

GOA Site Report

The impact of rate and timing of clethodim applications on canola– Tullamore 2014

Trial Code; GOCD00214-2
Date; Winter 2014
Location; “Allawah” 6km NNE of Tullamore, NSW
Collaborator; Neville Jones and his family

Background

Increasing levels of Group A- fop resistance and the drop in retail pricing of clethodim¹ based herbicides has driven increases in both the frequency of use and the rates applied of these products in canola. It has been long noted that clethodim can at times cause some level of crop damage but the conditions that invoke this expression are not very clear and neither are the possible impacts on yields

Visual effects have been rarely reported for the lower rates (label rate of 250 ml/ha) and more commonly observed at higher rates. However, it is ambiguous as to whether the damage is simply related to rate or a combination of rate, late timings or unfavourable weather conditions such as extended cold/frost periods. Recent trial work by the Hart Group has also indicated that there could be varietal difference in susceptibility to clethodim and/or variety.

In terms of acceptable timings for clethodim application it could also be suggested that some labels are open to a range of interpretations. The common label timing of “bud visible” could be from very early stem elongation around 8 leaf stage through to mid elongation when the bud may be 5-10cm off the ground when it is clearly “visible”.

The effect upon yield is unclear - some commentary suggests that the visual symptoms of flower distortion have little or no impact upon yield or in more serious cases of pod abortion the crop compensates well. The other end of the commentary is that the impacts on flowering and pod formation is irreparably detrimental and the effects upon yield substantial. A trial in South Australia² in 2013 suggests that grain yield losses from clethodim use occur when using higher rates (1l/ha) from the 8 leaf stage and resulted in up to 40% losses when applied at bud initiation.

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.

¹ Example trade names- Select, Plantinum, Status, Clethodim 240

²http://www.hartfieldsite.org.au/media/2013%20TRIAL%20RESULTS/17_Clethodim_tolerance_in_canola_2013HartTrialResultsBook.pdf

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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, if any, is the level of yield impact is associated with the use of clethodim

Methodology

The trial was conducted on small plots, using a randomised complete block design with three replicates.

To investigate the possible causes of Clethodim damage the following treatments were devised;

- Clethodim Rates:
 - 250 ml/ha (half label rate),
 - 500 ml/ha (full label rate),
 - 1000 ml/ha (double label rate)
- Timings:
 - Label timing (before bud visible)
 - Late (after bud visible)
 - Very Late
 - During heavy frost period
- Factor: with or without label rate (80 ml/ha)

Details of the timing of applications are contained in **Error! Reference source not found.** below. All treatments were applied by hand boom applying 100L/ha of herbicide and rain water through AIXR015 nozzles @ 3 bar.

Table 1; Trial site details

Trial Establishment Date	Autumn 2014		
Crop and Variety	Canola- Pioneer 44Y24RR	Seeding rate	2.5 kg/ha
Sowing date	2/5/2014	Row Spacing	27.5 cm
Seedling equipment	Double Boot Tyne	Soil type	Light red clay loam
Crop Nutrition (kg/ha)	100 DAP (seeding) + 100 Gran Am (topdressed 23-7-2014)	Pre-Seeding Herbicide Applied	2L Round Up Powermax + 1.5L Trifluralin + 1.6L Avadex Xtra (IBS)
Previous Crop (and yield)	Wheat	Pre-Sowing Stubble Management	Nil

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The trial was also sprayed with Round Up Ready- Plant Shield @ 900g/ha on the 29/5/2014 to ensure no weed pressure in the trial area- any surviving plants were hand pulled when found.

Table 2: Details of herbicide treatment

Timing	Date	Crop Stage	Weather summary ³
Early	11/6/2014	4 leaf	No frosting 7 days either side of application
Frosty	10/7/2014	6-8 leaf	-2°C frost on 8/7, -3.3°C on 14/7
Late	31/7/2014	80% plants with visible buds	Significant frosting 3/8 till 16/8
Very late	20/8/2014	90% flowering	No frosts since the 16/8 and for 7 days after application

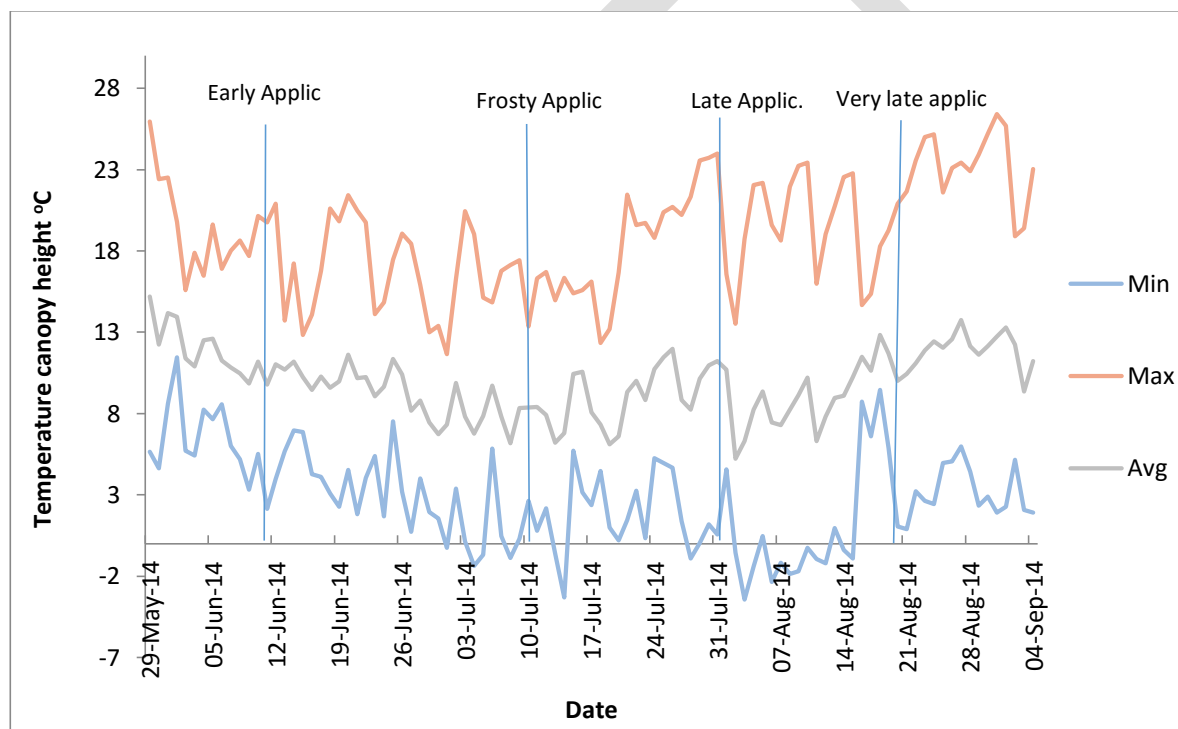


Figure 1: Daily maximum, minimum and average temperature measured at canopy height, Tullamore trial site 2014

Results

There were three treatments that resulted in increased levels of flower abnormality- the full and the 2X label rate of clethodim as well as the full label rate mixed with Factor applied late. None of these treatments or any others resulted in any significant pod loss compared to the nil treatment.

There was no significant impact on yield by any treatment compared to that of the nil treatment.

³ In field data loggers at canopy height

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These results are illustrated in **Error! Reference source not found.** below.

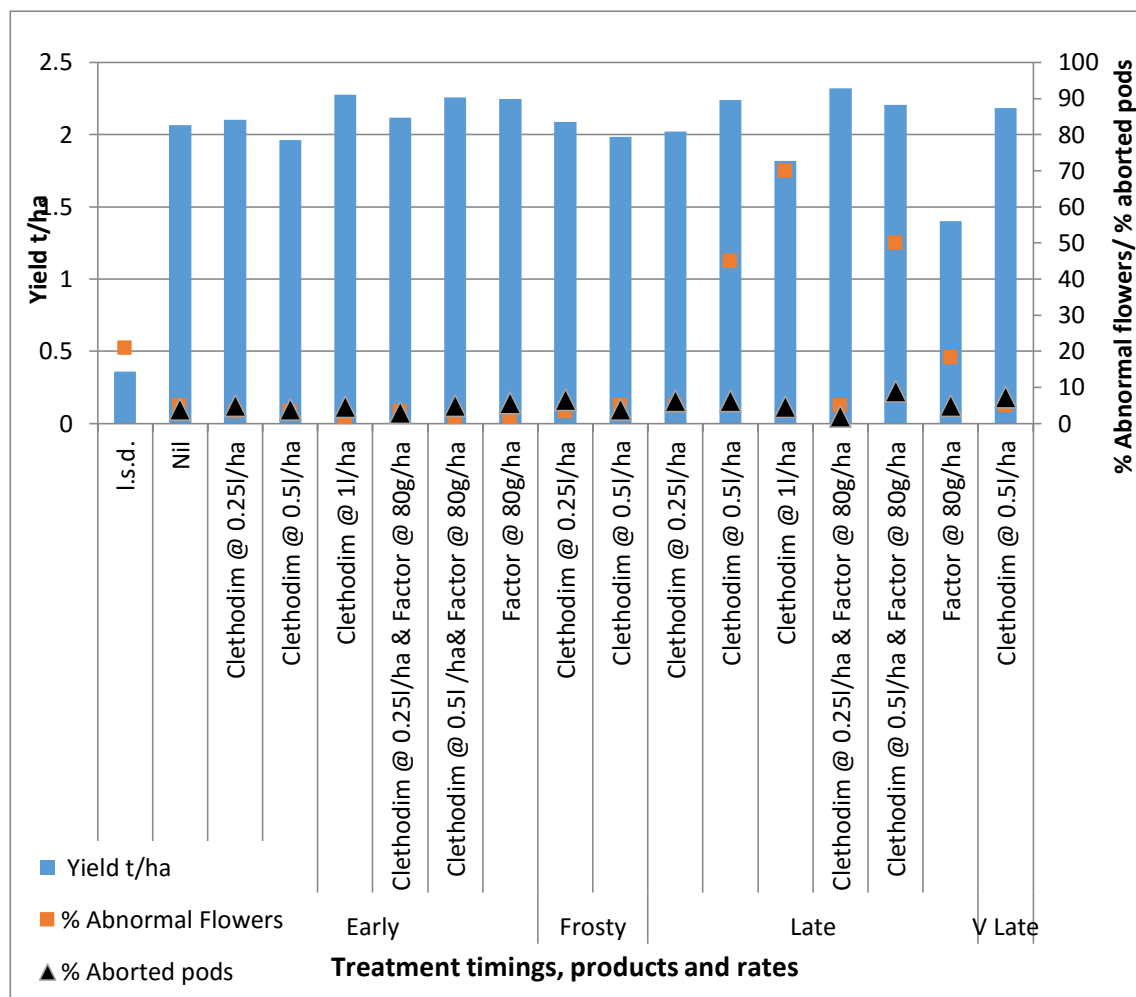


Figure 2: Canola yield, % of abnormal flowers and aborted pods to varying application rates and timing of clethodim herbicide and clethodim herbicide mixes, Tullamore 2014

There were three treatments that had a significant negative impact on oil% compared to the nil treatment (results not shown)- the 2X label rate, the ½ label rate of clethodim mixed with Factor and the full label rate of clethodim mixed with Factor but again, only when applied later than label timings. All three treatments were not significantly different to each other and had an average oil content 1.75% lower than the nil treatment.

Discussion

This trial demonstrated the potential that clethodim has to impact on canola. As detailed above three treatments resulted in significant flower abnormality (45-70% flowers affected), however this did not translate into any pod abortion compared with that of the nil treatment. Two of the treatments where there was measured flower abnormality also had significantly lower oil%. A third treatment that exhibited 45% flower abnormality did not result in lower oil% and similarly the only other treatment to show lower oil% compared to the nil treatment, had only 5% abnormal flowers. Interestingly all these cases only occurred following the later application timings.

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The interaction between flower damage and oil content as a symptom of clethodim damage was not consistent in this trial, although the relationship between application timing and oil content was more consistent (as all late treatments had lower oil content??). This aspect of clethodim damage warrants more investigation as the effects are not clear from the results.

As detailed above there was no significant impact by any treatment on yield. However, the lowest mean yield in the trial was the 2X label rate applied late and this treatment did also have the highest level of flower abnormality but as mentioned the yield was not statistically different to the nil treatment.

The “frosty” application in this trial also did not result in any significant yield effects but the temperatures before and after application could not be described as severe or persistent with only a single minus 4°C four days after application. The late timing however was followed by significant and sustained frosts but none of the late timed treatments resulted in any yield impacts.

Conclusion

In this trial clethodim did not result in yield or crop impacts when applied in label timings and at label rates.

However, it clearly shows that flower damage (abnormalities) can occur but only when clethodim is applied at higher rates and beyond label timings. Despite this high apparent damage, it did not translate into significant pod abortions or yield impacts in this trial. Late applications of clethodim did impact on oil%. The mechanism of this impact is not clear from this trial and may need further investigations.

In this trial there is no clear evidence that clethodim damage is exacerbated by frosty conditions.

Despite the lack of yield response in this trial there does remain a question over varietal sensitivities to clethodim. This trial only tested one variety and its relative tolerance is unknown. Other more sensitive varieties may behave very differently.

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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