

Management actions:

- Map the arum lily populations in your bushland.
- Hand remove or spot spray small populations or isolated plants. Carefully weed out rhizomes and remove from site.
- Target small infestations in good vegetation before they spread. These areas are often quickly recolonised by natives.
- Plan ahead for removal of large infestations.
 - Think about bank stabilisation issues and soil disturbance – will you handweed, slash or spray? (or all three)
 - Collect seed from native plants
 - Grow on plants if necessary
 - Organise a work crew or contractor
 - Decide how to dispose of any biomass
- Apply herbicide between June and September – when plants are actively growing.
- Look for regeneration of natives. If necessary, direct seed or spread vegetative material of those native perennial species that propagate easily.
- Collect all propagation material from native plant communities as close to your restoration site as possible (Make sure that what you have collected is not a weed!).
- **Do follow up control** – don't waste your efforts by failing to follow up arum lily control in subsequent years.

References and further information:

- Fisher, J. (1998) The role of the soil seed bank in bushland management. In: *Managing our bushland. proceedings of a conference about the management and protection of urban bushland.* (eds. K. Tullis & K. Mclean). 134-138. Urban Bushland Council WA Inc., West Perth, Western Australia.
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- Panetta, F.D. (1988) Studies on the seed biology of Arum Lily (*Zantedeschia aethiopica* (L.) Spreng). *Plant Protection Quarterly* 3(4), 169-171.
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- Papers in:** Scott, J.K. and Wykes, B.J. (editors) (1997) *Arum Lily (Zantedeschia aethiopica), Proceedings of a workshop held at HMAS STIRLING, Garden Island, Western Australia.* CRC for Weed Management Systems: Adelaide, Australia.
- Including:
- Keighery, G. (1997) Arum Lily as an environmental weed in Western Australia-over view of distribution and threat to natural systems. 17-20.
- Moore, J.H. (1997) Arum Lily: a general description. 4-6.
- Moore, J.H. and Hoskins E.B. (1997) Arum Lily control in south west of Western Australia. 31-37.
- Plummer, J.A. (1997) Reproductive biology of *Zantedeschia aethiopica*. 7-9.
- Scott, J.K. and Wykes, B.J. (1997) Report on research priorities for Arum Lily (*Zantedeschia aethiopica*). 1-3.

Getting involved - The Environmental Weeds Action Network:

The Environmental Weeds Action Network (EWAN) is a community initiative to tackle the problem of environmental weeds in bushland and waterways. It brings together community members in both urban and rural areas, bush regenerators, local government, weed scientists and ecologists to save our indigenous flora from the threat of weeds.

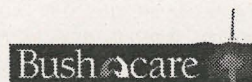
The aims of EWAN include:

- promoting an understanding of the threat of environmental weeds to our precious bushland
- providing useful information about weed control in native vegetation and elsewhere convincing governments at all levels of the need for appropriate legislation and funding for weed control
- researching methods of weed control
- encouraging community participation

Visit our web site at <http://members.iinet.net.au/~ewan/>

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MANAGING WEEDS IN BUSHLAND



ARUM LILY

Zantedeschia aethiopica (L.) Sprengel

Araceae



Arum lily (*Zantedeschia aethiopica*) is a perennial herb arising from a tuberous rhizome. The large, glossy-green, arrow-shaped leaves are held on long succulent stalks. In winter, a stout basal stalk, to 1.5 metres, bears a large, waxy-white spathe that surrounds a bright yellow spadix, or flower spike.

Poisonous to most stock, pets and humans, symptoms include a severe burning sensation and swelling of lips, tongue, and throat; stomach pain and diarrhoea are possible. **Ingestion of the plant may be fatal.** The toxicity is due to sequestering of calcium oxalate crystals and possibly other toxic compounds by the plant.

In parts of Western Australia arum lily is a listed '**Declared Plant**' under the Agriculture and Related Resources Protection Act. Landholders with declared plants are obliged to control them at their own expense.

Distribution: Where does it grow?

Arum lily occurs naturally in Southern Africa from the Mediterranean climates of the Cape Province to the subtropical climates of Natal and the inland mountains of Transvaal. In south west Western Australia it is a serious weed of natural areas from Northampton south to Albany. It is particularly serious around fresh water wetlands on the Swan Coastal Plain. Arum lily occurs in both wetlands and uplands in Tuart forest, along the Leeuwin-Naturalist Ridge, and on calcareous soils in higher rainfall areas around the southwest coast. Often forming dense monocultures, it out competes naturally occurring understorey species.

Biology:

A perennial plant, the top growth dies back to a tuber-like rhizome in drier conditions over summer. New leaves begin to regrow as the temperatures drop in autumn and flowering begins as early as June, continuing on through November. Reproduction is by both rhizome and seed. The main rhizome produces offsets capable of independent growth if removed or dislodged. Large amounts of seed are produced towards the end of the flowering season. The seeds are held within succulent berries and birds are the main vectors of dispersal. Being fairly short lived in the soil, seed rarely remains viable for more than four months.

Dispersal: How does it spread?

Daughter rhizomes: Spread by daughter rhizomes is generally very localised – less than 300mm per year.

Seed: Birds are the main agent for long distance dispersal of seed, although foxes, stock and flowing water are also known to play a role.

Garden rubbish: The weed can be introduced into new areas of bushland by the dumping of garden rubbish. Dug up rhizomes may survive and sprout given suitable conditions.

Control and management:

Understanding the distribution: Accurate distribution maps allow targeted control of infestations and provide evidence of where the program has been effective and where it has failed. It is important to keep uninfested areas clear and remove isolated infestations within intact bushland before they spread. Working from intact bushland out towards the disturbed areas also limits spread – especially where the infestation cannot be removed in one concentrated effort. Updating maps regularly provides good feedback to workers on the effectiveness of their efforts.

Physical Control: Volunteers are rarely trained in the use of herbicides and alternative methods of weed control are often sought. Methods include:

1. Hand removal of the whole plant including rhizomes.

Labour intensive and time consuming – the tuberous rhizomes can be very large and difficult to dislodge. The resulting soil disturbance may encourage germination and establishment of other weeds. Small daughter rhizomes also dislodge as the larger rhizomes are removed. If not recovered the daughter rhizomes will produce new plants.

2. Continued slashing of top growth to exhaust the rhizome.

Slashing is a labour intensive and time consuming method. It requires slashing of any emerging green material throughout the year and in following years. Its success relies on preventing the plant from photosynthesising and thus replenishing the rhizome. Without detailed record keeping, it can be difficult to assess the effectiveness and practicalities of these methods.

Chemical control: Herbicide application is effective any time between June and September. Follow up will be required for a number of years.

Herbicide	Brushoff® or Ally®	Glean®	Brushoff® + Roundup®
Active ingredient	metsulfuron methyl	chlorsulfuron	metsulfuron methyl * glyphosate
Amount in 15 litre knapsack	0.4g	0.4g	0.4g @ 225ml
Penetrant	pulse 30ml	pulse 30ml	pulse 30ml
Notes	Add indicator dye as per label. Carefully apply to leaves until wet. Spray between June and September.		

**Only use metsulfuron methyl/glyphosate mix in degraded sites where there is no chance of spraying natives. (glyphosate is nonselective)*

Early application of herbicide prevents the majority of the population flowering and setting seed. However, you will miss rhizomatous tubers that begin actively growing later in the season. If sufficient resources are available an early as well as a late application should provide very effective control. In winter wet areas, spray before the water levels have risen or after they have fallen.

A major concern with the use of these herbicides in native vegetation is off target damage to native species. However, arum lily has a large leaf area and tends to grow in dense monocultures. It is possible, with careful application of herbicide from a backpack unit, to minimise off target damage. In addition any run off from the leaf is usually held in the hollow of the leaf stem near the base of the plant. Alternatively using a one litre hand held spray with a higher concentration of herbicide (two to three times those in table) and applying a single squirt to each leaf is a very effective method of reducing off target damage.

NOTE: A minor off-label-use permit (No. PER4989) covers the control of arum lily in non-crop areas in WA. Herbicide application must comply with all conditions of the permit.

Restoration of the native plant community:

When arum lily occurs as isolated plants in intact bushland, the gap created by removal is small and quickly colonised by the native species. However, along many fresh water wetlands and watercourses on the coastal plain, arum lily grows as dense monocultures replacing native understorey plants.

Regardless of the size of infestation, you need to consider what will move into the space created when the weed is removed. In the moist areas often favoured by arum lily, a number of other weeds will thrive. The introduced perennial sedge, *Juncus microcephalus*, and the nutgrasses (*Cyperus rotundus*, *C. tenuifolius*), are particularly serious weeds of wetlands, that spread rapidly by seed. So too, are many annual herbs and grasses. Control of these weeds at the early stages of invasion helps facilitate establishment of native plants.

Several native species that are common along water courses of the Swan Coastal Plain are highly suitable for displacing such weeds, particularly annuals. For example the herbaceous perennials, *Centella asiatica*, *Carex fascicularis*, *Cotula coronopifolia* and *Persicaria decipiens* are all fast growing, easily propagated plants. They cover the ground and appear to reduce opportunities for germination of annual weeds, contributing to restoration of the native plant community.

NOTE: It is important that all propagation material is collected from native plant communities as close to your restoration site as possible. The suggested species should only be used if they occur naturally at your site.