Smart Ag Research

Evaluation of On-Farm Precision Experimentation (OFPE) Methodology in 2024

Olds College Centre for Innovation (OCCI) and Alberta Grains have teamed up with producer partners to study a new on-farm research method in central Alberta. The two-year research project is using On-Farm Precision Experimentation (OFPE)—a methodology defined by Data-Intensive Farm Management (DIFM)—to test various wheat seed and nitrogen rates. It is being funded by Alberta's Results Driven Agriculture Research (RDAR) agency.

INTRODUCTION

OFPE allows for real-world testing directly on working farms, potentially providing producers with highly specific data to help them make more informed decisions about their operations. This is accomplished through the DIFM platform, which utilizes machine learning to design and analyze field-scale trials.

By using Latin square or checkerboard plot trials, the platform can provide insights into how crop yields respond to different variables. These trials are part of a larger project led by Dr. David Bullock from the University of Illinois, who has been conducting this type of research since 2016.

OBJECTIVES

The project has two main objectives:

- **Validate the Methodology:** To determine if the Data-Intensive Farm Management (DIFM) methodology can be a valid, efficient and effective tool for conducting on-farm precision trials in Alberta. The research will specifically address the question: "What is the optimal seeding and fertilization application rate, and does this rate change significantly within a single field?"
- **Provide Recommendations:** To recommend how DIFM can be used to generate regional agricultural recommendations by aggregating and analyzing individual field data from multiple locations over several years.

For the first year of the project in 2024, the objective was to validate the methodology:

- Establish the expertise to conduct trials.
- Assess the challenges and successes of implementing the DIFM platform.
- Gather initial feedback from producers on the logistics and process of DIFM implementation.

110 lb/acre wheat seed rate.

150 lb/acre wheat seed rate.

- Explore the experience of the DIFM tool and process, past experience with on-farm trials, and the pros and cons of DIFM against those experiences.

- Establish the feasibility of the planned scale-up in year two of the research project.

STUDY DETAILS & RESULTS

Producer participation involved four fields, which was in line with the original goal of three to five fields. On-farm precision experimentation (OFPE) trials were conducted in central Alberta in two fields east of Olds and two fields west of Carstairs:

- Information to create the trials (legal land description, farm equipment sizes, status quo seeding and fertilizing rates, and source of nitrogen fertilizer) was collected from each producer through a custom webform.
- This data was added to the DIFM platform, which generated the trial designs. Seed and nitrogen fertilizer rate trials were generated for three fields, while one field had trials only for seeding rate due to limitations with farm equipment and management.
- The trial implementation phase proceeded smoothly, with positive feedback from the producers. They indicated that utilizing the prescription maps generated by the DIFM platform to conduct on-farm trials had a minimal impact on their operations.
- At the end of the cropping season, all operational data (as-applied maps for seeding and fertilizer and yield monitoring data) were collected and added to the DIFM platform.
- Due to the DIFM tool's original focus on U.S.-based trials, a platform inconsistency was discovered when it was used to process data from Alberta. This issue, which was isolated to the generation of economic prescription maps for variable rate technology, caused a delay in providing reports to producers.
- To resolve this, Olds College developed custom programming scripts. With this solution in place, the project's second year will not face the same challenge.
- Olds College also initiated communication with the University of Illinois team to integrate the custom solution into the main DIFM web platform.
- Insights gained from the first year of the project have led to changes in how the final reports are delivered for each field. This includes adjustments to the statistical analysis and variables used in the DIFM reporting procedure.
- Different Western Canadian farming practices will need to be taken into consideration. The use of multiple combines in a field can also create complications in the data analysis if the equipment is not properly calibrated.

Steckler 2025 Wheat Seed and Nitrogen Trial Orthomosaic.

NEXT STEPS/FUTURE RESEARCH

For the second year of the project in 2025, as previously outlined, the objective will be to provide recommendations about how DIFM can be used to develop regional agricultural recommendations by analyzing aggregated field data collected from multiple locations over several years:

- Researchers are gathering in-depth feedback from producers regarding the project's logistics and overall process. For year two, nine trials are in the process of being implemented across central Alberta.