

Blackberry

Invasive Species Unit

Introduction

Recognised as one of the worst weeds in Australia, blackberry was declared a Weed of National Significance (WoNS) in 1999. Blackberries belong to a large genus (group of species) called *Rubus* which includes other berry plants such as raspberries (*R. idaeus*), dewberries (*R. roribaccus*), and loganberries (*R. loganobaccus*).

In NSW the group of blackberries that are considered to be noxious weeds are referred to as the *Rubus fruticosus* aggregate (*R. fruticosus* agg.) or, commonly, as European blackberries.

Currently there are 16 species in the *R. fruticosus* aggregate that occur in Australia, with the following nine species occurring in NSW:

- *R. anglocandicans*
- *R. leucostachys*
- *R. polyanthemus*
- *R. laciniatus*
- *R. ulmifolius* var. *ulmifolius*
- *R. ulmifolius* var. *anoplothysus*
- *R. vestitus*
- *R. leightonii*
- *R. phaeocarpus*



Figure 1: Blackberries are semi-deciduous, scrambling shrubs that form dense thickets.

There are a number of other introduced weedy *Rubus* species that are often referred to as blackberry but are not declared noxious in NSW, including:

- *R. laudatus*
- *R. philadelphicus*
- *R. roribaccus* (dewberry, youngberry, boysenberry)
- *R. loganobaccus* (loganberry)
- *R. ellipticus* (yellow Himalayan raspberry)
- *R. rugosus* (keriberry)
- *R. niveus*
- *R. idaeus* (raspberry)

There are also a number of native *Rubus* species in Australia, with *R. pavifolius* growing most commonly in association with *R. fruticosus* agg. species.

This Primefact provides information specific to the *R. fruticosus* aggregate in NSW.

Habitat and distribution

Blackberry infests about 9 million hectares of land in Australia. It is mostly restricted to areas with temperate climates (warm summers, cool winters) with an annual rainfall of at least 700 mm (regardless of altitude), but plants can grow in lower rainfall areas when other environmental conditions are favourable (such as along the banks of watercourses).

The *R. fruticosus* agg. has probably reached its climatic limit of distribution; however, individual species in the aggregate may not have done so. The *R. fruticosus* agg. species in NSW currently occur in the following distribution:

- *R. anglocandicans* – most common species occurring in all wetter areas of the state
- *R. leucostachys* – widespread
- *R. polyanthemus* – recorded in Kosciuszko National Park
- *R. laciniatus* – recorded in wetter areas of the state
- *R. ulmifolius* var. *ulmifolius* – widespread
- *R. ulmifolius* var. *anoplothysus* – possibly present in NSW
- *R. vestitus* – recorded but not common
- *R. leightonii* – recorded
- *R. phaeocarpus* – Kowmung River area

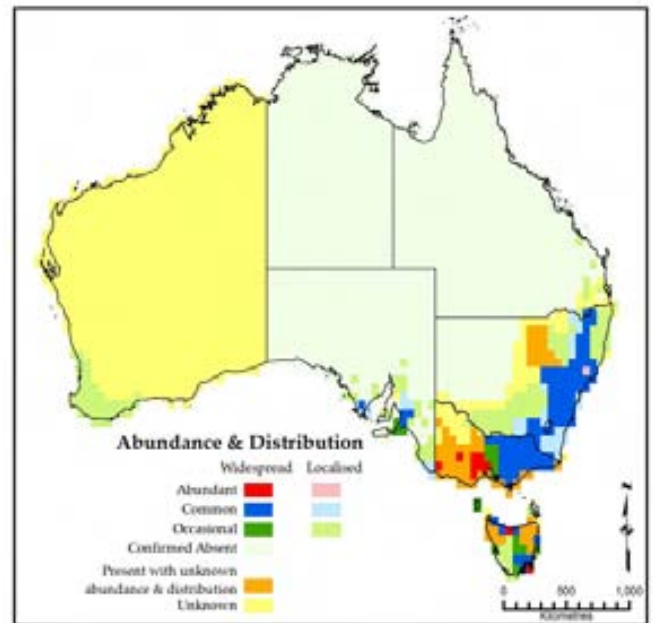


Figure 2: Distribution of the *R. fruticosus* agg.

Impact

Blackberry grows vigorously and can infest large areas quickly. Negative impacts include:

- reduced available grazing land (most livestock find blackberry unpalatable) and restricted livestock access to water (when growing densely around waterbodies)
- reduced productivity of land caused by shading out of pastures and crops, and competition for soil moisture and nutrients
- problems in forestry such as the prevention of regeneration of hardwood forests and reduced capacity of plantation softwood and hardwood seedlings to establish and grow. Thickets of blackberry also hinder access for forest operations
- degradation of natural environments by displacing native plants and reducing habitat for native animals
- devaluation of visual and recreational aspects of public land, parks and reserves
- provision of harbour for vermin such as rabbits and foxes, and seasonal food for exotic animals such as starlings, blackbirds and foxes. These pest species also disperse blackberry seed, acting as vectors that spread blackberry infestations
- increased fire hazard caused by dead blackberry material and obstruction of access to fire trails and water for controlling fires.

On the positive side, blackberry produces:

- fruit (berries) which is favoured by many people and which can be eaten fresh, or used in cooking and preserves
- blackberry flowers which produce nectar for bees to make honey
- leaves that can be used to make herbal teas, medicinal products for chest ailments, and astringents for skin care
- food and protection from predators for a number of native animals and birds, such as bandicoots and blue wrens.

Blackberry has been estimated to result in a loss of production and cost of control of between \$95.1 million and \$102.8 million in Australia. In comparison, the aggregated benefits of blackberry have been estimated to be approximately \$1.5 million per annum, indicating that the negative impacts of blackberry vastly outweigh the positive impacts (CRC, 2006).

Description

Blackberries are semi-deciduous, scrambling shrubs with tangled, prickly stems that form impenetrable thickets several metres high.

Due to a large amount of variation between species,

the best way to correctly identify a blackberry species is to send samples to a herbarium. The best time to collect samples for herbarium identification is when the plant is flowering. Include segments of both the primocane (first year cane) and the florican (flowering cane) (see Figure 3). Keep one specimen for reference and send two to the herbarium. For more information on collecting samples see the Primefact *Collecting and preparing plant specimens for identification* and the *Blackberry Control Manual* (see 'Publications available' below), or contact your local weeds officer.

Root system

The root system is the perennial part of the plant. It comprises a woody crown that can grow up to 20 cm wide with a main root that can grow to a depth of 4 m. Secondary roots grow horizontally from the crown for 30-60 cm, then grow down and shoot thin roots in all directions.

Stems

Stems are known as canes and can grow up to 7 m long. They can be erect, semi-erect, arched or trailing. With the exception of *R. ulmifolius* var. *anoplothyrsus*, the canes are covered in sharp prickles. Canes generally live for two years

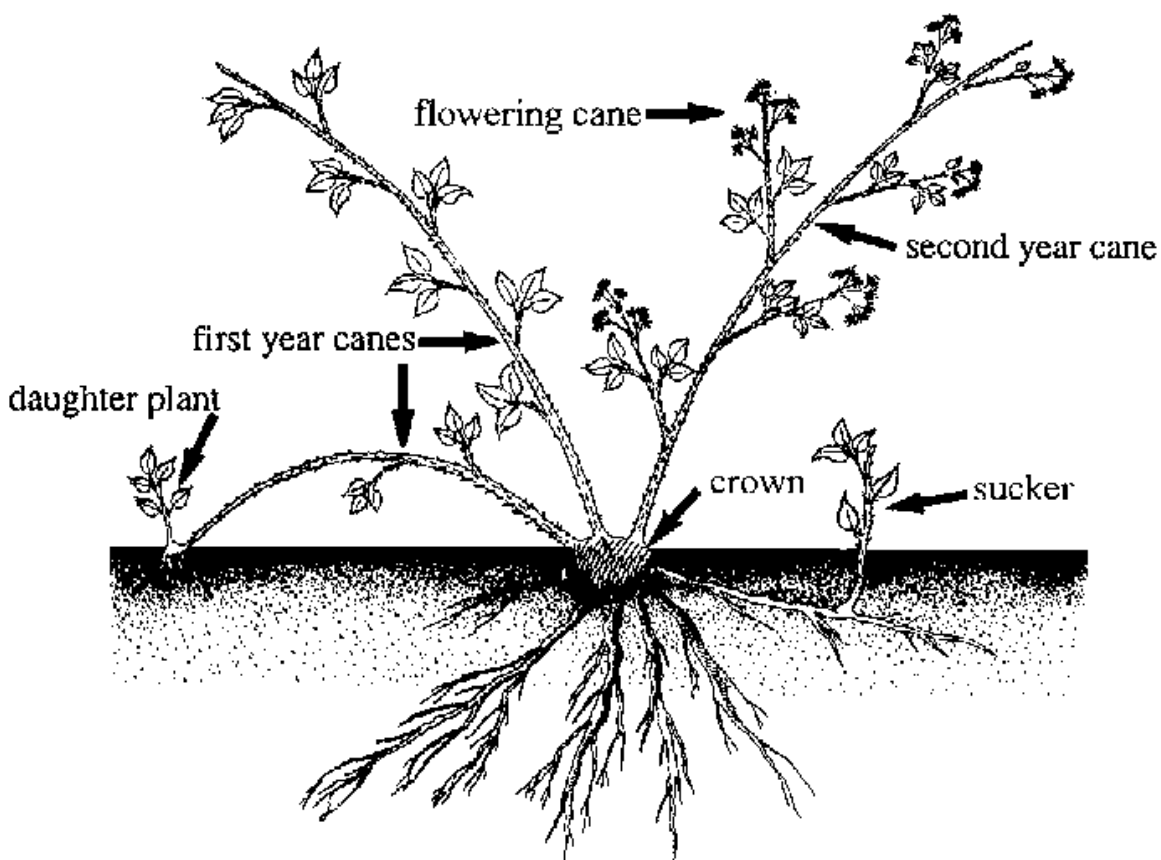


Figure 3. Growth pattern of the *R. fruticosus* aggregate.

(biennial) but may live for longer. They may be green, purplish or red depending on their exposure to light. The first year canes (primocanes) root where they touch the ground, producing a daughter plant. In their second year, primocanes form buds which sprout in spring to produce short canes (floricanes) that terminate in a branched cluster (panicle) of flowers and fruit.

Leaves

Leaves generally occur alternately along canes, are compound (with three to five leaflets), and are dark green on top with a lighter green underside. Leaflet veins and stalks are covered with short, curved prickles. Most leaves shed from the canes during winter except in warmer climates.



Figure 4: Leaves are compound (three to five leaflets,) light green on the underside and dark green on top.

Flowers

White or pink flowers 2-3 cm in diameter occur at the end of floricanes from late November to late February. Clusters of flowers are either cylinder or pyramid-shaped, and may change colour between budding and opening depending on the species.



Figure 5: Blackberry flower (*R. anglocandicans*).

Fruit and seeds

Berries (fruit) are 1-3 cm in diameter, and occur from late December to April, changing colour from green to red to black as they mature. Each berry consists of a number of fleshy segments (drupelets), and each drupelet holds one seed.



Figure 6: Blackberry fruit (berry), showing drupelets (*R. anglocandicans*).

Lifecycle reproduction and spread

All blackberries can reproduce both vegetatively and by seed. The following describes these two methods of reproduction for the *R. fruticosus* agg.

Reproduction by seed

Apart from *R. ulmifolius*, the *R. fruticosus* agg. species are opomictic plants; that is, the plant's embryo is stimulated but not fertilised by pollen, producing a clone. Where hybridisation occurs, one parent is likely to be the sexually reproducing *R. ulmifolius*. Each berry can contain from 20 to 30 seeds. At the end of the blackberry season, there may be up to 13,000 seeds/m² under a blackberry bush. Plants in dense shade will produce fewer seeds than those in open areas. Seedling survival rate is also considerably lower in shaded areas compared to areas with full sun.

Vegetative reproduction

Where the tips of the primocanes touch the ground, roots may sprout in autumn and become new plants. These 'daughter plants' will then produce a primocane in the following spring. When the second year primocanes die, the daughter plant continues as an independent plant. *R. fruticosus* agg. species can also produce sucker plants and can reproduce from root fragments and other plant parts.

Birds, mammals (including foxes and humans), water and contaminated soil can all act as vectors for blackberry seeds, sometimes spreading them a long way from the mother plant.

Management and control

Detailed information about the control and management of blackberry is provided in the Blackberry Control Manual (see 'Publications available' below).

Maintaining control of blackberry is an ongoing process. It cannot be achieved with a one-off effort, especially with larger infestations. The best way to manage blackberry is to develop a plan that details the factors to be considered, the control methods to be used, and the monitoring and rehabilitation regimes to be implemented. Develop a management plan using the following steps:

- Step 1 – Assess the problem (likely impacts of control methods; characteristics of infestation such as size, density, access); record the assessment on a topographic map; take photographs of the infestation.
- Step 2 - Prioritise the areas for management; set up treatment zones (see Table 1 below); note where the infestation appears to have come from.

Table 1 – Treatment zones for prioritising blackberry control.

Zone	Characteristics	Actions
Exclusion zone	Area free of blackberry	Monitor and eradicate new plants
Eradication zone	A few well-defined thickets	Eradicate infestations Monitor for new plants and eradicate
Containment zone	A few large well-defined infestations with outlying thickets	Start control where spread is most rapid Work from outer edges in Control to prevent reproduction Protect high value assets
Protection zone	Infestations widespread and scattered	Control to reduce impacts and prevent spread

- Step 3 – Develop the management plan; set a short term (first year), medium term (2-3 years) and long term (5 years) goal for each action; choose appropriate control methods; allocate financial resources and time for control as well as for follow-up and monitoring.
- Step 4 – Implement the plan; monitor, record, re-treat, rehabilitate; keep records and review progress.

Herbicides

Herbicides are the most reliable method for achieving local eradication of blackberry. For best results they should be used in combination with other control methods. A number of herbicides are registered for use on blackberry, each with advantages and disadvantages. Table 2 below briefly summarises some of these. See the Noxious & Environmental Weed Control Handbook for a complete list of herbicides registered for blackberry control in NSW (see *Publications available* below).

Table 2 – Herbicides for blackberry control

Herbicide (active ingredient)	Characteristics
Metsulfuron-methyl	Absorbed through foliage and root system; recommended for initial treatment of large, dense infestations
Glyphosate	Absorbed through foliage; recommended for small infestations that are easy to check and re-treat and areas where other herbicides cannot be used, such as in or near watercourses
Triclopyr	Absorbed mostly through foliage; recommended for initial treatment of large infestations
Picloram	Absorbed through foliage and roots; persistent in the soil; useful where pellet formulations are considered the most appropriate technique
Picloram + Triclopyr**	Recommended for most infestations, both large and small; usually provides highest levels of control

**with or without aminopyralid

Consider the following when selecting a herbicide for blackberry control:

- proximity of the site to water – this affects the choice of registered herbicides
- selectivity of the herbicide – it is usually best to retain desirable vegetation and groundcover where possible
- cost of herbicides - at their highest application rates, the relative costs of the afore-mentioned herbicides from lowest to highest is: metsulfuron-methyl; triclopyr; picloram; glyphosate; picloram + triclopyr
- level of control - experience has shown that a mixture of triclopyr + picloram used with or without aminopyralid will give the greatest long-term control
- application costs – for large infestations the cost of treatment is often underestimated. The costs of retreatment also need to be considered.

The success of any herbicide application will depend on:

- variation in herbicide application – large bushes are commonly under-sprayed. Foliar treatments must ensure that the inner leaves and canes of bushes are sufficiently wetted along with the outer canopy
- seasonal timing of application – optimal time for treatment is during the active growth stage from flowering to fruiting (usually December to March). Translocated herbicides applied in autumn can achieve better kill rates as long as the plants are actively growing
- the condition of the plant being treated – plants must be free of moisture stress or disease. Check that tips of canes have new, soft leaves
- weather conditions at the time of treatment – temperatures over 30°C can cause heat stress to plants, limiting uptake of herbicide, particularly when humidity is also high
- the age of the plant – plants in their first year of growth are easier to kill with herbicides. Old, well-established thickets may require a number of treatments. At least 1 m of growth on canes is required for successful treatment
- pre-control activities (e.g. slashing or burning) – after slashing or burning ensure enough regrowth, prior to herbicide applications
- the species of blackberry – some species are more resistant to certain herbicides than others. Correct identification of the species and monitoring the results of the treatment are critical for successful control
- the quality of the water used to mix herbicide – pH, water hardness and dirty water can all affect the results of a herbicide treatment. Use the best quality water available.

There are various ways of applying herbicides to blackberry infestations, depending on the size of the infestations and other aspects such as accessibility and proximity to waterways. For detailed information on selecting and applying herbicides for blackberry control, see the Blackberry Control Manual (see 'Publications available' below).

Physical control

Physical control alone is rarely successful because of the root structure of blackberry. These techniques are best used in combination with herbicides. The various methods of physical control are:

- hand removal of top growth and digging up of roots - this method may be suitable for small and isolated infestations. Combining hand removal with cut stump herbicide application gives better results
- mechanical grubbing and scalping - this method can be successful if the hoe or root rake completely removes the plant, including all roots
- cultivation of the ground - because blackberry can reproduce vegetatively as well as sucker, cultivation can simply spread blackberry. However this method may be suitable if it is carried out frequently enough
- using earthmoving equipment or slashing - this method is unlikely to remove root material and may even promote growth but can be useful to gain initial access to heavy infestations for further treatments.

Biological control

Biological control methods use natural enemies of blackberry to suppress and weaken plants. Currently the only deliberately released biological control agent in Australia is the leaf rust fungus *Phragmidium violaceum*. The fungus is only effective on the *R. fruticosus* agg., attacking the leaves and causing defoliation. It also infects flower buds and unripe fruit. The tips of infected canes die back, preventing the production of daughter plants. Overall the fungus reduces a plant's ability to grow and reproduce.

Phragmidium violaceum spores need dew, rain or high humidity to germinate. It is most effective when most of the plant's canopy is young leaves, in areas where annual rainfall is greater than 750 mm and evenly spread over the year, and where January temperatures average about 20°C.

There is currently an active program of releasing *Phragmidium violaceum* into new areas, as well as trialling other strains of fungus to specifically target other species of blackberry.



Figure 7: Blackberry leaf rust fungus. Heavily infected leaves turn brown, shrivel and fall from canes.

Grazing

Goats preferentially graze blackberry over improved pasture species. They may be useful as an initial control to reduce heavy infestations but follow-up treatment will be required after the goats are removed. The Meat & Livestock Australia publication *Weed Control Using Goats: a guide to using goats for weed control in pastures* provides useful information on the use of goats (see 'Publications available' below).

Cattle will not control blackberry infestations but will reduce tip rooting and the establishment of daughter plants.

Sheep graze blackberry seedlings depending on availability of other (more palatable) feed.

Pasture management

Pasture management or re-establishment can be an important component of a management program. Strong, actively growing pasture will help to prevent invasion from weeds.

Burning

Burning will not kill blackberry but it can be used to make infestations more accessible for follow-up treatment. Always allow sufficient regrowth before applying follow-up herbicide treatments.

Legislation

In NSW, all *R. fruticosus* agg. species are declared Class 4 weeds under the *Noxious Weeds Act 1993* (NSW).

As a Class 4 weed, the growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority, and the plant may not be sold, propagated or knowingly distributed.

All species in the *R. fruticosus* agg. (European blackberry) are banned from sale in Australia, and are prohibited entry to Australia. There are, however, a number of cultivars that can still be sold including Black Satin, Chehalem, Chester Thornless, Dirksen Thornless, Loch Ness, Murrindindi, Silvan, Smoothstem and Thornfree.

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Images

Figure 1. Bruce Auld

Figure 2. Australian Government National Land and Water Resources Audit (2009)

Figure 3. Birgitte Verbeek

Figure 4. Birgitte Verbeek

Figure 5. Alyssa Fitzgerald

Figure 6. Bruzzese and Lane (1996)

Figure 7. Courtesy of CSIRO Entomology

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