



# BEST MANAGEMENT PRACTICES FOR HERBICIDE RESISTANT WEEDS IN SUNFLOWERS

## How does herbicide resistance develop?

Herbicide resistance develops as a result of repeated use of a single mode of action herbicide on the same weed population in the same field. Selection for resistant weed populations occurs when a small number of individuals in that population have an inherited genetic makeup allowing them to survive a herbicide application that would otherwise harm it, and further passing those genetics to future generations.

### Weed management practices that encourage selection for herbicide resistance:

- Repeated use of the same mode of action in a field each growing season
- Repeated use of the same mode of action in a field over consecutive growing seasons
- Repeated use of herbicides with extended residual activity
- Increased or reduced herbicide application rate from label guidelines
- Applying herbicides at the incorrect timing according to label guidelines
- Applying herbicides with no other means of supplementary weed control

## How to identify herbicide-resistant weed populations?

- A single weed-type patch in the same spot each year that grows in an irregular shape and gets larger each year
- Surviving plant(s) of a species next to dead plants of the same species, following herbicide application
- One surviving species following herbicide application, while other weed species on label are effectively controlled

### Reasons other than herbicide resistance that herbicide efficacy may be reduced:

- **Herbicide application error**
  - Improper water volume
  - Reduced herbicide rate
- **Herbicide timing error**
  - Too early (weeds hadn't emerged or missed a flush of weeds)
  - Too late (weeds were too large to control)
  - Too much crop canopy cover
- **Poor weather conditions at application**
  - Too hot
  - Rainfast was not achieved

## How to test for resistance?

- Contact your agronomist if herbicide resistance is suspected following an application, as they may have a preferred lab for resistance testing
- [Pest Surveillance Initiative \(PSI\)](#) for glyphosate-resistant kochia testing
- [AgQuest](#) seed assays for herbicide-resistant weeds

## Integrated Weed Management

"Integrated weed management combines different agronomic practices to manage weeds, so that the reliance on any one weed control technique is reduced."

– Manitoba Agriculture

### Cultural

Diversify crop rotation and plant competitive crops

Plant with high seeding rate and narrow row spacing where applicable

Vary planting date

Modify fertilizer placement (consider banding instead of broadcast)

### Mechanical

Strategic tillage (pre-plant, harrow pre-emergence, inter-row cultivation at V5-V6, post-harvest)

Mowing

Hand-roguing

Harvest weed seed management (e.g., Harrington Weed Destructor)

Clean equipment to prevent transfer of weed seeds

### Chemical

Incorporate herbicides with different modes of action (tank mix, sequence with season, across seasons)

Vary application timing (pre-emergence, in crop, pre-harvest, post-harvest)

Use recommended rate and timing for all herbicides and appropriate water volumes

**Managing Group 2 herbicide resistance in a Group 2 tolerant crop**

(Clearfield Sunflowers, ExpressSun Sunflowers)

Integrated Weed Management (IWM) is the most effective tool to manage incoming and existing resistance. Utilize several IWM practices across the farm each year, preventing the primary development of herbicide resistance and the spread of existing resistance.

<b>TIMING</b>	<b>CHEMICAL</b>		<b>CULTURAL/MECHANICAL</b>
Pre-Seed	PPI herbicide application PRE herbicide application	Group 3 Group 14/15	Tillage if there is heavy weed growth Clean all equipment of possible weed seed Crop rotation 4+ years
Pre-Emergence	PRE herbicide application <ul style="list-style-type: none"> <li>• Control weeds early when susceptible</li> <li>• Residual control for several days</li> <li>• Kill weeds as they emerge</li> <li>• Alleviate POST herbicides</li> <li>• Longer chemical rotation</li> <li>• Control of perennials and winter annuals</li> </ul>	Group 14/15	Harrow to remove weed growth if no PRE herbicide will be applied Clean all equipment thoroughly
In-crop	POST herbicide application <ul style="list-style-type: none"> <li>• Control weeds early</li> <li>• Critical weed-free period is 2-3 weeks</li> </ul>	Group 1/2	Inter-row cultivation <ul style="list-style-type: none"> <li>• V5 - V6 timing</li> </ul> Clean all equipment thoroughly
Pre-Harvest	Desiccant application		Group 22
Post-Harvest	Using tank-mix partners of different MOA for diversity and multiple MOAs in a single year and long-term, reduces single resistance selection		Tillage if heavy weed growth and unfrozen ground Clean all equipment thoroughly

IWM – Integrated Weed Management  
MOA – mode of action  
PPI – pre-plant incorporated herbicide application

PRE – pre-emergent herbicide application  
POST – post-emergent herbicide application

