QUIZALOFOP ETHYL - A NEW SELECTIVE GRASS HERBICIDE FOR USE IN BROAD-LEAVED CROPS

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Summary. Quizalofop ethyl (DPX-Y6202, Assure^{R}) is a new post-emergence herbicide for the selective control of annual and perennial grass weeds in broad-leaved crops. In Australian trials conducted in field peas, *Pisum sativum*, and lupins, *Lupinus* spp., quizalofop ethyl at 72 g a.i./ha for annual ryegrass and 48 g/ha for wild oats, *Avena fatua*, great brome, *Bromus diandrus*, volunteer winter cerals, *Triticum* spp. and *Hordeum vulgare*, and barley grass, *Hordeum leporinum*, gave control comparable to fluazifop-P at 106 g a.i./ha. Quizalfop ethyl at 192 g/ha was not phytotoxic to Dundale, P247-3, P185-1 and P69 varieties of field peas, nor Danja, Wandoo or 73 A41.2 varieties of lupins.

INTRODUCTION

Quizalfop ethyl is a new post-emergence herbicide for the selective control of annual and perennial grass weeds in broad-leaved crops

The acute oral LD_{50} of the active ingredient ranges from 1480 mg/kg for female rats, to 1670 mg/kg for male rats. The acute dermal LD_{50} is in excess of 5000 mg/kg for mice and rats. Mutagenicity assays which are useful for predicting the carcinogenic potential of compounds have shown quizalofop ethyl not to be mutagenic in 5 tests (Ames bacterial assay, mouse micronucleus assay, *in vitro* cytogenic assay, *in vitro* unsheduled DNA synthesis assay, and *in vitro* Chinese hamster ovary assay).

In teratology tests 300 mg/kg/day was not teratogenic to rats and 60 mg/kg/day was not teratognic to rabbits. Whilst quizalofop ethyl use rates, based on LD_{50} studies, are not likely to be hazardous to birds (mallard duck oral LD_{50} greater than 2000 mg/kg and babwhite quail 8-day dietary LC_{50} greater than 5620 ppm) contamination of any body of water is likely to be hazardous to fish with rainbow trout 96-hour LC_{50} 10.7 ppm and water fleas with *Daphnia* 48-hour LC_{50} 6.4 mg/L (1).

Quizalofop ethyl is readily adsorbed to soils. Distribution coefficients (k-values) range from 64 to 174 on soils ranging in organic matter from 0.5-5.1%, respectively. Thin-layer soil chromatography studies indicate very slow soil mobility. Rapid breakdown occurs by microbial action under aerobic and anaerobic soil conditions (1).

Foliar applications of quizalofop ethyl are quickly absorbed and readily translocated throughout the plant. Treated plants show a reduction in growth and a loss of competitiveness. Visual symptoms include early chlorosis/ necrosis of the younger plant tissues followed by a progressive collapse of the remaining foliage and subsequent death within a few weeks of application. In addition to top-killing activity, quizalofop ethyl is effective in controlling root system regrowth of several perennial grass species (1).

Sedges and broad-leaved weeds are tolerant to quizalofop ethyl. Whilst peas, *Pisum sativum*, are reported to be tolerant to quizalofop ethyl there is no information on the tolerance of lupins (1).

Trials in Australia in 1985-86 on the efficacy of quizalofop ethyl against annual ryegrass, wild oats, brome grass, volunteer winter cereals and barley

grass, and on the tolerance of lupins and field peas are reported here.

METHODS

Of the 20 field trials on weed control 4 were done in W.A., 6 in Victoria, 7 in S.A. and 3 in N.S.W. An emulsifiable concentrate containing 95.8 g/L quizalofop ethyl was used. Trials generally used a randomized complete block design with four replicates. Plot sizes were usually 2.5x20 m. Treatments were generally applied using a CO_2 plot sprayer with water volumes of 68 to 122 L/ha. Applications were made when weeds were in the 3-leaf to early tillering stages. A non-ionic surfactant was always included at the labelled use rate, e.g. Agral^R 600 at 0.125% (v/v). Treatment effects assessed ranged from weed control ratings, to weed counts, to crop injury ratings. Control assessments varied from at about 21 days after application, to 3 at various intervals up to about 100 days after treatment. Yield of crop when assessed was usually based on a 1.25x20 m strip taken from each plot with a Hege header.

A phytotoxicity trial by the S.A. Department of Agriculture examined the varietal tolerances of field peas and lupins to quizalofop ethyl.

RESULTS AND DISCUSSION

Weed control obtained with four different rates of quizalofop ethyl compared to a standard rate of fluazifop are shown in Table 1.

Table 1. Comparison of quizalofop ethyl and fluazifop for the control of great brome (GB), volunteer wheat (VW), volunteer barley (VB), barley grass (BG), wild oats (WO), and annual ryegrass (ARG)

Herbicide	Rate	Weed control					
	(g/ha)	GB[a]	VW[b]	BG[c]	VB[c]	WO[d]	RG[e]
		(%)					
Quizalofop ethyl	24	61	87	49	68	79	58
	48	78	99	93	80	91	81
	72	84	100	84	85	90	85
	96	88	100	98	78	91	90
Fluazifop-P	106	76	100	98	68	89	86

[a]Mean of 5 trials; [b]mean of 2 trials; [c]mean of 1 trial; [d]mean of 8 trials, [e]mean of 13 trials.

Quizalofop ethyl at 72 g/ha for annual ryegrass and 48 g/ha for great brome, wheat, barley grass, barley and wild oats gave control comparable to that given by fluazifop-P at 106 g ha^{-1}.

The influence of weed control given by four rates of quizalofop ethyl and the standard of fluazifop on yields of field peas and lupins are shown in Table 2.

Table 2. Effect of weed control given by quizalofop ethyl and fluazifop on the grain yield of field peas and lupins (% of untreated control yield)

Herbicide	Rate (g/ha)	Grain yield of field peas or lupins[a] (%)
Quizalofop ethyl	24	141
	48	146
	72	152
	96	160
Fluazifop-P	106	134

[a]Yield data are the mean of 13 trials

Field peas and lupins treated with quizalofop ethyl at rates as low as 24 g/ha gave greater yields than those treated with fluazifop.

No crop injury was noted in the 20 field trials. In the phytotoxicity trial by the S.A. Department of Agriculture, applications of 192 g/ha quizalofop ethyl had no effect on vigour of yield or Dundale, P247-3, P185-1, and P69 varieties of field peas and Danja, Wandoo, and 73 A41.12 varieties of lupins.

It is concluded that quizalofop ethyl at 72 g/ha for annual ryegrass and for brome grass, barley grass, wild oats, and volunteer winter cereals gave control comparable to that given by fluazifop-P at 106 g/ha in lupins and field peas without crop phytotoxicity. Lupin and field pea yields were respectively 46 and 52% more than untreated crps, whereas grain legume yields given by the fluazifop treatment were 34% more than the untreated crops.

REFERENCES

1. Anon, 1985. Assure Grass Herbicide Tech. Bull. Du Pont. U.S.A. (E68971 8/85) pp. 1-6.