Department of Primary Industries
Department of Regional NSW

NSW research results

RESEARCH & DEVELOPMENT – INDEPENDENT RESEARCH FOR INDUSTRY

The following paper is from an edition of the Northern or Southern New South Wales research results book.

Published annually since 2012, these books contain a collection of papers that provide an insight into selected research and development activities undertaken by NSW DPI in northern and southern NSW.

Not all papers will be accessible to readers with limited vision.
For help, please contact: Carey Martin at carey.martin@dpi.nsw.gov.au

Published by NSW Department of Primary Industries,
a part of the Department of Regional New South Wales.

Glyphosate-resistant annual ryegrass (*Lolium rigidum*) control with alternative, non-conventional herbicides: Comparison of spray volumes – Tamworth (glasshouse) 2018

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

Key findings

- The optimum spray volume of Non-Tox® herbicide needs to be more than 800 L/ha.
- There is limited potential to use this alternative, non-conventional herbicide as a spot treatment option for isolated patchy grass weeds such as annual ryegrass.
- This herbicide desiccates the weed and is likely to work more effectively on smaller broad leaf weeds. A follow-up experiment will investigate how growth rate affects the herbicide's efficacy.

Introduction

Herbicide resistance is becoming more widespread in the northern grains region. No new herbicides with novel modes-of-action have been developed since the 1980s. This reducing number of effective conventional herbicides has necessitated investigation into alternative herbicides.

This experiment aimed to determine the most practical spray volume of Non-Tox® herbicide. This product is a ready-to-go formulation needing no dilution with water, so the spray volume is the product rate per hectare. The current recommendation for application is a spray volume of 1000 L/ha. It would be more advantageous to reduce this spray volume for large scale broadacre agriculture to minimise application time and costs.

Site details

Location	Tamworth – Tamworth Agricultural Institute
Soil type and nutrition	Potting mix for containerised plants. Scotts® Osmocote Premium Potting Mix.
Irrigation	Plants watered regularly, soil near field capacity for the duration of the experiment.
Experiment design	Randomised complete block design with spraying volume as the only treatment factor; five replications.
Spraying date	6 September 2018.
Spraying conditions	Temperature : 22 °C, relative humidity : 88%, with full sunlight.
Plant population	One plant per pot (5 cm diameter pots – Figure 1).
Weed growth stage	Annual ryegrass treated at the 2–4 tiller stage (Figure 1).

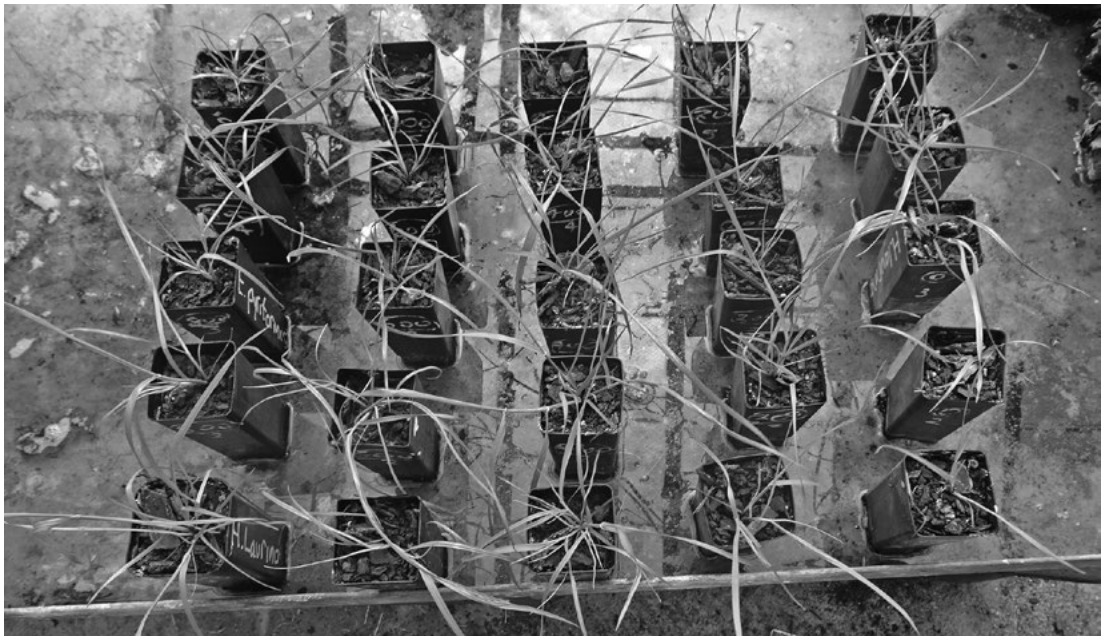

Figure 1 Annual ryegrass growth stage and glasshouse conditions at the time of application.

Assessment date	17 September 2018
Treatments	Spraying volumes (5) Spraying volumes: 0, 200, 400, 600 and 800 L/ha. These are equivalent to product rates as the product is not diluted with water.

Results

Rapid weed control

Non-Tox® herbicide's rapid action was apparent one day after treatment with leaves wilting (Figure 2).

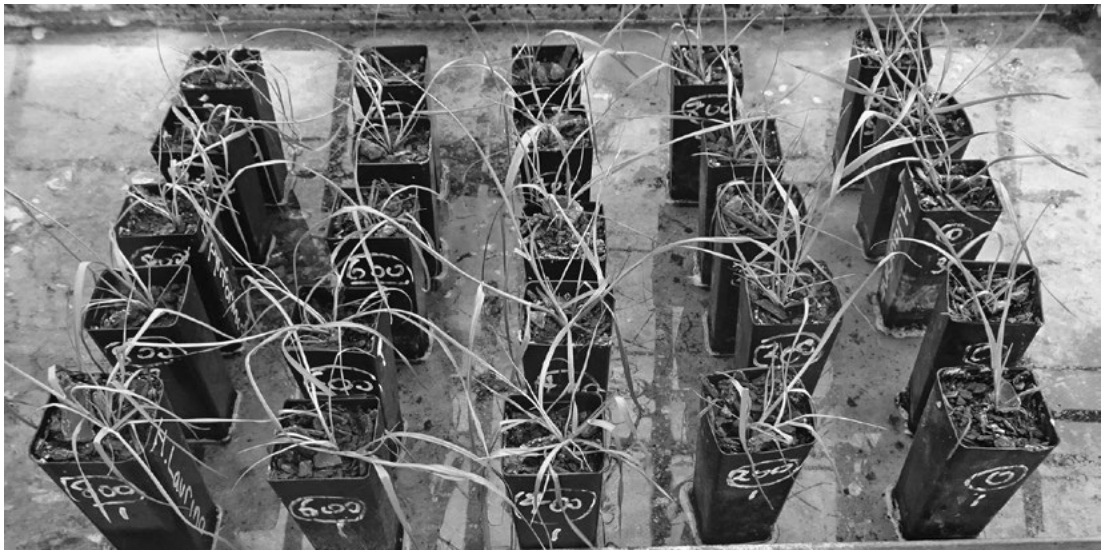

Figure 2 Rapid wilting of annual ryegrass one hour after treatment due to the product's drying nature: Increasing spray volumes from right to left (0–800 L/ha).

Rate response

Weed biomass steadily reduced as spray volume rates increased (Table 1). The percentage of dead plants only increased significantly ($P<0.05$) when comparing the highest rate (800 L/ha) with the remaining treatments (Table 1 and Figure 3).

Table 1 Rate response from Non-Tox® herbicide application on annual ryegrass, Tamworth (2018). Assessed 11 days after treatment.

Spray volume (L/ha)	Percentage of dead plants per pot (0–100%)	Estimated reduction in weed biomass (0–100%)
0	0	0
200	0	8
400	0	24
600	0	46
800	60	94
l.s.d. ($P = 0.05$)	10	17

NOTE: A 1000 L/ha spray volume was not included in this research as other preliminary evidence demonstrated that lower volumes could result in satisfactory results (results not shown).

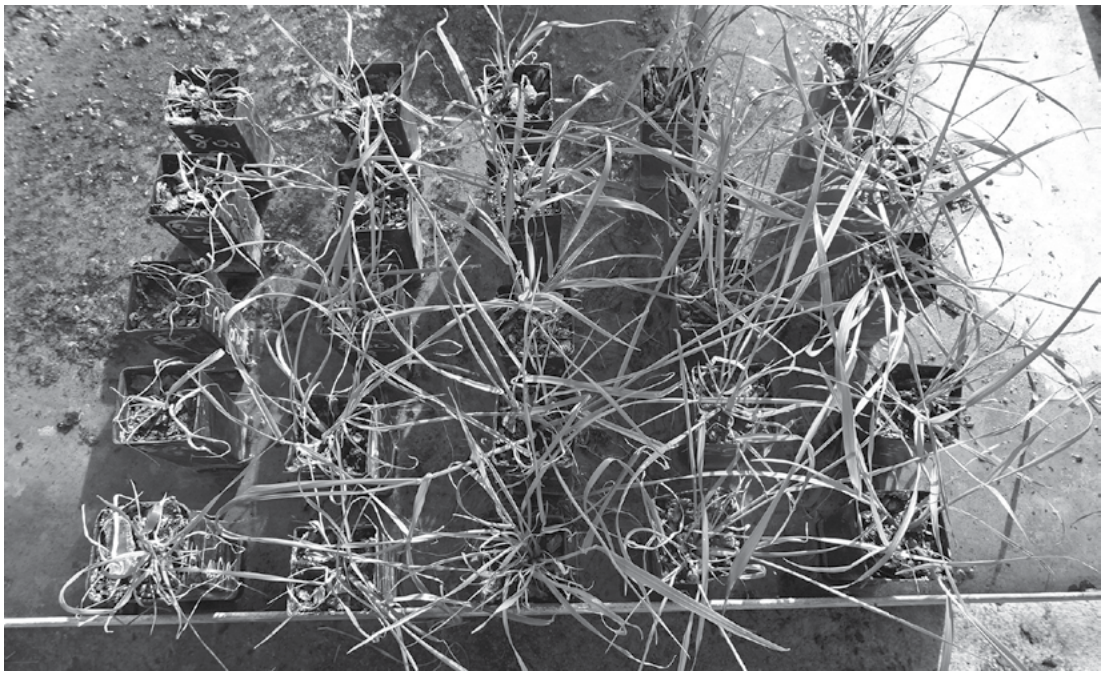

Figure 3 Affects of the various spray volumes on Non-Tox® efficacy, eleven days after treatment. Only the highest spray volume tested (800 L/ha) resulted in some plant death. Increasing spray volumes from right to left (0–800 L/ha).

Conclusions

Non-Tox® herbicide is a salt-based non-selective herbicide. It has some suppressive and lethal effects against annual ryegrass, including glyphosate-resistant strains, at the higher spray rate tested (800 L/ha). These weeds were relatively small (2–4 tillers) and thus further research is required to better understand and improve control at the larger weed growth stages.

The practicalities of applying 800 L/ha of spray volume means that Non-Tox® can only be applied as a spot spray treatment on patchy weeds due to the large volume of solution required. It has not been researched as a potential treatment using camera detector sprayers or robotic devices, however, it has potential with these technologies. It might have a fit in broadacre agricultural systems in fallow paddocks or potential in non-agricultural areas. The product's desiccating properties could be used for glyphosate resistance management.

Flaxleaf fleabane will be investigated in a similar experiment. Fleabane was selected because it is another widespread glyphosate-resistant weed that is problematic in fallows and in non-cropped areas.

The recommended spray volume on the label is 1000 L/ha. It appears from this research that this recommended application rate should remain; reducing this rate is likely to be detrimental since 800 L/ha did not control all annual ryegrass. It might be feasible that this spray volume could be applied to weeds using camera detector sprayers or robotic devices. The travelling speed will need to be significantly slower than commercial standards and the number of weeds in the paddock will need to be extremely light to accommodate for this treatment's spray volume.

Acknowledgements

This experiment was part of the NSW DPI GATE (Global Ag-Tech Ecosystems) initiative with in-kind contributions from NSW DPI. The contributing work from NSW DPI staff members Bill Davidson (Technical Officer) and Bec Miller (Technical Assistant) was an integral part of this research.

Contact

Tony Cook
Tamworth Agricultural Institute, Tamworth
tony.cook@dpi.nsw.gov.au
02 6763 1250