HINKLER AGTECH INITIATIVE

Integrated Data Analytics for Farming Systems

INTRODUCTION

This trial was undertaken as part of CQUniversity's Hinkler AgTech Initiative. The Initiative aimed to increase the productivity and profitability of the Bundaberg region's agricultural sector through greater availability and utilisation of agricultural technology (AgTech). An extensive consultative process undertaken with agribusinesses identified on-farm needs that may be addressed using AgTech. Trials of selected AgTech products and services were then undertaken in partnership with agribusinesses and technology providers to determine the technologies' efficacy in on-farm conditions. This summary provides an overview of findings from one of the technology trials, including grower feedback and considerations for other growers when deciding whether to utilise the technology in their own enterprise.

Background

The introduction of sensors and other digital agriculture technologies into farming operations can generate large amounts of data which needs to be integrated into useable formats to assist farmers in decision making. Each additional layer of data introduced into the farming operation has the potential to add value to decision making but can also add complexity if it is not integrated with existing data management processes. This challenge is particularly significant with large-scale intensive agricultural production systems.

There are three main components in the data capture and integration process:

- *Data capture* - this usually involves sensors able to detect parameters of interest such as weather conditions, crop growth rate, water and nutrient status and pest / disease pressures. Sensor systems generally also have the capacity to transfer that data to cloud-based platforms for real-time data access.
- *Data processing* - data analytics and modelling programs can be deployed to convert data into different formats, or combine data to generate new insights including predictive capacity. Weather forecasts based on data captured at various locations are an example of data analytics and modelling processes generating predictive values.
- *Data aggregation and display* - systems for presentation of raw, processed, analysed and/or predicted values in a format designed to aid farmer decision making. These displays are often referred to as dashboards and provide the interface where large volumes of data are summarised for ease of use.

As farming operations add more digital technologies to their operations, farmers are looking to integrated technology systems that provide real-time monitoring, data analytics and data visualisation to support them in making decisions.

The Technology

The Yield's 'Digital Playbook' system uses advanced data analytics to process sensor data and crop management information for real-time monitoring of crop performance. Sensors, clustered in farm area networks, gather data on temperature, humidity, soil moisture, leaf wetness and light intensity. The sensor data are then analysed to generate microclimate predictions within the cropping area as well as to provide insights into crop health and productivity. Based on these insights, the system generates recommendations, allowing growers to make data-driven decisions about irrigation, soil nutrition, and crop protection. The system is connected to a Cloud-based platform, allowing growers to access the data from anywhere at any time.

The Trial

This technology was trialed in commercial herb crops on five farming properties. The aim of this trial was to assess the value of The Yield's system to the business, including sensor quality, technical support and data analytics/reporting services. The second stage of the project aimed to develop best practice recommendations, in the form of a Digital Playbook, and a prediction model for the timing of harvest.

The project included the installation of environmental sensors on two farms and the deployment of standard notifications for crop management. Sensor systems included automated weather stations (rainfall, relative humidity, air temperature, wind speed and direction, barometric pressure and light), and in-crop sensors (air temperature, humidity, leaf wetness, soil temperature, soil moisture and soil electrical conductivity).

Regional data combined with the on-farm sensor data was analysed using The Yield's data analytics platform to generate predicted weather conditions (temperature, wind speed, wind direction and evapotranspiration) for sites that did not have an on-farm weather station.

Growers were given access to on-farm data, weather predictions and notifications for crop management via an online website and mobile application. Growers evaluated the usability and value of the system and support provided by The Yield over 12 months.

RESULTS

Data was collected from the installed weather stations and in-crop sensors and weather predictions were successfully generated for all five sites. Over the duration of the trial, the volume of data accessed was not sufficient to establish thresholds for automated crop management notifications. Large data sets are needed in the artificial intelligence (AI) data analytics used by The Yield to generate accurate crop models, and the volume and quality of data able to be processed was not sufficient to deliver accurate crop management recommendations. The trial demonstrated that large existing data sets or long periods of data capture are needed for this type of technology to deliver valuable insights into complex crop management decision making.

The results from this trial also demonstrate the importance of being able to communicate effectively with service providers. Some growers found it difficult to access technical support, reporting delayed or limited feedback from the service provider. Timely access to technical support is critical for successful adoption of new technologies, particularly during the implementation phase. Some growers may prefer local support for onsite communication/assistance. Some growers also commented that they found the data dashboard to be difficult to interpret and use.

Value to Business

This trial demonstrated the value of on-farm sensors for automated, real-time data capture. Growers acknowledged that the data collected by these types of sensors could help to improve their business, by helping them make informed decisions relating to crop management. particularly relating to crop yield or quality using data analytics. This information would allow them to review the influence of farming practices on productivity and profitability.

Grower Feedback

Trial Summary Questions	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I see value in this technology		✓			
I found the technology easy to use		✓			
The technology was easy to integrate within my business		✓			
I was satisfied with the service provided by the AgTech company	✓				
I intend using this technology in my business		✓			
I recommend this technology to other growers	✓				

Other Considerations

The Yield system is designed for large scale farming operations. Deployment costs and the value that the system delivers is designed for larger growers operating with substantial data sets over multiple farming locations where deployment costs and large data sets are more likely to be accommodated.

The nature of AI and machine learning technology also requires large historical data sets, or a period of time for data collection to allow the algorithms to be trained appropriately for accuracy.

Further Information

For further information on this trial and results, email CQUniversity's agricultural research team:
agriculture@cqu.edu.au

For further details on The Yield Sensor + technology and other services provided by the company, visit:
theyield.com

Summaries of other technology trials undertaken through the Hinkler AgTech Initiative are available at:
bundabergagtechhub.com.au

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