Final Report: SRDC Project BPS001

Identifying management zones within cane paddocks: an essential foundation for precision sugarcane agriculture

Attachment 3: Letters of Support

3.1 Mr A. Bugeja, Cane farmer, Mackay

3.2 Mr R. Sluggett, Agricultural consultant and cane farmer, Plane Creek

3.3 Mr P. McDonnell, Agricultural consultant, Ayr

Attachment 3.1:
Letter of Support, Mr A. Bugeja, Mackay

791 Walkerston-Homebush Rd
Palmyra Qld 4751

1 June 2011

To Whom It May Concern:

I have had a close association with the development of precision agriculture in the central cane growing region. I believe the first commercial electrical conductivity soil mapping undertaken in the Australia sugar industry using a Veris 3100 soil mapping was on our family farm at Homebush in 2001. This mapping service was offered by a local sugarcane consultancy, Independent Agricultural Resources Pty Ltd. Most of our farms have now been EC mapped and we have ten years of geo-referenced soil testing analysis based on soil mapping patterns for 400 hectares

These soil testing records coupled with individual block yield data from Mackay Sugar Ltd are used by our consultant to develop individual nutrient programs for each block. This program has saved us a lot of money over the years as we are fertilising according to the expected yield potential of the blocks. This fertiliser strategy has now been adopted by all the growers in the Reef Catchments managed Catalyst project in the Mackay, Burdekin and Ingham cane growing areas. My brother and I have adopted most of the Sugar Yield Decline Joint Venture recommendations and we have moved to a wider row spacing; most of our field work is now under GPS auto guidance to try and reduce soil compaction. We plant soybean in the fallow phase of the crop cycle and this has helped to reduce nitrogen rates in our plant cane, and improve soil health.

I have been involved with the BPS001 precision agriculture research project since 2007 as one of the project's trial sites is located on our Rosella farm. Our association with this project has been very beneficial as we now have a distinct path for ongoing improvement in the way we manage our farms. We were very aware of the within-paddock variability in soil types through the EC mapping programs but were concerned at the variability in yield that was indicated by the projects satellite yield maps. Our farming business has collected a lot of information about the nutrient levels in the topsoil but the project has now provided us with a good understanding of what is happening below the soil surface and how this influences the variability of sugarcane crop growth in our paddocks. The deep soil profile cores collected from the different EC patterns at the trial block explained some of the reasons for the poor crop growth areas. We had always thought that poor yielding areas were due to nutrient problems but now have a better understanding that clay at depth and subsurface drainage problems can cause low yielding areas in the paddock, especially in wet years. This project has provided us with a good understanding of all the factors that can influence sugarcane growth and placed us in a better position to manage the variability that occurs in many of our paddocks.

It is clear that a cane variety that yields well in the upper section of a paddock may not necessarily grow well in a badly drained section at the other end of the paddock. An innovation from this project is the possibility of planting two varieties in the same paddock based on their adaptation to the different soil types and to water logging. We also have the opportunity to create bigger hill-ups in low lying areas of the paddocks to keep the root zone out of standing water. An automated base cutter height adjuster has been fitted to our harvester which allows for variability in hill heights. In the future we aim to cultivate our paddocks at different times and at different intensities based on EC mapping and our knowledge of the different soils that occur within a paddock.

The BPS001 project has provided us with a greater understanding of all the issues that influence crop growth and the role of new technologies in Precision Agriculture. Soil EC mapping patterns now mean a lot more than coloured zones on a page. We are in good position to start confidently managing the variability we have in many of our sugarcane blocks and are able to build on the farming systems provided by Sugar Yield Decline Joint Venture.

Yours sincerely,

Tony Bugeja

Attachment 3.2:
Letter of Support, Mr R. Sluggett, Plane Creek

15 July 2011
Robert Sluggett
Consulting Agronomist & Director Farmacist Pty Ltd

The adoption of precision agricultural practices in the sugar industry is in its relative infancy when compared to other industries such as grain. For a number of years we have been observing developments in precision agricultural technologies used in other industries and overseas and adopting or investigating and tailoring them to our clients operations in the central sugar growing region. While we have developed some expertise and made progress, the progression of adoption of much of this technology and benefiting from the huge potential on offer has been hampered by the lack of fundamental research and knowledge of the drivers of variability of productivity within cane fields and their relative importance. Without this understanding, we can't begin to manage this variability in a precision agricultural sense. BPS001 has proved to be a valuable project by significantly improving this understanding, the project has investigated and evaluated the importance of a whole range of soil and site characteristics, management practices, inputs etc and their interactions and impacts on productivity.

As a commercial provider of precision agricultural services, the findings of this project have been critical in providing the confidence in the integration of soil EM mapping, topography and yield mapping to better determine stable yield zones within cane fields and therefore more confidence in the development of management strategies for different zones within fields. We have recently increased our investment in equipment including EM Mapping equipment, RTK GPS base stations, satellite imagery and PA software to provide a high level service to our clients.

The widespread adoption of precision agricultural practices promises huge environmental, economic and social benefits to the sugar industry. It is the next frontier. It is critical that research funding providers take note of the findings and recommendations of this project and see this as the first steps in a longer term program of knowledge enhancement and industry progression.

Congratulations to the BPS001 project team for their dedication and efforts to make a significant step forward in the precision agriculture knowledge base for the sugar industry. Acknowledgement is due to SRDC for the foresight to support this work through funding.

Attachment 3.3:
Letter of Support, Mr P. McDonnell, Ayr

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Case Study of Precision Agriculture Systems Approach

BY PETER MCDONNELL

AG DATA SOLUTIONS PTY LTD, AYR QLD.

- Initial Grower Contact/Engagement
- Data Collection
- Field Validation
- Limitation Identification
- Yield potential
- Nutritional status
- Application management

*This case study is based on actual events under a commercial arrangement with a grower in the Wet Tropics.

1. Initial Grower Contact

The grower involved in this case study has purchased Precision Agriculture (PA) technology, which includes;

Trimble Auto-Steer RTK system
Trimble Variable Rate application fertiliser applicator
Multi-compartment fertiliser applicator
Trimble harvester yield monitor

My services have been engaged under the Project Catalyst banner in assisting the local precision planner assisting with on-farm, grower-led, innovative projects. Under this arrangement I was to provide a Soil Electrical Conductivity Map (ECa) using the Veris 3100 ECa machine and make recommendations about paddock management.

2. Data Collection
   2.1. Soil ECa Data

During this process a number of inspection bores were conducted during the mapping process to ascertain local knowledge of the soil properties. These inspections suggested that the soil type was uniform clay across the paddock which was confirmed by the soil ECa data.

2.2. Elevation Data

During the soil ECa mapping process elevation data was collected. Existing elevation data had been collected using Trimble auto-steer system.

2.3. Yield Data

Yield data information was gathered from the Satellite Imagery (Natural Image) and grower knowledge of the paddock

3. Field Validation
    3.1. Soil sampling sites were identified using the soil ECa maps and two top soils and two sub soil samples were taken in the highest soil ECa and lowest ECa zones.
    3.2. Elevation changes within field were investigated and waterlogged zones were noted.
    3.3. Previous applications of nutrients were obtained.

4. Identify Field Limitations
    4.1. During the grower interaction process identifying field limitation was undertaken. Elevation and the effect of drainage was identified as the major limitation
    4.2. Soil test lab results indicated the nutritional differences between the high and low yielding areas of the paddock were not significant.

5. Yield Potential
    5.1. Using all available data and agronomic assessments, yield potential zones were established within the field using a GIS package to spatial base application zones.

6. Application Management
    6.1. The six easy steps recommendations were generated for both soil samples
    6.2. To establish confidence in the PA approach, field strip trials have been recommended based on yield potential zones matching nitrogen rates.
    6.3. An Application Prescription Dataset map using a GIS package has been developed.