# Improvement of Agronomic Practices in Sugarcane Production by Designing Homogeneous Management Zones

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## Abstract

Site specific management has the potential to change the way fields are currently managed. The advent of the popularisation of global positioning systems (GPS), together with a range of different on-board sensors (harvest sensors, soil conductivity, reflectance, etc.) allows for continuous increase of data availability. Among the different concepts of precision farming application is the use of spatially similar field sub-units that require the same management, designated homogeneous management zones (HMZ). A HMZ is a sub-region of a field that expresses a relatively homogeneous combination of yield-limiting factors, in any scale. Many techniques are already available for annual crops, and they can basically be divided in terms of output data: a) factors that can influence yield, like variability of soil parameters or topographic properties and b) variability of the yield, assuming that yield is a product of different sites properties. The objective of this work is to test different HMZ delineation procedures for sugarcane, a semi-perennial crop playing a major role in sugar and bioethanol production, which only recently is being effectively included in precision farming systems. Field data from four crop seasons (2011–2014) included soil chemical and physical parameters collected from 122 sampling points, so as yield maps from a 50 ha experiment in the Campinas region, Brazil. Yield maps were linearized and filtered to remove sensor failures and discrepant values. Fuzzy clustering (c-means) and multivariate regressions were applied to different parameters in order to identify which are the factors that are more spatially correlated with sugarcane yield. The majority of the parameters presented low correlation with yield. The parameter with higher yield correlation was soil pH (0.31), which could then be correlated with other parameters such as extractable Aluminum and soil organic matter content. The investigation is still being conducted in order to identify i) which parameters effectively influence the yield of sugar cane and ii) which procedure is more adequate for sugarcane homogeneous management zones delineation, as the actually available methods are designed for annual crops and therefore not adequate for semi-perennial species. Finally, a method for HMZ delineation for sugarcane fields will be presented.

**Keywords:** Management efficiency, precision farming, sugarcane, zoning

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