Spatial relationship between the productivity of cane sugar and soil electrical conductivity measured by electromagnetic induction

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The cultivation of sugar cane in Brazil occupies a prominent place in national production chain, because the country is the main world producer of sugar and ethanol. Accordingly, studies are needed that allow an integrated production and technified, and especially that estimates of crops are consistent with the actual production of each region. The objective of this study was to determine the spatial relationship between the productivity of cane sugar and soil electrical conductivity measured by electromagnetic induction. The field experiment was conducted at an agricultural research site located in Goiana municipality, Pernambuco State, north-east of Brazil (Latitude 07 ° 34 '25 "S, Longitude 34 ° 55' 39" W). The surface of the studied field is 6.5 ha, and its mean height 8.5 m a.s.l. This site has been under sugarcane (Saccharum officinarum sp.) monoculture during the last 24 years and it was managed burning the straw each year after harvesting, renewal of plantation was performed every 7 years. Studied the field is located 10 km east from Atlantic Ocean and it is representative of the regional landscape lowlands, whose soils are affected by salinity seawater, sugarcane plantations with the main economical activity. Soil was classified an orthic the Podsol. The productivity of cane sugar and electrical conductivity were measured in 90 sampling points. The productivity of cane sugar was determined in each of the sampling points in plots of 9 m2. The Apparent soil electrical conductivity (ECa, mS m-1) was measured with an electromagnetic induction device EM38-DD (Geonics Limited). The equipment consists of two units of measurement, one in a horizontal dipole (ECa-H) to provide effective measurement distance of 1.5 m approximately and other one in vertical dipole (ECa-V) with an effective measurement depth of approximately 0.75 m. Data were analyzed using descriptive statistics and geostatistical tools. The results showed that productivity in the study area reached values above 200 t ha-1, with higher values of productivity are concentrated in the region northern terrain. The maps of soil electrical conductivity (ECa-V and ECa-H) showed behavior similar to the productivity of cane sugar. The linear correlation showed values of 0.74 (yield x ECa-H) and 0.85 (yield x ECa-V). The adjusted semivariograms showed no similarity in the spatial pattern of pairs of semivariance. The electrical conductivity measured by electromagnetic induction has been shown as an important tool for predicting the productivity of sugar cane, however more studies are needed to determine the magnitude of the differences between such attributes.