Photo credit: Greg Semach

From simple to systems

Building a regional road map for better crop rotations

Wheat and canola form the backbone of crop rotations on the Prairies. It's a simple rotation that has "worked" for decades, but more and more research points to the benefits of diversifying crop rotations for long-term sustainability whether you measure it by yield, soil health or resilience to biotic and abiotic stresses.

In an ideal world, producers would farm in four-year crop rotation cycles as an effective way to balance the varied needs of the crop and soil, manage pest pressures and maintain vital biodiversity.

While it's a lofty goal, a group of researchers across Western Canada are working on ways to bring biodiversity back into crop rotations. They are part of Resilient Rotations, a project of the Integrated Crop Agronomy Cluster led by the Western Grains Research Foundation that's evaluating practical options for more productive, sustainable and resilient cropping systems. By comparing different crop rotations – measuring drawbacks and benefits – the goal is to ultimately help farmers make decisions that are the best fit for their operation.

Dr. Kui Liu, Research Scientist with Agriculture and Agri-Food Canada, is leading the five-year project with a team as diverse as the crop rotation options they are evaluating for western Canadian farmers. There are agronomists, weed scientists, pathologists, economists, meteorologists and soil health experts – a testament to the diversity of factors that impact an effective, sustainable and productive approach to crop rotation.

Dr. Kui Liu

Photo credit: Michael Liu

"We are approaching crop rotation using a systems approach – all the elements that impact crop rotation from yield, soil health and economics to local growing conditions," says Liu. It's a more holistic way to look at crop rotation and one they hope will provide new insights and options for farmers in a more customized, prescriptive type of approach.

A slow switch

Dr. Sheri Strydhorst

Photo credit: Alberta Wheat Commission

The team is evaluating six different crop rotations at eight field sites across the Prairies to provide relevant recommendations based on local growing conditions. There are three sites in Alberta, three in Saskatchewan and two in Manitoba. Data from the four-year rotations are being evaluated by region based on yield, resource use efficiency, soil health, pest pressure, economics, carbon footprint and resilience.

They are under no illusion that there is a single solution, but rather a slow switch from a simplified two-crop rotation to a rotation that takes a systems approach – considering all the factors that impact the performance of cropping systems. "We don't want producers making

one year rotation decisions," says Dr. Sheri Strydhorst, Principal with Sheri's Ag Consulting, and part of the Resilient Rotations team. "It should be a long-term process that considers the local field and farm conditions, and the many factors that impact crop performance and farm economics."

Spreading the news

"We are producing factsheets with regional results on how each of the six rotations performed based on the evaluation criteria," says Strydhorst, who also leads extension for the Resilient Rotations project. "Rainfall and yield are key issues on producers' minds and the first two factsheets will provide timely and relevant information to help with 2023 planning decisions." Other factsheets will follow on nutrient use efficiency and economic returns.

Regional recommendations

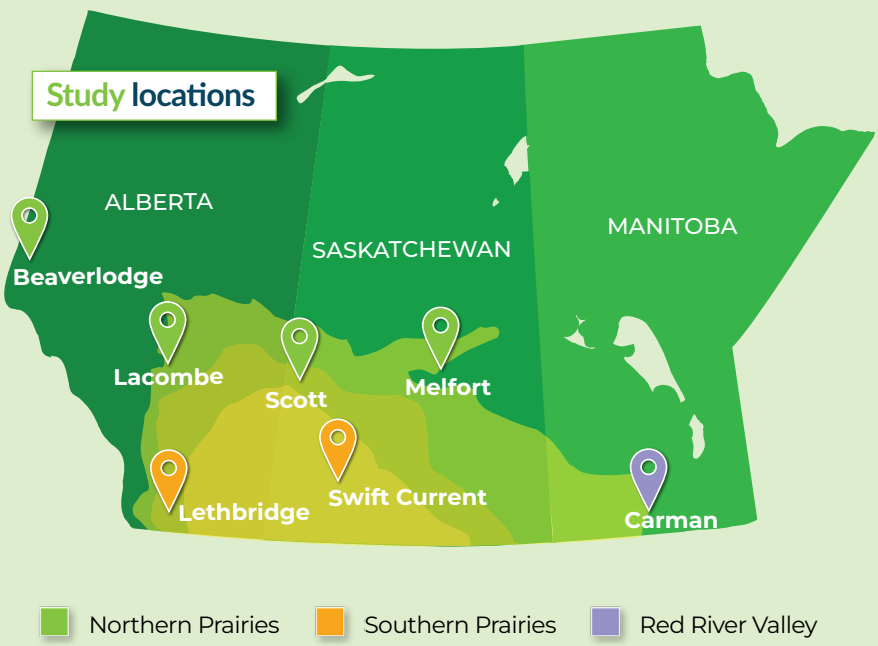
One thing is clear from the four years of field data under their belt. "There is no single cropping system that's suitable for a large region like Western Canada," says Liu. "We need site specific cropping systems based on local conditions."

It's too early for even regional recommendations. But the research team expects to provide a road map or decision tree of information for producers to consider for future crop rotation decisions. "A geographic decision tree could be the ultimate tool for producers from this work," says Strydhorst. "Producers would start by their region, and identify their top concern – nutrient use efficiency, weed control, economics, etc. – and look to that "branch" for recommendations for their farm."

As the current five-year project wraps up, Liu has applied for continued funding through the next Integrated Crop Agronomy Cluster. "We really need two to three cycles of studying various crop rotation data to be able to make solid recommendations to producers," he says. "And it's important for producers to realize that the benefits of a diversified cropping system may not be realized in the first four years, but gradually, and sustainably, over time."

More information is available at **wgrf.ca/resilient-rotations-factsheet**

THE RESILIENT ROTATIONS PROJECT



The Resilient Rotations project is evaluating six crop rotations across the Prairies:

Control: historically recommended, four-year crop rotation

Intensified: oilseed intensified in the northern Prairies or pulse crop intensified in the southern Prairies

Diversified: multiple crop types, diversified rotations

Market driven: crop types selected based on annual commodity prices

High risk: introduce new crop types that may not be adapted for the geographic region

Soil health: include green manures and intercrops to improve soil health

Resilient Rotations is supported by funding from WGRF, Alberta Wheat Commission, Saskatchewan Wheat Development Commission, Alberta Pulse Growers, Saskatchewan Canola Development Commission, Manitoba Crop Alliance, and Agriculture and Agri-Food Canada through the Canadian Agricultural Partnership – a provincial-federal-territorial initiative.