AgTech Decoded – Growers critically analysing the role of new technologies in on-farm decision-making.

Hosts: Adams Family (Woogengellup), Mackie Family (Mount Barker), Preston Family (Cranbrook) and Webster/Beech Families (Tenterden).

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KEY MESSAGES:

- Surveyed growers utilise, on average, 7 different pieces of digital technology/applications, with weather records & climate information the most readily used.
- Technology and applications which lead to direct insights and clear management actions will be the most adoptable.

Project Background

The AgTech decoded project aims to increase engagement in local R&D through the direct use of growers' own farm data and digital tools to rapidly and economically address agronomic issues and reduce the yield gap. Growers across the Stirlings to Coast Farmers & Liebe group regions have increased their knowledge of how modern digital technologies and analysis methods can be utilised to address locally relevant research issues.

The objective of this project was to critically assess the ability of modern data analytics to address farming system challenges and improve in-season decision-making when faced with a variable climate.

Methodology

Five paddocks across the Stirlings to Coast Farmers membership were analysed in 2022 by CSIRO tools such as Agricultural Production Systems sIMulator (APSIM) - Next Generation, to determine each paddock yield potential, in combination with additional farmer data such as weather & soil moisture monitoring readings, farm records (soil tests, chemical & fertiliser applications and seeding records). Satellite imagery was used in conjunction with farm records to measure and monitor variation across the landscape. Growers' experiences with technologies were captured by surveys to identify current technologies utilised and feature-set gaps.

Technology workshops were also delivered in Albany & Dalwallinu during March 2023 where growers were surveyed on their farm data usage, data types collected on-farm and general mobile/web farm application usage. This information was tabulated, graphed, and reported by CSIRO staff to gain a better understanding of data usage for decision making, and ultimately what is the barriers to success or successful implementation on-farm.

Discussion & Conclusion

Data analytics is increasingly being seen as an important tool for farmers to improve their enterprises. Modern technology including real-time soil moisture sensors and satellite imagery, when combined with in-season paddock data and evaluated with advanced analytic techniques, has the potential to change the face of farmer-driven R&D in Australia.

Traditionally, growers would utilise information from numerous in-field trials and demonstrations to support their on-farm decisions. With the integration of modern sensors, models, and satellite technology, it is now possible to gain information more quickly and efficiently with the addition of real-time and historical paddock data. The technology will be able to provide near real-time outcomes for better decision-making so that growers do not have to wait until the end of an R&D program to apply the learnings.

The farm-host survey and workshop components which utilised collected farm data showed that combining the datasets with powerful tools beyond their current forms could near-accurately identify potential yield estimates, allowing the opportunity for farmers to hone their inputs as seasonal conditions change, optimising their efficiencies & outputs.

The workshop surveys and report produced by CSIRO also showed that agricultural technology is pervasive, and results from this project demonstrate that farmers are willing adopters of new technology. Each grower surveyed throughout the SCF & Liebe membership was using at least 7 technology pieces,

which could include yield maps, soil moisture sensors and weather monitoring sensors. Other technology, such as earth observation (satellite) imagery and insights provided by crop models were also considered but were not as widely used. Importantly, the surveys show that the technologies adopted served a clear purpose and provided intelligence to the farmer that was valued and influenced a management decision. Across all technologies, growers wanted the technology to be supported, either through a consultant or through a service offering provided by the company.

The findings in the CSIRO-led report agree with earlier surveys of farmer adoption of technology and align with the concepts associated with technology acceptance models. That is, the adoption of the technology highlights the importance of perceived useability and perceived ease of use (Pierpaoli et al. 2013).

- The most highly valued, and used technology was Delta T; a tool that utilises weather information and assists with the decision of when and when not to spray a herbicide. The purpose of the tool is clear, and it is relatively easy to use.

- Compare this to a soil moisture probe for example, which can assist with the decision of when sow a crop, the decision to plant a certain area to a particular crop type, or the decision to apply nitrogen. All of these decisions will require local context and considerable nuance, therefore, the information and action arising from the information is less clear than that provided by Delta T.

To that end, the survey showed that grower's requests are remarkably straightforward and clear. That is, they would like to know when and where the biotic and abiotic stresses are likely to occur on their farm, and how they should manage these constraints given prevailing weather and climate forecasts. They would like to know the decisions they should make given these abiotic and biotic stresses. The information should be presented in a readily digestible manner, preferably on a single platform or dashboard.

The CSIRO report also showed that the ability to define the grower's needs with such clarity following expositions of technology, workshops and surveys is unique. It suggests that technology has improved in the last decade. It is also clear that much of the technology shows promise but is at the early stages of evolution and adoption. Agricultural technology companies and researchers must work more closely with growers to develop the technology into a useful product. These useful products must provide intelligence on farm attributes that growers value and deliver the outputs in a form that farmers can readily consume. The technology must be supported by a service network, to ensure the technology services the real needs of the industry. The implication is that if technology were genuinely useful, farmers would be prepared to pay for a service. This last insight contradicts some studies about farmers' willingness to pay, but it could be that the technology delivered to date has not been able to fulfil farmers' needs, and this influences their desire to pay for technology.

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