# SPATIAL DEPENDENCE OF SOIL COMPACTION IN ANNUAL CYCLE OF DIFFERENT CULTURE OF CANE SUGAR FOR SANDY SOIL

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**Summary:** Mechanization currently practiced for the production of cane sugar involves a heavy traffic of machinery and equipment. Studying culture in your development environment generates a huge amount of information to fit the top managements and varieties for specific environments. The culture of cane sugar has a heavy traffic of machinery and equipment, where more than 20 operations per cycle , more intense during harvest , providing increased soil compaction and enhancing these effects when applied indiscriminately conditions the water content of the soil unsuitable. This work was carried out to evaluate the soil physical degradation in relation to the sequence of annual crop production of cane sugar, on a Typic Ferric with sandy texture and calculated the Soil Cone Index (SCI) in depth ranges: 0-0.10, 0.10-0.20, 0.20-0.30, 0.30-0.40 and 0.40-0.50 cm. Were evaluated during three subsequent seasons the productive area of cane sugar mill belonging to Barra Grande, the Zilor group located in the region of Paulista - SP. For soil sampling it was used the Mobile Soil Sampling Unit - UMAS – belonging to Agroforestry Machinary and tire Test Center - NEMPA, Department of Rural Engineering, College of Agricultural Sciences - FCA - UNESP, Botucatu - SP. Sampling points in the areas and in subsequent crop cycles (subsequent years), samples were taken with a sampling grid of 30 x 50 m, and every 30 meters between points following the line of planting sugar cane and every 50 meters between plant rows (in the line traffic) for resistance to penetration. Data were analyzed using geostatistical analysis. The models were adjusted by GS + 7.0 program. To analyze the degree of spatial dependence of the attributes under study, we used the classification Cambardella, which considers the strong spatial dependence semivariogram nugget that have a lower or equal to the threshold effect 0.25, moderate when between 0.25 and 0.75 and poor when it is greater than 0.75. There was a reduction in productivity in subsequent cycles, with the greatest reduction occurred in areas with sandy soils to the 3rd cycle of the crop. It was found that in areas with higher productivity reduction over the cycles, the values of cone index soil were higher than 3.5 MPa, the layers 0-0.30 m, in line with the culture of cane sugar.

**Key words:** compaction, geostatistical, soil penetration resistance.

**Introduction:** Mechanization currently practiced for the production of cane sugar involves a heavy traffic of machinery and equipment. Studying culture in your development environment generates a huge amount of information to fit the top managements and varieties for specific environments. The culture of cane sugar has a heavy traffic of machinery and equipment, where more than 20 operations per cycle, more intense during harvest, providing increased soil compaction and enhancing these effects when applied indiscriminately

conditions of Inadequate water content of the soil. This work was carried out to evaluate the soil physical degradation in relation to the sequence of annual crop production of cane sugar, on a Typic Ferric with sandy texture and calculated the Soil Cone Index (SCI) in depth ranges: 0-0.10, 0.10-0.20, 0.20-0.30, 0. 30-0.40 and 0.40-0.50 m.

**Material and Methods:** The samples after three subsequent harvests were performed, the productive area of cane sugar mill belonging to Barra Grande, the Zilor group located in the region of Paulista - SP. For soil sampling it was used the Mobile Soil Sampling Unit - UMAS – belonging to Agroforestry Machinary and tire Test Center - NEMPA, Department of Rural Engineering, College of Agricultural Sciences - FCA - UNESP, Botucatu - SP. Sampling points in the areas and in subsequent crop cycles (subsequent years), samples were taken with a sampling grid of 30 x 50 m , and every 30 meters between points following the line of planting sugar cane and every 50 meters between plant rows ( online traffic ) for resistance to penetration . Data were analyzed using geostatistical analysis . The models were adjusted by GS + 7.0 program. To analyze the degree of spatial dependence of the attributes under study , we used the classification Cambardella (1994), which considers the strong spatial dependence nugget semivariograms that have a lower or equal to the threshold effect 0.25 , moderate when between 0 25 and 0.75 and low when it is larger than 0.75 .

**Results and Discussion**: Table 1 shows the values of geostatistics and adjusted models for each layer are observed.

**Table 1**. Models of semivariograms.

| Layer (m) | Model | Co | Co+C | A | C/Co+C |
|---|---|---|---|---|---|
| 0 - 0.10 | Gaussian | 0.001000 | 2.118000 | 48.84 | 100 |
| 0.10 - 0.20 | Gaussian | 0.001000 | 1.191000 | 52.82 | 0,99 |
| 0.20 - 0.30 | Gaussian | 0.001000 | 1.201000 | 65.12 | 0,99 |
| 0.30 - 0.40 | Exponential | 0.001000 | 1.79900 | 264.30 | 0,99 |
| 0.40 - 0.50 | Exponential | 0.001000 | 1.87200 | 378.60 | 0,99 |

The values of spatial dependence were high for all layers evaluated as Cambardela (1994). Layers 0.30 to 0.50 m not fit the exponential model, showing greater range for this variable. The maps of figure 1, show values greater compression also in layer 0.30 to 0.50. Vasques et al. (1991) showed that the density and soil moisture are important parameters that influence the index cone as characterizing their state of compression.

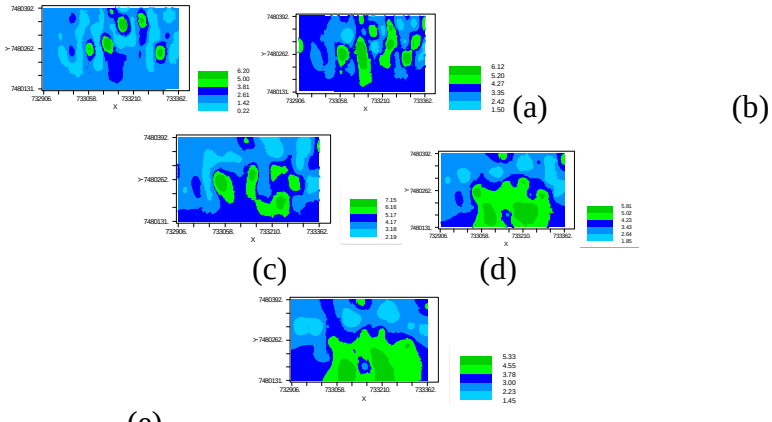


**Figure 1.** Maps isocompactação.

**Conclusion**: There was a reduction in productivity in subsequent cycles, with the greatest reduction occurred in areas with sandy soils to the 3rd cycle of the crop. It was found that in areas with higher productivity reduction over the cycles, the values of cone index soil were higher than 3.5 MPa, the layers 0-30 cm, in line with the culture of cane sugar.

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