CENTRE FOR
INVASIVE SPECIES SOLUTIONS

BEST PRACTICE MANAGEMENT FOR THE CONTROL OF athel pine (*Tamarix aphylla*)

ADDENDUM TO THE WEEDS OF NATIONAL SIGNIFICANCE
NATIONAL BEST PRACTICE GUIDE FOR ATHEL PINE

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Citation: Wild Matters (2023). *Best practice management for the control of athel pine (Tamarix aphylla); Addendum to the Weeds of National Significance national best practice guide for athel pine.* A Weeds Australia publication, report to Centre for Invasive Species Solutions.

Print ISBN: 978-1-922971-35-7
Web ISBN: 978-1-922971-34-0

Published by: Centre for Invasive Species Solutions

The Centre for Invasive Species Solutions gratefully acknowledges the funding support for this publication through the Australian Government Department of Agriculture, Fisheries and Forestry.

The Centre also acknowledges Wild Matters as the primary author and thanks those who made technical contributions and reviewed the publication, including:

- Chris Brown, Regional Weeds Officer, Weed Management Branch, Department of Environment, Parks and Water Security, Northern Territory Government
- Professor Victor Galea, Deputy Head of School, School of Agriculture and Food Sciences, Faculty of Science, The University of Queensland
- Kay Bailey, former Athel Pine National Coordinator
- Andrew Storrie, Agronomo Consulting
- Royce Holtkamp, Ecological Horizons, Chair NSW Biocontrol Taskforce
- Kerinne Harvey

This publication was funded by

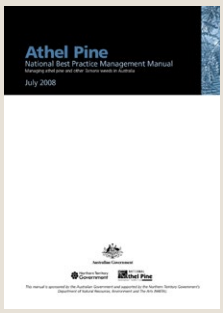
Australian Government
Department of Agriculture, Fisheries and Forestry

Cover images

Front — Athel pine. Image by NSW Department of Primary Industries.

Back — Athel pine. Image by NSW Department of Primary Industries.

How to use this addendum



The national best practice management guide for athel pine **(PDF, 4.9 MB) was published in 2008 and provides information on the weed and best practice management options. The manual has since been reviewed to ensure currency of best practice management advice and information. Any updates to the information contained within the manual are included in this addendum and should be taken as the most current source of information.**

Note: the addendum is not a standalone document and should be read in conjunction with the 2008 manual.

The addendum focuses on updates to control options, including mechanical, chemical and biological control methods. It also includes updates on available herbicides and where to go to find additional information on athel pine and its management.

When new or additional information is provided in the addendum, page numbers reference the related text in the original manual.

Section 2: Managing athel pine, tamarisk and smallflower tamarisk

Planning

Page 20 – In your planning process, the first step should also include setting your goals. These should be clear and realistic, based on your site assessment and mapping, and time bound. They should reflect what you are trying to achieve. For example, are you trying to prevent weed spread throughout your property or protect a significant asset? It can be useful to set goals for the near term (1–2 years) and also for the medium or longer term (5–10 years or beyond).

Setting goals

A useful starting point to determine your goal is to consider the level of weed invasion and assign an appropriate management objective. Then turn your management objective into on-ground action; for example:

MANAGEMENT OBJECTIVE	DESCRIPTION	MANAGEMENT ACTIVITIES
Prevention	Prevent new athel pine from arriving and/or establishing	• Surveillance • Hygiene / spread prevention • Education and awareness
Eradication	Eliminate all athel pine plants and plant matter from which they may propagate — such as leaves and woody stems — from an area, such that there is limited or no potential for reinvasion	• Survey to determine extent (delimitation) • Hygiene / spread prevention • Integrated management (chemical and/or physical/mechanical)
Containment	Prevent the further spread and establishment of athel pine beyond a predefined area (core infestation) and reduce the impact within the area it occurs	• Hygiene / spread prevention • Integrated management (chemical and/or physical/mechanical)
Asset protection	Reduce the adverse impacts of athel pine on high-value assets by protecting and restoring those assets	• Hygiene / spread prevention • Integrated management (chemical and/or physical/mechanical)

Adapted from Sheehan and Potter (2017), pp. 54-55.

Online assistance for mapping

A map from an internet mapping tool is an effective way to record infestations of athel pine. There are many mapping tools freely available online. For example, the Atlas of Living Australia (www.ala.org.au) provides a free platform for interactive map making.

Another example is the free NT WeedMate App for iPhone and android. Available at: https://depws.nt.gov.au/rangelands/publications2/weed-management-publications/contribute-weed-data/weed-data-collection/nt-weedmate-app

This app helps you:

- collect information about weed species, density and location
- add extra information such as treatments, chemicals and growth stages
- organise your data in the standard format of the NT Weed Management Branch, ready for mapping.

Combine two or more control options for success, then follow up

Page 22 – Refer to the case studies of athel pine management on the Finke River, NT (page 37 of the athel pine manual), and Florina Station, SA (page 40), for examples of successfully using a combination of control methods and the benefit of follow-up in the second and subsequent years.

Control options

Preventing spread

Page 22 – Finding athel pine early and taking prompt action to control it are key to preventing its spread. Get to know the plants on your property and quickly identify and deal with new threats.

Routinely check or monitor the preferred habitats for athel pine, particularly following large episodic rainfall events which provide ideal conditions for spread and establishment of athel pine. In arid areas, preferred habitats for athel pine include borrow pits and areas in creeks and rivers where flood waters persist.

Mechanical clearing

Page 24 – Additional disadvantages of mechanical clearing are the:

- challenge of finding experienced operators
- relatively high costs of mobilising the heavy machinery necessary in remote areas of central Australia (excluding for longer-term programs where efficiency is gained).

For mechanical clearing to be efficient in remote areas, available funding cycles should allow machinery to be onsite for long enough to justify the machinery transportation costs**.**

In areas prone to erosion, mechanical clearing should not be used.

Herbicides

Page 26 – Chemical control provides a viable alternative where mechanical removal of plants poses an erosion risk.

Aerial athel pine spraying trail, Northern Territory

Based on successful aerial spraying of salt cedar (*Tamarix ramosissima*) in the USA, the NT Weeds Management Branch obtained a minor use permit for a trial on dense juvenile athel pine along the Finke River using imazapyr applied via helicopter.

The minor use permit included stringent conditions on the rate of imazapyr to be trialled, its application via helicopter rather than fixed-wing aircraft, the presence of no surface water in the vicinity, and the maximum area to be included in the trial.

Monitoring six months and three and a half years after spraying (the US results on salt cedar indicated that up to three years were required for imazapyr to have maximum efficacy) indicated that the majority of athel pine plants showed evidence of the impact of the trial. Initial impact was a morphed growth habit with denser and compacted leaves. After three and a half years, a proportion of the juvenile plants were killed; however, a significant number had regrown. No larger plants were killed and the majority showed signs of regrowth.

Due to a number of factors including the permit conditions (particularly the rate of application of imazapyr), the use of the adjuvant Uptake® rather than a penetrant adjuvant, and the environmental conditions at the time of spraying, it was concluded that no definitive answer could be made on the effectiveness of the aerial application of imazapyr in controlling athel pine.

The results of management of *Tamarix* spp. in the USA could be used for future trials of additional herbicides and application methods on athel pine in Australia. A permit would be required from the AVPMA for these trials.

Basal bark

Page 28 – Additional points for the basal bark 'most useful for' list:

- arid areas where there is a scarcity of water for foliar spraying
- young trees that are too high for foliar spraying
- areas affected by weather conditions such as extreme heat.

Cut stump

Page 29 – It is essential that ongoing monitoring and follow-up occur after the cut-stump method is used, as the large root system of athel pine often results in regrowth.

Stem injection

The stem-injection method includes drill and fill, axe cut and direct injection techniques. For all techniques the herbicide is placed immediately into holes or cuts made by drilling or cutting through the bark into the sapwood tissue in the trunks of woody weeds and trees.

The aim is to reach the sapwood layer just under the bark (the cambium), where the chemical will be transported throughout the plant. It is essential to apply the herbicide immediately (within 15 seconds of drilling the hole or cutting the trunk), because stem injection relies on the active uptake and growth of the plant to move the chemical through its tissues.

This method of herbicide application is permitted for athel in NSW (Refer Table 6, PER9907) in areas of native vegetation, non-crop areas and open public spaces; and in all states/territories using Di-Bak AM capsules (refer section 'Herbicides for use on athel pine').

Herbicide labels and legislation

Page 26 – The Australian Pesticides and Veterinary Medicines Authority (APVMA) regulates the availability of all pesticides, which includes herbicides. Herbicides are registered with the APVMA for specific applications, as stated on the label. State governments regulate the use of pesticides after sale. A herbicide label is a legal document that defines where, when and how a herbicide can be used on which weed species and at what rate.

Note: not all registered herbicides are commercially available. Often, companies improve herbicide formulations and only market the new formulation. For example, many herbicides are being marketed in higher concentrations. This reduces transport, storage and container-disposal costs.

In addition to herbicides being registered and described 'on-label' for specific weeds and situations, herbicides can sometimes be used through permits or 'off-label' use. These situations are described below.

Minor use and emergency use permits

APVMA may issue minor use and emergency use permits for herbicide applications that are not otherwise registered for that particular use. Minor use permits are sometimes referred to as 'off-label' permits. Minor use and emergency permits are valid ('in force') for a limited time. See the APVMA website to find current permits.

Some states also have permits for the control of 'declared' weeds and may not specifically list the weed species to be controlled. These permits will often list a range of herbicides that can be used for the control of declared or environmental weeds. To find these permits for your state:

- go to the APVMA permits database search
- enter 'declared weeds' or 'environmental weeds' in the SEARCH box
- click the search term 'Pest/purpose'
- click 'Search'.

It is also recommended that if you are unsure which herbicides can legally be used on a particular weed in your state, contact the relevant biosecurity section of your state department of agriculture. When using herbicides in aquatic situations, only use those that are registered or permitted for use in and around aquatic areas.

Any minor use permits relevant to athel pine at time of publication are listed in Table 6.

Off-label use

Off-label use is the use of a registered chemical to address a specific issue that is not covered by the APVMA-approved label. Off-label use is to:

- control a different weed (or pest)
- apply at a different rate (only lower)
- apply in a different manner (not allowed in ACT, NSW and Tasmania).

Off-label use is permitted in all states and territories; however, conditions vary in each jurisdiction. Contact your relevant state/territory agency for more information (Table 1).

Table 1. Where to find specific rules relating to herbicide use, including off-label use, in each state and territory

STATE/ TERRITORY	WEBSITE AND FURTHER INFORMATION
ACT	Agvet chemical use https://www.accesscanberra.act.gov.au/s/article/pest-and-weed-control-tab-Agvet-chemical-use
NSW	Pesticides https://www.epa.nsw.gov.au/your-environment/pesticides/pesticides-nsw-overview
	Weed control and identification https://www.dpi.nsw.gov.au/biosecurity/weeds/weed-control
NT	Chemical use https://nt.gov.au/industry/agriculture/farm-management/using-chemicals-responsibly
Qld	Chemical use https://www.business.qld.gov.au/industries/farms-fishing-forestry/fisheries/aquaculture/chemicals/registered
SA	Rural chemicals https://pir.sa.gov.au/biosecurity/rural_chemicals
	Weed control handbook https://www.pir.sa.gov.au/__data/assets/pdf_file/0020/232382/WEB_8867_PIRSA_Weed_Control_Handbook_2018.pdf (PDF, 4.2 MB)
Tas	Agricultural and veterinary chemicals https://nre.tas.gov.au/agriculture/agvet-chemicals
	Weeds https://nre.tas.gov.au/invasive-species/weeds
Vic	Off-label chemical use https://agriculture.vic.gov.au/farm-management/chemicals/offlabel-chemical-use
WA	Using pesticides safely https://ww2.health.wa.gov.au/Articles/U_Z/Using-pesticides-safely

Safety and training

Page 26 – Personal protective equipment (such as protective clothing, eye or face shields, and respiratory protection) must be used in accordance with the recommendations stated on the herbicide label or permit. Chemical-use training is required for people using herbicides as part of their job or business. Training is recommended for community groups and may be required if working on public land. Training courses are run by ChemCert, AusChem and TAFE in each state. Other training courses may be available through state agencies (e.g. AgTrain in Victoria, SMARTtrain in NSW), local councils or non-government organisations.

By law, you must read the label (or have it read to you) before using any herbicide product. Always follow the label or permit.

Chemical user certification

Commercial weed-control operators need to be licenced in most states (Table 2). It should also be noted that there is now shared responsibility between landholders and their contractors for any breaches of laws and regulations (such as herbicide drift).

Table 2. Chemical-user certification by state and territory

STATE/ TERRITORY	WEBSITE
ACT	www.accesscanberra.act.gov.au/s/article/pest-and-weed-control-tab-Agvet-chemical-use
NSW	www.epa.nsw.gov.au/your-environment/pesticides/licences-and-advice-for-occupational-pesticide-users
NT	nt.gov.au/industry/agriculture/farm-management/using-chemicals-responsibly/spray-applicator-licences
Qld	www.business.qld.gov.au/industries/farms-fishing-forestry/agriculture/land-management/chemical-controls/commercial-operators
SA	www.sa.gov.au/topics/business-and-trade/licensing/building-and-trades/pest-control-licence
Tas	nre.tas.gov.au/agriculture/agvet-chemicals/licences-and-certificates/ground-spraying-and-pest-management-licences
Vic	agriculture.vic.gov.au/farm-management/chemicals/licences-and-permits/commercial-operator-licence-for-contractors
WA	www.health.wa.gov.au/articles/n_r/pest-industry-licensing-and-registration

Effective use of herbicides

Successful herbicide control is dependent on the right herbicide for the target species, growth stage of the target species, weather conditions during and after spraying, how thoroughly the herbicide is applied, and the herbicide mix and application rate.

For spraying, wind speeds should be low (< 15 km/h) with no rain expected in the following six hours.

Do not apply herbicide to plants that are under any sort of stress, as herbicide will not be absorbed and translocated effectively, resulting in a reduced level of control. Plants may be stressed due to:

- dry soil
- low humidity
- air temperatures above 30 °C
- frost.

Effectiveness of herbicides can be maximised further by:

- mixing dye with the herbicide to help minimise missed areas and prevent overspraying (double spraying)
- using an adjuvant – an additive that improves herbicide uptake (always read the adjuvant's product labels to ensure that they are compatible with the particular herbicide and there are no restrictions on their use; e.g. most adjuvants should not be used near waterways)
- ensuring spray equipment is correctly calibrated and maintained, including being thoroughly cleaned between uses.

Spraying in sensitive areas

Herbicide users have a legal obligation to avoid spray drift damage and to ensure that the chemicals applied stay within the target area. Target-weed infestations are often located in areas of native vegetation, so great care should be taken to avoid spraying surrounding foliage and soil. Do not use high pump/sprayer pressures that create small droplets which float in the air. Adjust the nozzle settings to produce coarser droplet sizes.

Using herbicides near water

Never spray herbicides over bodies of water or plants standing in water. Some herbicides are formulated to be a lower risk when used near water (e.g. Roundup® Biactive). NEVER add unregistered adjuvants to herbicides that will be used near water. Some states have publications explaining the safe use of herbicides near water (Table 3).

Table 3. Safe use of herbicides near water by state and territory

STATE/ TERRITORY	WEBSITE
South-eastern Australia	archive.dpi.nsw.gov.au/__data/assets/pdf_file/0011/319448/riparian-habitat-management-guide.pdf (PDF, 1.1 MB)
Qld	https://www.business.qld.gov.au/industries/farms-fishing-forestry/agriculture/sustainable/chemical/ground-distribution-herbicide/laws
SA	https://www.epa.sa.gov.au/files/477387_pesticide_water.pdf (PDF, 1.7 MB)
Tas	https://nre.tas.gov.au/Documents/herbicide_guidelinesFINAL2012.pdf (PDF, 689 kB)
WA	https://www.water.wa.gov.au/__data/assets/pdf_file/0016/3355/12149.pdf (PDF, 113 kB)

Regulations and permits for works in riparian zones

Areas on or near the bank of a river or other body of water (riparian zones) are sensitive habitats, and in some states a licence is required to conduct weed-control works (Table 4).

Table 4. Authorities who can advise about regulations and permits for works in riparian zones

STATE/ TERRITORY	DEPARTMENT	WEBSITE
NSW	NSW Department of Planning and Environment — Water	https://water.dpie.nsw.gov.au
SA	Landscape SA, including 8 regional boards	https://www.landscape.sa.gov.au
Vic	Catchment management authorities	https://viccatchments.com.au/about-us/our-cma-regions
	Department of Energy, Environment and Climate Action — Forests and Reserves	Riparian management licences – www.forestsandreserves.vic.gov.au/__data/assets/pdf_file/0016/31426/Riparian-management-licences.pdf (PDF, 160 kB)

Herbicides for use on athel pine

Page 26 – At the time of writing there are no herbicides registered for use on athel pine, however products registered for other weeds may be used off-label. For example, aminopyralid (93.7 g/kg) and metsulfuron-methyl (75g/kg) is sold as an encapsulated herbicide (Di-Bak AM) and is registered in all states and territories. Whilst athel pine is not listed on the label, the product may be used off-label (meeting the 'different pest than on label' measure).

It is the reader's responsibility to ensure that their herbicide use complies with either a currently registered product label or a minor-use permit, or other relevant state legislation governing the control-of-use of herbicides.

Minor use permits are listed in Table 5.

Table 5. Herbicides permitted for use on athel pine under minor use permits as at September 2023

SITUATION	ACTIVE INGREDIENT	COMMERCIAL PRODUCT EXAMPLES[1]	RATE	STATE OR TERRITORY	COMMENTS
PER91126 – Control of athel pine in non-crop areas in and near ephemeral waterways Weed Management Branch, NT Government. Expires 31 August 2026. Persons generally.					
Non-crop areas in and near dry ephemeral waterways	fluroxypyr (333 g/L) only	Starane® Advanced	600 mL/100 L water Apply as a foliar spray via ATV-mounted spray tank	NT only	Seedlings less than 50 cm tall DO NOT apply more than 1 application per year.
	triclopyr (600 g/L) only	Garlon® 600	1 L/60 L diesel or Biosafe® Basal bark/cut stump		Juvenile from 50 cm – 2 m in height
			1 L/100 L water Apply as a foliar spray via ATV-mounted spray tank		Juvenile from 50 cm – 2 m high DO NOT apply more than 1 application per year.
PER83392 – Control of woody weeds in forestry plantation fallows HQPLANTATIONS. Expires 31 March 2027. Licensed aerial-application contractors working under the direction of the Permit Holder					
Forestry fallow areas (preplantation establishment only)	picloram + triclopyr (100 + 300 g/L)	Macspred Trichloram® Herbicide	10 L/ha Foliar spray	Qld only	Specifically areas of forestry plantations under the management of HQPlantations Ground boom and helicopter only. Consult label for critical use comments.
	Aminopyralid + picloram + triclopyr (8 + 100 + 300 g/L)	Grazon® Xtra			
PER13333 – Various herbicides on non-crop, agricultural, food-producing areas / environmental weeds in WA. Expires 31 March 2025					
Crop and non-crop areas as specified for WA on the approved label	fluroxypyr (333 g/L)	Starane® Advanced	600 ml / 100L water	WA only	All over foliage spray
	picloram + triclopyr (120 + 240 g/L)	Access®	1 L/60 L diesel		Paint stump immediately after cutting. Or paint or spray basal bark.
PER14249 – Control of various environmental weeds in National Parks and nature reserves National Parks and Wildlife Service. Expires 31 March 2025. Staff or contractors employed/contracted by NSW Department of Planning, Industry and Environment; agencies/ organisations represented on NSW Regional Weed Committees; and staff or contractors employed by the ACT Government, who are qualified and experienced in the handling and use of agricultural chemicals					
Areas of native vegetation and non-cropland areas	aminopyralid + picloram + triclopyr (8 + 100 + 300 g/L)	Grazon® Xtra	500 mL/100 L	NSW and ACT only	Foliar
	picloram + triclopyr (100 + 300 g/L)	Adama Fightback®			Apply to trees less than 1.5 m tall.

SITUATION	ACTIVE INGREDIENT	COMMERCIAL PRODUCT EXAMPLES[1]	RATE	STATE OR TERRITORY	COMMENTS
PER9907 – Control of various environmental and noxious weeds in areas of native vegetation, non-crop areas and open public spaces NSW Office of Environment and Heritage. Expires 31 March 2025. Persons generally					
Forests, including native vegetation areas, bushland reserve areas, national park areas. Non-crop areas, including rights of way, commercial and industrial areas, domestic and urban areas, public service areas, botanical gardens	fluroxypyr (333 g/L)	Starane® Advanced	21 mL/L diesel or kerosene	NSW and ACT only	Basal bark
	Glyphosate (360 g/L)	Weedmaster® Duo	1:1.5 with water to undiluted herbicide		Drill, frill, axe, injection. Cut-stump, basal bark spray or cut/scrape and paint.
	Glyphosate (360 g/L) + Metsulfuron-methyl (600 g/kg)	Various	Tank mixes of 1:1.5 glyphosate + 1 g metsulfuron-methyl per 1 L water		Stem injection
PER91974 – Control of woody weeds in non-crop situations. Primary Industries and Regions SA. Expires 31 January 2027. Persons generally					
Non-crop areas	triclopyr (600 g/L)	Garlon® 600	1L/30L biodiesel or diesel	SA only	Cut stump or basal bark only

1 Commercial products listed here are examples only. Search at https://apvma.gov.au/node/10831

Note: Not all currently registered herbicides are commercially available. Check the company website for a current label.

Note: herbicides are not to be used for any purpose or in any manner contrary to the label unless authorised under appropriate legislation. By law, you must read the label (or have it read to you) before using any herbicide product. The same applies for minor use permits. Always follow the label and permit directions.

Biological control

Page 30 – There is currently no active research on biological control of athel pine being conducted in Australia. **No biological control agents have been released in Australia.**

Athel pine dieback

The extensive dieback of athel pine observed on the Finke River in 2007 was investigated by the University of Queensland, Gatton Campus in partnership with the Northern Territory Government. Stem samples were tested and a number of fungal pathogens were identified. These pathogens were injected into the stems of healthy athel pine during trials over several years. No significant results were observed and the trials were concluded.

Monitoring progress with photo points

Page 33 – Photo monitoring is an easy 'visual' method of assessing progress over time and can be used to help document the size and condition of athel pine before, during and after control.

Establishing photo-monitoring points

When set up correctly, photo monitoring can be one of the cheapest and most reliable records of change over time. It is quick, inexpensive, requires little technical skill and causes little-to-no disturbance of the site.

To establish photo monitoring points:

- Mark out the location where the photo will be taken with a star picket. If possible, record the location with a GPS.
- Where possible, align the photo in a north–south direction to avoid excessive sun or shadow. If not possible, record a compass bearing of the direction the camera is pointing. Try to have the sun behind you when taking photos.
- Take photos in the morning or afternoon, or on a slightly overcast day to avoid excess glare or downward shadows.
- Where possible, include distinct objects in the photo to provide a basis for comparison (e.g. a significant tree or piece of infrastructure).
- Use the same camera and settings each time.
- Take photos as frequently as needed to show changes.
- Try to take photos at the same time of year for annual comparisons.

Source: Sheehan and Potter (2017:60).

Contacts

STATE/ TERRITORY	DEPARTMENT	PHONE	EMAIL	WEBSITE
National	Australian Pesticides and Veterinary Medicines Authority	02 6770 2300	enquiries@apvma.gov.au	www.apvma.gov.au
ACT	Parks and Conservation	13 22 81	ACTBiosecurity@act.gov.au	www.environment.act.gov.au/parks-conservation/plants-and-animals/Biosecurity/invasive-plants
NSW	Department of Primary Industries	1800 680 244	weeds@dpi.nsw.gov.au	www.dpi.nsw.gov.au/biosecurity/weeds
NT	Department of Environment, Parks and Water Security	08 8999 4567	weedinfo@nt.gov.au	www.nt.gov.au/environment/weeds
Qld	Department of Agriculture and Fisheries	13 25 23	info@daf.qld.gov.au	www.daf.qld.gov.au/business-priorities/biosecurity/invasive-plants-animals/plants-weeds
SA	Department of Primary Industries and Regions	1300 374 731	invasivespecies@sa.gov.au	www.pir.sa.gov.au/biosecurity/weeds
Tas	Department of Natural Resources and Environment	1300 368 550	biosecurity.tasmania@nre.tas.gov.au	www.nre.tas.gov.au/invasive-species/weeds
Vic	Agriculture Victoria	13 61 86	Refer to www.agriculture.vic.gov.au/about/contact-us for contact options	www.agriculture.vic.gov.au/biosecurity/weeds
WA	Department of Primary Industries and Regional Development	08 9368 3333	enquiries@agric.wa.gov.au	www.agric.wa.gov.au/pests-weeds-diseases/weeds

Further information

NT best practice management manual: athel pine. Department of Natural Resources, Environment and The Arts, NT (2008). https://profiles.ala.org.au/opus/b6be6ec2-37e5-43c6-a2c0-7f5427cb8d93/profile/b3aca8b0-0b68-458d-8f7e-588aa75ba18e/attachment/c1631969-d90b-49d8-be67-834b04e6bfbe/download (PDF, 4.9 MB)

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