

because you have the technology to split a paddock up into zones and manage them differently doesn't mean you should. In a recent economic analysis of a farm in WA CSIRO calculated that PA would return the farm an average of \$8.78 per hectare. But out of 17 paddocks, 12 returned less than the \$8 per hectare more when managed with PA.

The remaining five had enormous variation and returned between \$12 and \$20 per hectare when managed with PA. These were also some of the largest paddocks on the farm. In this situation, the farmer only needs to concentrate on managing the variable paddocks.

Rule 5: If your Variable Rate Technology (VRT) fails, don't wait, put the crop in.

Finally, many farmers have had trouble making the technology talk. Unfortunately, if the technology is performing badly or not at all, put the crop in with a uniform rate. The payoff from PA will be over-ridden by delaying sowing time. It is simply too risky to delay sowing to repair a VRT controller, or fix a software bug that is preventing one controller from 'talking' to another.

It is essential that all the equipment 'bugs' have been sorted out prior to sowing, otherwise something will go wrong at the worst possible time.

**Roger Lawes is a research scientist with the CSIRO based at Floreat, WA.
Ph: 08 9333 6455; E: roger.lawes@csiro.au** ■

PA adoption - small steps are simple enough

By Nigel Metz, SEPWA

Many growers out there may feel more than a little daunted when they first look into precision agriculture (PA). The concept of varying rates of fertiliser or other inputs to a soil types particular requirement over different parts of the farm makes good sense. But putting PA into practice requires significantly different skill sets than previous farming technology adoptions.

Assembling yield and other spatial data, making decisions and creating a zoned prescription map is largely a computer based process, not something you can modify in the workshop. Thanks to the project - "Putting Precision Agriculture on the group in Western Australia" these hurdles are getting easier for growers.

Funded by GRDC this project is lead by CSIRO and is a collaboration between the Department of Agriculture and Food Western Australia (DAFWA), Curtin University and local region farmer groups across the WA. In the Esperance region of WA, the project is collaborating with the South East Premium Wheat Growers Association (SEPWA) to implement PA trials with a number of case study farmers.

In the process of implementing PA trials during 2009, the project needed to progress through the basic steps of making a zoned prescription map for use in PA. This involved:

- Assembling information of the paddocks variability and yield;
- Defining zones within the paddock by which will be managed differently;
- Create a zone prescription map by which inputs were varied across designated zones (in this case it was the variation of fertiliser); and,
- Loading the prescription map into the tractor-mounted variable rate controller for application at seeding, checking rates and zones corresponded accordingly.

The first process of PA is defining the different areas of the farm or paddock in question and deciding how these can be best managed. This is no doubt one of the most confounding parts of PA. Different farmers and agronomists will have different approaches to management across various zones.

To date there are several information sources being commonly used in defining

A NEW PA TOOL

To assist with some of the economic decisions around variable rate technology, CSIRO, DAFWA and Curtin University have been developing a PA economic calculator.

This tool calculates the profit derived from a paddock when PA is implemented, compared to managing it uniformly. The calculator takes into account the fertiliser price (for nitrogen and phosphorus), the expected or potential yield of the crop for each zone, the response of the crop to fertiliser in each zone, the area of each zone and the grain price.

All of these factors will influence the return from PA and it is difficult to perform all of these calculations with pen and paper.

This tool will be available for release in February 2010 and is currently being evaluated by consultants in the industry.



LEFT: Project participant Colin Degruessa, with his zone map on the desk top computer ready for exporting as shape file to his seeding tractor monitor. RIGHT: The same file loaded, and ready on the tractor monitor.



The project used a combination of yield maps to create zones in a trial paddock and will examine the relative economic fertiliser response from this year's harvest data.

management zones over agricultural land in Australia. These include:

- Yield maps;
- Aerial photography;
- Biomass imagery (NDVI);
- Electromagnetic surveying (EM 38);
- Radiometric surveying; and,
- Digital elevation models (DEM).

For the purposes of the project SEPWA used a combination of several years' yield maps to define zones of high medium and low performing areas in each of the trial paddocks. Trial strips were then designed to run across high, medium and low yielding zones at 50 per cent, 100 per cent and 150 per cent of the standard district practice fertiliser rate.

This year's harvest yield data will be collected via the header yield monitor for analysis by CSIRO to determine optimal economic fertiliser returns across the paddock.

Can you create your own zone prescription maps?

The creation of a zone prescription map is carried out by working in computerised mapping software. Speciality PA software is now common as it accompanies the yield mapping hardware of combine harvesters. More advanced software is sometimes required for the analysis for more in-depth data analysis.

Many of these software programs will now automatically generate zone prescription maps and export them in ready format for your tractor monitor. If this is not possible you will need to export your zone prescription map as a shape file format.

The shape file format is universal file format which is recognised by most tractor monitors, hence hurdling many of the early

PA issues of incompatibility. A shape file is actually a combination of between three and five individual files of various formats – but when opening in your PA software they will appear as single file ready to load.

You can transfer the shape file of the zone prescription map from your computer to your variable rate tractor monitor with a standard USB thumb drive. Once the shape file has been loaded into the tractor monitor you may need to convert it to a unique format for your specific monitor brand but some monitors do read directly from shape files.

Most monitors now allow you to view, edit and change rates of your zone prescription map in the tractor as easily as you would on your desk top computer. This is an important final check that the transfer was successful. At this stage you are ready to drive and apply that zone map

as a management prescription to your paddock.

How does it all talk to each other?

The first building block of PA is the automatic guidance of the tractor as it crosses the paddock. This is done by the GPS receiver determining the tractors positioning and then ensuring the coverage of the paddock is consistent with the machinery width. In the case of applying a prescription of a zone map, this GPS signal is also interpreted to define your position on the zone prescription map.

In each zone of the map there is a management prescription, for example: 60 kg per hectare application rate. As your GPS defines your position in a new zone it then sends a message to your machinery controller which alters the application rate accordingly.

Many PA systems to date have been a combination of several equipment brands between the GPS steering guidance ensuring coverage, a PA screen receiving the GPS signal and interpreting the map, and then finally an airseeder or boomspray controller varying the rate of application.

The good news is that there are several variable rate controllers on the market that have now combined these functions into a single screen.

Having a go yourself

The key to PA adoption is not to be daunted by the technology. Overall it is simple enough in a step by step process, which gets significantly easier once you have done your first maps and applications... You can do it!

Nigel Metz is the projects officer for the South East Premium Wheat Growers Association see: www.sepwa.org.au E: nigel@sepwa.org.au; Ph: 08 90 83 1115. ■



Farmer Will Carmody with the project's zone map and trial strips loaded onto his variable rate monitor. Will has been using variable rate application of fertiliser over his farm for several seasons now.