

Alternatives to glyphosate

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Key messages

- **Mixtures of Liberty with Voraxor or Terrad'or could be used as a replacement for glyphosate for knockdown weed control prior to seeding.**
- **Higher rates of herbicides appear to make the mixtures more consistent.**
- **These products will be more expensive than glyphosate highlighting the need for growers to work to protect glyphosate.**

Why do the trial?

The aim of the trial was to test mixtures of Liberty + newer Group 14 herbicides as an alternative to the use of glyphosate for knockdown weed control.

Glyphosate is under threat for use in several markets, most importantly Europe. One possible consequence of the banning of glyphosate in overseas markets is that pressure is applied to Australian growers to avoid glyphosate in order to access certain international markets for grain or other agricultural products. Other threats to glyphosate include the evolution of weed resistance and poor use of the herbicide by growers leading to market concern. Glyphosate is the preferred herbicide for knockdown weed control in Australia as a result of its ease of use, high efficacy across multiple weeds and relatively low cost. Identifying an alternative to glyphosate for this use will be challenging. Recent research in the USA demonstrated that Group 14 herbicides are able to synergistically improve the efficacy of glufosinate (Basta or Liberty) on broadleaf weeds (Takano *et al.* 2020). However, glufosinate

provides inconsistent control of grass weeds (particularly annual ryegrass), which are a key issue in Australia. Recently released Group 14 herbicides, such as Voraxor and Terrad'or, have better activity on grass weeds and offer new opportunities to develop an alternative to glyphosate for knockdown herbicide use.

How was it done?

- The trial had 10 treatments (Table 1) and 3 replicates of each treatment.
- Treatments were applied on 24 June at Wangary and 7 August at Minnipa Agricultural Centre (MAC). Measurements made were % brownout at 17 and 28 days after treatment (DAT) and dry biomass at 28 DAT.
- Data were analysed by ANOVA following square root transformation. Means were separated using Tukey's test.

What happened?

- Glyphosate + Hammer reduced biomass at Wangary by 96% and at MAC by 81% (Table 1). Liberty alone at the low rate was less effective than glyphosate at MAC; however, the higher rate performed better. The mixtures of Liberty with Group 14 herbicides were as effective as glyphosate + Hammer, except for the low rate of Liberty + Voraxor at MAC.
- The MAC trial was established late as a display for the field day. Previous work has shown that Liberty is less effective at controlling some weed species, notably annual ryegrass and wild radish, during winter. Had the herbicides been applied at the normal pre-sowing timing, it is expected that Liberty

and the mixtures would have performed better.

- Higher rates of Liberty and the Group 14 products tended to work better, suggesting synergism in these mixtures is unlikely.

What does this mean?

- Mixtures of Liberty with some Group 14 herbicides were as effective as glyphosate + Hammer in both trials, suggesting they could be useful as replacement knockdown herbicide options.
- Higher rates of herbicides in the mixtures tended to provide more consistent control, meaning these mixtures will be considerably more expensive to use than glyphosate.
- There is a pressing need for growers to help protect glyphosate from both resistance and market concern.

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References

Takano, H.K., Beffa, R., Preston, C., Westra, P. and Dayan, F.E., 2020. Glufosinate enhances the activity of protoporphyrinogen oxidase inhibitors. *Weed Science* 68, 324-332.

Table 1. Effect of various alternative mixtures on dry matter at Wangary and Minnipa in 2022.

Treatment no.	Herbicide	Wangary	Minnipa
		DM (g/m ²)	
1	Nil	163.2 a	106.9 a
2	Liberty @ 1.875 L/ha	28.0 b	65.3 ab
3	Liberty @ 3.75 L/ha	12.3 b	27.6 bc
4	Liberty @ 1.875 L/ha + Terrad'or @ 20 g/ha + Banjo @ 1%	32.2 b	32.6 bc
5	Liberty @ 1.875 L/ha + Terrad'or @ 40 g/ha + Banjo @ 1%	40.7 ab	14.0 c
6	Liberty @ 3.75 L/ha + Terrad'or @ 20 g/ha + Banjo @ 1%	29.9 b	22.3 c
7	Liberty @ 1.875 L/ha + Voraxor @ 100 mL/ha + Hasten @ 1%	39.9 b	78.8 a
8	Liberty @ 1.875 L/ha + Voraxor @ 200 mL/ha + Hasten @ 1%	9.6 b	57.1 ab
9	Liberty @ 3.75 L/ha + Voraxor @ 100 mL/ha + Hasten @ 1%	5.1 b	27.0 bc
10	Glyphosate @ 1.5 L/ha + Hammer @ 20 mL/ha + Hasten @ 0.5%	6.7 b	20.8 c

Different letters indicate means that are significantly different ($P < 0.05$) within each column.



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