METOLACHLOR FOR CONTROL OF 'SUMMER GRASSES' IN MAIZE

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Summary

Treatments including metolachlor plus atrazine at rates above 2.5 + 1.25 kg/ha were highly effective in controlling three commonly occurring grass weeds in maize *(Zea mays)*; summer grass *(Digitaria sanguinalis)* barnyard grass *(Echinochloa crus-galli)*, and smooth witchgrass *(Panicum dichotomiflorum)*. At the rates evaluated, maize showed good tolerance to metolachlor. Where soil moisture was a limiting factor, metolachlor plus atrazine treatments were more active and provided greater persistence than the standard alachlor plus atrazine treatments.

INTRODUCTION

'Summer grasses' (panicoid spp) including: barnyard grass, summer grass, and smooth witchgrass (see Table 1) are now widespread in New Zealand maize *(Zea mays)* crops. These species are not well controlled by atrazine, necessitating a need for an alternative or additive herbicide to extend the spectrum of control.

Metolachlor, an acetanilide, is a selective pre-emergence herbicide active primarily on annual grass weeds being absorbed into the plant mainly via the coleoptile. It has shown good soil residual activity, but is less persistent than atrazine, reducing the possibility of subsequent crop damage.

This paper presents results from trials carried out in the Waikato and Gisborne regions, to evaluate the activity of metolachlor for control of annual grass weeds in maize.

METHOD

The treatments were applied using a precision plot sprayer applying 200-300 litres/ha at 200 kPa. Individual plot size varied between trials from 5-8 x 2-3 m with four replications per treatment. Analysis was made of soil organic matter at the time of treatment and rainfall was measured from each site for 2 weeks following treatment.

The metolachlor plus atrazine treatments were applied post plant pre-emergence and the application of the standard alachlor plus atrazine treatments complied with the alachlor label recommendations.

Visual assessments of grass and broadleaf weed control and maize vigour were conducted at regular intervals, in most cases by two independent observers using a 0-10 scale. Results are expressed as percent removal of grass weeds relative to untreated. Maize yield was assessed by hand harvesting cobs from 5-8 m of the two centre rows in each plot. The cobs were dried and shelled and all weights adjusted to 15% moisture content.

TABLE 1: CONTROL OF 'SUMMER GRASSES' WITH METOLACHLOR PLUS ATRAZINE (% REMOVAL)

Trial No.	*A*			*B*		*C*		*D*		*E*		*F*	*G*		
Location	*Te Awamutu*			*Morrinsville*		*Kaipaki*		*Parawera*		*Pokeno*		*Gisborne*	*Gisborne*		
Treatment date	5 Oct 75			14 Nov 74		31 Oct 75		5 Nov 75		3 Nov 75		20 Nov 74	4 Nov 75		
Soil OM (%)	8.9			11		10		12		6		—	5		
Soil moisture	wet			dry		moist		moist		wet		dry	moist		
Soil type	silt loam			silt loam		sandy loam		silt loam		clay loam		gleyed silt loam	heavy silt loam		
Rainfall/2 weeks (mm)	88			0		22		13		33		52	31		
Dominant grass weeds	DIG sa ECH cr			DIG sa ECH cr		DIG sa		DIG sa ECH cr		PAN di DIG sa		ECH cr	ECH cr		
Treatment *kg/ha*															
Time/weeks	3	8	13	7	13	4	8	4	8	4	8	4	5	10	15
metolachlor + atrazine 2 + 1	87	78	61	92	79	98	95	98	90	100	100	64	88	82	76
metolachlor + atrazine 2.5 + 1.25	92	85	80										92	82	82
metolachlor + atrazine 3 + 1.5	92	88	83			99	97	100	98	100	100	72	96	88	87
metolachlor + atrazine 4 + 2	94	93	93	94	83	100	99	100	98	100	100	78	99	92	91
atrazine 1.0												15	47	35	31
alachlor + atrazine 3 + 1.5 (2.25* + 1)	83	60	31	69	45	98	95	99	95	100	98	63	96	90	90
untreated	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Rainfall/2 weeks — rainfall in first two weeks post application
Dominant grass weeds —
DIG sa = summer grass *(Digitaria sanguinalis)*
ECH cr = barnard grass *(Echonochloa crus-galli)*
PAN di = smooth witchgrass *(Panicum dichotomiflorum)*
Time/weeks — elapsed time in weeks post treatment
* rate used in Morrinsville trial

RESULTS

Effect on 'Summer grasses'

Table 1 shows the effect of mixtures of metolachlor on 'summer grasses' from five trials in the Waikato and two in the Gisborne region.

Summer grass was the dominant grass weed species in the Waikato trials while in the Gisborne trials barnyard grass was more common.

Effect on broad leaf weeds

All treatments including metolachlor plus atrazine at rates above 2.5 + 1.25 kg/ha provided excellent control of the main broad-leaf weed species present i.e., willow weed *(Polygonum persicaria),* redroot *(Amaranthus powellii),* black nightshade *(Solanum nigrum),* and fathen *(Chenopodium album* agg). Metolachlor showed no additive advantage to atrazine in the level of control achieved. Two other commonly occurring species; Californian thistle *(Cirsium arvense)* and dock *(Rumex* spp) were not well controlled by any treatment.

Effect on yield

The metolachlor plus atrazine treatments showed no adverse effects on maize vigour. On the untreated plots, plant vigour declined rapidly as competition from weeds increased. There were no significant differences in maize yield between treatments of metolachlor plus atrazine or alachlor plus atrazine from five trials harvested. A highly significant reduction in yield occurred on untreated and the atrazine-alone treatments, in comparison to the metolachlor and alachlor-plus-atrazine treatments.

DISCUSSION

In all trials, treatments including metolachlor plus atrazine at rates above 2.5 + 1.25 kg/ha recorded high levels of control of summer grass, barnard grass and smooth witchgrass.

Where soil moisture was limiting at the time of spraying treatments including metolachlor were more effective and provided longer residual activity than the standard alachlor plus atrazine treatments (trials B and F). Rainfall varied from 0-88 mm between trials, in the first 2 weeks after spraying, and this had little effect on the reliability of the treatment.

Whilst soil organic matter levels did not exceed 12% in this trial series, the results indicate that soil type and organic matter are less important than soil moisture, this indication supports the view of previous authors (Fellowes and Scherp 1971; Upritchard and Naish 1974).

The metolachlor plus atrazine treatments demonstrated good maize tolerance and were similar to the alachlor plus atrazine treatment in relation to maize vigour and yield.

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