

Annual ryegrass control in conventional and herbicide tolerant canola

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ABSTRACT

The introduction of minimum tillage cropping systems has increased the dependence upon herbicides for weed control. Herbicide tolerant varieties of canola (*Brassica napus*) have increased the range of chemicals available for weed control. The comparative value of tillage (wide vs. narrow points) and different herbicides to control *Lolium rigidum* (annual ryegrass) was evaluated for both conventional and herbicide tolerant canola systems. Annual ryegrass control was more effective in the triazine and glyphosate tolerant canola lines compared to the conventional canola. Triazines were the most effective pre-emergent herbicide, and glyphosate was the most effective post-emergent herbicide.

KEY WORDS

Canola, herbicide, glyphosate, triazine, cultivation, ryegrass.

INTRODUCTION

Annual ryegrass is a major weed of the cropping area of south-eastern Australia, and has developed resistance to several of the grass selective herbicides currently available for annual ryegrass control (1,2,4). The introduction of herbicide tolerance traits into canola varieties has increased the herbicide options available in this stage of a rotation. Conventional breeding programs have been used to develop canola varieties tolerant to triazine and imidazolinone herbicides, whilst transgenic varieties are currently being developed with tolerance to glyphosate and glufosinate herbicides.

In crop use of triazine and glyphosate herbicides will affect the weed control achieved, particularly where herbicide resistance has developed in a weed species (eg annual ryegrass) (3), or where there are previously uncontrollable weeds present (eg wild radish *Raphanus raphanistrum*). The purpose of this work is to compare the effectiveness of weed control using different management systems, and the impact of these treatments on the rest of a typical cropping rotation.

METHODS AND MATERIALS

A site at Wagga Wagga was sown on 7th April 1999 with 15kg ha⁻¹ annual ryegrass to ensure an even, heavy weed burden. Three lines (conventional, triazine tolerant, and glyphosate tolerant) of one canola variety of were sown on 18th May at 4.0kg ha⁻¹. The experimental design was a split-split-split plot design with three replicates of each treatment. Plots measured 1.8m x 10m.

The first treatment was use of an autumn cultivation. The second was the degree of cultivation used at sowing (narrow points or wide points), and the third was the herbicide treatment. Herbicide treatments included combinations of use or no use of pre-emergent and post-emergent herbicides (Table 1). All plots were treated during the season with an insecticide for red legged earth mite control and with clopyralid to suppress broadleaf weeds post-emergence.

Annual ryegrass numbers were counted throughout the season using 0.1m⁻² quadrats, five measurements per plot. Crop yield data was obtained at harvest, with subsamples analysed for quality. Due to commercial in confidence requirements associated with transgenic crops, not all data collected can be presented at this stage.

Table 1. Selective herbicides used and rate of application for each line of canola.

line	pre-emergence		post-emergence	
	herbicide	rate (g a.i. ha ⁻¹)	herbicide	rate (g a.i. ha ⁻¹)
conventional	trifluralin	800	clethodim	48
triazine tolerant	simazine +	1000	atrazine	500
	atrazine	500		
glyphosate tolerant	trifluralin	800	glyphosate	441

RESULTS

Using an autumn cultivation did not significantly effect the level of ryegrass control achieved with any of the canola lines over all treatment combinations.

Over all lines of canola slightly better annual ryegrass control was observed with direct drilling compared to full soil disturbance at sowing, although this difference was not significant ($P>0.05$).

Herbicides treatment affected the level of weed control achieved (Table 2). Triazine herbicides gave better control than trifluralin when only a pre-emergent herbicide was applied. Glyphosate gave better control than clethodim when only a post-emergent herbicide was applied. Atrazine gave poor annual ryegrass control when applied only as a post-emergent herbicide. The best annual ryegrass control was achieved when both a pre-emergent and post-emergent were applied. Annual ryegrass control was better in both the triazine tolerant and glyphosate tolerant lines compared to the conventional line.

Table 2. Annual ryegrass density (plants m⁻²) in August and percent control achieved using different selective herbicide treatments for three lines of canola (values averaged over cultivation treatments).

Herbicide treatment	conventional		triazine tolerant		glyphosate tolerant	
	density	% control	density	% control	density	% control
Control (no herbicide)	369	0	239	0	461	0
Pre-emergent only	127	66	42	82	177	62
Post-emergent only	53	86	188	21	40	91
Pre- & Post emergent	28	92	14	94	17	96

From these results, there are advantages in adopting herbicide tolerant crops to improve management of annual ryegrass.

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