# GOA Trial Site Report

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

| | |
|---|---|
| **Trial Code:** | GOWE01616-1 |
| **Year/Season:** | Summer 2015/16 |
| **Location:** | 'Torokina', Armatree |
| **Trial Cooperator:** | 'Haddon Rig' Warren |


## Keywords

GOWE01616-1, 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 a 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, which was at early flowering stage 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 not suspected. 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 **Table 1** were applied on the 18/12/2014. The double knock containing 2 L/ha of paraquat was applied on 5/1/2016 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 rate 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

In this trial only four treatments **did not** result in a lower common sowthistle population than the UTC, Express™, Oxyfluorofen, Starane™ Advance and Starane™ Advance + Stinger™.

Of the remaining treatments none were statistically significantly different to each other, however, all resulted in reduced populations compared to the UTC.

Where the double knock with paraquat was applied, no common sowthistle survived in the majority of treatments as illustrated in Figure 1.

[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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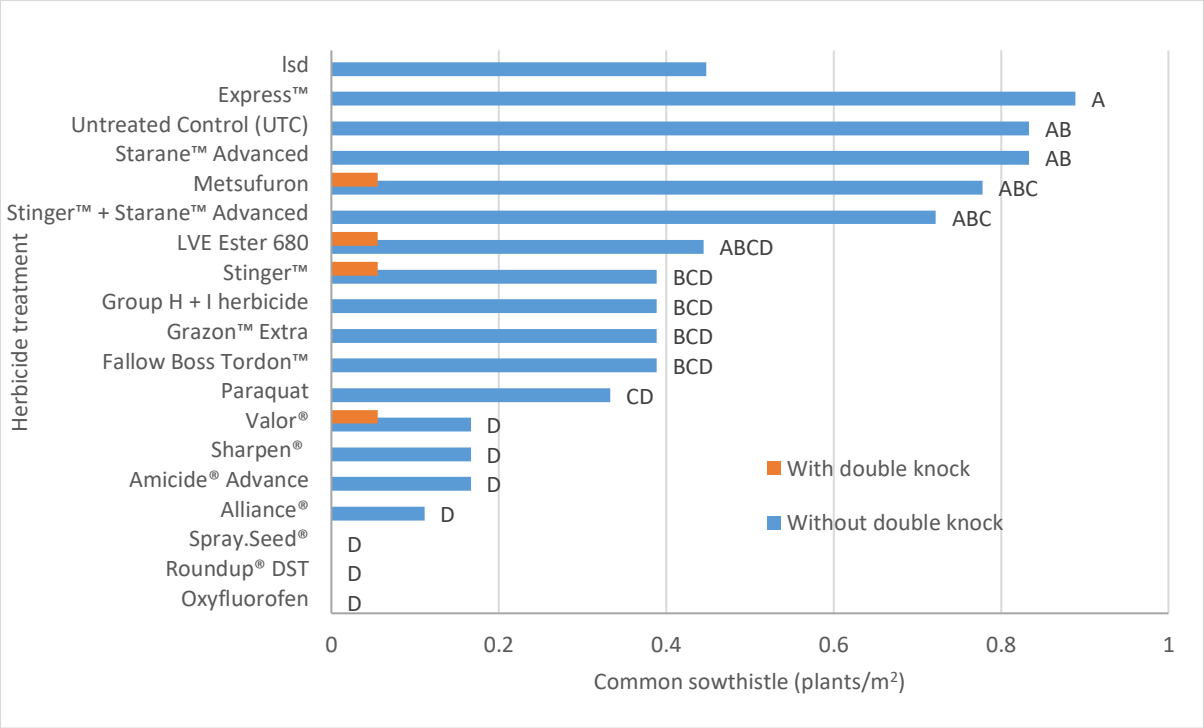


**Figure 1.** Common sowthistle population (plants/m2) 47 days after initial application (DAT) of various herbicide treatments with and without the application of a double knock

## Discussion

In this trial the common sowthistle population was sparse and not uniform, as a result, separating treatments using statistical analysis proved difficult.

The glyphosate applied in this trial achieved 100% control indicating there was no glyphosate resistance present in this population.

Spray.Seed®, Roundup® DST and paraquat, although not statistically different to a number of other treatments resulted in no common sow thistle plants surviving in any plots when applied as a single pass operation. In all other single pass treatments some plants were not controlled.

With the control achieved by the paraquat alone it could be suggested that the majority of the efficacy of Spray.Seed® (paraquat + diquat) and Alliance® (amitrole, paraquat and diquat) may be driven by their paraquat component.

Amicide® Advance, Sharpen® and Valor® also in the absence of a double knock treatments resulted in approximately 80% reduction in common sowthistle plants but would be best described as only suppression of the weed.

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

However, regardless of the level of effectiveness of the initial treatments a double knock treatment with paraquat resulted in excellent levels of control achieving close to 100% control in the majority of cases.

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 medium to large common sowthistle plants were paraquat or paraquat based products and glyphosate. Although a number of options tested certainly may offer some value 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 of 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.

The advanced maturity of the common sowthistle in this trial may have impacted on the control achieved and application to younger plants may result in different outcomes. This deserves further investigations.

## Acknowledgements

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