Section 4

Holistic management of invasive vines and scramblers

Holistic management of invasive vines and scramblers

A holistic approach to management

It is important to consider weed management in conjunction with other land management priorities and site based threats, including secondary weed invasion. Weed management needs will vary with the asset or value that is impacted, the habitat, the characteristics of the weeds and the size of the weed invasion. A holistic approach to management will assist in achieving optimal, long-term outcomes (refer to Section 2 – Planning and Pre-control Considerations). Holistic management is a decision making and planning framework whereby you consider all elements of your system, including ecological, economic and social aspects, and how your management actions might interact with that system.

This section provides information on key factors to consider when undertaking weed control in habitats commonly invaded by asparagus weeds, and identifies some key weeds that are commonly managed in conjunction with asparagus weeds.

Note: The information below is for example purposes only and does not include all weed threats or habitats.

Asparagus weeds must be managed holistically, in association with other site-based threats, to avoid secondary invasion by other weeds and reduce other threats to native system recovery. It is essential to develop your control strategy to target co-existing weeds and successional weeds (i.e. weeds that quickly colonise) that can have ongoing negative impacts.

Managing other weeds in conjunction with asparagus weeds

It is important to be aware of the threats posed by co-existing weeds and likely secondary invaders when planning and undertaking asparagus weed management. For example:

- *Gloriosa superba* (glory lily) commonly invades sites following asparagus weed control in coastal environments in eastern Australia. This weed can pose significant threats to native species and, in some cases, is more difficult to control (see case study page 72 in this section and on page 90).
- *Asparagus aethiopicus* is a frequent invader in areas where other weeds have been removed (e.g. bitou bush – *Chrysanthemoides monilifera* ssp. *rotundata*).
- Western Cape bridal creeper and *A. declinatus* can invade sites where common bridal creeper has been controlled and can be more difficult to control. Because Western Cape bridal creeper

Shauna Potter

Asparagus declinatus (with small white flowers) and common bridal creeper are often found together

is not affected by the bridal creeper rust fungus (*Puccinia myrsiphylli*, a biocontrol agent which is highly effective at suppressing the common form), it could be more difficult to manage over the long-term. See case study on page 72 on the importance of timing in holistic management.

Holistic planning and actions that target a suite of weeds and other threats will provide more effective, long-term outcomes. A list of some major weeds that are known to co-occur with asparagus weeds is provided below to assist with holistic management. Recognition of these and other weedy species and their potential effects on your management program will assist in gauging resource commitments and ensuring use of appropriate control measures. Many of these weeds are difficult to control, so it is important to consult your local weeds officer for best practice management advice.

Some major weeds occurring with asparagus weeds

List created through discussion and stakeholder consultation at national asparagus weeds workshops in 2012/2013.

Scientific name	Common name/s
Vines and scramblers	
Acetosa sagittata	Turkey rhubarb
Anredera cordifolia	Madeira vine
Aristolochia elegans	Calico flower, dutchman's pipe
Araujia sericifera	Moth vine
Cardiospermum grandiflorum	Balloon vine
Delairia odorata	Cape ivy
Dolichandra unguis-cati	Cat's claw creeper
Ipomoea alba	Moonflower, coastal morning glory, mile-a-minute
Lonicera japonica	Japanese honeysuckle
Passiflora spp.	Corky passionfruit, passionfruit
Solanum seaforthianum	Climbing nightshade
Thunbergia alata	Black-eyed Susan
Herbs	
Ageratina spp.	Crofton weed, mistflower
Ageratum houstonianum	Billy goat weed
Crocosmia × *crocosmiiflora*	Montbretia
Chasmanthe floribunda	African cornflag
Euphorbia paralias	Sea spurge
Gloriosa superba	Glory lily
Lilium formosanum	Formosan lily
Moraea spp.	Cape tulips
Sphagneticola trilobata	Singapore daisy
Tradescantia fluminensis	Trad
Vinca major	Blue periwinkle
Watsonia meriana var. *bulbillifera*	Wild watsonia, bugle lily

Scientific name	Common name/s
Grasses	
Elymus repens	English couch
Ehrharta spp.	Veldtgrass
Melinis minutiflora (pasture grass)	Molasses grass
Paspalum spp. (pasture grasses)	
Shrubs	
Chrysanthemoides monilifera	Boneseed and bitou bush
Genista monspessulana	Montpellier broom
Lantana camara	Lantana
Lycium ferocissimum	African boxthorn
Nicotiana glauca	Tree tobacco
Ochna serrulata	Mickey mouse plant
Ricinus communis	Castor oil plant
Rubus fruticosus agg.	Blackberry
Senna pendula	Cassia
Solanum mauritianum	Wild tobacco bush
Sorghum halepense	Johnson grass
Trees	
Cinnamomum camphora	Camphor laurel
Celtis spp.	
Schinus terebinthifolius	Broad-leaf pepper tree

Case study

A focus on main weed invaders after *Asparagus aethiopicus* control on the east coast of Australia

As determined by stakeholder consultation at national asparagus weeds workshops held from south-east Queensland to southern New South Wales in 2013.

Herbs *Gloriosa superba* (glory lily) and ***Watsonia meriana* var. *bulbillifera*** (wild watsonia)

- *Gloriosa superba* is a perennial herb that rapidly moves in where both *A. aethiopicus* and *Chrysanthemoides monilifera* ssp. *rotundata* (bitou bush) have been removed, forming a dense understorey (up to 70 stems per m^2) in coastal dune environments. It is extremely difficult to control. For an example of where glory lily and *A. aethiopicus* are being holistically managed see case study on page 90.
- *Watsonia meriana* var. *bulbillifera* (wild watsonia) is an erect perennial herb that forms large clumps of underground corms. It is a successful competitor of native vegetation forming dense stands that exclude other vegetation.

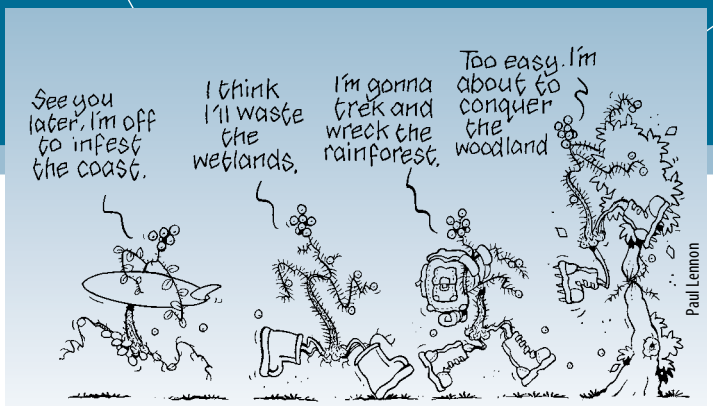
Climber *Acetosa sagittata* (turkey rhubarb)

- *Acetosa sagittata* is a perennial climber with thick underground tubers. It is an aggressive weed that can completely smother native ground plants and small shrubs. It rapidly invades after asparagus weed management particularly in coastal riparian environments. Control of this species is difficult because it is a prolific seeder and regenerates from hard-to-find underground tubers.

Climbers *Ipomoea cairica* (coastal morning glory), ***Passiflora suberosa*** (corky passionflower) and ***Cardiospermum grandiflorum*** (balloon vine)

- *Ipomoea cairica* is a rampant, perennial groundcover or climber. It rapidly invades after asparagus weed management, most commonly in riparian areas, littoral rainforest and coastal environs. When *A. aethiopicus* is removed, a successional cycle of coastal morning glory can occur, often followed shortly by glory lily invasion.
- *Cardiospermum grandiflorum* and *Passiflora* species are also problematic secondary invaders post *A. aethiopicus* control.
- *Cardiospermum grandiflorum* is a long-lived perennial climber that is commonly found growing (to 8 m high) over vegetation lining creeks and rivers. *Passiflora suberosa* is a slender vine with a climbing or creeping habit that develops corky bark at the base of older stems.

Note: After spraying *A. aethiopicus* with metsulfuron-methyl in dune systems, generally good regeneration of native grasses and sedges can occur. Corky passionflower (*Passiflora suberosa*) commonly trails over *A. aethiopicus* in these systems. To control both of these species you may need to control corky passionflower first with glyphosate before tackling *A. aethiopicus* with metsulfuron-methyl. Corky passionflower is not sensitive to metsulfuron-methyl. Spraying corky passionflower that is trailing over *A. aethiopicus* provides an opportunity for glyphosate off-target damage to be only directed at *A. aethiopicus*, thus allowing good regeneration of native grasses and sedges.



There's an asparagus weed for every habitat!

Management considerations in natural habitats invaded by asparagus weeds

Asparagus weeds invade a range of native habitats across Australia. Available control options vary according to different habitat types. Some methods that are effective in certain environments can be unsuitable in other environments. In all native habitats, control and management must:

- minimise damage to desirable vegetation,
- minimise soil disturbance,
- address other weed species invading the environment,
- encourage native plant regeneration, and
- treat asparagus invasion at a rate that allows for effective long-term control and natural regeneration or restoration processes to occur, or at least at a rate that allows effective follow-up.

For canopy climbing asparagus weeds, initial treatment often needs to be undertaken rapidly to reduce pressure on host trees.

Key management considerations in some natural habitats invaded by asparagus weeds

Habitat type		Asparagus weeds most commonly found in habitat type	Key management considerations
Coastal	 Hillary Cherry	*A. aethiopicus* invades all coastal habitats, while common bridal creeper, *A. declinatus* and *A. scandens* thrive in the sandy soils of coastal environs	Minimise erosion See text later in this section for further details
Tropical, sub-tropical, littoral and temperate rainforests (closed forest)	 Mark Hamilton	*A. africanus* and *A. plumosus* are common invaders of rainforest, *A. aethiopicus* is an invader of littoral rainforest and *A. scandens* invades a variety of rainforest habitats including littoral, wet sclerophyll and cool temperate rainforests	Protect vulnerable, small, disturbed remnants and patches of rainforest vegetation; limited control methods available due to high densities of sensitive species and difficulty of access See text later in this section for further details
Wetlands and riparian zones	 Kerinne Harvey	*A. aethiopicus* is a common weed of estuarine edges, saltmarshes and swamps; similarly, both *A. africanus* and *A. plumosus* are found in saline environments including mangroves and saltmarsh plant communities *A. aethiopicus*, common bridal creeper and *A. scandens* are common invaders of riparian zones	Minimise stream bank erosion and weed spread by water and prevent re-invasion, as these areas are particularly vulnerable to this See text later in this section for further details
Woodlands	 Deb Stevenson	All asparagus WoNS can occur in woodland habitats	Integrated management is particularly important in modified habitats (e.g. stock and fire management) See text later in this section for further details
Shrublands / heathlands		*A. asparagoides* invades mallee shrublands and heathlands; *A. aethiopicus* and *A. scandens* can occur in heathlands	Minimise soil disturbance to prevent erosion
Dry and wet sclerophyll forests (open forest)	 Mark Hamilton	*A. africanus*, *A. scandens*, *A. declinatus* and *A. asparagoides* commonly invade sclerophyll forests	Minimise changes to fire regimes

Holistic management

Site assessment is crucial. The actions required to achieve ecosystem rehabilitation are always site-specific, and weed management plans must be tailored based on environmental factors and the relevant management objectives (See Section 2 – Planning and Pre-control Considerations).

The remainder of this section describes some natural habitats invaded by asparagus weeds, along with corresponding management considerations. This information is best used in conjunction with control methods outlined in Section 3 and restoration options in Section 5.

Key management considerations

Minimise erosion

Erosion is a primary concern in environments that are characterised by unstable substrates. To reduce the chance of erosion during control work you can:

- Remove asparagus infestations in stages. The rate of removal depends upon the rate of native plant regeneration and level of site disturbance (i.e. whether or not natives are present in sufficient numbers to provide soil stabilisation).
- Revegetate with a diverse range of plants. Contact local professionals (e.g. Landcare coordinators or local government officers) in your area for region-specific native species lists and advice (see Section 5, Restoration page 79; Section 7 – Further Information).
- Use mulch, to protect young native plants and reduce new weed incursions.
- Avoid applying residual herbicide where there is the potential for roots of desirable non-target species to be present. Be aware that herbicides can leach through sandy substrates at a greater rate than in other habitats.
- Consider using manual techniques or more selective herbicide application methods (e.g. gouge-paint techniques rather than foliar spraying) to reduce the persistence of herbicides and limit off-target damage.

In warmer wetter regions, good native regeneration can occur through dead *A. aethiopicus* root mats which can decay within 6 months after death of plants. In well established infestations in more temperate regions, it may be necessary to remove some or all of the root mat to allow native regeneration, as root mats may take many years to decay.

Mark Hamilton

Asparagus aethiopicus forms thick root mats

Protect vulnerable rainforest remnants

Small, disturbed remnants and patches of rainforest vegetation are particularly vulnerable to weed invasion:

- High priority sites should be regularly monitored for new incursions.
- Where applicable, buffer zones (e.g. plantings of pioneer natives) could be established around the perimeter and at vulnerable edges to provide a physical barrier to disturbance and reduce rates of weed incursion.

Rainforest weeds can be hard to delimit as they can occur in relatively intact, highly complex systems, and search and control efforts are difficult.

Natural regeneration is likely to occur in areas that have a good canopy cover.

Kerinne Harvey

Asparagus africanus invading coastal forest

Due to high densities of sensitive species and access difficulties, control methods should be chosen carefully:

- Control operations should be conducted using low impact methods (e.g. hand removal).
- In most instances, herbicide management should be targeted e.g. cut-stump, gouge-paint or, in some circumstances, splatter-gun.
- Restoration activities that help increase the resilience of the environment to future invasion are of critical importance.

Natives flourish quickly when weedy vines are cut to relieve canopy pressure.

- The risk of damage to micro-organisms such as mycorrhizal fungi (essential for plant nutrition and growth) is lowest with non-residual herbicides.
- When using a residual herbicide such as metsulfuron-methyl, great care must be exercised to avoid herbicide reaching the soil. Frequent repeated use of herbicides in any areas should be avoided.
- Low impact control options should be considered for sensitive areas, particularly riparian zones where there is a risk of herbicide entering the water. 'Frog friendly' formulations of glyphosate registered for use around waterways should be used in rainforests.

Minimise weed spread by water and prevent re-invasion

A well designed weed management program can achieve positive outcomes to minimise weed spread in wetland and riparian areas and assist in preventing re-invasion. Basic principles include:

- Identify and assess threats to any assets in the system being managed (e.g. water quality, threatened species, bank stability).
- Minimise stream bank erosion and prevent sediment and nutrients from entering waterways and impacting on aquatic organisms. Treat small areas, one at a time, to allow native plants to regenerate and stabilise the bank.
- Mechanical control such as slashing should be avoided in riparian areas.
- Initiate management of water and wind dispersed weeds in the upper part of the catchment first to prevent infestations downstream; remove weeds from edge of watercourse to prevent seeds and rhizomes moving downstream.
- Anticipate likely replacement species establishing after primary weed management, as these areas are particularly vulnerable to re-invasion.
- Replanting may be required to provide rapid bank stabilisation and protect vulnerable areas from re-invasion.
- Determine priority species for control, as complete removal of all weed species may not be realistic in areas where multiple weed species invade.

An example of a group successfully managing *A. africanus* in a wetland habitat can be found in the case study on page 100.

Integrated management in modified habitats

Habitats that have undergone chemical and structural modification associated with agricultural land use can favour non-native weed invasion to the detriment of natives. For example, elevated nutrients (e.g. nitrogen, phosphorus) are a common problem in modified woodland habitats because of the addition of fertilisers to soil, deposition of livestock dung, rubbish dumping and stormwater

runoff from urban areas. Basic management principles include:

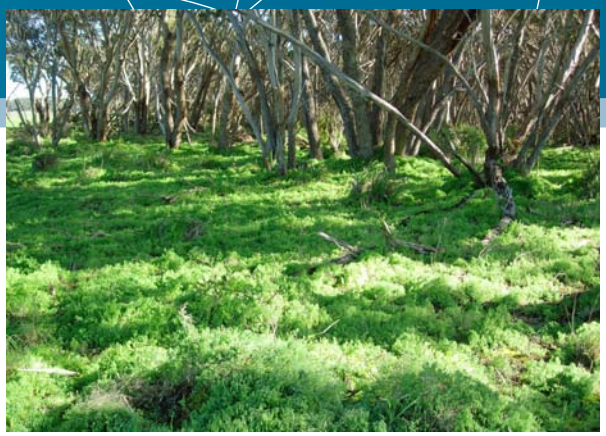
- Manage site to improve native species diversity.
- Keep soil carbon levels high (e.g. establish native perennials to reduce nitrate levels). The addition of carbon and burning can reduce inorganic nitrogen and may reduce the growth of non-native ground layer species relative to native species.
- Maintain ground cover – don't create opportunities for weed invasion, but some bare ground is needed to allow native forbs to establish.
- Prevent grazing of native seedlings and sensitive species.
- Use herbicide sparingly.

Stock management can be an important consideration in modified environments:

- Intermittent grazing regimes can maintain or improve condition of grassy woodland ecosystems without causing too much compaction of the soil.
- Time grazing periods to avoid native flowering and seed set (regionally specific).
- Grazing pressure can support asparagus weed management. For example, sheep will graze common bridal creeper and *A. declinatus* keeping the plants at low levels in grazed areas.

Integrated fire and herbicide control may be effective in managing asparagus weeds in modified environments:

- Geophytes (perennial plants with underground storage organs, such as *Asparagus* spp.) are reasonably fire tolerant due to their habit of dying back to the storage organ during summer. However, following a summer fire, these weeds will often emerge in autumn, prior to regeneration of native vegetation, making herbicide control easier and more effective.
- Control of established populations and prevention of seed production can be achievable under these conditions.



Shauna Potter

Asparagus declinatus dominating understorey vegetation

Note: For many asparagus species the seed will germinate or decay within two years and vegetative material (rhizomes) can often have greater persistence in the soil than seed. Fire is the major disturbance in the Mediterranean ecosystems of South Africa where 95% of Australia's geophyte weeds originate. Consequently many have evolved life history traits that are strongly tied to recurrent fire. Dying back to an underground storage organ over the long dry summer is an extremely effective way of surviving fire. When dormant in summer, most geophyte weeds will probably survive all but the very hottest fires.

Herbicide selection and application approach is important in woodland environments:

- Glyphosate (a non-selective herbicide) is useful for removing dense weed monocultures in disturbed environments.
- Where asparagus weeds are growing closely amongst native vegetation, non-selective herbicides can cause unacceptable levels of off-target damage unless targeted application techniques are used (e.g. cut-paint, gouge-paint).
- Residual herbicides, such as metsulfuron-methyl, can cause native plant death at very low concentrations and can remain active in the soil for several months following application.

See case study for managing Western Cape bridal creeper in modified eucalypt woodland of the Mount Lofty Ranges on page 95.