GOA Trial Site Report

Canola – Aphid control: understanding product options and the effect of timing. Wellington 2019.

Trial code:	GOIN00119-2
Year:	Winter 2019
Location:	'Spicers Run', Wellington
Trial partners:	Sam and Joe Mason

Keywords

GOIN001, canola, aphids, sucking insect pests, Wellington

Key findings

- All insecticides reduced the numbers of aphids, some were better than others.
- Spraying early controlled aphids better than a later application.
- Even though yields were very low and likely to be non-profitable, aphid control was economically viable, even in a low rainfall and low yielding year.
- Aphids are most problematic in drier, lower yielding seasons.

Background

Aphids are mostly present in canola crops in low numbers but periodically numbers can build up to levels warranting control. Grains Research and Development Corporation (GRDC) research has shown that infestations occurring between flowering to podding can cause yield losses of up to 33%. Since 2013 aphid issues in canola have been regularly raised in Grain Orans Alliance's (GOA) Local Research Updates, focussed on thresholds, timing of control and the economics of control options.

Current recommendations regarding aphid thresholds are not consistent. The GRDC 'Pest Management in Canola' guidelines states the threshold for cabbage and/or turnip aphid is '25 mm (or more) of stem infested in >20% plants', the same document also recommended 'threshold of 10-50 % infestation + limited compensation capacity'.

More recent research by Miles et al 2015[1] shows that the 'compensatory capacity of canola supports the use of less conservative aphid thresholds, and increased consideration of natural enemies in controlling outbreaks'. Further to this the advice is that 'a delay in enacting a spray decision at the 10% infestation level could be low risk and allow time for biological control. If natural enemies were ineffective, spraying on an increasing level of infestation to the 20-25% level would be unlikely to result in irrecoverable crop damage. Similarly, late infestations of aphids are also unlikely to pose a damage threat to canola as the associated raceme disruption mainly affects flowers that contribute little to final yield'.

Aphids are most problematic in drier, lower yielding seasons, and thus questioning the economic justification for insecticide application. GRDC continue to invest into qualifying aphid thresholds, however, there is very little work looking at the timing of control and the effectiveness and economics of various pesticide options.

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Aim

The project aims are:

- to see if delaying the timing of aphid control has any influence over final yields
- better understanding of the levels of control and the economic implications of various pesticide control options.

Methods

Opportunity canola plots were sown on 30.4.2019, adjacent to other 2019 winter trials. These plots were to be used for pest and/or disease trials if needed. Toward the end of August 2019, a build-up of aphids at the site and surrounding paddock was observed and the trial was initiated.

Experimental design

- All plots sown to Victory V3002 canola @ 2.0 kg/ha on 30.4.2019, harvested 18.11.2019.
- Randomized complete block design with 5 replicates.
- Buffer plots were placed between each treated plot to reduce the influence of pesticide drift.

Treatments

- 3 timings, ~2 weeks apart.
    - Timing 1: 16.8.2019.
    - Timing 2: 27.8.2019.
    - Timing 3: 10.9.2019.
- 5 replicates of:
    1. Pirimor® @ 500 mL/ha
    2. Transform™ @ 50 mL/ha
    3. Fastac® Duo @ 300 mL/ha + 500 mL/ha Dimethoate® 400
    4. Control (unsprayed).
- Each timing sprayed at 100L/ha water with AIXR015 nozzles through a hand boom.

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

Table 1. Rainfall at Wellington for 2019 and the long-term average (LTA)

Month	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec	TOTAL
2019	62	23	71	0.4	42	13	4	13	29	29	13	5	304
LTA	60	51	53	46	47	51	49	49	45	57	59	56	623

Results

Aphid populations

At Timing 1 ~39% of main spikes had aphids present with ~1 colony/m^2 (visible infestation on spike of about 1 cm depth or greater). The number of main spikes infested increased to close to 100% at Timing 3 and stayed high, however the number of colonies decreased (Figure 1).

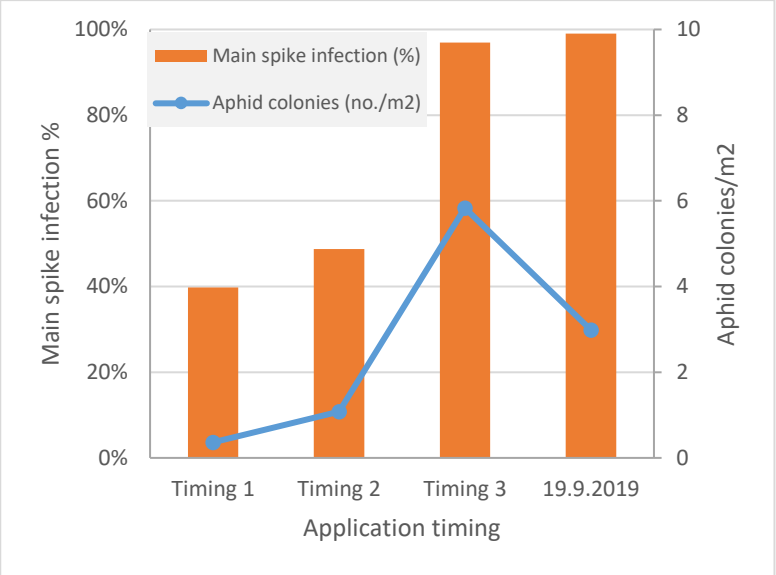

Figure 1. Aphid infestation levels in untreated plots prior to insecticide application at the 3 timings and 9 days after the last application.

All treatments significantly reduced both the population and number of colonies of aphids compared to the control (when assessed 9-14 days after application). All treatments were assessed on the 19.9.2019, there were some reinfestations of aphids (and a very small number of colonies) in the Timing 1 and Timing 2 treatments however Timing 3 had almost no colonies and low numbers of infected spikes.

Yield and grain quality

The average site yield was 0.24 t/ha with an average oil content of 38.3%. Timing 3 had the highest yield and oil contents, while timings 1 and 2 were had higher yields and oil content than the control (

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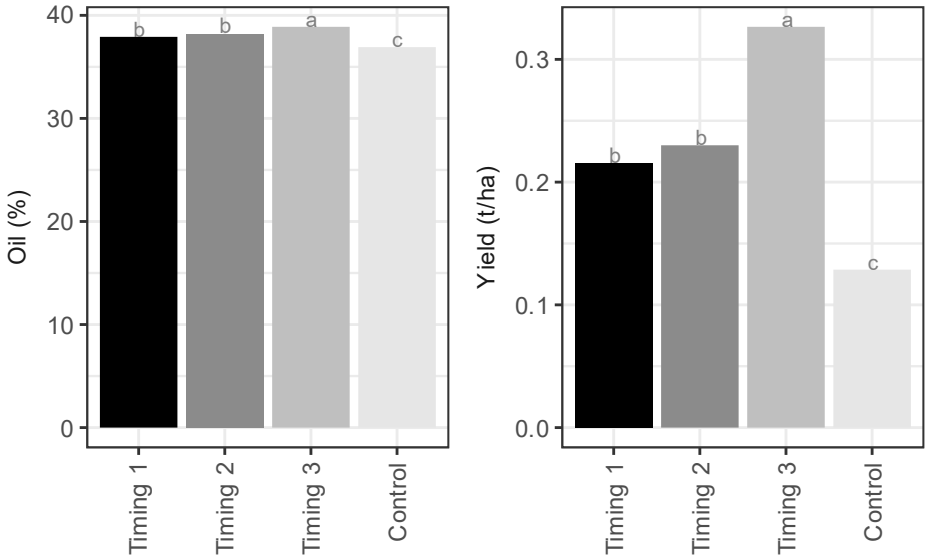

Figure 2. Oil and yield by application timing (averaged by product). Treatments with the same letter are not significantly different.

There were product differences in impact on yield, Transform™ and Fastac® Duo + Dimethoate® (**Figure 3**) had the highest yields while Pirimor® yielded lower but had a higher yield than the control. All products had higher oil content than the control.

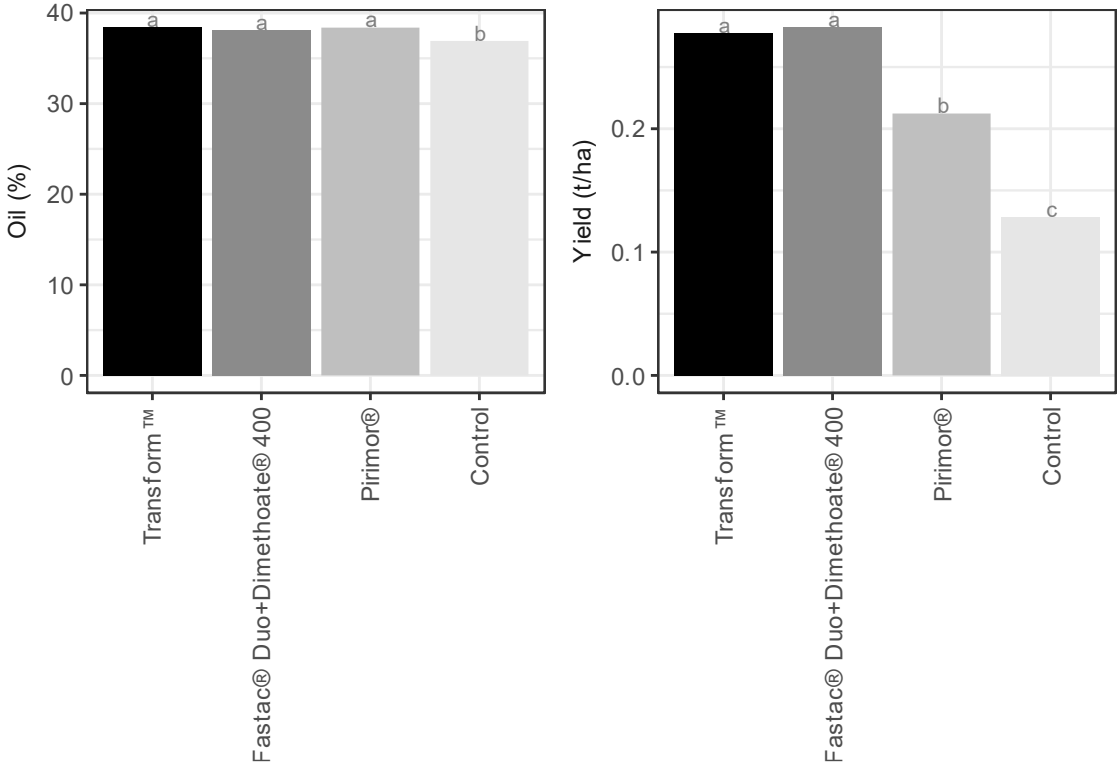

Figure 3. Oil and yield by product (averaged by timing). Treatments with the same letter are not significantly different.

All treatments had an improved yield over the control except for Pirimor® at Timing 2 (**Figure 4**).

Timing 3, applied with either Fastac® Duo+Dimethoate® 400 or Transform™, yielded more than the other treatments.

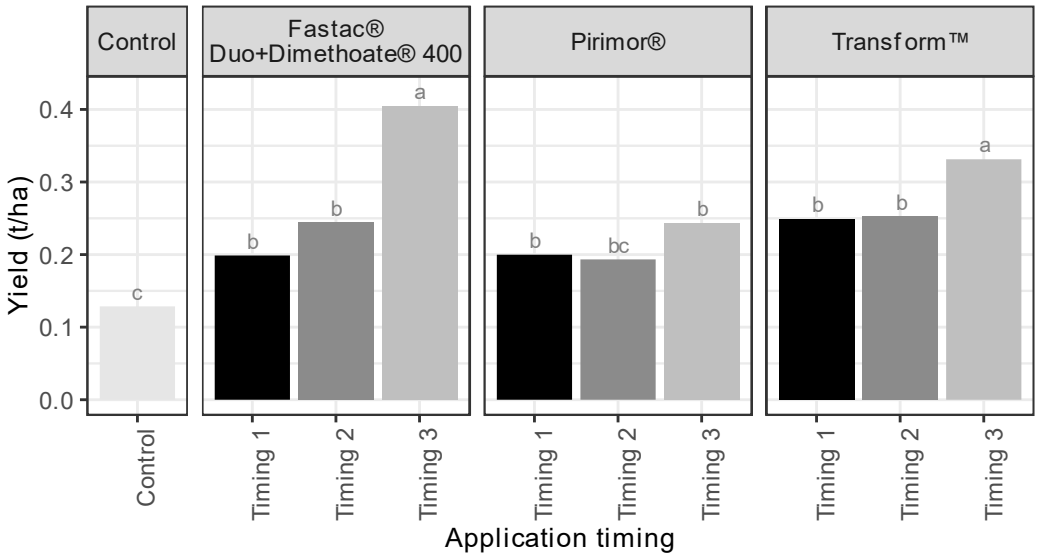

Figure 4. Yield by product and timing. Treatments with the same letter are not significantly different.

Discussion

In this trial the application of various insecticides provided aphid control with a treatment effect on yields. Transform™ and the tank mix of Fastac® Duo and Dimethoate® 400 tended to provide better control than Pirimor®, however this did not always result in improved yields.

At Timing 1, aphids were present on about 39% of spikelets, with 12% of plants infested with colonies. This is on the lower end of the current recommended thresholds, however given that it was a very dry year, and the plants 'compensation' potential was reduced, control was justified in this trial, though could be thought of as a more aggressive approach.

At Timing 2, the populations and the number of colonies had increased (though not the number of colonies) to nearly 50% of spikelets infected, almost exceeding thresholds and justifying control (in terms of populations). In this trial it might be viewed as a more conservative approach.

At Timing 3 the numbers of aphids and their colonies peaked to an almost full-blown infection and would have to be considered as a late application.

The site average yield was low at less than 0.5 t/ha, a level where the gross margin becomes marginal. The 2020 GRDC Gross Margin and Enterprise Planning[1] guide suggests that conventional canola at 0.5t/ha and $500/t is a marginally profitable exercise. The challenge for the grower is to be able to estimate yield, understand the aphid population dynamics then determine if the additional expense to control aphids might be justified.

The very dry year of 2019 (Table 1) with limited crop yield potential, coincided with an aphid outbreak which can be typical of dry seasons. This combination made the economic decision around aphid control difficult. The average yield increase for Timing 3 (over the control), regardless of product, was ~100 kg. At $500/t this equates to close to $50/ha gross margin gain over the control from the

[1] 2020 Farm Gross Margin and Enterprise Planning Guide - GRDC

application of well-timed aphid control. The treatments used in this trial ranged from ~ $6 - 15/ha, application costs are likely to be $15-20/ha (once crop damage is considered). Aphid control would be approaching economically viable levels, even in a low yielding year.

These tend to support the current recommendations[2] for aphid 'threshold for cabbage and/or turnip aphid is '25mm, or more, of stem infested in > 20% plants', or 'threshold of 10-50% infestation + limited compensation capacity'. The use of both these measures could help to guide management decisions.

Conclusion

Follow recent recommendations regarding aphid thresholds and base spray decisions on presence of natural predators and compensation capacity of the crop.

Acknowledgements

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[2] https://grdc.com.au/resources-and-publications/grdc-update-papers/tab-content/grdc-update-papers/2015/02/insect-management-in-fababeans-and-canola-recent-research

Appendix

Results

Product	Timing	Yield (t/ha) p.v.	s1	Oil (%) p.v.	s1
Control	Control	0.13	c	36.9	e
Fastac® Duo+Dimethoate® 400					
	1	0.20	b	37.5	d
	2	0.24	b	37.9	cd
	3	0.40	a	39.0	a
Pirimor®					
	1	0.20	b	38.0	bcd
	2	0.19	bc	38.6	ab
	3	0.24	b	38.5	abc
Transform™					
	1	0.25	b	38.2	bcd
	2	0.25	b	38.1	bcd
	3	0.33	a	39.1	a
lsd	lsd	0.08		0.7	

p.v. = predicted value
s1 = values with the same letter for each variable are not significantly different