



Declared Plant Policy

This policy relates to natural resources management under section 9(1)(d) of the Landscape South Australia Act 2019 (the Act), enabling co-ordinated implementation and promotion of sound management programs and practices for the use, development or protection of natural resources of the State. Specifically, this policy provides guidance on the use and management of natural resources relating to the prevention or control of impacts caused by pest species of plants that may have an adverse effect on the environment, primary production or the community, as per object s7(1)(f) of the Act.

caltrop (*Tribulus terrestris*)

Caltrop (*Tribulus terrestris*) is a rapidly-growing summer annual that causes problems with its sharp-spined burrs. The species is a complex found throughout the tropics and subtropics of the world, and caltrop populations in inland South Australia are likely to include native forms that have been present in northern Australia for many thousands of years. The weedy populations in South Australia appear to have been introduced from overseas since the late 19th century.

Management Plan for Caltrop

Outcomes

- Impacts of caltrop on susceptible land uses throughout South Australia minimised.

Objectives

- Minimise new infestations of caltrop in previously uninfested susceptible areas.
- Contain established priority infestations.
- Prevent the reinfestation of areas cleared of caltrop.

Best Practice Implementation

- Regional landscape boards and Green Adelaide to develop and implement plans to ensure priority infestations on roadsides, public or private land are contained.
- Regional landscape boards and Green Adelaide to monitor areas identified as high risk for stock and vehicle contamination. This may include parking bays, campgrounds, stock sale yards and roadhouses.

Regional Implementation

Refer to regional management plans for further details.

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Region	Actions
Alinytjara Wilurara	Limited action
Eyre Peninsula	Protect sites
Green Adelaide	Manage weed
Hills and Fleurieu	Manage weed
Kangaroo Island	Contain spread
Limestone Coast	Contain spread
Murraylands and Riverland	Manage sites
Northern and Yorke	Manage weed
South Australian Arid Lands	Limited action

Declaration

To implement this policy, caltrop is declared under the *Landscape South Australia Act 2019* throughout the whole of the State of South Australia. Its movement or transport on a public road, by itself or as a contaminant, or sale by itself or as a contaminant are prohibited. Regional landscape boards and Green Adelaide may require land owners to control caltrop plants growing on their land. Landscape boards and Green Adelaide are required to control plants on road reserves in their regions, and may recover costs from the adjoining land owners.

Caltrop is declared in category 2 under the Act for the purpose of setting maximum penalties and for other purposes. Any permit to allow its road transport or sale can only be issued by the Chief Executive of the Department for Environment and Water (DEW) or their delegate pursuant to section 197.

Under the *Landscape South Australia (General) Regulations 2020*, Regulation 27 specifies the conditions under which a person is exempt from the operation of section 186 and may transport wool, grain or other produce or goods carrying caltrop on public roads. Regulation 28 specifies conditions under which a person is exempt from the operation of section 188(2) and may sell wool, grain or other produce or goods carrying caltrop. Note that certain produce or goods may be excluded from these general movement and sale exemptions by Gazettal Notice of the Chief Executive, DEW.

The following sections of the Act apply to caltrop throughout each of the regions noted below:

Sections of Act	Region								
	AW	EP	GA	HF	KI	LC	MR	NY	SAAL
186(1) Prohibiting entry to area									
186(2) Prohibiting movement on public roads	X	X	X	X	X	X	X	X	X
188(1) Prohibiting sale of the plant	X	X	X	X	X	X	X	X	X
188(2) Prohibiting sale of contaminated goods	X	X	X	X	X	X	X	X	X
190 Requiring notification of presence									
192(1) Land owners to destroy the plant on their properties									
192(2) Land owners to control the plant on their properties	X	X	X	X	X	X	X	X	X
194 Recovery of control costs on adjoining road reserves	X	X	X	X	X	X	X	X	X

Review

This policy is to be reviewed by 2025, or in the event of a change in any regional management plan for caltrop.

Weed Risk

Invasiveness

Each caltrop plant can produce up to 4000 seeds, which disperse by attaching to livestock, produce, clothing or vehicles, and by soil movement (e.g. road grading, spoil dumping).

Some seed readily germinates following rainfall events of at least 5mm in late spring and summer. The weed can flower within 21 days of emergence, and fruits can contain viable seed only 10 days after pollination. This short window of time to viable seed production, combined with the volume of seed produced and staggered germinations following summer rainfall presents many challenges for effective control.

Impacts

Caltrop is a major burry weed of urban areas, where it thrives on footpaths, sports fields and amenity areas due to lack of competition from other plants in summer. The burrs cause injury to feet even through footwear and puncture bicycle tyres, making caltrop a seasonal concern for local government.

It has been a problem in the dried vine fruit industry, as a product contaminant and even a hazard where fruit is picked manually.

In dryland cropping areas caltrop grows on fallows and headlands after summer rain and especially on sandy soils. It can block seeding machinery, and like other summer fallow weeds it depletes soil moisture and nutrients.

Caltrop occasionally impacts on livestock through burr-injury or poisoning, although this is increasingly uncommon. It is potentially toxic to sheep and goats, mainly by causing photosensitisation, also by accumulating nitrites under some conditions and containing harmala alkaloids although at much lower levels than African rue. However, livestock poisonings are very rare.

Potential distribution

Distribution of caltrop is limited by availability of water in summer; it has no winter growing period as it requires relatively high temperatures and is not frost tolerant. Areas with sandy soils and receiving frequent summer rainfall events greater than 5 mm are at higher risk of experiencing greater impacts from caltrop infestations.

It is present in all regions but there a number of areas have been identified by regional weed risk assessments as having potential for further expansion of caltrop distribution.

Feasibility of Containment

Control costs

Control costs may be relatively low when compared with many other weeds as caltrop infestations are normally accessible to spot spraying. But control is problematic for urban Councils as serial germinations may occur after each heavy rain in summer requiring repeat treatments. Mulching or maintaining a dense turf are the best options in these situations.

Similarly, pasture management or renovation to provide competition is often the key to caltrop control in pasture.

Persistence

The high seed production per caltrop plant enables it to maintain a population at very low densities, and also makes control difficult. Most of the seed has innate dormancy, with only one seed from a burr emerging at a time, and remains viable for 5 years or longer.

Current distribution

Caltrop has been confirmed as present in each region. The Riverland has historically experienced greater abundance of caltrop, as the region provides an ideal environment for it to thrive.

Caltrop is widespread in irrigation areas of the Murraylands and Riverland region and through many urban and township areas. It also occurs in dryland agricultural areas, where it germinates and grows rapidly in response to summer rainfall.

State Level Risk Assessment

Assessment using the Biosecurity SA Weed Risk Management System gave the following comparative weed risk and feasibility of containment scores by land use:

Land use	Weed Risk	Feasibility of control	Response at State Level
Grazing only: southern agricultural	high 126	low 61	Manage weed
Grazing: rangeland	medium 98	negligible 156	Manage sites
Irrigated pastures	medium 98	low 85	Manage sites
Crop-pasture rotation	medium 90	low 91	Manage sites
Urban	medium 51	low 113	Manage sites
Perennial horticulture	medium 45	low 91	Manage sites
Vegetables	low 29	medium 55	Limited action

Considerations

Risk assessment indicates a management action at State level of managing sites in most of the affected land uses to minimise the impacts of caltrop. Regional management plans vary according to regional habitats and presence of the weed.

In the Alinytjara Wilurara and South Australian Arid Lands regions, only limited action is generally feasible although local containment zones may be used to prevent establishment of new infestations in high priority areas. The Murraylands and Riverland region aims to manage sites, for example in the irrigated horticulture land use. The Green Adelaide, Hills and Fleurieu, and Northern and Yorke, regions aim to manage the weed to reduce impacts. In the Eyre Peninsula region the regional aim is to protect sites. As the Limestone Coast and Kangaroo Island are even less suitable climatically for caltrop growth, management in these regions is aimed at containing spread.

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Caltrop is not yet established on Kangaroo Island, and any infestations there are destroyed as found.

The community sometimes expects local government to maintain particular urban sites totally free of caltrop, but even local eradication is rarely possible where there is high traffic movement, discontinuous ground cover and limitations on herbicide use.

Caltrop has a long history in traditional Indian, Greek and Chinese medicine; usually the seeds are used but sometimes also the leaves. It is not known to be cultivated for medicinal use in South Australia.

Synonymy

Tribulus terrestris L., Sp. Pl. 1: 387 (1753).

Taxonomic synonym:

Tribulus lanuginosus L., Sp. Pl. 1: 387 (1753).

Tribulus saharae A. Chev., Explor. Bot. Afrique Occ. Franc. 1: 96 (1920).

Other common names include gokshura, bai ji li, puncture vine, calthrop, yellow vine, goats head, bulls head, devil's thorn, devil's eyelashes, burra gokharu, kanti, Malta cross and Mexican sandburr. It is also one of the many plants (both native and introduced) known as bindii or bindyeye.

In addition to native populations of *T. terrestris*, there are other species of *Tribulus* endemic to Australia, some of which e.g. *T. occidentalis*, may sometimes be confused with caltrop.

Hon David Speirs MP
Minister for Environment and Water

Date: 28 March 2021