

Impact of initial fallow herbicide treatments on the efficacy of an unregistered Group H¹ herbicide + paraquat when applied as a double knock to control Windmill Grass (*Chloris truncata*)

Trial Code: GOWE04619
Season/Year: Summer 2017/18
Location: “North Parkes Mine”, Parkes
Collaborators: Matthew Burkitt

Keywords

GOWE046, Windmill grass, Double knock, Tank mixes, Herbicide resistance, Paraquat, *Chloris truncata*

Take home messages

A combination of an unregistered herbicide (UnReg 1) plus paraquat (PQ) provided useful levels of WMG control and was successful as a double knock (DK) to control windmill grass (WMG), regardless of DK timing.

Application of the first knock herbicides did not appear to have any antagonistic effect on performance of Unreg1 + PQ in controlling WMG.

In previous trials this double knock strategy has not been successful, particularly in hot dry conditions. It is recommended that this strategy only be used where WMG is actively growing with a reasonable soil moisture profile and relatively mild weather forecast.

Background

Previous GOA trials found that the combination of an unregistered herbicide plus paraquat (UnReg1+PQ) can provide very effective knockdown control for WMG when used as a single pass, standalone treatment. However, the relative narrow weed control spectrum of UnReg1+PQ highlights a possible shortcoming; control of a broader range of weeds often present in fallow situations alongside WMG.

One possible way to address this issue is to tank mix UnReg1+PQ with herbicides targeting other weeds applied as a single pass.

Another alternative is to use UnReg1+PQ as a double knock treatment following more conventional weed control herbicides. Paraquat is well accepted as a common product of choice for double knocks. Noting that in this scenario the concern is whether the herbicides applied in the first pass will affect WMG efficacy of UnReg1+PQ. This trial has been designed to investigate this question.

¹UnReg1 is a Group H herbicide registered for use in fallows but not registered for use on Windmill Grass (however is registered for Feathertop Rhodes Grass another *Chloris* species and Fleabane)

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

Determine if the effectiveness of control of WMG by UnReg1+PQ, herbicide mix, is reduced when used as a DK following application of a range of common fallow herbicide mixes applied in the first knock. Assess if there is any impact of timing of the double knock.

Methods

A randomized small plot trial with three replications was established in summer 2018/19 at Parkes. There was a uniform thick population of WMG. A number of plants were flowering. Good rain in November (87 mm²) followed by further falls in December (28 mm) ensured that WMG was fresh at initial time of application.

The DK consisted of 100 ml/ha of UnReg1 and 2000 ml/ha paraquat.

Initial treatments were applied on 20/12/2018 in a total volume of 100 L/ha through AIXR110-015 (coarse) nozzles at 3 bar. 'Double knock' was applied using the same setup on the 24/12/2018. On 5/2/2019 30 Windmill Grass 'buts' from each plot were assessed for presence of green shoots. About 9 months later, on 8/11/2018, plant counts were conducted.

Results were analysed using ASREML (Butler, 2017) for the analysis of variance and results compared by using a least significant difference (LSD) method with a 95% confidence interval. Any references to differences between treatments should be assumed statistically different unless otherwise stated.

The herbicide treatments and timings are listed in **Table 1**.

² Recorded at the Goonumbla (Avondale) Station (No# 50002) approximately 3/6 km from the trial site

Table 1. Herbicides and rates applied in the first application

Initial Application (20/12/2018)	Rate (ml or g/ha)	Double Knock Application (24/12/2018)	Rate (ml or g/ha)
Untreated Control	N/A		N/A
Roundup CT	2000	UnReg1 Paraquat	100 2000
Roundup CT LVE Ester 680	2000 800	UnReg1 Paraquat	100 2000
Roundup CT Starane Advance	2000 900	UnReg1 Paraquat	100 2000
Roundup CT Amicide Advance	2000 1600	UnReg1 Paraquat	100 2000
Roundup CT Ally	2000 7	UnReg1 Paraquat	100 2000
Roundup CT Garlon	2000 160	UnReg1 Paraquat	100 2000
Roundup CT Tordon Fallow Boss	2000 700	UnReg1 Paraquat	100 2000
Roundup CT Sharpen	2000 26	UnReg1 Paraquat	100 2000
UnReg1 Paraquat	100 2000	Untreated	N/A
Untreated	N/A	UnReg1 Paraquat	100 2000

Results

Full set of results is available in Appendix 1.

Control 47 days after application (DAA): A high level of control was observed for all treatments when compared to untreated control (Figure 1). Unreg1+PQ applied in the first application had more 'buts with green shoots' than from the same treatment delayed 4 days. Application of first pass herbicides did not significantly reduce efficacy of Unreg1+PQ on WMG (compared application of UnReg1+PQ at the DK timing).

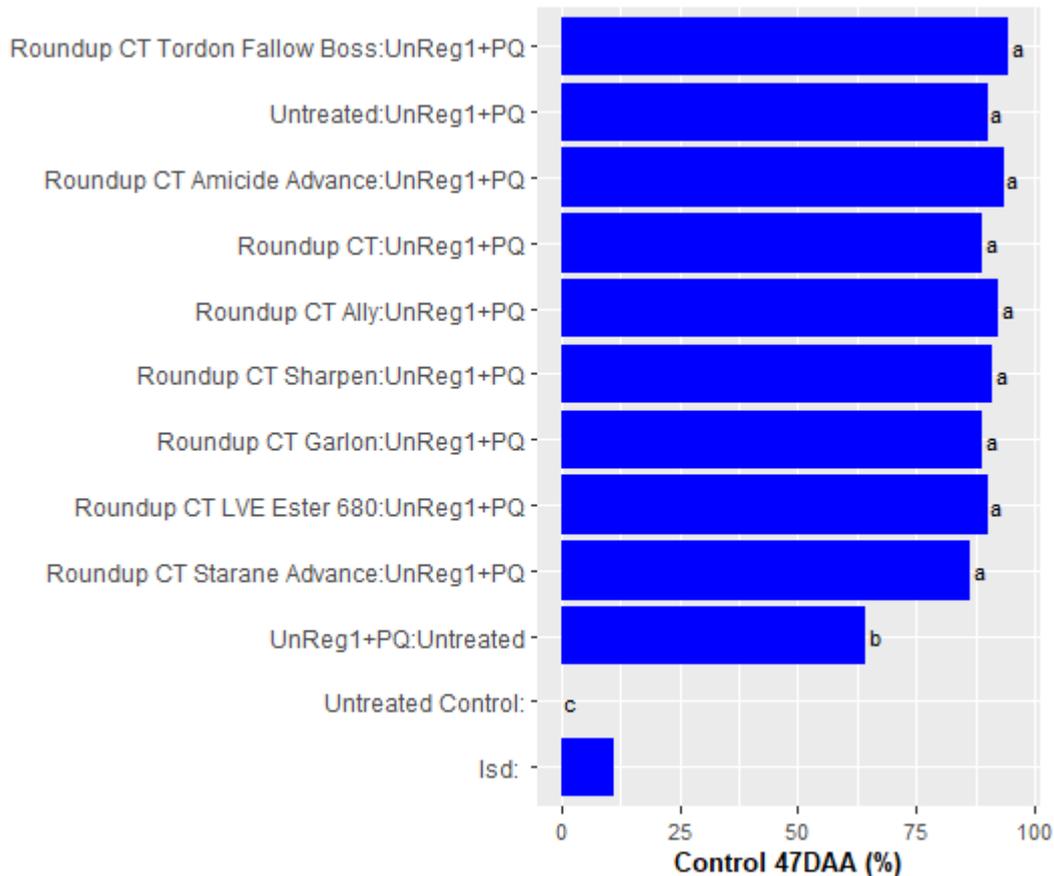


Figure 1. WMG control (%) 47 days after initial application of various herbicide options followed by a double knock of UnReg1+paraquat@4 days (First pass:Double Knock).

Longer term Control: treatment differences were observed approximately 11 and 17 months after herbicide application (Figure 2). As there were no treatment effect differences from application of Roundup CT and Roundup CT tank mixes observed at the first assessment, only the effect of UnReg1+PQ was analysed in the longer term assessments from all treatments. Both assessments showed that the use of UnReg1+PQ provided greater than 50% control and reduction in biomass when compared to the untreated plots.

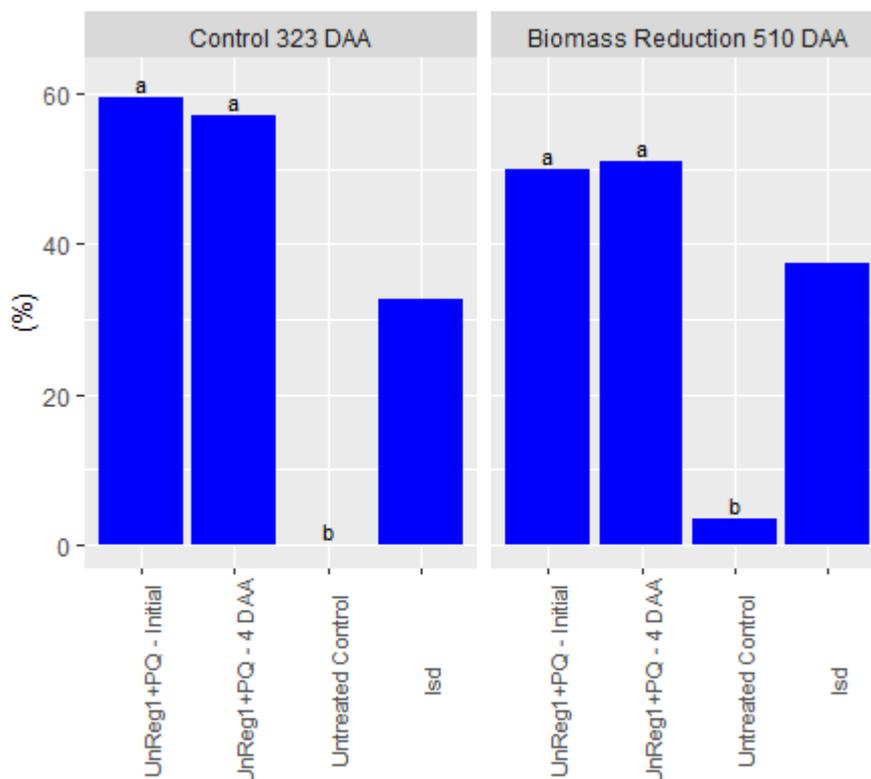


Figure 2. WMG control (%) 323 DAA and Biomass Reduction (%) 510 DAA for applications of UnReg1+PQ 4 days apart.

Discussion

Effectiveness of control of WMG by UnReg1+PQ, herbicide mix, was not reduced when used as a DK following the application of a range of common fallow herbicide mixes applied in the first application.

There were some differences when comparing application timing of UnReg1+PQ. At the first timing (6 days after rain) control was not as effective as it was when applied 4 days later (10 days after rain). It is not clear what is driving this difference. It may be due to plant maturity, subsequent rainfall or other environmental differences. However, when looking at the longer term efficacy there was no difference.

Assessments conducted at 323 and 510 days after application exceed 'normal' timeframes for plot type herbicide trials with outcomes seen more as a 'guide' than a definitive recommendation.

Treatment differences were observed even 17 months after application, indicating there was a significant reduction in plant biomass. It is possible that low solubility of UnReg1 was having a longer term 'residual' effect, however environmental factors could have also played a part.

2019 was a very dry year, from the time of application till the breaking of the drought (first significant rain) there was approximately 350 mm. The UnReg1 label has various plant back interval recommendations with ranges from 10 weeks to 21 months and 100 to 500 mm rain requirement. Label directions also note 'prolonged dry periods' and 'heavy rainfall after an extended dry period' extending or reactivating the product. These suggest that UnReg1 can persist in the soil for extended

periods under specific conditions, and in this trial, it would appear that it did persist and provide some level of control.

At time of trial establishment, the surrounding paddock was ploughed specifically to control WMG. 2019 was a very dry year and it was observed that cultivation successfully controlled the existing WMG population. When the final assessment was conducted in May 2020 there had been drought breaking rains (~260 mm) in the preceding months, causing a significant reinfestation. This observation reiterates the difficulties with controlling WMG. Given control over the existing population provided by cultivation, and the longer term control provided by residual herbicide, investigations that combine these options is worthy of consideration.

Conclusion

UnReg1+PQ can be effective in controlling WMG

Using UnReg1+PQ as part of a double knock strategy for controlling other fallow weeds did not reduce its efficacy on unstressed WMG when applied 4 days after the initial application.

The timing of application of UnReg1+PQ post rain may influence its short term performance and warrants further investigation.

Acknowledgements

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Appendix 1. Data and analysis

First Application	Second Application	Control 47 DAA		Control 323 DAA		Biomass Reduction 510 DAA*	
		p.v. ¹	lsd ²	p.v. ¹	lsd ²	p.v. ¹	lsd ²
UnReg1+PQ	Untreated	64.4	b	59.5	b	50.0	abc
Untreated	UnReg1+PQ	90.0	a	30.0	c	26.7	bcd
Roundup CT	UnReg1+PQ	88.9	a	58.3	c	66.7	ab
Roundup CT Ally	UnReg1+PQ	92.2	a	55.6	c	70.0	a
Roundup CT Amicide Advance	UnReg1+PQ	93.3	a	72.3	c	71.7	a
Roundup CT Garlon	UnReg1+PQ	88.9	a	53.1	c	46.7	abc
Roundup CT LVE Ester 680	UnReg1+PQ	90.0	a	79.6	c	46.7	abc
Roundup CT Sharpen	UnReg1+PQ	91.1	a	63.8	c	21.7	cd
Roundup CT Starane Advance	UnReg1+PQ	86.4	a	33.0	c	45.0	abcd
Roundup CT Tordon Fallow Boss	UnReg1+PQ	94.4	a	66.6	c	63.3	abc
Untreated Control		0.0	c	0.0	a	3.3	d
Isd		11.3		35.8		42.0	

* 17 months after herbicide application

¹ predicted value

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