GOA Trial Site Report

Impact of delaying the application of (i) unregistered 1[1] herbicide + paraquat and (ii) Targa™ with double knock of paraquat on the control of Windmill grass (*Chloris truncata*)

Trial Code: GOWE05518-2

Year: Summer 2017/18

Location: 'Sheldons', Collie, NSW

Collaborators: Dean Walton

Keywords

GOWE055, Windmill grass, Double knock, Tank mixes, Herbicide resistance, Targa™, Paraquat, *Chloris truncata, Collie*

Take home messages

Timing of herbicide options using either a mixture of an unregistered herbicide (UnReg1) and paraquat (PQ) or Targa followed by a double knock of paraquat (TfbPQ) influences level of control when targeting Windmill Grass. Best timing is likely related to the plant growth, especially timing after rain, and warrants more investigation.

Current recommendation would be to use Targa™ fb paraquat as soon as possible after (a significant) rain, while delay using UnReg1+PQ for several days (but not weeks).

Background

Previous GOA trials found that a combination of an unregistered herbicide (UnReg 1) plus paraquat (PQ) can provide very effective knockdown control of mature Windmill grass (WMG) *Chloris truncata* when used as a single pass, standalone treatment. Similarly, there is a minor use permit[2] for the use of Targa™ followed by a double knock of paraquat (TfbPQ) for WMG control in summer fallows. However, level of control tended to be variable. This inconsistency is thought to be because of application timing after rainfall and its effect on residual herbicide activity, combined with impact of soil moisture and plant stress.

One possible way to address herbicide performance variability, is to assess if application timing effectiveness is related to rainfall amount and timing. Also if subsequent WMG growth has any relationship to herbicide efficacy. Previous GOA research suggested that efficacy of glyphosate or Targa™ tended to decline 2-3 weeks after rain. Similar research has not been undertaken with UnReg 1+PQ, nor Targa™ followed by paraquat.

[1]Experimental 1 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)

[2] Minor permit number PER13460 http://permits.apvma.gov.au/PER13460.PDF

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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

Determine if effectiveness of WMG control by UnReg1+PQ herbicide mix or Targa™ double knock paraquat, changes in relation to time passing since a 'growth' rain event.

Method

Two small scale split plot trials with three replications were established in summer 2017/18 at Collie and Wongarbon (see separate report). There was a uniform thick population of WMG, with many plants at flowering stage. Good rain in early December (40-50 mm) ensured that WMG was fresh at initial time of application.

All treatments were applied in a water volume of 100 L/ha through AIXR110-015 (coarse) nozzles at 3bar. A brownout score was conducted in January 2018 and a plant count was conducted later on the 24th April.

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 initial herbicide treatments are listed in Table 1 while timings of double knocks are listed in Table 2.

Table 1. Herbicides, rates and abbreviations

Unregistered product 1 (100 mL/ha) + paraquat (2000 mL/ha)	UnReg1+PQ
Targa™ (500 mL/ha) followed by paraquat (2000 mL/ha) applied at 8 days	TfbPQ

Table 2. Herbicide application and assessment dates

Event	Notes	Date
Rain		3/12/2017
Timing 1	5 days post rain	8/12/2017
Timing 2	9 days post rain	12/12/2017
Timing 3	13 days post rain	16/12/2017
Timing 4	17 days post rain	20/12/2017
Timing 5	21 days post rain	24/12/2018
Brown Out Assessment		19/1/2018
Final plant count		24/4/2018

Rainfall

The trial paddock contained an established WMG population and had a history of WMG infestations. It is possible that October 2017 rain (~100mm) germinated or activated existing WMG populations and a further 62 mm in late November/early December freshened them up. When the initial herbicide

applications were applied early December WMG was flowering and nearing maturity. Rain in late November/early December may have been enough to trigger a further flowering event.

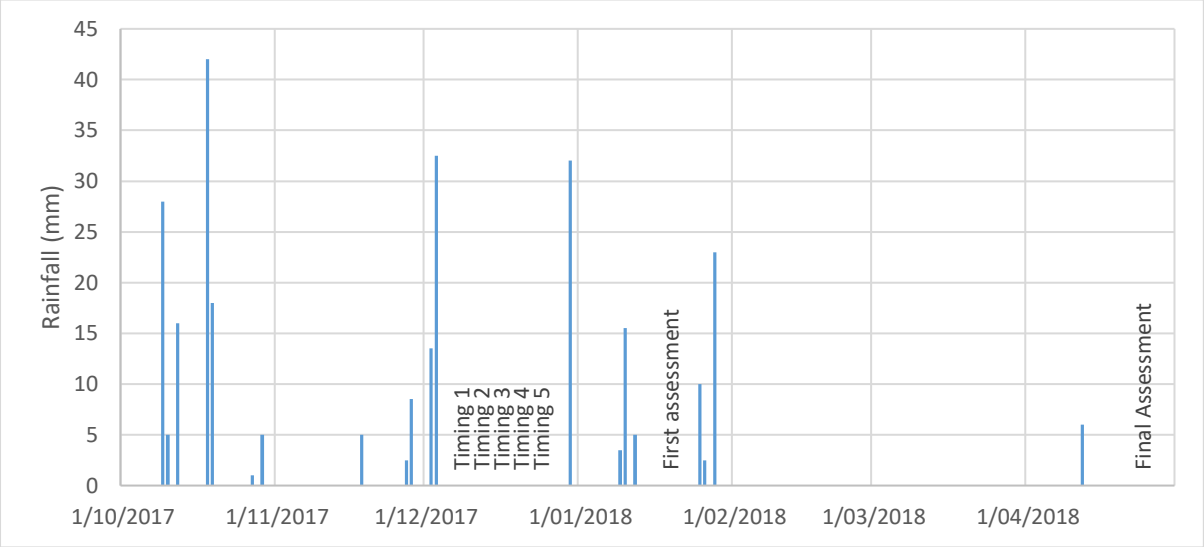

Figure 1. Rainfall (mm) recorded at 'Sheldons'

Results

Full results are available in Appendix 1.

Brown out: A 'brown out' assessment was conducted 42 days after application (DAA) where herbicide impact on plants was compared to unsprayed areas. 100% Brown Out signifies that WMG in those treatments had no green, whereas 0% corresponds to no herbicide effect. Best of the TfbPQ treatments was timing 1, resulting in 83% Brown Out (Figure 2). Only the final timing had a significantly lower score at 55%. Timing 5 treatment was best performing of UnReg1+PQ with 100 % Brown Out, a significant improvement over the two earliest timings, the first with a score of 40%.

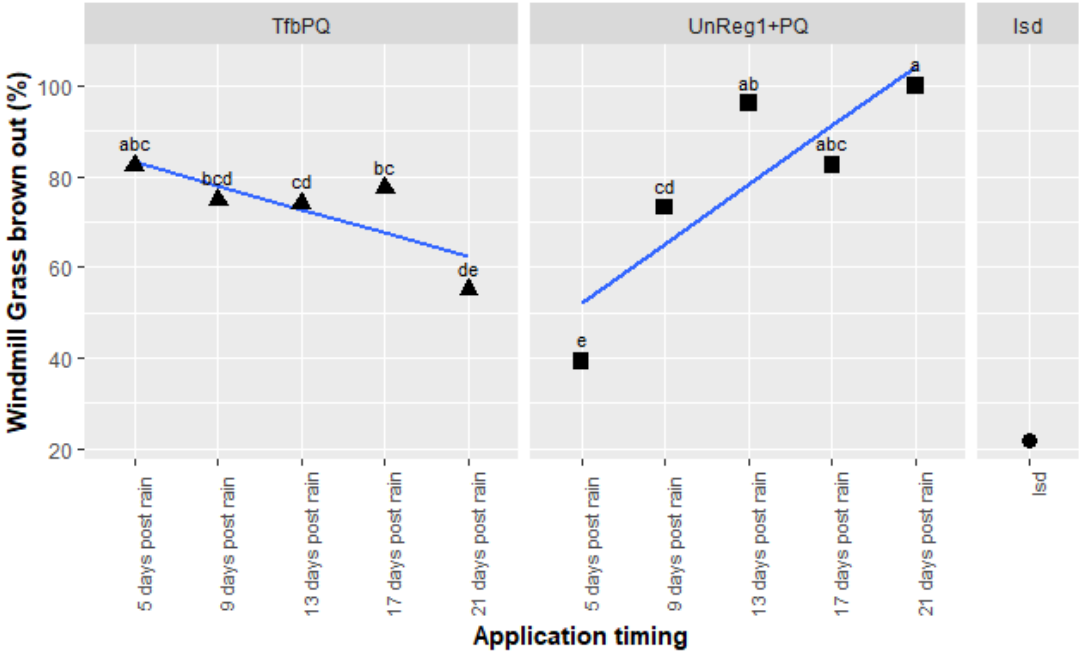

Figure 2. Brownout scores at Collie, 2017/18 (assessed 42DAA).

Plant Counts: Surviving WMG plants, counted in April 2018 (137 DAA), noted significant treatment population differences. Highest surviving population was observed in Timing 1 (5 days post rain) UnReg1+PQ treatment with 26 plant/ m^2, (Figure 3). Lowest surviving population was in UnReg1+PQ treatment, Timing 3 with less than 1 plant/m^2.

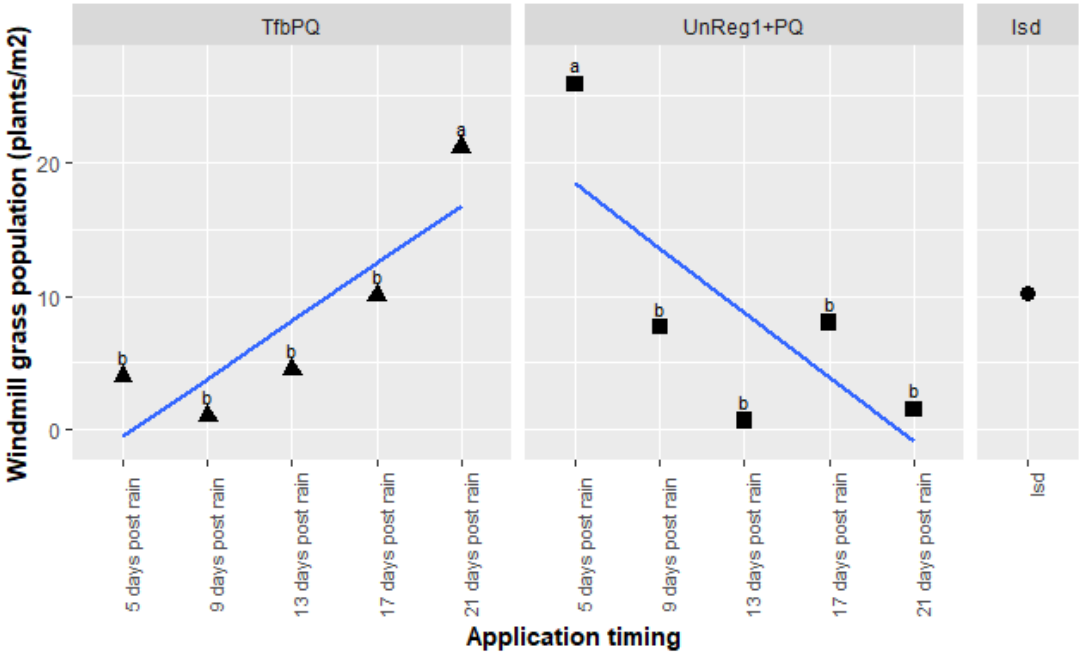

Figure 3. Plant counts 137 DAA at Collie for the various application timings.

Discussion

Moisture conditions at initial timing were close to ideal. WMG plants were actively growing following recent rainfall and temperatures were relatively mild.

High levels of Brown Out were achieved by UnReg1+PQ mix applied 13 days after rain or later. In contrast high levels of Brown Out were achieved with earlier applications of TfbPQ. This pattern was similar when final plant counts were assessed 3 months later.

Neither product stood out in terms of overall performance, i.e. the best performance of UnReg1+PQ was similar to the best of the TfbPQ

Final plant counts of both products suggests that timing of application is important, and might be different from one product to the next. However, it is not clear if the timing differences are caused by plant maturity, moisture stress or other factors. Results of this trial suggest that if using Targa™ followed by paraquat application soon after rain provides better results. If using UnReg1+PQ better results occur from delaying application for several days. It maybe the paraquat component of UnReg1+PQ rendering earlier application less effective compared to Targa™ fb paraquat where the paraquat application is delayed, again this requires further investigation.

Conclusion

Timing of both products can influence level of control. UnReg1+PQ tends to perform better when application is slightly delayed following good rainfall, and warrants more investigation.

Current recommendation would be to use Targa™ fb paraquat as soon as possible after (a significant) rain, while delay use of UnReg1+PQ for several days (but not weeks).

Acknowledgements

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Appendix 1. Data sets

Table 3. Data, Collie

		WMG Counts (137DAA)		Brown Out (42DAA)	
		(plants/m2)		(score)	
Timing	Product	p.v.[1]	lsd[2]	p.v.[1]	lsd[2]
5 days post rain	TfbPQ	4.0	b	82.5	abc
5 days post rain	UnReg1+PQ	25.8	a	39.2	e
9 days post rain	TfbPQ	1.0	b	75.0	bcd
9 days post rain	UnReg1+PQ	7.7	b	73.3	cd
13 days post rain	TfbPQ	4.5	b	74.2	cd
13 days post rain	UnReg1+PQ	0.7	b	96.2	ab
17 days post rain	TfbPQ	10.0	b	77.5	bc
17 days post rain	UnReg1+PQ	8.0	b	82.5	abc
21 days post rain	TfbPQ	21.2	a	55.0	de
21 days post rain	UnReg1+PQ	1.5	b	100.0	a
lsd	lsd	10.2		21.5	

[1] predicted value

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

Bibliography

Butler, D. G. (2017). *ASReml-R.* Hemel Hempstead, HP1 1ES, UK: VSN International Ltd.