



Effect of climate and weed size on performance of glyphosate and glufosinate in mixtures with Group 14 herbicides

Trial co-operator Brad Coleman, 'Yarral Yarral' Rowena

Weed target: Milk thistle (Different sizes)

100L/ha

Rain water (SOA added to all plots)

110015 AIXR @ 2 Bar 6km/hr (Coarse)

4 Reps

	Date	Weed size	Time	Temp	RH%	Delta T
Timing 1	9/1/2025	Rosette	11am	28°C	55%	6.8
Timing 2	21/1/2025	Elongating	7.30am	19°C	48%	6.4
Timing 3	21/1/2025	Elongating	11am	32°C	35%	11.8

Objectives of the trial

- Effect of weed size on control of milk thistle?
- Effect of Delta T on control of milk thistle?
- Does Group 14 + oil antagonise or help glyphosate?
- Does Group 14 + oil antagonise or help glufosinate?
- Is a robust application of straight glyphosate applied under good conditions a better strategy than Group 14 mixtures?

Treatment list		Timing 1	Timing 2	Timing 3
Roundup® PL (540K)	1.5 L/ha	1 Roundup PL 1.5L	2 Rup PL 1.5 L	3 Rup PL 1.5L
Crucial®	5.5 L/ha	4 Crucial 5.5L	5 Crucial 5.5L	6 Crucial 5.5L
Sharpen® + Hasten®	17 g/ha + 1% v/v	7 Sharpen 17g		8 Sharpen 17g
Voraxor®+ Hasten	100 mL/ha + 1% v/v	9 Voraxor 100mL		10 Voraxor 100mL
Sharpen + Roundup PL + Hasten	17 g/ha + 1.5 L/ha + 1% v/v	11 Sharpen + Rup PL		12 Sharpen + Rup PL
Voraxor + Roundup PL +Hasten	100 mL/ha + 1.5 L/ha + 1% v/v	13 Voraxor + Rup PL		14 Voraxor + Rup PL
Biffo®	3.75 L/ha	15 Biffo 3.75L	16 Biffo 3.75L	17 Biffo 3.75L
Sharpen + Biffo + Hasten	17 g/ha + 3.75 L/ha + 1% v/v	18 Sharpen + Biffo		19 Sharpen + Biffo
Voraxor + Biffo + Hasten	100 mL/ha + 3.75 L/ha +1% v/v	20 Voraxor + Biffo		21 Voraxor + Biffo
Sharpen + Glyphosate 450 CT + Hasten	17 g/ha + 1.8 L/ha + 1% v/v			22 Sharpen + Gly 450CT

Treatments were scored for brownout at either 10 or 12 days after application at each weed growth stage. Within each plot there was a small and larger cohort of milk thistle, so these were scored independently.

Treatments containing glufosinate or a Group 14 herbicide were mostly showing high levels of brownout by 10 days after application, particularly on the smaller cohort of weeds.

Trial site managed by AMPS Research on behalf of ICAN



At 10-12 days after application, brownout of the glyphosate treatments (alone) was much slower relative to the faster-acting contact herbicides, however there was a noticeable increase in the level of initial brownout for the high rate of Crucial compared to the lower rate of Roundup Plantshield. This was especially evident on the smaller cohort of weeds.

Table 1. Brownout of milk thistle at either 10 or 12 days after application.

Brownout rating 10-12 DAA	Timing 1 12DAA		Timing 2 10DAA		Timing 3 10DAA	
	Small	Large	Small	Large	Small	Large
Roundup® PL (540K)	14% fg	0% f	5% g	28% c-f	29% efg	4% ef
Crucial®	43% def	25% c-f	58% cde	25% c-f	81% abc	55% a-e
Sharpen® + Hasten®	100% a	47% a-f			100% a	99% a
Voraxor®+ Hasten	100% a	25% c-f			100% a	73% abc
Sharpen + Roundup PL + Hasten	100% a	47% a-f			95% ab	50% a-f
Voraxor + Roundup PL +Hasten	100% a	50% a-f			100% a	74% abc
Biffo®	98% ab	63% a-d	63% bcde	45% b-f	99% a	41% b-f
Sharpen + Biffo + Hasten	75% a-d	25% c-f			100% a	93% ab
Voraxor + Biffo + Hasten	95% ab	15% def			100% a	50% a-f
Sharpen + Glyphosate 450 CT + Hasten					76% abcd	41% b-f

A field walk was conducted on 4/2/2025 (14-26 days after application) with treatment photos available in an associated report.

Plots were further assessed three times for regrowth (survivors), with a final rating undertaken on 26/2/2025 (36-48 days after application).

Table 2. Regrowth of milk thistle at either 36 or 48 days after application.

Regrowth rating 36 or 48 DAA	Timing 1 48DAA		Timing 2 36DAA		Timing 3 36DAA	
	Small	Large	Small	Large	Small	Large
Roundup® PL (540K)	58% a-d	90% abc	65 abc	65% a-d	95% a	100% a
Crucial®						
Sharpen® + Hasten®	0% f	0% f			15% def	30% def
Voraxor®+ Hasten	0% f	0% f			0% f	0% f
Sharpen + Roundup PL + Hasten	0% f	0% f			5% ef	10% f
Voraxor + Roundup PL +Hasten	25% c-f	50% b-f			20% def	25% def
Biffo®	38% b-f	17% def	30% c-f	55% b-e	15% d-f	15% ef
Sharpen + Biffo + Hasten	25% c-f	25% d-f			0% f	25% def
Voraxor + Biffo + Hasten	0% f	0% f			8% ef	23% def
Sharpen + Glyphosate 450 CT + Hasten					25% c-f	7% f

There is strong evidence of glyphosate resistance in this population, with typical rates of glyphosate performing poorly.

We have elected not report the percentages for the Crucial 5.5L/ha treatments in this format, due to extreme variability across plots. Twelve plots were treated with this high application rate of glyphosate. Of the 12

Trial site managed by AMPS Research on behalf of ICAN



individual plots, seven reported 100% control (0% regrowth), while the other five plots averaged 72% regrowth. While we cannot be certain as to the reason why this high-rate glyphosate treatment is so variable, it is possible that this paddock has a mix of susceptible and glyphosate resistant individuals and these are not evenly distributed across the paddock.

Group 14 herbicides are known to be very effective on milk thistle. There are a wide range of Group 14 herbicides available, with many being applied at similar rates (in active ingredient per hectare). In order to keep the treatment list manageable, we elected to focus on only two rates of a Group 14 herbicide:

- Sharpen at 17 g/ha (12 gai/ha saflufenacil), which is one of the lowest registered ‘knockdown’ rates for fallow use, and
- Voraxor at 100 mL/ha (25 gai/ha saflufenacil + 12.5 gai/ha trifludimoxazin), which is one of the highest registered ‘knockdown’ rates for fallow use.

In this trial, both of the Group 14 herbicides have performed extremely well on milk thistle, especially when applied alone and on younger weeds. While not statistically significant, there is a trend to reduced control when either glyphosate or glufosinate have been tank mixed, with increased rate of Group 14 appearing to be more detrimental to final performance.

Glufosinate alone, as Biffo at the 3.75 L/ha broadcast rate for fallow application, has provided high levels of initial brownout although significant regrowth was evident in several plots by the end of the trial. While there appears to be a counterintuitive numerical decrease in regrowth with larger weeds or application under harsher environmental conditions, this trend was not statistically significant.

Appendix - Active ingredients of treatments

Name	Active ingredient	Concentration
Roundup Plantshield	Glyphosate as potassium salt	540 g/L
Glyphosate 450 CT	Glyphosate as isopropylamine salt	450 g/L
Crucial	Glyphosate as potassium, monomethylamine & ammonium salt	600 g/L
Biffo	Glufosinate-ammonium	200 g/L
Sharpen	Saflufenacil	700 g/kg
Hasten	Ethyl and methyl esters of fatty acids with non-ionic surfactants	704 g/L + 196 g/L
Voraxor	Saflufenacil + trifludimoxazin	250 g/L + 125 g/L

® Registered trademark

Disclaimer: This document is based on the results from individual trials. Variability in product performance is expected across trials and environments. Different outcomes are possible under different trial situations; brand of herbicide applied; environmental conditions before, at and following application; sprayer setup; adjuvant choice; water quality and spray volume; weed size and weed stress; and herbicide resistance status of the population. Trials seek to build on current knowledge – therefore this summary may contain experimental use patterns that are currently not specifically labelled for all of the weed(s) targeted in the trial, or treatments applied at a weed growth stage or application timing that may differ to the product label. In some circumstances, inclusion of a particular treatment is included to demonstrate why this product should not be used in that particular situation. Any research with unregistered agricultural chemicals or of unregistered products, rates or use patterns reported in this document does not constitute a recommendation for that particular use by the authors or the authors’ organisations. All agricultural chemical applications must accord with the currently registered label for that particular agricultural chemical, crop and region.

Any recommendations, suggestions or opinions contained in this publication do not necessarily represent the policy or views of the Grains Research and Development Corporation (GRDC) or Independent Consultants Australia Network (ICAN) or trial contractors. No person should act on the basis of the contents of this publication without first obtaining specific, independent, professional advice. The GRDC, ICAN and trial contractors will not be liable for any loss, damage, cost or expense incurred or arising by reason of any person using or relying on the information in this publication.

Trial site managed by AMPS Research on behalf of ICAN