Sugar Research Australia

Information Sheet

IS14013

What is Precision Agriculture (PA)?

Increasing use of global navigation satellite systems (GNSS) such as GPS, as well as other technologies in sugarcane production, has caused some confusion about what PA is and how it can be used to improve farming practices. Although it is a useful tool, GPS—or 'autosteer'—on its own is not PA.

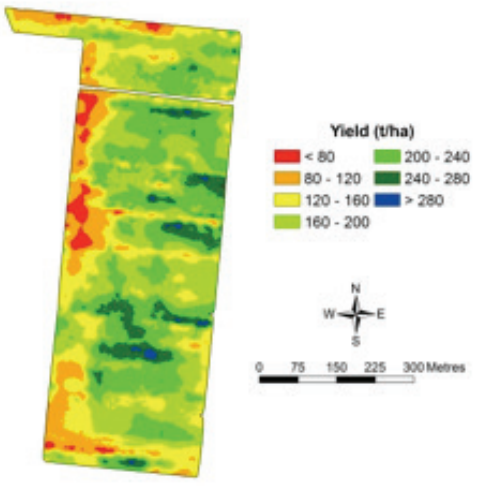
Precision agriculture is farm management that involves identifying and managing on-farm variability.

Another term for PA is 'site-specific crop management'. The use of PA can increase farm productivity, profitability and environmental sustainability through targeted application of inputs.

Land is variable

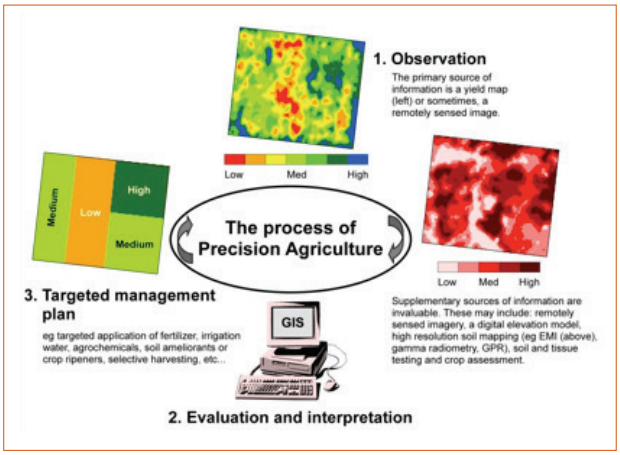
Farmers already know that variability exists on their land. However, they may not be aware of the extent of variability of factors such as yield and soils. PA provides the tools and process to identify variability and establish management zones.

Consider a yield map of a 26.7 ha paddock in the Burdekin cane-growing region. This paddock contains a few different varieties, but is otherwise managed uniformly. The average yield in this block was 176 t/ha, yet the map shows yields ranging from less than 80 t/ha in red to more than 280 t/ha in blue. That's a big range—more than 200 t/ha. Yield data from multiple years can be combined with other information to be used for PA.



The PA Process

This diagram illustrates the cyclical process of PA.



1. The first step is to collect spatial information for your farm such as yield maps and high-resolution soil maps.

2. The second step is to put all of this information together and analyse it.

3. Then you can create a management plan that addresses variability in soils, yield potential, or other factors you have identified.

4. Because the PA process is a cycle, it is important to evaluate your targeted management plan, continue to collect yield and other information over time and adjust your farm management as necessary.

The cyclical nature of this process also means that PA lends itself to incremental adoption. There is no need to try and do everything at once.

PA technologies

There are a variety of PA tools and technologies available depending on what you are trying to accomplish. Some of the key technologies for sugarcane production are:

- global navigation satellite systems (GNSS), such as GPS and GLONASS

- yield monitors
- high-resolution soil maps, sometimes known as EC_a or EM maps
- geographical information systems (GIS)
- variable rate applicators, often used in conjunction with GPS and GIS
- proximal sensors such as the WeedSeeker® technology used for targeted herbicide application
- remote sensing, including satellite and aerial imagery.

Getting started

The Australian sugarcane industry has been a relatively late adopter of PA. As a result, some of the PA capabilities available in other industries are still being developed for sugarcane.

There are many things that growers can do to start incorporating PA into their farm management and growers are an important part of the innovation, research and development of new technologies and practices.

There are two things that you must do as a farmer before you can successfully implement PA:

1. Recognise that your land and crop are variable.
2. Understand that managing for variability could potentially improve your farm outcomes.

Once you decide that you want to go down the PA path, here are some ideas for getting started:

- Start with good agronomy. To truly benefit from PA you need to have the basics of your farming system already worked out.
- Keep good records and consider using farm management software.
- Use GNSS/GPS for vehicle navigation. If you can't afford your own, consider buying equipment with another farmer or employ contractors who use guidance.
- Acquire **spatial** data. For example, use handheld GPS to mark important locations (e.g. soil samples, pest or weed infestations).
- Obtain high-resolution soil maps for your farm.
- Work with a consultant who specialises in PA.
- Work with other growers in your area who are using PA.
- Encourage industry to support PA research and development.

References

Bramley, R. 2011. *Precision Agriculture: what it is and what it isn't.* BSES Bulletin, Issue 31:18-21.

Images courtesy of Rob Bramley, CSIRO.