

Low-tech approach favoured for yield maps

Yield monitors, global positioning and geographic information systems are considered key requirements of precision agriculture. But many farmers are managing their properties more precisely and productively without these high-tech tools. This article details how three producers are using low-cost methods to achieve their management goals.

by **Mike Wong, Peter Stone and Greg Lyle,**
CSIRO LAND AND WATER

Many farmers are using 'mental' maps rather than yield maps to make more precise management decisions about specific areas of their properties.

CSIRO researchers are examining the reasons why most farmers have not adopted yield mapping as part of their farm management tool kit.

Early evidence suggests the technical input required to generate yield maps is currently too complicated and time-consuming.

In preference, farmers are using intuitive knowledge, soil maps and satellite imagery to lift crop yields.

Yield mapping too technical

While many harvesters in Western Australia are less than five years old and equipped with yield monitoring capacity, several software and technical difficulties are rendering yield mapping too difficult for many producers.

For example, different computer-driven components of the new technology are not always compatible with each other, making information collection problematic.

In addition, downloading yield data to send away for processing requires time and skills not always available.

To be adopted widely, yield mapping systems will need to be enhanced and farmers will require support to operate the new technology effectively.

Precision agriculture

Despite the low adoption of yield mapping technology, most farmers are committed to precision agriculture and its production benefits but many are using more convenient approaches to achieve more productive outcomes.

CSIRO research suggests proponents of precision agriculture have been too focused on developing yield mapping technology rather than on the management needs of farmers.

Using satellite imagery

Many WA farmers have embraced satellite imagery as an alternative to yield mapping their cropping areas.

While satellite imagery is not always accurate at predicting high-yielding areas it can be used successfully to identify areas which



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Yield mapping technology is too time-consuming and complicated to be of use to many farmers, according to CSIRO research. In preference, farmers are using soil maps and satellite imagery coupled with intuitive knowledge about the production capacity of different areas of their farms to make more precise management decisions about cropping enterprises.

consistently perform poorly. Management decisions then can be made about fertiliser rates, crop choice or whether to crop particular areas at all.

Satellite imagery is available for all cropping farms in WA for the past 5–10 years.

The images enable producers to integrate up to 10 years of production information and develop management solutions for 2–3 areas of specific productivity.

Maps give benefits without cost

Geraldton, WA, farmer Ian prefers satellite imagery to yield mapping when making management decisions on his 3000-hectare farm.

Satellite imagery enables him to capture the benefits of precision agriculture without enduring the effort required of yield mapping.

Like many growers, Ian employs external staff during sowing and harvesting and consequently it is not cost-effective to train such workers in the methods required to produce yield maps from harvester information.

Ian also has many off-farm commitments and has had little time to implement yield mapping methods, despite being well informed about the potential benefits of precision agriculture technology.

Using satellite images generated by a local service provider, Ian has 'yield-mapped' a 100ha paddock in which the eastern side consistently performs better than the western side (see Figure 1A).

The maps have enabled him to determine yield variability over 8–10 seasons within the paddock (see Figure 1B) and then, using his own knowledge and experience of the paddock, divide it into two

At a glance

- Many farmers are using intuitive knowledge, soil maps and satellite imagery in preference to yield maps to manage their properties more precisely.
- CSIRO research indicates yield mapping technology is currently too time-consuming and complicated for many producers.
- Technical difficulties and a lack of farmer support with yield mapping are turning many producers off the new technology.

distinct management zones (see Figure 1C). This valuable information cost \$500 per paddock or less than 10 per cent of the paddock's annual gross margin.

But the main advantage for Ian was the ability to access up to 10 years of yield information without actually having to wait 10 years.

In WA, satellite imagery is used predominantly to tailor fertiliser applications to specific production areas.

Used correctly, CSIRO research estimates savings in fertiliser inputs could return almost 75% of the cost of satellite images within one year.

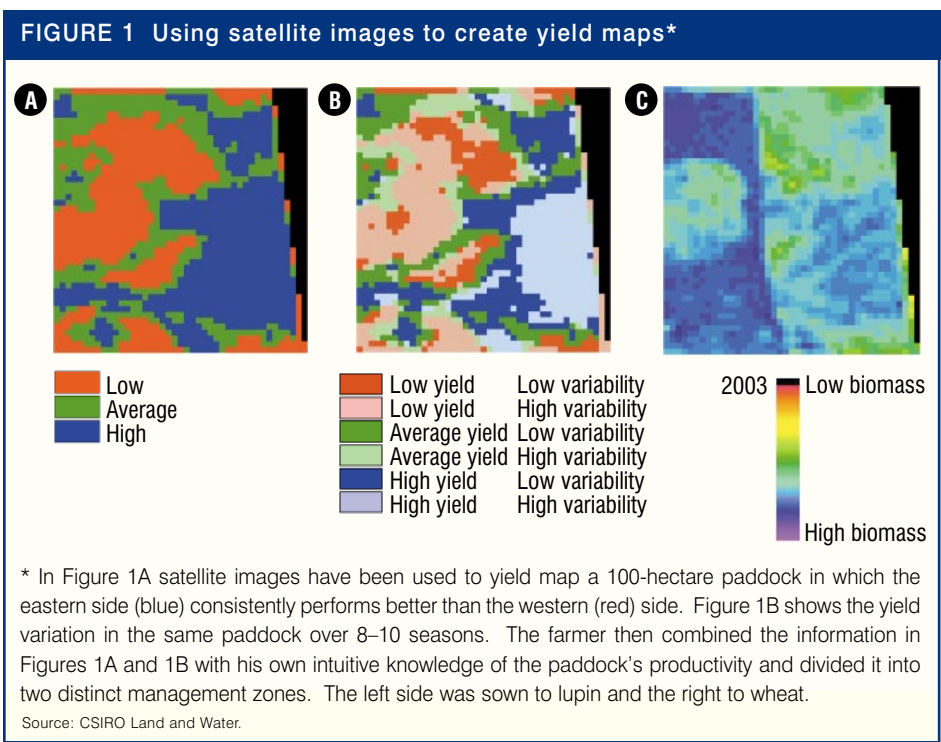
Using soil maps

Soil type has long been recognised to influence crop yield and some farmers use soil maps when making major farm planning and annual cropping decisions.

Mingenew, WA, farmer Paul operates a 3000ha mixed enterprise property, which includes certified pasture seeds, cereal crops, livestock and spices.

Paul does not feel compelled to purchase satellite imagery maps to supplement or replace soil maps he bought 25 years ago at a current cost of \$15,000.

In his opinion, the soil maps have paid for themselves many times over.



Soils grouped for productivity

Although the maps list 28 soil types, Paul can integrate these into three distinct productivity groups. For example, certified pasture seed is grown on 'good yellow sand', lupin, wheat and anise seed are grown on

'medium sand plain' country, while canola is produced on the 'heavier' land and the good yellow sand. Coriander is grown only on the 'heavier' soil.

During wet years, Paul sows the heavier land first to avoid waterlogging, while dry

years see the lighter soils cropped first to make the most of the shorter growing season. In addition to sowing and rotation decisions, Paul uses the soil types to manage fertiliser inputs and soil sampling points.

Paul's approach demonstrates farmers do not have to rely on sophisticated technology such as yield mapping to make productive and profitable precision agricultural decisions.

But Paul does not rule out supplementing his soil mapping system with computer-aided precision agriculture methods in the future.

He plans to use yield monitoring to determine if fine-tuning his management decisions within soil types can improve crop productivity.

If successful, he will implement other aspects of precision agriculture technology. In this way, Paul will adopt the new technology in stages to reach defined management goals.

Using intuitive yield maps

Most of WA's northern sand plain was cleared of bush land 30–50 years ago by many of those still farming in the area.

In consequence, these farmers have an intimate knowledge of yield variations across their farms and use this information to make precise management decisions.



Ben White

To be adopted widely, yield mapping systems will need to be enhanced so that different components of the computer-driven technology become more compatible. Farmers will also require better support to operate the new technology effectively.

For example, WA farmer Alf cleared the land which he and his son Chris now farm.

Alf and Chris use their mental map of soil variability at a sub-paddock scale to inform management decisions such as potash

fertiliser inputs. The paddocks have a range of sandy to clay soils with defined boundaries.

Chris and Alf have combined their knowledge of soil properties and boundaries with recent scientific information to decide where and how to apply potassium fertilisers.


For example, on sandy soils, potassium chloride is applied at 120 kilograms per hectare every two years while clay soils are considered well supplied with potassium so potash is rarely applied.

While Alf and Chris could move to another stage of precision agriculture in the future, this would need to be cost-effective and provide a specific management solution.

Farms of the future

While farmers with a long-standing experience of their farms could have less need for precision agriculture technology, it seems likely that as farm amalgamations continue, the number of landholders with intimate knowledge of their farms will decline. These farms could well rely heavily on the more technical aspects of precision agriculture and CSIRO research is simplifying this process.

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For more information contact Mike Wong at mike.wong@csiro.au, phone (08) 9333 6299 or fax (08) 9387 8991. 

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