

GOA Site Report

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

Trial Code; GOCD00214-1

Date: Winter 2014

Trial Location; “Sunnyside” Avondale Road, Alectown West, 23km North of Parkes NSW

Collaborator; Wright Family, Alectown

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, Platinum, Status, Clethodim 240

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

GOA Site Report

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 cone seeded small plots, using a randomised complete block design with three replicates.

To investigate the possible causes of clethodim damage a range of clethodim rates (1/2, full and double the label rate) and a range of timings were tested. The timings tested were applications within label recommendations, delayed applications when the bud was visible and ones applied when poor growing conditions were forecast. The use of Factor, an alternate Group A, Dim herbicide was also tested both alone and in combinations with clethodim. All herbicide treatments were applied with Uptake Spraying oil at 0.5% of the spray volume.

Details of the timings of the applications are contained in **Table 2** below. All treatments were applied using a hand boom applying 100L/ha of herbicide and rain water through AIXR015 nozzles at 3 bar. The trial was also sprayed with Round Up Ready- Plant Shield @ 900g/ha on the 4/7/2014 to ensure no weed pressure in the trial area- any surviving plants were hand pulled when found.

Table 1; Trial site details

Trial Establishment Date	Autumn 2014		
Crop and Variety	Canola- GT50	Seeding rate	3.5 kg/ha
Sowing date	2/5/2014	Row Spacing	25 cm
Seedling equipment	Primary sales split boot assembly	Soil type	Light red clay loam
Crop Nutrition (kg/ha)	100 Granulock 12Z (seeding) + 100 urea (topdressed late rosette)	Pre-Seeding Herbicide Applied	2L Round Up Powermax + 2L Trifluralin (IBS) + 0.3L Dual Gold (PSPE)
Previous Crop (and yield)	Wheat	Pre-Sowing Stubble Management	Nil

GOA Site Report

Table 2: Application timing details

Timing	Date	Crop Stage	Weather summary ³
Early	26/06/2014	3 leaf stage	No frost for a week either side of application
Frosty	10/7/2014	3-4 leaf stage	-0.5° C 2 days prior, -2°C on the 13th & 14th
Late	30/7/2014	Very early budding, nil flowers	No frost prior, frosts from 2 nd – 4 th August
Very late	29/8/2014	50% flowering	No frosts one week either side of application

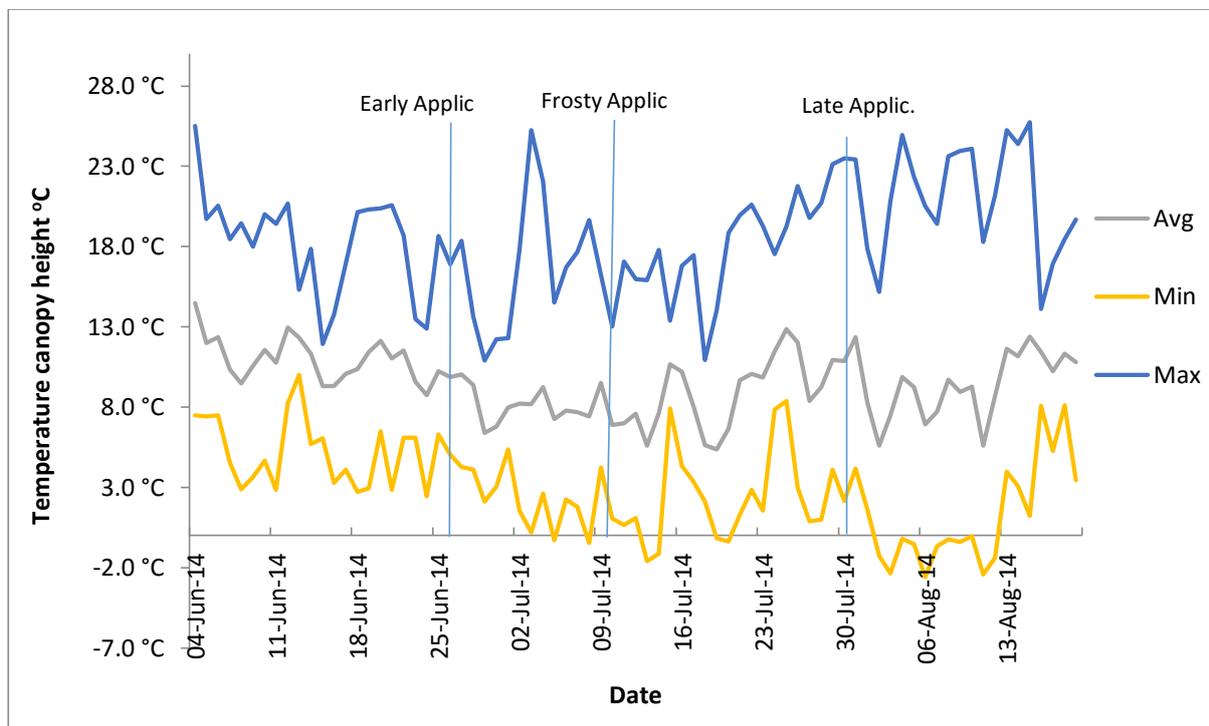


Figure 1: Daily maximum, minimum and average temperature measured at canopy height, Parkes trial site 2014

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.

³ In field data loggers at canopy height

GOA Site Report

Results

Three treatments resulted in increased flower abnormality in this trial. The late application of both 2X label rate and the full label rate of clethodim plus Factor resulted in 82% and 37% flower abnormality respectively. The full label rate of 0.5L/ha when applied very late resulted in 96% of flowers showing signs of abnormality. The 2X label rate applied late and the full label rate when applied very late resulted in 28% and 23% aborted pods respectively but the full clethodim & Factor mix did not result in any aborted pods.

The 2X label rate and the full label rate plus Factor mix when applied at the late timing both had a significant negative impact on the final yield compared to the untreated control of 720kg/ha or 33% and 310kg/ha or 14% respectively.

The full label rate when applied at the very late timing of 50% flowering also had a negative impact on final yield of 290kg/ha or 13%.

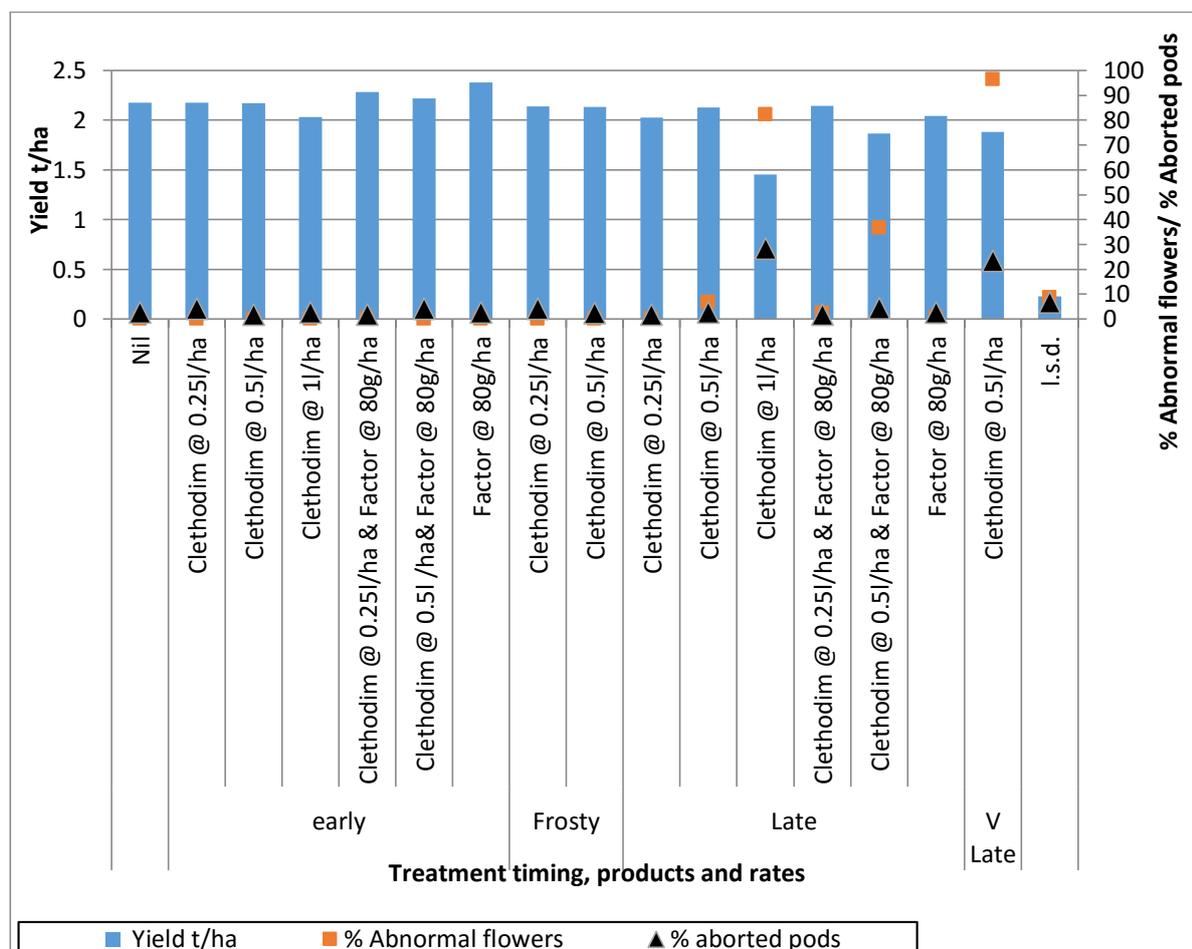


Figure 2: Canola yield, % of abnormal flowers and % aborted pods to varying application rates and timing of clethodim herbicide and clethodim herbicide mixes, Parkes 2014

No other treatments had a significant impact on yield compared to the Nil treatment.

These results are illustrated in **Figure 2** above.

GOA Site Report

Only the 2X label rate when applied late resulted in significantly lower oil% (1.86%) compared to the nil treatment.

Discussion

This trial did demonstrate the potential damage that clethodim can have on canola flowering and subsequent grain filling. However, both flower abnormality and yield loss did not occur with any treatment that was **within label timings and rates**.

Crop damage in the form of flower abnormality only occurred following three treatments when clethodim or in one case a mixture with Factor was applied beyond label timings or rates. However this damage only translated in two of these cases to higher pod abortions but to a lesser extent than the flower abnormality. This in turn assumedly led to yield penalties of 33% and 13%, and only one of which is directly proportional to the pod abortions. These results might indicate the canola plants ability to compensate following any flower damage or even some pod loss following damaging applications.

The 2X late application of clethodim also resulted in lower oil% and the mechanism of this is unclear but may warrant further investigations.

The “frosty” application in this trial also did not result in any significant yield effects however the temperatures before and after application could not be described as severe with only two frosts recorded in the week following application. The late timing however was followed by significant and sustained frosts but only the 2X rate and label rate + Factor resulted in yield impacts. However it cannot be distinguished from this data that the impacts are related to the poor growing conditions or the late timing and in any case both applications are still beyond label recommendations.

The use of factor had only one occurrence where it negatively impacted on yield when applied with the full rate of clethodim and applied late.

Conclusion

This trial has demonstrated that clethodim can have a negative impact on canola but in this trial only when used outside label rates and timings and the level of impact can be quite severe.

As discussed above yield penalties may be predicated by crop damage in the form of abnormal flowering or aborted pods but the crop has shown some ability to compensate for such damage.

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

This trial did demonstrate yield penalties can occur but only in extreme cases of delayed application and excessive rates. However, the relative tolerance of the one canola variety tested in this trial is unknown and other more sensitive varieties may vary in their response to such treatments.

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.

GOA Site Report

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 Greg Wright and his family for hosting this trial.