PENDIMETHALIN AND METRIBUZIN COMBINATIONS FOR BROMEGRASS, *BROMUS* SPP., CONTROL IN CEREALS

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Summary. Pendimethalin (495, 594 and 660 g a.i./ha), metribuzin (100, 150 and 200 g a.i./ha) and combinations of the two were evaluated for the control of bromegrass,*Bromus* spp., and crop safety in wheat and barley. Combinations of pendimethalin and metribuzin incorportated by sowing (IBS) were more effective for bromegrass control than either of the components used alone in 10 of 15 cases. Yield increases were present in all herbicide treatments in 3 of 5 trials. The trial in Spear wheat suffered crop damage from treatments containing metribuzin, while the trial in Blade wheat had poor grain yields due to lack of rain.

INTRODUCTION

Bromus spp. are regarded as contaminants of grain, hosts of cereal diseases and serious weeds of pastures and crops (2). Dockage of crop seeds due to seeds of great brome,*B. diandrus,* has increased in Victoria from 5% of the samples inspected in 1977/1978 to 26% in 1985/1986 (3,4). In Western Australia, wheat yields decreased exponentially with increasing densities of great brome, and at 100 plants m^{-2} wheat yield was reduced by 30% (1). At present there are no effective and reliable herbicides for selective control of *Bromus* spp. in wheat (2).

Field trials conducted in Western Australia examined different rates of pendimethalin and metribuzin for rigid brome,*B. rigidus,* control and crop safety in wheat(1). Pendimethalin is a dinitroaniline herbicide which inhibits cell division and cell elongation in roots and shoots. It is a selective soil acting herbicide, predominately used pre-emergence for control of annual broad-leaved weeds and annual grasses in cereals and other crops. Metribuzin is a triazinone herbicide which inhibits photosynthesis. It is a translocated and soil acting herbicide for pre and post emergence control of a broad spectrum of dicotyledonous weeds and annual grasses. In the 1987 trials, pendimethalin (.75 Kg/ha) IBS and pendimethalin (.25 Kg/ha) + metribuzin (.15 Kg/ha) IBS resulted in the highest grain yield with very good control of rigid brome. In 1988, trials again revealed that pendimethalin (.33 Kg/ha) + metribuzin (.1 Kg/ha) and metribuzin (.2 Kg/ha) IBS resulted in the highest grain yields and gave excellent control of rigid brome (1).

The objective of this research was to determine an optimum rate of pendimethalin plus metribuzin to obtain acceptable brome grass control with minimal crop damage.

METHODS

In 1989 three replicated trials were conducted in South Australia, one replicated trial in Victoria and one replicated trial in Western Australia. Three rates of pendimethalin, 3 rates of metribuzin and 3 combinations of pendimethalin plus metribuzin were evaluated.

Three replicated field trials were conducted on commercially grown crops in South Australia. All treatments were applied to the soil surface using a gas powered two metre boom sprayer delivering 132 L/ha through 4 Delavan 1.5 (110°) nozzles. A randomised block design with 4 replicates was used in each trial. Plot size was 2m x 20m. In two trials, treatments were incorporated by the sowing process (IBS) using an air seeder with trailing harrows within 24 hours of spraying. The other trial was incorporated by a small plot seeder without trailing harrows. Soil types contained 90-97% sand and 1-6% clay with less than 1% organic matter. One site was located on the Eyre Pennisula and two sites were located in the Mid North of the state.

One trial was conducted in Schooner barley at the Mallee Research Station, Walpeup, Victoria and one trial was conducted in Blade wheat at Mullewa, W.A. The trial sites were situated on light sandy soils reported to have a high density of bromegrass seed from the previous season.

Assessments included crop counts (results not presented) and bromegrass counts (Table 1). Plots were harvested using a small plot harvester and grain yields determined (Table 2).

RESULTS AND DISCUSSION

All herbicide treatments containing metribuzin resulted in a significant reduction in emergence of Spear wheat (data not shown). Poor sowing depth or incorporation of metribuzin around the seed are possible explanations. Spear wheat displayed poor tolerance to pendimethalin /metribuzin mixtures in cereal tolerance trials in W.A. in 1989 (D.G Bowran, pers. comm.)

Bromegrass Control. The treatment averages of five trials are presented in Table 1. and indicate that combinations of pendimethalin and metribuzin resulted in bromegrass control superior to pendimethalin or metribuzin used alone. Metribuzin used alone resulted in bromegrass control superior to pendimethalin used alone.

The three combinations of pendimethalin and metribuzin tested resulted in a similar reduction in bromegrass when averaged over five trials.

In Machete wheat, pendimethalin and metribuzin used alone provided similar control of bromegrass. Pendimethalin .594 Kg/ha + metribuzin .100 Kg/ha and pedimethalin .660 Kg/ha + metribuzin .200 Kg/ha resulted in the greatest reduction in bromegrass numbers.

In Spear wheat, all treatments resulted in a significant reduction of bromegrass. All combinations of pendimethalin and metribuzin provided control of bromegrass superior to pendimethalin and metribuzin used alone. In this trial metribuzin used alone provided bromegrass control similar to the combination treatments.

In Schooner barley (S.A.), a low density of bromegrass was present. All herbicide treatments resulted in a significant reduction in bromegrass numbers. Two metribuzin treatments (.15 and .2 Kg/ha) resulted in bromegrass control which was superior to the respective combination treatments. At this site, pendimethalin resulted in poor control of bromegrass.

In Schooner barley (Victoria), a low density of bromegrass was present. Combinations of pendimethalin and metribuzin treatments providing superior bromegrass control compared to the herbicides used alone. Metribuzin used alone was more effective than pendimethalin used alone for control of bromegrass.

In Blade wheat (Western Australia), a high density of bromegrass was present. Combinations of pendimethalin and metribuzin treatments and metribuzin used alone resulted in acceptable control of bromegrass. Pendimethalin used alone resulted in poor control of bromegrass.

Table 1. Effect of herbicide treatments on bromegrass density .

Treatment	(kg/ha)	Bromegrass Density (% Untreated) Machete (SA)	Spear (SA)	Schooner (SA)	Schooner (Vic)	Blade (WA)	Average
1. Pendimethalin	.495	40*	32*	62*	96	63	59
2. Metribuzin	.150	54	17*	32*	65	30*	40
3.Pendimethalin + Metribuzin	.495 .150	56	14*	43*	21*	34*	34
4. Pendimethalin	.594	51*	38*	65*	83	59	59
5.Metribuzin	.100	88	14*	57*	46	31*	47
6.Pendimethalin + Metribuzin	.594 .100	26*	12*	38*	42*	10*	26
7.Pendimethalin	.660	53	27*	63*	83	87	63
8.Metribuzin	.200	50*	19*	28*	44*	12*	31
9.Pendimethalin + Metribuzin	.660 .200	27*	11*	34*	35*	12*	23
10.Untreated Control		(106)100	(93)100	(33)100	(16)100	(126)100	100
*LSD (5%)		48	33	24	56	44	

( ) plants/m^2 in Untreated plots.
* Significant reduction of bromegrass density at the 5% level.

Grain Yield. Grain yields are presented in Table 2 as a percentage of the untreated control.

Table 2. Effect of herbicide treatments on grain yield.

Treatment	(kg/ha)	Grain Yield (% Untreated) Machete (SA)	Spear (SA)	Schooner (SA)	Schooner (Vic)	Blade (WA)
1. Pendimethalin	.495	116*	97	108	115*	97
2. Metribuzin	.150	106	114	119*	118*	97
3.Pendimethalin +Metribuzin	.495 .150	102	109	118	131*	110
4. Pendimethalin	.594	105	108	124*	116*	103
5.Metribuzin	.100	103	79	108	111	116
6.Pendimethalin +Metribuzin	.594 .100	115*	93	120*	119*	113
7.Pendimethalin	.660	109	99	108	112	94
8.Metribuzin	.200	107	99	118	111	110
9.Pendimethalin +Metribuzin	.660 .200	108	88	129*	127*	106
10.Untreated Control		100	100	100	100	100
LSD (5%)		12	NS	18	12	NS

* Significant increase in grain yield at the 5% level.

The trials in Spear and Blade wheat showed good bromegrass control from pendimethalin/metribuzin combinations but no significant yield increases. This could be due to crop damage from metribuzin in Spear wheat and drought conditions in Blade wheat. In Machete wheat only pendimethalin (.495 Kg/ha) and pendimethalin (.594 Kg/ha) + metribuzin (100 Kg/ha) resulted in significant yield increases. In Schooner barley (S.A.), only four treatments resulted in a significant yield increase with pendimethalin (.66 Kg/ha) + metribuzin (.2 Kg/ha) resulting in the highest grain yield. In Schooner barley (Victoria), the 3 pendimethalin/metribuzin combinations resulted in the highest grain yields.

Pendimethalin used alone (.495 - .66 Kg/ha) resulted in poor control of bromegrass in cereals with excellent crop safety. Metribuzin used alone (.1 - .2 Kg/ha) was effective for the reduction of bromegrass in cereals with phytotoxicity to Spear wheat. Pendimethalin/metribuzin combinations were more effective for bromegrass control than either pendimethalin or metribuzin used alone in 10 of 15 cases but grian yield increases were only present in 6 of 15 cases.

REFERENCES

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