

Curtain of bridal creeper:  
Photo DWLBC

## Section 02 : Common Bridal Creeper

*Asparagus asparagoides* (L.) Druce

*Other species names:*

*Asparagus asparagoides* (L.) W. Wight

*Myrsiphyllum asparagoides* (L.) Willd

*Asparagus medeoloides* (L.f.) Thunb

*Dracaena medeoloides* L.f.

*Medeola asparagoides* L.

*Elachanthera sewelliae*

*Luzariaga sewelliae*

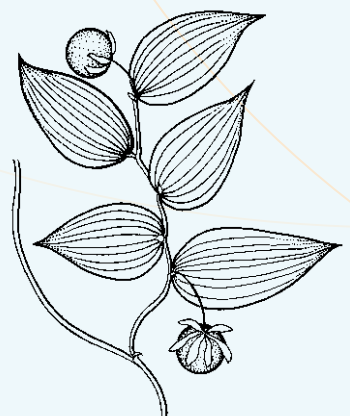
Bridal creeper : Flora of NSW

*Other common names:*

*Bridal veil creeper*

*Florist's smilax, Baby smilax,*

*False smilax, Smilax*



Bridal creeper *Asparagus asparagoides* is one of southern Australia's worst weeds, recognised as such with its declaration as a Weed of National Significance (WoNS). It is very aggressive and highly invasive in bushland, capable of smothering native ground flora and small shrubs. It forms a thick tuberous root mass, which inhibits growth of other plants and prevents over-storey regeneration. Berries are readily consumed by birds and foxes, enabling rapid dispersal of seeds. Bridal creeper invades a variety of environments including coastal areas, wet and dry sclerophyll forests, heathland, woodland, mallee shrubland, riparian areas, citrus orchards and pine plantations (Blood 2001). Bridal creeper tolerates a wide range of soil and climatic conditions and, unlike many other weeds, can readily establish in undisturbed areas. Growing conditions can vary from dense to part shade, alkaline to acidic soils of light and heavy textures, and even areas of frequent frost. The perennial root system ensures it can survive drought conditions.

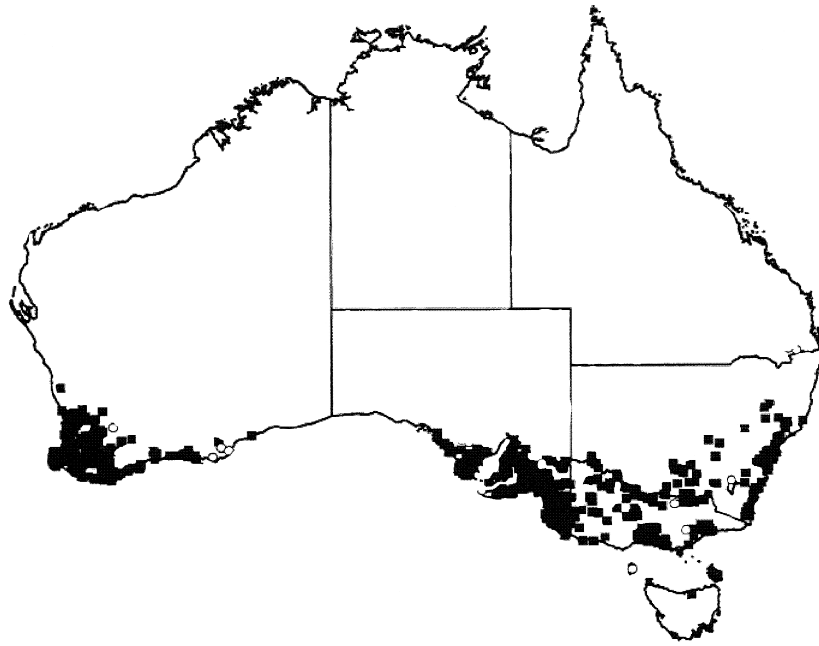
#### **Current and predicted distribution**

Bridal creeper has spread extensively throughout southern Australia and is found mainly in the winter rainfall zones (Morin et al. 2006). However, it does occur in areas with even rainfall such as coastal New South Wales (ARMCANZ 2001). Bridal creeper is widely distributed through south-west Western Australia, southern South Australia and Victoria. It is present as isolated populations across much of central, eastern and southern New South Wales (including Lord Howe Island), with larger infestations in coastal areas. Small, scattered infestations in north-east and south-east Tasmania are currently under management with an objective of eradicating the plant in the next ten years (ARMCANZ 2001). Bridal creeper has also invaded parts of New Zealand.

Climate matching models suggest that the full extent of its growth range has not yet been reached. If no action is taken it is likely to spread further into regions that have an annual rainfall greater than 350mm (Stansbury 1999). This includes central-northern and far south-eastern coasts of Western Australia, far south-western coast and northern agricultural districts of South Australia, northern and south-western Victoria, central and southern New South Wales, south-east Queensland and northern and eastern Tasmania. In areas that have lower annual rainfall it would mainly be found in irrigated areas, wet microhabitats and gardens.

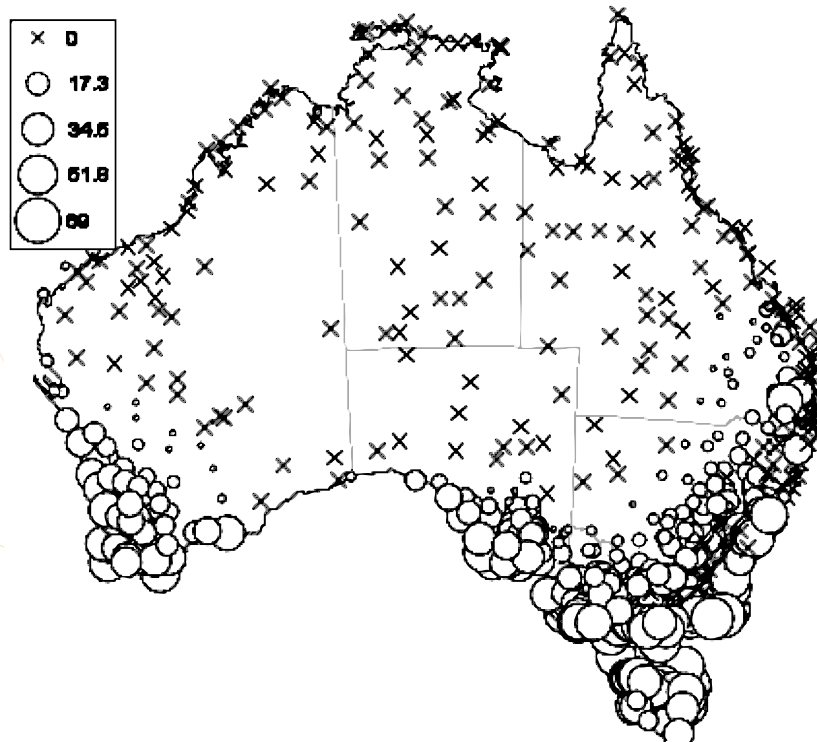
On a local scale, bridal creeper invades a wide range of natural ecosystems, with isolated remnant vegetation on roadsides and farms being particularly susceptible. Revegetation plantings such as shelterbelts are also prone to invasion as bird movements to these areas increase. Bridal creeper also grows well in citrus orchards and pine plantations. It has been found in a wide range of soils (Morin et al. 2006), commonly in sandy soils with an abundance of leaf litter (Stansbury 1999). It particularly thrives in alkaline sandy soils that have had nutrient addition from fertilisers, such as drainage lines, roadsides next to farms and orchards. High soil temperatures during the summer months inhibit productivity with low survival rates for seedlings (Stansbury 1999).

Map 1 – Current distribution National (Morin et al 2006)



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Map 2 – Potential distribution National (Scott & Batchelor 2006)



**Introduction into Australia**

Bridal creeper is likely to have arrived in Australia via Europe or the Americas (Scott 1995) as an ornamental plant. It was first recorded in Australia in 1857 in a nursery catalogue and by the 1870's it was a common garden plant (ARMCANZ 2001). The lush green foliage has been used in floral arrangements, particularly in wedding bouquets, up until as recently as 1995 (Stansbury 1999). It was listed as present in the South Australian Botanic Gardens in 1871 (Robertson 1983) and recorded as

naturalised in South Australia sometime between 1871 and 1937 (Kloot 1986). It was listed as a plant under cultivation in the Melbourne Botanic Gardens in 1883 (Stansbury 1999). Bridal creeper was listed in garden catalogues in Western Australia in 1905, however, it is likely that it had been available some time before then (Scott 1995). During the 1950's it was first recorded as naturalised in south-western Australia.

### Dispersal methods

Seed is spread via a number of dispersal mechanisms. The ripened berries are dark red and sticky, attracting frugivorous birds, which disperse seeds over varying distances. Most seed dispersal events are restricted to less than 100 metres, particularly if the berries are consumed by small birds, such as silvereyes *Zosterops lateralis*. Rare long distance dispersals, up to several kilometres, have been reported (Stansbury 2001). The main dispersers of bridal creeper seed have been identified as the silvereye and blackbird *Turdus merula* (Stansbury 2001; Raymond 1994). Other species such as the red wattlebird *Anthochaera carunculata*, singing honeyeater *Acanthagenys rufogularis*, common starling *Sturnus vulgaris*, little crow *Corous lennetti*, ringneck parrot *Barnadius zonarius* and Emu *Dromaius novaehollandiae* have been observed feeding on the fruit (Cooke & Robertson 1990; Stansbury 1996).

Foxes *Vulpes vulpes* and rabbits *Oryctolagus cuniculus* have also been recorded eating the berries and spreading seed through their scats.

Other methods of dispersal include water-aided dispersal with movement of seeds down creeks, streams, ditches and drains. Earth moving machinery such as backhoes and graders are responsible for digging up tubers and depositing them in other sites where they shoot from the rhizome.

Humans still remain a key disperser of bridal creeper. The dumping of garden rubbish into the bush and roadside vegetation, illegal sales at markets and the exchange of plants by gardeners all contribute to the continued dispersal of this noxious weed.

### Legal status of the weed

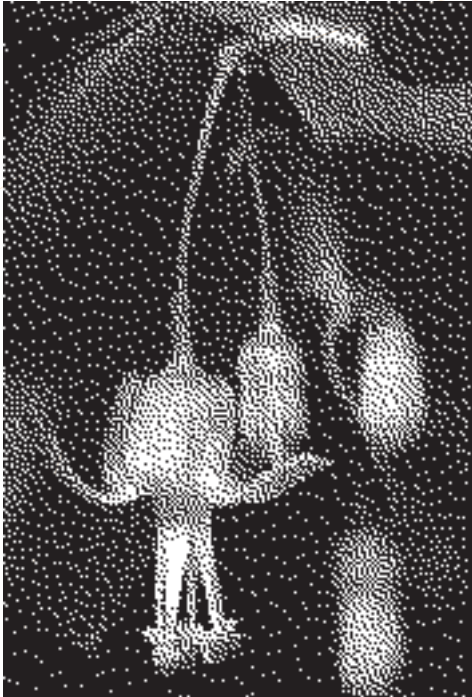

Bridal creeper has been declared a noxious weed under all State and Territory legislation.

### Description and life cycle

The above ground morphology and the known life cycle of bridal creeper is described below. This information will greatly assist field identification of this weed.

Annual shoots emerge from the underground rhizomes at or before the onset of autumn rains (Morin et al. 2006). Earlier emergence can occur in areas where summer rainfall is higher. Shoots may be visible throughout the year in areas that receive summer rains or are irrigated. Initial growth is rapid and shoots grow upright to twine amongst nearby shrubs, trees and other supports. If shoots fail to attach to a support they become more prostrate as developing leaves weigh them down.

Growth ceases in November to December and plants turn yellow and die back down to the rhizome. The plant survives below ground until the following autumn.

Flowers	Appearance and characteristics
<p><b>Bridal creeper flower: Photo DWLBC</b></p> 	<ul style="list-style-type: none"> <li>• greenish white, solitary, 6 petalled, 6-10mm in diameter</li> <li>• develop during late winter and early spring (Aug-Sep)</li> <li>• flowers are nectariferous and scented, and are visited by the introduced honeybee <i>Apis mellifera</i> (Cooke &amp; Robertson 1990)</li> <li>• there is a three-year period from germination before bridal creeper plants reach flowering size (ARMCANZ 2001)</li> </ul>
Berries and seeds	Appearance and characteristics
	<ul style="list-style-type: none"> <li>• berries are produced in early spring (Oct-Nov) and are initially green, turning pink then red/burgundy during November-December</li> <li>• small, pea-sized berries, measuring 6-10mm in diameter</li> <li>• fruit production may exceed 1000 berries/m<sup>2</sup> (ARMCANZ 2001)</li> <li>• fruit production can vary substantially from year to year and between sites</li> <li>• below average autumn-spring rainfall shorten the growing season thereby limiting fruit production</li> </ul>
<p><b>Ripe and green berries: Photo DWLBC</b></p>	<ul style="list-style-type: none"> <li>• plants in densely shaded areas or in open habitats that receive a lot of sunshine also have a limited fruit set</li> </ul>

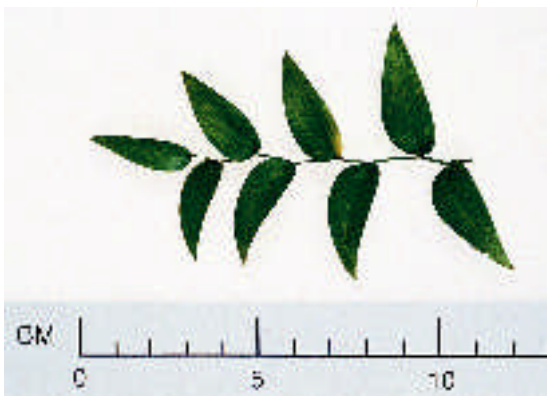


Berries persisting well into summer: Photo DWLBC

- shoots growing up support structures (e.g. trees, shrubs, fences) have greater fruit production than those growing on the ground
- seeds are 3-4mm in diameter, black and shiny with 1-9 contained within each berry
- bridal creeper is self fertile
- bridal creeper has a relatively short-lived seed bank of several years
- seeds in the leaf litter and at soil depths up to 10cm germinate during autumn and winter

**Cladode (Leaves)**

**Appearance and characteristics**



- cladodes (leaf-like branches) are broadly ovate but sharply pointed, shiny green, 10 - 70mm long x 4 - 30mm wide with many longitudinal nerves.
- cladodes are borne in groups on small side-branches, or solitary and alternate along the stem.
- cladodes begin to yellow and fall as berries ripen and stems begin to dry and die back, usually in early December.

**Tubers and Rhizome**

**Appearance and characteristics**



- numerous fleshy tubers (25–42 mm long and 8–20 mm wide) ending in roots are densely arranged along a branching rhizome (underground stem with shoot buds).
- the tuberous root mat, up to 10cm thick, can account for up to 90% of the plant's biomass.

Tubers arranged around the rhizome:  
Photo DWLBC



**Large underground tuber mat: Photo Weeds CRC**

- the tubers provide and store water, energy and nutrients that enable the plant to survive over summer and allow rapid shoot growth in autumn.
- the tubers also act as a physical barrier that impedes the root growth of other plants and often prevents their seedling establishment.
- the majority of the rhizome shoot buds produced do not grow into shoots each autumn, but act as a buffer against adverse affects that may cause existing shoots to die prematurely, e.g. disturbance due to cultivation, fire, hand-pulling or knockdown herbicides.
- this characteristic allows bridal creeper to persist for decades, compensating for the weeds short-lived seed bank.
- bridal creeper can regrow from rhizome fragments, which often occurs when plants are moved by road making machinery (Cooke & Robertson 1990).

Sources: Blood 2001; Muyt 2001; Clifford & Conran 1987; Harden 1993; Jessop & Toelken 1986; Raymond 1994; Parsons & Cuthbertson 2001; Morin et al. 2006

### **Controlling infestations**

There are a variety of methods available for controlling bridal creeper, ranging from herbicide application to biological control agents. Choosing an appropriate control method depends on a number of factors including:

- size and density of the infestation
- accessibility
- time and resources available
- type of environment invaded (e.g. conservation area or citrus orchard)
- growth stage of the plant (life cycle)
- features of the landscape (e.g. proximity to waterways or cliffs)

### **Keeping bridal creeper out of uninfested areas**

The national ban on the sale and movement of bridal creeper must be enforced, as preventing establishment of infestations is the most cost-effective means of weed control. Gardeners should be discouraged from planting it on their properties. The safe disposal of bridal creeper should be encouraged and an emphasis placed on replacing noxious plants with non-invasive species.

## Map

Finding out what you are dealing with is a crucial component in determining the extent of the problem. A detailed map should record information such as:

- 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
- locations for buffer zones

Bridal creeper infestations are often found under tall trees, power lines and fence lines, or anywhere birds are likely to perch. Given this knowledge, each time a field area is visited the following checks should occur:

- check 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.

Accurate field observations mean that a successful containment and control program can occur around pre-existing infestations. Where bridal creeper is found, a buffer zone needs to be established. Allow at least a 500m wide buffer zone around the edge of the infestation. It is imperative that this buffer zone be kept free of any seedlings to limit further spread. Work back from the buffer zone towards the centre of the infestation.

### *Physical removal*

Physical removal involves carefully excavating around and under the tuberous root mass and 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 sites.

Digging, sometimes referred to as grubbing, is only effective on small isolated infestations or after several years of herbicide treatment on larger sites. Be aware that the act of digging out the tubers can create considerable soil disturbance allowing bridal creeper and other dormant weed seeds to germinate. Once the plant has been grubbed 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 prior or during flowering will prevent fruit production and may slowly deplete the tubers of energy over time but it is unlikely to eradicate an infestation.

### *Disposal of weed material*

If bridal creeper is controlled through grubbing it is imperative that all tubers and rhizomes are bagged immediately and taken off site. The extracted material must be placed in a black bag (garbage bag or something similar) and left out in a sunny spot to 'cook' the tubers. After 2-3 months, dispose of this material through the local government kerbside collection or take it to the rubbish tip for deep burial. Do not compost or mulch root material as rhizome fragments can reshoot.

### *Herbicide treatment*

Application of herbicides has been an effective form of control. Both selective and non-selective herbicides can be used and spraying should be conducted during the winter to early spring flowering period when the plants are actively growing. Do not spray if plants are under any sort of stress, as herbicide will not be absorbed effectively. Application of herbicides can be very effective after a prescribed burn in late summer or early autumn, but beware of off-target damage.



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Bridal creeper infestations are often located in areas of native vegetation and therefore great care should be taken to avoid spraying herbicide onto surrounding foliage and soil. The use of a hand sprayer, or wiping herbicide directly onto leaves will help to reduce off target damage to native plants. Mixing a dye in with the herbicide will minimise missed areas and prevent over spraying. Weather conditions should be calm, with low wind and no immediate rain expected.

From May to June bridal creeper can be sprayed with a 600g/kg Metsulfuron methyl product, such as Brush-off® or Ally®, at a rate of 5g/100L water plus a surfactant such as BS1000® at rates as indicated on the label. From July to early September use a 360g/L Glyphosate® product such as Zero® or Roundup® at the rate of 1L/100L water plus a penetrant such as Pulse® (Weed Control Notes, APCC).

It is important that the product label is read carefully before using any herbicide. Any deviation from the labels' instructions may require an off-label-use permit issued by the Australian Pesticides and Veterinary Medicines Authority (APVMA). The APVMA can be contacted via their website at <http://www.apvma.gov.au/index.html>. Some off-label-permits for the control of bridal creeper have already been issued. These can be found by searching the APVMA site, using the words bridal creeper and Asparagus in the relevant pest/product line on the permit search page. Ensure spray equipment is correctly calibrated and maintained. Herbicide should be applied every year in order to prevent seed set and to exhaust the tubers.

### *Control in horticulture*

Bridal creeper thrives in citrus orchards with their fertiliser and irrigation regimes, often surviving through the normally dry summer months. Its smothering foliage and tuberous root mass compete with citrus roots and contribute to reduced tree growth, fruit production and susceptibility to diseases such as collar rot.

Citrus growers employ a number of control techniques such as spraying with herbicide, manual removal of tubers and/or skirting (pruning the lower branches of citrus trees) to enable the weed to be slashed or spot sprayed. Recently, the use of biological control agents such as the leafhopper and rust fungus have proven to be effective control agents in reducing the vigour of bridal creeper in orchards.

### *Other control methods*

Other less common control methods include grazing and fire. Grazing by wallabies and sheep can successfully keep bridal creeper at low levels and prevent fruit production. However, grazing should be considered as an opportunistic control method and not relied upon to eradicate an infestation. The use of fire in controlling large infestations has proven successful. Fires during late summer and early autumn burn both native vegetation and bridal creeper, improving access for later spraying. Bridal creeper is often the first plant to emerge post-fire therefore herbicides can be carefully applied before native plants regenerate.


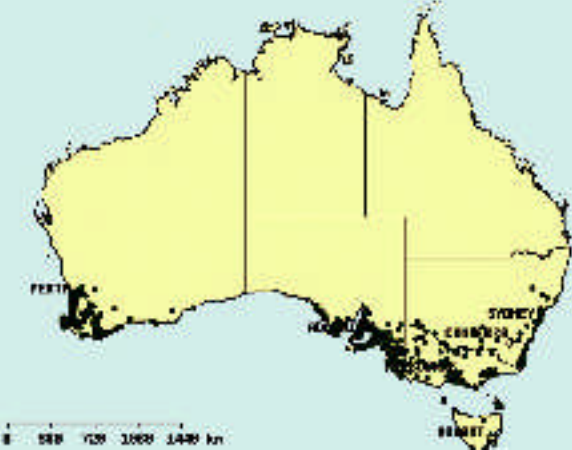
### *Follow-up and monitoring*

Follow-up work and monitoring of controlled areas is extremely important. Areas that have been grubbed should be monitored carefully for regrowth, either from fragmented rhizomes or from a disturbed seed bank. It may take several years for an area that has been grubbed to be free from bridal creeper. Plants that have been sprayed with herbicide should also be monitored annually to ensure that control efforts have been effective.

Bridal creeper leafhoppers cannot be collected from a National Park or A-class reserve without a permit. Collections from private property can only be undertaken with landholders consent.

*Biological control of bridal creeper*

One of the reasons bridal creeper is a relatively uncommon plant in South Africa is the high number of natural enemies, which predate on it and keep it in check. When bridal creeper arrived in Australia its natural enemies were left behind and it was able to grow, reproduce and spread unhindered. Research on suitable biological control agents began in the late 1980s when surveys for suitable control agents were undertaken in South Africa. In May 1999 the first biocontrol agent, the bridal creeper leafhopper, was approved for release in Australia. The release of the rust fungus followed in 2000 and the leaf beetle in 2003.

Bridal creeper leafhopper <i>Zygina</i> sp.	Appearance and characteristics
 <p><b>Leafhopper on bridal creeper leaf:</b> Photo University of Adelaide</p>  <p><b>White marking indicating leafhopper damage:</b> Photo DWLBC</p>	<ul style="list-style-type: none"> <li>• adult leafhoppers are white, 2-3mm long and live on the underside of bridal creeper leaves.</li> <li>• eggs are laid on the leaves with the first instar nymphs hatching in 4-7 days.</li> <li>• the nymph will progress through four stages over a period of 2-4 weeks culminating in the adult leafhopper.</li> <li>• each female lays about 200 eggs over a six week period, and several generations are produced each year.</li> <li>• leafhoppers are winged and although they can fly a distance of 15–30cm, they prefer to 'hop' between plants or amongst foliage. Dispersal of leafhopper populations is therefore relatively slow.</li> </ul>
	 <p><b>National leafhopper release sites: Courtesy CSIRO Entomology</b></p>

The bridal creeper leafhopper *Zygina* sp. damages bridal creeper by feeding on the photosynthetic leaf cells. White spots and lines appearing on leaves indicates feeding. This is often the only sign that they are present. As leafhopper populations build up and damage increases the plant is unable to produce enough energy, slowing down the formation of flowers, fruit and the production of new tubers. This continual stress forces plants to use existing tuber reserves, which become exhausted over time.

### *Sourcing leafhopper for release*

In 2000, the CSIRO undertook a program to establish leafhopper nursery sites throughout Australia. The current aim is for community groups to use these nursery sites to redistribute hoppers to other areas and thereby speed up the natural spread of the agent. A detailed map of release sites is available from the following website <http://www.ento.csiro.au/weeds/bridalcreeper/project.html>. For information on local release sites contact the authorised officer at your regional natural resource management board.

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A site is considered heavily infested with leafhoppers when most of the foliage is 80-90% white. When this occurs it is possible to transport some of the insects to another site, aiding the natural spread of the insect. Successful harvesting of insects involves taking sufficient foliage and insects to inoculate the new infestation without adversely affecting the nursery site. This should be undertaken before October. Before leafhoppers can be harvested, they should be present at a site for at least 18 months after the initial release.

### *Redistributing leafhoppers*

In order to redistribute the leafhopper, the following steps should be taken:

Equipment required	Method
<ul style="list-style-type: none"><li>• a few large, plastic bags</li><li>• secateurs</li></ul>	<p>To collect the leafhopper do the following:</p> <ul style="list-style-type: none"><li>• cut a large bunch ( enough to fill a shopping bag ) of heavily infested foliage and quickly put it into the plastic bag.</li><li>• try and harvest the foliage early in the morning when temperature is low in order to collect some adults.</li></ul> <p>seal the bag with an elastic band; keep it out of the sun and travel to the release site.</p> <p>At the new release site do the following:</p> <ul style="list-style-type: none"><li>• remove the harvested foliage from the plastic bag over the bridal creeper infestation.</li><li>• tease the foliage apart and spread thinly over the resident bridal creeper, pushing the foliage into the infestation as you go.</li><li>• invert the plastic bag and shake off any nymphs and adults stuck to the bag.</li></ul> <p>Within a week, the harvested foliage will have died and the nymphs and adults on the foliage will have moved on and started to feed on the resident bridal creeper.</p>

**Rust fungus** *Puccinea myrsiphylli***Appearance and characteristics**

Rust fungus on bridal creeper cladode: Photo CSIRO Entomology

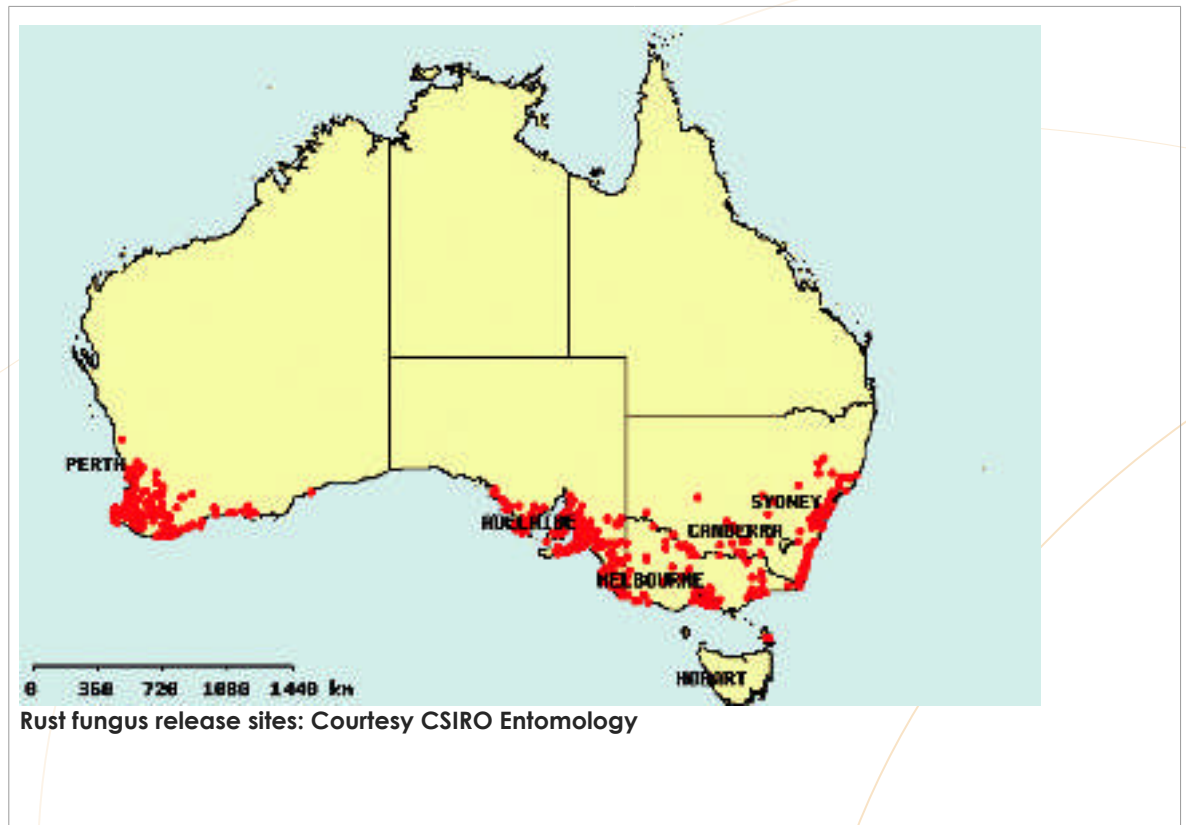
- Rust fungus first appears as a yellow spots on the bridal creeper leaf.
- Rust completes its entire life cycle exclusively on bridal creeper.
- The fungus destroys leaf tissue which reduces the photosynthetic surface of the leaf and diverts nutrient away from the host plant.
- This retards development by reducing stem, fruit, rhizome and tuber production.
- The rust is readily spread via spores.



Yellowing of bridal creeper effected by rust : Photo DWLBC

The best time to redistribute the rust fungus is when production of the most infective spore stage is at its peak. Orange, powdery spores can be easily rubbed off large pustules on leaves. This stage is normally between July and September but this will depend on seasonal conditions

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The bridal creeper rust fungus *Puccinia myrsiphylli* was approved for release in Australia in 2000. The rust fungus completes its lifecycle exclusively on bridal creeper. It has a complicated lifecycle with five spore stages including one that survives over summer when the bridal creeper has senesced (retreated underground). By destroying leaf tissue, the rust fungus reduces the photosynthetic surface of the plant. The plant sheds infected leaves prematurely, limiting flower and fruit production.

The first signs of the rust generally appear in early autumn. During the winter months the incidence and severity of rust increases and reaches a peak in spring when plants are flowering and fruiting. The rust fungus does not spread internally throughout the plant and therefore must reinfect bridal creeper every growing season to be effective.

The timing and levels of rust fungus populations depends on seasonal conditions. In 2005, South Australia had an extremely dry autumn and it was not until August that the first signs of rust were seen on bridal creeper populations on the Fleurieu Peninsula. Conversely, 2004 was an excellent year for rust, with consistent rains during autumn and winter providing good conditions for infection and spread.

### *Sourcing the rust fungus*

In 2000, the CSIRO undertook a program to establish rust fungus nursery sites throughout Australia. The current aim is for community groups to use these nursery sites to redistribute rust to other areas and thereby speed up the natural spread of the agent. A detailed map of release sites is available from the following website <http://www.ento.csiro.au/weeds/bridalcreeper/project.html>. For information on regional release sites contact your local noxious weeds officer.

### *Redistributing the rust fungus*

The following instructions provide details on how to spread the rust fungus onto uninfected bridal creeper infestations. This was the original method used by CSIRO to establish the nursery sites.

Safety tip – always use gloves and a facemask when working with rust-infested bridal creeper as breathing in spores may aggravate any pre-existing respiratory ailments. Always obtain permission to remove plant material, particularly from national parks and state reserves.

Equipment required	Method
<ul style="list-style-type: none"> <li>• plastic bags</li> <li>• secateurs</li> <li>• clean spray bottle containing water</li> <li>• large plastic sheeting</li> <li>• pegs</li> </ul>	<ul style="list-style-type: none"> <li>• collect sufficient infected bridal creeper from a site already infected. This is simply done by cutting material and transporting it in large garbage bags.</li> <li>• slide the handful of infected foliage back and forth to dislodge spores from pustules and allow them to be deposited on the under surface of healthy leaves. A handful of infected bridal creeper (approximately 30cm<sup>2</sup>) will inoculate approximately an area of 1-2 m<sup>2</sup>. Leave the used rusty material at the inoculation site.</li> <li>• after inoculation, gently mist the area with water using a hand held spray bottle.</li> <li>• wrap the inoculation site in plastic sheeting for about 16-24 hours. Secure the sheeting with pegs to ensure a humid environment. If the site is in a sunny position, take off the plastic the next morning to avoid overheating.</li> <li>• return to the site regularly to check on progress of the rust. Rust pustules should be visible after 3-4 weeks.</li> </ul>

The best time to release rust fungus is during misty rain. However, as long as it rains within 2 days, infection should still be successful. The most important factors for successful inoculation are wet bridal creeper leaves.

It is also important to think of the prevailing winter winds. Inoculating on the upwind edges of infestations will allow for a rapid, natural spread of rust spores throughout the entire infestation. Animal and human movement through a bridal creeper infestation will also help to spread rust spores. Road corridors can spread rust well via the wind generated by vehicle movement. The rust fungus will not totally eradicate an infestation. It may take several years before a significant reduction in bridal creeper density is evident.

#### *Rust fungus 'spore water'*

A community group on Kangaroo Island, South Australia, developed a second method of distributing rust spore known as 'spore water'. Spore water is simply a mixture of rust spores and rainwater. This method works by rinsing rust-infested bridal creeper leaves in rainwater and spraying out the resulting slurry. It is necessary to use rainwater, as mains water and minerals in bore water may adversely affect the rust spores. A clean spray unit, lines and spray gun is also imperative as residual herbicide may adversely affect the rust spores.

The following guidelines for mixing and spraying spore water are from the Kangaroo Island Bridal Creeper Control Committee:

Equipment required	Method
<ul style="list-style-type: none"> <li>• well rusted bridal creeper leaves</li> <li>• rainwater</li> <li>• container to wash off rust in to (e.g. fish bin or similar)</li> <li>• 60-litre garbage bags</li> <li>• clean spray unit of any sort</li> <li>• sieve (1mm mesh)</li> <li>• gloves and facemask</li> </ul>	<p>The method below is based on a 15 litre spray unit. Adjust quantities for the amount of spray required. One plastic shopping bag of infected bridal creeper leaves will make approximately 15 litres of sporewater.</p> <ul style="list-style-type: none"> <li>• take a handful of infected leaves and dunk them into a bucket of rainwater</li> <li>• swish the leaves around in the bucket for 30-60 seconds to dislodge the spores into the water. Place washed-off leaves into another bag. Repeat until you have dunked all the leaves.</li> <li>• the water should turn a brownish colour. This is spore water</li> <li>• remove filters from a clean spray unit</li> <li>• strain spore water from the bucket into the spray unit sieving out any leaves or debris</li> <li>• spray the weeds with the mixture, following the technique outlined below</li> </ul>

### A good rule of thumb is 4 kg of leaf to 100 litres of rainwater

#### Spraying sporewater


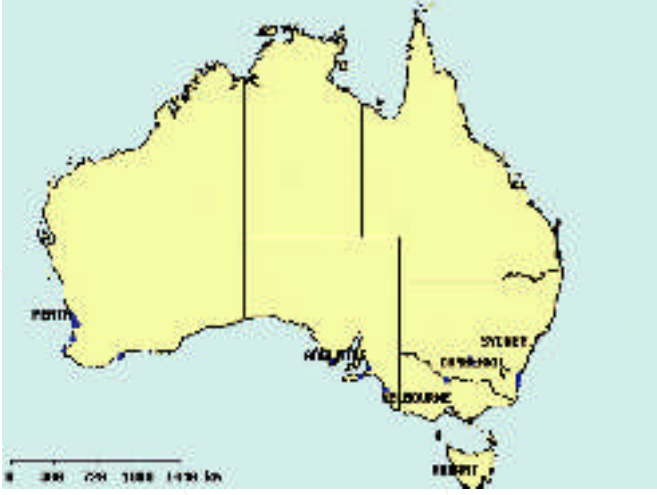
- start at the top of the infestation and work downwards, spray until run-off, paying particular attention to the underside of leaves. Use the finest mist possible
- spray the spore water solution as soon as possible after mixing, as the spores lose viability the longer they are kept in solution
- try to keep the spore water solution agitated while in the spray tank to minimise spores sticking to the sides of the tank
- as there is no threat of off-target damage, spore water can be liberally applied to bridal creeper in all areas where it occurs, including native vegetation and near watercourses.

#### *Following up after spraying*

Follow-up monitoring of the release sites should take place a month after initial spraying. If no sign of the rust is seen within two months another dose of spore water will be required. However, it must be remembered that the spore water technique does not work in all areas. Repeated failure to establish may indicate that a different application technique is required for the identified area. Monitoring and recording activities at the spray site is important so that work is not unnecessarily duplicated.

A PowerPoint presentation on how to make spore water is freely available from bridal creeper page at:

[http://www.weeds.org.au/docs/BC\\_How\\_to\\_make\\_spore\\_water.ppt](http://www.weeds.org.au/docs/BC_How_to_make_spore_water.ppt)

<p><b>Leaf beetle</b> <i>Crioceris</i> sp</p>	
<p><b>Leaf beetle</b></p>  <p><b>Bridal creeper leaf beetle: Photo CSIRO Entomology</b></p>	 <p><b>Leaf beetle release sites: Courtesy CSIRO Entomology</b></p>

The bridal creeper leaf beetle (*Crioceris* sp.) is the third biological control agent available to combat bridal creeper. It was approved for release in May 2002. Since then it has been released at nursery sites in Western Australia, South Australia, New South Wales and Victoria. It has established at some of these sites but populations are slow to build-up. Widespread establishment of this agent will need significant technical expertise, currently limiting redistribution to government agencies. From autumn to early winter, adult females lay eggs on expanding shoots and leaves of bridal creeper, either singly or in groups of up to 10. Both the adults and larvae feed exclusively on the plant's young, expanding tissues. The leaf beetle damages bridal creeper by stripping the young stems of shoots and leaves. This action prevents bridal creeper from climbing, reducing fruit production. The action of the leaf beetle is expected to complement that of the rust fungus and the leafhopper.

***Biological controls are unfortunately not a silver bullet. They are governed by natural events such as drought, fire and predation which will effect their rate of dispersal and efficacy.***



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## Appendix

## Section 02 Appendix

Growth Calender - bridal creeper												
	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												