USING SPATIAL MAPPING LAYERS TO UNDERSTAND VARIABILITY IN PRECISION AGRICULTURAL SYSTEMS FOR SUGARCANE PRODUCTION

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PRECISION agriculture (PA) has been identified as an effective tool for identifying and then managing crop production across a wide range of farming systems, globally.

The implementation of such technologies within the Australian sugar cane industry also holds much potential. However it is imperative that strong cohesion between sound agronomy and PA technologies is first achieved.

Intensive yield observations across five study sites in the Mackay, Burdekin and Herbert districts identified that to manage within-paddock variability, improved strategies must consider the multifaceted interactions of variables, including nutritional issues, seasonal conditions, management practices and biological factors such as plant disease and pest damage.

It therefore follows that there is also a need to combine a number of existing PA tools, quantified with corresponding field samples, to ensure a more accurate and robust diagnosis of crop production is achieved.

The following example from the Herbert cane growing region demonstrates how the interaction of spatial data layers (satellite imagery, EC mapping, yield monitoring) can be used effectively to identify the spatial variability of crop production, including the use of strategic soil and yield sampling, and for the prediction of lost production resulting from underperforming regions. The infrared reflectance images of plant cane crops, derived from high resolution satellite images captured just before harvest, identified in-season crop variability that related well with the expected variability driven by contrasting soil properties portrayed through soil EC mapping. A linear algorithm developed between Normalised Difference Vegetation Index (NDVI) values with strategically located manually harvested yield samples, was shown to be a reliable predictor of spatial variability as well as total crop yield when compared to final harvest weights and results obtained from a yield monitor on a commercial sugarcane harvester.

These results indicate how decisions based on multiple mapping layers are likely to underpin new farm management strategies in the further development of a precision agricultural framework for the sugar industry.