As athel pine shoots readily from vegetative material, it can quickly re-establish itself if left unchecked.



Athel pine was traditionally planted around homesteads for shade.
Photo: Les Tanner

Control options

Tree size	Physical	Mechanical	Chemical	Biological
Small (plants under 2 m)	Hand pulling in sandy soil will easily remove small athel pine.	Not suitable.	Snap the stem and wet the area with registered herbicide. Seedlings can also be foliar sprayed.	No biological control agents in Australia.
Medium and large trees (greater than 2 m tall)	Not suitable.	Rip and bulldoze with large bulldozer. Take care to remove all roots.	Use frilling around the base or cut-stump methods. Immediately apply registered herbicide.	

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