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. **Observation**
   - The primary source of information is a yield map and high-resolution soil maps.

2. **Evaluation and interpretation**
   - 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.

3. **Targeted management plan**
   - Ag targeted application of fertilizer, irrigation water, agrochemicals, and amendments or crop inputs, selective harvesting etc.

4. **Feedback**
   - Suppose the yield map from the previous year shows a number of paddocks with yields below the average. The farmer might decide to implement a targeted management plan to address the low yields. This plan could involve applying more fertilizer to certain paddocks or using different crop inputs in specific areas.

5. **Evaluation**
   - The targeted management plan is evaluated next year. The yield map is compared to the previous year’s map to determine if the plan was effective in improving yields.

6. **Adjust**
   - Based on the evaluation, the targeted management plan may be adjusted. This could involve changing the application rates of inputs, altering crop inputs, or targeting specific paddocks for targeted management.

### 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_{2} 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


Images courtesy of Rob Bramley, CSIRO.