POSTER SUMMARY

USEFULNESS OF SOIL APPARENT ELECTRICAL CONDUCTIVITY (ECa) AS AN INDICATOR OF CANE YIELD IN PLANT BREEDING PLOTS

THOMPSON IB, VAN ANTWERPEN R, ZHOU MM, MCHUNU LN, MCHUNU M, KUBHEKA P, JALISA M, MAKHAYE A AND COLLINGS K

South African Sugarcane Research Institute, Private Bag X02, Mount Edgecombe 4300, South Africa

ingrid.thompson@sugar.org.za

Abstract

The South African Sugarcane Research Institute (SASRI) conducts plant breeding research and selection on its Research Stations (RS), which are representative of selected climatic regions in the South African sugar industry. Soils across these sites and at field level are variable, which impacts on trial results. Currently, RS are mapped at field level based on soil parent material (SPM) and terrain. Additionally, soil form and total profile available water are available for some RS fields. When conducting a trial, meaningful soil information is required for each plot within a trial. SPM is too coarse to reflect soil properties of plots. Intensive soil sampling is necessary to link soil properties to plots; however, this is costly and time consuming. Since electrical conductivity (ECa) in soils is influenced by many soil properties including soil water, clay and organic matter content, its measurement was identified as a potential alternative indicator of the soil properties. The aim of the project was to assess the usefulness of soil apparent ECa to explain the degree of variation in cane yield between plant breeding plots at the Gingindlovu RS. The EM38-MK2 instrument, linked to a high accuracy global positioning system (GPS), was used to map ECa of soils in each field. The survey paths were five metres apart; logging ECa and GPS data at one second intervals. An average of 2400 paired data points were collected per hectare. The ECa data were interpolated in ArcGIS using the Kriging method. The resulting ECa surface map was used to allocate ECa values to each trial plot using zonal statistics. The correlation between ECa values and stalk yield per plot was significant (r^2=0.82). For SASRI, EMI is a quick and cost effective method of obtaining ECa data for all RS, which can be used to plan randomisation of trial treatments more effectively to map soil variability in RS.

Keywords: apparent electrical conductivity, GIS, plant breeding, field trials, research station, soil properties