

GOA Trial Site Report

The impact of rate and timing of clethodim herbicide applications on canola performance – Coolah 2013

Trial Code	GOCD0013-3
Season/year:	Winter, 2013
Trial Location:	“Kurrajong Park” 15km North of Coolah
Trial Collaborators:	Paspaley Rural and Andrew McFayden

Keywords

Canola, clethodim, Factor, weeds, annual ryegrass, *Lolium rigidum*, herbicides, crop damage, Coolah, GOA1313, GOCD00113-3, resistance

Take home messages

In this trial, there was very little visual clethodim damage found even with high rates of clethodim outside recommended timings.

None of the applied treatments resulted in any statistically significant impact on yields or oil % when compared to the untreated control. Even treatments applied in excess of label rates or beyond the label timing did not result in any impacts.

The use of Factor herbicide either alone or in combination with clethodim was no more damaging than to the canola performance than clethodim alone.

This trial only included one variety of canola, 44Y84. Other varieties may show different tolerance results.

Background:

Increasing levels of Group A ‘fop’ resistance and the reduction in pricing of clethodim herbicides has driven increases in both the frequency of use and the rates applied of these products in canola for the control of annual ryegrass. Coinciding with this there has been an increase in the observed level and occurrence of crop damage by that same herbicide. Damage by clethodim in canola has long been documented but the triggers that result in this expression are not very clear and neither are the possible impacts on yields.

Visual symptoms of crop damage have been rarely reported for the lower label rates of 250 mL/ha but have been more commonly observed at higher rates of 500mL/ha, indicating that rates could be to blame, however, the use of the high rate does not universally result in crop damage. Suggested label timings of spraying before bud initiation may not always be achieved in reality, however, late applications have also not consistently resulted in damage, thus suggesting that damage may be in response to a combination of rate and unfavourable conditions at application.

As mentioned above the true effect upon yield is unclear - some commentary suggests that the visual symptoms of flower distortion or abnormal or missing pods has little or no impact upon yield as the canola can compensate for the damage incurred. At the other end of the commentary is that the

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impacts on flowering and pod formation are terminally detrimental and the effects upon yield substantial. A trial in South Australia¹ in 2013 suggests that grain yield losses from clethodim occur when using higher rates (1 L/ha) after the 8-leaf stage and resulted in up to 40% losses when applied at bud initiation. This work also indicated a possible variation in susceptibility between varieties.

DISCLAIMER

Following is a report on a scientific experiment. It may contain some herbicide treatments that are not registered for the situation, manner or rate at which they are used in this trial. This document or anything else resulting from, construed or taken from this or by GOA or its representatives should not be taken as a suggestion, recommendation or endorsement of any unregistered herbicide uses.

Aim:

- Identify possible contributors to the expression of clethodim damage in canola, such as the critical rate, timing or other factors such as environmental conditions around application
- Quantify what is the level of yield and grain quality impact associated with the use of clethodim

Methodology:

This trial was a small plot, randomised complete block design with three replicates.

All plots were sown with 100kg/ha of MAP and later top-dressed with 80kg/ha of Granular sulfate of ammonia and 100kg/ha of granular urea.

Plots were sown with Clearfield® - 44Y84 @ 3.5 kg/ha on the 20/6/2013,

Site was treated with trifluralin @ 1 L/ha ahead of sowing and with Intervix @ 750 mL/ha on the 1/08/2013 at the 4-leaf crop stage to minimize any existing weed pressure. Very few weeds were present in this trial but any surviving plants were manually removed when found

The trial treatments consisted of three planned timings of early, late and 'unfavourable conditions'. The early treatment was targeted within recommended timings of the 2-4 leaf stage, the late treatment was targeted to be applied when the crop was beyond the label timing of bud initiation/visible stage. The last (flexible) treatment was to be targeted and applied 'unfavourable' growing conditions- i.e. very frosty and poor growing.

At each of these timings a range of treatments were applied including three rates of clethodim (250, 500 and 1000 mL/ha) and a single rate of Factor® (80 g/ha) as well as a tank-mix of clethodim (250 or 500mL/ha) and Factor® (80 g/ha). A full list of the treatments are listed in **Error! Reference source not found.** below. All treatments were applied with Uptake™ spraying oil at 0.5%.

All these treatments were applied by hand boom with 100 L/ha of rain water through AIXR015 nozzles at 3 bar. The details are listed in Table 2 below.

¹http://www.hartfieldsite.org.au/media/2013%20TRIAL%20RESULTS/17_Clethodim_tolerance_in_canola_2013HartTrialResultsBook.pdf

Table 1 Herbicide treatments and rates applied

Treatment	Rate (mL or g/ha)
Untreated Control (UTC)	Nil
Clethodim (early)	250
Clethodim (early)	500
Clethodim (early)	1000
Clethodim (late)	250
Clethodim (late)	500
Clethodim (late)	1000
Factor® (early)	80
Factor® (late)	80
Clethodim + Factor® (early)	250 + 80
Clethodim + Factor® (early)	500 + 80
Clethodim + Factor® (late)	250 + 80
Clethodim + Factor® (late)	500 + 80
Clethodim (frosty conditions)	250
Clethodim (frosty conditions)	500

Table 2 Herbicide application dates and crop stage

Timing	Date	Crop Stage
Early	6/07/2013	3-4 leaf stage
Frosty	16/08/2013	4-6 leaf stage
Late	12/9/2013	1-5% flowering

Results

There was no observable crop biomass reduction in this trial in response to herbicide application as measured after herbicide application as measured by NDVI.

There was observed flower damage as a result of only three treatments which is detailed in Table 3. This damage was expressed as abnormal flowers, with petals fusing to the forming pods.

No treatments resulted in yield or oil % significantly different to the untreated control.

The application of clethodim under adverse weather conditions (3 consecutive heavy frosts) also had no statistically significant impact on yields.

Table 3 Flower abnormality, yield and oil % in response to different rates and timing of clethodim and/or Factor herbicide (* indicates the result was different to the UTC)

Treatment	Description	% Flower abnormality		Yield t/ha		Oil %	
1	UTC	0.4		1.18	ns	38.0	ns
2	Clethodim (early)250ml	5.3	*	1.21	ns	39.2	ns
3	Clethodim (early)500ml	2.6		1.09	ns	37.9	ns
4	Clethodim (early)1000ml	9.6	*	1.07	ns	38.4	ns
5	Clethodim (Late)250ml	3.6		1.22	ns	39.7	ns
6	Clethodim (Late)500ml	4.6	*	1.06	ns	38.9	ns
7	Clethodim (Late)1000ml	24.6	*	1.00	ns	37.1	ns
8	Factor (early)80ml	2.3		0.98	ns	37.4	ns
9	Factor (late)80ml	1.9		1.10	ns	38.3	ns
10	Clethodim + Factor (early)250ml + 80g	0.4		1.08	ns	39.1	ns
11	Clethodim + Factor (early)500ml + 80g	3.3		1.05	ns	38.1	ns
12	Clethodim + Factor (late)250ml + 80g	2.6		1.11	ns	38.0	ns
13	Clethodim + Factor (late)500ml + 80g	7.1	*	1.05	ns	37.7	ns
14	Clethodim (Frosty)250ml	0.6		1.05	ns	38.5	ns
15	Clethodim (Frosty)500ml	4.6	*	1.15	ns	38.9	ns
		l.s.d		0.45- 6.28		ns- Not significant	

Discussion

The use of clethodim at various rates, at early and late timings and in combination with Factor® had no statistically significant impact yield or percentage oil in this trial as illustrated in Figure 1 below. This was despite some evidence of clethodim damage in abnormal flowers observed in the trial.

This trial was sown quite late for this region and the trial was located very low in the landscape. The trial experienced very significant frosting during establishment and early growth which, this potentially has contributed to some underlying variability in the trial which has challenged the ability of the statistics to identify significant treatment effects. Despite the lack of a statistical response there was not even clear or consistent trends that might support or suggest crop yield damage is caused by high rates or delayed timing.

This suggest therefore that crop damage from clethodim is not simply related to excessive rates or delayed timing but additional factors such as poor environmental conditions. Cold and frosty conditions could be one such factor. However the applications made on the 16th of August were applied in very frosty weather. Unfortunately temperatures were not recorded at this site but nearby weather stations suggest a run of frosts with temperatures as low as minus 5 °C would have been experienced. Yet yields were not significantly different to the UTC.

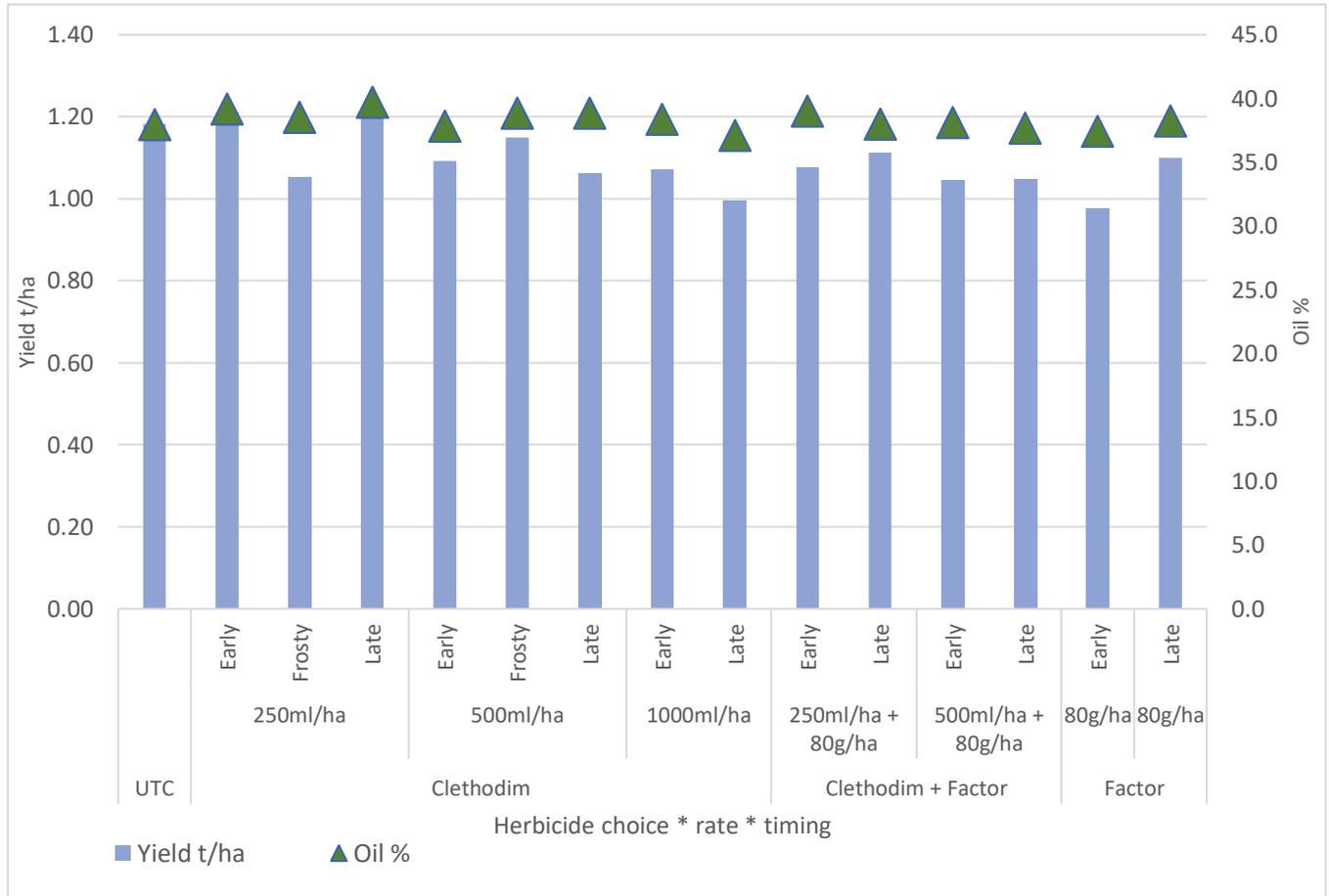


Figure 1 Canola yield and oil % in response to application timing and rate of clethodim and Factor herbicides

Conclusion

In this trial there was no impact on crop yields from the use of clethodim or factor herbicide. The results from this one trial demonstrated that the use of Clethodim or Factor herbicide within the stipulated label conditions did not cause significant yield reductions with this variety (Pioneer 44Y84).

However at this site using these herbicides outside of recommended rates and timings also did not result in significant crop effects. This overall lack of response to rates and timings outside label suggestions suggest that other extenuating circumstances may be required to result in damage. Until we have a better understanding of what those triggers may be it is best to err on the side of caution and aim to apply only label rates of herbicides within label timings.

There does remain question over differing varietal sensitivities to clethodim and the one variety tested in this trial is also unknown and other more sensitive varieties may have behaved very differently. Further investigations are needed to help better understand what triggers crop damage.

The trial is one of a series of trials investigating clethodim damage and should not be considered in isolation nor any of the experimental timings or rates used in this trial as a suggestion, recommendation or otherwise to use such rates or timings.

Acknowledgements

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