



Bridal veil infestation: Photo
DWLBC

Section 03 : Bridal Veil

BRIDAL VEIL

Asparagus declinatus L

Other species names:

Myrsiphyllum declinatum

Syn. *Asparagus crispus*

Other common names:

Pale berry asparagus fern

Asparagus fern

Bridal creeper

South African creeper



Bridal veil :Flora of NSW

Bridal veil *Asparagus declinatus* is native to the Western Cape region of South Africa. It is a highly invasive and aggressive environmental weed that can successfully out-compete and displace native flora (Leah 2001). Bridal veil produces scrambling and weakly climbing annual shoots, which can grow up to 2-3m in length. It forms a dense, underground, tuberous root mass that prevents native plant recruitment and regeneration. Bridal veil shares many characteristics with its close relative, bridal creeper, including a similar lifecycle, potential for spread and impacts on native vegetation. If not controlled, bridal veil has the potential to become a severe threat to biodiversity.

Current and predicted distribution

Bridal veil has naturalised in South Australia and Western Australia. It is a greater problem in South Australia where there are several distinct populations. Serious infestations occur on the eastern end of Kangaroo Island where it is commonly found along roadsides, on private properties and in native vegetation areas. Four distinct populations occur on the Fleurieu Peninsula, namely; Victor Harbor and surrounds, Finnis-Milang region, Myponga Reservoir and Happy Valley Reservoir. Other minor populations occur around the Adelaide metropolitan region including Cherry Gardens and the Mitcham hills.

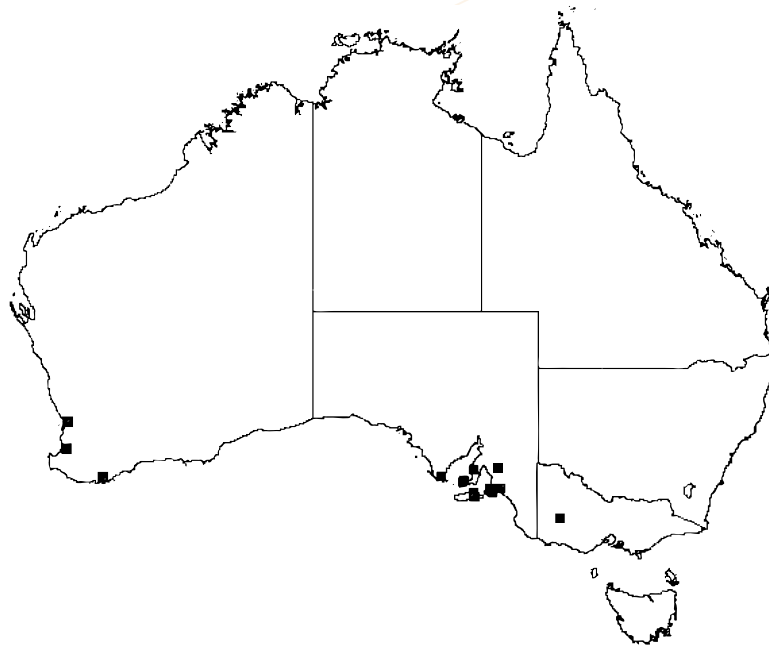
Infestations have been found in several areas on Yorke Peninsula; namely in Inneson, South Kilkerran, Stansbury and Corny Point. Eyre Peninsula has several populations in Lincoln Lakes (an old dump site), in four National Parks, Coffin Bay, and along 2.6km of roadside in Tootenilla where it has been spread by graders. Small infestations have been discovered in the South east of South Australia.

At least three established populations occur in Western Australia; Kings Park and Botanic Gardens in Perth, Bunbury, 180km south of Perth and north-west of Albany (Pheloung & Scott 1996; Keighery 1996, K. Batchelor pers. comm.).

The significance of bridal veil as an environmental weed is confirmed by distribution-climatic modelling with CLIMEX, which identifies a potentially wide suitable range, including south-west Western Australia, coastal South Australia, Victoria and eastern Tasmania (Pheloung & Scott 1996). The northern drier regions of Australia are considered unsuitable for bridal veil.

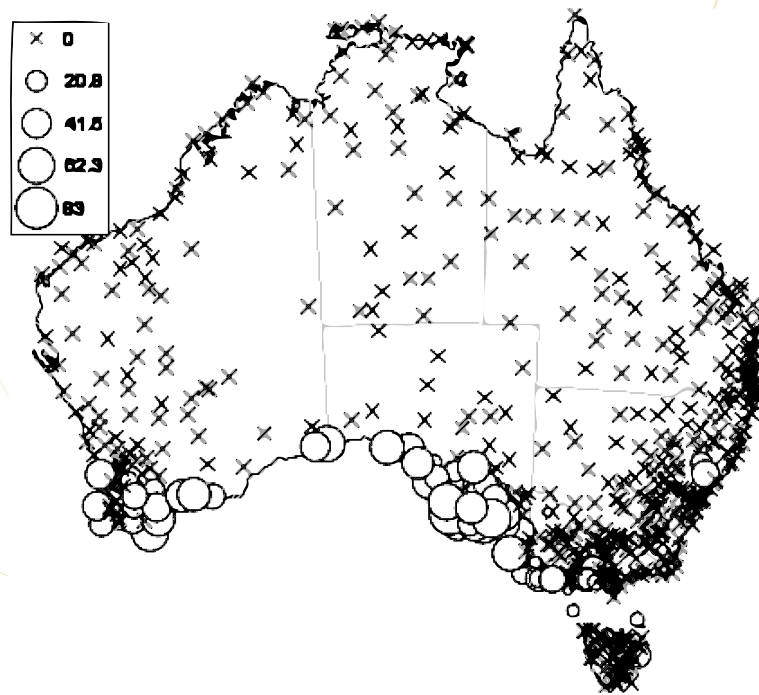
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Map 1 : Current known distribution of bridal veil (Scott & Batchelor 2006)



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Map 2: Potential distribution of bridal veil (Scott & Batchelor, 2006)



Introduction into Australia

Bridal veil was introduced into Australia as an ornamental plant (Jessop & Toelken 1986) and was first recorded as a garden plant in 1870 (Pheloung & Scott 1996). The first naturalised occurrence of bridal veil in South Australia was recorded on Kangaroo Island in 1954 (Weidenbach 1994). On the mainland, it was first recorded in 1966 near Victor Harbor and has since increased its range dramatically (Weidenbach 1994).

Dispersal methods

Initial seed dispersal observations of bridal veil in South Australia indicate the main dispersers are medium to large gregarious birds such as the grey currawong, Australian magpie, red wattlebird and brush wattlebird (Bass & Lawrie 2003). Other likely bird dispersers are the common blackbird, raven, common bronzewing, honeyeaters and silvereye. The attractiveness of bridal veil fruits to birds has been confirmed through monitoring fruit removal in South Australia. Research found that 69-80% of tagged fruits was removed during October and November (Bass & Lawrie 2003); similar removal rates to what has been observed for bridal creeper (Raymond 1996b).

Dispersal distance for bridal veil is likely to be greater than that of bridal creeper, given the difference in fruit size and array of bird dispersers. The fruit of bridal veil is nearly double the size of bridal creeper and thus has a stronger dispersal association with larger birds due to the relationship between bird gape width and fruit diameter (Bass & Lawrie 2003). Larger birds, such as currawongs, can ingest up to 15 bridal veil fruits and fly up to 10km before regurgitating seeds. If the fruits consumed by such birds averaged 6 seeds per fruit, one dispersal event could equate to 90 seeds (Bass & Lawrie 2003). Smaller birds such as silvereyes and honeyeaters are likely to consume far less fruit with each event therefore would ingest a lesser number of seeds, and disperse seed a far shorter distance ranging from 1-100m. This short distance dispersal is an important factor in the occurrence of infill plant invasions, resulting in higher density infestations.

Other potential dispersers of bridal veil include brush-tailed and ringtail possums, foxes and small rodents. Damage to fruits, possibly by a bush rat, have been observed on the Fleurieu Peninsula. There is also the potential for lizards, such as the sleepy lizard, to disperse bridal veil as white or pale coloured fruit is associated with frugivory by lizards (Lord & Marshall 2001). Dispersal can also be aided by water movement of seeds down creeks, streams, ditches and drains. Earth moving machinery such as backhoes and graders are capable of digging up tubers and depositing them in other sites where new plants shoot from the rhizome.

Humans continue to be a major distributor of the weed. The dumping of garden rubbish into the bush and roadside vegetation, unregulated sales at community markets and the exchange of plants material by gardeners all contribute to the ongoing dispersal of this serious weed.

Legal status of the weed

South Australia is the only State to have declared bridal veil a noxious weed. Serious consideration should be given by other States and Territories to declaring this weed to prevent it from establishing itself to the same extent as bridal creeper.

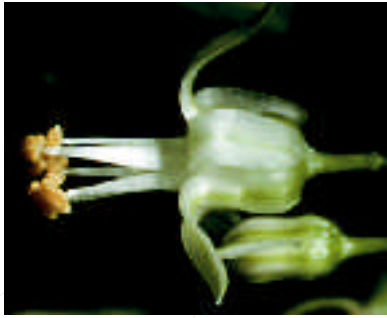
Description and lifecycle

The life cycle of bridal veil is as follows. Shoots begin to appear after the first autumn rains, usually during April or May, and scramble across the ground but do not generally climb to the same extent as bridal creeper. The onset of cool winter weather sees shoots eventuate into dense foliage becoming deep green in colour.

Above ground plant matter begins to wither and die off when temperatures rise, usually during November-December, though drying fruit has been observed to stay on the plant through to January. Over the hot summer months bridal veil senesces back to the underground tuberous root mat.

The above and below ground morphology of bridal veil is detailed below. This information will greatly assist in the field identification of this weed.

Flowers



Bridal veil flower: Photo DWLBC

Appearance and characteristics

- greenish white, bisexual and 5-8mm in diameter.
- flower buds appear during July and flowers open in August.
- flowers are nectariferous and attract the introduced honeybee *Apis mellifera*.

Berries and Seeds



Green bridal veil berries: Photo DWLBC

Appearance and characteristics

- green ovoid berries are initially light green but turn pale translucent white as they mature.
- fruit is on average 10mm long by 7mm wide.
- fruit begins to form during August and September.
- seeds are black, globose, 2.5-3.5mm in diameter with an average of 5-8 seeds per fruit.



Bridal veil cladodes (leaves): Photo DWLBC

Cladodes (Leaves)

Appearance and characteristics

- cladodes are blue-green, soft, needle-like 3-10mm.
- densely arranged in groups of 3 along short, finely-branched side shoots off a wiry, main stem.

Root system

Appearance and characteristics



- extensive underground root system consisting of branching rhizomes, which bear numerous bulb-like tubers or storage organs.
- stems emerge from the rhizome.
- The tuberous root mass generally occupies the top 15cm of the soil.
- Tuber and root mass accounts for 85% of the total mass of the plant.

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Tubers and fine roots of bridal veil:
Photo DWLBC



Digging up bridal veil tuber mats: Photo DWLBC

Growth rate

There is little knowledge of the growth rate of bridal veil. Based on research conducted by Raymond (1996a) it could be inferred that it has a similar growth rate to bridal creeper. The underground, tuberous root mat ensures that during periods of unfavourable conditions (such as during a dry season or extended drought period) the plant can draw on nutrients and moisture contained within the storage organs (Pate & Dixon 1982). Observations made on bridal veil vigour and fruiting capacity during the 2002 drought in South Australia found that during this period, foliage turned a pale yellow colour and growth rate and vigour was reduced. Similarly, fruiting levels were lower than average during that season suggesting drought conditions adversely affect bridal veil (Bass & Lawrie 2003).

Controlling infestations

The main methods of control are digging out, or grubbing, the above and below ground parts of the plant, cutting back the foliage and herbicide application. Choosing an appropriate control method depends on a number of factors including:

- size and density of the infestation.
- accessibility to the area.
- time and resources available for treatment.
- type of environment affected.
- features of the landscape (e.g. proximity to waterways or cliffs).

Keeping bridal veil out of uninfested areas

Nurseries should not sell bridal veil and gardeners should be discouraged from planting it on their properties. Safe disposal of bridal veil should be encouraged and an emphasis placed on replacing existing plants with non-invasive species.

Find out what you are dealing with

Mapping is a crucial component in establishing the following factors:

- the total area invaded.
- areas of vegetation that are under threat from invasion.
- which areas are eradicable.
- infestations that are most likely to be major seed sources.
- where to locate buffer zones.

Bridal veil infestations are often found under tall trees, power lines and fence lines or anywhere that birds are likely to perch. Whilst in the field, it is important to check the following for signs of infestation:

- tree corridors, roadside vegetation and taller trees on the verge of native vegetation areas
- always search up to several hundred metres further from where the last plant was found to ensure that all bird-dispersed seedlings are located.

Allow at least a 500 metre wide buffer zone around the edge of an infestation. It is imperative that this buffer zone be kept free of any seedlings to limit any further spread. Work back from the buffer zone towards the centre of the infestation.

Physical removal

Physical removal of bridal veil involves carefully excavating around and under the tuberous root mass and then levering it out with hand tools. This control method is only effective if all of the tuberous root mass, including the rhizomes, are dug up and removed from the site. Hand digging is

only effective for small, isolated infestations or after several years of herbicide treatment on larger infestations. The act of digging out the tubers can create considerable soil disturbance, allowing bridal veil and other weed seeds that have been lying dormant to germinate. Once the plant has been dug out it is best to replace the soil and leaf litter to prevent erosion. Plants should be grubbed during autumn and winter while soils are still moist and before fruit forms. Slashing or pulling off the foliage of bridal veil will prevent fruit production and may slowly deplete the tubers of energy over time but is very unlikely to eradicate an infestation.

Disposal of weed material

If bridal veil is controlled through physical removal, it is imperative that all tubers and rhizomes are bagged immediately and taken off site. Material should be placed into a black plastic bag and left out in a sunny spot to 'cook' the tubers. After 2-3 months, this material should be disposed of through the local government kerbside collection or taken to the rubbish tip for deep burial. Do not compost or mulch the root material, as under the right conditions rhizome fragments may still reshoot.

Herbicide treatment

Applying herbicide is the most common method of controlling this weed. Research has shown that the most effective herbicide is glyphosate + Pulse Penetrant®, sprayed during the winter to early spring flowering period when plants are actively growing. However, leaves of bridal veil are fine and waxy which can make herbicide application difficult, as the chemicals do not adhere to the leaves very well. Trials by the Kangaroo Island Asparagus Weeds Committee have shown that emulsifiable vegetable oil mixed with glyphosate + Pulse will help the chemicals to stick. There is currently no specific herbicide registration for bridal veil.

It is important that the product label is read carefully before using any herbicide. Any deviation from the labels' instructions requires an off-label-use permit issued by the Australian Pesticides and Veterinary Medicines Authority (APVMA). For further information, contact the APVMA via their website at <http://www.apvma.gov.au/index.html>.

Do not spray herbicide if plants are under any sort of stress, as herbicide will not be absorbed effectively. Bridal veil infestations are often located in areas of native vegetation and so great care should be taken to avoid spraying surrounding foliage and soil. The use of a hand sprayer, or wiping herbicide directly onto leaves, will help to reduce any off-target damage to native plants. Mixing dye in with the herbicide will help minimise missed areas and prevent over spraying. Weather conditions should be calm with low wind and no immediate rain expected.

Ensure spray equipment is correctly calibrated and maintained. Herbicide applications need to be repeated in subsequent years to progress towards eradication of an infestation. The first glyphosate application can reduce bridal veil cover by >90% and cause substantial tuber death. Follow-up herbicide application must occur within two years after a previous spray to avoid fruit set. The number of herbicide applications required to achieve total eradication is not known, but may take up to 10 years. Annual sprays may shorten the time to achieve eradication, but lack of foliage may limit effective herbicide uptake throughout the root system.

Other control methods

Other less common control methods include grazing and fire. Grazing by cattle and sheep can successfully keep bridal veil at low levels and prevent fruit production. Sheep will graze on the new shoots and are more likely to chew it down than cattle. However, bridal veil is not a preferred food source for sheep and cattle and so grazing should be considered as an opportunistic control method and not relied upon to eradicate an infestation.

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The effectiveness of fire as a control method is yet to be verified. Previous experiments using fire have had little impact on the underground tuber mat due to difficulties in maintaining fire intensity. In some high rainfall regions of South Australia, it has been observed that tubers grow in the leaf litter. A high intensity fire may 'cook' and ultimately destroy these tubers. Results from fire trials in late 2006 will be posted on the following website - <http://www.weeds.org.au/WoNS/bridalcreeper/>

Follow-up and monitoring

Follow-up work and monitoring of controlled areas is extremely important. Areas that have been grubbed should be monitored carefully for any signs of regrowth. It will take several years for an area that has been grubbed to be free from bridal veil. Plants that have been sprayed with herbicide should be monitored post-spraying to ensure that control efforts have been effective.

Biological control

At present there are no biological control agents for bridal veil in Australia.

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References and further reading

Bass, D.A. and Lawrie, S.L. 2003, Impacts, dispersal, predictive modelling and control of Bridal Veil. Environmental Weeds Group, Flinders University, South Australia.

Jessop, J.P. and Toelken, H.R. (eds) 1986, Flora of South Australia, Part IV, Alismataceae-Orchidaceae. (South Australian Government Printing Division, Adelaide).

Keighery, G. 1996, Native, naturalized and cultivated Asparagaceae in Western Australia. Plant Protection Quarterly 11, 49-50.

Leah, J.M. The impacts of the environmental weed bridal veil *Asparagus declinatus* on native vegetation in South Australia. Honours thesis, Flinders University, Adelaide

Lord, J.M. and Marshall, J. 2001, Correlations between growth form, habitat and fruit colour in the New Zealand flora, with reference to frugivory by lizards. New Zealand Journal of Botany 39, 567-576.

Pate, J.S. and Dixon, K.W. 1982, Tuberous, cormous and bulbous plants: biology of an adaptive strategy in Western Australia. (University of Western Australia Press, Nedlands, Western Australia).

Pheloung, P.C. and Scott, J.K. 1996, Climate-based prediction of *Asparagus asparagoides* and *A. declinatus* distribution in Western Australia. Plant Protection Quarterly 11, 51-53.

Raymond, K.L. 1996a, Geophytes as weeds: Bridal Creeper *Asparagus asparagoides* as a case study, Proceedings of the Eleventh Australian Weeds Conference, (eds R.C.H. Shepherd), pp. 420-423.

Raymond, K. 1996b, The ecology of bridal creeper in south-eastern Australia. Plant Protection Quarterly 11, 47.

Scott, J.K and Batchelor K.L. 2006, Climate –based prediction of potential distribution of introduced *Asparagus* species in Australia, Plant Protection Quarterly, Vol 21, No 2. Online <http://www.weeds.org.au/WoNS/bridalcreeper/>. Accessed 14/08/06

Weidenbach, M. 1994, Bridal Creeper and *Myrsiphyllum declinatum*. Managing weeds for Landcare 1994. A workshop on protecting out land from invading weeds, Urrbrae, 12 March 1994, p. 2. Leah 2001

Appendix

Growth Calendar - bridal veil												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Flowering								■	■			
Fruiting										■	■	
Dieback	■	■									■	■
Regrowth	■	■	■	■	■	■	■	■	■	■	■	■
Germination			■	■	■	■	■	■				
General Growth Pattern		■	■	■	■	■	■	■	■	■	■	■
Growth pattern in suitable conditions			■	■	■	■	■	■	■	■	■	■
Adapted from Weed CRC Bridal Creeper Weed Management Guide												

Section 03 Appendix