CASE STUDY EIGHT

PA data improves yields

Reduced costs and improved yields are the focus for the Sargent family, who currently use yield and pH mapping to make effective on-farm management decisions.

Farm profile

Farming personnel: Andrew and Malcolm Sargent

Farm location: Crystal Brook, Mid North, SA

Annual rainfall: 400 millimetres

Soil types: Sandy loam and clay loam

Farm area: 2000 hectares

Enterprises: wheat, barley, lentils, canola, oaten hay

Average wheat yield: 3 tonnes per hectare

SPAA member: Yes

PA consultant: N/A

Agronomy consultant: Sam Trengove, Trengove Consulting

PA timeline

Yield mapping –	**1999**
Guidance –	**2002**
Variable rate –	**2003**
Autosteer –	**2004**
Inter-row seeding –	**2004**
On-farm trials –	**2005**
Soil gamma radiometrics mapping –	**2006**
Satellite imaging –	**2018**

Top PA tips

- ***Yield mapping and satellite imaging are great tools to collect data on soil constraints across your property***
- ***Assess precision agriculture tools for adoption on a case-by-case basis with what is suitable on your property***
- ***Management and compatibility of PA software is important for ease of use***

Why did you choose to adopt precision farming technology?

Dad (Malcolm) has always been an early adopter of precision farming technology, helping SPAA many years ago with technology compatibility issues farmers were facing. Precision technology adoption began with yield mapping in 1999, which helped farmers make smart chemical and fertiliser decisions and reduced labour requirements. From there, we began using guidance and autosteer in 2002 and 2004 respectively to reduce overlap. We trialled variable rate for nitrogen and phosphorous inputs in 2003. Within our business we are always trying to gain efficiencies, whether that is in chemical and fertiliser use or labour and machinery. We are always looking for different ways to improve our business.

Which technology tools or components have you adopted and (which do you) continue to adopt?

We began with yield mapping in 1999 and guidance in 2002, with the addition of autosteer in 2004. We saved 3 per cent in variable input costs from the use of the autosteer and guidance. The autosteer and guidance system allowed for accurate inter-row sowing about 90 per cent of the time.

We began trialling variable rate with the help of yield mapping in 2003, conducting variable rate experiments for nitrogen and phosphorous inputs through SPAA. On-farm trial work began in 2005 and over the three years we noticed some interesting trends. Low production zones on the southern side of our farm were not responding to various phosphorous fertiliser rates and high yielding zones were only moderately responsive to phosphorous fertiliser. Soil tests showed that soil in that low production zones were high in phosphorous, suggesting that variable rate of fertiliser in this area would be beneficial. However, this was not the case for the northern half of the property.

Complete variable rate management of this area of our property was introduced in 2006 and all paddocks were zoned using yield maps and gamma-radiometrics. The soil variation maps from the gamma-radiometrics were always strongly correlated to the yields we are getting in the paddock, so this was helpful for paddock management decisions. This highlighted the differences in soil nutrients across the paddock. We saved money by implementing the variable rate in this area of the farm, however, it wasn't

applicable for full-farm adoption as management issues arose. We no longer use variable rate on our property due to management and costs.

In the past few years, we have been using satellite imaging to monitor differences in crop growth, along with yield mapping.

The on-farm trials continue with a focus on pH mapping. Soil tests from last year kept indicating low pH levels, so we started pH testing this year to monitor the levels and adjust lime applications. Previous on-farm trials have included looking into the benefits of biosolids and deep ripping.

What are the factors that motivate you to adopt and use each of the different tools or PA components?

Our decision-making on PA is driven by decreased costs and improved yields resulting in improved return. If the technology is not suitable for use in our business for various reasons such as management and costs, then we will not utilise it.

Autosteer and guidance have always generated returns for us due to improved efficiency and reduced overlap. The ability to inter-row sow has allowed us to maintain more stubble for ground cover and has reduced wind erosion effects.

With variable rate, however, we noticed it was difficult to manage and implement on-farm and we were not seeing noticeable results from the yield mapping for full-farm adoption, so this motivated us to stop using this technology.

Software management and compatibility is something we also consider when adopting PA technology. When Dad was involved in SPAA many years ago, technology compatibility issues were a focus. Still to this day, there can be communication issues, even from technology from the same manufacturer.

We really assess PA on a case-by-case basis, observing the benefits each tool can provide to our business.

What types of data and information are you collecting to guide your decision-making to adopt or not adopt each PA component?

Yield maps have been an excellent tool for us. They have allowed us to complete various on-farm trials and analyse the response of technologies or concepts we have implemented. It has also been helpful to record and visualise any damage that happens within paddocks, which became evident when a hailstorm went through our property a few years ago.

Soil testing has also helped us identify soil constraints and zones within our paddocks that we need to address. This testing identified the pH issues within our soils, allowing us to adopt pH mapping technology to rectify the issue.

Has the adoption of PA increased profitability on your farm? How?

Most of the technology we have adopted has increased profitability on our farm, particularly autosteer and inter-row sowing due to reduced overlap and improved efficiency. Yield mapping has been an effective tool to evaluate on-farm trial results, as we can accurately estimate yield increases and possible return.

On-farm trials help to quantify results of various methods, technologies and crop varieties on our property and help us with effective on-farm management and decision making. The tools we continue to utilise allow us to reduce costs and improve yields on farm.

How are you using the data generated by PA? Is it leading to further practice change? If so, what kind of practice change?

The main data we are currently using is the yield and pH mapping. Yield data helps us determine suitable nutrient management in each paddock and allows us to zone areas of the paddock for soil testing. The pH mapping has allowed us to treat certain areas of the worst paddocks with the lime levels suitable for the conditions. Satellite imaging has also allowed us to monitor the difference in crop growth, however, has not led to any further practice change as of yet. It is still a great information source.

Who is influencing or assisting you with the adoption of PA?

Internal decisions regarding PA adoption are usually made within the business. These decisions are made using information picked up from various field days, conferences and attending Grains Research and Development Corporation (GRDC) updates. Twitter is also a valuable resource for farming tips and information. Sam Trengove, our agronomy consultant, also has some input in terms of tools to adopt, and has helped us understand and utilise pH mapping on farm.

Are you planning to adopt more or less of these various precision farming technology components in the future?

We will continue to use pH mapping on the worst paddocks to observe the benefits of the technology, along with data collection from yield mapping and satellite imaging. Improving the usefulness of the PA technology software would help with management and use on-farm. There needs to be more thought put into this to help with the adoption of precision farming technology.

At this stage, we will only adopt a PA tool if we can see it will benefit our business in terms of reduced costs and increased yield. We have seen and experienced a lot of technology that does not give any return and is too hard to implement on our property, so it is not worth investing in. It really is a case-by-case decision making process.

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