What Is Herbicide Resistance?

It is the ability of a weed species to survive a herbicide treatment to which the original population was susceptible.

- Some individuals in the population may be naturally resistant to that herbicide/herbicide site of action.
- Although the occurrence is “one in a million,” if the same herbicide/herbicide site of action is used repeatedly, the resistant individuals continue to survive and reproduce while the susceptible die.
- Over time, this selection pressure results in resistance dominating the population, rendering the herbicide ineffective.

Best Management Practices to Prevent or Delay Resistance

- Integrated weed management—multiple weed control practices, including chemical, cultural, mechanical.
- Tank-mix herbicides with different sites of action but overlapping control of the same weed species.
- Crop rotation, use clean-certified seed, and avoid spreading weeds.
- Follow the label for correct rates, methods, and timing.
- Good recordkeeping and scouting fields regularly (before and after herbicide application).
- Zero tolerance of weed escapes.

For more information, please contact:

Albert Adjesiwor  
Assistant Professor and Extension Weed Specialist  
Department of Plant Sciences, University of Idaho  
(208) 423-6616 • aadjesiwor@uidaho.edu

Pamela J.S. Hutchinson  
Associate Professor and Potato Cropping Systems Weed Scientist  
Department of Plant Sciences, University of Idaho  
(208) 397-4181 • phutch@uidaho.edu

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Herbicide Sites/Modes/Mechanisms of Action

Classification and Groups: The Weed Science Society of America (www.wssa.net) has created an international classification system where herbicides with the same primary site of action are grouped together. There are twenty-four known and one unknown herbicide sites of action and each group has been given a number. Seven herbicide sites of action are listed below, followed by examples of herbicides in each group (active ingredients and trade names).

Site of Action: The specific protein or biochemical site in the plant to which the herbicide binds.

Mode of Action: The plant physiological or growth processes that the herbicide disrupts.

<table>
<thead>
<tr>
<th>Site of Action</th>
<th>Mode of Action</th>
<th>Herbicides/Trade Names</th>
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</thead>
<tbody>
<tr>
<td>ACCase Inhibitor</td>
<td>pinoxaden (Axial)</td>
<td>clethodim (Select Max)</td>
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<tr>
<td></td>
<td>fenoxaprop (Acclaim, Tacoma)</td>
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<tr>
<td>ALS Inhibitor</td>
<td>rimsulfuron (Matrix, Solida)</td>
<td>imazamox (Beyond, Raptor)</td>
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<td></td>
<td>florasulam (Goldsky)</td>
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<tr>
<td>Auxin Mimics</td>
<td>2, 4-D (various)</td>
<td>clopyralid (Stinger)</td>
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<td></td>
<td>picloram (Tordon, Grazon)</td>
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<tr>
<td>Photosystem II Inhibitor</td>
<td>atrazine (AAtrex)</td>
<td>metribuzin (TriCor, Sencor)</td>
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<tr>
<td></td>
<td>hexazinone (Velpar)</td>
<td></td>
</tr>
<tr>
<td>Lipid Synthesis Inhibitor</td>
<td>(not ACCase)</td>
<td>EPTC (Eptam)</td>
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<tr>
<td></td>
<td>trialate (Far-GO)</td>
<td>etofumesate (Nortron)</td>
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<tr>
<td>EPSPS Inhibitor</td>
<td>glyphosate (Cornerstone, Roundup PowerMax, Touchdown)</td>
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<tr>
<td>Very Long-Chain Fatty Acid</td>
<td>S-metolachlor (Dual Magnum)</td>
<td>dimethenamid-P (Outlook)</td>
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<tr>
<td>Synthesis Inhibitor</td>
<td>pyroxasulfone (Zidua)</td>
<td></td>
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</tbody>
</table>

Idaho Herbicide-Resistant Weeds

Match the numbers with the guide on the right to identify the herbicide to which a weed is resistant.

Kochia (Bassia scoparia)

Italian Ryegrass (Lolium multiflorum)

Wild Oat (Avena fatua)

Russian-Thistle (Salsola tragus)

Redroot Pigweed (Amaranthus retroflexus)

Prickly Lettuce (Lactuca serriola)

Potentially Resistant

Mayweed Chamomile (Anthemis cotula)

Common Lambsquarters (Chenopodium album)

Barnyardgrass (Echinochloa crus-galli)

Look out for these potential herbicide-resistant weed threats. These weeds are common in Idaho crops. There are reports of poor control after certain herbicide applications.