Comparing double knock treatments of herbicides on feathertop Rhodes grass (NSW pot experiment 2015)

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Key findings

Balance® and haloxyfop, followed by a double knock application of paraquat seven days later produced excellent control of mid-late tillering feathertop Rhodes (FTR) grass.

Atrazine and paraquat, followed by paraquat, was slightly less effective than the Balance® and haloxyfop double knock treatments.

Research questions

1. How effective are a range of double knock treatments, using herbicide groups A, C or H followed by group L to control FTR grass?
2. How do herbicides applied as single treatments compare with double knocking with paraquat?
3. Can effective control be obtained using a split application of paraquat on mid-tillering FTR grass?

Aims

The main aim of the experiment was to determine whether a range of systemic herbicides have the potential to control mid-tillering FTR grass when used in combination with a following application of paraquat, in a double knock control strategy. If successful then such double knock combinations could replace the industry practice of purely relying on glyphosate or paraquat based treatments. The use of more diverse herbicide groups would reduce the resistance selection pressure on Group M (glyphosate) and L (paraquat) products.

Methods

Site

- Tamworth: Tamworth Agricultural Institute glasshouse

Herbicide treatments

- 13 (12 herbicide treatments + one untreated control).

Growth stages

- Late tillering (15 tillers) to inflorescence emergence (Z50–59).

Pot size and design

- 8 cm square pots; one plant per pot, thinned down from two plants
- Randomised complete block design of 13 treatments × six replicates (78 pots)
4. Pots moved outside for two weeks before spraying to simulate plants grown under field conditions.

Spraying

- Herbicides applied using a hand-held boom sprayer; water volume 100 L/ha for all herbicides. Uptake™ spray oil (0.5% v/v) used with all treatments.

Herbicide timing

- 1st application (single) – 9/11/2015; temperature 25.6 °C; relative humidity 49%; wind 9 km/h
- 2nd application (double knock with paraquat) – 16/11/2015; temperature 18.5 °C; relative humidity 51%; wind 10 km/h.

Measurements

- Brownout score 3 days after treatment application (DAT; rating system 0–10 where 0 = green and healthy and 10 = brown and completely dead)
- Biomass control % (visual estimate) compared with untreated control at 14 DAT, 28 DAT and 35 DAT
- Plant count of survivors 35 DAT
- Destructive sampling of green biomass 35 DAT (dry weight, g).
- Note all DAT assessments were following the second double knock herbicide application of paraquat.

Treatments

Trt. No.	Herbicides and rates per hectare	Double knock (DK) or single application
1	Untreated	
2	Balance® 100 g	Single
3	Balance® 100 g + Paraquat (250 g/L) 2 L	DK
4	Atrazine (500 g/L) 6 L	Single
5	Atrazine (500 g/L) 6 L + Paraquat (250 g/L) 2 L	DK
6	Simazine (500 g/L) 3 L	Single
7	Simazine (500 g/L) 3 L+ Paraquat (250 g/L) 2 L	DK
8	Terbuthylazine (750 g/kg) 1 kg	Single
9	Terbuthylazine (750 g/kg) 1 kg + Paraquat (250 g/L) 2 L	DK
10	Haloxyfop (520 g/L) 300 mL	Single
11	Haloxyfop (520 g/L) 300 ml + Paraquat (25 0g/L) 2 L	DK
12	Paraquat (250 g/L) 2 L	Single
13	Paraquat (250 g/L) 2 L + Paraquat (250 g/L) 2 L	DK
Note: All treatments applied at 100L/ha with TT 110-01 nozzles. All treatments had Uptake ™ added at 0.5% v/v		

Results

There were significant increases in the brownout of FTR grass with a double knock application of paraquat when it was preceded by haloxyfop (Trt 11), atrazine (Trt 5), terbuthylazine (Trt 9) or simazine (Trt7)(Figure 1). Balance® (Trt 3) and haloxyfop (Trt 11), followed by paraquat seven days later were the most effective double knock treatments to control mid-late tillering FTR grass with 100% control at 35 DAT (Figure 2 and Figure 3). Atrazine (Trt 5) followed by paraquat was also very effective with 95% control at 35 DAT. A split application of paraquat fb paraquat (Trt 13) provided 91% control of FTR grass at 35 DAT (Figure 2 and Figure 3).

Haloxyfop applied as a standalone treatment (Trt 10) resulted in 95% control at 35 DAT (Figure 2 and Figure 3). The remaining single treatments did not reach commercially acceptable levels of control.

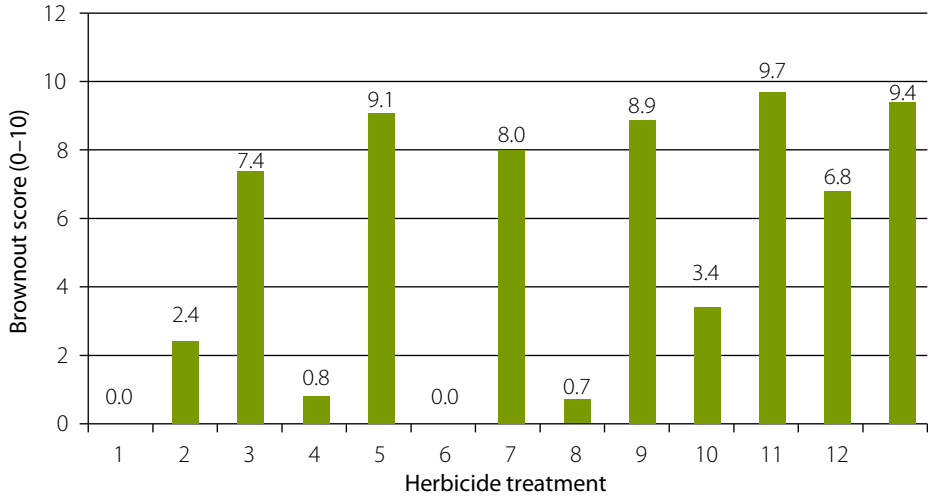

Figure 1. *Brownout score (%) three days after single herbicide applications and double knocking with paraquat on feathertop Rhodes grass*
LSD (0.05) = 0.7

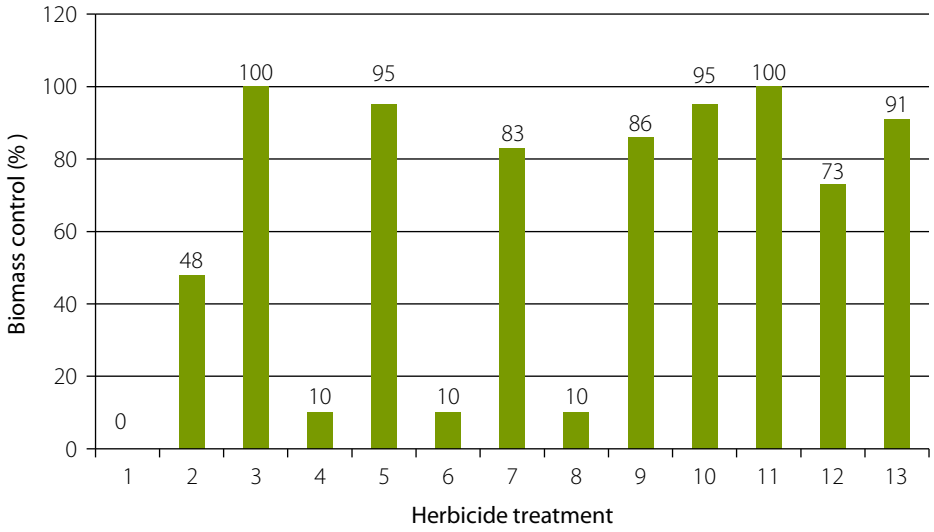

Figure 2. *Biomass control (%) 35 days after single herbicide applications and double knocking with paraquat on feathertop Rhodes grass*
LSD (0.05) = 8

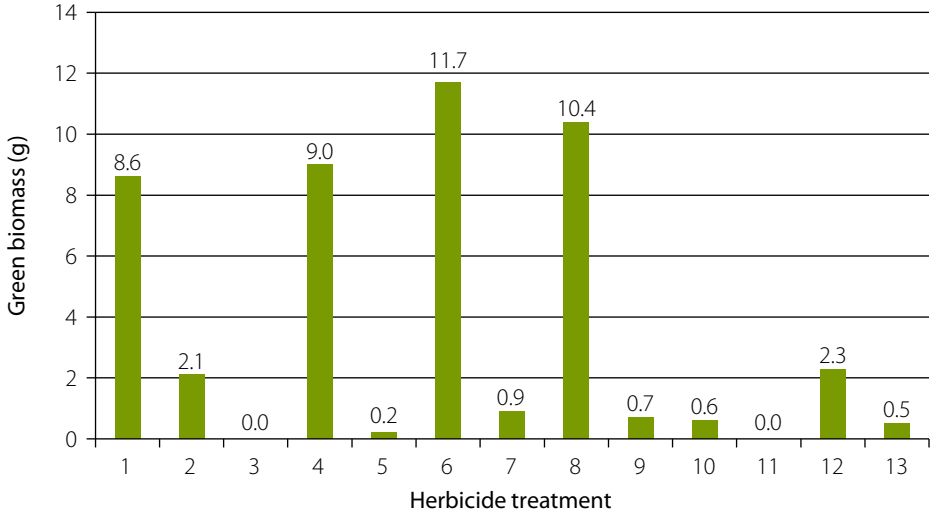

Figure 3. *Green biomass (g) 35 days after single herbicide applications and double knocking with paraquat on feathertop Rhodes grass*
LSD (0.05) = 1.7

Summary

Balance® and haloxyfop, followed by paraquat seven days later in a double knock strategy, produced excellent control of mid-late tillering FTR grass. Atrazine and paraquat followed by paraquat was slightly less effective, with 95% and 91% control, respectively.

Double knock herbicides applications using paraquat as the second treatment appears to be a very effective tool for controlling FTR grass, provided herbicides such as haloxyfop and Balance® are used as the first application. These two treatments have the additional benefit of being an effective double knock strategy against awnless barnyard grass.

Haloxyfop (Group A) applied individually was moderately effective, but should still be used with a paraquat follow-up double knock treatment to minimise the potential of developing group A resistance.

Further experimental work under field conditions investigating these double knock combinations over a range of weed growth stages is required to verify the robustness of these double knock strategies for the control of FTR grass. These double knock strategies might also have further applicability in the control of FTR grass within crops as inter-row sprays in wide row sowing configurations.

Plate 1. *Balance® 100 g/ha compared to Balance® 100 g/ha fb Paraquat (250g/L) 2 L/ha, 35 days after application of the double knock treatment*

Acknowledgements

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