CENTRE FOR
INVASIVE SPECIES SOLUTIONS

BEST PRACTICE MANAGEMENT FOR THE CONTROL OF blackberry (*Rubus* spp.)

ADDENDUM TO THE WEEDS OF NATIONAL SIGNIFICANCE BLACKBERRY CONTROL MANUAL

WEEDS.ORG.AU

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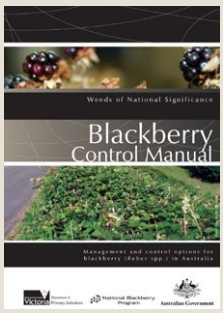
Cover images

Front — Blackberry handspraying from back of ute.
Image by NSW Department of Primary Industries.

Back — Blackberry with rust at Bega, NSW.
Image by NSW Department of Primary Industries.

How to use this addendum



The blackberry control manual **(PDF, 6.6 MB) was published in 2009 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 2009 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 blackberry and its management.

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

Section 4: Blackberry control practices

Control with herbicides

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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 blackberry at time of publication are listed in Table 7.

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

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)

Water quality

Page 43 – The pH of spray water rarely creates a problem for spray efficacy unless it is above 8. Adding glyphosate to the spray solution will drop its pH automatically.

Herbicides at a glance – mixtures of actives

Page 44 – Grazon® DS is no longer marketed.

Herbicide mode of action (MOA) groups have now changed for global harmonisation of herbicide resistance management. Herbicide labels will now reflect this change by having numbers instead of letters (Table 5).

Appendix 8 – herbicide resistance

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Table 5. Summary of herbicide groups, their associated resistance risks and their MOAs

MODE OF ACTION GROUP		RESISTANCE RISK	HERBICIDES
NEW	OLD		
2	B	High	metsulfuron-methyl
5	C	Moderate	hexazinone
4	I	Moderate	2,4-D; triclopyr; picloram; aminopyralid
9	M	Moderate	glyphosate
34	Q	Moderate	amitrole

Visit the CropLife Australia website www.croplife.org.au for more information on herbicide resistance and its management.

Chemical control of blackberry

Page 45 – Herbicides registered for the control of blackberry are found in Table 6, while minor use permits are found in Table 7.

Table 6. Herbicides permitted for use on blackberry under registration as at September 2023

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	glyphosate[3] (360 g/L)	Weedmaster® Duo	1.0–1.3 L/100 L water handgun	All	Add Pulse® as per label. Apply to actively growing bushes. Spray to wet all foliage.
	aminopyralid + metsulfuron (375 + 300 g/kg)	Stinger®	20 g/100 L water Add Pulse® Penetrant or Uptake® oil.	All	Spray to thoroughly wet all foliage and canes. Ensure peripheral runners are sprayed. Follow-up applications over at least two seasons are essential for complete control. It is not recommended to apply to bushes bearing mature fruit.
	metsulfuron-methyl (600 g/kg)	Associate®	10 g/100 L water + Pulse® High-volume handgun	All	Follow label instructions for different jurisdictions.
			1 g/L +Pulse® Low-volume gas gun		
Native Pastures[¥], rights of way, commercial and industrial areas			160 g/ha Helicopter only	NSW, Tas, Vic only	Follow label instructions for different jurisdictions. Use not less than 100 L prepared spray/ha.
Pastures and Forests Planting interval: wait a minimum of 1 day per gram metsulfuron before planting.	metsulfuron-methyl (600 g/kg) + glyphosate[3] (360 g/L)	Associate® + Weedmaster® Duo	60 g + 8.0 L/ha Aerial or ground boom	All	Apply from flowering until prior to leaf yellowing. Due to widespread picking of blackberries, do not apply to bushes bearing mature fruit. Use Pulse® Penetrant at the rate of 500 mL per 100 L water.
			3 g + 400 mL/100 L water Handgun or knapsack		
Non-crop areas including: native vegetation, conservation areas, gullies, reserves and parks	aminopyralid + picloram (4.5 + 45 g/L)	Vigilant® II	Apply a 3–5 mm layer of gel for stems less than 20 mm. Apply 5 mm layer on stems above 20 mm.	All	Cut stump

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	aminopyralid + picloram[4] + triclopyr (8 + 100 + 300 g/L)	Grazon® Extra	350 or 500 mL/100 L water High-volume handgun application	All	In association with docks, ragwort, smartweed, thistles Apply during late spring to autumn when actively growing. Ensure complete plant cover including foliage and stems.
			Undiluted CDA application		
			335 mL/10 L water Low-volume gas gun/ sprinkler		Apply to actively growing bushes which are able to be sprayed on all sides. For larger bushes, the high-volume application technique is recommended.
			10 L/ha Aerial application only	ACT, NSW, NT, Qld, SA, Vic, WA only	Apply summer to autumn. See label for critical comments
	picloram[4] + triclopyr[3] (100 + 300 g/L)	Adama Fightback®	350 or 500 mL/100 L water High-volume handgun application	All except NT	Use the higher rate on plants that have been damaged by grazing stock or insects and on known difficult-to-kill blackberry. Where herbicides other than Group 4 herbicides have been used, allow two seasons regrowth to occur before respraying.
			Undiluted CDA application		Late spring to autumn
			335 mL/10 L water Low-volume gas gun/ sprinkler	ACT, NSW, NT, Qld, SA, Vic, WA only	Apply to actively growing bushes which are able to be sprayed on all sides. For larger bushes, the high-volume application technique is recommended.
			10 L/ha Aerial application only		Apply summer to autumn. See label critical comments

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	aminopyralid + picloram[4] + triclopyr (25 + 100 + 200 g/L)	Tordon® Regrowthmaster™ herbicide	500 mL/100 L water High-volume handgun	All except NT	Spray late spring to autumn. Always use an adjuvant. See label.
	picloram4 + 2,4-D (75 + 300 g/L)	Tordon® 75 D	1.3 L/100 L water High-volume handgun	Vic only	December to January Spray regrowth in autumn
	picloram[4] (240 g/L)	Adama Picoflex™	145 mL + 140 mL triclopyr (750 g/L)/100 L water High-volume handgun	All	In association with docks, ragwort, smartweed, thistles Apply during late spring to autumn when actively growing. Ensure complete plant cover including foliage and stems.
			405 mL + 625 mL 2,4-D amine (625 g/L)/100 L water High-volume handgun	Vic only	December to January Spray regrowth in autumn.
	triclopyr[3] (600 g/L)	Garlon® 600	170 mL/100 L water High-volume handgun	All (note: ester formulations of triclopyr are restricted use chemicals in Victoria[5])	Apply during time of active growth – spring to autumn. Ensure complete plant cover including foliage and stems.
Non-crop areas around buildings, commercial and industrial areas, domestic and public service areas, rights of way	amitrole + ammonium thiocyanate (250 + 220 g/L)	Amitrole® T Herbicide	2 L/100 L water High-volume handgun	Vic, Tas and SA only	Apply twice. First treatment December to January and regrowth in autumn. Respraying in later years will be necessary.
Forestry, Pasture, Commercial & Industrial areas, Rights of Way, Around Agricultural Buildings & Public Service areas.	aminopyralid + metsulfuron-methyl (93.7 g/kg + 75g/kg)	Di-Bak AM	1 capsule every 10 cm of circumference	All	Use the InJecta applicator to drill a hole and deliver Di-Bak AM capsule in the sapwood layer beneath the bark. Space capsule insertions at 10 cm, centres around tree circumference below any branching, otherwise remove or treat all branches below the capsule insertion. On multiple trunk trees ensure each trunk is treated. ALL TREES: Apply the capsules to each tree at waist height or below.

SITUATION	ACTIVE INGREDIENT	COMMERCIAL PRODUCT EXAMPLES[1]	RATE	STATE OR TERRITORY[2]	COMMENTS
Around agricultural buildings and pastures	hexazinone[3] (250 g/L)	Velpar® L	4 mL spot for each bush Soil applied	All	Single-crowned bushes up to 1 m tall Apply near base of crown. Tas: Do not apply to bushes that have mature or bear mature fruit.
Grazing pastures, forests and rights of way	picloram[4] (20 g/kg)	Tordon® Granules	45 g/m^2 Soil applied	Vic, Qld, NSW, SA and WA only	Residual for root application Do not apply when plant may be stressed (not actively growing).

Use of soil-applied herbicides must be in accordance with state and/or local native vegetation legislation.

– Do not use soil-applied herbicides within a distance of two to three times the mature height of wanted trees.

– Do not apply hexazinone within 30 m of a recognised watercourse.

Notes to this table can be found at the bottom of Table 7.

Table 7. Herbicides permitted for use on blackberry under minor use permits as at September 2023

PERMIT NO.	EXPIRES	PERMIT HOLDER	ACTIVE INGREDIENT	COMMERCIAL PRODUCTS[1]	RATE	COMMENTS
ACT						
PER85613 For the control of blackberry and loganberry in non-crop situations	31 March 2023	ACT Parks and Conservation Service	triclopyr (600 g/L) only	Garlon® 600	Boom spray 4.8 L/ha in 400–800 L/ha	Used by persons generally Bushland areas, plantations, reserves, public land, leased land and non-crop situations.
PER87642 For the control of willow regrowth and blackberries on public land, including riparian zones and aquatic situations	30 June 2024	ACT Parks and Conservation Service Persons who can use the product under this permit: ACT Parks and Conservation Service staff and contractors only	metsulfuron-methyl (600 g/kg)	Associate®	15 g/100 L water Knapsacks and handgun	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.

PERMIT NO.	EXPIRES	PERMIT HOLDER	ACTIVE INGREDIENT	COMMERCIAL PRODUCTS[1]	RATE	COMMENTS
NSW						
PER11916 Control of various weed sin urban bushland, forests and coastal reserves	31 March 2025	NSW Dept. of Primary Industries	Glyphosate (360 g/L)	Roundup®	Undiluted	Cut stump/scrape stem
PER14591 Control of blackberry in pine plantations	31 August 2024	Forestry Corporation of NSW	Metsulfuron (600 g/kg) + glyphosate[3] (460 g/L)	Associate®[1] WIPE-OUT 450	60 g 600 g/kg + 6.4 L 450 g/L per hectare	Ground or aerial spraying. Refer to permit for critical use comments.
PER90453 Control of blackberry and volunteer pine wildlings in pine plantations	31 May 2024	Hume Forests Limited	Metsulfuron (600 g/kg) + glyphosate[3] (360 g/L)	Associate®[1] Roundup®	61–160 g/ha + 8 L/ha	Situation: Pine plantation (pre-plant spray and associated management activities). Apply by aerial (helicopter) boom spray. Use a spray volume of 100 L/ha. Refer to permit for critical use comments.
PER83324 Control of certain weeds in aquatic situations (non-potable)	31 August 2025	Snowy Monaro Regional Council	Metsulfuron (600 g/kg) + glyphosate[3] (360 g/L)	Associate®[1] Roundup® Biactive	10 g/100 L + 200 mL/100 L	Aquatic situations (nonpotable) within Snowy Monaro Regional Council and Queanbeyan-Palerang Regional Council only. Refer to permit for critical use comments.
PER12363 Product for controlling various environmental weeds in natural ecosystems using helicopter and drone/unmanned aerial vehicle spot-spraying equipment	31 March 2026	National Parks and Wildlife Service	Metsulfuron (600 g/kg) + glyphosate[3] (360 g/L)	Associate® Roundup®	As per permit	Staff or contractors employed/contracted by the National Parks and Wildlife Service or agencies/organisations represented on NSW Local Land Services Regional Weeds Committees

PERMIT NO.	EXPIRES	PERMIT HOLDER	ACTIVE INGREDIENT	COMMERCIAL PRODUCTS[1]	RATE	COMMENTS
Qld						
PER82631 For the control of woody weeds in forestry plantation fallows using aerial (helicopter) application	31 March 2028	HQ Plantations	triclopyr (600 g/L) only	Garlon® 600	3 L/ha	Licensed aerial application contractors working under the direction of the Permit Holder See label for critical comments.
SA						
PER91974 For the control of woody weeds in non-crop situations	31 January 2027	Primary Industries and Regions South Australia	triclopyr (600 g/L) only	Garlon® 600	1 L:30 L diesel Cut stump or basal bark	Persons generally Nature reserve and other native vegetation, roadsides, urban open space and forests
PER13371 For the control of environmental weeds in South Australia	30 April 2027	Primary Industries and Regions South Australia	Glyphosate (360, 450 g/L)	Various	1:1 water Cut stump	Persons generally
			metsulfuron (600 g/kg) + glyphosate[3] (360 g/L)	Various	3 g + 1 L/100 L water + adjuvant	
Tas						
PER84775 For the control of environmental weeds in non-crop and bushland situations	30 June 2025	Dept. Primary industries, Parks, Water and Environment	metsulfuron (600 g/L)	Associate® 1	As per label rate. If weed not recorded on label: 1 g/L + Pulse penetrant (2 mL/L) Gas gun	Persons generally
			triclopyr (600 g/L)	Garlon® 600	1:60 diesel Cut stump	

PERMIT NO.	EXPIRES	PERMIT HOLDER	ACTIVE INGREDIENT	COMMERCIAL PRODUCTS[1]	RATE	COMMENTS
WA						
PER13333 Various herbicides/ non-crop, agricultural, food-producing areas/ environmental weeds	31 March 2025	DPIRD For more information contact WA Pest and Disease Information Service 08 9368 3333 or email padis@dpird.wa.gov.au	triclopyr (600 g/L)	Garlon® 600	15–40 mL/10 L water	Knapsack
			picloram[4] + triclopyr (100 + 300 g/L)	Various	35–50 mL/10 L water	Knapsack Spray flowering to fruit maturity, usually from December to April.
PER86144 For the control of woody weeds in non-crop situations Shire of Mundaring, WA only	31 March 2023	Shire of Mundaring	triclopyr (600 g/L) only	Garlon® 600 + Envirodye Blue	1:30 L diesel Cut stump only	Persons generally

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

2 Products may be registered for use on blackberry 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 350, 450, 510, 540, 570 and 600 g/L and 700, 720 and 800 g/kg concentrations. Check the label for application rates.

4 Higher doses of picloram (such as by soil application) can remain active in soil for extended periods and may leach into groundwater.

5 Users of Agriculture Victoria restricted-use chemicals must hold an Agricultural Chemical User Permit (ACUP) or be working under the direct and immediate supervision of an ACUP holder and must make and keep certain specified records of use for two years. For more information: agriculture.vic.gov.au/farm-management/chemicals/offlabel-chemical-use/restricted-use-and-restricted-supply-chemicals

¥ Will damage legumes in pastures.

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.

Stem injection with encapsulated herbicide

Stem injection of herbicide capsules can be used to control blackberry infestations. Di-Bak AM is a herbicide produced in capsule form, containing a combination of aminopyralid and metsulfuron-methyl.

Capsules can be inserted into the tree using a specially designed handheld applicator. The applicator, used in conjunction with a hand held drill, first drills a hole into the tree stem and then inserts the capsule. The capsule is sealed in place with a plug.

Alternatively, drill a 25-mm-deep hole in the tree stem using an 8 mm-diameter drill bit, approximately 10–30 cm above ground level. Insert one capsule and seal with a plug immediately.

Over time, the capsule dissolves, releasing the herbicide into the plant. This process can be performed at any time of year and is a cost-effective method suitable for low-to-high-density populations.

Further information on using this technique can be found at
https://www.bioherbicides.com.au/about/videos-resources/

Aerial application – drones

Page 56 – There has been a growing interest in the use of unmanned aerial vehicles (UAVs or drones) in aerial spraying programs. Recent drone technology using a rotary atomising spraying system may enable more precise spraying and reduced drift. Drone technology enables highly targeted treatment of weeds in disturbed or inaccessible areas, and has been shown to significantly reduce the amount of chemicals and water used compared with ground-based herbicide application. Regulation requires pilots maintain a line of sight with the drone, which may not always be achievable in hard-to-access areas.

Recent studies and trials, such as those run by Victorian Blackberry Taskforce, have shown that drones are a cost-effective and efficient method for controlling weeds, with some models able to cover approximately two acres per flight and averaging 10 minutes of flight time. Drone use, in addition to complying with the same legal requirements as regular aircraft, requires completion of training in preparation, applying, transporting and storing chemicals. This technology should not be implemented where native vegetation or sensitive horticultural crops cannot be avoided.

Physical control methods

Page 57 – When removing small, isolated plants, ensure proper disposal by burning or containing in black plastic bags, or discuss options with your local council for disposal in an approved deep burial facility.

Biological control

Page 64 – One biological control agent is present in Australia, the rust fungus, *Phragmidium violaceum, of which 10 strains have been released and are present.*

In Australia, blackberry is composed of a collective of at least 16 closely related species, subspecies, varieties and hybrids belonging to the Rubus fruticosus aggregate, with varying levels of susceptibility to P. violaceum. Consequently, where mixed infestations are present, a species that has been effectively controlled with a biological control agent can be replaced by one with a higher tolerance, meaning the rust has minimal or no impact.

Blackberry rust is widespread, and little is to be gained by redistributing it. Where plants are not infected, conditions are likely to be suboptimal and too dry for the rust to thrive, and it will be necessary to use another control method such as herbicides or mechanical control.

Further information on collecting, rearing and monitoring biological control agents on blackberry can be obtained from the *Biological control of weeds: a practitioner's guide for south-east Australia* (Harvey et al. 2021), https://www.dpi.nsw.gov.au/biosecurity/weeds/weed-control/biological-control/biological-control-of-weeds-manual

Current research

Research is ongoing, including the potential importation of agents for host specificity testing, and genetic research to better understand the origins of Australian blackberry populations.

Biocontrol Hub

Information-sharing is vital to the success of biological control of weeds. Recording what weed species you are controlling, and the locations of agent-release sites can assist others obtaining access to the right agents for their infestation.

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

The 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 and
- 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

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Weeds Australia blackberry weed profile. Weeds Australia (2019). https://weeds.org.au/profiles/blackberry-european/

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