PRECISION AGRICULTURE IN AUSTRALIAN RICE

Andrew Whitlock

Consultant, PrecisionAgriculture.com.au, Ballarat, Vic

QUICK TAKE

- Many farmers have already invested in variable rate technology. A new project aims to deliver knowledge on how these farmers can maximise the return in their investment.
- The project hopes to provide all rice farmers who are interested in precision agriculture with the knowledge of how they can implement precision agriculture on their farm.
- Better understanding of precision agriculture will lead to more efficient use of crop inputs, better matching of soil type to crop management, and better protection of the non-farmed environment.

A new project aims to build an understanding of how precision agriculture technologies and processes can improve the profitability of Australian rice farmers and so, foster on-farm adoption of precision agriculture.

Precision agriculture uses spatial information to assist managing the complex nature of crop production in order to deliver economic, management and environmental efficiencies.

There has been a considerable amount of precision agriculture work conducted in the rice industry, in particular aerial imaging of crops, managing crop effects from laser-guided land levelling, and variable rate nitrogen application. There is now a need to consolidate past experiences and design a program for the successful implementation of precision agriculture.

This project needs to simultaneously address the key research questions associated with the implementation of precision rice management, and deliver critical training to provide rice farmers and relevant industry stakeholders with the necessary skills to benefit from precision agriculture.

The project will have a strong focus on engaging farmers with practical processing and management of their own data through local precision agriculture discussion and training groups.

Maximise investment in precision ag.

Many farmers have already invested in variable rate technology. This project aims to deliver knowledge of how these farmers can maximise the return in their investment.

The project is designed to run for three years. It started in August 2012 with the selection of 12 focus farms and initial data gathering. The project will be completed by June 2015. It will explore the following key research questions.

Key research questions

- Who is currently implementing precision agriculture and how? (baseline evaluation data)
- How can farmers maximise the benefits of GPS and variable rate technology?
- How can precision agriculture technology be used to make paddock recording easier and more accurate?
- Is paddock variability sufficient to warrant variable rate? Review of economics at paddock, farm and industry level.
- How can farmers implement precision agriculture at a farm level? What are the barriers to adoption and key steps for supporting farmers at different stages of implementation?
- How can agronomy businesses utilise spatial information and GPS mapping technologies?
- What precision agriculture processes can be utilised to gain additional information at an industry level?
- Identify and test steps to achieving widespread adoption in the rice industry—what can we learn from sugar, horticulture and grain industries?

The research program

The research will be based on 12 focus farms located across the rice growing regions. Farmers will be selected on their level of interest in precision agriculture, availability of spatial data, linkages with industry service providers, willingness to conduct on-farm trials and welcome

farm visits. Half of the farmers will use traditional aerial sowing techniques and half will use direct drill seeding technology. This will enable the project to explore the implications of how precision agriculture is integrated in both farming systems.

All available spatial data from each farmer (such as yield, imagery, elevation, cut and fill) will be collected, processed and delivered via on an online mapping portal. This information will be used to select one key focus paddock per farm. This focus paddock will be divided into production zones and soil nutrients will be mapped prior to sowing.

Integrating the data with knowledge from all farmers will enable us to identify trends in the economic impact of within-paddock variability. Agronomic information will be integrated to generate gross margin maps for all farms and economics of retrospective variable rate applications will be explored. The aim of this economic analysis is to identify the likely return on investment for precision agriculture equipment.

The project will also investigate the agronomic drivers of variability within each focus paddock and build further R&D programs around these findings. This work is critical as it underpins what precision agriculture is all about, and that is the refinement of crop management. These on-farm trial results will support both variable rate and blanket management techniques. Crop monitoring of trial paddocks will utilise ground-based NDVI crop sensors, satellite imagery, visual observations, crop establishment counts, tissue testing and final yield.

The network of on-farm demonstration sites will provide an opportunity to test new and innovative crop management ideas. They will integrate use of precision agriculture technologies with innovative agronomy practices designed by leading farmers and agronomists. Such practices may include variable seeding rates, composted manures, variable soil ameliorants and nitrogen ramps.

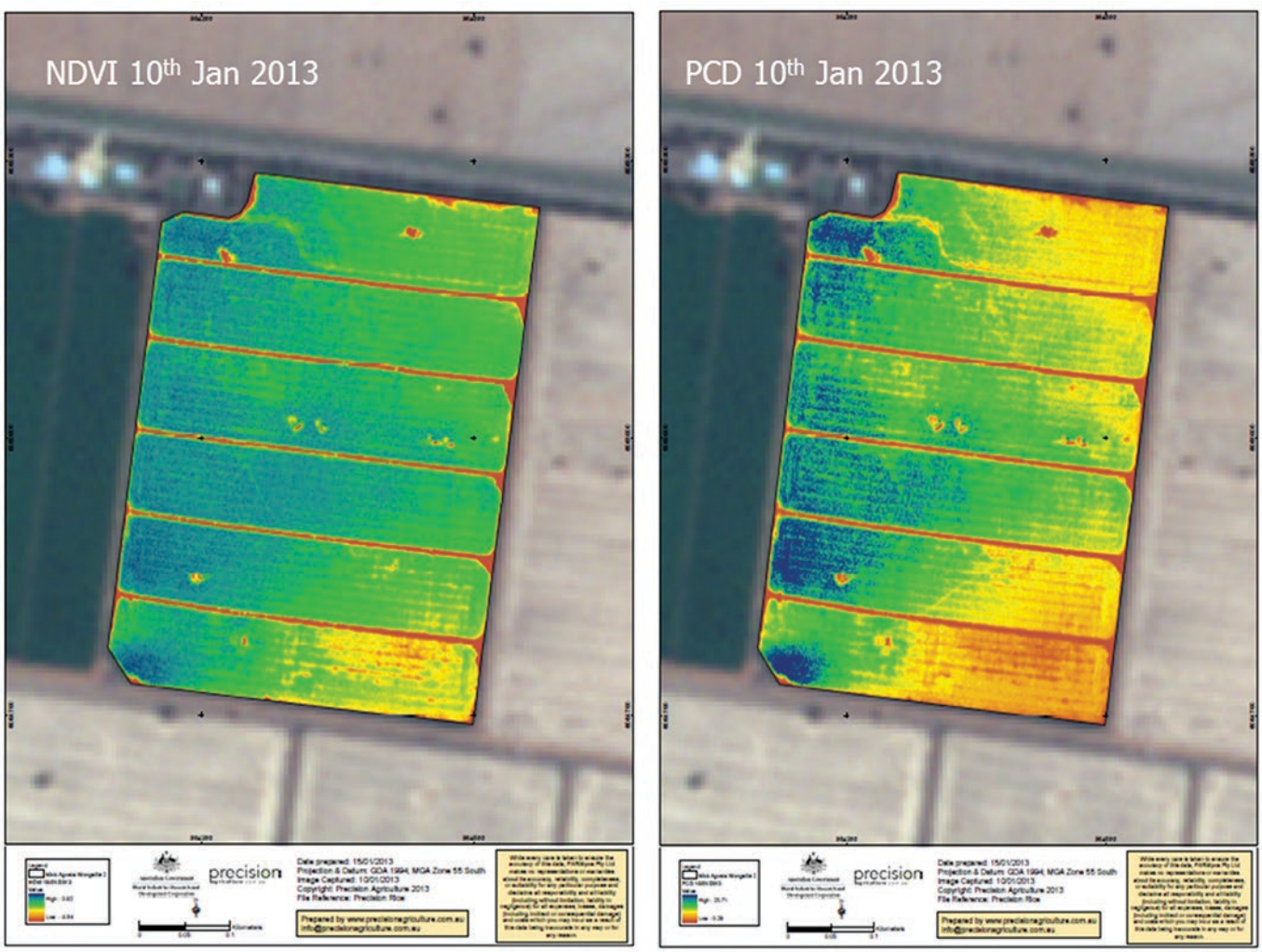
Technologies/data layers will include yield mapping, cut and fill maps, satellite imagery (NDVI maps), soil mapping (elevation, EM-38/31, soil pH, sodicity & nutrients), plant tissue testing, machine guidance and implement control, farm record keeping software, variable rate controllers, hand-held mapping devices and apps.

Industry-wide implementation

The project will also investigate high resolution crop biomass mapping at the catchment or industry scale. This is the only technology that will give us industry-wide impact in a very short time frame. The project will also explore web-based data delivery and storage platform through a partnership PASource and demonstrate the use of apps and internet based mobile technology to take the data to the field.

Engaging growers

The project will have a plan to ensure that rice growers at all levels of knowledge and implementation in regards to precision agriculture will have the opportunity to learn from the project.



The project will compare different data types (e.g. NDVI and PCD satellite imagery), to determine what provides the most useful information for rice growers, and what can be best integrated with precision farming technologies.

A network of four training cluster groups will be established. This will be based around the 12 focus farms, and will engage local farmers, agronomists and technology providers.

A series of precision agriculture training workshops will be held, with the aim of covering an update on GPS guidance, collecting and managing data, mapping paddock variability, record keeping, advanced crop monitoring and crop scouting tools, and designing and analysing on-farm trials.

The project will organise crop walks on focus farms and at demonstration sites at critical points during the cropping season, and pre-seeding and pre-harvest workshops.

The findings of the project will be published in an annual trial booklet (downloadable from a website) and a precision agriculture manual will be developed over the three years of the project. Experiences from the three-year project will be integrated into a booklet "Practical guide for how to implement Precision Agriculture". This information will be targeted for farmers with different levels of available GIS information/ data.

Industry-wide benefits

The project hopes to provide all rice farmers who are interested in precision agriculture with the knowledge of how they can implement precision agriculture on their farm.

In turn, new knowledge and better understanding of precision agriculture will increase the efficiency of crop inputs (e.g. fertiliser) through the adoption of variable rate management, which aims to match to reduce cost and minimise environmental footprint without compromising yield.

Through the project, rice agronomists will understand how they can use spatial information to improve crop monitoring, soil and plant testing, and crop input recommendations.

Overall, the project will innovate, challenge and support future R&D by identifying opportunities through the network of on-farm trials.

Further information

Andrew Whitlock
M: 0458 312 589
E: andrew@precisionagriculture.com.au
W: www.precisionagriculture.com.au

precision agriculture.com.au

Australian Government
Rural Industries Research and Development Corporation

The project will provide opportunities for all rice growers interested in precision agriculture to participate in workshops, field days and crop walks to further their knowledge and make the best return on their precision agriculture investment.