

Herbicides and equipment to improve pastures infested with cape tulip (*homeria* spp.)

R. J. Carter, D. Hogarth and M.L. Williams

SA Animal & Plant Control Commission GPO Box 1671 Adelaide SA 5001

SA Animal & Plant Control Commission Box 618 Naracoorte SA 5271

Summary. Herbicides reduce one-leaf and two-leaf cape tulip, *Homeria flaccida* and *H.miniata*, in non-arable permanent pastures however increased yields may not cover control cost. Sprayed herbicides give good control, but reduce desirable pasture species. Carpet roller applicators are effective on one leaf cape tulip. The recommended treatment is using a contra-rotating carpet roller to wipe a solution of glyphosate (45 g a.i./L water) or metsulfuron-methyl (60 mg a.i. /L water) with an organosilicone surfactant (2 mL/L) from flower-stem emergence until flowering.

Introduction

Cape tulip is a weed of non-arable pastures in southern Australia. There are limited control options. Phenoxy herbicides are useful (2) but may damage nearby crops. We tested ways for farmers to manage cape tulip, in pastures in South Australia.

Methods

In field trials from 1981 until 1991 we tested herbicides and application methods for cape tulip control. All trials were in randomised block design in permanent pasture. European Weed Research Council (EWRC) scoring system was used for visual assessment (1).

Clare site

At Clare. on one- and two- leaf cape tulip. we treated 4 replicates with the herbicides shown on Table 1 at two times. Plots were 20x3 m. Treatments were applied by a 1.7 to wide hand boom, with spray volume of 166 l/ha. Table 2 shows a similar experiment sprayed in 1983. A third trial shown in Table 3, evaluated a wiper.

Table 1. Effect of herbicide timing on the control of one-leaf cape tulip at Clare.

Treatment	Rate (g.a.i/ha)	Control 3.8.82 (EWRC ^b score)	Count 3.8.83 (Plants/m ²)
Control(untreated)		7.6	46
Early 7.9.81 (prior to bulb exhaustion)			
glyphosate 360g/L	180	6.0	41
1440		5.8	38
chlorsulfuron 750g/kg	15 ^a	2.5	8
37.5 ^a		2.8	6
2,4-D butoxyethyl ester 357g/L	2142 ^a	2.5	8
amitrole 250g + ammonium thiocyanate 220g/L	3000+2640 ^a	2.2	7
Late 22.10.81 (mid to late flowering)			
glyphosate	180	8.5	42
1440		6.2	29
chlorsulfuron	15 ^a	3.8	20
37.5 ^a		4.0	16
2,4-D butoxyethyl ester	2142 ^a	5.0	28
amitrol + ammonium thiocyanate	3000+2640 ^a	6.0	10
L.s.d. 5%		1.8	6

^anon-ionic surfactant added ^bEWRC score for efficacy 1=complete kill 9=no control

Table 2. Effect of sulfonyl-urea herbicides on one and two leaf cape tulip at Clare.

Treatment	Treatment Date	Rate (g ai/ha)	Control 30.8.84 (EWRC score)
Metsulfuron-methyl	12.7.83	6 ^a	1.8
Chlorsulfuron	12.7.83	15 ^a	2.0
2,4-D butoxyethyl ester	7.9.83	2142 ^a	3.5
Glyphosate	7.9.83	1440	4.2
Amitrole	7.9.83	3000 ^a	4.5
Untreated control			6.0
L.s.d. 5%			1.7

^aNon-ionic surfactant added

Table 3. Effect of pipe rope-wick wiper applied glyphosate on cape tulip at Clare.

Treatment	rate	method	treatment date	Count (plants/m ²)
2,4-D butoxyethyl ester	1964g/ha ^a	boomspray	12.9.83	10.7
Glyphosate 360g/L	120g/L	wiper	3.8.83	11.9
Glyphosate 360g/L	120g/L	wiper	12.9.83	13.1
Amitrol 250g/L	2750g/L ^a	boomspray	12.9.83	6.7
Untreated control				60.1
L.s.d. 5%				16.4

^aNon-ionic surfactant added

we applied 'Lug giynnosate iso-propyiamme formulatea with surfactant) with a iivan pipe rope-wick wiper, set 3-10 cm from desirable pasture, with two passes at opposite directions at 6 km/hr. We applied 2,4-D and amitrole by boomspray in 70 L/ha spray volume, with plots 200x 10 m replicated three times.

Eden Valley site

At a site with two-leaf cape tulip, we sprayed herbicides listed in Table 4, with a 2.8 m boom at 100 L/ha. We wiped glyphosate with a Winstone Wick Wiper one or two times.

Table 4. Cape tulip and pasture regeneration one year after treatment at Eden Valley.

Treatment	Rate	Method	Cape tulip Plant Count (/m ²)	Pasture Regeneration (%)
Bayonet leaf emergence treatment 30.8.85				
glyphosate	120g/L	wiper 1 pass	35	41
glyphosate	120g/L	wiper 2 pass	37	52
metsulfuron-methyl	3.0g/ha	boomspray	5	28
metsulfuron-methyl	4.2g/ha	boomspray	12	13
chlorsulfuron	11.3g/ha	boomspray	48	36
chlorsulfuron	15.0g/ha	boomspray	34	22
amitrol	3000g/ha	boomspray	23	38
Post flowering treatment 30.10.85				
glyphosate	120g/L	wiper 1 pass	60	28
glyphosate	120g/L	wiper 2 pass	46	32
metsulfuron-methyl	3.0g/ha	boomspray	13	32
metsulfuron-methyl	4.2g/ha	boomspray	10	16
chlorsulfuron	11.3g/ha	boomspray	14	46
chlorsulfuron	15.0g/ha	boomspray	23	19
amitrol	3000g/ha	boomspray	24	19
L.S.d 5%			31	18

Mount Benson site

At Mount Benson, we sprayed the herbicides listed in Table 5 onto one-leaf cape tulip in 1987. The four replicates included plots 2x25 m. In 1988 half the plots were retreated. We burnt another area in autumn 1988 to improve sprouting or dormant corms (3) and applied the same treatments in spring.

Table 5. Effect of herbicides on one-leaf cape tulip with and without burning.

Assessment dates		15.6.89		5.9.91	
Treatment	Rate	Unburnt single	Unburnt double	Burnt single	
Treatment dates	(g ai/ha)	13.8.87	13.8.87	10.8.88	
		(plants/m ²)	(plants/m ²)	(plants/m ²)	(plants/m ²)
Herbicide					
2,4-D butoxyethyl ester	2142	288	89	44	75
Metsulfuron methyl	4.2				
+ 2,4-D butoxyethyl ester	2142	272	30	32	35
Chlorsulfuron	11.2	312	70	14	19
Metsulfuron methyl	4.2	404	53	29	16
Untreated control		413	410	385	221
LSD 5%			72	46	71

On an area burnt in autumn 1989, we applied 45 g/L glyphosate or 60 mg/L metsulfuron-methyl with 2 mL/L organosilicone surfactant (Pulse()) by contra-rotating carpet roller. Plots were 20x4 m. The herbicide was applied in either a single or double pass at two speeds at times shown in Table 6. Approximately 10 L/ha of solution was applied. Pasture samples were hand cut on 28 August 1990, separated from cape tulip and oven dried to measure dry matter production. All means were compared using a t-test.

Results and discussion

Herbicides reduce cape tulip counts in permanent pastures however increased yields may not cover control cost. Sprayed herbicides give good control, but reduce desirable pasture grasses and legumes (data not shown). Ropewipers are difficult to maintain and unreliable. Carpet roller applicators are effective on one-leaf cape tulip. The best treatments use a contra-rotating carpet roller to wipe a solution of glyphosate (45 g/L water) or metsulfuron-methyl (60 mg/L water) with an organosilicone surfactant from flower-stem emergence until flowering. Burning in autumn improves control (Table 5). At Clare both one and two leaf cape tulip were assessed separately, but are reported together here in Tables 1, 2 and 3.

Application method

The wiper technique was as effective as sprayed herbicide at Clare (Table 3) and Eden Valley (Table 4). Wiping reduced pasture damage. Reduced speed or double wiping did not improve control except for double wiped early treatments at Mt Benson (Table 6). Glyphosate, or metsulfuron, applied by wiper protected the pasture, and gave good control of one and two leaf cape tulip at all sites.

Herbicide

Depending on application method and timing, glyphosate, chlorsulfuron and metsulfuron, methyl are equal or more effective than butoxyethyl ester 2,4-D, or amitrole. Pasture damage with sprayed glyphosate, chlorsulfuron or amitrole is too severe for practical use.

Timing of herbicide

Timing of herbicide treatment is critical. From Tables 1 and 2, early treatment, prior to bulb exhaustion, is best for sprayed chlorsulfuron, metsulfuron, 2,4-D, and amitrole. Wiping was more effective at stem emergence or flowering, probably due to smaller leaf area at earlier times.

Table 6. Effect of timing and herbicide on one-leaf cape tulip at Mount Benson.

Treatment	Speed (km/h)	Passes	Assessment Date	
			28.8.90 Mean (Plants/m ²)	5.9.91
Untreated			139	174
Early season - prior to bulb exhaustion 24.7.89				
Glyphosate 45 g/L	7.2	1	163	268
Glyphosate 45 g/L	5.3	1	142	186
Glyphosate 45 g/L	7.2	2	106	202
Metsulfuron-methyl 60 mg/L	7.2	1	80	161
All treatments			123	220
Mid season - bayonet leaf emerged 4.9.89				
Glyphosate 45 g/L	7.2	1	33	64
Glyphosate 45 g/L	5.3	1	26	74
Glyphosate 45 g/L	7.2	2	21	37
Metsulfuron-methyl 60mg/L	7.2	1	48	83
All treatments			32	79
Late- flowering 19.9.89				
Glyphosate 45 g/L	7.2	1	34	61
Glyphosate 45 g/L	5.3	1	39	81
Glyphosate 45 g/L	7.2	2	28	92
Metsulfuron-methyl 60 mg/L	7.2	1	31	38
All treatments			33	74
LSD 5%			54	76
Untreated			138	174
Glyphosate 45 g/L	7.2	1	77	131
Glyphosate 45 g/L	5.3	1	69	114
Glyphosate 45 g/L	7.2	2	52	110
Metsulfuron-methyl 60 mg/L	7.2	1	53	94
l.s.d. 5%			33	45

Pasture production

Pasture production, excluding cape tulip from treated plots (Table 6) was less than from the untreated plots. The dry matter from plots increased with cape tulip plants ($R^2=0.666$), from 35.7 g/m² where cape tulip was totally removed, to 119 g/m² at the highest cape tulip density (data not shown). This highlights the need to resow pastures after cape tulip is reduced.

Farmers should include cape tulip control in a general pasture improvement strategy, including resowing suitable species. The increased pasture production from cape tulip removal may not cover control costs without resowing. Farmers in SA are adopting these strategies.

References

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