

TOLERANCE OF GRAZED AND UNGRAZED PHALARIS, *PHALARIS AQUATICA*,
TO GLYPHOSATE, TETRAPION, AND 2,2-DPA

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Summary. Two experiments carried out near Orange in 1986-87 measured the tolerance of phalaris, *Phalaris aquatica* cv. Siroso, to herbicides. In Experiment 1, herbicides were applied at two-monthly intervals starting in February 1986. Phalaris was grazed heavily before the first spraying and then left ungrazed. In Experiment 2 each herbicide was applied in June and October 1986 to ungrazed and grazed phalaris. In Experiment 1 phalaris tolerated: glyphosate applied in February; tetrapion applied in April, June and August; and 2,2-DPA applied at any time except December. In experiment 2: grazing immediately before spraying greatly reduced the toxicity of glyphosate in June and October; grazing before or after spraying increased the toxicity of 2,2-DPA in October; grazing before or after spraying reduced the toxicity of tetrapion in October.

INTRODUCTION

Phalaris is sown to replace the perennial grass weeds serrated tussock, *Nassella trichotoma*, poa tussock, *Poa labillardieri*, Parramatta grass, *Sporobolus africanus*, and African lovegrass, *Eragrostis curvula*. In some cases the initial control treatment (pasture improvement) may not completely replace the weed and in other cases the weed re-invades over time. Thus, there is a need to be able to selectively remove from a phalaris pasture: poa tussock with glyphosate (5); serrated tussock (1, 3, 4), African lovegrass (2), or Parramatta grass (6) with tetrapion or 2,2-DPA.

METHODS

Experiment 1. Each of the above herbicides was applied, at three rates, to a six year old stand of phalaris, cv. Siroso, at two monthly intervals in 1986 near Orange (Table 1). The phalaris was grazed heavily before the first spraying in February and then left ungrazed. The ground cover of green leaf at each spraying was 2, 18, 40, 55, 54 and 55% respectively. Herbicides were applied from a hand-held pneumatic sprayer in 400 L of water ha⁻¹ to 5x5 m plots. Treatments were blocked for time of spraying with four replications. Results were recorded at six-weekly intervals by visually assessing per cent ground cover of six botanical components. Results presented in Table 1 are for the low and high rate of each herbicide measured in March 1987.

Experiment 2. Each herbicide was applied in June and October 1986 to ungrazed and heavily grazed phalaris; in October grazing was also imposed immediately after spraying. Ground cover of green phalaris leaf on treatments grazed before spraying in June and October was 4 and 3% respectively, compared to >50% on ungrazed treatments. Design, herbicide application and assessment were similar to Experiment 1. Results presented in Table 2 were recorded in March 1987.

RESULTS AND DISCUSSION

Experiment 1. With few exceptions the effect of herbicides on phalaris was a progressive reduction in ground cover of green leaf for two to eight months after spraying followed by partial or complete recovery. Maximum reduction by glyphosate and 2,2-DPA was from 80 to 99% in all sprayings except glyphosate applied in February. In contrast, tetrapion only severely reduced green leaf

cover in the February, April, October and December sprayings.

Thus the March 1987 measurements (Table 1) reflect recovery of phalaris after varying periods; in the latter two sprayings phalaris had only three to five months to recover.

Glyphosate had no long term effect when applied to phalaris after grazing in February but severe effects when applied in the other months (Table 1). The February tolerance was due to lack of green leaf rather than to time of application which means that phalaris is susceptible to glyphosate throughout the year provided sufficient green leaf is present to absorb the herbicide. Tetrapion had severe effects on phalaris in February (high rate only), October and December, and slight effects at other times. 2,2-DPA had little long-term effect, February to October; the December spraying is still recovering.

Table 1. Experiment 1. Depression in ground cover of phalaris (% of unsprayed control, measured in March 1987) caused by herbicides

Herbicide	Rate (kg ha ⁻¹)	Time of application in 1986					
		Feb.	April	June	August	Oct.	Dec.
Glyphosate	0.54	0	21	54	43	48	57
	1.08	0	36	65	77	71	77
Tetrapion	1.5	18	14	8	3	40	47
	3.0	56	28	22	18	77	87
2,2-DPA	4.4	0	9	13	4	21	38
	22.2	7	22	13	28	29	66

Experiment 2. Grazing before spraying reduced the effect of glyphosate on phalaris in June and October, but grazing after spraying had no effect (Table 2). Grazing before spraying in June had little influence on the effect of tetrapion and 2,2-DPA. Grazing before or after spraying in October reduced the effect of tetrapion but increased the effect of 2,2-DPA. Sheep introduced after spraying avoided phalaris treated with 2,2-DPA eating 30% of available leaf in six days compared with 70% on other treatments.

Table 2. Experiment 2. Depression in ground cover of phalaris (% of unsprayed control, measured in March 1987) caused by herbicides applied twice in 1986

Herbicide	Rate (kg ha ⁻¹)	June		October		
		Ungrazed	Grazed before	Ungrazed	Grazed before	Grazed after
Glyphosate	0.72	71	1	71	12	70
Tetrapion	2.25	15	24	68	41	24
2,2-DPA	11.1	23	15	17	49	54

Regeneration of phalaris from seed occurred mainly on the glyphosate treatments applied in June and August and amounted to 12% and 20% ground cover; on all other treatments, except one, the ground cover of seedlings was <5% in March 1987. Ground cover of seedlings was not included in assessments in Tables 1 and 2.

Previous investigations (1, 2, 3, 4) demonstrated the indirect effect of herbicides on phalaris when it was wholly or partly protected from herbicides at spraying by taller growing weeds. Phalaris survived high rates of glyphosate (3), tetrapion (1, 2, 4) and 2,2-DPA (1, 2, 4) but these studies yielded no information on times of application that had minimum effect on phalaris and thus greatest selectivity. The results reported here record the direct effect of herbicides on phalaris and showed that greatest selectivity could be achieved by applying: glyphosate to heavily grazed or dormant phalaris; tetrapion to ungrazed phalaris from April to August, or to heavily grazed (before or after spraying) phalaris in October; and 2,2-DPA to phalaris at any time except possibly December.

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