

GOA Trial Site Report

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

Trial Code:	GOWE01616-2
Year/Season:	Summer 2015/16
Location:	'Macquarie Park', Geurie
Trial Cooperators:	Jeff Hutchison of Kalnee Pastoral Company

Keywords

GOWE01616-2, common sowthistle, milk thistle, herbicide, resistance, glyphosate, paraquat, double knock, *Sonchus oleraceus*

Take home messages

- Very few of the tested alternate single pass herbicides to glyphosate, with the exception of paraquat based options, showed acceptable control of common sowthistle
- Single applications of paraquat based herbicides provided effective control of common sowthistle in this trial
- Using paraquat as a double knock, following a range of 'initial' herbicide treatments was also effective even when the 'initial' treatments resulted in poor levels of control
- Using paraquat in 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 sowthistle

Background

Common sowthistle (*Sonchus oleraceus*) or milk thistle is becoming a significant weed in our farming systems, primarily due to its adaptation to a wide variety of growing environments, prolific seeding rate and its ability to germinate at almost any time of the year. In addition, common sowthistle is a shallow germinating plant, making it well suited to our zero or minimal tillage cropping systems.

Glyphosate is the most commonly used method of control, unsurprisingly this has led to the recent identification of glyphosate resistance in a number of common sowthistle populations. This trial is designed so that the findings could be applied either prior to a population developing resistance and help reduce the over-reliance of glyphosate or to manage population already with resistance where glyphosate is no longer effective.

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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.

Aim

This project has the following main aims:

- Investigate alternatives to glyphosate for the knockdown of common sowthistle.
- Determine the effectiveness of a double knock herbicide application.

Methods

A split, small plot replicated trial was established in the summer of 2015/16 in an existing population of established sowthistle, was at rosette stage approximately 10-20cm in diameter and growing under very hot and dry conditions (at the time of treatment).

The resistance status of the common sowthistle 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 sowthistle 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 sowthistle.

A range of herbicide options as detailed below in **Error! Reference source not found.** were applied on the 1/3/2016. The double knock containing 2 L/ha of paraquat was applied on 8/3/2016 to one half of each plot.

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 coarse droplets.

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.

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Table 1. Herbicide treatments and rates applied

Treatment	Rate (mL or g/ha)
Untreated Control (UTC)	n/a
Metsufuron	7
Express®	25
Oxyfluorofen	75
Sharpen®	26
Valor®	30
Group H + I herbicide ¹	1000
Amicide® Advance	1600
Grazon® Extra ²	500
LVE Ester 680 ³	800
Fallow Boss Tordon®	300
Starane® Advanced	600
Stinger® + Starane® Advanced	14 + 600
Stinger® ⁴	14
Paraquat	1600
Spray.Seed®	2400
Alliance®	4000
Roundup® DST	2000

Results

Single pass treatments such as Alliance®, Spray.Seed®, paraquat, Sharpen® and Roundup® DST resulted in mean control levels from 84% up to 100%, however, statistically they all performed similarly. The balance of the single herbicide treatments achieved less than 50% control and would not commercially acceptable. A number of treatments performed statistically no better than the UTC as illustrated in Figure 1 below.

Where the double knock of paraquat was applied all treatments resulted in the same level of control at 100% as shown in the picture (Figure 2) below.

¹ Neither herbicide is registered for the control of sow thistle

² Grazon Extra is registered for use in fallows but not specifically for sow thistle

³ LV Ester 680 is registered for use in fallows but not specifically for sow thistle

⁴ Stinger is registered for use in fallows but not specifically for sow thistle

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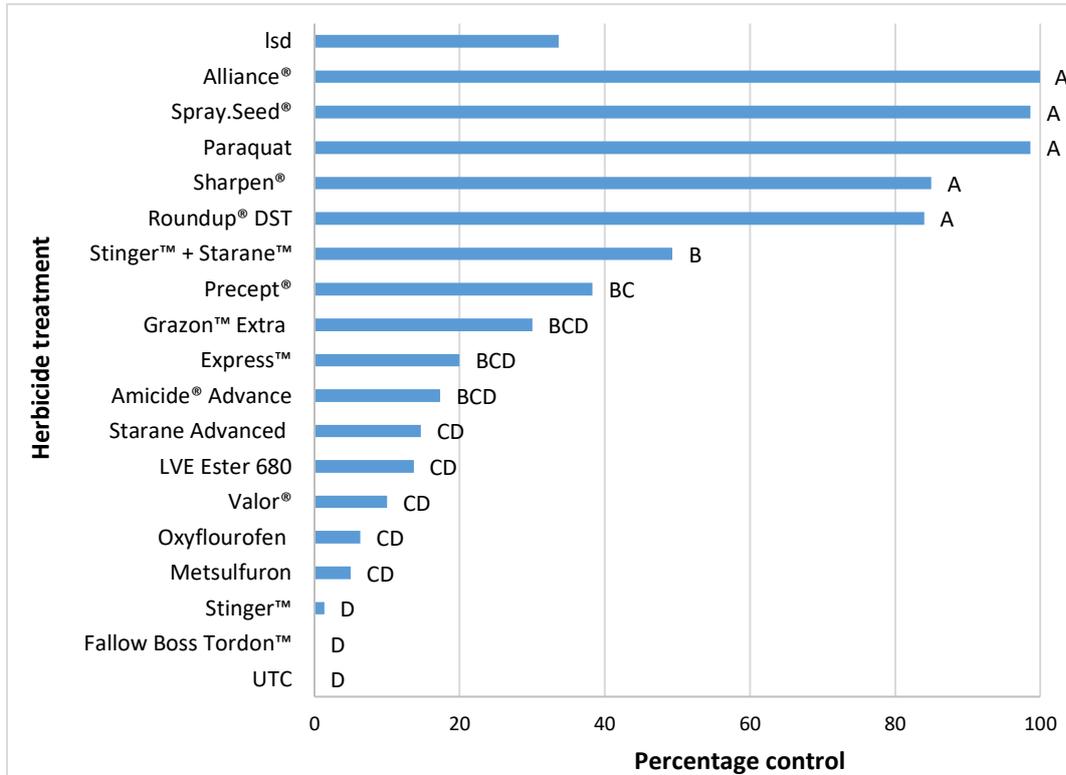


Figure 1. Common sowthistle percentage control levels achieved by various herbicide treatments - 31 days after treatment (DAT).



Figure 2. Common sowthistle trial site at 31 DAT, initial treatments run from left to right and on the left is the double knock strip running perpendicular. The area on the right did not receive the double knock.

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Discussion

The relatively high level of control achieved in this trial by Round Up DST alone would suggest the population is still largely susceptible to glyphosate.

In this trial three products Alliance[®], Spray.Seed[®] and paraquat, achieved around 98% control, well within commercially acceptable levels of control (>90%) as a single pass option. All three treatments contained paraquat- Alliance[®] (amitrole + paraquat) and Spray.Seed[®] (diquat + paraquat). The efficacy of paraquat alone would suggest that the additional active ingredients in Alliance[®] and Sprayseed[®] are offering little more in terms of improving control.

No other single pass treatments provided a commercially acceptable level of control. Sharpen[®], achieved slightly better than 80% control and was the best performing alternate to glyphosate or paraquat based options.

Most other options tested achieved only ~50% or less reduction in weed numbers and would not be considered a useful level of control.

However, regardless of the level of effectiveness of the initial treatments, a double knock treatment with paraquat resulted in very high levels of control.

It could be said the performance of the paraquat either as a single pass or as a double knock was the most effective option tested.

Conclusion

In this trial the only herbicides that provided a high and acceptable level of control of small to medium common sowthistle plants were paraquat or paraquat based products. Sharpen[®] may offer some value as an alternate to glyphosate depending on application rate, the size of the target plant, timing and if mixed with other products.

This trial has demonstrated that paraquat can be employed either as part of a single pass approach or used as a double knock, following up any conventional herbicide choices to achieve high levels of control and avoid over the reliance on glyphosate. Paraquat, based on these trials, is likely one of the few useful alternatives to glyphosate for the control of common sowthistle.

Acknowledgements

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