

## Moderate resistance risk

Group 14 herbicides are inhibitors of the protoporphyrinogen oxidase (PPO) enzyme. There are currently no known populations of weeds resistant to Group 14 in Australia. However, there are 6 weeds with confirmed resistant to Group 14 herbicides in 9 countries, and in particular in populations of *Amaranthus* spp. in the USA.

The increased use of Group 14 herbicides as stand-alone herbicides in Australia is likely to increase the risk of resistant populations developing. The use of Group 14 herbicides in co-formulations or as tank mixtures in-crop or on fallows has a lower risk of resistant populations developing.

## Tank mixtures and co-formulations

Most current recommendations for Group 14 herbicides are for mixtures with another herbicide, e.g. carfentrazone plus glyphosate, pyraflufen plus MCPA amine. There are also some co-formulations that incorporate at least two modes of action e.g. Aptitude® (carfentrazone + metribuzin) and Pyresta® (pyraflufen + 2,4-D).

- Mixtures should be applied at full label rates to provide robust weed control.
- Rotation of all herbicide modes of action should be employed between seasons.

## Stand-alone applications

The risk for Group 14 herbicide resistance is highest where they are used alone, e.g. flumioxazin in cotton or oxyfluorfen as a residual herbicide.

If there are significant escapes following the application of a Group 14 herbicide, consider using another herbicide with a different mode of action or a non-herbicide control method to stop seed set. If not possible, be sure to include a different mode of action in the next herbicide application.

The above recommendations should be incorporated into an Integrated Weed Management (IWM) program. In all cases try to ensure surviving weeds from any treatment do not set and shed viable seed. Keep to integrated strategies mentioned in this brochure including cultural weed control techniques to reduce the weed seedbank. Make sure you mix and rotate herbicides from different mode of action groups. Always consult the product label prior to use.

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### Please note:

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Chemical family	Active constituent (first registered trade name)
<b>GROUP 14</b>	
<b>Inhibitors of protoporphyrinogen oxidase (PPOs)</b>	
Diphenylethers	acifluorfen (Blazer®), fomesafen (Reflex) oxyfluorfen (Goal®, OH2 Ornamental Herbicide®, Rout®, Pathweeder®)
N-phenyl-imides	butafenacil (B-Power®*, Logran® B-Power®*, Resolva®*), saflufenacil (Sharpen®, Voraxor®*), flumioxazin (Valor®, Terrain®) tiafenacil (Terrad'or), trifludimoxazin (Voraxor®*)
N-Phenyl-oxadiazolones	oxadiargyl (Raft®), oxadiazon (Ronstar®)
Phenylpyrazole	pyraflufen (Condor®*, Ecopar®, Sledge® Pyresta®*)
N-Phrnyl-tiazolinones	carfentrazone (Affinity®, Aptitude®*, Broadway®, Buffalo Pro Weedkiller®*, Hellcat®*, Silverado®*)

\* This product contains more than one active constituent

### Notes:

List of chemical families, approved active constituents and, in parenthesis, the trade name of the first registered product or successor. Refer to the APVMA website ([www.apvma.gov.au](http://www.apvma.gov.au)) to obtain a complete list of registered products from the PUBCRIS database.

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