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Comparing double knock and individual herbicide treatments on flaxleaf fleabane (NSW pot experiment 2015)

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Key findings

Double knock applications of some group H containing herbicides followed by paraquat seven days later appear to be a viable alternative to double knocking with Tordon® 75D followed by paraquat for the control of early flowering flaxleaf fleabane.

The most effective group H containing herbicides in combination with paraquat as double knock treatments were Precept®, Balance® and Velocity® in order of effectiveness of their control of early flowering flaxleaf fleabane.

Research questions

1. How effective are a range of double knock treatments, using group H containing herbicides followed by group L on the control of flaxleaf fleabane?
2. How do herbicides applied as single treatments compare with double knocking with paraquat?

Aims

The main aim was to determine the efficacy of a range of herbicide treatments or double knock strategies on the post-emergence control of flaxleaf fleabane. Development of new herbicide treatments with alternate modes of action to the standard Group I and L double knock approach currently used by growers are likely to reduce resistance selection pressure on Group I chemistry.

Methods

Site

- Tamworth: Tamworth Agricultural Institute glasshouse

Treatments

- 12 (11 Herbicide treatments + one untreated control)

Growth stages

- Early flowering (30–40 cm tall).

Pot size and design

- 8 cm square pots; one plant per pot, thinned down from two plants
- Randomised complete block design of 12 treatments × six replicates (72 pots)
- 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.

Timing

- 1st application (single) – 24/09/2015: temperature 11.4 °C; relative humidity 50%; wind 1 km/h
- 2nd application (double knock with paraquat) – 1/10/2015; temperature 29 °C; relative humidity 26%; wind 7 km/h.

Measurements

- Brownout score three days after treatment (DAT) (rating system 0–10; where 0 = healthy and green and 10 = brown and completely dead)
- Biomass control % (visual estimate) compared with untreated control at 14, 28 and 56 DAT
- Plant counts of survivors 56 DAT
- Destructive sampling of green biomass 56 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	Herbicide group	Double knock (DK) or single application
1	Untreated		
2	Balance® 100 g	H	Single
3	Balance® 100 g fb Paraquat (250 g/L) 2 L	H fb L	DK
4	Tordon® 75-D 700 mL	I	Single
5	Tordon® 75-D 700 mL fb Paraquat (250 g/L) 2 L	I fb L	DK
6	Velocity® 500 mL	H/C	Single
7	Velocity® 500 mL fb Paraquat (250 g/L) 2 L	H/C fb L	DK
8	Precept® 1 L	H/I	Single
9	Precept® 1 L fb Paraquat (250 g/L) 2 L	H/I fb L	DK
10	Experimental BCP 250 mL	H	Single
11	Experimental BCP 250 mL fb Paraquat (250 g/L) 2 L	H fb L	DK
12	Paraquat (250 g/L) 2 L	L	Single
Note: All treatments applied at 100L/ha with TT 110-01 nozzles. All treatments had Uptake™ added at 0.5% v/v Fb = followed by			

Results

Paraquat (Trt 12) was effective as a standalone treatment with 87% control at 28 DAT (Figure 1) and 100% control at 56 DAT (Figure 2). The remaining single application herbicide treatments had significantly lower levels of efficacy ranging from 5 to 54% at 28 DAT (Figure 1) and 5 to 67% at 56 DAT (Figure 2).

Precept® (Trt 9) and Tordon® 75-D (Trt 5) double knock treatments with paraquat achieved 100% control on early flowering fleabane by 56 DAT (Figure 2). Balance® (Trt 3) and Velocity® (Trt 7) double knock treatments with paraquat achieved lower but acceptable levels of control of 92% and 88% by 56 DAT, respectively (Figure 2).

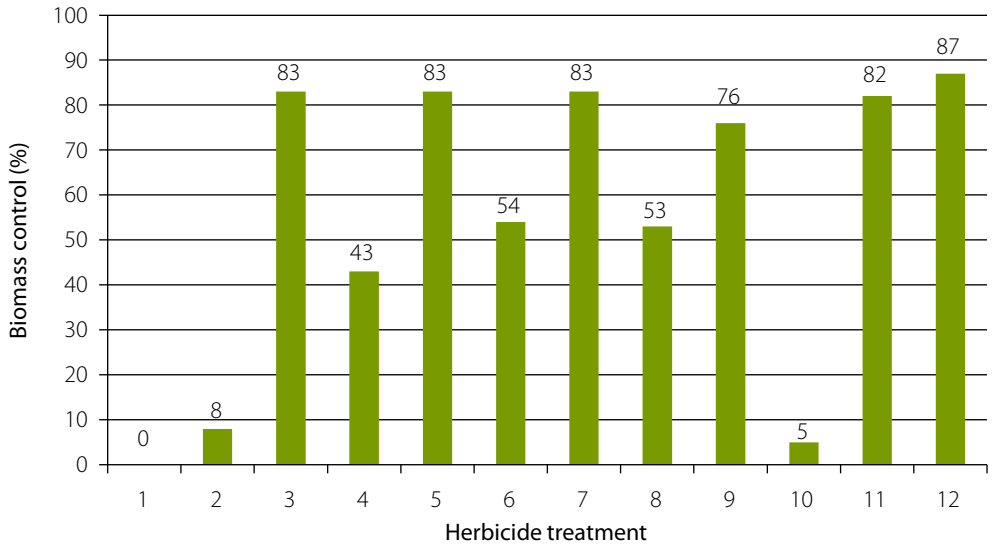

Figure 1. *Biomass control (%) 28 days after single herbicide applications and double knocking with paraquat on flaxleaf fleabane*
LSD (0.05) = 10

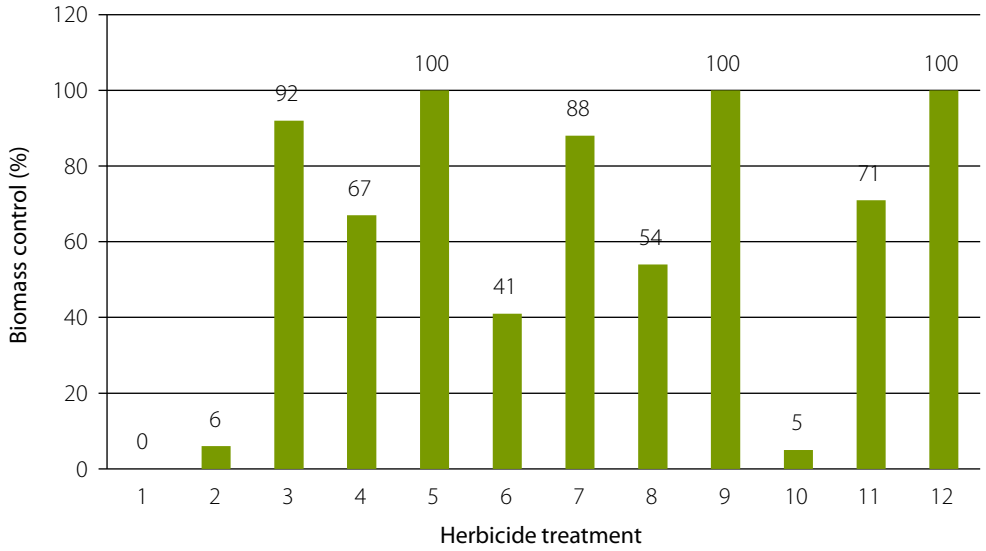

Figure 2. *Biomass control (%) 56 days after single herbicide applications and double knocking with paraquat on flaxleaf fleabane*
LSD (0.05) = 15

Summary

Double knock applications of some group H containing herbicides followed by paraquat (group L) seven days later appear to be a viable alternative to double knocking with Tordon® 75D (group I) followed by paraquat (group L) for the control of early flowering flaxleaf fleabane.

The most effective group H containing herbicides in combination with paraquat as double knock treatments were Precept®, Balance® and Velocity® in order of effectiveness. The Tordon® 75-D double knock treatment resulted in 100% control by 56 DAT. Notably, paraquat as a standalone treatment was 100% effective after the same period, whilst the remaining single herbicide application treatments did not provide adequate levels of control. For these effective herbicide treatment options to achieve registration, they will need to be re-evaluated in future field experiments for consistency and effectiveness over a range of flaxleaf fleabane growth stages.

It appears that the best option currently to control flaxleaf fleabane is probably to double knock, because a comparative experiment that investigated tank mixing paraquat with a range of Group H herbicides achieved lower level of flaxleaf fleabane control. However, more research on tank mixing systemic herbicides with paraquat is recommended as these options could still be a reasonable control option against younger and hence smaller fleabane plants.

Plate 1. *Tordon® 75-D 700 mL/ha compared to Tordon®75-D 700 mL/ha followed by Paraquat 2 L/ha, 56 days after application of the double knock treatment*

Acknowledgements

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