THE ECONOMICS OF WILD OAT AND ANNUAL RYEGRASS CONTROL IN WHEAT IN AUSTRALIA WITH DICLOFOP-METHYL

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Summary. A range of rates of diclofop-methyl[1] was applied at early (1 to 3 leaf) and late (up to tillering) growth stages of wheat at eight sites with annual ryegrass *(Lolium* spp.*)* and thirteen sites with wild oats *(Avena* spp.*)* during 1979 and 1980. Annual ryegrass control was equally as good with early and late applications, but the maximum increase in gross margin occurred with rates of 0.28 to 0.375 kg ha^{-1} applied early. Wild oat control was slightly better with later applications, but the maximum increase in gross margin occurred with 0.56 to 0.75 kg ha^{-1} at the early timing.

INTRODUCTION

The yield advantages from early (pre tillering) weed control as shown by McNamara (1976) and Wilson (1979) have not been fully grasped by many wheat growers and there is still a tendency to look for near total weed control rather than economic yield response. This series of trials was conducted to obtain data on early versus late spraying and by using various rates of herbicide, to compare the levels of weed control with yield and economic yield response or changes in gross margin.

MATERIALS AND METHODS

Each trial was laid out as a randomised block with four replications, each plot being 2 m by 20 m. Five rates of diclofop-methyl were applied at early and at late growth stages, plus one unsprayed treatment (nil). A non-ionic surfactant was added to each spray at 0.25% active ingredient in the spray solution. In the wild oat trials difenzoquat was applied at the recommended rate of 0.75 kg ha^{-1} plus surfactant at each time of spraying. Sprays were applied using AZO Propane gas powered sprayers with flat fan nozzles. Percent weed control was calculated from weed counts approximately two months after spraying. Yields were harvested from the full length of each plot, using either a Poynter Stripper Harvester (width of cut 0.6 m) or a Hege Plot Harvester (width of cut 1.25 m).

RESULTS

Whilst yields of the individual trials were analysed separately, the results represented here are based on the average of individual results from each trial and this collective data has not been statistically analysed. The results cover a wide range of conditions and growing seasons and, therefore, reflect a trend.

[1] Trade name Hoegrass

In each of the following tables the gross margin increase is the average of each individual trial and is calculated from the extra yield above the unsprayed plots less cost of herbicide and is based on wheat @ $120.00 per tonne and diclofop-methyl at $42.67 kg^{-1} (i.e. Hoegrass at $16.00 L^{-1}). Application costs have not been included as these would be constant for each treatment.

Annual ryegrass. The results in Table 1 are the average of four trials in 1979 (two in Western Australia and two in Victoria) and four trials in 1980 (two in Western Australia and two in Victoria). The time of spraying for the early application ranged from 21 to 40 days after sowing (crop and weed stage 1 to 3 leaf) and from 41 to 63 days after sowing (crop and weed stage 3 leaf to tillering) for the late application.

Ryegrass control increased with the rate of herbicide, with a tendency to level off at about the 0.375 kg ha^{-1} rate. There was no real difference between early and late applications at the same rate of herbicide. The yield results were clearly higher at the earlier time of spraying than at the late time. A rate of 0.28 kg ha^{-1} applied early will give the maximum increase in gross margin of $50.40 ha^{-1}.

Table 1. Effect of different rates and timing of diclofop-methyl on control of ryegrass, wheat yield and gross margin (G.M.) increase

	Early treatment			Late treatment		
Rate	Ryegrass control	Yield	G.M. increase	Rye grass control	Yield	G.M. increase
(kg ha^{-1})	(%)	(t ha^{-1})	($ ha^{-1})	(%)	(t ha^{-1})	($ ha^{-1})
0.09	69	1.31	34.10	66	1.20	21.35
0.19	87	1.41	41.95	89	1.30	28.75
0.28	93	1.51	50.40	93	1.33	28.20
0.375	96	1.51	45.95	97	1.37	29.60
0.48	97	1.52	44.65	98	1.37	25.30
Nil	0	0.99	0.00	0	0.99	0.00

Wild oats. The results in Table 2 are from seven trials conducted in 1979 (two in Western Australia, two in Victoria, two in New South Wales and one in Queensland) and six trials in 1980 (two in Western Australia, two in Victoria, one in New South Wales and one in Queensland). The time of spraying for early application ranged from 17 to 45 days after sowing (crop and weed stage 1 leaf to early tillering) and for late spraying from 38 to 77 days after sowing (crop and weed stage 1 leaf to tillered).

Wild oat control increased as the rate increased, but there was a tendency for the level of control to be greater with the later application. This was largely due to germinations of wild oats occurring after the early spray had been applied. The yield response was greater with early spraying and yields of both early and late treatments tended to increase as the rate of diclofop-methyl was increased. The increase in gross margin was greater from early spraying of diclofop-methyl, with the maximum increase of $88.30 ha^{-1} occurring at 0.56 kg ha^{-1}.

Table 2. Effect of different rates and timing of diclofop-methyl on control of wild oats, wheat yield and gross margin (G.M.) increase

Rate	Early treatment			Late treatment		
	Wild oat control	Yield	G.M. increase	Wild oat control	Yield	G.M. increase
(kg ha^{-1})	(%)	(t ha^{-1})	($ ha^{-1})	(%)	(t ha^{-1})	($ ha^{-1})
0.19	58	1.70	81.00	63	1.47	53.80
0.375	75	1.82	87.70	83	1.68	71.40
0.56	79	1.89	88.30	89	1.70	65.40
0.75	87	1.93	85.20	92	1.71	58.60
0.94	90	1.97	81.10	93	1.67	45.85
Difenzoquat	68	1.80	71.40	65	1.57	42.30
Nil	0	0.96	0.00	0	0.96	0.00

DISCUSSION

Early spraying with diclofop-methyl led to the most favourable economic responses in both the wild oat and ryegrass situations. The results demonstrate the need, when selecting a rate of diclofop-methyl, to take economic response into consideration as well as the weed control level. High rates may give good weed control and hence a good cosmetic effect, but poor returns. Low rates which may give slower but adequate weed control will not give optimum returns. An intermediate rate will give less weed control than high rates but will optimise gross margin increase. These results support the current recommendations to use 0.56 kg ha^{-1} for wild oat control, except in areas where the germination is extended. In these areas a rate of 0.75 kg ha^{-1} should be used and applied 35 to 40 days after sowing.

These results also indicate the importance of wild oat control. In the annual ryegrass and wild oat trials, the unsprayed yield was similar (0.99 and 0.96 t ha^{-1} respectively), whereas the economic gain from wild oat control was nearly double that from annual ryegrass control. This includes taking account of the higher rates of diclofop-methyl for wild oat control.

LITERATURE CITED

McNamara, D.W. 1976. Aust. Jour. Exp. Agric. Anim. Husb. 16: 402-406.

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