GOA trial site report

Investigating a range of residual herbicides for effective sow thistle and other weed control in the summer fallow.

Grain Orana Alliance

Trial Code:	GGWE07823-1
GRDC code:	GOA2302-001SAX
Season/year:	Summer 2023-2024
Location:	Narromine Station, Narromine
Trial partners:	Billy Browning
Trial establishment date:	18/12/2023

Keywords

GGWE078, sow thistle, summer fallows, resistance, in-crop herbicides, residual activity, application timing, residual herbicides, Narromine

Take home messages.

- This trial showed no useful effects of any of the herbicides tested due to few weed germinations throughout the fallow period following application. Evidenced by the untreated control treatment (no herbicides applied) having no significant germinations of weeds.
- None of the herbicide combinations used caused any negative germination or early crop vigor effects in the subsequent canola crop.

Background

At the 2022 Narromine GRDC National Grower Network (NGN) forum, growers identified summer fallow weed control as a significant and escalating input cost.

Increasing herbicide costs, herbicide resistance and the increasing prevalence of harder to kill weeds have all contributed to this. Several specific weeds in sow thistle, fleabane and windmill grass have arguably had the greatest impact on these rising costs of managing summer fallows.

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Sow thistle (ST) is characteristed by its ability to germinate all year around, high number of seeds/plants, quick growth rates and increasing tolerance or resistance to commonly used herbicides. As such, ST is a dominant species in weed germinations in fallow. Sow thistle is often a key determinant of both the frequency of fallow sprays as well as the herbicide choice and rates used.

Given this, employing soil applied residual herbicides to prevent or limit the frequency of germination as well as the resultant population of sow thistle may offer some potential to reduce fallow management costs.

To test the validity of this management approach to reduce costs a series of herbicide trials were established under an NGN project over the period of 2023 and 2024.

Aims

- To investigate a range of residual herbicides that could be applied at the first fallow spray timing for control of subsequent germinations of sow thistle and other weeds over the summer fallow period.
- Assess any residual impact these herbicides may have on the establishment of the subsequent crop.

Methodology

- The trials were a randomised and replicated design with the results statistically analysed by ANOVA
- This site was selected because it has a long weed history, with significant weed infestations in the 2022/23 dryland cotton crop.
- Trials were established in a commercial fallow with a knockdown herbicide applied before the application of any of the trial treatments to ensure the measured impacts were a result of the residual capability of herbicides rather than any knockdown capacity.
- After each germination of weeds were assessed any weed escapes were again controlled by non-residual knockdown so that subsequent germination could be again assessed

The herbicides tested are detailed in

Table 2 with further details as to the registered claims detailed in

- *Table 3*
- Treatments were applied on the 18 December 2023, and significant rainfall (>60 mm at Narromine airport) fell within 3 days.
- Good rainfall (Table 1) was received for the remainder of the summer resulting in favorable conditions for weed germination.

Table 1 Monthly rainfall (mm) and long-term average (LTA)

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2023	44	53	36	55	3	33	29	11	2	18	66	67	**417**
2024	94	43	63	71	77	43	28	-	-	-	-	-	**419**
LTA	58	50	48	41	40	43	39	36	37	47	46	46	**531**

Table 2 Treatment list.

Product and rate/ha
Balance® @ 100 g
Balance® @ 100 g + Dual Gold®@ 2L
Balance®@ 100 g + Terbyne® Xtreme ® @ 1.2L
Dual Gold® @ 2L
FallowBoss® TORDON® @ 1L
Impose® @ 200L
Overwatch® @ 1.25L
Picoflex® @ 0.315L
Reflex® @ 1250
Sakura® @ 118 g
Terbyne® Xtreme® @ 1.2L
Terbyne® Xtreme® @ 1200 ml + Impose® @ 0.2L
Trezac® Arylex® @ 0.2L
Valor® @ 280g
Valor® @ 280g + DualGold® @ 2L
Voraxor® @ 0.24L
UTC

Results

Weed control:

- Weed assessments were completed 3 times after herbicide applications (DAA) over summer (11/1/2024, 2/2/2024, 7/2/2024). No significant weed numbers were recorded.
- The site was sprayed out on 9/02/2024 with assessments taken on the 22/3/2024, with no sow thistle or fleabane detected in the untreated plots (UTC) and less than 0.05 catheads/m^2.
- There was no sow thistle in the untreated plots in the subsequent canola crop on the 12/6/2024.

Establishment:

There was no treatment effect of the various herbicides on plant establishment or growth of the subsequent canola crop Figure 1.

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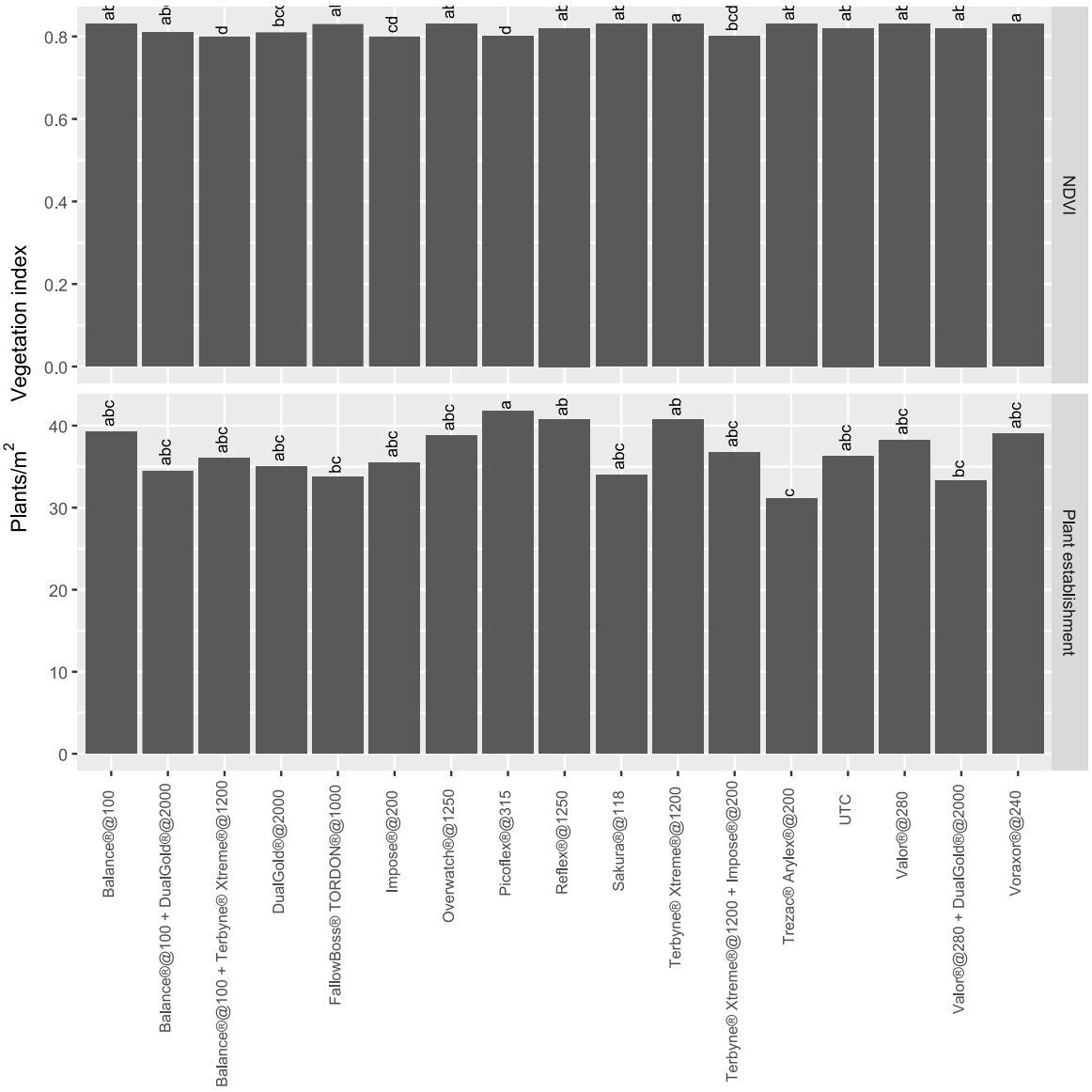

Figure *1* Crop establishment and vegetation index in the following canola crop, 12/06/2024. Treatments with the same letter are not significantly different.

Discussion

Despite good rain in December and January almost no germination of any weed species was recorded, even in the untreated plots for this summer fallow period (a similar result was found in a co-located fleabane trial).

There was no evidence of the trial being over sprayed by the grower either and none reported to the trial operator.

It is possible that the cropping history of the site may have severely suppressed the weed seed bank limiting weed germination through the trial. The site was previously sown to dryland cotton. This would have required a long fallow through the previous summer and winter fallow period. The Round Up ready cotton would have also resulted in good weed control and subsequent defoliation of the crop would have ensured little seed set. The wheat crop following the cotton and prior to this crop would also have had limited seed set. As a result, the site may have had no weed seed set for 24 months prior to the trial establishment. Additional to this, other residual herbicide applied to the cotton or wheat crops may have impacted the weeds.

In this circumstance the use of residual herbicides would not be justified and would have resulted in no savings to growers in managing or maintaining a fallow in this circumstance. The use of residual herbicides would have cost growers more with no benefit.

None of the herbicide combinations used caused any negative germination or crop vigor effects in the subsequent canola crop when compared to the UTC.

Conclusions

The low numbers of weeds germinating in this trial site limited the ability to compare the treatments tested for any potential residual control of sow thistle or other weeds.

However the low weed burden also meant that there would have been no advantage in the use of the a residual herbicides in an attempt to reduce fallow management costs. If fact it would have simply cost growers morewith no benefit.

None of the herbicides tested resulted in any negative impacts on crop establishment or early growth on the subsequent canola crop compared to the UTC.

Acknowledgements

The research undertaken as part of this project is made possible by the significant contributions of growers through both trial cooperation and the support of the Grains Research and Development Corporation (GRDC). The authors would like to thank them for their continued support. Special thanks go out to Billy Browning who hosted this trial.

DISCLAIMER — TECHNICAL

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Appendix

Results

Product (rate)	Plant establishment (plants/m2)		Vegetation index (NDVI)	
Balance®@100	39.25	abc	0.83	ab
Balance®@100 + Dual Gold®@2000	34.50	abc	0.81	abcd
Balance®@100 + Terbyne® Xtreme®@1200	36.00	abc	0.80	d
Dual Gold®@2000	35.00	abc	0.81	bcd
FallowBoss® TORDON®@1000	33.75	bc	0.83	abcd
Impose®@200	35.50	abc	0.80	cd
Overwatch®@1250	38.75	abc	0.83	abc
Picoflex®@315	41.75	a	0.80	d
Reflex®@1250	40.75	ab	0.82	abcd
Sakura®@118	34.00	abc	0.83	ab
Terbyne® Xtreme®@1200	40.75	ab	0.83	a
Terbyne® Xtreme®@1200 + Impose®@200	36.75	abc	0.80	bcd
Trezac® Arylex®@200	31.11	c	0.83	ab
Valor®@280	38.25	abc	0.83	ab
Valor®@280 + Dual Gold®@2000	33.25	bc	0.82	abcd
Voraxor®@240	39.00	abc	0.83	a
UTC	36.25	abc	0.82	abcd

Table 3 Herbicide details

Trade name	Active	Rate/ha)	Registered for use in fallow	Registered for sowthistle control	Comment
Balance®	750g/kg isoxaflutole	100 g	Yes	Residual	
Dual Gold®	960g/L S-metolachlor	2 L	Yes	Residual	
FallowBoss® TORDON®	300g/L 2,4-D, 75g/L picloram, 7.5g/L aminopyralid	1 L	Yes	No	
Impose®	240g/L imazapic	0.2 L	Yes	No	
Overwatch®	400g/L bixozone	1.25 L	No	Residual	
Picoflex®	240g/L picloram	0.315 L	Yes	Knockdown	
Reflex®	240g/L fomesafen	1.25 L	Yes	Residual	
Sakura®	850g/kg pyroxasulfone	118 g	No	Residual	
Terbyne® Xtreme®	875g/kg terbuthylazine	1.2 L	Yes	Residual	
Trezac® Arylex®	25g/L aminopyralid, 30g/L halauxifen	0.2 L	Yes	Knockdown	
Valor®	500g/kg flumioxazin	0.28 L	Yes	Residual + knockdown	
Voraxor®	250g/L saflufenacil, 125g/L trifludimoxazin	0.24 L	Yes	Residual + knockdown	Wetter required (Hasten)

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Spray application details

Spray application	Narromine Station
Date applied	18/12/2023
Start time	8:45am
Finish Time	9:15am
Water rate (l/ha)	100
Speed (km/hr.)	5
Pressure (bar)	2
Equipment	Hand boom
Nozzle	Airmix11001
Boom height (cm)	70
Temp (oC)	30.9
Wind velocity (km/hr.)	0-4
Wind direction	East
Humidity (%)	46
Δt	9
Cloud cover (%)	1