

PRECISION AGRICULTURE: **The Next Phase**

A RURAL PRESS SPECIAL FEATURE

# Patterns key to crop success



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**F**OR Richard Heath, precision agriculture is less about the individual tools and more about the ability to acquire information that reveals patterns across the entire cropping system.

Mr Heath studied nitrogen application on a 2002 Nuffield scholarship, and has since made some pioneering changes on Pinecliff, the Curlewis, NSW, where he manages 3300 hectares of summer and winter cropping as part of a 5800ha mixed family enterprise.

His cropping program now involves layers of information collection: soil tests before planting, to assess available nutrient; in-crop tiller counts and sap tissue tests; and biomass mapping with a Greenseeker unit.

"The combination of all those bits of information gives you a very good indication of whether the crop is performing on current nitrogen levels, or whether there are other issues there," Mr Heath said.

"The patterns you can identify through data like biomass maps may not be something you can rectify that year, but it allows you to take steps to correct issues that might otherwise not be apparent."

Two years ago, Mr Heath was puzzled by the poor emergence of a crop of winter wheat.

Nothing was apparent to the naked eye, but the Greenseeker picked up a pattern that suggested the emergence problems lined up with paddock management patterns.

"That led us to thinking that it was a chemical issue – probably an over-application of a residual herbicide from a previous faba bean crop.

"We were going to apply the same rotation to a paddock with the same history, so we changed and put a different grain in."

The new crop performed well.

Nitrogen management is based on in-paddock test strips, a technique learned on his Nuffield scholarship.

Test strips are sown at the same seed rate as the rest of the paddock, but are given luxury levels of nitrogen. The rest of the crop only receives about 75 percent of optimum levels upfront.

Upfront nitrogen applications are based on pre-planting soil tests.

If plant-available N is left over



## Precision ag's real profit gains

**G**RAINGROWER Richard Heath of Curlewis, NSW, says that while studies suggest that precision agriculture can deliver profitability gains of about \$20 per hectare, the real gains could be far more.

"If the return on precision ag is \$20/ha, it's very easy to say that with the time and cost implications to get a system working, it isn't worth it," Mr Heath (pictured) said.

"But by putting all the precision ag information together, we've been able to make more far-reaching management changes than we could have otherwise.

"We've been able to identify drainage issues, correct uneven nitrogen deposition from previous pulse crops, and understand the long-term effects of fertiliser, as well as manage growing crops more efficiently. By my calculations, the benefits to us have been in the hundreds of dollars per hectare."

The tools of precision ag also help farmers conduct their own on-farm research – an ongoing real-life farm trial that provides hard data on every decision, Mr Heath says.

"Farming is a biological system, and very variable. Your farm or your paddock isn't going to behave exactly the same as that farm or paddock where official research takes place. Research might provide principles, but precision ag helps you refine them."

from the previous crop, nitrogen applications at planting are cut back accordingly.

At stem elongation, Mr Heath then assesses performance of the test strips against the rest of the paddock.

If the vegetation canopies are similar between the test and the crop, no nitrogen is applied.

If the canopy on the crop appears to be lagging the test strip and there is a decent chance of a good finish, an in-crop nitrogen application is made.

The system means that 25pc of the nitrogen budget is only applied if the crop demands it.

If a dry finish appears likely, the in-

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crop application can be withheld. The strategy not only saves on nitrogen if the crops fails, it helps

manage vegetative growth.

Vegetative growth fuelled by too much N can make big demands on soil moisture at the expense of grain development.

In his first three years of using the system – all of them dry finishes – Mr Heath estimates that he saved 40-100pc of his nitrogen budget.

After the past two years of big crops, nitrogen use is creeping back to earlier levels.

Mr Heath believes that early on in his experimentation he was using N accumulated from previous years.

Now he is taking out all that he is putting on.

## New simple system

INHERENT in the tools provided by precision ag is the ability for farmers to conduct their own on-farm research, backed by hard data. But data needs to be collected and analysed using some form of system if it is to have relevance, so researchers have developed a 'farmer friendly' system.

CSIRO and the Department of Agriculture and Food, funded by the GRDC, are compiling a fact sheet on the simplified testing system. This will be released at a series of precision ag training courses to be held in the wheatbelt before seeding in 2010.

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