

Top 10

Herbicide-resistant weed management practices



10 Keep accurate records

Maintain a database that chronicles your agronomic practices, particularly those that vary from field to field and year to year. Records should include cultural, mechanical, and herbicidal weed management variables. Keeping accurate records will help you make informed crop management decisions, especially pesticide choices, for each field.

9 Practice strategic tillage

Use tillage only if, where and when deemed necessary to manage herbicide-resistant (HR) weeds. The risk of weeds developing resistance to herbicides is shown to be highest in no-tillage, owing to greater herbicide use and weed seed bank turnover rate. In some regions, tillage is an essential method for managing some glyphosate-resistant weeds.

8 Customize weed management by field

Weed management programs are not one size fits all – they should be customized on a field-by-field basis as weed populations are not uniform across your land. Even within a typical field they are not generally consistent. Survey your weed populations before herbicide application. It is also possible to detect and manage weeds in real time using sprayers equipped with sensors.

7 Use weed sanitation practices

Equipment sanitation practices reduce both immigration of weed seeds and spores into a field and HR gene (seed or pollen) dispersal across a field. Reducing weed seed load into the soil can be achieved directly by harvest weed seed control practices, which include chaff carts, direct-harvest crop residue baling, narrow-windrow burning and seed pulverization.

6 Rotate in-crop wheat and non-wheat herbicides

Many HR grassy weed populations (e.g., wild oats) are able to tolerate herbicides using the same mechanism as wheat. Therefore, it is important to rotate in-crop wheat and non-wheat herbicides to delay or manage this type of resistance. Avoiding continuous cereal crop rotations and including non-selective herbicides such as glyphosate or glufosinate in HR crops will help to achieve this objective.

5 Rotate herbicide groups

Rotate herbicides based on their group (site of action). The group number is identified on the front of each herbicide product. Where possible, across and within growing seasons, rotate the use of one herbicide group with other herbicide group(s) that control the same weeds in a field.

4 Use herbicide mixtures

Herbicide mixtures, or tank mixes, can be effective in delaying resistance. They are most successful when herbicide mixtures that combine different sites of action meet the criteria of 1) similar efficacy, 2) similar soil residual activity, and 3) different propensities for selecting for resistance in the target species. For example, mixtures of Group 2 and 4 herbicides having overlapping control of some key broadleaf weeds have been shown to delay or manage resistance.

3 Scout fields before and after herbicide applications

Scout your fields before in-crop herbicide application to determine what weeds are present, their distribution and abundance in order to customize an effective weed management plan. Additionally, scouting post-herbicide application will inform you of how successful you have been in controlling the targeted weeds. Unmanned aerial vehicles have good potential for

weed surveillance and monitoring. Whether using spreadsheet or mapping software, scouting data are important parameters to record annually.

2 Focus on crops and practices that promote competitiveness

Employ crops and practices that can aggressively compete with weeds. Some traits include rapid emergence (the ‘first up wins’) and ground cover, rapid and extensive canopy closure, and plant height. Crop competitiveness is optimized by good agronomic practices such as precision fertilizer placement near or at time of seeding, optimum seed placement and seedbed conditions, and high crop seeding rate. Adopt the ‘First up wins’ approach.

1 Ensure crop diversity is the foundation of your HRWM plan

The core of an effective HRWM plan is crop diversity. Include weed-competitive species and those with varied growth cycles and maturities in your crop plan – a mix of dicots and monocots, winter and spring planted, cool and warm season or annuals and perennials. While this approach ensures herbicide diversity, it also helps to provide different seeding and harvesting dates, and selection pressures on weed communities.

This story is adapted from: "Our top 10 herbicide-resistant weed management practices" by Hugh Beckie and Neil Harker in Pest Management Science, Volume 73, June 2017.

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