

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:	GGWE07823-2
GRDC code:	GOA2302-001SAX
Season/year:	Summer 2023-2024
Location:	Cornucopia, Narromine
Trial partners:	M ^c Leod McKenzie
Trial establishment date:	18/12/2023

Keywords

GGWE078, sow thistle, summer fallows, resistance, herbicides, residual herbicides, Narromine

Take home messages

- Several of the treatments investigated in this trial offered significant reductions of up to 90% or complete control of sow thistle (*Sonchus oleraceus*) over an 8-week period, compared to non-residual knockdown options.
- Treatments that did not reduce the milk thistle population to zero would have required follow up control sprays within the 8 week period. These treatments may offer little cost savings unless spot spray technology can be utilised, which may reduce total herbicide usage.
- Even where sow thistle numbers were reduced to zero, other weeds not controlled by the same herbicides would still require follow-up treatment.
- There were no negative effects on crop establishment or vegetative index by using herbicides either alone or in tank mixes.
- Herbicide mixes did not necessarily give better control than stand-alone products.

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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.
- Sow thistle is characterised by the ability to germinate all year around, high number of seeds/plant, quick growth rates and increasing tolerance or resistance to commonly used herbicides. As such, sow thistle 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 germinations 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 randomized and replicated design with the results statistically analysed by ANOVA
- This site was selected as it was suggested to have a history of sow thistle prominence. The nearby irrigation channel would provide a good source of seed regularly
- 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.
- The whole site was initially sprayed out with a non-residual knockdown on the 18/12/2023. The trial treatments were then applied immediately follow.
- Several assessments were made between January and February 2024, but weeds were not sprayed out between these assessments.
- Any weeds present were sprayed out by a non-residual knockdown on the 9/2/2024 in preparation for the paddock to be sown to winter crops in 2024

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- The herbicides tested are detailed in **Error! Reference source not found.** with further details as to the registered claims detailed in More than 60 mm of rainfall was measured at Narromine airport within 3 days of applying trial treatments. Further good rainfall as shown in **Table 1** fell over the remainder of the summer resulting in good conditions for sow thistle 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	43	53	36	55	3	36	29	11	2	18	65	67	418
2024	85	48	63	71	84	43	15	-	-	-	-	-	409
LTA	57	51	48	40	40	42	38	35	36	47	46	45	525

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Table 2 Treatment list

Product and rate/ha
Balance® @ 100g
Balance® @ 100g +Dual Gold® 2L
Balance® @100g + Terbyne® Xtreme® @1.2L
Dual Gold® @ 2L
FallowBoss® TORDON® @ 1L
Impose® @ 0.2L
Overwatch® @ 1.25L
Picoflex® @ 0.315L
Reflex® @ 1.25L
Sakura® @ 118g
Terbyne® Xtreme® @1.2L
Terbyne® Xtreme® @ 1.2L + Impose® @ 0.2L
Trezac® Arylex® @ 0.2L
Valor® @ 0.28L
Valor®@ 280 + Dual Gold®@ 2L
Voraxor® @ 0.24L
UTC

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Results

Weed Control

- The sow thistle population was assessed 3 times from January to February 2024, illustrated in Figure 1.
- At 24 days after application (DAA) all treatments resulted in lower populations than the UTC, except for Trazac® and Impose®. For the remaining treatments there was no difference between them. Several treatments had no sow thistle.
- At 31 DAA and 46 DAA populations in many treatments increased, but several treatments still with no sow thistle
- In several treatments no sow thistle emerged.
- Several other treatments had significant reductions in sow thistle (up to 90%), but the resulting population would still have to be commercially controlled.
- Following a knockdown spray in February there were no weeds present in any treatments at a subsequent inspection in early March and weed populations post- sowing 2024 were very low.
- Sow thistle was not detected post sowing of the 2024 winter crop.

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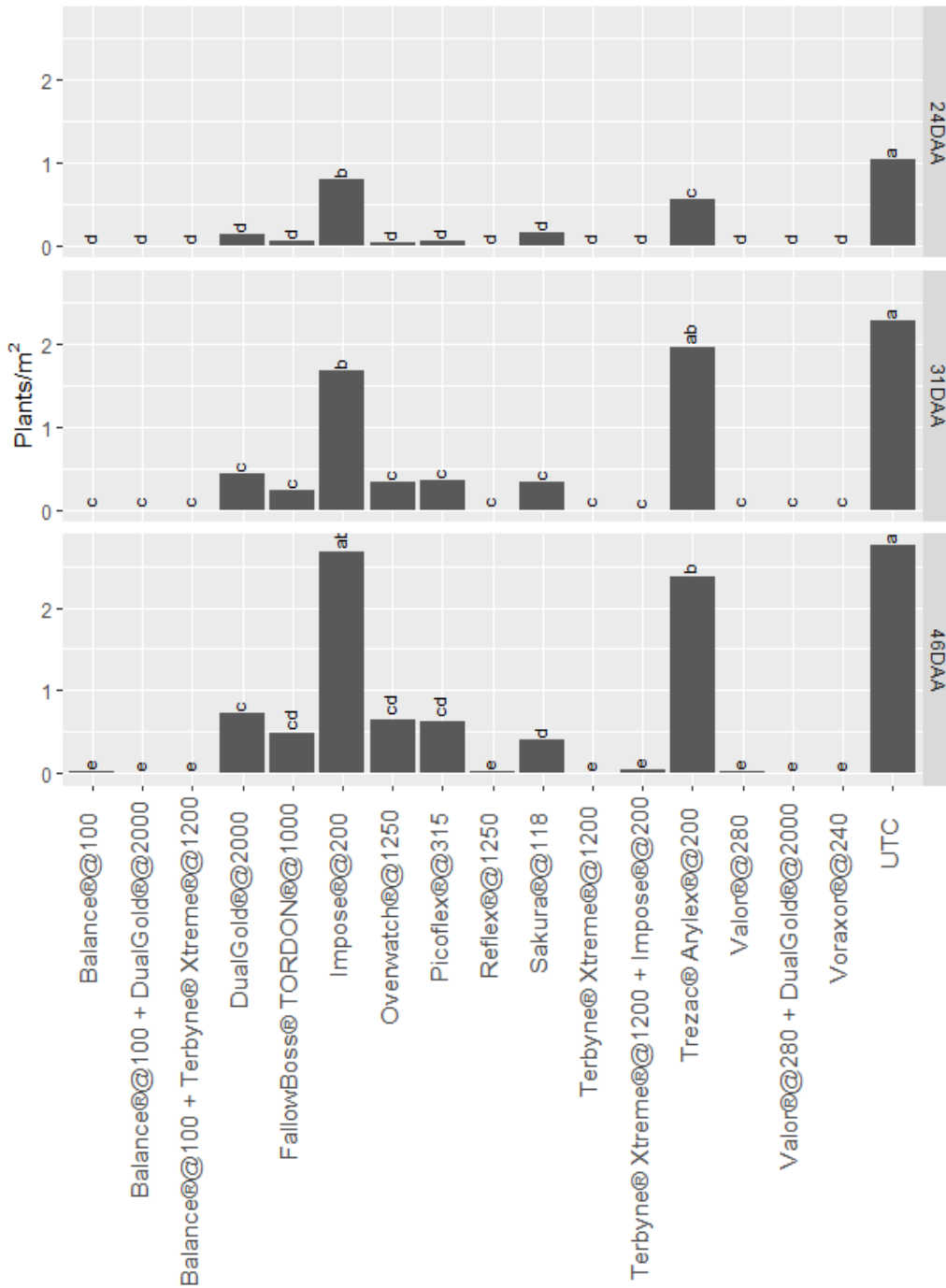


Figure 1 Sow thistle population assessed at 3 times over the fallow period. Treatments with the same letter are not significantly different.

Establishment:

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There was no negative treatment effect of the various herbicides on establishment or vegetation index (VI) of the subsequent crop (Figure 2). Several treatments resulted in higher plant populations and higher VI.

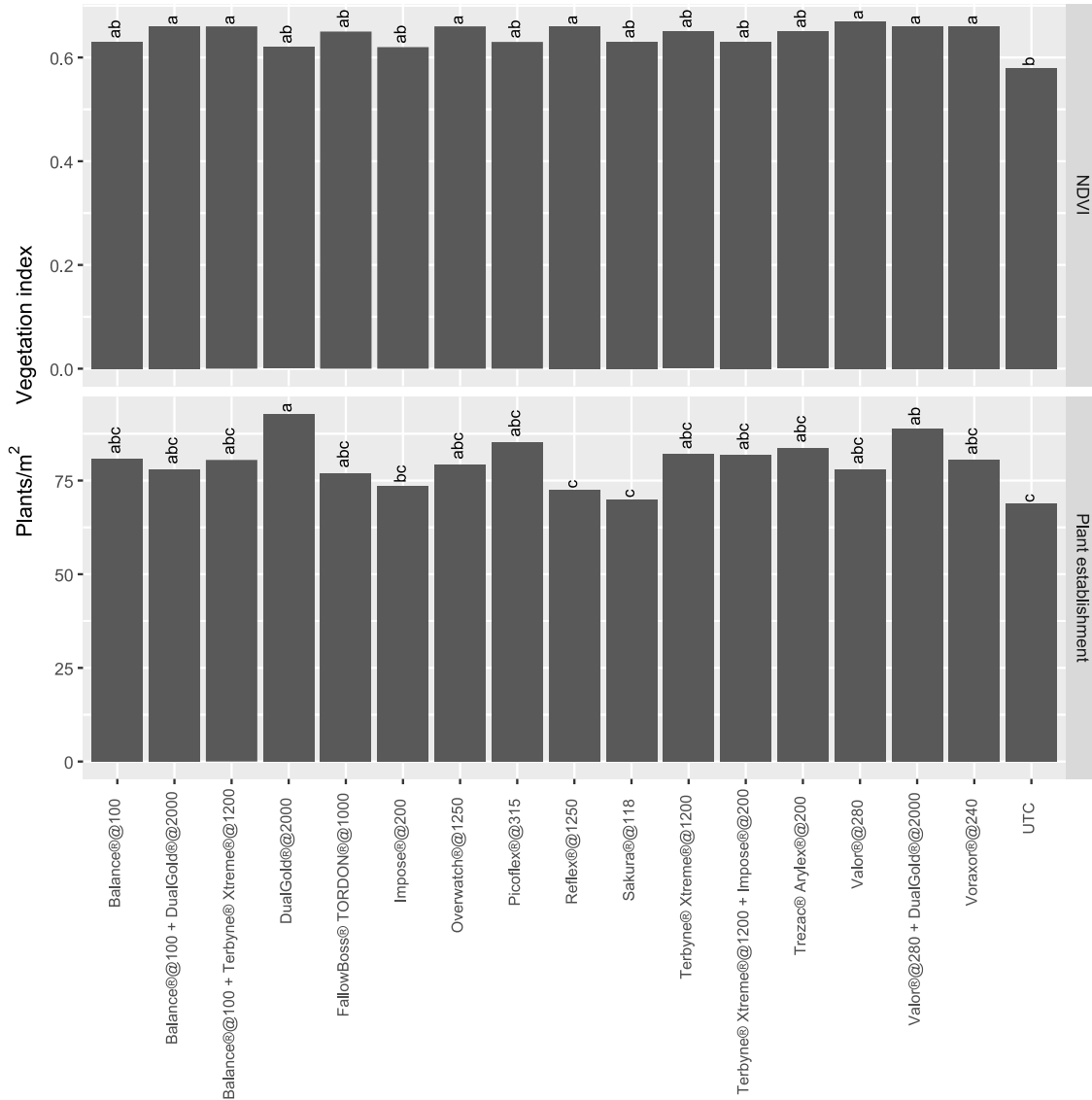


Figure 2 Crop establishment and vegetation index in the subsequent winter crop, assessed 12/06/2024. Treatments with the same letter are not significantly different.

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Discussion

Rainfall followed treatment applications in December and January. As evidenced in Figure 1 populations increased over time.

Populations increased from 1 - 2.8 plants/m² in February 2024 in the UTC. Several other products showed good initial control, but populations continued to increase over the same time suggesting any residual impacts may be declining in that time frame. These treatments, although not achieving 100% control, may be still useful to suppress weed populations sufficiently to delay spraying or utilize spot spraying technology to reduce herbicide usage. These include:

- Terbyne® Xtreme® + Impose®
- Balance®
- Reflex®
- Valor®.

Several treatments listed below maintained a practically zero sow thistle population over a 46-day DAA.

- Valor® + Dual Gold®
- Voraxor®
- Terbyne® Xtreme®
- Balance® + Terbyne® Xtreme®
- Balance® + Dual Gold®.

Conclusions

Several herbicides or herbicide combinations resulted in significantly lower sow thistle population.

A subset of these achieved up to a 90% reduction in weed numbers, but the surviving population would still require follow-up control. The populations, however, may allow some delays in applications which may better suit growers' spraying capacity. A better outcome is that if follow up control could utilize spot spray technology, targeting a much smaller population and lowering herbicide usage.

Several treatments tested resulted in no sow thistle establishment during the observation period. If sow thistle was the only weed present this would remove the need for any spraying in this period representing a saving to the grower.

If other weeds were present that were not controlled by these same herbicides, spraying may still be necessary resulting in no savings to the grower.

In this trial no weeds other than sow thistle were observed.

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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 M^cLeod McKenzie who hosted this trial.

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Appendix

Results

Product (rate)	Sow thistle 24DAA		Sow thistle 31DAA		Sow thistle 46DAA		Plant establishment		Vegetation index	
	(plants/m2)								(ndvi)	
Balance®@100	0.00	d	0.00	c	0.03	e	80.75	abc	0.63	ab
Balance®@100 + Dual Gold®@2000	0.00	d	0.00	c	0.00	e	78.00	abc	0.66	a
Balance®@100 + Terbyne® Xtreme®@1200	0.00	d	0.00	c	0.00	e	80.50	abc	0.66	a
DualGold® @ 2000	0.13	d	0.43	c	0.73	c	92.75	a	0.62	ab
FallowBoss® TORDON® @ 1000	0.05	d	0.23	c	0.48	cd	77.00	abc	0.65	ab
Impose® @ 200	0.80	b	1.67	b	2.67	ab	73.50	bc	0.62	ab
Overwatch® @ 1250	0.03	d	0.33	c	0.65	cd	79.25	abc	0.66	a
Picoflex® @ 315	0.05	d	0.35	c	0.63	cd	85.25	abc	0.63	ab
Reflex® @ 1250	0.00	d	0.00	c	0.03	e	72.50	c	0.66	a
Sakura® @ 118	0.15	d	0.33	c	0.40	d	70.00	c	0.63	ab
Terbyne® Xtreme® @ 1200	0.00	d	0.00	c	0.00	e	82.00	abc	0.65	ab
Terbyne® Xtreme®@1200 + Impose® @200	0.00	d	-0.01	c	0.05	e	81.75	abc	0.63	ab
Trezac® Arylex® @ 200	0.55	c	1.95	ab	2.38	b	83.75	abc	0.65	ab
Valor® @ 280	0.00	d	0.00	c	0.03	e	78.00	abc	0.67	a
Valor®@280 + Dual Gold® @ 2000	0.00	d	0.00	c	0.00	e	88.75	ab	0.66	a
Voraxor®@240	0.00	d	0.00	c	0.00	e	80.50	abc	0.66	a
UTC	1.03	a	2.28	a	2.75	a	68.74	c	0.58	b

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Herbicide details

Trade name	Active	Rate (mL or g/ha)	Registered for fallow use	Registered for sow thistle control	Comment
Balance®	750g/kg isoxaflutole	100	Yes	Residual	
Dual Gold®	960g/L S-metolachlo	2000	Yes	Residual	
FallowBoss® TORDON®	300g/L 2,4-D, 75g/L picloram, 7.5g/L aminopyralid	1000	Yes	No	
Impose®	240g/L imazapic	200	Yes	No	
Overwatch®	400g/L bixozone	1250	No	Residual	
Picoflex®	240g/L picloram	315	Yes	Knockdown	
Reflex®	240g/L fomesafen	1250	Yes	Residual	
Sakura®	850g/kg pyroxasulfone	118	No	Residual	
Terbyne® Xtreme®	875g/kg terbuthylazine	1200	Yes	Residual	
Trezac® Arylex®	25g/L aminopyralid, 30g/L Halauxifen	200	Yes	Knockdown	
Valor®	500g/kg flumioxazin	280	Yes	Residual + knockdown	
Voraxor®	250g/L saflufenacil, 125g/L trifludimoxazin	240	Yes	Residual + knockdown	Wetter required (Hasten)

Spray application details

Spray application	Cornucopia
Date applied	18/12/2023
Start time	10:30am
Finish time	11:22am
Water rate (l/ha)	100L/ha
Speed (km/hr)	5 km/h
Pressure (bar)	2
Equipment	Hand boom
Nozzle	Airmix11001
Boom height (cm)	70 cm
Temp (°C)	34
Wind velocity (km/hr)	6-7
Wind direction	East
Humidity (%)	26.5
Δt	15
Cloud cover (%)	0.01