

## Improving knockdown control of annual ryegrass: the effects of droplet size, water rate and timing.

<b>Trial code:</b>	<b>GAW07021-2</b>
<b>Season/year:</b>	Autumn 2021
<b>Location:</b>	Peak Hill
<b>Collaborators:</b>	David Newbigging and Ryan Pratton

### Keywords

**GAW070**, annual ryegrass, resistance, glyphosate, spray quality, water rates, application timing

### Key findings

- Good levels of control of ARG can be achieved with and XC spray quality
- Using higher water rates and delaying application to ensure good coverage did not reduce efficacy.

### Background

During recent Grain Orana Alliance (GOA) Recent research<sup>1</sup> into the control of glyphosate resistant annual ryegrass (ARG), GOA questioned if the ARG population was glyphosate resistance. Some of the confirmed glyphosate resistance populations were controlled with only moderate label rates and remind us that the cause of commercial spray failures is not always resistance.

Contributing factors to weed control failure include:

- inappropriate water rates (too high or too low)
- poor water quality
- incorrect droplet size for the target weed (weeds too small or large a target)
- poor spray timing
- antagonism with other herbicides
- poor weather conditions.

This is not to suggest that herbicide resistance is not real or not the sole reason for failure in some circumstances.

Grain Orana Alliance, with support of the Grains Research and Development Corporation (GRDC), has undertaken several trials to understand how these factors influence spray efficacy in the Central West of NSW.

<https://grdc.com.au/resources-and-publications/grdc-update-papers/tab-content/grdc-update-papers/2020/02/is-our-ryegrass-really-getting-harder-to-kill-through-our-over-reliance-on-glyphosate>

## Aims

To better understand the potential influence of some key parameters of spray application. Focusing on application timing, water rate or spray quality to control ARG using glyphosate

## Methods

Herbicide treatments were applied with a ute mounted sprayer with a 12 m boom fitted with 24 nozzles spaced at 50 cm.

All treatments used Roundup Ultramax at the rate of 950 mL/ha and used rainwater as the spray carrier. No adjuvant was added.

Two water rates were tested:

- low: 50 L/ha
- High: 100 L/ha.

Two timings were tested:

- early (8/04/21) where the average of the ARG population was at the 2-3 leaf stage
- delayed (19/04/21) where the average of the ARG population was at the 4 – 5 leaf stage.

Three different nozzle type were used to achieve the targeted spray qualities (as identified by the GRDC Nozzle Selection Guide, January 2021):

- Turbo Teejet: producing a fine (F) spray quality
- TeeJet AIXR: producing a medium (M) spray quality
- TeeJet TTI nozzle: producing an extremely coarse (XC) spray quality.

Note that the current label (2025) for Roundup Ultra® Max recommend water rates of 80 L/ha or less. And not to apply with spray droplets smaller than coarse to very coarse. In this trial these parameters were exceeded to examine the impact, and it is not an endorsement or recommendation in any way.

To apply the treatments in this trial all nozzles were a 015 (green) nozzle size.

Trial details		
Trial establishment date		8/4/2021
Crop stage		Fallow
Trial design	Type: small plot (~12m x 3m) Design: randomized complete block Replication: 4	Analysis ASREML – randomized complete block. Tested to a 95% confidence interval
Observations and measurements	ARG counts	

## Results

The Peak Hill site had an ARG population of 200 plants/m<sup>2</sup>. ARG samples were collected just prior to treatment application for resistance testing, the results showed a very low level of resistance to glyphosate as shown in Table 1.

Table 1. Herbicide resistance testing results to glyphosate in annual ryegrass populations sampled.

Herbicide	Herbicide group	Paddock sample	
		Survival %	Rating
Glyphosate @ 285 g.a.i./ha	Group M	10	R
Glyphosate @ 541 g.a.i./ha	Group M	0	S
Glyphosate @ 855 g.a.i./ha	Group M	0	S

- Untreated control plots had an average on 191 ARG plants/m<sup>2</sup>
- The XC had similar numbers of surviving ARG regardless of water rate and timing
- The fine at the high water rate and delayed timing had the fewest surviving ARG
- There was generally very little difference in the performance of the various spray qualities regardless of water rate and timing

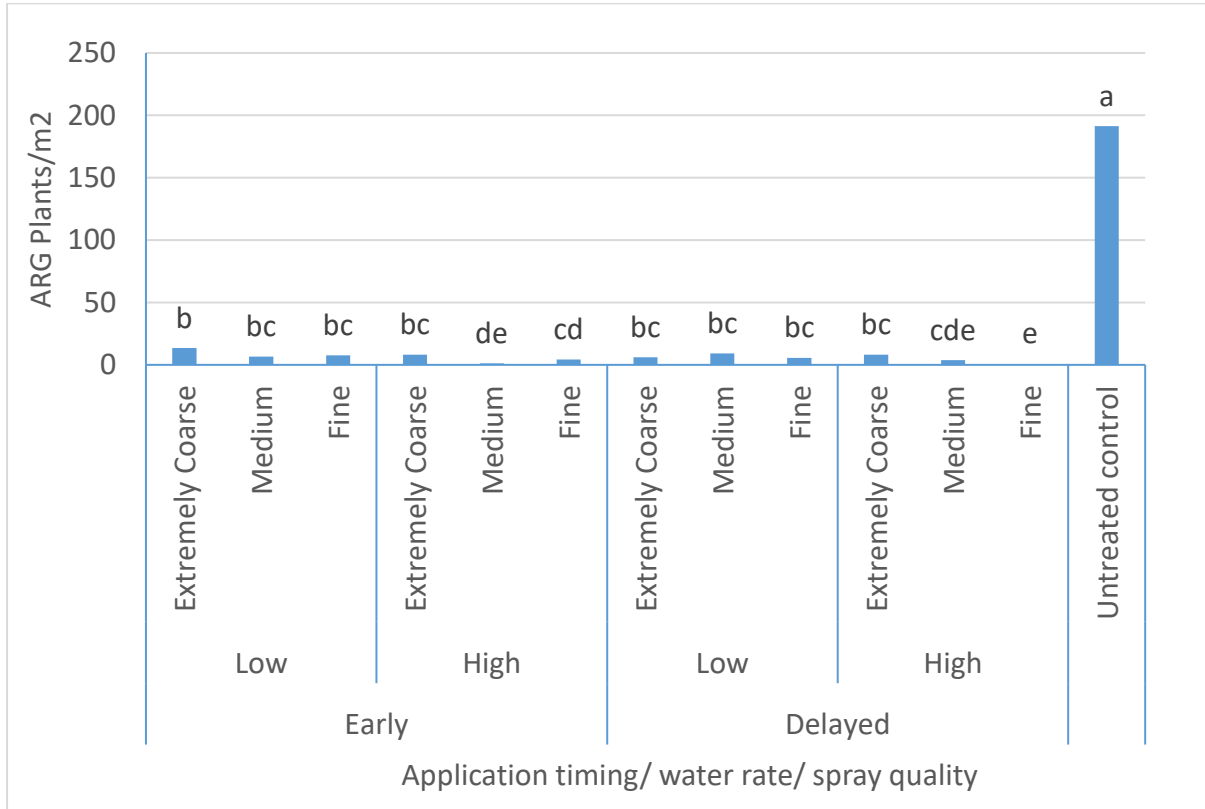


Figure 1. Surviving ARG numbers (29 DAA) in response to time of application, water rate and spray quality near Peak Hill 2021. Treatments with the same letter are not significantly different.

## Discussion

In this trial an untreated control was included, ARG counts in these plots averaged ~190 plants/m<sup>2</sup>. When looking at the numbers of surviving plants in all treated plots the level of control is very high, well over 90%.

In some cases, the fine and medium spray qualities resulted in fewer surviving ARG, with the higher water rate tending to give better outcomes than time of application, which might be expected as the higher water rates should result in better coverage.

Apart from water rate, there is little difference in the effect of application (water rate, spray qualities and timing), on surviving ARG. It should be noted that even the XC spray quality has resulted in high levels of control. This should give growers confidence that under the right conditions good results can be achieved.

While these results also show that delaying application does not reduce the performance, and neither does increasing the water rates.

## Conclusion

- Good levels of control of ARG can be achieved with and XC spray quality.
- Using higher water rates and delaying application to ensure good coverage did not reduce efficacy.

## Acknowledgements

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## Appendix

Timing	Water rate	Spray quality	ARG/m <sup>2</sup>	LSD
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# GOA Trial Site Report

<b>Early</b>	Low	Extremely coarse	13.5	b
<b>Early</b>	Low	Medium	6.5	bc
<b>Early</b>	Low	Fine	7.5	bc
<b>Early</b>	High	Extremely coarse	8.2	bc
<b>Early</b>	High	Medium	1.1	de
<b>Early</b>	High	Fine	4.2	cd
<b>Delayed</b>	Low	Extremely coarse	6.1	bc
<b>Delayed</b>	Low	Medium	9.2	bc
<b>Delayed</b>	Low	Fine	5.7	bc
<b>Delayed</b>	High	Extremely coarse	8.2	bc
<b>Delayed</b>	High	Medium	3.8	cde
<b>Delayed</b>	High	Fine	0.8	e
<b>Control</b>	Control	Control	191.5	a