

Controlling button grass (*Dactyloctenium radulans*): an emerging summer weed in the northern agricultural region of Western Australian wheatbelt

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Key messages

- Herbicides were more effective in controlling button grass when applied at seed set stage under mild autumn conditions than at the seedling or rosette stage under harsh summer conditions.
- Glyphosate at upper rate alone or as tank mix with 2,4-D Ester were highly effective on button grass when applied at seedling and rosette stage. In contrast, lower rates of glyphosate alone or as tank mix with phenoxy herbicides provided 100% control of button grass when applied at seed set stage under mild autumn conditions. Para-trooper® alone was also equally effective when applied at seed set stage during mild autumn.

Aims

Button grass (*Dactyloctenium radulans*) is an emerging summer weed that emerges in spring to early summer; grows vigorously depleting moisture and nutrients from the soil profile and can reduce the yield potential of the following winter crop in Western Australia.

To enable effective button grass management strategies, further investigation is required into the optimum time of spray application and the efficacy of available herbicides. If the button grass that is mainly found in the northern agriculture regions such as Mullewa is not sprayed at the seedling stage, then this weed may grow profusely to a diameter of 0.5 m, producing large number of primary and secondary tillers and seed heads. It is also difficult to control button grass when stressed plants are sprayed during hot summer days (Thompson 2011).

Button grass has the ability to produce large quantities of seed and rapidly colonise an area. One button grass plant can grow up to 0.5 m diameter and have up to 45 primary tillers, 12 of which will be creeping on the ground and the rest growing erect. Each creeping tiller can produce 7-8 secondary tillers and 2-3 seed heads per tiller. Each seed head carries 7-11 spikes with 5-11 seed/spike. Button grass can potentially produce about 8000 seed/plant or 8000 - 32,000 seed/m². Each of the creeping primary tillers develops roots from nodes into the ground providing anchorage and ability to absorb water and nutrients.

While it is important to determine the efficacy of herbicides to control this summer weed, there is little information available on the efficacy of herbicides on this weed during summer fallow and its effect on the growth of winter grain crops.

The aim of the trial was to examine the efficacy of herbicides to control button grass at different growth stages during the 2015 summer/autumn fallow under comparatively harsh and mild conditions.

Methods

Trial in paddock (Trial 1)

Trial 1 was conducted in a paddock with wheat stubble from February to March, 2015 at Mullewa. The site received 26 mm rain in February and 125 mm in March (10 mm on 1/3/2015, 51 mm on 2/3/2015 and 62 mm on 14/3/2015). The initial density of button grass was counted on 19/2/2015 from two fixed locations per plot using a 2 m x 1 m quadrat. Thirteen herbicides either applied alone, in sequence or as tank mixes (Figure 1) were sprayed on 24/2/2015 followed by 2nd spray on 27/2/2015. An untreated control was used to compare the weed control efficacy. Since the day temperature was around 40 °C, herbicides were sprayed before 8:30 am.

Initial weed control efficacy (as percent of the untreated control) was determined 2 weeks after spraying by visual assessment and as well as by counting the plant survival within the fixed quadrats in each plot. Untreated control plots were sprayed to kill all surviving plants at the end of the trial. All plots were GPS logged and identifiable during the winter cropping season.

Trial along fenceline (Trial 2)

Trial 2 was conducted from April to May 2015 along the fenceline of the same paddock as Trial 1. Button grass plants in Trial 2 were at seed set stages at the time of spraying. The treatments are listed in Figure 2 and include two rates of some herbicides in addition to tank mixes. Herbicides were applied on 10/4/2015 (day temperature 27 °C) and herbicide efficacy was assessed on 22/4/2015.

Design and analysis

Both the trials were laid out in a randomised complete block design with 4 replications in Trial 1 and 3 replications in Trial 2. The unit plot size was 20 m x 2 m in Trial 1 and 4 m x 4 m in Trial 2. Data on the weed control percentage were subject to ANOVA and means were compared by LSD at 5%.

Results

Trial in paddock (Trial 1)

Counting before spraying showed that average button grass density in Trial 1 was 13 plants/m², comprising 73% plants at seedling, 9% at rosette and 18% at early flowering stages.

When applied in the early morning of a hot day in February (day temperature around 40 °C) in Trial 1, only glyphosate at upper rate with or without tank mixes with 2,4-D ester was found effective in controlling button grass regardless of plant growth stages (Figure 1). Thompson (2011) also found similar results in the Mullewa area with glyphosate. Para-Trooper® at upper rate controlled button grass by 78% when applied during the hot summer conditions of February 2015 (Figure 1). None of the other herbicides or mixtures of herbicides or double knockdowns were effective on button grass when treated in February at the seedling or rosette stage, because glyphosate rate used in double knockdowns was rather low. In some treatments, surviving button grass plants were affected to variable degrees by herbicides but plants started to regrow 3 weeks after spraying.

Trial along fenceline (Trial 2)

When treated in April (mild autumn temperature) at seed set stage in Trial 2, a range of herbicides including glyphosate, were highly effective on button grass even at 2/3rd or lower rates of the application in Trial 1 (Figure 2). Glyphosate alone, Para-Trooper® alone and mixtures of Glyphosate with phenoxy herbicides or Garlon® were highly effective on button grass. However, Garlon®, MCPA or 2,4-D ester did not control button grass when applied alone.

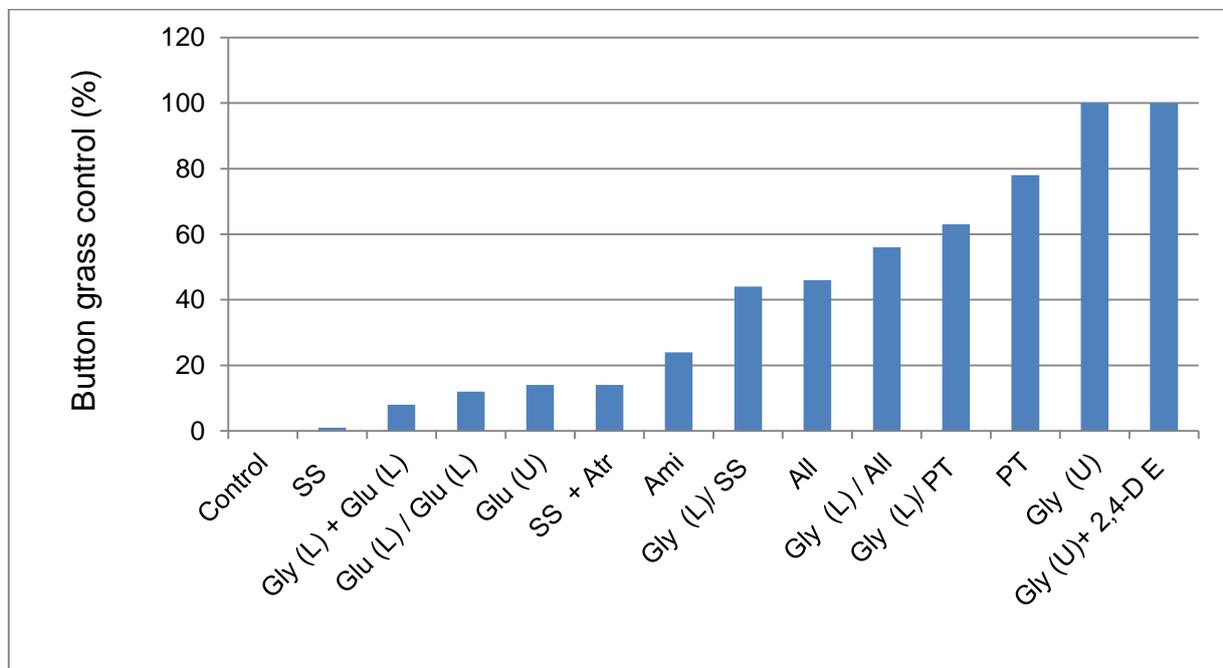


Figure 1. Effect of different herbicide treatments applied at seedling and rosette stage during hot summer time on the control of button grass in a Mullewa field in 2015. SS = Spray.Seed® (paraquat 135 g/L + diquat 115 g/L), Gly = glyphosate 570 g/L, Glu = glufosinate 200 g/L, Glu/Glu = glufosinate/glufosinate, All = Alliance® (paraquat 125 g/L + amitrole 250 g/L), PT = Para-Trooper® (paraquat 250 g/L + amitrole 10 g/L), 2,4-D E = 2,4-D ester 680, Ami = Amitrole® (250 g/L), Atr = atrazine (500 g/L); L = lower rate, U = upper rate; '+' = tank mixes; '/' = applied in sequence; P-value = <.001, LSD_(5%) = 17.3.

The results from Trial 1 and 2 have demonstrated that when spraying to control button grass during hot summer days, it is important to keep the rate of glyphosate up and complete spray application during the early hours of the day to ensure efficacy. To control button grass during mild autumn conditions, glyphosate and other herbicides are highly effective at much lower rates than the summer application.

Conclusions

Changes in farming systems, farm management practice and climate are resulting in changing summer weed spectrum (such as button grass) particularly in the Geraldton zone of the western region. The button grass plants emerge in summer and if not sprayed at early seedling stage, then the harsh summer conditions stress the plants, making them more difficult to control with herbicides (Thompson 2011).

This preliminary study suggests that single knockdown alone or tank mix treatments of glyphosate were effective at the upper rate to control button grass during hot summer applications in the Geraldton zone of WA. However, when sprayed during mild autumn (April) when day temperature was around 27 °C or lower, glyphosate and Para-Trooper® and all glyphosate-based tank mixes were highly effective even at about the 2/3rd or lower rates of summer application.

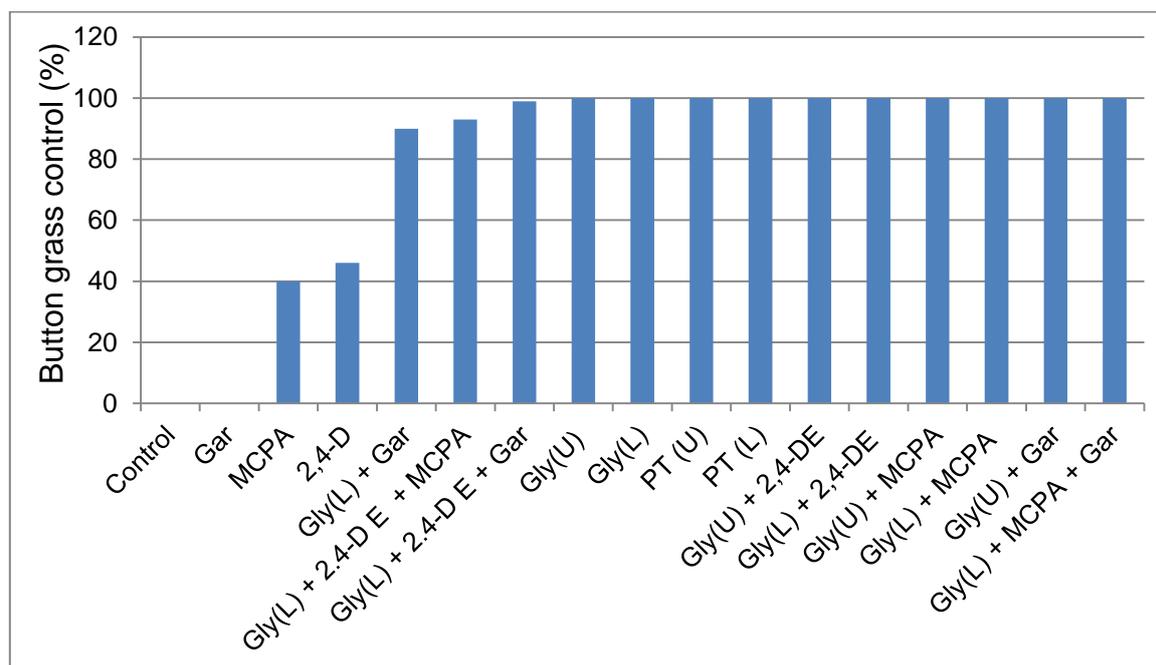


Figure 2. Effect of different herbicide treatments applied at seed set stage during mild autumn conditions on the control of button grass along fenceline at Mullewa from April to May 2015. Gly = glyphosate 570 g/L, MCPA = MCPA 570 g/L, 2,4-D E = 2,4-D ester (2,4-D 680 g/L), Gar = Garlon 600 (triclopyr 600 g/L), PT = Para-Trooper® (paraquat 250 g/L + amitrole 10 g/L); L = lower rate, U = upper rate ; '+' = tank mixes; P-value = <.001, LSD_(5%) = 22.9.

A wheat crop was sown in the Trial 1 area by the grower in 2015 season. Weeds spectrum during the spring season and the growth of wheat crop were monitored to assess any detrimental effect of button grass and the herbicide treatments on winter wheat. No button grass appeared to have emerged in wheat crop during spring season and no visual effect of button grass control treatments was found in wheat crop.

Key words

Button grass control, knockdown herbicides, double knockdown, tank mixes, summer weed control.

Acknowledgments

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