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Photo: Kahlia Jenke

Cropping without glyphosate: Exploring alternatives for pre-sowing weed control

LEAD ORGANISATION:

University of Adelaide

SA DROUGHT HUB MEMBERS AND PARTNERS INVOLVED:

Hart Field Site Group, AIR EP, MFMG, SARDI,
AgCommunicators, Grain Producers SA

Introduction

Glyphosate has been the cornerstone of weed management in Australian agriculture for decades, providing effective and convenient control before and after crop establishment. However, its dominance is facing challenges from two fronts:

- **Market concerns:** some premium markets, particularly in Europe, are increasingly wary of glyphosate residues in exported products, potentially limiting access for Australian farmers.
- **Glyphosate-resistant weeds:** The emergence of resistant weed populations threatens the long-term effectiveness of glyphosate and necessitates exploring alternative solutions.

The SA Drought Hub's Cropping without glyphosate project addressed these concerns by investigating and demonstrating potential pre-sowing weed control strategies for grain crops that could replace glyphosate.

Project outcomes and recommendations were based on seven field trials conducted in 2022 and 2023 at Wangary, Minnipa, Hart, Struan and Gawler to examine the potential of glufosinate mixed with Group 14 herbicides and other strategies.

Key findings

- While effective pre-sowing weed control strategies exist as alternatives to glyphosate, their current cost is significantly higher.
- Mixtures of glufosinate and Group 14 herbicides, along with other strategies, can achieve equivalent weed control to glyphosate in many cases.
- Dry sowing practices offer a viable option to reduce the need for pre-sowing herbicides, especially when combined with effective pre-emergent herbicide selection.
- Early post-emergent applications of Mateno® Complete proved effective in managing weeds emerging after dry sowing.
- Widespread adoption of these alternative pre-sowing strategies and dry sowing practices can help conserve glyphosate for future use.



FIGURE 1. Effect of knockdown herbicide treatments on weed growth 14 days after application at Hart in 2022. From left to right: untreated; glyphosate + Hammer®; Liberty® + Voraxor®.



FIGURE 2. Effect of knockdown herbicide treatments on weed growth 14 days after application at Hart in 2023. From left to right: untreated; glyphosate + Hammer®; Liberty® + Terrad® or followed by paraquat.



FIGURE 3. Annual ryegrass populations present at the dry sowing trial at Gawler in 2023. Left: Nil; Right: Overwatch® followed by Mateno® Complete.

DRY SOWING

Grower and farm advisor comments

“We dry sow when we need to, but probably need to think about using Mateno® Complete.”

“We find some of the pre-emergent herbicides can cause crop damage in dry sowing. Based on what you’re saying, we would be better off using a safer, less effective herbicide up front and then coming back with Mateno® Complete.”

Harvest weed seed control

As well as being used prior to sowing, glyphosate is also used close to harvest for crop-topping to control weed (particularly ryegrass) seed set. Many alternative herbicides cannot be used for this, as their residues will end up in the harvested product.

Harvest weed seed control is an alternative to herbicides, but can be a more complex process. Approaches include:

- narrow windrow burning
- chaff lining
- baling
- chaff carts
- chaff decks
- chaff impact mills.

RYEGRASS CONTROL

Grower and farm advisor comments

“I’m surprised at how well you controlled ryegrass sowing dry. I need to use better herbicides next time.”

“I didn’t know glyphosate-resistant ryegrass was so widespread. I need to think about double knocking to protect glyphosate.”

GROWER OUTLOOK - CHAFF DECKS

James Venning

GRAIN GROWER, BUTE, SA

Weeds often dictate your rotation – what you want to plant, when you want to plant. So if you can get on top of your weeds and have a system where they don't get a seat at the table, it opens the opportunity for much better profitability.

Glyphosate is important in our system at the moment. Being able to wipe out every single weed in the paddock and getting the crop established in front of the weeds is important. The weeds that get a head start on your crop are the ones that set a lot of seed and hurt your yield.

We did a bit of research on different harvest weed seed management systems and ended up going with the chaff decks. It's a pretty cheap way to get into the system and cheap to run.

We looked at some research from WA around two systems using the same herbicides and the same crop rotation, but plus or minus harvest weed seed management. Using top-of-the-range herbicides was doing a good job but

just maintaining the status quo. When they added harvest weed seed management, it started to drive down the weed seed bank.

The chaff decks mount on the back of the header. The straw still goes out the back and gets spread and the chaff gets dropped into the decks onto our permanent wheel tracks. After several years, the new chaff is going back onto old chaff. And there's just not a lot of seed contact in those areas. It's surprising how little comes up in the line.

Often as farmers we sit back and look for the silver bullet, and that can be a barrier to adoption. But doing something is better than doing nothing.

If you look at your chemical bill, it's a massive part of your profitability. It's a business risk, being so reliant on chemicals. With harvest weed seed management doing the grunt work, that's no longer the case.





Recommendations for growers

- Implement effective pre-sowing weed control strategies as an integral part of your farm's weed management plan.
- Consider dry sowing practices, especially when combined with strategic selection of pre-emergent herbicides, as a viable option to reduce reliance on pre-sowing herbicides.
- Include early post-emergent applications of registered products for effective weed control in dry-sown crops.
- Partner with agricultural advisors to develop a tailored weed management plan specific to your farm and crop rotation.
- Actively participate in research trials and demonstrations to stay informed about new weed control technologies and best practices.

Benefits to industry

- **Preserving glyphosate:** By developing and adopting alternative strategies, growers can prolong the effectiveness of glyphosate, ensuring its continued viability as a crucial tool for weed control.
- **Minimising disruption:** Having readily available alternatives minimises potential disruptions and allows for immediate adoption if glyphosate is ruled out due to resistance issues or market demands.
- **Future sustainability:** Ongoing research and development efforts by agrichemical companies hold promise for more cost-effective and sustainable solutions.

ADDITIONAL RESOURCES

- **Podcast:** Strategies for managing glyphosate-resistant weeds in high rainfall zones – listen at mackillopgroup.com.au/the-prosperous-farmer.
- **Video:** Farmer tips for successfully adopting harvest weed seed control on the farm – view at sadroughthub.com.au/project/innovation-activities/cropping-without-glyphosate.

CONTACTS AND MORE INFORMATION

For more information on how to incorporate alternative weed management practices into your cropping system, contact:

- Dr Christopher Preston, University of Adelaide: christopher.preston@adelaide.edu.au.
- Your regional SA Drought Hub Node Coordinator – visit the hub website for contact details: sadroughthub.com.au/about/#team.



To view the full range of SA Drought Hub projects, visit please visit sadroughthub.com.au/projects.

The SA Drought Hub Knowledge Base is a repository of resources, publications and tools that can help SA farmers and regional



communities in decision-making and practice change to build drought preparedness and resilience: sadroughthub.com.au/resources/knowledge-base.

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