PROJECT CATALYST

PRACTICE FACT SHEET

ROLE IN SITE-SPECIFIC SOIL ANALYSIS AND VARIABLE RATE APPLICATIONS

Project Catalyst is a grower-led innovation project in sugar cane that was formed to explore and validate farm management practice change leading to improved water quality for the Great Barrier Reef.

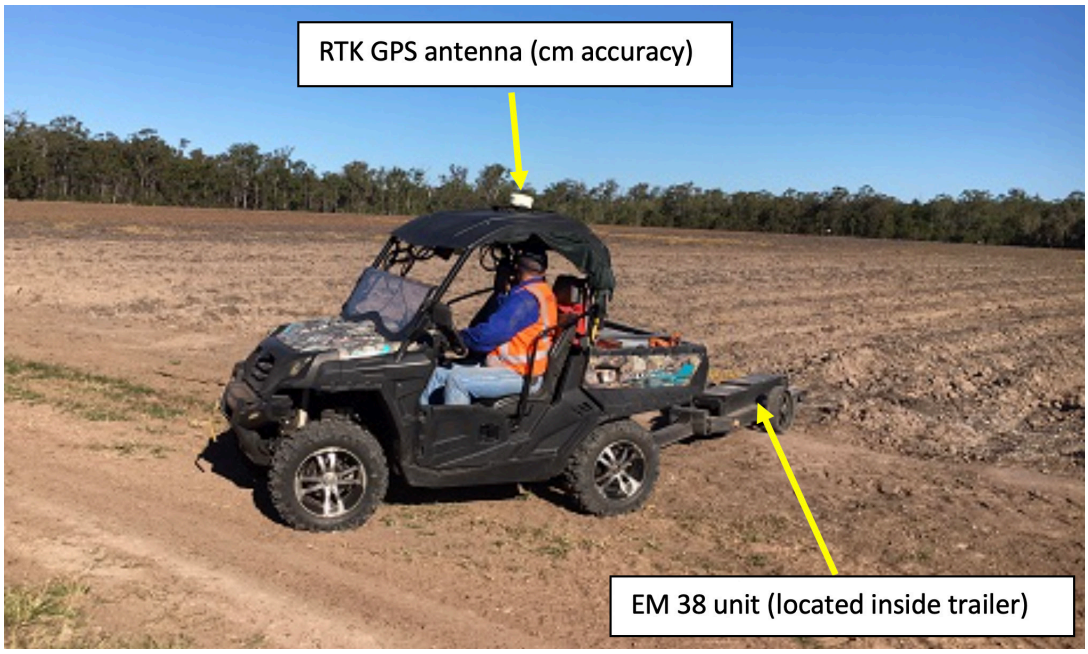
BACKGROUND

Precision agriculture (PA) begins with the soil, which is the basic management unit in any paddock, and deals with the responses in crop growth to the complex interactions of soil nutritional status, soil physical properties (especially soil texture), surface and subsurface drainage, seasonal conditions, soil health, pests and diseases, cane variety adaptability to soil type, and paddock management practices.

A PA approach incorporating management zones and variable rate application (VRA) at an intra-block scale provides a potential pathway to refine farm inputs according to the soil constraints and the potential of defined zones. This approach would have a positive influence on water quality and on N use efficiency.

However, an impediment to the adoption of PA practices has been the ability for growers to identify the sources of spatial variability in sugarcane blocks, and the absence of appropriate approaches for growers to use in managing block-scale variability in both soils and crop growth.

The development of electromagnetic induction (EM38) (see image 1) and electrical resistivity technologies for measuring soil electrical conductivity (EC) has been successfully adopted by agricultural sectors in many countries to spatially define areas of contrasting soil physical properties and zones of salinity and sodicity. These soil variation maps, along with sugar cane yield mapping developments, have formed the basis in closing the knowledge gap to allow growers to successfully implement site specific application of inputs within their farming operations.



Precision Agriculture has a **positive influence** on water quality and on **N use efficiency.**

Image 1: EM38 soil mapping device being towed behind 4WD buggy. GPS antenna is located on the roof of the buggy.

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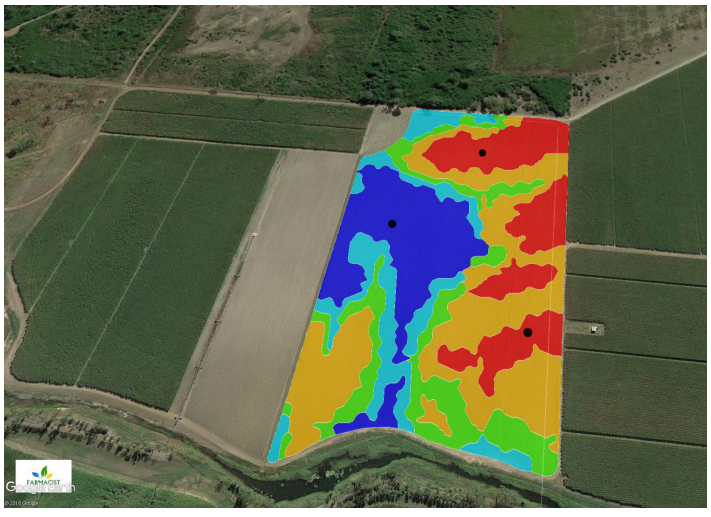
Tony Bugeja is an original Project Catalyst grower and was the first grower to have a cane block surveyed using EC mapping technologies under the guidance of Farmacist agronomist Tony Crowley.

Creating and analysing the soil variation maps allowed the users to **identify locations of highly variable soil** and to precisely geo-reference soil sample locations within the block (see image 2).

Soil analysis results from these locations quickly identified probable causes of yield constraints and allowed the agronomist to accurately refine inputs within the variable soil locations to help rectify the known soil constraints.

In the early stages of the project development, variable rate application of soil ameliorants were targeted. This has been expanded to include nutrients and chemicals (see image 3).



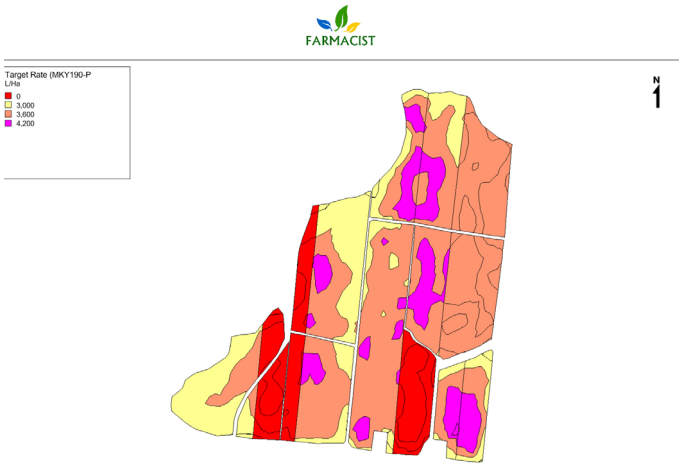


Image 2: EC generated soil variation map showing geo-referenced location of soil samples and Image 3: Whole of farm Variable nutrient application map.

EXPANSION

The number of hectares surveyed using EM or EC technology expanded rapidly following the successful implementation of variable rate applications for growers within Project Catalyst. Initially this was confined to the Mackay-Whitsunday region where an innovative mapping program undertaken by a local agronomic service provider and funded by the Australian Government's Caring for Our Country, Reef Rescue program and Reef Catchments (Mackay Whitsunday Isaac) helped map more than 25,000 hectares of sugar cane growing land.

This has now expanded to more than 40,000 hectares in the region representing approximately 33% of the total area under sugar cane.

The Burdekin growers have also adopted EC mapping technology to help them prepare variable rate gypsum application maps with more than 8,500 hectares of Burdekin region now surveyed. Further to this, the Herbert Cane Productivity Services (HCPSL) have recently introduced EM mapping technologies into the Herbert region. Other significant mapping surveys have occurred within the Tully, South Johnstone, Tablelands and Maryborough sugar milling regions. All in all, more than 65,000 hectares of land has been mapped within the Queensland sugar industry.

The data obtained during the mapping surveys together with the results of the site-specific soils analysis has significantly contributed to the adoption of variable rate technologies within the sugar industry. In summary, this technology has allowed users to:

1. **Identify in-paddock variability in soils and crops.**
2. **Determine soil and site-related constraints to crop growth.**
3. **Provide a basis for managing inputs (e.g. fertiliser, gypsum, lime, herbicides, pesticides,** water, tillage, etc.) to selected parts of paddocks to best manage the constraints to crop production.

Cover photo: Warren Papas

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