CHEMICAL WEED CONTROL IN CHICKPEAS

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Chickpeas (*Cicer arietinum*) are a good source of carbohydrate and protein (Williams and Singh 1987) and can be considered as an alternate crop in New Zealand for both domestic and export market (Logan 1983). Chickpeas have a slow initial growth rate which makes them susceptible to weed competition (Bhan and Kukula 1987). Early weed control is critical in economic production of chickpeas, but very little work has been done on weed control in this crop in New Zealand. This experiment aimed to evaluate several pre- and post-emergence herbicides in chickpeas.

The experiment was conducted at the Lincoln University research farm on a Wakanui silt loam soil from December 1993 to April 1994. Chickpea cv. *Kabuli* seed was drilled in 15 cm rows at a depth of 5 cm. All herbicide treatments were applied with a portable battery operated sprayer fitted with a 2 m boom in 300 litres/ha water at rates given in Table 1. Pre-emergence herbicides were applied 6 days after sowing (DAS) and post-emergence herbicides 23 DAS. A weed-free control, an unweeded control and a mechanical weed control treatment of a single hoe at 42 DAS were also included in the experiment. There were twenty treatments and four replicates arranged in a randomized complete block design. Plot size was 10 x 2 m. Dry matter production of chickpeas and weeds were monitored during the growing season by quadrat sampling. All plants in two 0.1 m^2 quadrats, placed randomly in each plot, were cut at ground level. Here only the data for the first (45 DAS) and the final harvests (130 DAS) are presented.

The main weed species present in the experimental area were broadleaves especially fathen (*Chenopodium album*), black nightshade (*Solanum nigrum*), speedwell (*Veronica arvensis*) and wireweed (*Polygonum aviculare*). Weed competition had a dramatic effect on chickpea growth and reduced the dry matter production of chickpeas by 20% at the first harvest and 28% at the final harvest (Table 1, Fig. 1). Seed yield was reduced by 31% due to weed competition. Mechanical control of weeds with a single hoe reduced weed competition during early crop growth (Table 1). There was some resurgence of weeds later in the season (data not shown), but this did not cause a significant yield reduction at the final harvest (Fig. 1).

Most pre-emergence herbicides, especially at the higher rate provided adequate weed control without phytotoxicity to chickpeas. This resulted in seed yields similar to the weed free control. The highest grain yield was obtained by the application of cyanazine at 1.0 kg/ha (Fig. 1A). Other workers have also reported selective weed control in chickpeas and lentils (*Lens culinaris*) with cyanazine and metribuzin (Bhan and Kukula 1987; Knott and Halila 1988). Post-emergence application of the grass herbicides, clethodim and haloxyfop did not provide good weed control (Table 1) as the dominant weeds were broadleaf species. Reductions in dry matter and yield of chickpea with these treatments were therefore a result of weed competition during the growing season (Fig. 1B). Post-emergence application of cyanazine, bentazone, bentazone plus MCPB and cyanazine plus haloxyfop resulted in severe damage to the chickpeas with significant yield reductions (Table 1, Fig.1). Phytotoxicity from these herbicides when applied post-emergence to chickpeas or other grain legumes has been reported (Mahoney 1984; Yadau *et al.* 1983; Adamczewski and Paradowski 1987).

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TABLE 1: Effect of weed control treatments on shoot dry weight (g/m^2) of chickpea and weeds 45 days after sowing[1].

Treatment	Rate (kg ai/ha)	Chickpea	Weed
Pre-emergence			
Cyanazine (Bladex)	1.0	151.2	5.4
	2.0	111.2	1.9
Metribuzin (Sencor)	0.25	115.4	16.9
	0.50	121.4	4.9
Terbuthylazine (Gardoprim)	0.75	110.5	25.8
	1.0	159.3	2.9
Cyanazine + metribuzin	1.0+0.25	100.4	2.3
Post-emergence			
Cyanazine (Bladex)	1.0	31.9	89.6
	2.0	2.6	11.2
Bentazone (Basagran)	1.0	26.4	25.5
	1.5	5.3	13.2
Clethodim (Centurion)	0.06	118.3	56.9
	0.12	140.3	57.1
Haloxyfop (Gallant)	0.15	121.6	56.8
	0.30	87.4	83.7
Bentazone+MCPB	1.0+1.2	5.5	18.5
Cyanazine+haloxyfop	1.0+0.15	6.0	0.2
Weed free control		123.6	0.0
Weedy control		99.4	38.1
Single hoe		106.8	10.9
Confidence interval limits[2]		0.64-1.57	0.55-1.83
CV%		26.6%	39.6%

[1] Values are back transformed.
[2] Confidence interval is the mean multiplied by the upper and lower limits (ratios) given.

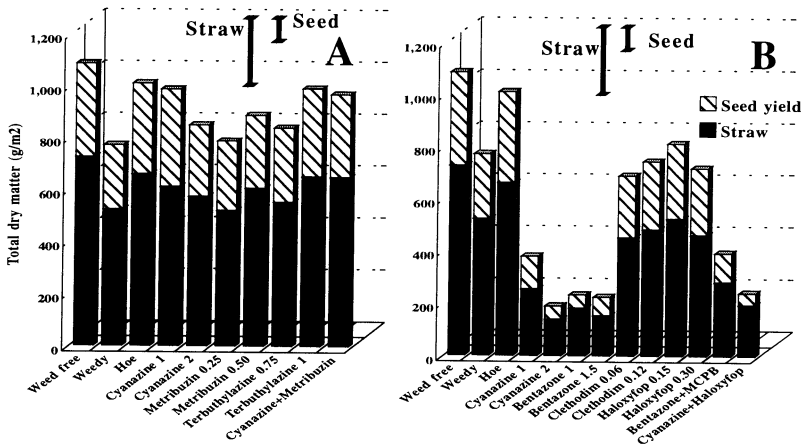

FIGURE 1: Effect of pre-emergence (A) and post-emergence (B) herbicides on straw and seed yield of chickpeas at the final harvest. Error bars are LSD $_{.05}$ for straw or seed yield.

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In conclusion, a pre-emergence application of cyanazine, metribuzin, terbuthylazine or their combination will provide effective control of broadleaf weeds in chickpeas, but chickpeas are very sensitive to post-emergence application of these herbicides. If the problem weeds in the crop are grasses, post-emergence application of clethodim or haloxyfop can be considered. The exact rates for the above herbicides would need to be tested for different locations.

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