Australian Centre for Precision Agriculture

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The University of Sydney

The Australian Centre for Precision Agriculture Symposium on Precision Agriculture Research in Australasia

Proceeding of the 1997 Symposium
-Site Specific Management Systems-

Universitas Sidneiensis

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Rice Yield Mapping

Brendan Williams, Longerenong College, The University of Melbourne

In 1995 RDS donated a Ceres 2 yield monitor and Hermes data logger to Longerenong College. This was the first Ceres 2 yield monitor in Australia, an earlier version Ceres 1 had previously been used by the Department of Agriculture in Merredin, W.A. It was dispatched from the U.K. in December but unfortunately, its passage through customs was delayed to the point of missing the entire grain harvest in Victoria.

In April 1996 it was decided that experience with the yield monitor could be obtained by fitting it to a rice harvester, by this time the rice harvest was already in progress. Support was received from New Holland and The Rice Growers Association to fit the RDS yield monitor and data logger and Fugro DGPS to a New Holland TX66 rice harvester owned by Dennis Gleeson of Wakool. Unfortunately, problems with the data logger and DGPS prevented any geo-referenced data being collected in the first year, however, yield data was recorded and analysed. Most of Denis Gleeson s 800 hectares of rice is grown on contour following land which means irrigation bays are generally small and have a very irregular shape.

In 1997 Bert Schultz from Mayrung yield mapped rice fields using an Agleader yield monitor and Fugro DGPS fitted to a Claas CS114 harvester. Unlike Denis Gleeson's property most of Bert Schultz s land is laser levelled and layout in rectangular bays.

Results

In 1996 only yield and grain moisture content data was being recorded. More than 10,000 individual yield and moisture content readings were recorded in 13 different locations and times. This recorded data was displayed and analysed using Excel spread sheet. In 1997 geo-referenced data was collected and yield maps were drawn. The same analysis as described above was performed to try to characterise the variation of yield and moisture content. For comparison similar analysis was done on two paddocks of wheat harvested in 1996 by Brian Smith of Nhill, using an Agleader yield monitor fitted to CaseIH 1680.

Discussion

Yield:

Measuring yield in rice bays that are small and have an irregular shape cause problems for yield monitors that calculate yields based on full header widths. There is a facility on most yield monitors to switch to part header widths to allow for part widths but this is generally not very conveniently activated especially when in some bays about 30% of the time is spent with part and varying header widths. Of all the yield monitors available, the RDS has the only remote switching device to alter header width which makes it the most convenient to operate, although this device has only four graduations for part widths.

In 1996 rice yields were well below average, the crop was affected by cold weather during its development and the paddocks where the monitor was working correctly were the last paddocks to be harvested and were the lowest yielding. Not withstanding the difficulties of partly filled fronts, large variation in yield were observed. Yields and grain moisture content fluctuated widely. In 1997 yields were much higher and in some instances there was still a high level of variability in yield even in laser levelled bays.

There are a number of similarities between droplet size measurement and yield measurement using a yield monitor. The devices commonly used to measure droplet size generate a large amount of data by measuring the diameter of thousands of individual drops and the errors in measurement at the extremes of too small and too large drops are usually great depending on the type of instrument being used. This is similar to measuring yield with a yield monitor where there is a lot of data generated and the very low and high yield readings may be associated with large errors due to harvester dynamics. The yield monitor will register a high yield as the harvester slows down, so travel speed is low and the grain flow is still high. The reverse will happen as the harvester suddenly increases speed. Most yield monitors attempt to account for this by setting offset but these methods are relatively crude.

Grain moisture

Grain moisture readings were effected by low grain flows, if the grain did not entirely cover the sensor plate. This generally only occurred after the header was left running empty for some time, even with part header widths there was generally sufficient grain flow to get accurate readings. The accuracy of the moisture meter was tested against the elevators readings and was reasonably accurate around the 20% moisture content, the readings were stepped in 0.5% increments on the RDS unit. It would be expected that the level of accuracy would diminish as readings varied from the 16-24% range.

Moisture content fluctuated widely in both 1996 and 97 harvests. Fluctuating moisture content represents a major problem for the rice industry and the farmer. On-the-go grain moisture sensors are a considerable benefit to farmers trying to avoid costly penalties for delivering moist grain to the processors.

Conclusions

Span may be a useful term used to describe the amount of variation occurring in grain yield and moisture content.

Yield monitoring in rice that is grown in irregular shaped bays will be inaccurate because of the constant changing header width. An automated header width sensor or an alternative method of processing yield maps will be required to gain maximum benefit from yield monitoring technology in these situations.

Wheelslip and wheel sinkage, in the often boggy conditions will add to errors in yield estimates for yield monitors that measure speed from wheel sensors. The use of GPS speed is preferred.

When calibrated, on-the-go moisture sensors are relatively accurate in rice and represent a very useful tool for the farmer.

Rice yield and moisture content fluctuate widely which would indicate that the industry has the potential to benefit from site specific management.

Adoption of Site-Specific Technology at the Farm Gate

Nigel Bodinnar & Robert Christie, Pivot Ltd.

The introduction of commercial grain yield monitors and data handling software to the cropping regions of South Eastern Australia has allowed farmers to gain an insight and a more detailed understanding of crop yield variability and performance. Since the first monitors were fitted to harvesters, farmer interest in Site Specific Management (SSM) has increased dramatically. After the installation of 6 units in □95, some 47 systems were fitted last year to commercial headers in the SE Australian grain belt. Nationally, estimates for the number units range from 75 - 90. Around 15% of these do not have Global Positioning System (GPS) capability to reference the yield data.

The technology has been successfully used by farmers in South Australia, Victoria and New South Wales to harvest a diverse range of crops including wheat, barley, canola, field peas, chickpeas, lupins, lentils, vetch, faba beans, oats and triticale. It is estimated up to 90,000 ha have been harvested using yield monitor hardware with the majority mapped in detail using a variety of advanced software applications.

Last harvest, over 250 paddocks were monitored and mapped through Pivot Prescription Farming. Significant yield variation was found in most of these paddocks. The causes of this variability could be identified with confidence in a number of cases. However, in many other situations the reasons were not clear. Additional yield data will need to be collected over several seasons before the factors behind the variation in these paddocks can be established. The ability to manage these factors then becomes the challenge. From the paddock analyses to date, the key factors influencing crop variability are topography, soil type, nutrition and previous paddock management.

With the development of SSM in Australia, new farming techniques and management strategies are being implemented. Prior to the availability of GPS, farmers tackled the issues of yield variability in a variety of ways ranging from patching out soils with gypsum, sowing different crops according to soil type through to the “do nothing” solution. Site Specific Technologies allow grain growers to quantify and manage this yield variability for both economic and sustainable outcomes. These are the expectations of the farmers that have taken this technology to their paddocks.

At this stage, those farmers adopting the technology are doing so on the understanding and vision that it will take a number of seasons to develop the skills and interpretative power to fully utilise the data that this management approach generates. There are no illusions amongst these innovators. They believe the hardware and software are in place to deliver the information but turning that information into knowledge is recognised as the major hurdle to broaden the adoption of Site Specific Management in the grain belts of Australia. There is also a burgeoning need to support this technology in the field as more farmers take on SSM with the goal of optimising the economics of grain production and developing more sustainable and environmentally sound farming practices.

Remote Sensing Applications in Pasture Nutrition

Martin Williams, Incitec Fertilisers

Deficiencies of phosphorus (P) and sulfur (S) are common and widespread on soils of the temperate grasslands of Australia. Most commonly, soil testing is used to determine the fertilizer requirements of a pasture. While soil testing gives a result for the area sampled, it provides no spatial information. Vickery et al (1980) suggested that remote sensing could be a low cost method of estimating the fertilizer requirements of pastures. Vickery & Hedges (1987) reported several methods for processing Landsat MSS data to represent most accurately the differences in fertilizer needs as a function of pasture growth rate. The Incitec Analysis Systems SatMap is the resulting commercialisation of this technology developed by the CSIRO.

The procedure developed by the CSIRO involves relating the satellite data to the reflected characteristics of pastures with known histories of fertilizer treatment. Measurements from the satellite are calibrated accordingly and a colour coded pasture status map produced.

SatMap can provide a graphic picture of pasture vigour over the whole farm. It shows the relative appearance of pasture within a particular season. It can also illustrate the impact of pasture improvement and past fertilizer programs. Combining the SatMap with data from soil test monitoring sites can provide a powerful insight into the formulation of farm fertilizer programs. The maps do not provide information or requirements for specific nutrients, but rather highlight areas for further investigation

Interpretation of the Maps

The interpretation process involves on ground verification as the maps illustrate more than just soil fertility differences. The maps use the 30 x 30 resolution of the LANDSAT Thematic Mapper or the 20 x 20 m resolution of SPOT. Each square is called a PIXEL. The colours used are dark green for the most actively growing pastures which may only require maintenance applications of fertilizer. The light green colour represents more slowly growing pasture; these pastures may be extremely responsive to added fertilizer but they will not be as productive as the dark green class unless extra nutrients are added. The pastures with the lowest growth status under average conditions are coloured brown; these may be improved pastures which have become degraded (low legume content) or native pastures.

The application of fertilizer to these pastures without the establishment of improved species (clover first, then grasses) may be unlikely to provide an economic response to those nutrients in many cases.

In the initial phases of developing a fertilizer program for a particular property, the growth status maps should be used in conjunction with the tables showing the area of each growth class in each paddock and the recommended soil test for the district. This will provide a continuity with existing information and allow for improved resolution in estimating the actual responsiveness of the various classes within each paddock. In this context the maps can also be used to select monitor sites for soil testing so that they are truly representative of each paddock. SatMap can also be used to assist with the differential application of fertilizers to pastures.

There is increasing farmer adoption of this sort of technology. With the advent of new satellite and computing technology combined with improved calibration and data analysis techniques, it is envisaged that SatMap and other remote sensing applications will play a significant role in farm planning and decision making.

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An Investigation of Barley Grain Protein Variation.

Richard Low, Graham Moore, Marc Nicolas & Brendan Williams, The University of Melbourne.

In Australia, precision farming techniques are just beginning to be assimilated by common farmers. Yield and soil mapping are some of the more common techniques being used. However, in the case of barley, grain protein content is just as important if not more important to the farmer than yield. Barley produced is graded at the point of sale to either one of two categories; malting or feed barley. The former attracts a premium price however, a narrow protein range requirement must be met.

This study was conducted to determine the degree of grain protein variation that occurs within two 5 ha plots with different cultivation practices (cultivated vs. no-till) and also determine likely correlations between other components of yield. Yield was measured using a RDS Ceres 2 yield monitor while grain samples were collected at predetermined locations from the header clean grain elevator at predetermined locations for subsequent laboratory analysis of grain protein and grain weight.

Yield, grain protein and grain weight were found to be significantly different between tillage treatments. In field patterns of variation were also very different for both plots. The no-till plot displayed lower in-field variation for all the parameters measured. Grain protein was as low as 8.2% and as high as 12.3% in the cultivated plot. Only 22.5% of the cultivated plot and 1.1% of the no-till plot produced grains with protein levels within the acceptable range for malting. Strong positive correlation (p? 0.002) between yield and grain protein and negative correlation (p? 0.007) between grain weight and protein were obtained for both treatments, however the coefficient of determination between grain protein and the other variables was quite low being less than 15%. Useful predictions of protein from yield could not be made from such relationship. Due to high degree of variability in protein across a relatively small field and the lack of other reliable methods of predicting or managing grain protein, there is an opportunity to develop in field grain segregation technology.

Precision Agriculture: What are the Implications for Wheat Quality ?

John H Skerritt, CSIRO Plant Industry, Canberra and Quality Wheat CRC Ltd, Sydney.

Most of the interest by wheatgrowers in the use of precision agriculture has centred around the ability to map variation in yields in defined areas of individual paddocks, and to use this information to remedy local deficiencies in soil fertility or weed control, such that yields can be maximised. Use of this information, together with soil maps and differential global positioning system technology also enables N and other fertiliser inputs to be made at a variable rate. However, in agronomic trials there is quite often an inverse relationship between grain yield and grain protein content, especially where nitrogen fertiliser is applied early in crop development. With premiums being paid for grain protein content and the various premium-paying wheat grades requiring a minimum and sometimes a maximum protein content specification to be satisfied, there is the risk that a focus on use of site-specific management solely to enhance grain yield could result in the loss of grade premiums if the protein content (and potentially quality) is not suitable.

Recently, the GRDC have supported a small pilot project for 1997 and 1998, collaborative with Simon Cook at CSIRO Soils and Agriculture WA agronomists, but hoping also to interact with Alex McBratney and others at Sydney University, and Jon Medway and Ted Wolfe at Charles Sturt University. This project aims to evaluate aspects of the relationship between site-specific N management and grain processing quality. Some of the issues that will be addressed in this project include:

What is the relationship between use of variable N application rate, yields and grain quality? Is there variation in "protein quality" as well as protein content? Where higher N inputs are used to overcome low yield or protein in grain due to soil fertility or weed problems does "stressed" grain of higher protein but poor quality result? Are similar trends apparent in paddocks that have been subjected to constant rate N but for which yield data has been obtained from individual sites? Grain from both variable and constant rate N fertiliser experiments will be analysed using small-scale biochemical and rheological tests predictive of dough (and for noodle wheats, starch) properties, and the results related to grain yield and protein content as well as field measurements of in-paddock development, soil type and N status and weed management at the within-paddock sites from which the grain is harvested.

Since grain protein contents often vary markedly within each paddock, site-specific knowledge could help the grower harvest (and bin) grain from different ends of the paddock separately in order to maximise financial returns through obtaining high-protein segregation premiums. In a related project, we will develop a simple on-farm test for grain protein content to facilitate such binning. The protein contents of grain in different sites could be mapped 1-2 weeks before the harvest. A similar test for grain downgraded by pre-harvest sprouting has already been developed to the prototype stage.

The research that has recently been commenced should enable the implications of site-specific management for grain processing quality to be understood, as well as facilitate the development of a new on-farm test for growers that will be most usefully adopted in conjunction with hand-held differential GPS technology.

Preliminary Real-Time Cotton Yield Monitoring

Broughton Boydell, The Australian Centre for Precision Agriculture /CRC for Sustainable Cotton Production.

The 1996/7 Australian cotton-picking season saw the first extensive trials of real-time cotton yield monitors. Two systems; one developed in Australia by the University of Southern Queensland, and the other in the USA by Zycom Inc. were trialled in the St. George, Bourke and Wee Waa districts. Both systems utilize an array of light beams to detect real-time cotton flow into the picker and DGPS for location determination.

The presentation identifies the primary goal of research into yield mapping being the characterisation and understanding of spatial variability in cotton yield. An emphasis is made on the identification of opportunities and prioritisation of research aimed to produce practical, managerially beneficial applications of Precision Agriculture. The grain yield monitoring and the cotton yield monitoring systems are compared with respect to accuracy and some early cotton yield maps are displayed and some features investigated.

Precision Agriculture for Sugar Cane

Graeme Cox, Harry Harris & Randolph Pax, The University of Southern Queensland, Toowoomba.

This paper outlines the research that the University of Southern Queensland has conducted in the area of sugar cane precision agriculture, particularly in the development of a yield mapping system. As sugar cane is a high value crop requiring high levels of inputs, it is an excellent candidate for the application of Precision Agriculture. The first step for this application is to develop a yield mapping system for the *chopper* type harvester.

Two years work on this project has yielded various sugar cane mass flow rate sensors and the first sugar cane yield maps. Based on these maps soil sampling has been carried out. The mass flow sensors have achieved accuracies of greater than 95%. The yield maps produced are encouraging when compared visually with aerial photos. Soil sampling results have also provided a strong correlation, with a single soil parameter (sodium) accounting for 69% of the yield variation.

This work will enable the application of precision agriculture principles to sugar cane. The first specific utilisation will be variable rate application of gypsum to combat sodic soil problems on the yield mapped fields.

Towards the Development of a Real-Time Soil pH Sensor

R.A. Viscarra Rossel, The Australian Centre for Precision Agriculture.

A required step in the evolution of agricultural site-specific management systems is the development of real-time, continuous sensors and scanners to more efficiently and economically obtain comprehensive and precise soil and crop attribute variability information. Soil pH was chosen as an initial attribute for which to develop such technology, and a preliminary evaluation of four potentiometric pH sensors, namely a glass electrode, a glass micro-electrode, a metallic electrode and an Ion Sensitive Field Effect Transistor (ISFET), was conducted.

The pH range, fragility, precision and response time of each sensor was investigated, response time being the most critical property. The ISFET sensor proved to be the most suitable sensor in terms of its ruggedness and its fast response time. Further experimentation conducted with the ISFET sensor involved testing its response time at two different solution stirring rates and two soil to solution ratios. The speed of response increased with increased stirring speed, and when a higher soil to solution ratio was used. Preliminary kinetic experiments looking at reactions between the SMP buffer (Shoemaker et al, 1969) and four different acid soil types were conducted by measuring the pH of samples at various time intervals.

These experiments were conducted to determine the shaking time needed for the buffer pH to equilibriate. The four soil types showed similar reaction trends and reaction rates were determined by fitting exponential models to the data. A two point log linear predictor for the equilibrium pH was used as an illustration of what may be required in a field situation. Further experimentation is required, but results although preliminary show to be very promising.

Spatial Prediction & Mapping Accuracy

Brett Whelan & Alex McBratney, The Australian Centre for Precision Agriuculture.

A primary requirement of a Site-specific Management System is the combination of an appropriate and accurate sampling strategy with a spatial prediction method that together provide a sufficiently detailed representation of the true spatial variability of relevant crop and soil properties. While the mass balance accuracy of current monitoring systems at the whole field level are very good, the instantaneous grain yield representation is subject to a number of errors and biases. We use the term error to represent random inaccuracies and bias to signify systematic influences on inaccuracy.

The systems are sensitive to spatial error introduced by the dGPS and spatial bias due to aerial position in relation to the cutterbar and sensor. Quantitative error in the yield may be caused by incorrect speed and cutting width measurements and machinery noise. Temporal and quantitative bias is also brought about by the mixing action of the threshing process. Further quantitative error may be introduced by the use of inappropriate spatial prediction methods.

In all, the effect of these errors and bias is the creation of uncertainty in the yield data being allocated to individual points in the field. It is important that this uncertainty is reduced by minimising error and compensating for bias. While these goals are being achieved, it is essential that some estimate is made of the uncertainty involved in yield maps so that sensible decisions and assessments can be made on differential actions.

The least understood of these influences on accuracy is the mixing imparted by the threshing process on the grain as it moves through the harvester. The process does not impart a simple time delay from grain table to clean-grain elevator. The grain cut from a small area of crop appears at the sensor mixed with grain cut prior and after. Modelling this effect is necessary to begin reducing uncertainty in yield maps.

Finally, yield monitoring gathers intensive data on variability but its order in space requires some form of prediction between the header runs. Most of the methods utilised at present impose a single model for the variation within each field or within any field. An examination of the yield data shows that this is not usually the case. To minimise the loss of information and provide an estimate of the uncertainty in the prediction, local kriging with a local variogram (localised model for the variation) is introduced.

Modelling Sorghum Response to Fine-Scale Sorghum Variation

Tamara Shatar, The Australian Centre for Precision Agriculture.

Site-specific management cannot be implemented without identification of the relationships between yield and soil properties. A knowledge of these relationships is essential in the determination of yield potentials and in determining an appropriate management response.

Yield-soil property relationships within a 15 ha field, located 40 km east of Moree, in northern NSW, were examined. A sorghum yield map was produced for the field in March, 1996, by continuous monitoring during harvest.

The yield map was used to obtain yield information and to select soil sampling locations, with extra sampling locations to improve interpolation. A four-wheel drive bike, equipped with a laptop computer and global positioning system unit were used to aid in positioning and soil sample collection in the field. Soil properties related to water retention and nutrient status were measured.

Differences in the amount of water available to plants, due to differences in water retention by soil was found to be the principal cause of yield variation along the edges of the field, where clay content was quite variable. In the centre of the field, where clay content was more uniform, yield appeared to increase with increasing exchangeable potassium. Potassium was identified as the main factor causing yield variation in this region.

The data was used to test a more practical, simple sampling scheme., which involved examination of yield-soil relationships using only data from the lower, middle and upper 10% of yields. This was found to be a practical method of characterising a field.

The Potential Role of Precision Agriculture Techniques in Property Management Planning

Kim Bryceson & Steve Marvanek, CRC Soils & Land Management.

Property Management Planning (PMP) is a process which aims to assist primary producers in becoming more highly skilled and self reliant business people. The process involves recognising and assessing all aspects of the farm business - including the natural and human resources on the property, the business enterprises, and the development of appropriate whole farm management plans for achieving sustainable and profitable land use.

Precision agriculture has been promoted in the last two years as a new approach to farming. Acronyms describing technologies which are themselves only recent innovations when compared to agriculture - for example “GPS” (Global Positioning Systems) and “GIS” (Geographic Information Systems), along with phrases such as “GPS linked yield monitoring”, “grid sampling” and “farming by satellite”, have been bandied around quite freely in the press and amongst the enthusiasts of the approach. The question is - are farmers being hooked by the hype or not, and how can this type of farming approach, and the technologies that it encompasses, fit in with the whole farm planning approach of PMP?

This paper will discuss how the technologies that Precision Agriculture involves can be used, not only to generate information on spatial variability at the sub-paddock level, but how such information can be used in a whole farm planning context.

Designing and Implementing On-Farm Experiments in Precision Agriculture

Simon Cook[1], Matthew Adams[1] & Glen Riethmuller[2]
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Precision agriculture technology greatly improves the intensity of information and control in broadacre agriculture. Of immediate benefit to farmers is the ability to measure more accurately the response to variable inputs, and so improve decision about the future placement of inputs. The overall aim of the process is to answer two simple questions:

- Does this paddock respond to a given input? and
- Does the effect vary significantly within the paddock?

Knowing these, the farmer can make a more informed decision about likely future responses and manage appropriately.

This paper describes some early experience with on-farm experimentation in the Western Australian wheatbelt and explains the principles which underlie their application and continuing development.

Limitations of Site-Specific Technology in Conducting On-Farm Trials

David Mills Precision Farming Australia.

Site-specific technology offers farmers the opportunity to perform virtually unlimited on-farm experimentation, however equipment accuracy, data analysis methods, shape and size of trial sites can seriously impact results and lead to incorrect assumptions. Important factors for the farmer to consider are; harvester performance, yield monitor accuracy, GPS accuracy, harvester & seeder widths and limitations of graphical presentations of data from standard yield mapping software.

Progress on Variable-Rate Control in Australia

David Sharp, Director, Computronics Corporation Ltd.

The prime objective of this report is to outline the current direction of VRT developments in Australia and highlight equipment currently available. For the past 20 years, the majority of basic monitoring and control equipment found on airseeders, drills and sprayers has been developed by local agritronic companies. The equipment is tailored to suit local conditions and based on personal knowledge, is at least equivalent or better than products being offered from overseas.

Presently, a number of leading machinery manufacturers are engaged in development of variable rate technology with a view to providing simple tools for now that can be enhanced in the future with full DGPS and agronomic decision support software. Current forms of VRT range from simple linear actuators (12 volt DC Ram) used to remotely adjust gates or ground driven systems to full electronic implement controllers that independently control seed and fertiliser metering units.

In VRT trials over the past 4 years, DC motors have proven successful in controlling starwheel drives on seed drills and fluted roller type metering systems on airseeders with low torque requirements. Hydraulic or ground drive is essential for belt type airseeders and fertiliser spreaders where much higher torque loadings are required to control the belt.

With the advent of controlling multiple product bins, the latest generation of implements are being developed with "black box machine controllers" that enable the implement to operate as a self managed unit able to receive rate instructions and react immediately to deliver specific rates as directed by a cab mounted "task computer".

This means that rather than having a cab controller directly driving motors and processing signals from various sensors, the new "task computer" will handle DGPS signals, read rate maps and issue control instructions to the implement by a simple 3 wire serial communication cable. In basic form, the "task computer" will allow operators to manually select different rates on the fly according to their own own knowledge of soil types. These decisions can be logged and downloaded into mapping programs for later reference. The "task computer" will allow the operator to stay in visual contact with all machine functions such as bin levels, fan speed and areas covered as well as logging actual rates of application and any waypoints recorded for later treatment or scouting visits.

To date most emphasis has been on proving reliability of the hardware rather than actually using geo positioning to vary product rates. This is largely due to the lack of a sound basis for making site specific rate decisions. It seems farmers in general are quite content to use the new tools to make their own adjustments based on their own knowledge of soil type variations rather than using a more scientific approach.

Whilst variable rate control technology is immediately possible, the majority of farmers are not confident with PC's, mapping programs nor have sufficient historical agronomic information for site specific farming . The challenge is for all promoters of the technology to come up with simple tools that work. This I believe will provide the basis for further development of more efficient farming.

Precision Agriculture, putting the concept into practice: a demonstration project

Ed Blanchard & Geoffrey Hamilton, Kondinin Group.

The Kondinin Group in conjunction with Muresk Institute of Agriculture and industry partners have established a precision farming demonstration project at Muresk Institute of Agriculture near Northam in the Avon Valley of Western Australia. The project has been financially supported by the participants and the Grains Research and Development Corporation .

Project Aims

1. The establishment of a long-term precision farming demonstration centre where farmers can evaluate precision farming equipment in operation throughout the season. Additionally, the site will be available for researchers to conduct paddock scale research.

2. To allow growers to decide where precision farming technology fits into their own operations.

3. To determine whether adoption of precision farming is profitable to WA farmers.

The Precision Agriculture process

Although precision faming uses the latest in electronic technology it is not about technology per se. The technology only provides the tools to help the user improve their ability to measure what is happening to the crop and the land and make effective decisions and take action to improve efficiency.

The process can be broken down into three steps, see figure 1. The first step is to collect a range of information dealing with the crop's performance. This includes monitoring the crop during the growing season measuring the crops's yield and measuring the soil's properties and health. The second step is analysis of the collected data to find out what it means. The third step is to implement an improved crop management program based on the analysis of the gathered information. The process is a circular one with the level of knowledge increasing with each time around the cycle.

The project is in its first year with two paddocks on the Institute's farm being chosen for an intensive monitoring system while the whole of the Muresk Institute's farm was harvested using a yield monitoring system during the 1996 harvest season. The next phase of data analysis is now under way with yield and other maps being produced. Once this is complete the third phase of implementing an improved crop management program will commence.