GOA Trial Site Report

Alternate herbicide options for fallow control of (glyphosate resistant) common sowthistle (*Sonchus oleraceus*)

Trial Code: GOWE01619

Year/Season: Autumn 2019

Location: 'Huanita', Wongarbon

Trial Cooperators: Maurie Street

1.1 Keywords

GOWE016, common sowthistle, milk thistle, herbicide, resistance, glyphosate, paraquat, *Sonchus oleraceus*, Wongarbon

1.2 Take home messages

- In this trial the following herbicides paraquat, Basta®, SHARPEN® WG, Velocity® and Grazon® Extra provided effective control of common sow thistle and maybe considered as alternatives to Roundup
- Paraquat has proven to provide high levels of control and may be useful as an alternate herbicide in single pass control but also could be used as a double knock treatment to control survivors following 'initial' herbicide treatments that maybe targeting other weed species
- Using paraquat (even as a double knock strategy following normal herbicide use) may offer a resistance management option to slow the development and the spread of glyphosate resistant common sow thistle

1.3 Background

Common sowthistle or milk thistle is a becoming a significant weed in our farming systems for a number of reasons but might primarily include its adaption to a wide variety of growing environments, prolific seeding rate and its ability to germinate almost any time of the year. In addition, sow thistle will not readily germinate and emerge from depth so the adoption of zero or minimal tillage systems that allow seedbanks to increase at or near the soil surface may have also allowed the weed to increase in its prevalence.

Currently glyphosate is the most common, primary herbicide used to control milk thistle in non-crop or fallow situations, but it also is commonly used in conjunction (tank mixes) with a number of other herbicides aiming at improved control.

However, there are concerns with the recent identification of glyphosate resistance that controlling this weed may become increasingly difficult as glyphosate becomes ineffective placing the burden for weed control onto tank mix partners. There are also concerns that our current system is over reliant on glyphosate as the primary herbicide to control sow thistle and that if we need to identify more effective tank mix options which may reduce or slow the rate of resistance development.

This trial has been designed to investigate what herbicide options might be effective at controlling sow thistle as stand-alone products, that is those with the ability to offer high levels of control. These products may still be used in conjunction with glyphosate as a tank mix but as a tank mix partner they will be effective at controlling any glyphosate resistant sow thistle plants present.

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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.

1.4 Aim

This project has the following main aim:

- Investigate alternatives to glyphosate for the knockdown of common sow thistle.

1.5 Methods

A small plot replicated trial was established in the Autumn of 2019 in an existing population of established sow thistle, which was approximately 3-4 leaf and 5 cm in diameter and growing under reasonable conditions (at the time of treatment).

The resistance status of the common sow thistle at this site was unknown but it was not expected to be resistant to glyphosate. However, as the trial was interested in identifying potential herbicide options to be used when the common sow thistle is glyphosate resistant, most options did not contain glyphosate in the mix. As a result, any control from those options can be entirely attributed of the ability of those herbicides to control the common sow thistle.

A range of herbicide options as detailed below in **Table 1** were applied on the 18/4/2019.

All treatments were applied by an ATV mounted boom fitted with AIXR015 nozzles at 50 cm spacing operated at 3 bar applying a total spray volume of 100 L/ha as medium-coarse droplets.

Results were analysed by ANOVA and results compared by using the 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. Herbicide treatments and rates applied

TRT	Product 1	Rate 1 (mL or g/ha)	Product 2	Rate 2 (mlLor g/ha)	Adjuvant	Rate %
1	UTC					
2	Amicide® Advance 700	1600				
3	Amicide® Advance 700	1600	SHARPEN® WG	26	HASTEN ™	1.00
4	Basta®	3750				
5	LVE Ester 680	800			Uptake™	0.50
6	Grazon® Extra	500				
7	SHARPEN® WG	26			HASTEN ™	1.00
8	Paraquat 250	2000				
9	Pixxaro® EC	400			Uptake™	0.50
10	Precept®	1000			Uptake™	0.50
11	Roundup DST	575			Activator®	1.25
12	Roundup DST	1500			Activator®	1.25
13	SHARPEN® WG	17			HASTEN ™	1.00
14	SLEDGE®	160				
15	SLEDGE®	160	Roundup DST	575	Activator®	1.25
16	Starane™ Advanced	600				
17	Stinger™	14	Starane™ Advanced	600	Activator®	1.25
18	Velocity®	1000			Uptake™	0.50

1.6 Results

The full set of trial results are in the appendix.

RESISTANCE STATUS: at this site was not tested though presumed not to be resistant.

KNOCK DOWN: All treatments reduced the population of sow thistle when compared to the untreated control (**Figure 1**). No plants were present in the Paraquat and Roundup DST (high rate) when assessed 25 days after the herbicide application. The reduction in population by these two treatments was not different to Basta®, Amicide® Advance 700 + SHARPEN® WG, Velocity®, SHARPEN® WG (both high and low rates) and Stinger™ + Starane™ Advanced.

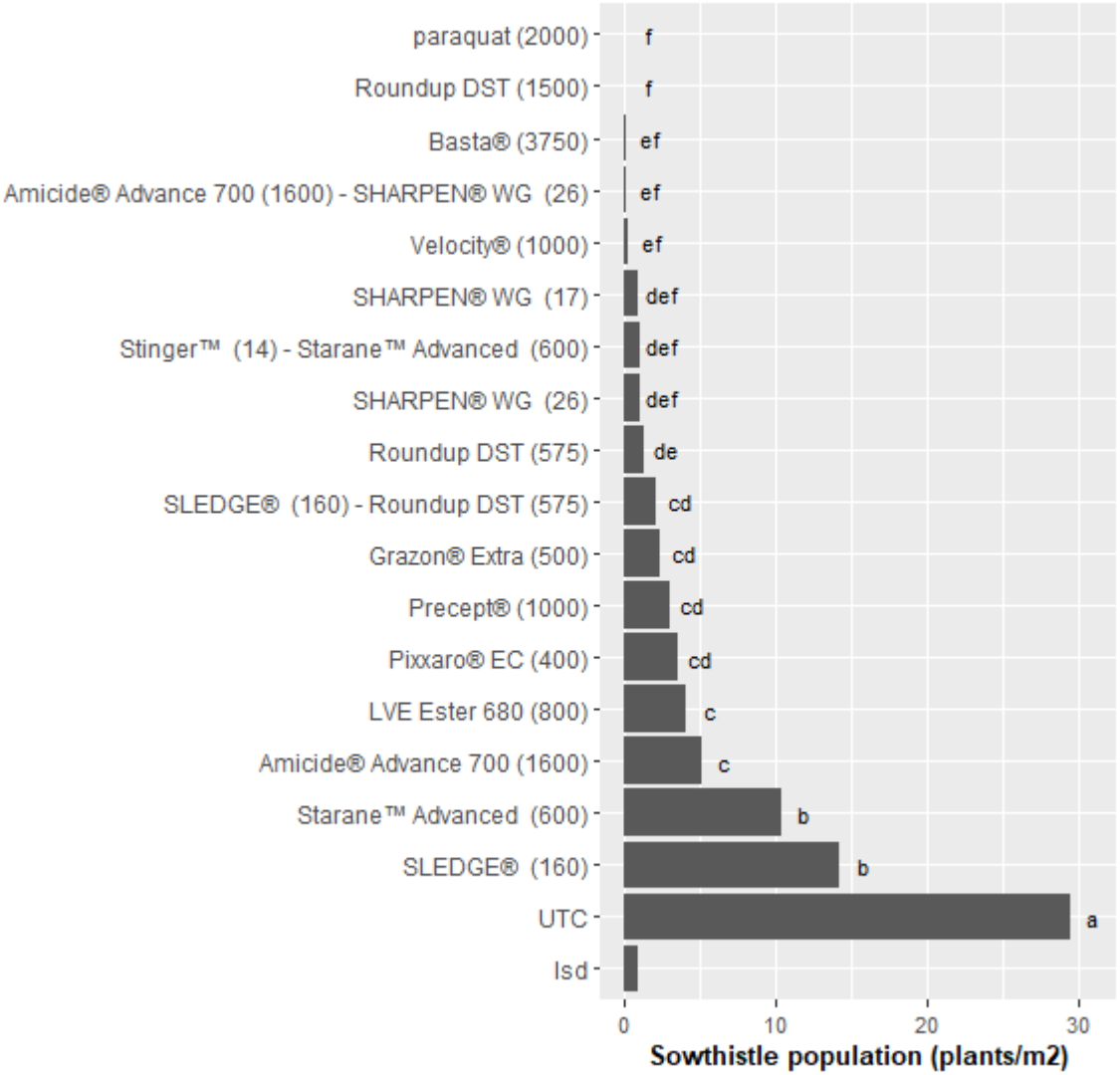

Figure 1. Common sow thistle plant counts (plants/m2) following a range of single pass herbicide treatments and an untreated control (numbers in brackets are rate in grams or millilitres per hectare) – assessed 25 days after treatment.

CONTROL: The level of control (when compared to the untreated plots) was greater than 90% for most of the tested products (and all tank mixes) with the exception of Precept®, Pixxaro® EC, LVE Ester 680, Amicide® Advance 700, Starane™ Advanced, SLEDGE® (see appendix for details). Control by these options may offer some useful suppression but in some cases it would be considered commercial control failure.

1.7 Discussion

Resistance testing at this site was not conducted, as such the glyphosate resistance status of this population is unknown. However, two rates of Roundup DST were tested, with close to 100% control at the higher label rate (1500 ml/ha) and arguably a commercially acceptable 95% control at the lower label rate (575 ml/ha) it appears the population is not resistant to glypphosate. Also noting that neither treatment was significantly different from each other. The level of control at the lower rate, where the sow thistle was around 5 cm in diameter or slightly larger than the label recommendation

of 'rosettes up to 3cm diameter", would tend to support the growers opinion that resistance was not present.

Several stand-alone products provided over 90% control as a single pass providing confidence that other products and mixes can provide levels of control similar to that of Roundup. These include paraquat, Basta®, SHARPEN® WG, Velocity® and Grazon® Extra. Of the three tank mixes tested, two were either not better than the performance one of the partners. For example, Amicide® Advance 700 + SHARPEN® WG was not better than SHARPEN® WG alone, similarly SLEDGE® + Roundup® DST® (low rate) was not better than Roundup DST (low rate). Stinger™ alone was not included in the trial so it is not conclusive as to whether the performance of this mix was synergistic or due to the Stinger™ alone.

1.8 Conclusion

In this trial several herbicides provided a high and acceptable level of control of small to medium common sow thistle plants including paraquat, Basta®, SHARPEN® WG, Velocity® and Grazon® Extra.

Other trial work conducted by GOA support the result in this trial that paraquat can be effectively employed as a single pass approach (even when it is employed as a double knock when targeting other weed species). And can reduce the over the reliance on glyphosate. Paraquat, based on this and other trials, is likely one of the most useful alternatives to glyphosate for the control of common sow thistle.

1.9 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 GRDC, the authors would like to thank them for their continued support. Special thanks go out to the Street family who hosted this trial.

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Appendix

Treatment	Plant Counts (plants/m2) p.v.[1]	lsd[2]	Control (%) p.v.[1]	lsd[2]
Amicide® Advance 700 (1600)	5.1	c	78.4	b
Amicide® Advance 700 (1600) - SHARPEN® WG (26)	0.2	ef	98.7	a
Basta® (3750)	0.2	ef	99.1	a
Grazon® Extra (500)	2.4	cd	91.4	ab
LVE Ester 680 (800)	4.1	c	85.6	ab
paraquat (2000)	0.0	f	99.7	a
Pixxaro® EC (400)	3.5	cd	86.5	ab
Precept® (1000)	3.0	cd	88.6	ab
Roundup DST (1500)	0.0	f	99.7	a
Roundup DST (575)	1.3	de	95.0	ab
SHARPEN® WG (17)	1.0	def	96.2	ab
SHARPEN® WG (26)	1.0	def	95.4	ab
SLEDGE® (160)	14.2	b	45.8	c
SLEDGE® (160) - Roundup DST (575)	2.1	cd	92.4	ab
Starane™ Advanced (600)	10.3	b	57.5	c
Stinger™ (14) - Starane™ Advanced (600)	1.0	def	95.5	ab
Velocity® (1000)	0.3	ef	98.6	a
UTC	29.5	a	0.0	d
lsd	0.9		10.2	

[1] predicted value

2 values with the same letter for each variable are not significantly different