Department of Primary Industries
Department of Regional NSW

NSW research results

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Key findings

The first population of glyphosate resistant (GR) sweet summer grass, found near Emerald in central Queensland, can survive rates of glyphosate between 450 mL/ha up to 2 L/ha, 28 days after application. The registered rates of application for moderate sized plants is between 800 mL and 1.6 L/ha.

Rates as low as 250 mL/ha of glyphosate controlled susceptible populations under glasshouse conditions.

The resistant population appears to have at least an 8-fold level of resistance as the extent of control with 250 mL/ha on a susceptible population was slightly higher than the response of 2 L/ha on a resistant population.

Growers in Central Queensland need to consider and use alternative control options for this weed to prevent or minimise the development of further such glyphosate resistant cases.

Plants grown under glasshouse conditions are likely to be more susceptible to herbicides and it is likely that glyphosate rates higher than 2 L/ha may not be enough to control GR sweet summer grass in the field, especially under less favourable conditions.

Dose responses of glyphosate resistant and susceptible biotypes of sweet summer grass (*Brachiaria eruciformis*) at the early tiller growth stage – 2014

Tony Cook, Bill Davidson and Bec Miller
NSW DPI, Tamworth

Introduction

The first population of glyphosate resistant (GR) sweet summer grass was found near Emerald in central Queensland in 2014. This study aimed to determine the rate response interaction of this GR sweet summer grass population to the application of glyphosate. Rate response data was used to determine the level of resistance of the GR population compared to a susceptible sweet summer grass population. The glyphosate application rates investigated were choose to cover standard commercial boom spray and optical spray technology rates.

Experiment details

Location:	**Tamworth Agricultural Institute, glasshouse**
Treatments:	**Factorial designed experiment with 5 herbicide rates, 2 biotypes (populations – resistant and susceptible), 1 growth stage and 5 replications**
Application:	**Early tillering plants (3 to 5 tillers)**
	Biotypes (populations): Susceptible standard and a GR confirmed biotype sourced from a property north of Emerald
Application rates:	**Glyphosate 450 g/L at 0, 0.25, 0.5, 1, 2, 4 and 8 L/ha (all application using non-ionic surfactant at 0.2% v/v – 200 mL surfactant/100 L water)**
Design:	**Five replicates per treatment. A total of 70 pots used (2 biotypes × 7 rates × 5 replicates)**
Nozzles:	**TT 110-01 nozzles with pressure of 2 bars with speed of application designed to deliver a water rate of 100 L/ha**

Special notes:

The sweet summer grass seed was sown in a heavy clay soil to promote germination and then transplanted at the 3 leaf stage to the experimental pots that contained potting mix.

Plants grown in glasshouse through most of the experiment, however one week prior to spraying they were grown outside to 'harden-up'. After herbicide application the plants were taken back to the glasshouse for the duration of the experiment.

Measurements: a) Biomass rating (% of untreated) of whole pot using visual assessment at 14, 28 and 42 days after each treatment (DAT), b) plant counts of survivors at 28 and 42 DAT and c) destructive biomass sampling of green material 42 days after each treatment.

Treatments

Herbicide	Rate	Biotype
Glyphosate 450	Nil	Susceptible and resistant
Glyphosate 450	0.25 L/ha	Susceptible and resistant
Glyphosate 450	0.5 L/ha	Susceptible and resistant
Glyphosate 450	1 L/ha	Susceptible and resistant
Glyphosate 450	2 L/ha	Susceptible and resistant
Glyphosate 450	4 L/ha	Susceptible and resistant
Glyphosate 450	8 L/ha	Susceptible and resistant

Results

- At 28 DAT the GR biotype of sweet summer grass (SSG) survived rates up to and including Glyphosate 450 at 2 L /ha (Figure 1 and 3).
- The 1 L/ha rate of glyphosate reduced biomass by 20% at 28 DAT whilst the 2 L/ha rate provided 92% control (Figure 1 and 3).
- All rates of glyphosate used in this experiment were very effective at controlling the susceptible SSG population. The estimated biomass control of susceptible SSG at 28 DAT following application of 250 mL/ha of glyphosate was 98% (Figure 2).

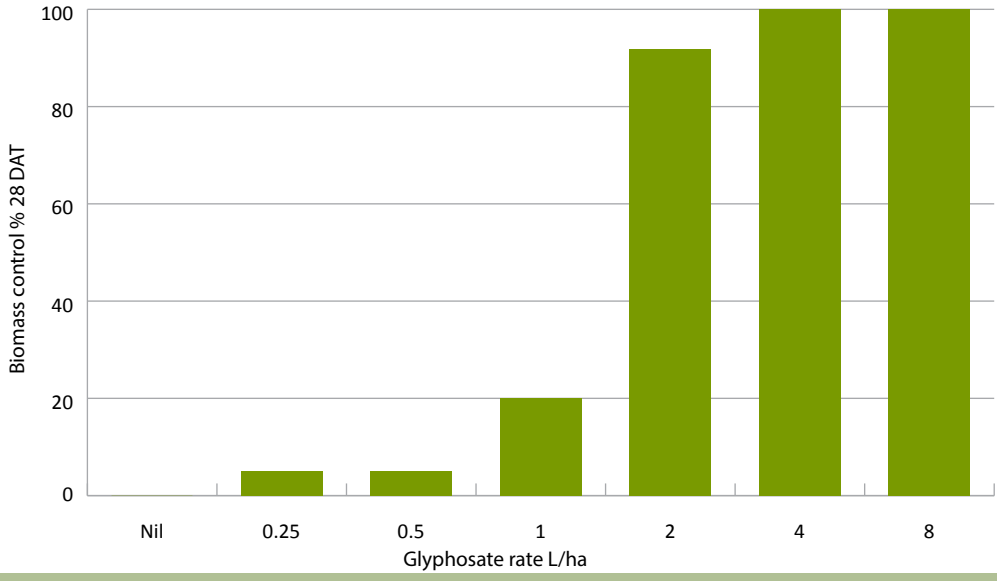

***Figure 1**. Biomass control % 28 DAT of GR sweet summer grass showing response to rates of glyphosate.*

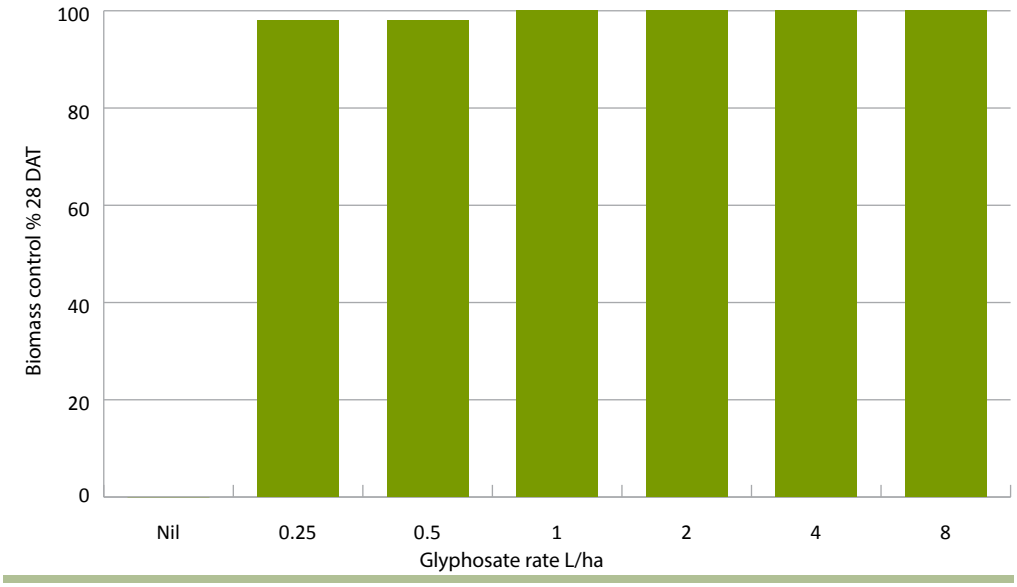

***Figure 2**. Biomass control % 28 DAT of susceptible sweet summer grass showing response to rates of glyphosate.*

***Figure 3**. GR sweet summer grass showing response to rates of glyphosate starting at 8 L/ha on left and graduating to 0.25 L/ha on the right.*

Summary

The recently discovered population of glyphosate resistant sweet summer grass appears to have at least an 8-fold level of resistance. Softer glasshouse conditions may have increased the levels of glyphosate activity as noted by the excellent control following sub-label rates on the susceptible population. Nonetheless, control of the susceptible population after application of 250 mL/ha of glyphosate exceeded control following application of 2 L/ha on a resistant population, thus the conclusion of at least an 8-fold increase in resistance to glyphosate appears valid. It is likely that control using 2 L/ha in the field would be much lower if treated under hotter and drier conditions as glasshouse conditions appear to favour the activity of glyphosate. Alternative weed management strategies, rather than repeat applications of glyphosate, are urgently required in Central Queensland to prevent the development of other cases of glyphosate resistance sweet summer grass.

Acknowledgements

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