GOA Site Report

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

Trial Code; GOCD00214-5

Date; Winter 2014

Location; "Gwandalan" Peak Hill, NSW

Collaborator; The Bell Family

Background

Increasing levels of Group A- fop resistance and the drop in retail pricing of clethodim[1] 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 Australia[2] 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.

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

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

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

- 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 visable)
  - Very Late
  - During heavy frost period
- Factor: with or without label rate (80 ml/ha)

Details of the timing of applications are contained in Table 2 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- Hyola 559TT	Seeding rate	3 kg/ha
Sowing date	2/5/2014	Row Spacing	27.5 cm
Seedling equipment	Double Boot Tyne	Soil type	Sandy Clay Loam
Crop Nutrition (kg/ha)	100 DAP (seeding) + 80 SOA + 100 Urea (Broadcast & IBS)	Pre-Seeding Herbicide Applied	1.5L Powermax + 1.5 kg Simazine WDG + 1kg Atrazine WDG + 2L Trifluralin
Previous Crop (and yield)	Wheat	Pre-Sowing Stubble Management	Burnt pre-sowing

The trial was also sprayed with Verdict 520 @ 100ml/ha, Lontrel Advance @ 150ml/ha and Uptake Spraying oil @ 0.5% of spray volume on the 29/5/2014 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	11/6/2014	2-3 leaf stage	No frosting or adverse conditions around application
Frosty	8/7/2014	6-8 leaf, some early plants with bud present and elongating	Minus 2oC on application day, mild frost 3rd day and severe frosts 5th and 6th days after application
Late	1/08/2014	Most plants with bud clearly visible and plants very early flower	Three mild frost in the four days prior to application and 14 frosts in row following application
Very late	20/8/2014	Most plants in full flower	One mild frost on the day of application

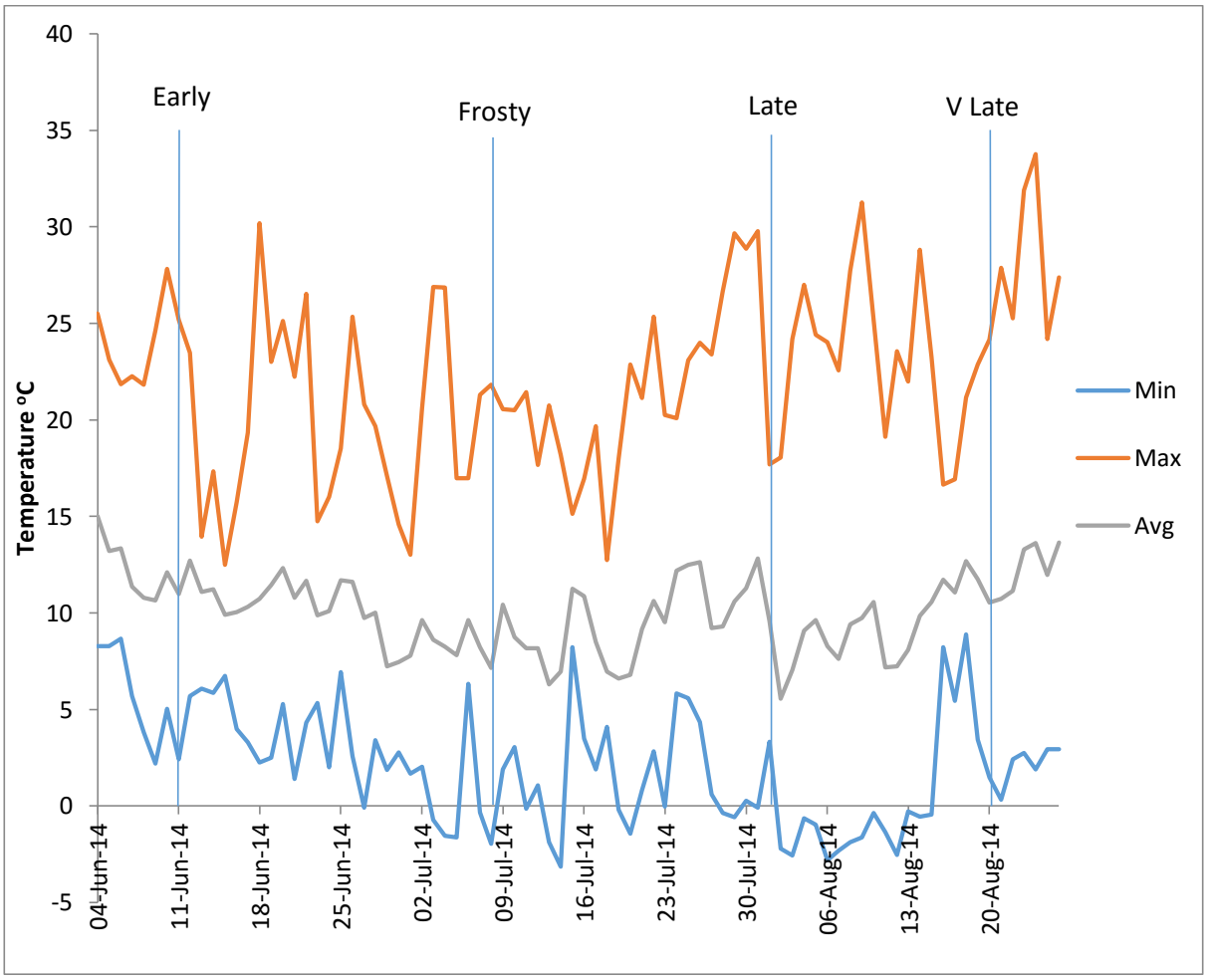

Figure 1 Daily maximum, minimum and average temperature measured at canopy height, Peak Hill trial site 2014

[3] In field data loggers at canopy height

Results

Four treatments resulted in more abnormal flowers compared to the nil treatment- the full rate of clethodim applied at the frosty timing (33%), both the label (23%) and the 2X label rate (73%) applied late and the full rate of clethodim mixed with Factor (43%) also applied late. Only two treatments showed significantly more aborted pods compared to the nil treatment- the 2X rate (35%), and the full label rate mixed with Factor (25%) both applied at the late timing both of which had high levels of flower abnormalities.

No treatment resulted in any significant impact on yield as shown below or oil %.

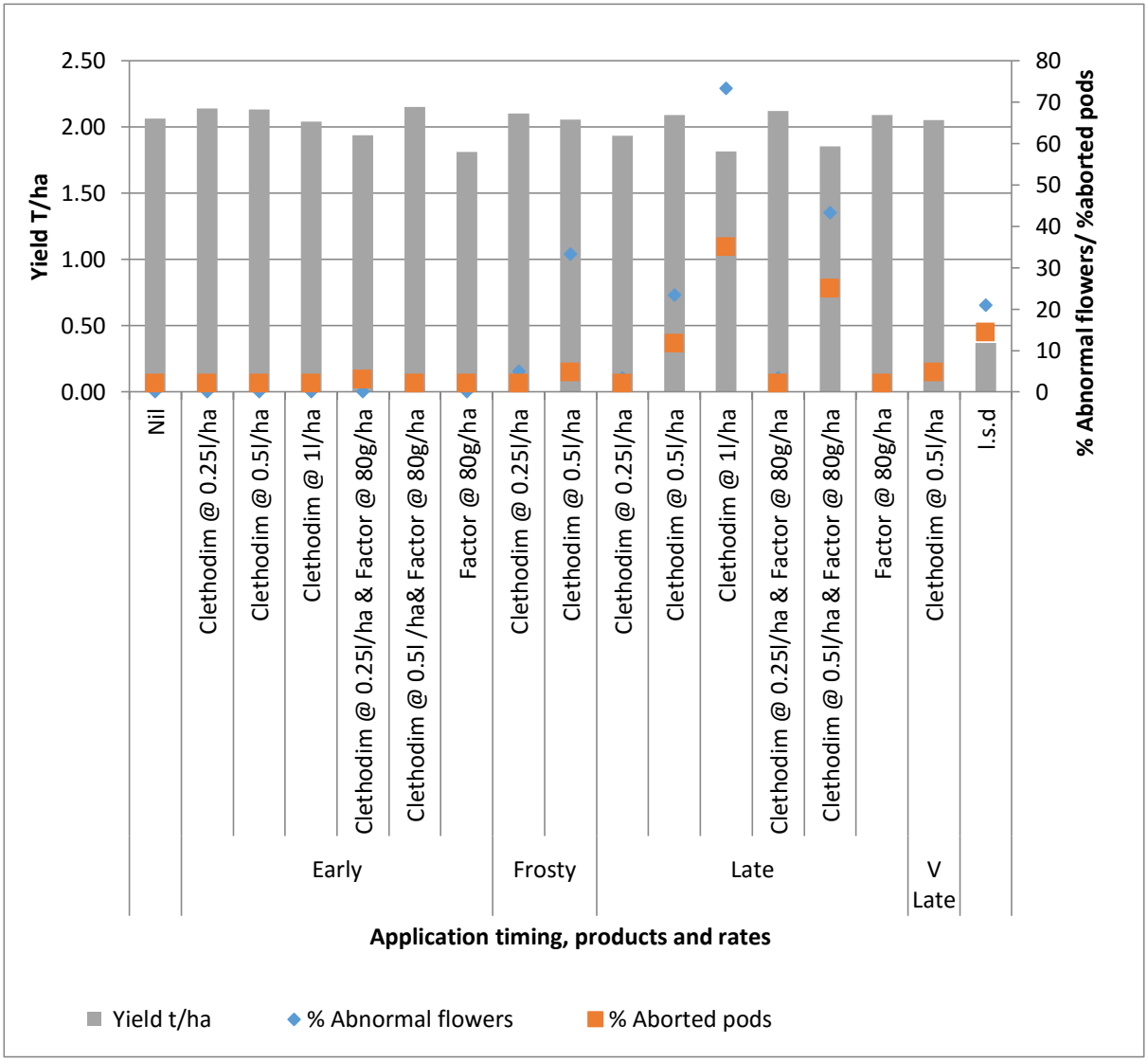

Figure 2 Canola yield and % of abnormal flowers and aborted pods to varying application rates and timing of clethodim herbicide, Peak Hill 2014

Discussion

This trial has demonstrated the potential that crop damage in the terms of flower abnormality or pod abortions can occur from the application of clethodim or clethodim plus Factor tank mixes. However the treatments where such damage was observed were those where application was after buds were visible[4] and/or where rates were in excess of label recommendations.

However, flower abnormality did not transfer directly to pod abortions or any significant yield or oil % penalties.

Treatments applied at the frosty timing also did not result in any yield or oil% impacts. It should also be noted that the late applications were followed by 14 frosts over 17 days with many temperatures dropping below minus 2^{o}C yet no significant yield impacts were measured.

Conclusion

This did not show any significant crop effects or yield damage when clethodim was applied within suggested label timings and rates.

Where application has been delayed and/or rates in excess of label recommendations have been applied some crop damage has been observed in terms of flower abnormalities and pod abortion but in this trial no treatment resulted in any significant yield impacts. This may indicate the potential for the canola plant to compensate in situations of flower damage or aborted pods.

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

GOA would like to thank GRDC support in running these trials which would not be possible without such funding. GOA would also like to thank Paul Bell and his family for hosting this trial.

[4] The frosty treatment in this trial was applied when some buds were visible