

MANAGING SPATIAL VARIABILITY IN SUGARCANE PRODUCTION SYSTEMS

By

JR HUGHES¹, RJ COVENTRY², P McDONNELL³

¹*Department of Employment, Economic Development, and Innovation, Mackay*

²*Soil Horizons Pty Ltd, Townsville*

³*Ag Data Solutions Pty Ltd, Ayr*

Abstract

PRECISION agricultural technology is currently available to allow growers to provide the inputs required to cope with most of the factors that control paddock variability on a site-specific basis. But managing crop variability in a sugarcane paddock remains extremely complex, requiring an understanding of the variables that influence crop growth within spatially defined areas in the paddock.

Our research suggests that no single GIS spatial layer is sufficient, by itself, to identify and manage the variability inherent in sugarcane production systems.

The variable application of paddock inputs is likely to be most effective if the yield potential of the management zones within each paddock is defined in terms of three key GIS layers:

- *a soil layer (stable):* based on deep soil electrical conductivity responses and cross-checked against actual soil data, especially soil texture and drainage characteristics, from strategically-located boreholes;
- *a surface drainage layer (stable within a cropping cycle):* providing detailed topographic data that define water movement pathways across the paddock and assist in identifying the drainage status of contiguous segments of the crop along each row within the paddock.
- *a crop yield layer (unstable in response to seasonal fluctuations in weather regimes, pests and diseases, and paddock management practices and strategies):* reflecting differences in soil and site parameters that control growing conditions within paddock management zones. The growth patterns may be detected from processed satellite imagery captured prior to harvest, and from harvester-mounted crop yield monitors.

Enhanced knowledge of relationships among these and other spatial GIS layers is needed to progress the wider adoption of precision agriculture techniques in sugarcane production.