

# MANAGE RESISTANCE*Now*

Protect your land, one field at a time



## ECONOMIC GAINS FROM RESISTANCE MANAGEMENT

**Economically it makes sense to adopt best management practices (BMPs) to manage resistance now.**

A common barrier to resistance management is the perception that it is costly and complex. Short-term expenses may include increased inputs, labour and equipment to manage the resistant-prone weeds. Although resistance management practices can increase costs in the short-term, farmers stand to gain significant economic benefits over the long-term.

### STUDY SHOWS LONG-TERM RETURN TO PROACTIVE APPROACH

A recent study by researchers at the University of Arizona (2021, unpublished) on the economic gains of resistance management demonstrated that it could pay off quickly and significantly. This reconfirms the findings from a previous study<sup>1</sup> carried out by researchers at the University in 2016, in partnership with the United States Department of Agriculture.

Conducted in 2021, the research shows that over ten years **the long-term return on investment to a proactive resistance management strategy for kochia – a problematic weed – in Western Canada can be worth as much as \$20 per acre per year.**

The results clearly illustrate to western Canadian farmers the longer-term value of managing to avoid the development of herbicide-resistant weeds in a canola-wheat rotation.

### BENEFITS OUTWEIGH SHORT-TERM COSTS

The modelling considered scenarios for two Canadian farms in a canola-wheat rotation and identical in every way, except for their weed management practices. The weed control strategies evaluated included residual herbicide treatments or tank mixes, using different mechanisms of action than glyphosate.

The first farm followed a reactive strategy that does not attempt to delay the onset of herbicide resistance to kochia. The second farm adopted a proactive resistance management strategy intended to delay resistance onset.

**Crop rotation is a recommended best management practice to avoid or delay the development of herbicide-resistant kochia.**

While the proactive farm incurred increased short-term weed control costs, it was able to avoid or delay the onset of glyphosate resistance and its associated losses. Conversely, the reactive farm encountered infestations of glyphosate-resistant kochia.

These two scenarios illustrate how farmers who manage resistance may have to trade off some short-term profits for higher longer-term profits.

## NET RETURNS TO A PROACTIVE STRATEGY

Findings show the pay-off to a proactive resistance management strategy is influenced by the speed in which resistance occurs on the reactive farm.

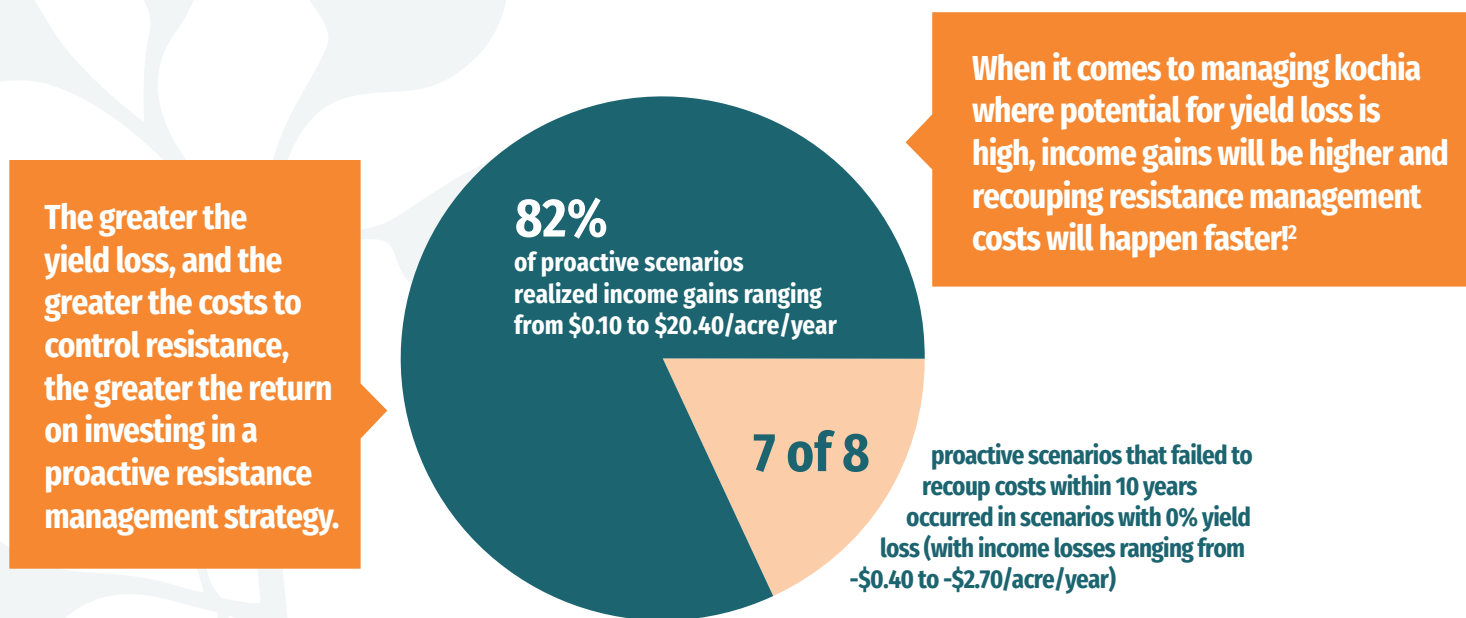
This study developed a schedule of 10-year net returns to the proactive strategy based on various scenarios differing in four key parameters:

- 1** Year of resistance onset under the reactive strategy (3, 5 and 7 years)
- 2** Increased control costs for herbicide-resistant kochia (\$5-25 per acre per year)
- 3** Yield losses from herbicide-resistant kochia (0-10%)
- 4** The discount rate farmers use to evaluate future costs and benefits

**The results showed a large range in average farm income within different proactive resistance management scenarios - ranging from \$2.70/acre income loss up to a \$20.40/acre income increase.**

As more precise biological and agronomic data become available, better estimates of the effects of resistance management can be made. Individual growers can consider this information when making decisions about their weed management practices and how it relates to their own farm and growing season.

## RECOUPING ADDITIONAL INVESTMENT OF A PROACTIVE MANAGEMENT STRATEGY



## Economic impact of herbicide-resistant weeds

Herbicide-resistant weeds have a significant economic impact due to increased control costs and lower revenues from reduced yields and crop quality.

- Herbicide-resistant weeds cost growers in Western Canada **CA \$13-\$14 per acre** (2014-2017 surveys).
- The total cost of herbicide-resistant weeds to Canadian Prairie growers is more than **CA \$500 million per year** (Beckie et al. 2019).

More information on the economics of herbicide resistance can be found [here](#).

## INVEST IN A PROACTIVE RESISTANCE MANAGEMENT STRATEGY

A proactive resistance management strategy is like insurance - you may not always need to rely on your resistance management. But, if you invest in it, most of the time the management strategies will pay off. Farmers understand there is a chance they will experience an average loss when taking a proactive approach to managing the possibility of herbicide-resistant kochia, and shouldn't be deterred by any potential financial losses.

Proactive resistance management strategies are the best insurance against possible yield and financial losses from herbicide-resistant kochia. In fact, more than 80% of the scenarios in the study showed a farmer could recoup the additional costs related to a proactive strategy within 10 years, and more than one-third could recoup within five years.

Check out [this factsheet](#) for information on the biology of kochia, the prevalence of single and multiple herbicide resistance and recommended best management practices in Western Canada.

## ABOUT THE STUDY

This study was conducted by George B. Frisvold, Professor and Extension Specialist in Agricultural and Resource Economics at the University of Arizona. The study extends the basic partial budgeting model approach (often used in economic assessments of pest management) to a multi-year framework. Conducted in 2021, this study is unpublished.

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For more information, visit **ManageResistanceNow.ca**

This information is brought to you by CropLife Canada, Canola Council of Canada, Manitoba Crop Alliance, Prairie Oat Growers Association and SaskWheat.



<sup>1</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

<sup>2</sup> <https://canadianagronomist.ca/kochia-yield-losses-can-be-high>