

Impact of initial fallow herbicide treatments on the efficacy of an unregistered ¹ herbicide + paraquat when applied as a double knock to control Windmill grass (*Chloris truncata*)

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Collaborators: Dale Foster

Keywords

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Take home messages

Use of a combination of an unregistered herbicide (UnReg 1) plus paraquat (PQ) as a “double knock” (DK) to control windmill grass (WMG) provided limited control. This mix has previously proven effective on WMG fallow control.

It would appear that the first knock herbicides did not interfere with the efficacy of the Unreg1 + PQ as the DK, but it did suggest that delaying the application of Unreg1 + PQ reduced its effectiveness. It is highly plausible that this reduction was caused by excessive heat and moisture stress at application.

Until more is understood about timing of application and the interaction of any previous herbicide applications and the efficacy of UnReg1+PQ it is not advisable to use this mix as double knock (DK). It is also not advisable to use other fallow herbicides in close succession with paraquat until more is known about their best use pattern.

Background

Previous trials by GOA have found that a combination of UnReg1+PQ can provide 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 in combination with 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 to assess is using UnReg1+PQ as a double knock treatment following more conventional weed control herbicides, noting that paraquat is already well used as a strategy of choice for double knocks. The concern, and hence the need for this researching this approach, is do herbicides applied in the first pass affect the efficacy of UnReg1+PQ. This trial has been designed to investigate this question.

¹Experimental 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)

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.

Method

A small split plot trial was established in summer 2016/17. There was a uniform dense population of WMG. However, WMG was in full flower, approaching maturity and growing under rapidly deteriorating hot dry weather conditions.

Herbicide treatments listed in **Table 2** were applied on 21/12/2016 to actively growing WMG. Estimates based on nearby rain gauges indicated the site received around 80 mm rainfall a week prior to initial herbicide application. A rainfall event of approximately 20 mm occurred on 24/12/2016, between the initial application and the first follow-up application of UnReg1+PQ.

Table 1. Dates of application

Initial application	21/12/2016
First timing - UnReg1+PQ	23/12/2016
Second timing - UnReg1+PQ	29/12/2016

On 23/12/2016 and 29/12/2016, 2 and 8 days respectively after the initial applications, a DK treatment containing UnReg1+PQ was applied in strips over the trial site (with the exception of plots that were treated with UnReg1+PQ at the initial timing).

Subsequently very little rainfall was received at the trial site until March 2017, when approximately 100 mm fell. Assessments were made for level of brownout at 100 days after the initial application (DAA) with a final assessment of percentage regrowth made 140 DAA on 12th May 2017.

All treatments were applied with 100 L/ha water volume through AIXR110-015 (coarse) nozzles at 3 bar.

Results were analysed using ANOVA for 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.

Table 2. Herbicides and rates applied in the first application. The double knock contained UnReg1+PQ at 100 and 2000 ml/ha respectively.

Initial Treatment	Rate (mL or g/ha)
Unregistered 1 + paraquat (UnReg1+PQ)	100 + 2000
Roundup® DST® + LVE Ester 680	2000 + 800
Roundup® DST® + Starane™ Advanced	2000 + 900
Roundup® DST®	2000
Targa™	500
Roundup® DST® + Amicide® Advance	2000 + 1600
Roundup® DST® + Targa™	2000 + 500
Roundup® DST® + Ally®	2000 + 7
Roundup® DST® + Garlon™	2000 + 160

Results

All treatments recorded a high proportion of WMG plants browned out 100 DAA, where no differences were observed between the two UnReg1+PQ timings. An assessment of regrowth conducted 142 DAT found no visible differences between the timings in terms of WMG regrowth (Figure 1).

UnReg1+PQ: in this trial there was 3 application timings of UnReg1+PQ;

1. initial timing,
2. first 'double knock'
3. second 'double knock' timings.

In the plant regrowth assessment both DK timings was assessed together, and while the initial application had approximately 17% regrowth, it was not significantly different to the (combined) double knock timings (approximately 37% regrowth).

When assessing effect of initial treatments followed by UnReg1+PQ as a DK, no treatment had more regrowth than where UnReg1+PQ was applied as a double knock at either DK timing. Treatments where Targa™ was applied followed by a DK of UnReg1+PQ had very little regrowth.

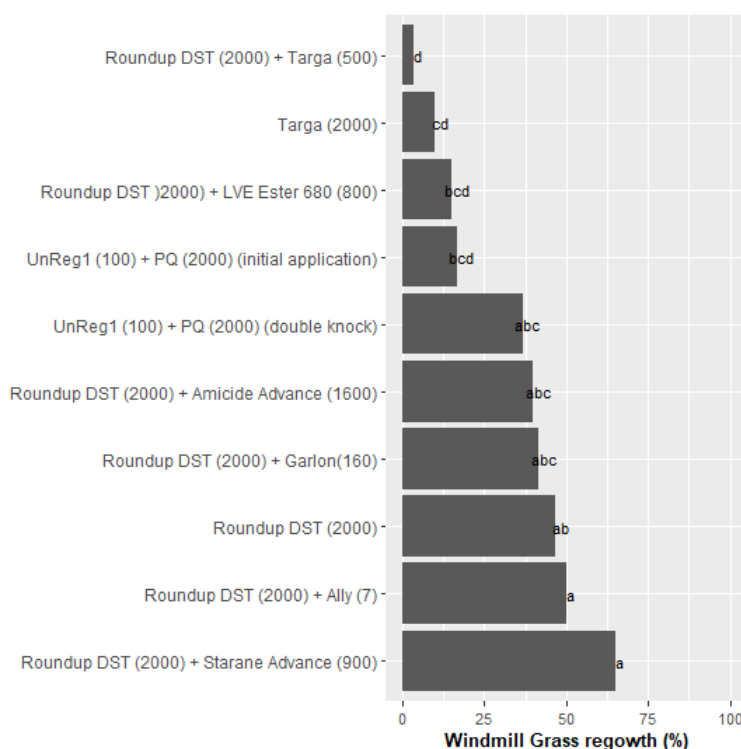


Figure 1. Percentage of plants assessed as showing regrowth 142 DAA following various initial herbicide treatments² followed by a double knocked of UnReg1+PQ.

Discussion

The summer of 2016/17 was very hot and dry, conditions that would be considered marginal at best for optimal herbicide performance. These conditions could have contributed to decreased performance of any herbicides in the control WMG.

There were no untreated plots in this trial, however in a co-located trial it was estimated 100% of WMG in untreated plots regrew. This comparison provides confidence that the performance of herbicides has controlled WMG to varying degrees, some options being better than others.

Results tend to suggest that there is a penalty (in efficiency of WMG control) if delaying application of UnReg1+PQ (for use as a double knock), and this may be attributable to the hot dry conditions. It is curious that the rainfall event on 24th December did not allow for a better result from the later applications of UnReg1+PQ (rainfall records SILO data from Narromine Airport and Alagalah St, Narromine). It is possible that this summer storm may have missed the site.

Application of an initial herbicide did not reduce efficacy of UnReg1+PQ when applied as a DK (when comparing with application of UnReg1+PQ at the DK timing without any initial treatments). While this gives some confidence in the use of this strategy, reduction in efficacy on WMG control from delaying application UnReg1+PQ would suggest otherwise.

Targa™ followed by a DK of UnReg1+PQ provides good levels of control of WMG. However, past research suggests that this may not be any better than Targa™ followed by paraquat, for which there is currently a APVMA minor use permit³.

² The Roundup DST Starane Advance treatment had confounded results and was not included in the analysis.

³ <http://permits.apvma.gov.au/PER13460.PDF>

Conclusion

UnReg1 + PQ in this trial has not achieved acceptable levels of control of WMG when used as a DK. Circumstantial evidence suggests that failure to achieve acceptable control was caused by WMG moisture stress.

Results tend to suggest that initial application of an alternative herbicide did not reduce efficacy of UnReg1+PQ on WMG.

This research reinforces previous WMG research that suggests it is prone to developing moisture stress rapidly and when this occurs, herbicide control is far less effective.

Until further evidence is available, it may be safest to assume that there is potential negative impact to final control from using UnReg1+PQ as a DK. This could be because of delay in application of an effective herbicide in combination with using UnReg1+PQ.

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