



CENTRE FOR
INVASIVE SPECIES SOLUTIONS

BEST PRACTICE MANAGEMENT FOR THE CONTROL OF willows (*Salix* spp.)

ADDENDUM TO THE WEEDS OF NATIONAL SIGNIFICANCE WILLOWS MANAGEMENT MANUAL



weeds.org.au

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NO PRODUCT PREFERENCES: The product trade names in this publication are supplied on the understanding that no preference between equivalent products is intended and that the inclusion of a product name does not imply endorsement over any equivalent product from another manufacturer.

ALWAYS READ THE LABEL: Users of agricultural chemical products must always read the label and any permit, before using a product, and must strictly comply with the directions on the label and the conditions of any permit. Users are not absolved from compliance with the directions on the label or the conditions of the permit by reason of any statement made or not made in this publication.

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Cover images

Front — *Salix sepulcalis* with rust. Image by J Hosking, NSW Department of Primary Industries.

Back — Willow seedlings. Image by NSW Department of Primary Industries.

How to use this addendum



The [willows management manual](#) (PDF, 11 MB) was published in 2007 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 2007 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 willows and their management.

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

Section 3: Controlling and removing willows

Choosing a control technique

Using chemicals

Page 49

Foliar spray and leave (seedlings up to 2 m)

Page 61 – For best results, apply to actively growing plants and follow label directions. Avoid dry conditions and stressed plants.

Basal bark

When conditions are dry, herbicide can be applied using basal bark spraying. This application method is recommended for plants with stems of 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.

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 willows at time of publication are listed in Table 6 below.

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 49 – 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 49 – 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

Page 51 – 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

Page 49 – 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 willows

Page 50 – A range of herbicides are registered for the control of willows (Table 5). Minor use permits are also available (Table 6).

Table 5. Herbicides permitted for use on willows under registration as at September 2023

SITUATION	ACTIVE INGREDIENT	COMMERCIAL PRODUCT EXAMPLES ¹	RATE	STATE OR TERRITORY ²	COMMENTS
Non-crop areas, including: native vegetation, conservation areas, gullies, reserves and parks	glyphosate ³ (540 g/L)	Weedmaster® ARGO	100–140 mL/15 L	All	Knapsack Willows up to 2 m high DO NOT apply to weeds growing in or over water. DO NOT spray across open bodies of water.
					High-volume handgun Willows up to 2 m high DO NOT apply to weeds growing in or over water. DO NOT spray across open bodies of water.
	glyphosate ³ (360 g/L)	Roundup® Blactive	Undiluted Cut stump	All	Cut tree close to ground and immediately wet stump surface thoroughly using splatter gun, spray, swab or brush. Remove any branches on the stump and treat cut surface.
	aminopyralid + picloram (4.5 + 44.7 g/L)	Vigilant® II	Apply a 3–5 mm thick layer of gel immediately to wound from applicator bottle. Use and squeeze the brush-bottle, as the applicator, to apply a 5 mm layer of Vigilant® II over the lower cut surface of the blaze.	All	Small plants and saplings – horizontal cut 20–100 mm above ground. Trees – cut a series of blazes 15–20 mm deep around main trunks of the tree using an axe or pruning saw. Blazes should be evenly spaced with no more than a 20–40 mm gap between blazes.
	triclopyr + picloram ¹ (240 + 120 g/L)	Access®	4 L/60 L diesel or Biosafe®	All	Any time of year Cut stump only. Apply immediately after cut. Complete control may not occur with multi-stemmed willows that have not been fully treated.

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

Table 6. Herbicides permitted for use on willows under minor use permits as at September 2023

PERMIT NO.	STATE OR TERRITORY	PERMIT HOLDER	SITUATION	HERBICIDE ACTIVES ¹	RATE	COMMENTS
PER83324 Expires 31 August 2025	NSW	Snowy Monaro Regional Council Persons who can use the product under this permit: Employees and contractors employed by the Snowy Monaro Regional Council, Queanbeyan Palerang Regional Council, South East Local Land Services, Landcare groups and local weeds groups, who are trained in the preparation and use of agricultural chemicals and under the direction of the permit holder.	Aquatic situations (non-potable) within Snowy Monaro Regional Council and Queanbeyan-Palerang Regional Council only	metsulfuron methyl (600 g/L) + glyphosate (360 g/L) Registered for aquatic situations only	10 g + 200 mL/100 L	Apply by hand-directed spray from knapsack or handgun equipment in a maximum spray volume of up to 600 L/ha. Apply to identified non-potable water bodies only. Refer to permit for critical use comments.
PER87642 Expires 30 June 2024	ACT only	ACT Parks and Conservation Service Persons who can use the product under this permit: ACT Parks and Conservation Service staff and contractors only.	Public land, including riparian zones and aquatic situations (non-potable) in the ACT	metsulfuron methyl (600 g/L)	15 g/100 L	Apply as a spot spray to foliage using hand-directed sprays from knapsack or handgun equipment in a maximum spray volume of up to 600 L/ha. Apply from spring to autumn to actively growing plants. Refer to permit for critical use comments.
PER13333 Expires 31 March 2025	WA only	Forest Product Commission Persons who can use the product under this permit: Persons generally.	Agricultural non-crop areas, Non-crop areas, Commercial and industrial areas, Wetlands, Bushlands and Forests	glyphosate ³ (360 g/L) triclopyr + picloram ¹ (240 + 120 g/L)	Undiluted to 1 L/5 L water 1 L/60 L diesel	Paint stump immediately after cutting or paint basal bark. Paint stump immediately after cutting. Or paint or spray basal bark.

1 Commercial products listed here are examples only, and many other products containing these active ingredients are registered for use on willows. Visit www.apvma.gov.au to find registered products.

2 Products may be registered for use on willows 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 glyphosate are available with 360, 450, 510, 540, 570, and 600 g/L and 700, 720 and 800 g/kg concentrations. Check the label for rates.

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 63 – There is currently no active research on biological control of willows being conducted in Australia. No biological control agents have been released in Australia.

Willow sawfly, *Nematus oligospilus*, is believed to have accidentally arrived in Australia. It was first recorded in Canberra in 2004, and by April 2006 was present throughout southern Australia. The larvae of willow sawfly feed on willow leaves, and large populations may defoliate willow trees.

It is unknown what the long-term impact of willow sawfly will be, but it should not be relied upon as a control technique.

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

Willows national management guide. Victorian Department of Primary Industries (2007). <https://profiles.ala.org.au/opus/b6be6ec2-37e5-43c6-a2c0-7f5427cb8d93/profile/229669b8-0806-40de-aa88-89caf42291e4/attachment/d6e02c28-73f3-4f8f-b441-e0f1257fbf74/download> (PDF, 11 MB)

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