

COMPARISON OF CDA "MICROMAX" UNITS WITH STANDARD FAN NOZZLES FOR WEED CONTROL

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SUMMARY

Controlled droplet application (CDA) using 150-250 micron particles was compared to conventional fan nozzles with a volume mean diameter (VMD) of 350-420 microns in 15 field trials. Comments from commercial CDA users were also obtained. CDA tended to be less effective and more variable than conventional spraying. Further experience with this technique is necessary before full commercial support for the technique can be given by agricultural chemical manufacturers.

INTRODUCTION

This paper reports on results from 10 North Island and 5 South Island trials comparing results obtained with "MICROMAX" CDA units and conventional boom spray equipment using fan nozzles. A brief survey of results obtained by five commercial users of "MICROMAX" units is also discussed. The trial series included lucerne, ragwort, nodding and winged thistles, cereals, white clover seed and total vegetation control (TVC).

METHOD

All equipment was vehicle mounted, the CDA units at the rear such that the spray pattern did not touch the vehicle when stationary, and the conventional boom was mounted at the front with the fan nozzles forming the recommended half overlap pattern. All treatments were replicated 2-3 times. Other comparative details were given in Table 1. Commercial formulations of chemicals were applied at recommended weed stages using the standard label rate and half the rate. Chemicals used are shown in Table 2.

TABLE 1: Comparison of equipment used in trials.

	CDA units		Conventional fan nozzles		
	North Island	South Island	North Island	South Island	
Unit or nozzle	"Micromax"	"Micromax"	730231	730154	8002LP
No. of units	3	3	13	12	8
Drive	electric	cable	—	—	—
Boom height	600 mm	600 mm			
Unit spacing	1.6 m	1.3 m	380 mm	380 mm	500 mm
Orifice plate No.	4916-29	4916-41	4916-29	—	—
Orifice No./unit	1	1	2	—	—
Pressure kPa	150	150	150	200	200
Flow rate	0.3	0.6	0.6	0.745	0.496
(litres/min/unit)					
Vehicle speed	4.5	4.5	10	6	4
(km/h)					
Litres/ha	25	50	30	200	200
Cup speed (rpm)	2000	3500	2000	3500	—
Droplet size	250	150	250	150	420
(microns) (VMD for fan nozzles)					380
					400 (est)

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TABLE 2: Chemicals used in field trials.

Crop/Weed	Chemical Used	Full Rate (g ai/ha)
Thistles	clopyralid/MCPB	21/750
	2,4-D ester	144
Ragwort	2,4-D ester	144
Cereals	clopyralid/bromoxynil/ MCPA/mecoprop	60/200 600/1600
Lucerne	paraquat	300 and 600
	2,4-DB	3200
White clover	alloxydim sodium	1125
TVC	simazine/dalapon/ amitrole	8800/5650 2750/

Weed control was assessed 11-23 weeks after application (paraquat 1-6 weeks) by two or more independent observers using a 0-10 rating scale where 0 = no effect and 10 = complete die back of weed foliage. Ratings are expressed as % control.

In nine trials wind was less than 5 km/h and in the remaining six trials wind ranged from 5-15 km/h both across and parallel to the direction of travel.

RESULTS

Results are given in Table 3.

The weed species are not presented as the primary aim was to compare application methods in trials on uniform weed populations.

TABLE 3: Results of comparative trials with conventional and CDA equipment (% weed control).

Litres/ha	Full rates					Half rates	
	Convent.	CDA	CDA	CDA	CDA	Convent.	CDA
Droplet size (microns)	200	25	25	50	50	200	25-50
	380-420	250	150	250	150	380-420	150-250
Trial No. Crop, Weed	NORTH ISLAND						
0-059 Lucerne	84	75	—	81	82	—	—
0-045 Lucerne	88	75	80	78	90	—	—
0-044 Ragwort	60	70	50	50	40	—	—
2-779 Thistle	65	33	58	63	45	43	40
2-780 Thistle	95	95	90	53	95	43	43
3-417 Thistle	100	93	97	83	90	70	75
3-418 Thistle	80	70	60	50	40	60	25
5-060 Cereal	90	90	—	60	80	90	80
5-061 Cereal	70	50	30	30	—	20	30
5-062 Cereal	90	70	—	60	90	50	20
	SOUTH ISLAND						
Litres/ha	200	30	30	60	60	200	30-60
1-681 White clover	82	41	—	—	—	73	30
1-683 Lucerne	97	53	60	—	—	94	73
1-684 TWC	80	—	—	40	—	—	—
1-680 Thistle	93	23	—	—	—	73	30
1-685 Thistle	93	20	—	—	—	85	15
Overall mean	85	61	66	59	72	64	42

0-Taranaki, 1-Canterbury, 2-Waikato, 3-Hawkes Bay, 5-Manawatu

DISCUSSION

There is a clear trend through all the trials for conventional fan nozzles to give better results than the "MICROMAX" CDA unit, this being very pronounced in the South Island trials. The South Island results are consistent with those obtained in MAF trials (Stevenson pers comm) using the same equipment. There is no obvious explanation for this, the only major differences in trial conditions being spacing of the units and travelling speed. Theoretically this should not affect performance.

Both authors noted that the spray pattern of the CDA units was distorted by winds of more than 5 km/h either from the side or parallel to the direction of travel, and this was reflected in uneven weed control across the swath width. Some disturbance of the spray pattern was also noted from the turbulence created by the spray vehicle at 10 km/h. This was not evident with the standard nozzles at 7.2 km/h. Bell (pers comm) surveyed four farmers and one contractor in the Canterbury area all using "MICROMAX" CDA equipment with 10-15 units per boom at 1-1.4m spacing. Crops treated were peas (weed control) pasture (nodding thistle control, ryegrass suppression for clover seed, and desiccation for direct seeding) and cereals (broadleaf weed, wild oat and yellow stripe rust control). All farmers reported favourably on the CDA equipment. Two mentioned wind as a minor problem, one remarked units were not very durable, and one believed that the quantity of chemical could only be reduced under a few circumstances, specifically cereal spraying. They all regarded increased speed of covering the area to be sprayed, because of the extended area sprayed by one fill, to be a major advantage. The contractor was disappointed, with mechanical failures and units requiring different spacing for different crop/weather conditions.

From the 19 paddocks surveyed five were rated as giving excellent pest control, seven good and three fair and four poor, one of the latter not being attributable to the equipment. None however compared conventional spraying in the same paddock.

CONCLUSION

Results using "MICROMAX" CDA sprayers were more variable than those given by standard boom and fan nozzle equipment. Reliability will need to be improved before manufacturers can support specific CDA label claims for commercial formulations. The advantages of CDA equipment and the very limited experience under commercial use in New Zealand support its continued evaluation so that user and chemical manufacturer confidence for this concept can be increased.

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