STOMP ® – A HERBICIDE FOR PRE-EMERGENCE CONTROL OF WEEDS IN DECIDUOUS ORCHARD AND VINE CROPS

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Summary. Pendimethalin (Stomp) at 3.0-4.0 kg/ha provided control of a range of grass and some broadleaf weeds for 10-25 weeks in orchard and vineyard field trials, when applied to relatively weed free soils and incorporated by rainfall or spray irrigation. The addition of simazine at 0.8 kg/ha to pendimethalin increased the broad-leaved weed spectrum controlled, and provided similar control to oryzalin + simazine at 3.4 and 0.8 kg/ha respectively. These rates of pendimethalin, pendimethalin + simazine and double these rates were shown to be safe to freshly planted rootlings of apple, pear, peach, apricot, plum, almond and grape on a heavy and a light soil.

INTRODUCTION

Deciduous tree and vine crops, of which there are approximately 90,000 hectares of trees and 60,000 hectares of vines in Australia, are a very important part of the rural sector.

Weed control in orchards and vineyards is accomplished by various combinations of slashing, cultivation and herbicide application. Both knockdown and residual herbicides are commonly used to keep tree and vine lines clean by treatment of merging strips on each side of the row. The interow area not treated with herbicide is then either cultivated or slashed, usually depending on the irrigation system used. The benefits of the herbicide / slashing combination include better access for equipment for spraying and other orchard operations, particularly during wet weather, and for pickers at harvest.

Currently there is a range of herbicides recommended for use in orchards and vineyards. Diquat, paraquat and glyphosate are used for knockdown of weeds. Residual herbicides used are simazine, oxyfluorfen, terbacil, diuron, oryzalin and norflurazon alone or in combination. Most of these products have some limitation on the species or the age of trees on which they can be used. Only oryzalin is recommended for use on a wide range of trees which are younger than 18 months old.

Stomp (330 g/L pendimethalin) is a herbicide which has been developed throughout the world by American Cyanamid Company. In some countries it is recommended for control of annual weeds under tree and vine crops. In Australia experiments were commenced in 1987 to evaluate Stomp alone and in combination with simazine for weed control in tree and vine crops.

METHODS

Efficacy. During the spring and summer seasons of 1987/88, 1988/89 and 1989/90 there were 16 field trials conducted in various districts in Queensland, New South Wales, Victoria and South Australia, to evaluate the efficacy of pendimethalin and tank mixtures of pendimethalin and simazine in deciduous tree and vine crops. Rates of pendimethalin investigated were 2.0, 2.5, 3.0 and 4.0 kg/ha, while simazine was mixed at 0.8 or 1.1 kg/ha with pendimethalin depending on the individual trial. In all trials oryzalin at 3.4 kg/ha and a proprietory mixture of oryzalin and simazine (3.4 + 0.8 kg/ha) were included as commercial standards for comparison.

Stomp ® is a registered trademark of American Cyanamid Company

Treatments were applied in a total spray volume of 175-315 L/ha to the soil surface which was relatively free of surface litter and weeds. This was achieved by the application of glyphosate or paraquat/diquat prior to trial establishment in most cases. At two sites all treatments were tank mixed with paraquat to control a fresh germination of emerged weeds.

The growth stage of trees or vines at application varied from late winter dormancy prior to bud burst to early fruit formation.

Incorporation of treatments was achieved by a minimum of 10 mm of sprinkle irrigation or rainfall within 22 days of application.

Plot size varied between 2-4 m wide x 6-18 m long centred on the tree or vine line with 5-6 vines or 1-3 trees/plot. All trials were of randomized complete blocks design with 3-5 replications/treatment.

Soils varied from granitic sands at Stanthorpe sites to clay loams at Cobram and alkaline sands in the Riverland of South Australia.

Assessments consisted of visual ratings (1-9 E.W.R.C. or 0-10 arithmetic scale) of each weed species every 4-8 weeks and weed counts at least once during each trial. Specific details of each trial are available from the senior author.

Crop safety. In the late winter of 1989, 2 crop safety trials were established at Cobram to evaluate the safety of likely commercial rates of pendimethalin and pendimethalin + simazine as well as double those rates. Young rootlings from the nursery, of one variety each of apple, pear, peach, apricot, plum, almond and grape were planted into lines 2 m apart, in a randomized complete blocks design in each trial. Each plot was replicated 4 times. One trial was established on an acid sand and the other on a heavy clay soil.

Immediately after planting treatments were applied in a 2 m strip centred on the young tree/vine lines.

Incorporation of treatments was accomplished by 5 mm of rain within 12 hours of treatment.

Assessments consisted of girth measurements prior to treatment and at 168 and 250 days after treatment. Pruning weights are also to be taken in the winter of 1990.

RESULTS AND DISCUSSION

Efficacy. The duration of acceptable weed control obtained by some of the herbicide treatments included in the trials are shown in Table 1 for a range of grass and broadleaf weeds.

Table 1. Comparison of the duration of acceptable weed control of pendimethalin and oryzalin alone and in mixture with simazine under tree and vine crops.

	Duration of Weed Control (weeks)				
Herbicide	P[a]	P	O[b]	P + S[c]	O + S
Rate kg/ha	2.0	3.0	3.4	3.0 0.8	3.4 0.8
Weed Species					
Grasses					
Summer grass, *Digitaria ciliaris* (6)[d]	12	15	16	16	16
Barnyard grass, *Echinochloa crus-galli* (2)	4	11	5	10	11
Crowsfoot grass, *Eleusine indica* (1)	-	13	13	13	13
Pigeon grass, *Setaria verticillata* (3)	0	11	7	10	11
Winter grass, *Poa annua* (2)	0	25	28	25	28
Ryegrass, *Lolium rigidum* (2)	10	13	15	15	15
Broadleaf weeds					
Stinking Roger, *Tagetes minuta* (4)	0	0	8	18	18
Cobblers peg's, *Bidens pilosa* (3)	0	0	3	14	17
Curious weed, *Schkuhria pinnata* (4)	3	3	6	19	19
Fat hen, *Chenopodium album* (6)	2	10	8	15	11
Wireweed, *Polygonum aviculare* (3)	6	15	5	15	13
Prickly lettuce, *Lactuca serriola* (1)	0	0	0	6	6
Amaranth, *Amaranthus sp.* (2)	0	10	6	15	15
Common groundsel, *Senecio vulgaris* (1)	0	0	8	10	10
Deadnettle, *Lamium amplexicaule* (1)	10	10	10	10	10
Spotted medic, *Medicago arabica* (2)	5	5	14	14	14
Common sowthistle, *Sonchus oleraceus* (3)	0	9	9	11	11
Capeweed, *Arctotheca calendula* (1)	0	0	6	11	12

[a] P = Pendimethalin ; [b] O = Oryzalin ; [c] S = Simazine

[d] Figures in brackets are the number of trials in which the weed species occurred.

Pendimethalin alone provided acceptable control of a number of grasses for 4- 25 weeks and some broadleaf weeds for 2-10 weeks, depending on the rate of application and the weed species. At 3.0 kg/ha pendimethalin provided control of a wider range of grasses for a longer period (11-25 weeks) than the lower rate of 2.0 kg/ha, and showed similar efficacy to oryzalin at 3.4 kg/ha.

There were notable differences in efficacy between pendimethalin and oryzalin applied to broad-leaved weeds. Pendimethalin at 3.0 kg/ha provided better control of fat hen, wireweed and amaranth, while oryzalin demonstrated better efficacy against stinking Roger, cobbler's pegs, curious weed, common grounsel, spotted medic and capeweed. Efficacy against deadnettle and common sowthistle was similar.

The addition of 0.8 kg/ha of simazine to pendimathlin at 3.0 kg/ha increased the broad-leaved weed spectrum controlled for 10-25 weeks and, over all the trials, similar control was obtained to oryzalin + simazine.

Safety. The percentage increase in trunk girth for each of the species of tree and vine on the heavy soil type 168 days after treatment, are shown for each of the herbicide treatments in Table 2.

Table 2. Percentage increase in trunk circumference of trees or vines in relation to herbicide treatment after 168 days.

		Percentage increase in trunk circumference						
Species		Apple	Pear	Peach	Apricot	Plum	Almond	Grape
Herbicide Treatment	Rate kg/ha							
Pendimethalin	4.0	22.6	27.8	29.3	27.4	33.8	55.1	25.1
Pendimethalin	7.9	23.4	28.2	39.3	16.5	35.4	52.8	37.2
Pendimethalin + simazine	4.0 1.1	28.6	33.9	33.7	27.1	38.3	71.8	32.8
Pendimethalin + simazine	7.9 2.1	31.0	33.3	31.6	43.6	28.5	81.9	71.1
Handweeded control	-	12.6	29.6	31.0	14.5	34.3	55.5	20.5
Untreated control	-	3.4	9.6	4.0	- 0.8	7.3	12.8	- 1.8
l.s.d. P=0.05		9.2	8.7	19.5	19.6	13.0	17.7	27.0

All herbicide treatments resulted in significant increases in trunk circumference in all species of the trees or vines compared with those where weeds were not controlled. Trees or vines in those plots which were handweeded had similar trunk circumference increases to most herbicide treatments in the pear, peach, apricot, plum, almond and grape plots. In the case of all herbicide treatments in apple plots and the high rate of pendimethalin + simazine in the apricot, almond and grape plots there were significant increases in trunk circumference compared with handweeded plots in these species. This is attributed to early weed competition in handweeded plots, due to practical considerations. These results indicate good crop safety at likely commercial rates of pendimethalin, pendimethalin + simazine and double commercial rates of these herbicides on this soil type. Similar results with the herbicides at 75 percent of the rates shown in Table 2 were obtained on the sandy soil.

ACKNOWLEDGEMENTS

The assistance of Malcolm Taylor of Agropraisals Pty Ltd and Greg Madafiglio of Agrisearch Services Pty Ltd who were responsible for the conduct of a number of the trials is acknowledged.