



## **Geostatistical techniques to assess the influence of soil density on sugarcane productivity**

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Spatial variation in some soil properties on small distances occur even on homogeneous areas with same soil class that can influence to crop productivity. This variability must be incorporated into the procedures and techniques used in agriculture. Thus, it is necessary to know it to optimize agricultural practices. This study aimed to evaluate the influence of soil density on the sugarcane productivity by geostatistical techniques. The area is located on Rio Formoso city, Pernambuco (Brazil), at latitude 08°38'91"S and longitude 35°16'08"W, where the climate is rainy tropical. About of 243 georeferenced undisturbed soil samples (clods) were collected on lowland area at three depths (0-20, 20-40 and 40-60cm) grid spacing of 15 x 30 m. The total area has 7.5 ha, divided equally into three subareas. Statistical and geostatistics analysis were done. It was found that soil density increased with depth Bulk density and can be used as an index of relative compaction. Machine weight, track or tire design and soil water content at the time of traffic are some of the factors that determine the amount of soil compaction and resulting changes in the plant root environment. These points can have influenced the highest soil density found in subarea 1. This subarea was intensively mechanized and it presents poor drainage and seasonal flood. Based on semivariograms models fitted, we can say that soil density showed spatial dependence in subarea 1 at all depths (Gaussian (0-20cm) and spherical both 20-40 and 40-60cm). Unlike this, the models fitted to subarea 2 were to 0-20 and 40-60cm depths, exponential and on subarea 3, at 0-20cm (Gaussian). Pure nugget effect was found on 20-40cm depth at the subareas 2 and 3, and 40-60cm on the subarea 3. Subarea 1 had higher soil density and lower sugarcane productivity thus, it is known that root development and nutrient uptake are directly influenced by soil density.