# MANAGE **RESISTANCE**//ow

Protect your land, one field at a time





Three out of five Canadian growers are affected by herbicide-resistant weeds.<sup>1</sup> While the specifics are unique to each farm, growers commonly face short-term and long-term challenges.

In the short-term, **resistant weeds can reduce yield** and a grower's bottom line. Yield loss may be unnoticed at first, but weed reproduction is exponential and can quickly result in significant vield reduction.

Grower profitability can also be impacted by the **additional time** and cost required to manage resistant weeds. Estimates show that herbicide resistance costs producers from \$1.1 to 1.5 billion annually in terms of increased herbicide use and decreased yield and guality.<sup>2</sup> Specifically, wild oat herbicide resistance costs Prairie growers an average of \$12/acre in increased herbicide use and yield loss.<sup>3</sup>

From a longer-term perspective, herbicide resistance also threatens the productivity and value of the land, posing significant challenges for future generations on the farm.

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## SHORT-TERM COSTS VS. LONG-TERM BENEFITS

The best way to minimize or delay the development of herbicideresistant weeds and maximize profit potential is by adopting integrated weed management. This includes using a combination of best management practices (BMPs) – cultural, mechanical, biological and chemical control measures – over the long term. Specific BMPs include crop rotation, rotation and mixture of herbicides, use of recommended label rates and timing, scouting, sanitation and more.

A common barrier to resistance management is the perception that it is costly and complex. Short-term costs may include increased inputs, labour and equipment to manage the resistant weeds. Because there is no 'silver bullet' to the problem, crop management using BMPs is required – an approach that may take growers more time and effort.

For some, these immediate "investments" in weed control are not made as they perceive the benefit is uncertain and/or too far away.

## ECONOMIC RETURNS TO HERBICIDE RESISTANCE MANAGEMENT

A study<sup>4</sup> conducted by researchers at the United States Department of Agriculture and the University of Arizona may help to change this perception. It identifies the number of years it takes for resistance management efforts to pay off.

Using economic modelling, researchers estimated how managing glyphosate resistance to Canada fleabane affects short- and long-term profits in corn, soybean, and corn-soybean rotation systems.

Results show that resistance management reduces profits in the first year of implementation but increases profits in the second and subsequent 18 years. In all three systems, resistance management pays for itself by the second year.

Over a 20-year period, the estimated annual average profit advantage from managing resistance exceeded \$158 ha (\$64/acre) for corn, \$137 ha (\$55/acre) for corn-soybean, and \$55 ha (\$22/acre) for soybean. That equates to grower profits of 14 to 17 percent over 20 years. Resistance management reduces profits in the first year of implementation but increases profits in the second and subsequent 18 years.



#### Average Annual Gains to Managing Herbicide Resistance

The research concludes that resistance management pays off quickly and significantly in the case of Canada fleabane in corn and cornsoybean rotations. More research is required for different cropping systems and regions.

It makes good economic sense to adopt BMPs to manage resistance now. Growers should always aim for near-perfect weed control and scout fields after application. This will maximize farm profitability and keep everyone's options open for effective and flexible weed control well into the future. Growers should speak with their crop advisors about specific herbicide-resistant weed solutions.

#### EXPONENTIAL WEED REPRODUCTION

A study<sup>5</sup> by researchers at the University of Arkansas and Kansas State University demonstrates how far and quickly glyphosateresistant Palmer amaranth can spread when allowing a single plant to escape control. After one year, an escape was located as far as 114 m downslope from the original glyphosate-resistant infestation. In two years, it had reached the field boundaries, infesting over 20% of the total field area. In three years, 95 to 100% of the field was infected, resulting in complete crop loss as it was impossible to harvest the crop. Over a 20 year period, the estimated annual average profit advantage from managing resistance exceeded \$158 ha (\$64/acre) for corn, \$137 ha (\$55/acre) for corn-soybean, and \$55 ha (\$22/ acre) for soybean.



### For more information, visit ManageResistanceNow.ca

This information is brought to you by CropLife Canada.



<sup>1</sup> Stratus Ag Research. Resistance Management Practices & Attitudes. Proprietary Study for CropLife Canada

 $^{\rm 2}$  State of weed resistance in Western Canada and future outlook, Hugh J. Beckie June 2018

<sup>3</sup> Hugh Beckie, 2018, Producer Management Questionnaire results

<sup>4</sup> Weed Science 2016 Special Issue:595–608, Economic Returns to Herbicide Resistance Management in the Short and Long Run: The Role of Neighbor Effects https://www.researchgate.net/ publication/308343555\_Economic\_Returns\_to\_Herbicide\_Resistance\_Management\_in\_the\_Short\_and\_Long\_Run\_The\_Role\_of\_Neighbor\_Effects?\_sg=94DItsAspAEPNVZUn7kPuS44WMW\_wad\_ wSmjGJAIy60DQ4F1nxikQy31UkmObmksqLlWtpEzViZ3WRKaKc6pb0pFgXYt

<sup>5</sup> https://www.researchgate.net/publication/267039906\_In-Field\_Movement\_of\_Glyphosate-Resistant\_Palmer\_Amaranth\_Amaranthus\_palmeri\_and\_Its\_Impact\_on\_Cotton\_Lint\_Yield\_Evidence\_ Supporting\_a\_Zero-Threshold\_Strategy [accessed Jul 24 2018].