

GOA Site Report

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

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| Trial Code; | GOCD00214-3 |
| Date; | Winter 2014 |
| Location; | “Larrys Plains” Geurie. 20km SSE of Dubbo, NSW |
| Collaborator; | Gary Evans |

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 44Y84 | Seeding rate | 2.6 kg/ha |
| Sowing date | 7/5/2014 | Row Spacing | 27.5 cm |
| Seedling equipment | Double Boot Tyne | Soil type | Red/brown medium clay |
| Crop Nutrition (kg/ha) | 108 MAP (seeding) + 100 Gran Am (topdressed 24-7-2014) | Pre-Seeding Herbicide Applied | 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 Intervix @ 450ml + Uptake Spraying oil @ 0.5% of spray volume on the 1/7/2014 to ensure no weed pressure in the trial area- any surviving plants were hand pulled when found.

Results were analysed by ANOVA and results compared by using a LSD method with a 95% confidence interval. Any references to differences between treatments should be assumed to be statistically different unless otherwise stated.

Table 2: Details of herbicide treatments

| Timing | Date | Crop Stage | Weather summary ³ |
|-----------|------------|----------------------------------|---|
| Early | 24/06/2014 | 2-4 leaf stage | Mild -1°C frost 3 days after application |
| Frost | 9/7/2014 | 4-6 leaf stage | Five frosts in the 7 days prior to, and one on the day of application, four in the five days following application. |
| Late | 29/7/2014 | Early budding (post bud visible) | Heavy frosts on the day of and the day prior to application, fourteen frosts in the 17 days following application |
| Very late | 20/8/2014 | 20% flowering | Mild frost five days prior to application and none following. |

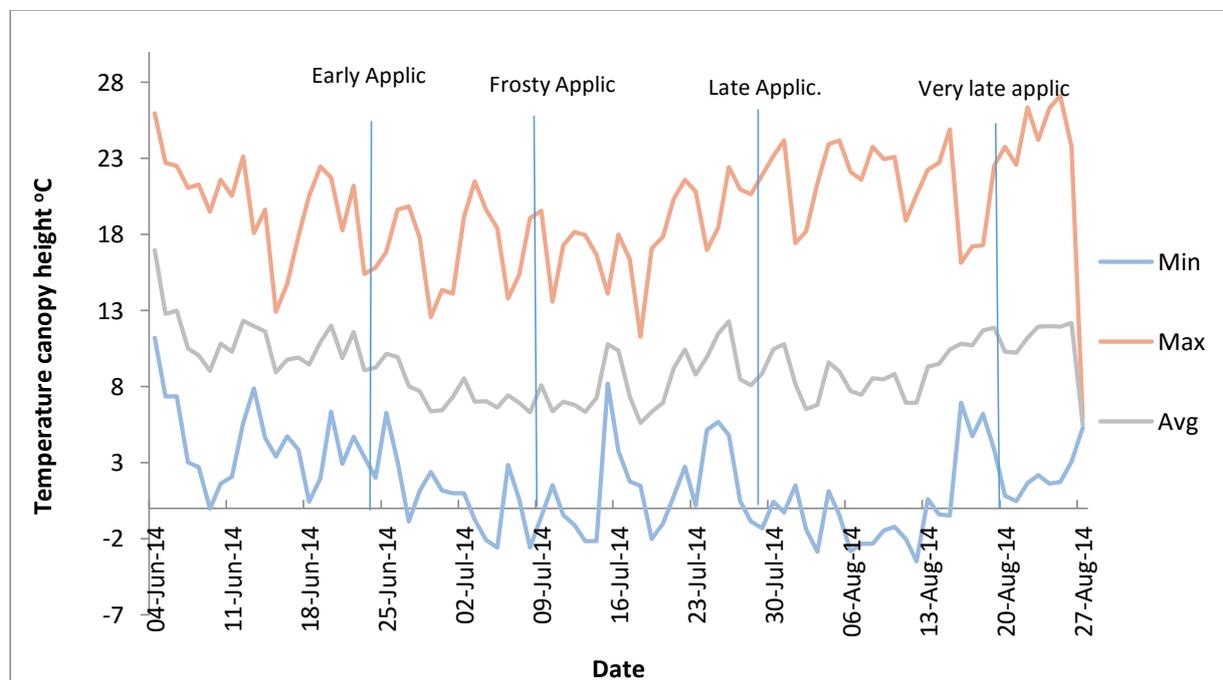


Figure 1: Daily maximum, minimum and average temperature measured at canopy height, Geurie trial site 2014

³ In field data loggers at canopy height

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Results

The application of Clethodim within label rates and timing caused no significant damage to flowers or pods. However, two treatments applied beyond the label timings resulted in significantly more abnormal flowers compared to the nil treatment; the 2X label rate and the full label rate mixed with Factor. The 2X label rate applied late resulted in an estimated 33% aborted pods with no other treatment resulting in any pod loss significantly different to the nil treatment.

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

The resultant yield, % flower abnormalities and % aborted pods are illustrated in **Figure 2** below.

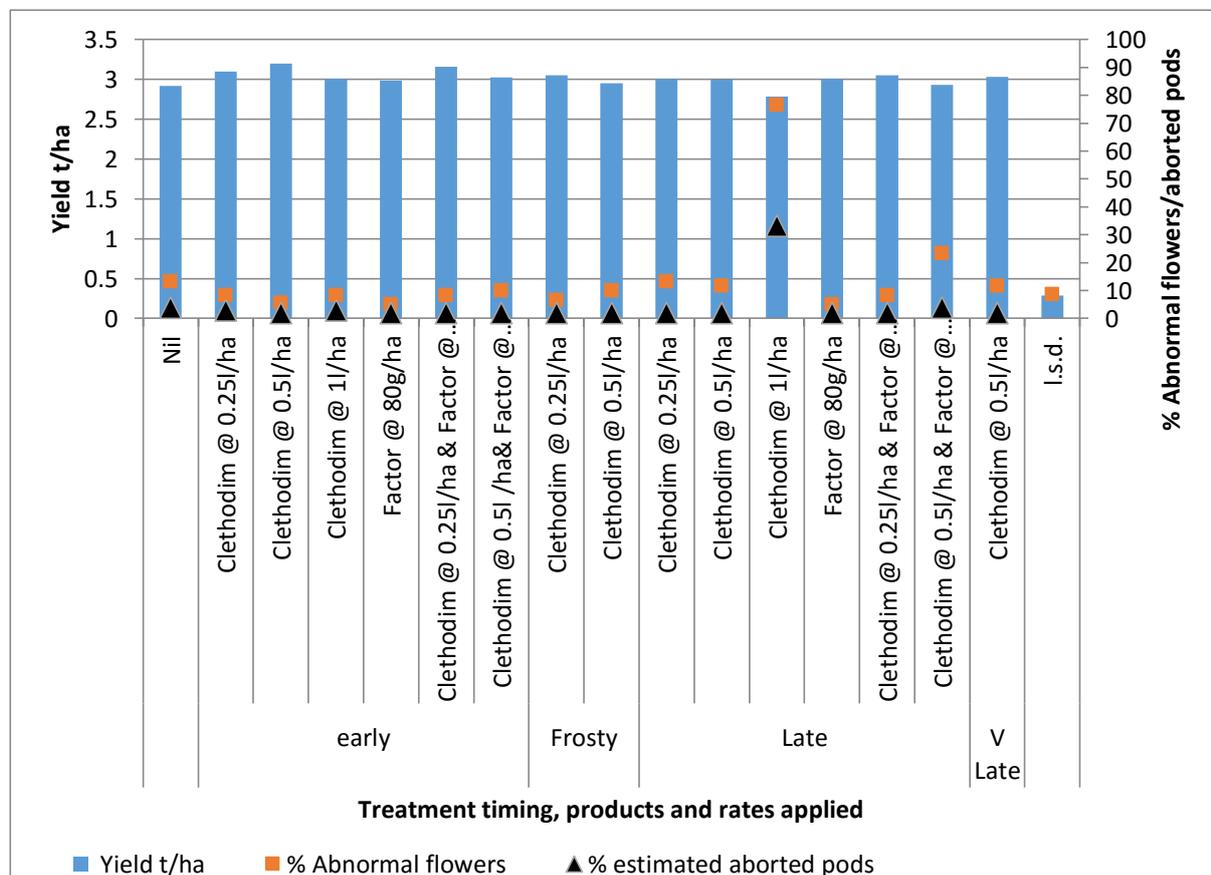


Figure 2: Canola yield, % abnormal flowers and % aborted pods in response to varying application rates and timings of clethodim or clethodim and Factor herbicide mixes, Geurie 2014

Discussion

This trial demonstrates that clethodim application can impact on canola flowering however damage was only observed following two treatments that were applied beyond the recommended label timings, and one of which was applied at double the label rate. This observed flower damage was converted into significant pod loss (or aborted pods) only for the 2X label rate applied late.

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Interestingly this had no bearing on subsequent yields as there were no significant differences between the various treatments although the 2X label rate did have the lowest mean yield in this trial.

The treatments applied at the “frosty” timings in this trial did not result in any significant yield or oil % impacts or flower abnormality despite moderate frosty weather in the seven days following application. It should also be noted that the late timing was followed by fourteen frosts in the 17 days following application with many as low as -2°C & -3°C. Despite these very adverse growing conditions and the advanced crop stage at application only the 2X label rate and the clethodim and Factor tank mix resulted in any significant flower abnormalities but again no treatment resulted in any negative yield impacts.

Conclusion

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

However, it shows that flower abnormalities can occur when applied at excessive rates and beyond label timings. However despite observing significant flower abnormality and podding losses neither transferred to any significant yield impact. This highlights canola ability to compensate for reduced pod set and that the level of observed flower damage does not proportionally indicate pod abortion or subsequent yield damage.

In this trial there is no 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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