Government of South Australia



Kangaroo Island Natural Resources Management Board



JUNE 2009 Kangaroo Island Natural Resources Management Board ONE-LEAF CAPE TULIP – WORKING MANAGEMENT

STRATEGY

ii

ONE-LEAF CAPE TULIP – WORKING MANAGEMENT STRATEGY

Reviewed November 2010

Sustainable Landscapes

A report prepared for the Kangaroo Island Natural Resources Management Board

Trish Mooney Bush Management Adviser Department of Environment and Natural Resources

Rory Wiadrowski and Veronica Bates Senior Sustainable Landscapes Officer and Animal and Plant Control Officer KI NRM Board



Sustainable Landscapes Program

The views expressed and the conclusions reached in this report are those of the author and not necessarily those of persons consulted. The Kangaroo Island Natural Resources Management Board shall not be responsible in any way whatsoever to any person who relies in whole or in part on the contents of this report.

Project Officer Contact Details

Rory Wiadrowski Senior Sustainable Landscapes Officer Kangaroo Island Natural Resources Management Board 35 Dauncey Street Kingscote SA 5223

Phone: (08) 8553 4200 Fax: (08) 8553 4399 Email: rory.wiadrowski@kinrm.com.au

Kangaroo Island Natural Resources Management Board Contact Details

Jeanette Gellard General Manager 35 Dauncey Street Kingscote SA 5223

Phone: (08) 8553 4300 Fax: (08) 8553 4399 Email:gellard.jeanette@bigpond.com

© Kangaroo Island Natural Resources Management Board

This document may be reproduced in whole or part for the purpose of study or training, subject to the inclusion of an acknowledgment of the source and to its not being used for commercial purposes or sale. Reproduction for purposes other than those given above requires the prior written permission of the Kangaroo Island Natural Resources Management Board.

For bibliographic purposes this paper should be cited as:

Bates, V. Mooney, T. Wiadrowski, R. 2009. *One-leaf Cape Tulip – Working Management Strategy.* Kangaroo Island Natural Resources Management Board. Kingscote South Australia.

Front cover images: One-leaf Cape Tulip, R Wiadrowski

ii

Contents

1. In	troduction1
1.	1 Weed description, reproduction and dispersal1
1.	2 Stock toxicity
1.	3 Kangaroo Island infestation - history of spread2
2. S	urvey results and recommendations2
2.	1 Core infestations
	2.1.1 North west
	2.1.2 Karatta
	2.1.3 Vivonne
	2.1.4 Cassini-Menzies
	2.1.5 Murray Lagoon
	2.1.6 Flour Cask
2.	2 Outliers
	2.2.1 Parndana
	2.2.2 Birchmore
	2.2.3 Shoal Bay 4
	2.2.4 Nepean 5
	2.2.5 Dudley
	2.2.6 Western River
	2.2.7 Ten Tree
3. R	eview of control methods5
3.	1 Hand Removal
3.	2 Mechanical Slashing
3.	3 Controlled Burning 6
3.	4 Cultivation 6
3.	5 Herbicide Control7
0	ne-leaf Cape Tulip Control Calendar9
0	ne-leaf Cape Tulip Herbicide Application Rates and Techniques 10

4. Priorities	12
Appendices	13
One-leaf Cape Tulip distribution	13

1. Introduction

1.1 Weed description, reproduction and dispersal

One-leaf Cape Tulip, *Moraea flaccida*, is a garden plant that originated from South Africa and belongs to the Iris family (Iridaceae). It has been present in Australia since the 1880s. The following descriptions have been summarised principally from Muyt (2001), and Parsons and Cuthbertson (1992).

Seeds of One-leaf Cape Tulip germinate in autumn and plants regrow from corms at the same time. The weed is characterised by strappy foliage that emerges following autumn rains, with plants reaching around 70 cm in height. Salmon pink to orange flowers appear in early-mid spring on plants that are two-three years old, with seed generally maturing in late spring. New season corms are produced prior to flowering. The foliage dies back completely over summer and infestations of the weed are not visible during the dry period.

Both One-leaf Cape Tulip and the related Two-leaf Cape Tulip have invaded agricultural lands and more open areas of native vegetation, e.g., grasslands, and woodlands across southern Australia. This weed is relatively easily controlled by chemical means in an agricultural setting where the land is being cropped. However, it is more difficult to manage on grazing land, particularly where it occurs in low lying areas prone to water logging. In the latter case, machinery access may be difficult to impossible, during the critical period for control in August-September.

While not regarded as a high risk environmental weed, One-leaf Cape Tulip is known to invade native vegetation along disturbed edges, tracks and creek lines and impedes regeneration and growth of native flora in these settings.

One-leaf Cape Tulip spreads through seed and underground corms, both of which are produced annually. Corms can remain viable for a few years and numbers in the soil may approach 7000 per square metre. Corms have a period of dormancy which determines the number of plants which germinate in any one year, dependant on seasonal conditions. Up to 60% of corms may remain dormant through a growing season.

There may be up to 150 seeds produced per seed capsule and with, for example, eight capsules per plant this would result in 1,200 seeds per plant. However, seeds are not long-lived in the soil and most germinate the following autumn.

Seed can be readily spread in hay cut from infested paddocks ands both corms and seed can be dispersed in contaminated soil, for example, on farm machinery. Seed capsules are also dispersed by water and wind. One-leaf Cape Tulip may be spread along roadsides as a result of road grading and maintenance activities.

The seeds remain viable after passing through the digestive systems of animals and may be spread in stock droppings. Seed can also adhere to wool, fur and feet of animals, either stock or wildlife, and be spread by this method.

1.2 Stock toxicity

All parts of One-leaf Cape Tulip are poisonous to grazing animals, with cattle considered to be the most susceptible. Stock accustomed to grazing on infested areas will generally avoid eating the plants, with the result that desirable pasture species are replaced by One-leaf Cape Tulip through a selective grazing process. Young stock may eat the plants if there is little alternative grazing available.

1.3 Kangaroo Island infestation - history of spread

One-leaf Cape Tulip was first recorded on Kangaroo Island in the 1980s (B. Overton, pers. comm.), although this weed is likely to have been present since at least the 1960s. It appears to have been brought in as a garden plant and possibly also as a contaminant in stock fodder or cro/pasture seed.

2. Survey results and recommendations

2.1 Core infestations

2.1.1 North west

This infestation is centred on the Roo Lagoon area, near the intersection of Playford Highway and Mount Taylor Road. This population threatens to infest native vegetation in Flinders Chase National Park, surrounding farming land and forestry plantations.

Aim: to contain within boundaries of Gosse-Ritchie, North Coast-Johncocks and Harriet-Ahwans roads. Control needs to include roadsides, especially Playford Highway and Mt Taylor, Coopers and Tin Hut roads.

2.1.2 Karatta

This infestation is centred on the Karatta Lagoons area north of the South Coast Road. It potentially threatens to invade Kelly Hill Conservation Park, surrounding farming land and forestry plantations, and has already spread down steam along the Stunsail Boom River, to the east of the park.

Aim: (northern) to contain within boundaries of Church Road and Mount Taylor Road, north of South Coast Road; (southern) contain within existing properties between South Coast Road and the mouth of the Stunsail Boom River.

2.1.3 Vivonne

This infestation has spread along the South Coast Road, either side of Vivonne Bay township. It threatens to infest surrounding farming land and the Harriet and Eleanor River systems.

Aim: to contain within boundaries of Mt Stockdale Road, Hickmans Road and East West Two, north of South Coast Road. The infestation south of South Coast Road in the vicinity of Vivonne Bayto be eradicated.

2.1.4 Cassini-Menzies

This widespread infestation seems to have spread from a number of roadsides, including Bark Hut, North Coast, Millers and Springs roads.

Aim: to contain within boundaries of North Coast, Bark Hut and Rose Cottage-Cockatoo Creek roads and keep clean properties free of Cape Tulip.

2.1.5 Murray Lagoon

This infestation has a limited distribution along the northern and western edge of Murray Lagoon, apparently originating from fencing work carried out in the 1980s (A. Maguire, pers. comm.). It could potentially spread around the entire boundary of Murray Lagoon, threatening the biodiversity values of this nationally significant wetland.

Aim: to contain south and east of Seagers Road and west of Woods Road. Several dozen plants were removed from roadside at intersection of Birchmore and South Coast roads in 2008 (V. Bates, pers. comm.).

2.1.6 Flour Cask

This infestation is mostly restricted to an area inland from Flour Cask Bay on south eastern Kangaroo Island. It could potentially spread around a series of saline wetlands that are characteristic of this landscape. This is also the most easterly mapped occurrence of One-leaf Cape Tulip on Kangaroo Island.

Aim: to contain within boundaries of Shag Rock track, Three Chain Road and Flour Cask Bay Road; eradicate outliers at intersection of Hog Bay and Three Chain roads and along Halls Road, west of Wiadrowski Lagoon.

2.2 Outliers

2.2.1 Parndana

This isolated infestation occurs on several properties on the west side of Timber Creek Road, south of Playford Highway.

Aim: Since this is an isolated occurrence of One-leaf Cape Tulip, the aim should be to eradicate if possible. At the minimum this infestation should be contained north of the Rowland Hill Highway to prevent infestation of the Timber Creek system and areas west of Timber Creek Road. Eradication may also require roadside control.

2.2.2 Birchmore

Isolated infestation apparently restricted to two properties between Birchmore Lagoon and Birchmore Road. This infestation occurs at the end of an internal drainage system so cannot spread further via surface water transport.

Aim: Since this is an isolated occurrence, the aim should be to eradicate if possible. Eradication may also require roadside control.

2.2.3 Shoal Bay

Isolated infestation apparently restricted to Rhynie Road and adjoining private land. The weed is present in low lying salt affected land that has been subdivided into lifestyle blocks.

Aim: Maintain weed free roadsides and assist landholders in controlling Cape Tulip on private land.

4

2.2.4 Nepean

This infestation occurs on Min-Oil Road and on one or two properties to the south.

Aim: Reduce overall density and size of the infestation. Eradication is not feasible because the weed is well established in native vegetation.

2.2.5 Dudley

Three isolated patches of Cape Tulip exist on the Dudley Peninsula. These infestations are being actively managed by landholders.

Aim: Eradicate all outlier populations on the Dudley Peninsula.

2.2.6 Western River

Cape Tulip is restricted to one property with a small number of plants present. The property is grazed by stock, which also graze the landholder's property in the North West infestation.

Aim: Eradicate before Cape Tulip becomes established. The terrain will make eradication impossible if Cape Tulip does establish in the area.

2.2.7 Ten Tree

Cape Tulip is present on the road side and adjoining properties at Ten Tree Lagoon.

Aim: Continue to control the infestation to avoid further spread into adjoining un-infested land.

3. Review of control methods

Control of One-leaf Cape Tulip is complicated by dormancy of the corms and because the plant can reproduce by seed and secondary corms. Treatment often needs to be repeated for several seasons before infestations can be completely controlled.

Water logging and difficult terrain are complications that face land owners managing one-leaf Cape Tulip infestations on Kangaroo Island. During the optimum control period of July and August many of the infested areas on the island are water logged or submerged. In this situation earlier applications metsulfuron methyl will be effective but there will be a higher survival rate of mature corms. Larger infestations are best treated with herbicide applied through a weed wiper or a boom sprayer, while individual plants can be hand-wiped or spot sprayed with herbicide or physically dug out. The Kangaroo Island NRM Board has a trailer-mounted carpet wiper unit which is available for use by landholders. The advantages of a weed wiper over conventional application methods include: minimal off target damage, concentrated herbicide solution is applied direct to the foliage, easy to use and it can be used earlier in the season in areas prone to water logging.

3.1 Hand Removal

Plants can be dug out – best when soil is moist so that corms do not dislodge. Plants should be removed before flowering to ensure new corms are not fully developed and detach from the parent corm. Flowering generally occurs from early September on KI but varies depending on the season. One-leaf Cape Tulip may not flower at all in extremely dry conditions. Corms and seed should be destroyed by burning, immersion in boiling water or composted in sealed plastic bags for at least one year before deep burial or burning.

3.2 Mechanical Slashing

Slashing can be used as a seed suppression tool if the window of opportunity for chemical control or manual control has been missed. Slashing should be conducted during flowering and prior to seed set. Mature stands with seed heads should not be slashed because of risk of spreading seeds.

3.3 Controlled Burning

Autumn burning in paddocks will assist later control actions by reducing organic matter that will protect the plant from chemical applications. Fire is also thought to stimulate germination of the corms, allowing a higher degree of control.

3.4 Cultivation

Control programs in agricultural areas are greatly improved by cultivation or burning in autumn to stimulate the germination of dormant corms. Cultivation can also be used during a very short period to kill Cape Tulip when the mature corm is shrivelled and exhausted and the secondary corms are not fully developed. This stage lasts for 2 weeks and occurs in July or August depending on the season. The soil needs to be cultivated to a depth of 15 cm to ensure all corms are disturbed. Cultivation will need to be repeated after four weeks to kill surviving plants.

3.5 Herbicide Control

Plants can be treated with both selective and non-selective herbicides using various application techniques. There are several chemicals that are suitable for the control of One-leaf Cape tulip. Before using a particular herbicide a check must be made that is registered in South Australia for the application method and rate that is going to be used. Metsulfuron methyl and glyphosate are the most commonly used chemicals to combat One-leaf Cape Tulip on KI. Amine salts (2,4-D and MCPA) can be used as an alternative to Metsulfuron methyl. Chlorsulfuron has been successfully used in Western Australia as metsulfuron methyl has been used here using a weed wiper in the same manner. Chlorsulfuron is not selective like Metsulfuron methyl.

Metsulfuron methyl and glyphosate or a combination of both are suitable for spot spraying small infestations.

Including glyphosate in the herbicide solution applied through a carpet wiper or spray unit during flowering will stop seed set due to the herbicide's fast acting nature, if earlier treatment was not possible. However, the inclusion of glyphosate will make applications non-selective if a weed wiper or tongs are not used.

Large agricultural infestations can be sprayed with 2,4-D or MCPA using a boom sprayer just prior to flowering. This method has not proven to be as effective in destroying the Cape Tulip corms as using metsulfuron methyl applied through a weed wiper or spray unit.

Glyphosate

Glyphosate is a non-selective herbicide that can be applied as a foliar spray at any growth stage. Timing of application is very important to have any effect in developing corms. Glyphosate is translocated into Cape Tulip bulbs but field observations indicate that most plants will re-grow from corms in the following autumn. Another disadvantage of using glyphosate is that all vegetation treated will be destroyed leaving the treated site susceptible to wind and water erosion and re-invasion from Cape Tulip and other undesirable plant species.

Glyphosate can become selective by wiping it on individual plants using tongs or using it through a weed wiper.

Metsulfuron Methyl

Metsulfuron methyl is effective from early growth stages through to flowering. It is recommended that a penetrant be added at a rate of 100 ml per 100 L of spray solution to help break through the waxy surface of the leaf. Metsulfuron methyl is a residual chemical that remains active in the soil for up to 60 days. High organic matter and soil acidity reduces the chemicals residual properties. Care needs to be taken to ensure the chemical does not

leach into water ways. It is applied at a rate of 15–17 g/Ha when used in a spray unit and at 1g/L though a weed wiper. It is a selective herbicide only effective on broadleaved plants, which allows grass cover to be retained.

Glyphosate (540 g/L) diluted at 100 ml/L and metsulfuron methyl mixed at 1g/L applied though a weed wiper has also been used successfully in the region to control One-leaf Cape Tulip. The glyphosate is thought to provide stronger knockdown properties (important to stop flowering after late applications), while the metsulfuron kills the adult and secondary corms.

Chlorsulfuron

Chlorsulfuron has similar properties to metsulfuron methyl and is applied at a rate of 20g/Ha using a boom sprayer and at 1g/L using a weed wiper.

Optimum treatment time, using metsulfuron methyl or chlorsulfuron is at adult corm exhaustion, during winter (late July- August). Treatment must occur prior to flowering. The only means of checking corm exhaustion is by physically digging them up. The old corm should be shrivelled and the new corms should not be fully developed or present.

2,4-D Dimethyl amine salt

2,4-D is a broadleaf selective herbicide applied as a foliar spray just before flowering (when the flowering heads are still developing). It is effective on Cape Tulip at a rate of 1.6 L/Ha.

2,4-D is a volatile herbicide and care needs to be taken to avoid off target damage to sensitive crops such as pulses, potatoes and vine crops. Restrictions on the use of 2,4-D products apply. Contact the Australian Pesticides and Veterinary Medicines Association or PIRSA Rural Chemicals before using any 2,4-D product.

MCPA Dimethyl amine salt

MCPA is an alternative to 2,4-D and should be applied at a rate of 1-1.5 L/Ha just before flowering (when the flowering heads are still developing).

2,4-D and MCPA products are not preferred control options for One-leaf Cape Tulip because of the narrow window of opportunity for successful control and the volatile nature of the chemicals. Both chemicals were widely used for the control of Cape Tulip before the introduction of the more effective sulfonylurea group of herbicides in the 1980's. They should only be used when other control methods are not suitable. One-leaf Cape Tulip Control Calendar

	Summer	Autumn		Winter			Spring	
Control								
Treatment	February	March	April	Мау	June	July	August	September
Burning	CFS Permit Required	CFS Permit Required						
Cultivate								
Hand								
Removal								
Slashing								
Spot Spray								
Hand wipe								
Gyphosate								
and								
Metsulfuron methyl								
Weed Wiper								
Metsulfuron								
methyl or								
Weed Wiper								
Metsulfuron								
Glyphosate								
Boom enroy								
Motoulfurer								
methyl or								
Chlorsulfuron								
Boom sprav								
2,4-D or								

	Summer	Autumn		Winter			Spring	
Control								
Treatment	February	March	April	Мау	June	July	August	September
MCPA								

One-leaf Cape Tulip Herbicide Application Rates and Techniques

Application method	Active ingredient	Rate	Situation	Comments
Hand wipe	Glyphosate 540g/L	1:1 with water	Individual plants	Ideal for plants in riparian (riverside) vegetation.
Spot spray	Glyphosate 540g/L Metsulfuron	500 ml	Isolated patches	Use 100 ml of Pulse penetrant per 100 L spray solution. Apply before seed set.
	methyl 600 g/kg	+15 g		
		/100 L Water		Non-selective, residual but fast acting. Do not use in native vegetation.
	Glyphosate 540g/L	500 - 700 ml/ 100 L water	Isolated patches	Use 100 ml of Pulse penetrant per 100 L spray solution.
				Apply before seed set.
				Non-selective but non-residual. OK in native vegetation.
	Metsulfuron methyl 600 g/kg	15 - 17 g/100 L water	Isolated patches	Use 100 ml of Pulse penetrant per 100 L spray solution.
				Apply before seed set.
				Selective but residual. Do not use in native vegetation.

Application	Active			
method	ingredient	Rate	Situation	Comments
Weed wiper	Metsulfuron methyl 600 g/kg	1 g/L	Large infestations in pasture	Use 200 ml of Pulse penetrant per 100 L spray solution.
				8 kph application speed
				2 passes are beneficial in heavy infestations.
	Glyphosate 540g/L Metsulfuron	100 ml/L	Large infestations in pasture	Use 200 ml of Pulse penetrant per 100 L spray solution.
	methyl 600 g/kg	1g/L		Knockdown speed increased with the addition of glyphosate.
				Can be used when flowering.
	Chlorsulfuron 750 g/kg	1 g/L	Large infestations in pasture	Use 200 ml of Pulse penetrant per 100 L spray solution.
				8 kph application speed
				2 passes are beneficial in heavy infestations.
Boom Spray	Metsulfuron methyl 600 g/kg	15 - 17 g/Ha	Large infestations in pasture	Use 100 ml of Pulse penetrant per 100 L spray solution.
	Chlorsulfuron 750 g/kg	20 g/Ha	Large infestations in pasture	Use 100 ml of Pulse penetrant per 100 L spray solution.
	МСРА	2 L/Ha	Large infestations in pasture	Apply just prior to flowering
	2,4-D 500 g/L	1.6 L/Ha	Large infestations	Apply just prior to flowering

Application	Active			
method	ingredient	Rate	Situation	Comments
			in pasture	

4. Priorities

One-leaf Cape Tulip is a difficult weed to control and is now widespread on Kangaroo Island (see map). The following priority areas have been identified, although it is recognised that priorities may change as new areas of infestation are identified:

- High priority to contain North west, Karatta and Murray Lagoon infestations since these have the potential to spread along creek lines and around lagoons into DEH reserves on western and southern Kangaroo Island. If One-leaf Cape Tulip were to spread through these areas unchecked, there are likely to be significant impacts on these biodiversity conservation areas
- The outlier populations should be surveyed more closely to ascertain actual extent of
- One-leaf Cape Tulip. If eradication is deemed possible at any of these sites, landholders should be assisted with on-going control to achieve this outcome.
- Manage roadside and crown land infestations to stop the spread to clean properties.
- Eradicate newly detected and establishing populations

Appendices

One-leaf Cape Tulip distribution

