Comparing double knock and individual herbicide treatments on common sowthistle (NSW pot experiment 2015)

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Key findings

Double knock applications of group H containing herbicides followed by paraquat seven days later appear to be very effective in controlling early flowering common sowthistle.

Paraquat and Velocity® were also very effective as standalone treatments in controlling early flowering common sowthistle.

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 common sowthistle?
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 common sowthistle. 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 (50 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.

Herbicide timing

- 1st application (single) – 24/09/2015: temperature 16 °C; relative humidity 42%; wind 11 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 the only herbicide which caused significant brownout of common sowthistle 3 DAT when applied as a single application (Figure 1). All double knock treatments significantly reduced the initial level of brownout of common sowthistle compared to paraquat alone (Trt 12)(Figure 1). The magnitude of decreases in early brownout was modest and had no implications on longer-term (56 DAT) control but did appear to still have reduced activity at the 28 DAT assessment (Figure 2).

Paraquat (Trt 12) was very effective as a standalone single application treatment with 98% control at 28 DAT and 100% control at 56 DAT (Figure 2 and Figure 3). Velocity® (Trt 6) also attained excellent control as a single application with 82% and 100% control at 28 DAT and 56 DAT, respectively (Figure 2 and Figure 3). However, the remaining single application treatments (Trt 2, 4, 8 and 10) did not provide commercially acceptable levels of common sow thistle control (29–82%) even by the 56 DAT assessment (Figure 3).

All of the double knock treatments with paraquat (group L) produced 100% control at 56 DAT (Figure 3). However, they all took longer than a single application of paraquat to achieve complete control with between only 74–83% control at 28 DAT compared to 98% with the single paraquat application treatment (Trt 12) (Figure 2).

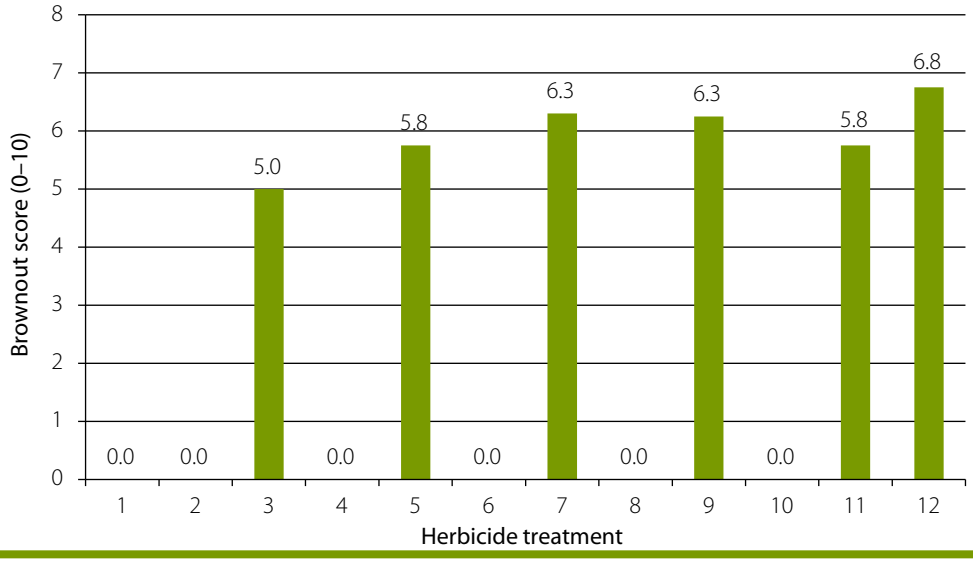

Figure 1. *Brownout score (%) three days after single herbicide applications and double knocking with paraquat on common sowthistle*
LSD (0.05) = 0.4

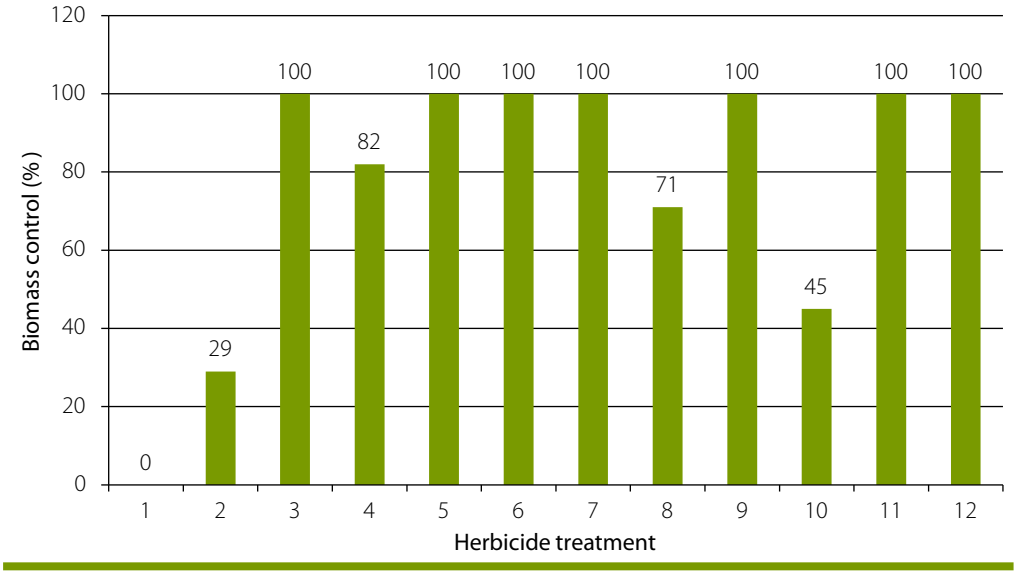

Figure 2. *Biomass control (%) 28 days after single herbicide applications and double knocking with paraquat on common sowthistle*
LSD (0.05) = 10

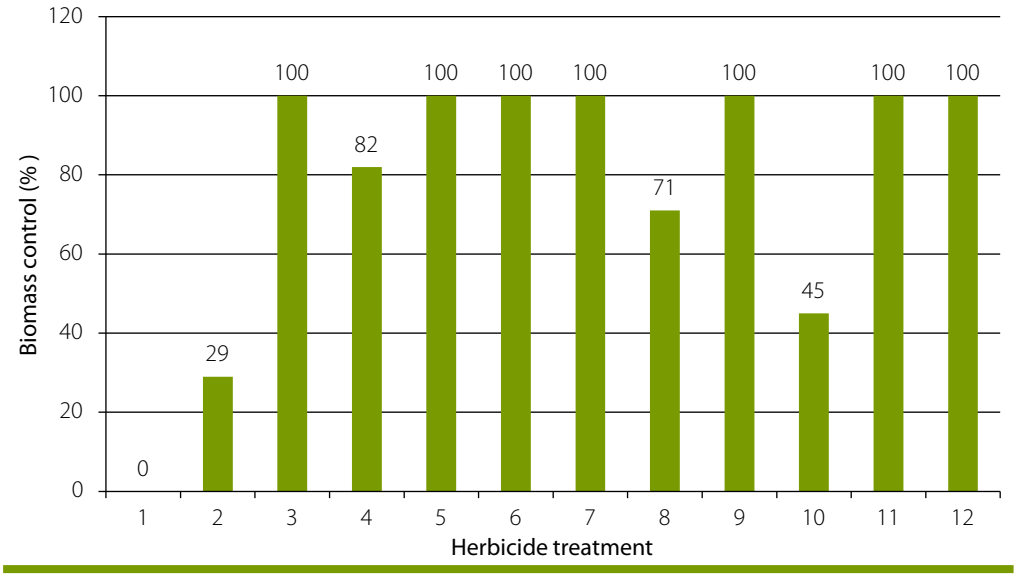

Figure 3. *Biomass control (%) 56 days after single herbicide applications and double knocking with paraquat on common sowthistle*
LSD (0.05) = 18

Summary

Early flowering common sowthistle appears to be very effectively controlled with double knock applications of a range of group H containing herbicides followed by paraquat (group L) seven days later. Paraquat (group L) and Velocity® (group H/C) also appear very effective as standalone single application treatments.

Further experimental work under field conditions investigating these double knock combinations and single applications of paraquat or Velocity® over a range of weed growth stages is required to verify the robustness of these double knock strategies for the control of common sowthistle. Some of these potentially viable herbicide options appear even more promising as they have activity against other common weed species such as awnless barnyard grass, feathertop Rhodes grass and flaxleaf fleabane.

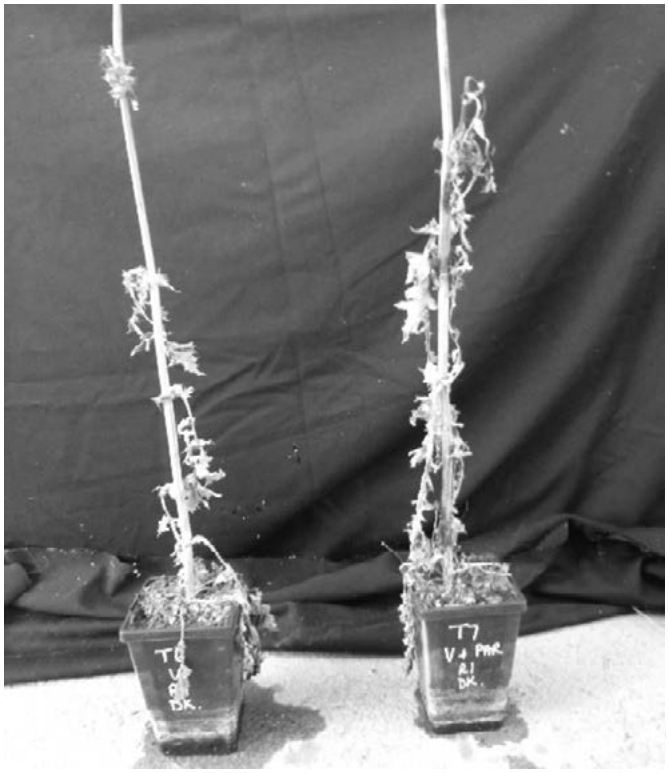

Plate 1. *Velocity® 500 mL/ha compared with Velocity® 500 mL/ha followed by Paraquat (250 g/L) 2L/ha, 56 days after application of the double knock treatment*

Acknowledgements

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