CENTRE FOR
INVASIVE SPECIES SOLUTIONS

BEST PRACTICE MANAGEMENT FOR THE CONTROL OF prickly acacia (*Vachellia nilotica*)

ADDENDUM TO THE WEEDS OF NATIONAL SIGNIFICANCE
PRICKLY ACACIA NATIONAL CASE STUDIES MANUAL

WEEDS.ORG.AU

weeds.org.au

Citation: Wild Matters (2023). *Best practice management for the control of prickly acacia (Vachellia nilotica); Addendum to the Weeds of National Significance prickly acacia national case studies manual.* A Weeds Australia publication, report to Centre for Invasive Species Solutions.

Print ISBN: 978-1-922971-37-1
Web ISBN: 978-1-922971-36-4

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 Weed Management Officer, Department of Environment, Parks and Water Security, Northern Territory
- Kay Bailey, Weeds Project Coordinator, Tamar NRM
- 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 — Prickly acacia flowering.
Image by Colin G Wilson.

Back — Prickly acacia in full fruit near Hughenden, Queensland. Image by Colin G Wilson.

How to use this addendum

The prickly acacia national case studies manual **(PDF, 2.1 MB) was published in 2004 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 2004 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 prickly acacia 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: Developing strategies

The chemical solutions

Page 14–24

Basal bark spraying

Basal bark application is recommended for plants with stems up to 10-cm basal diameter. For smaller plants, thoroughly spray herbicide into all crevices around the base of the plant to 30 cm above ground level. For large trees, spray up to a height of 100 cm above ground level. Apply treatment when plant is actively growing. The optimum time for application is autumn.

Soil-applied herbicides

Apply herbicides as close to the trunk as possible. For best results, apply before rainfall. The optimum application period is from October to January.

Cut stump

Cut stems of plant horizontally as close to the ground as possible. Swab or spray the cut surface and stem with the herbicide mixture within 15 seconds of cutting. This method can be applied at any time of year, on all plant sizes.

Foliar spraying

Spray seedlings and young plants to 2 m high to the point of run-off. For best results, apply to actively growing plants and use a wetting agent. Avoid dry conditions, stressed plants and pod-bearing plants.

Bore drain application

Bore drains can harbour heavy infestations of prickly acacia which can then produce a large number of seed pods. To treat a bore drain, water should be temporarily diverted away from the channels or dam 24 hours before herbicide application. Spray herbicide along a 1-m strip of mud along the bore drain, and slowly return the water 72 hours after the initial application.

Stem injection

Stem injection of bioherbicide capsules can be used to control prickly acacia infestations. Drill holes 10 cm apart into the stem circumference at approximately waist height. Place one capsule in each hole and plug. Apply a minimum of two capsules per tree when the plant is actively growing.

Herbicide labels and legislation

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 prickly acacia 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 (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 62 – 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

Page 62 – 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	https://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 prickly acacia

Page 14–24 – Herbicides registered for controlling prickly acacia can be found in Table 5, and permits (current at September 2023) are in Table 6.

Table 5. Herbicides permitted for use on prickly acacia under registration

SITUATION	ACTIVE INGREDIENT	COMMERCIAL PRODUCT EXAMPLES[1]	RATE	STATE OR TERRITORY[2]	COMMENTS
Agricultural non-crop areas, commercial and industrial areas, forests, pastures and rights of way	fluroxypyr[3] (333 g/L)	Starane® Advanced	900 mL/100 L diesel or Biosafe®	All	Basal bark/cut stump Basal bark only when plant is actively growing and up to 10-cm basal diameter, or cut stump at any time of year for all plant sizes (swab or spray stump within 15 s of cutting)
			450 mL/100 L water	All	High volume application up to 2-m high Add Uptake® spray oil
	triclopyr[3] (600 g/L)	Garlon® 600	500 mL/60 L diesel or Biosafe®	All	Basal bark/cut stump
			160–320 mL/100 L water	All	High-volume application Up to 3-m tall
	triclopyr + picloram (240 + 120 g/L)	Access®	1 L/60 L diesel or Biosafe®	All	Any time of year Basal bark plants up to 10-cm basal diameter, or cut stump for all plant sizes (swab or spray stump within 15 s of cutting)
Forests, pastures, commercial and industrial areas, rights of way, around agricultural buildings and public service areas	glyphosate (700 g/kg)	Di-Bak® G	One capsule every 10 cm of stem circumference Minimum two capsules per tree	All	Stem injection Use when active plant growth is present. Apply at waist height.
Around agricultural buildings and in pasture situations	hexazinone (250 g/L)	Velpar® L	4 mL/spot; one spot for each metre of height	Qld, NSW only	Hand application only Apply October–March for best results. Plants up to 5-m tall Avoid herbicide damage to off-target species
Grazing land	tebuthiuron[3*] (200 g/kg)	Graslan®	1.5 g/m^2	Qld, NT and WA only	Hand application Estimate the area within 30 cm beyond the drip zone of each target weed or group of weeds, and calculate the amount to cover area to be treated. Distribute the required dose uniformly within this area.
			10–15 kg/ha	Qld and NT only	Ground and aerial application Use the high rate on dense growth or heavy clay soils.

SITUATION	ACTIVE INGREDIENT	COMMERCIAL PRODUCT EXAMPLES[1]	RATE	STATE OR TERRITORY[2]	COMMENTS
Bore drains	diuron[3] (900 g/kg)	Diurex® WG Herbicide	35.5 kg/ha	Qld only	Bore drains (desert channels) DO NOT apply between December and March. Application should be limited to 1-m strips along the sides of bore drains. DO NOT apply more than once per calendar year. DO NOT open drains for 72 hours following treatment. DO NOT apply if heavy rains are predicted within three days of application.

Notes to this table can be found at the bottom of Table 6.

Table 6. Herbicides permitted for use on prickly acacia under minor use permits

APPLICATION METHOD	ACTIVE INGREDIENT	COMMERCIAL PRODUCT EXAMPLES[1]	RATE	COMMENTS
PER14478 – Control of prickly acacia in sections of watercourses, dams and depression lines to aid arid lands conservation. Expires 31 December 2027. Qld only. Specifically, within the Mitchell Grass Downs Bioregion of the Eyre Basin and within the Mitchell Grass Downs Bioregion of the Southern Gulf Catchments of the Flinders River, Saxby River and Cloncurry River.				
Soil application	Tebuthiuron* (200 g/kg) only	Graslan®	15 kg/ha	Situation: Dry (ephemeral) water courses around the perimeter of dams and within depression lines in rangelands, and non-crop areas under DCQ-approved weed control plans. DO NOT apply during January and February. DO NOT apply within 30 m of mature native trees or within 500 m of a permanent waterhole
PER82366 – Control of prickly acacia in pasture rangelands, stock routes, roadsides and other non-crop situations. Expires 31 July 2026. Qld only.				
Foliar	Fluroxypyr (200, 333 and 400 g/L products)	Starane® Advance	Check permit for chemical rate	Mist sprayer @ 500 L/ha at a 20 m swath.

APPLICATION METHOD	ACTIVE INGREDIENT	COMMERCIAL PRODUCT EXAMPLES[1]	RATE	COMMENTS
PER13333 – Control of environmental weeds in various situations. Expires 31 March 2025.* WA only				
Basal bark/cut stump	triclopyr + picloram (240 + 120 g/L)	Access®	1 L/60 L diesel	Paint stump immediately after cutting. Or paint or spray basal bark.
	Glyphosate 360 g/L	Roundup® Biactive	Undiluted to 1 L/5 L water	Paint stump immediately after cutting or paint basal bark.
Stem injection	Glyphosate 360 g/L	Roundup® Biactive	2 mL/drilled hole or cut	Drill, frill, axe or injection.
PER92454 – Control of various weeds in railway tracks and corridors. Expires 31 January 2025. SA and WA only				
Soil application	Tebuthiuron[3] (200 g/kg)	Apparent tebuthiuron 200	10–15 kg product / hectare	Situation: Railway tracks and corridors.

1 Commercial products listed here are examples only, and many other products containing these active ingredients are registered for use on prickly acacia. Search at https://apvma.gov.au/node/10831

2 Products may be registered for use on prickly acacia in all states and territories (shown as 'All'), or only in the specific states and territories listed.

3 Products containing different concentrations of the active ingredients are registered for this use. For example, registered products containing the active tebuthiuron are available with 200, 400, 600 and 750 g/kg concentrations. Check the label for application rates.

* Do not use soil-applied herbicides within a distance of 2–3 times the mature height of wanted trees. Use of soil-applied herbicides must be in accordance with state and/or local native vegetation legislation. Do not apply tebuthiuron within 100 m of a recognised watercourse or on land with a slope greater than 20% (11 degrees).

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 20–24, 88 – Historical surveys for potential biological control agents identified several species as potential biocontrol agents for prickly acacia, and six insects were released in Australia. However, only two of these have established.

Seed-feeding beetle

The seed-feeding beetle, *Bruchidius sahlbergi*, was first released in 1982. **Though widely established, it is largely ineffective** as there is insufficient feeding on the seed pods before they drop from the plant. Cattle are then able to eat and spread the seed. Agent efficacy may be higher in areas where cattle grazing does not occur.

Leaf-feeding moth

The leaf-feeding moth, *Chiasmia assimilis*, was released in 1999 and is widely distributed throughout Queensland, more so in coastal areas. The agent **causes significant to complete defoliation at coastal sites, but is less effective in western Queensland locations**, where the climate is less suitable. The agent is more impactful on seedlings growing beneath a prickly acacia canopy than in full sunlight, indicating it may help limit the formation of dense infestations of prickly acacia where plants already exist.

Because the agents are widely distributed and impacts are negligible, there is little benefit in their redistribution.

Current research

Recent research by Queensland Department of Agriculture and Fisheries has resulted in an application to release the gall-inducing thrips, *Acaciothrips ebneri*. Releases are expected to occur from 2023.

Australian Biocontrol Hub

Sharing information is vital to the success of biological control of weeds. Recording which weed species you are controlling and the locations of agent release sites can also assist others to obtain access to the right agents for their infestation.

The Atlas of Living Australia (ALA) is a national, online biodiversity database that helps share information. The Australian Biocontrol Hub is a portal within the ALA that acts as a one-stop shop for data and information sharing on weed biological control.

The Australian Biocontrol Hub can:

- facilitate recording of biological control agent release and establishment data
- capture observations of biological control agent spread
- ensure biological control agent distribution data is readily accessible
- provide access to biological control extension material.

For further information on how to contribute to or use information on the Australian Biocontrol Hub, visit the website: https://biocollect.ala.org.au/biocontrolhub

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

Using herbicides to control prickly acacia in bore drains. Desert Channels (2020). http://desertchannels.com.au/wp-content/uploads/2020/10/Diuron-for-prickly-acacia.pdf (PDF, 1.3 MB)

NT weed management handbook. Northern Territory Government (2020). https://nt.gov.au/environment/weeds/how-to-manage-weeds/weed-management-handbook

Qld prickly acacia profile and control. Department of Agriculture and Fisheries, Queensland Government (2020). https://www.daf.qld.gov.au/__data/assets/pdf_file/0007/73753/prickly-acacia.pdf (PDF, 8.7 MB)

SA prickly acacia profile. Primary Industries and Regions South Australia, Biosecurity SA (2021). https://pir.sa.gov.au/biosecurity/weeds/controlling-weeds/prickly_acacia

Qld prickly acacia profile. Department of Agriculture and Fisheries, Queensland Government (2021). https://www.business.qld.gov.au/industries/farms-fishing-forestry/agriculture/biosecurity/plants/invasive/restricted/prickly-acacia

NSW prickly acacia profile. Department of Primary Industries (2020). https://weeds.dpi.nsw.gov.au/Weeds/PricklyAcacia

NT prickly acacia profile. Northern Territory Government (2020). https://nt.gov.au/environment/weeds/weeds-in-the-nt/A-Z-list-of-weeds-in-the-NT/prickly-acacia

Weeds Australia prickly acacia profile. Weeds Australia (2019). https://weeds.org.au/profiles/prickly-acacia-blackthorn/

CENTRE FOR INVASIVE SPECIES SOLUTIONS

Building 22, University of Canberra
University Drive South, BRUCE ACT 2617
T 02 6201 2887
E communications@invasives.com.au