HALOXYFOP : A SELECTIVE POST EMERGENCE HERBICIDE FOR PERENNIAL GRASS WEED CONTROL

B.M. HARRIS

Ivon Watkins-Dow Ltd, Private Bag, New Plymouth, New Zealand

SUMMARY

Field trials over 5 years showed haloxyfop to be active against a wide range of perennial grass weeds and selective to many broadleaf crops at rates required to control perennial grasses. Excellent control of fibrous rooted perennials was achieved with 0.125-0.50 kg ai/ha; rhizomatous grasses required 0.25-1.0 kg ai/ha. The efficacy of haloxyfop was reduced when it was mixed with some broadleaf herbicides. Tank mixing of haloxyfop with broadleaf herbicides should be treated cautiously until the degree of antagonism is determined. The addition of a non-ionic surfactant or an emulsifiable crop oil, enhanced the activity of haloxyfop on perennial grasses and is recommended for all applications.

INTRODUCTION

Haloxyfop, a new selective post emergence grass herbicide from The Dow Chemical Company, has activity on both annual and perennial species. It is a slow acting herbicide. Plant growth is halted after application, although no symptoms are visible for several days, but mottled chlorosis then appears and spreads. Plants later wilt and tissues desiccate, often with the leaves turning red due to anthocyanin production. The time taken for complete kill depends on the maturity of the plants at application and environmental factors.

Haloxyfop is readily absorbed by the roots and gives pre-emergence control of germinating grass seedlings. The effectiveness of such control depends on dosage, weed density, soil and environmental conditions.

Previous publications of the use of haloxyfop in New Zealand have demonstrated its promise as a broad spectrum selective grass herbicide. Hartley (1984) reported on the efficacy of haloxyfop on both annual and perennial grass weeds in Hawkes Bay. Rahman *et al* (1985) showed haloxyfop had a residual life of 6-14 weeks in two soil types. Haloxyfop gave excellent control of pampas grasses (*Cortaderia* sp.) when used selectively in new forest plantations (Saville *et al* 1986).

This paper is a summary of the results of 82 trials conducted by staff of Ivon Watkins-Dow Ltd in New Zealand during 1981-86. These field trials were concerned with determining the rates of application required for control of perennial grasses in a wide range of localities and crop situations.

METHOD AND MATERIALS

In 78 trials, treatments were applied using a precision backpack sprayer with a hand-held, 2 m wide boom applying 200-400 litres/ha at 4-6 kph through 110-002, 730-154 or 730-231 Tee Jet fan nozzles at 200 kPa.

In four trials spot treatments were applied using a modified drench gun fitted with a cone nozzle applying 15-30 ml/m².

All trials were of a randomised block design with two to three replicates. Plot size ranged from 5-24 m².

All trials were visually rated by two or more observers two or three times after treatment. A rating of greater than 80% control was considered an acceptable result.

Haloxyfop (Gallant) was applied to grass weeds in brassicas, onions, cucumbers, peas, clover, lucerne and in orchard and forestry sites. Conditions of the grasses at treatment ranged from young and actively growing, to drought stressed mature plants.

Proc. 40th N.Z. Weed and Pest Control Conf.

In most trials a non-ionic surfactant (Multifilm X-90) at 0.25% v/v or an emulsifiable paraffinic oil (Shell Sun Spray Oil) at 1% v/v was added to haloxyfop.

In some trials other herbicides were tank mixed with haloxyfop and crop tolerance and grass control observed. These herbicides were atrazine (Actazine 5A), simazine (Simazol 5A), 4-CPA (Selecta 4-CPA), 2,4-D (IWD Hi Ester 2,4-D), MCPB (IWD MCPB), dinoseb (Sinox PE), diuron (Karmex), clopyralid (Versatill) and metribuzin (Sencor DF) plus methabenzthiazuron (Tribunil).

In the majority of trials haloxyfop was applied as the ethoxy ethyl ester. In earlier trials the methyl ester and butyl ester forms were also evaluated. All were formulated as emulsifiable concentrates. No difference in level of activity was seen between the formulations.

RESULTS AND DISCUSSION

The rates of application of haloxyfop required to give over 80% control of perennial grasses are presented in Table 1.

TABLE 1: Rates of haloxyfop required to achieve over 80% control of perennial grasses.

FIBROUS ROOTED PERENNIALS	No. of Trials	haloxyfop kg ai/ha
<i>Lolium perenne</i> (perennial ryegrass)	61	0.125-0.25
<i>Holcus lanatus</i> (Yorkshire fog)	10	0.25
<i>Dactylis glomerata</i> (cocksfoot)	10	0.25-0.5
<i>Bromus willdenowii</i> (prairie grass)	6	0.125-0.25
<i>Bromus hordeaceus</i> (soft brome)	6	0.125-0.25
<i>Anthoxanthum odoratum</i> (sweet vernal)	6	0.125-0.50
<i>Cynosurus cristatus</i> (crested dogstail)	3	0.125-0.25
<i>Sporobolus africanus</i> (ratstail)	1	0.5
STOLONIFEROUS/RHIZOMATOUS PERENNIALS		
<i>Elytrigia repens</i> (couch) — cultivated	9	0.125-0.5
sod bound	24	0.5-1.0
<i>Agrostis capillaris</i> (browntop)	22	0.25-0.5
<i>Cynodon dactylon</i> (Indian doab) — cultivated	3	0.125-0.50
sod bound	16	0.5-1.0
<i>Paspalum dilatatum</i> (paspalum)	15	0.25-0.5
<i>Paspalum distichum</i> (Mercer grass)	12	0.25-0.5
<i>Pennisetum clandestinum</i> (Kikuyu grass)	8	0.50-0.75

Axonopus affinis (narrow leaved carpet grass) and *Poa pratensis* (Kentucky bluegrass) were poorly controlled by 1.0 kg ai/ha.

Brownout from haloxyfop was slow, taking 3-12 weeks to reach full brownout depending on the maturity of the plant at treatment. Treatment of grasses under moisture stress resulted in slow, sometimes incomplete, brownout and reduced regrowth suppression, especially in stoloniferous/rhizomatous grasses. *Cynodon dactylon* and *Elytrigia repens* were more readily controlled when vigorously growing after cultivation than when sod bound. The effectiveness of haloxyfop was not impaired provided 1 h elapsed between application and rainfall.

Grass weed control with haloxyfop was enhanced by the addition of a non ionic surfactant, or, an emulsifiable paraffinic oil. Typical examples of the level of enhancement are presented in Table 2.

The level of enhancement depended on the grass species treated and the growing conditions at treatment. The emulsifiable oil was more effective than the surfactant particularly when harder-to-kill rhizomatous grasses were being treated and when grasses were stressed under dry conditions.

Visual assessments plus some yield analyses confirmed haloxyfop caused no damage to any of the crops tested. Neither *Pinus radiata* nor *Eucalyptus regnans*,

TABLE 2: Control of grass weeds with haloxyfop + adjuvants, 12 weeks after treatment.

Treatment	Rate kg ai/ha	% Control	
		Cultivated <i>Elytrigia repens</i>	Cultivated <i>Cynodon dactylon</i>
haloxyfop	0.25	50	—
	0.5	—	—
haloxyfop + surfactant	0.25	90	62
	0.5	—	74
haloxyfop + oil	0.25	95	73
	0.5	—	82

dormant or actively growing, were affected by haloxyfop at up to 2 kg ai/ha alone or in mixture with atrazine or simazine.

Tank mixes of 4-CPA, 2,4-D, MCPB, dinoseb, diuron and metribuzin plus methabenzthiazuron, with haloxyfop caused antagonism and a reduction in the level of grass control. Combinations with clopyralid gave variable results. Haloxyfop at 75 g ai/ha applied as a winter treatment in lucerne gave excellent control of established vegetative storksbill (*Erodium* sp.). The addition of atrazine, 0.75 kg ai/ha, for control of other broadleaf weeds did not reduce the level of control. This result is surprising as haloxyfop has exhibited a high level of selectivity to a wide range of other broadleaf species.

ACKNOWLEDGEMENTS

The authors are grateful to the many co-operators who made trial sites available and the staff of the Research Division, Ivon Watkins-Dow Ltd, who assisted with the field trial work.

REFERENCES

- Hartley, M.J., 1984. Selective grass weed control. *Proc. 37th N.Z. Weed and Pest Control Conf.*: 183-186.
- Rahman, A., James, T.K. and Mortimer, J., 1985. Residual activity of some newly developed post-emergence herbicides for grass weeds. *Proc. 38th N.Z. Weed and Pest Control Conf.*: 61-65.
- Saville, G.W., Watson, M.J. and Sharpe, C.J., 1986. Haloxyfop — Selective control of pampas grass in New Zealand forests. *Proc. 39th N.Z. Weed and Pest Control Conf.*: 92-94.