

Impact of initial fallow herbicide treatments on the efficacy of an unregistered 1¹ herbicide + paraquat when applied as a double knock to control Windmill grass (*Chloris truncata*)

Trial Code: GOWE04616-2
Season/Year: Summer 2015/16
Location: 'NDF', Narromine
Collaborators: Dale Foster

Keywords

GOWE04616-2, Windmill grass, Double knock, Tank mixes, Herbicide resistance, Paraquat, *Chloris truncata*, Narromine

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) resulted in a failure. This mix has been previously shown to be effective on WMG.

It is unclear whether the first knock herbicides interfered with the efficacy of the Unreg1 + PQ as the DK, or whether it was due to moisture/plant stress resulting from the very hot dry conditions following the first treatment.

Until more is understood around the interaction of any previous herbicide applications and the efficacy of UnReg1+PQ it is not advisable to use this mix as a DK. Or in close succession to the use of other fallow herbicides.

Background

Previous trials by GOA have found that the combination of 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, the control of the broader range of weeds often present in fallow situations alongside WMG.

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

Another alternative is to use the UnReg1+PQ as a double knock treatment following more conventional weed control herbicides, noting that paraquat is already well accepted as a common product of choice for double knocks. The concern with this approach is whether the herbicides applied in the first pass will 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 the UnReg1+PQ, herbicide mix, is reduced when used as a DK following the application of a range of common fallow herbicide mixes applied in the first knock.

Method

A small split plot trial was established in the summer of 2015/16. At this site, there was a uniform thick population of WMG. However, the WMG was in full flower, approaching maturity and growing under rapidly deteriorating weather conditions.

The herbicide treatments listed in **Error! Reference source not found.** were applied to the trial site on the 8th of February 2016 to actively growing WMG. It can be estimated by nearby rain gauges that the site received around 85mm of rainfall between the 22rd and the 30th of January, around 10 days prior to application.

On the 15th of February, 7 days after the initial applications, a DK treatment containing UnReg1+PQ was applied over the whole trial site, except for the untreated plots at the first application timing. No rainfall fell between the initial application and the DK treatment.

No rainfall was received at the trial site until very late April/ early May. Assessments were made as to the level of brownout at 30 days after the initial application (DAA) achieved within this period with a final assessment of percentage regrowth made 99 DAA on the 17th May following ~59 mm of rainfall.

All treatments were applied in a total volume of 100 L/ha through AIXR110-015 (coarse) nozzles at 3 bar.

Results were analysed using ANOVA 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.

Table 1. Herbicides and rates applied in the first application

Initial Treatment	Rate (mL or g/ha)
Untreated Control (UTC)	
Roundup® DST® + LVE Ester 680	2000 + 800
Roundup® DST® + Starane™ Advanced	2000 + 900
Roundup® DST®	2000
Targa™	2000
Roundup® DST® + Amicide® Advance	2000 + 1600
Roundup® DST® + Targa™	2000 + 500
Roundup® DST® + Ally®	2000 + 7
Roundup® DST® + Garlon™	2000 + 160

Results

In this trial all treatments, including the untreated control (UTC) plots were assessed as having high proportion of the WMG plants browned out 30 DAA as illustrated in **Figure 1**. The untreated plots did have a statistically lower level of brownout but still was assessed as having 95% of WMG plants browned out.

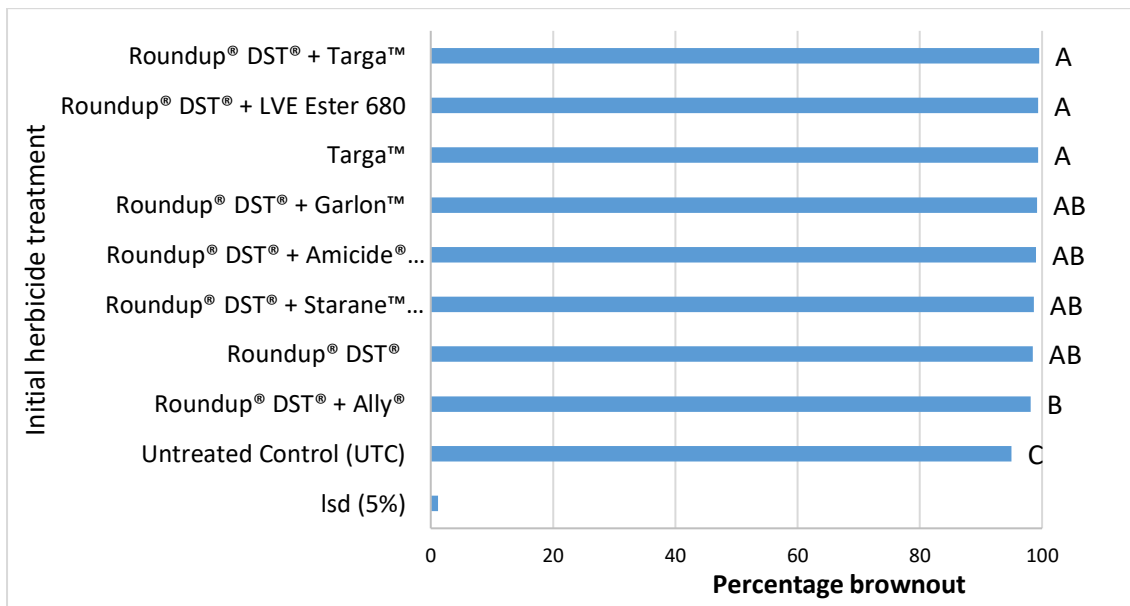


Figure 1. Percentage brown out scores, 30 DAA following various initial herbicide treatments followed by a double knock of UnReg1+PQ

WMG regrowth was assessed at 99 DAA, as detailed in Figure 2 below. There was significant regrowth in all treatments.

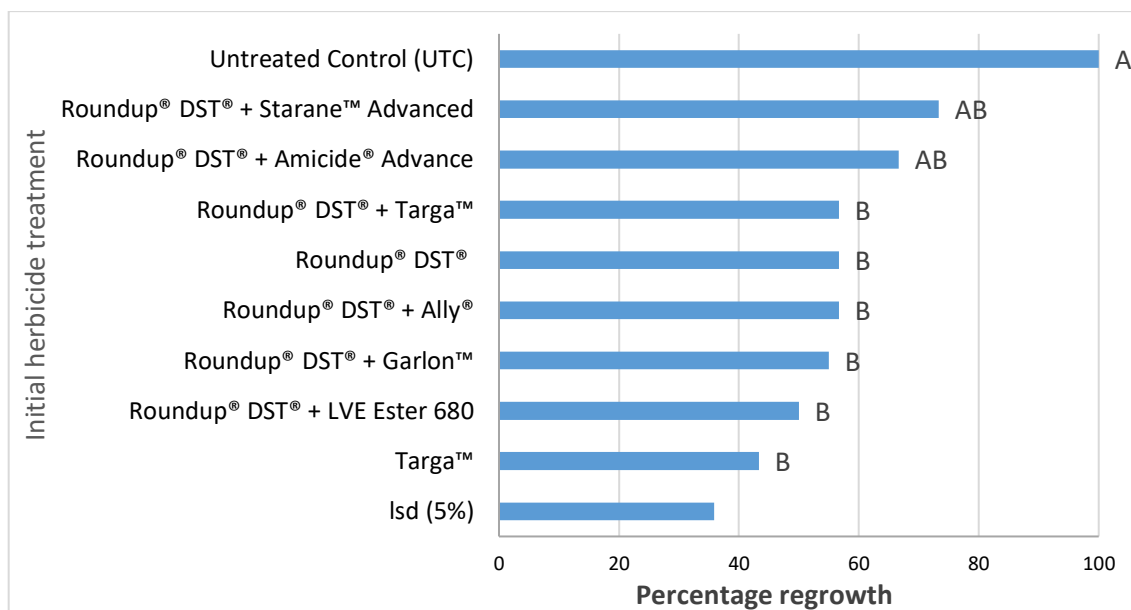


Figure 2. Percentage of plants assessed as showing regrowth 99 DAA following various initial herbicide treatments followed by a double knocked of UnReg1+PQ

Discussion

This trial was conducted under very hot and dry conditions that would be considered marginal at best for optimal herbicide performance. These conditions could have potentially contributed to decreased performance of any herbicides in the control WMG.

Further evidence of this is the early brownout scores. As detailed above, all treatments had high levels of brownout 30 DAA. It is suggested in this case, that this could be largely attributed to the poor growing conditions leading to an early senescence of the WMG, rather than the paraquat component of the DK, as the UTC also had a high brownout score.

99 DAA following good rainfall, the WMG in the UTC plots had recovered with 100% of plants with evidence of fresh regrowth. This reinforces the theory that the WMG had only entered some sort of dormancy phase when measured at the first assessment.

A number of other treatments tested resulted in less regrowth than the untreated as can be seen in Figure 2 but the best performing treatment still resulted in ~43% regrowth which would be considered commercially unacceptable. The use of Targa in the first knock (either alone or in a mixture with Round Up DST), followed by paraquat as part of the DK treatment, which has a minor use permit for the control of WMG, was of limited effectiveness, at best providing only 40-50% control.

However, the question is whether the initial herbicide applications in the first knock contributed to the poor performance of the UnReg1 + PQ when applied as a DK or was it a function of the poor growing conditions experienced by the WMG.

The high level of brown out in the untreated plots and the poor performance of the treatments containing Targa followed by paraquat in the unReg1 + PQ DK tend to support a theory that poor growing conditions could have contributed to the poor performance of UnReg1 + PQ. In another trial co-located adjacent to this site, the UnReg1+PQ treatment was applied seven days earlier than the DK timing in this trial and it resulted in higher levels of control.

Unfortunately, there was not a treatment of UnReg1+PQ applied by itself at either the initial application or the DK timing to confirm this hypothesis. This would have allowed the determination of whether the failure was due to the initial herbicide applications effecting efficacy, or whether developing moisture stress was the cause.

Conclusion

The use of UnReg1 + PQ in this trial has not achieved acceptable levels of control of WMG when used as a DK. This trial has been inconclusive as to whether a range of common herbicide mixes applied before the application of UnReg1+PQ as a DK has resulted in this failure. Circumstantial evidence suggests that the failure to achieve acceptable levels of control was caused by moisture stress in the WMG rather than any interactions between the herbicides applied in the first or second knocks.

This outcome reinforces previous research on WMG that suggests the plant is prone to developing moisture stress very rapidly and when this occurs, herbicide control is ineffective.

Until further evidence is available, it may be safest to assume that there is potential negative impact to the final control achieved by using the UnReg1+PQ as a DK. This could be due to either interference by the various initial treatments or simply the function of the delay in application of the effective herbicide combination of UnReg1+PQ.

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