

RESILIENT ROTATIONS: YIELD AND YIELD STABILITY SOUTHERN PRAIRIES



Research has shown the benefits of diversifying crop rotations, and yet most Prairie farmers keep their rotations short and simple with cereals and oilseeds being intensively grown. For the past four years, researchers across Western Canada have compared different crop rotations to measure the drawbacks and benefits. This work is designed to help farmers make crop rotation decisions that are the best fit for their operation, based on local research.

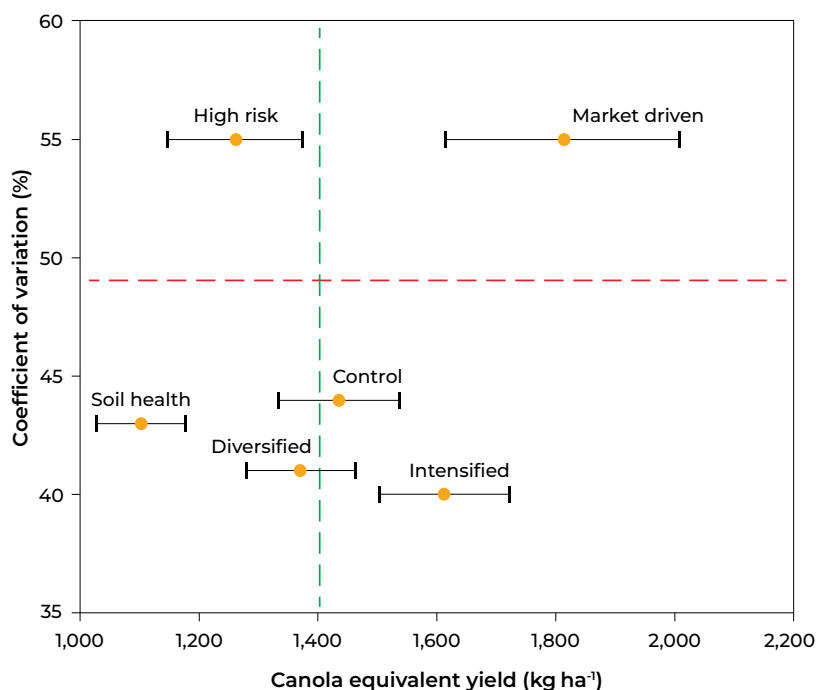
Six different crop rotations were studied in Alberta, Saskatchewan and Manitoba to represent growing conditions in the southern Canadian Prairies. This factsheet looks at the differences between rotations for **yield and yield stability**.

Canola Equivalent Yield (CEY) allows for yield comparisons between different crop rotations by standardizing the crop rotation's yield based on the price ratio of different crop types relative to canola. The highest yielding rotations varied depending on the geographic region.

COMPARING YIELD POTENTIAL

To evaluate crop rotations based on **yield and yield stability** (from year to year), it's critical to identify rotations that are more consistently high or low yielding. It's important to note that the highest yielding rotations varied depending on the geographic region.

The coefficient of variation (CV) is used to assess the yield stability of rotational treatments. When averaged across all six rotations, the **intensified** rotation (CV=40%) was the most stable crop rotation. The **market driven** and the **high risk** rotations (CV=55%) were the least stable.



This chart shows the yield stability of the crop rotation treatments averaged over 27 site years. The horizontal black bars represent standard error of the mean. The vertical green line indicates CEY across all six crop rotations. The horizontal red line is the average CV across all six crop rotations.





**YIELD AND YIELD STABILITY BY CROP
ROTATION IN SOUTHERN PRAIRIES, 2018-2021**

| Rotation Treatment | Crop Species Used Based on Local Growing Conditions | | | | Canola Equivalent Yield Ranking of Various Crop Rotations* | |
|---|---|--|--|---|--|---------------|
| | Year 1 | Year 2 | Year 3 | Year 4 | Lethbridge | Swift Current |
| The CEY at Lethbridge was 785 kg ha ⁻¹ (14 bu ac ⁻¹). The CEY at Swift Current was 1,361 kg ha ⁻¹ (24 bu ac ⁻¹). | | | | | | |
| Control | Fallow | Durum | Malt Barley | Durum | | |
| Intensified | Lentil | Durum | Chickpea | Durum | | |
| Diversified | Lentil | Canola | Pea | Durum | | |
| Market Driven | Flax (Swift Current) Canola (Lethbridge) | Wheat | Lentil (Swift Current) Wheat (Lethbridge) | Feed Barley (Swift Current) Malt Barley (Lethbridge) | | |
| High Risk | Soybean | Canary Seed (Swift Current) Corn (Lethbridge) | Faba Bean | Durum | | |
| Soil Health | Forage Pea Green Manure | Barley Pea Intercrop | Faba Bean Barley Intercrop | Durum | | |

Canola Equivalent Yield Ranking*

- = good CEY
- = statistically lower CEY
- = statistically lowest CEY

*CEY ranking is calculated by location

THE BOTTOM LINE

- There was rarely one rotation that was the highest yielding at individual sites.
- When choosing between multiple high yielding rotations, select a rotation with more than two crop species, and select for more pulse crops in rotations.
- The **high risk** rotation had lower CEY in part because crops were not well suited to the environment where they were planted.
- The yield stability of the **intensified** rotation makes it well suited for managing yield and yield risks.

FOR MORE INFORMATION

More information on how these crop rotations stack up in terms of economics, precipitation use and nutrient use will be covered in separate factsheets as part of this series. These results are based on the first four years of the study.

More robust results are expected if a second four-year cycle of the study is completed.

The factsheet is part of a series by Resilient Rotations – a project of the Integrated Crop Agronomy Cluster – led by Kui Liu, AAFC Swift Current. The project examines the benefits and drawbacks of different crop rotation options for farmers across Western Canada.

To find out more visit
wgfr.ca/resilient-rotations-factsheet/