

## Smart Agriculture Research

### 2021 Summary: *Bushel Plus Harvest Loss System: On-Farm, Harvest 2021*

This project evaluates the Bushel Plus Drop Pan System – a product to help farmers assess yield loss safely and effectively during harvest to help operators improve their combine set-up to achieve maximum efficiency with minimal losses.

#### INTRODUCTION

The single and multi-pan drop system can easily be installed on any combine. The pan is dropped via remote control while the combine is in motion and the contents, once the combine has passed over, are evaluated with the Bushel Plus Air Separator and digital scale. The information can then be entered into the Bushel Plus Mobile App which allows for quick on the go analysis of the grain loss in bushels per acre (bu/acre).

The multi-pan system (in prototype/development stage) houses up to four pans that can be dropped sequentially without stopping to speed up the yield loss/calibration process.

#### OBJECTIVES

- Evaluate installation, functionality and user experience of the entire system.
- Evaluate unit in different crops (wheat, barley and canola) with varying stubble heights.

#### STUDY DETAILS

- Evaluation occurred on several fields and crop types (barley, wheat and canola) on the Smart Farm during the 2021 harvest season from Aug. 30 to Oct. 5, 2021.
- Drop pans installed on a John Deere 9660 STS combine equipped with 30 ft. straight cut draper or 15 ft. pickup header, and a John Deere S780 combine equipped with 35 ft. straight cut draper header driving an average speed of 3.4 mph.
- Six drop pan types were trialed and evaluated: three 40" units (narrow width, wide width, four multi-drop wide aluminum nested), and three 60" long units (narrow width, wide width, two multi-drop wide aluminum nested).
- Pans were attached onto both the chassis front (under feeder house) and rear axle.
- Two activation methods of dropping the pans were tested: a hand-held wireless remote control device and mobile phone app remote activation function.
- Data on stubble row width, height and density were collected for each crop type that could potentially affect pan drop operations.

#### RESULTS

The Bushel Plus Drop Pan System was a great benefit during harvest. The combine operator saw immediate value in using the system to help set and make adjustments to the combine harvester during operation. The basic set-up for each product being tested was straightforward and no significant problems were encountered during this process.

- **Drop Pans:** All pan sizes performed with similar success rates regardless of the crop stubble type or height.
- **Mobile App:** Successful use; additional research on antenna placement and battery life could further enhance connectivity in the field; the Loss Calculator had great functionality and was useful, quick and accurate; calculations were verified manually.
- **Air Separator:** Easy set-up; great functionality removing majority of debris and leaving behind the grain to weigh on digital scale.
- **Digital Scale:** Very easy to use; worked great.

#### FUTURE RESEARCH

Bushel Plus is an ongoing project with opportunities for additional testing based on learnings from 2021, such as increased data collection for more robust statistical analysis, consideration of external factors (crop stubble height, density, etc.) on pan drop trials, and exploring various connectivity and application methods.



Learn more at [oldscollege.ca/SmartFarm](https://oldscollege.ca/SmartFarm)