PASPALUM CONTROL IN AUSTRALASIA WITH GLYPHOSATE

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Summary

Control of paspalum (*Paspalum dilatatum*) with glyphosate was evaluated over a period of four years in New South Wales, Victoria and Queensland, Australia and the North Island of New Zealand. Results of these field trials confirm the high activity that glyphosate exhibits against paspalum. For control of paspalum under New Zealand and Australian conditions 2.2 kg/ha glyphosate is required.

INTRODUCTION

Glyphosate, a new broad spectrum post emergence herbicide which readily translocates into below ground parts of perennial herbaceous plants (Baird *et al.* 1971), exhibits promise for the control of paspalum (*Paspalum dilatatum*). Paspalum is regarded as a problem weed in the warm generally moist regions of Australia and New Zealand, it thrives in waste areas, pastoral and some cropping situations, as well as railways and roadside drains.

This paper discusses the results obtained from 42 field experiments conducted in New Zealand and Australia between 1972 and 1975 using glyphosate at varying rates and with applications at various times of the year to control paspalum.

METHOD AND MATERIALS

The formulation of the isopropylamine salt of glyphosate used was MON 2139 and contained 360 g of acid equivalent/litre.

Rates used were 1 kg to 4 kg/ha in volumes of 225 to 1125 litres/ha. Experimental design consisted of randomized blocks with three or four replications. Comparisons were made with both untreated control plots and current standard treatments. Applications were made with equipment ranging from small plot knapsack sprayers to large scale commercial units operating at speeds of up to 32 km/h. Plot sizes varied from 30m² to 1.2 ha. New Zealand trials 4 and 5 had two replications only with plot sizes of 186m² and a volume of 3,255 litres/ha.

In 1974 in most of the Australian trials additional surfactant (MON 0011) was tested at the 0.42% level by weight in 225 and 1125 litres/ha versus the standard glyphosate formulation.

Areas treated were located primarily on railroad tracks and reserves and most trials were applied during the autumn after most paspalum seed would have germinated. Some trials were applied during late spring and early summer as well as early and late winter.

The target plants varied in height from 6 to 120 cm. Visual assessments were made of *initially* treated plants only, on a 0 to 10 scale (0 = no effect; 10 = complete knockdown or control) as follows:

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- (a) average knockdown (brown out) on a total plot basis compared with the average untreated plots up to 70 days for Australia and 100 days for New Zealand after treatment (DAT)
- (b) average control 70 and 100 DAT plus respectively.

RESULTS

Knockdown

New Zealand: the average visual knockdown of initially treated paspalum over a total plot compared with the untreated area using 1.0 to 1.1 kg/ha of glyphosate in 12 trials was 8.6. Glyphosate at 1.7 to 2.2 kg/ha gave an average knockdown of 9.5 in 14 trials (DAT range 32 to 97).

Australia: 1.1 kg in 225 litres/ha in 30 trials, gave an average control of 8.8. The addition of extra surfactant increased the knockdown to 9.4.

Glyphosate at 1.1 kg in 1125 litres/ha gave a knockdown of 8.2; when surfactant was added, the level increased to 9.2. At 1.7 kg/ha extra surfactant did not increase the level of knockdown.

The average paspalum knockdown when glyphosate at 1.1 kg/ha was applied during October/November was 8.3 compared with applications during January-May which gave an average reading of 9.0. In New Zealand out of 18 glyphosate treatments at 1.7 to 2.2 kg/ha the average knockdown rating was 9.5, whereas in Australia from 49 treatments at 2.2 kg/ha whether in 225 or 1125 litres $\pm$ surfactant the average knockdown rating was 9.4.

TABLE 1: VISUALLY ASSESSED KNOCKDOWN OF PASPALUM IN NEW ZEALAND

No. Trials: 14. Paspalum height range (cm): 6-120.					
Treatment	Rate kg/ha	Mean DAT	No. Treatments	Mean knockdown	Treatment knockdown mean
glyphosate	1.0			8.6	
	1.1	69	12	8.5	8.6
	1.7			9.8	
	1.9			9.5	
	2.2	67	18	9.3	9.5
	2.8			8.5	
	3.0			9.7	
	3.3	72	9	9.3	9.2
Karbutilate	3.8	58	7	9.8	9.8
	12.6			7.2	
bromacil	13.1	71	8	6.6	6.9
	7.2			7.0	
	9.0	75	2	4.2	5.6

knockdown ratings 0 = nil and 10 = complete knockdown.

Control

New Zealand: the average visual control with 1.0 to 1.1 kg/ha of glyphosate in eight trials was 9.0 (DAT range 102 to 357). Two of the eight trials contained plots with control ratings below 8.0.

By increasing the rate of glyphosate to 1.7 to 2.2 kg/ha the average paspalum control increased to 9.4. Only one of the 14 trials contained plots with ratings below 8.0. Some paspalum regeneration occurred in one trial at 200 DAT.

TABLE 2: VISUALLY ASSESSED CONTROL OF PASPALUM IN NEW ZEALAND

No. Trials: 10.
Paspalum height range (cm): 6-120.

	kg/ha	Mean DAT	No. Treatments	Mean control	Treatment control mean
glyphosate	1.0			9.3	
	1.1	196	8	8.7	9.0
	1.7			9.2	
	1.9			9.5	
	2.2	201	14	9.6	9.4
	3.3	232	4	8.4	8.4
	3.8	159	6	9.5	9.5
karbutilate	12.6			5.2	
	13.1	206	5	7.4	6.9
bromacil	7.2	119	2	6.2	6.2

control ratings: 0 = no control; 10 = complete control.

Karbutilate averaged 6.9 for both knockdown and control of paspalum. Bromacil gave an average knockdown of 5.6 and a control of 6.3.

Australia: the average visual control with 1.1 kg/ha in 18 trials in 225 or 1125 litres was 8.3 (range 4.5 to 10; DAT range 93 to 292). Evidence of varying degrees of regrowth from the crowns of the plants was noted with this rate. At 2.2 kg/ha control increased to 9.2. The range of control for 225 litres was 8.8 to 10 and for 1125 litres was 8.0 to 9.9. At this rate, addition of surfactant did not give any appreciable increase in control whether applied in November or January to May. Thirty treatments at 2.2 kg/ha assessed after the dormant period, all gave control ratings of 8.0 or greater (average 9.5).

The average control rating of 14 glyphosate treatments at 1.7 to 2.2 kg/ha was 9.4 in New Zealand while in Australia the average of 30 treatments at 2.2 kg/ha was 9.5.

DISCUSSION

The results presented show glyphosate to be particularly active against paspalum. An acceptable level of knockdown can be obtained with rates of 1.0 to 2.2 kg/ha. However, to achieve an acceptable level of control with minimum evidence of regrowth after more than 70 days rates of 1.7 to 2.2 kg are necessary.

In considering these results it is important that for each site, the interval between application and first assessment is taken into account. It was found at some sites that a slow initial response may lead to a more effective long-term control. Such results are usually associated with one or a combination of the following factors: lower temperatures before and after application, i.e. below approximately 12°C; late autumn, early winter applications; low sunshine hours or shade conditions; semi plant dormancy. A number of New Zealand trials that were applied during the winter months gave a very high level of long-term control.

Observations made by Baird and Begeman (1972) suggest that the volume of diluent can affect activity. The optimum volume rate is suggested to be around 200 to 300 litres/ha. However, Baird and Begeman (1972) demonstrated that by retaining a fixed ratio of acid equivalent to surfactant increasing the volume to 100 litres/ha did not greatly detract from the effectiveness of the treatment.

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The results discussed show acceptable levels of paspalum control when 1125 litres/ha of water was used $\pm$ surfactant. Current large-scale tanker equipment used in Australia are geared for high volume applications. However with the long lengths of rail-track involved it is suggested that applications using lower volumes of water could be considered.

Differences in control between late spring-early summer applications, to late summer-autumn application appear marginal in terms of initially treated paspalum plants. From a practical point of view late season applications would obviate the possibility of midsummer germination of paspalum seed in the treated area. Because of the high degree of control of paspalum obtained during this series of trials the value of split applications (i.e. December and March) appear limited.

Baird and Begeman (1972) report that the stage of maturity of weed species is a factor that has considerable influence on the results of applications to certain perennial weed species with extensive root systems. However the activity of glyphosate is sufficiently high that control can be achieved when applied to 6 cm high paspalum crowns. On such plants in New Zealand average control ratings of 9.3 and 10 were obtained from 1.0 and 1.9 kg/ha respectively at the 200 DAT assessment.

It has been suggested by many researchers that application should not be made to dormant plants. This is particularly applicable in temperate situations where frosts are likely to occur. However these trials indicate that with applications made during the early part of winter acceptable results can be obtained when the target weeds have been left to grow to maturity before application.

CONCLUSIONS

For control of paspalum under New Zealand and Australian conditions glyphosate is required at 2.2 kg/ha.

As glyphosate has no residual activity the optimum time of application is when maximum weed germination has taken place.

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REFERENCES

- Baird, D. D., Upchurch, R. P., Homesley, W. B., and Franz, J. E., 1971. Introduction of a new broadspectrum post-emergence herbicide class with utility for herbaceous perennial weed control. *Proc. 26th North Central Weed Control Conf.*: 64-68.
- Baird, D. D. and Begeman, G. F., 1972. Post-emergence characterization of a new quackgrass herbicide. *Proc. 26th North Eastern Weed Sci. Soc. Meet.*: 100-106.