DIURON TO CONTROL PRICKLY ACACIA ALONG ARTESIAN BORE-DRAINS

P.L. Jeffrey
Tropical Weed Research Centre, PO Box 187, Charters Towers, Qld, 4820

Summary. Research over a three year period led to the registration of diuron for the control of prickly acacia, *Acacia nilotica*, along artesian bore-drains and around turkey-nest dams. The technique involves blocking the drain and allowing it to empty, applying diuron at 32 kg a.i./ha in a one metre wide strip and reopening the drain after three days.

INTRODUCTION

Prickly acacia was introduced into Queensland in the 1890's as a shade and fodder tree. The species established well in the Mitchell grass downs area of north-west Queensland, where it is an aggressive invader of open downs and water ways. The dense thickets formed by prickly acacia reduce pasture production and greatly increase mustering costs. It is along the thousands of kilometres of artesian bore drains that water stock in the region where prickly acacia causes the most problems. These open channels carry water through paddocks from artesian bores that may deliver as much as 6.5 million litres of water per day. They vary in length up to 60 kilometres but average 10-20 kilometres. Nearly 2,000 kilometres of these drains are severely infested, providing the largest reliable seed source for the continuing spread of prickly acacia. The infestation along the drains siphon off large volumes of water, reducing the length of the drains by up to 30% in summer, therefore reducing the carrying capacity of the property. They also form impeneterable barriers to mustering stock and cause mechanical damage to farm equipment when delving (sealing and cleaning) the drains. It therefore became necessary to find a reliable,cost efficient method of control for prickly acacia along bore drains.

Traditional methods of woody weed control such as basal barking were expensive, upwards of $500.00 a kilometre, and time consuming, 2-3 man days per kilometre. Diuron was assessed as a possible control method after personal communication with Mr B Toms of the Rural Lands Protection Board who had observed that other species of acacia had been killed by diuron in industrial situations.

METHODS

Three field trials were conducted in the Richmond area of north-west Queensland. All trials were conducted using a brush gun at 690 kpa and a D8 solid cone nozzle spraying a metre wide strip delivering 1000 L/ha of spray.

Trial 1. Diuron at 48 kg ai/ha was applied to two bore drains that had been blocked to retain water within the drain; further flow was diverted at the bore-head. A kilometre long strip in each drain was sprayed and assessed for effect after six months. Water flow was reintroduced to the drains after three days.

Trial 2. Trial 2 was conducted along a section of bore drain that had a uniform infestation of approximately 4,000 prickly acacia plants per kilometre. The plants were allocated three class sizes; small <5 cms in diameter, medium; 5-20 cms in diameter, large > 20 cms in diameter. The plots were 200 m long and the width of the infestation was divided into three categories: on the drain, 3 m off the drain and 6 m off the drain. For assessing percent kill, 100 trees in each size class were chosen in the first two width categories. The third width category (6 m off the drain) had insufficient plants for a formal assessment. There were four treatments consisting of diuron applied at 16, 24, 32 and 64 kg ai/ha. The lower rates were applied upstream from the higher rates. The drain was diverted at the bore-head and allowed to empty for 24 hours before application. Flow was reintroduced to the drain after three days.

Trial 3. Diuron at 32 kg ai/ha was applied to three bore-drains of differing flow rates measured by a V notch weir board (Queensland Water Resources Commission, pers. comm.)

All drains were emptied before application of diuron from the bore-head to a 10 kilometre mark where water samples were taken to determine diuron residue levels (QDPI Standards Branch). Samples were taken at 1,3 and 7 days after flow was reintroduced to the drains at the medium and large flow drains and 1,3,7,12 and 26 days at the lowest flow drain.

RESULTS AND DISCUSSION

Trial 1. The larger trees (>20 cms in diameter) along both drains were killed. It was observed that where diuron was applied on to areas of the drains that had emptied prior to application the kill was greatly enhanced and included all class sizes. From these observations, the second trial to screen application rates was conducted on a previously emptied but still moist bore drain.

Trial 2. Results are summarised in Table 1.

Table 1. Effect of diuron on prickly acacia growing on and near a bore drain (Trial 2).

		Percent kill					
	Size class:	small		medium		large	
Treatment	width category:	on	3m off	on	3m off	on	3m off
Diuron 16 kg ai/ha		73	0	66	59	68	58
Diuron 24 kg ai/ha		84	0	83	70	86	80
Diuron 32 kg ai/ha		95	0	100	98	100	100
Diuron 64 kg ai/ha		94	0	100	100	100	100

Small plants that were not immediately on the drain were not killed by any treatment possibly because they had insufficient root structure in contact with the diuron. At the six metre width category only large trees were affected. There was little difference in the percent kill between 64 kg ai/ha and 32 kg ai/ha in any width category or size class and 32 kg/ai was selected as the rate for registration for control of prickly acacia.

Trial 3. The percent kill on all the drains remained within the results indicated in trial two except on the medium flow drain where a section 3 kms long had been bulldozed and regrowth exceeded 16,000 plants per kilometre of drain. All plants in this section were between 5-7 cms in diameter and the kill was reduced to 60%.

Diuron residue levels are summarised in Table 2.

Table 2. Concentration of diuron in the water of three bore drains after treatment and re-opening the drain.

Days After Re-opening Drain	Diuron concentration (mg/l) *High (1.3 ML/day)	Medium (0.66 ML/day)	Low (0.12 ML/day)
1	15.30	10.00	10.10
3	0.11	0.45	1.63
7	0.02	0.10	0.85
12	-	-	0.23
26	-	-	0.06

* Flow rate measured by V notch weir board at 10 km from bore head, in megalitres/day.

Results show that the first water passing through a drain after treatment with diuron contain relatively high residue levels that quickly drop as the volume of water passing through the drain increases.

The combination of these trials led to the registration for use of diuron at 32 kg ai/ha and the following application method to control prickly acacia along bore-drains and around turkey-nest dams.

1) Divert bore-drain or lower level in turkey-nest dam by one metre.

2) Spray a metre wide strip of diuron at 32 kg ai/ha in 1,000 L/ha.

3) Allow at least three days before returning water flow.

4) Bypass desirable plants or house tanks for at least seven days with medium to high flow drains and 21 days for low flow drains.

This procedure to control prickly acacia along a drain is cost efficient (approximately $45.00 per kilometre of drain) and takes only ten minutes per km. to apply. This has led to a high adoption level of this method of control.

Other weeds that have been observed to be equally controlled by this method are minosa bush (*Acacia farnesiana*), cumbungi (*Typha* spp), water primrose (*Ludwigia peploides*) and parkinsonia (*Parkinsonia aculeata*).

ACKNOWLEDGMENTS

The author would like to thank Mr Neil Richards (Clareborough, Richmond) and Dr Graham Thompson (Olive Downs, Richmond) for their financial and material support.

I wish to acknowledge the support of the Rural Lands Protection Board, Mr Barry Toms and the staff of the Tropical Weed Research Centre. I would like to thank the Queensland Water Resources Commission and the Queensland Department of Primary Industries for technical advice.