THE EFFECT OF HERBICIDE ON WEED CONTROL AND YIELD OF CABBAGES

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SUMMARY

Single applications of alachlor, aziprotetryne, desmetryne and a combined treatment of alachlor and aziprotetryne at label recommended rates were applied for weed control to a crop of transplanted stonehead cabbages. Aziprotetryne was the most effective herbicide and when combined with alachlor gave the longest period of weed control. All herbicide treatments achieved significantly greater yields than that from the untreated control. Cabbage plant growth appeared normal in all herbicide treated plots but head development was slower in the desmetryne treatment.

Keywords: cabbage, herbicide, weed control, yield

INTRODUCTION

Vegetable cabbage (*Brassica oleracea* var *capitata*) is one of the most important table vegetables in New Zealand. The need to minimise competition for moisture and nutrients in such fast growing green vegetable crops is well recognised.

At Invermay in 1990, the need arose for a standard herbicide treatment which would suit on-station conditions with anticipated weed problems in current and future trial work with cabbages. The herbicides selected were used by commercial growers on varying soil types on the Taieri Plain, which is a vegetable growing area supplying the Dunedin market.

This trial compared an untreated control with the use of three herbicides singly, and a combination of two of the herbicides, and describes the effect that weed control had on the growth and yield of cabbages.

MATERIALS AND METHODS

The trial was conducted at Invermay Agricultural Centre on a highly fertile area which had been in pasture for 11 years. The soil type was a Wingatui recent alluvial silt loam with a fine gravelly texture. The trial was laid out in a randomised block design with four replicates.

Ridges 76 cm apart were formed on 11 November 1991. Ten cabbages per plot were transplanted at 60 cm spacings into the ridges on 15 November 1991 and watered in by hand. The plants were at the four true leaf stage with the fifth leaf emerging. Three herbicides, alachlor (Lasso micro-tech), aziprotetryne (Brasoran) and desmetryne (Semeron 25WP), were applied at different times according to their activity against target weeds. Thus alachlor was applied on 18.11.91, soon after cabbages were transplanted and before weeds had germinated; aziprotetryne, a root and foliar herbicide active against germinating weeds, was applied a week later on 26.11.91 and the foliar herbicide, desmetryne, was applied on 10.12.91. All herbicides were applied at label recommended rates (Table 1). Treatments were applied over the crop at 250 litres/ha using a modified Oxford precision sprayer equipped with three 11002 lo-drift nozzles, two of which were placed above the ridges and the third being in the centre above the furrow.

Haloxypop (Gallant) at 15 mls/litre was used on 11 December 1991 as a spot spray for couch control in all plots. On 15 January 1992 the crop was sprayed for a minor insect infestation.

Assessments for percentage weed cover were made on 10 and 24 December 1991 and 15 January 1992. Following the third assessment, weeds growing between the ridges were cut with a motorised scrub cutter and those within the ridges were hand

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hoed to prevent seeding. No mechanical cultivation was carried out during the trial.

Random measurements of cabbage head diameter were taken on 15 January 1992. The crop was harvested on 27 January, 14 weeks after planting. Surplus leaves were removed so that one layer of leaves surrounded the heads which were then graded into marketable and reject produce. Marketable heads were considered as being of good size, shape and colour for the crop as a whole. Other criteria included firmness and lack of blemish. Rejects generally were small, with heads failing to mature, or failed because of pest damage.

All variables were analysed using analysis of variance.

RESULTS AND DISCUSSION

The major weeds present were fathen (*Chenopodium album*), seedling dock (*Rumex obtusifolius*), shepherd's purse (*Capsella bursa-pastoris*), and spurrey (*Spergula arvensis*). Traces of wireweed (*Polygonum aviculare*), red dead nettle (*Lamium purpureum*) and couch (*Elytrigia repens*) were also present.

Aziprotryne proved to be the most effective herbicide for weed control (Table 1). A prior application of alachlor in the combined treatment gave significantly improved control 9 weeks after planting compared with aziprotryne alone. Alachlor on its own achieved good initial weed control but later failed to give adequate control. This was largely due to the growth of fathen and seedling dock which was similar to that observed in the untreated plots on the last assessment date. The lack of control of these weeds was probably due to a 7 day delay between ridge formation and treatment application when weed seed germination was noted. As well, the ground surface was dry at the time of spraying, thus affecting chemical absorption.

Effects on the crop from early control of the weeds was apparent by 15 January, by which time cabbages had developed sufficiently to compete with later germinating weeds. Heads of cabbages growing in plots with least weeds measured 10-15 cm diameter and were full and well firmed, while those plants in the weediest plots had loose leaved heads and measured less than 10 cm across. Growth and the maturation of heads was rapid in the following 10 days.

TABLE 1: The effect of herbicide treatments on percent weed cover at three assessment dates.

Herbicide	Rate kg ai/ ha	% weed cover		
		10.12.91	24.12.91	15.1.92
untreated		5.7	46.6	89.2
alachlor	2.88	1.6	17.2	80.0
aziprotryne	2.00	0.3	1.5	30.0
alachlor + aziprotryne	2.88+2.00	0.2	0.5	12.5
desmetryne	0.25	4.7	4.6	46.7
LSD (P=0.05)		1.2	8.0	17.4

TABLE 2: The effect of herbicide treatments on mean marketable cabbage yield per plot, and percentage of marketable heads.

Herbicide	Marketable yield (kg)	% marketable heads
untreated	5.0	38
alachlor	14.6	88
aziprotryne	16.7	88
alachlor+aziprotryne	18.8	98
desmetryne	11.6	78
LSD (P=0.05)	4.76	24.4

There were no cabbage plant deaths. The herbicides appeared to have no detrimental effect on the cabbage plants until 15 January 1992 when it was noted that cabbages treated with desmetryne showed signs of slower head development than did those plants in the other treated plots.

The percentage of marketable heads and the marketable yields per plot were increased with the herbicide treatments when compared with the untreated controls (Table 2). There was a strong relationship between both the marketable yield and percentage of marketable heads with the percent weed cover at both 24.12.91 and 15.1.92. It would therefore appear that the more effective a herbicide is in restricting the growth of weeds the higher the crop yields although we were not able to show an increased yield in the aziprotryne treated plots when compared with the alachlor treated plots. Similarly, although the combined aziprotryne and alachlor treatments resulted in the best weed control and highest yields, the difference between the yields from this treatment and the treatments where the herbicides were used alone was not great. In most seasons, the use of these herbicides in this way would be uneconomic. However, the results of this trial reinforce the necessity for initial control of weeds, particularly annuals, in cabbages.

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