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RELATIONSHIPS BETWEEN TILLAGE SYSTEMS ASSOCIATED WITH PREVIOUS CROPS AND EFFECTS ON CORN PRODUCTIVITY IN 14 YEARS OF LONG-TERM EXPERIMENTS IN NORTHEASTERN BRAZIL

FEDERAL UNIVERSITY OF SERGIPE
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A. Pedrotti[1], T.M.M .Silva[1], R.M. de Souza[1], E.S. Pinto Jr.[1], S.J.R. Assunção[1], E.A. Pauletto[2].

1 - Department of Agricultural Engineering – DEA, Federal University of Sergipe – UFS; Campus Universitário de São Cristovão, Av. Marechal Rondon, s/n, CEP 49100-000, São Cristovão – Sergipe State – Brazil – www.ufs.br – E-mail: alceupedrotti@gmail.com

2 - Departament of Soils., Federal University of Pelotas, Capão do Leão, Rio Grande do Sul, Brazil

INTRODUCTION

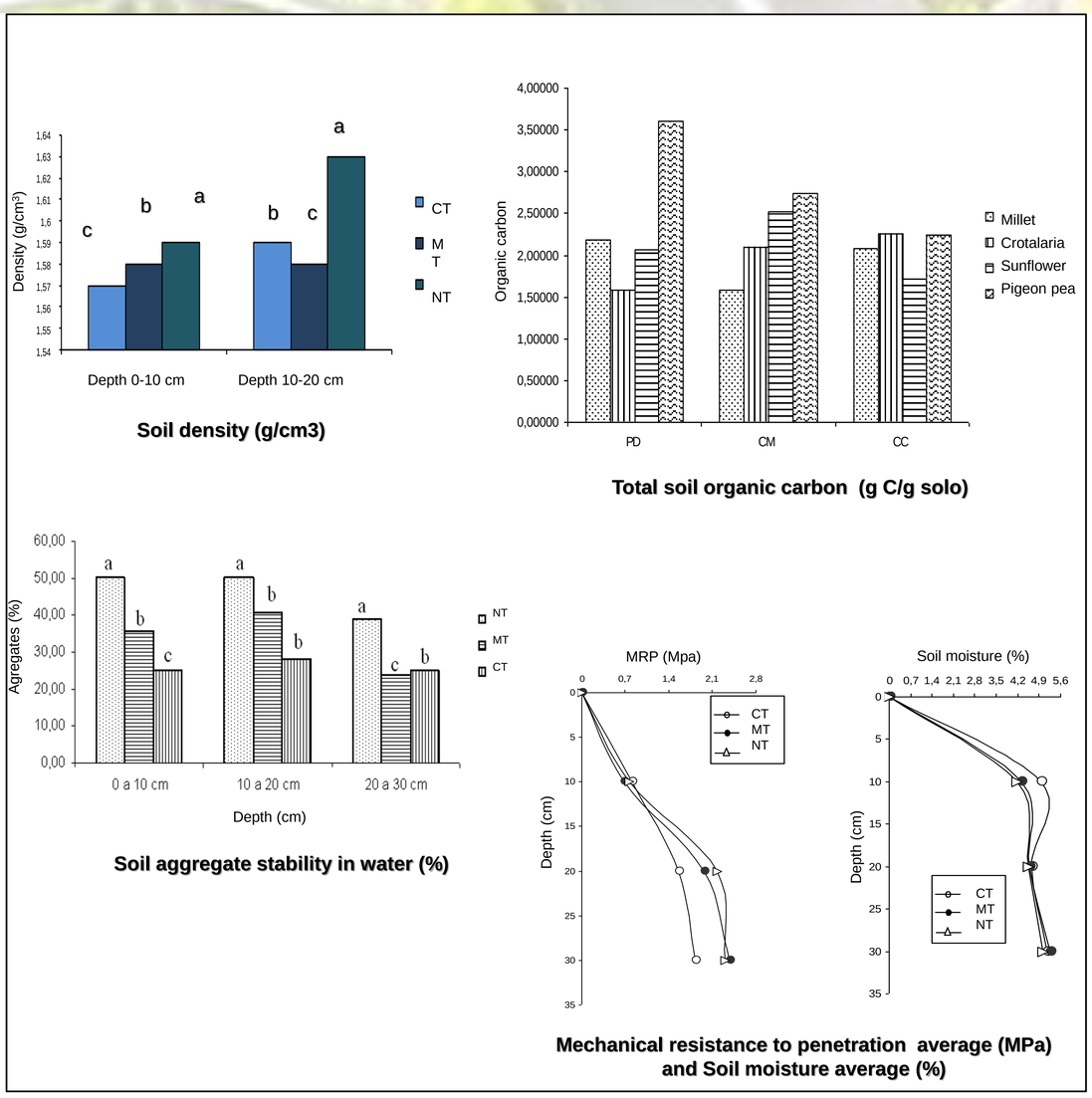
- The increase in corn production has been generated by increased physical productivity, caused especially by changes in technology and cultivation patterns. Moving from traditional techniques to the accession inputs of modern agriculture, the rapid growth in output raised corn production in Sergipe State from 6th position in 2003 to 2nd place in 2010 in the northeastern states of Brazil

- In the northeast region of Brazil, long-term research studies and experiments that investigate the physical behavior of soils under different tillage systems associated with crop successions have been virtually nonexistent, especially with crops of great market potential, such as corn.

MATERIALS AND METHODS

The design was adopted in the experimental scheme tracks with the treatments of soil management (conventional tillage (CT), minimum tillage (MT) and no-tillage (NT)) arranged as experimental tracks, and record crops (millet (*Pennisetum americanum* (L.) Leeke), sunflower (*Helianthus annuus* L.), pigeon pea (*Cajanus cajan*) and crotalária (*Crotalaria spectabilis*)) as split plots with three replications randomly distributed. The evaluation parameters were: number of plants (NP.ha^{-1}), commercial corn-ears (CE.ha^{-1}) and commercial weight corn-ears (WCE) (kg.ha^{-1}).
Data were subjected to analysis of variance and then the averages compared by Tukey test at 5% probability. To perform the statistical analysis we used the statistical program Sisvar.

The experimental design used was a split-plot strip block, with different soil management systems prepared in strips and different crop successions to corn in subplots, with three replications distributed randomly. In order to evaluate the soil physical parameters (soil density), soil mechanical resistance to penetration (RMP) was measured, and soil samples for chemical analysis (soil fertility and organic matter) were collected. For evaluation and statistical analysis of the physical parameters, the Tukey means comparison test was used at a significance level of 5% probability, using the statistical software program Sisvar (Furtado, 2003).



PLACE OF STUDY

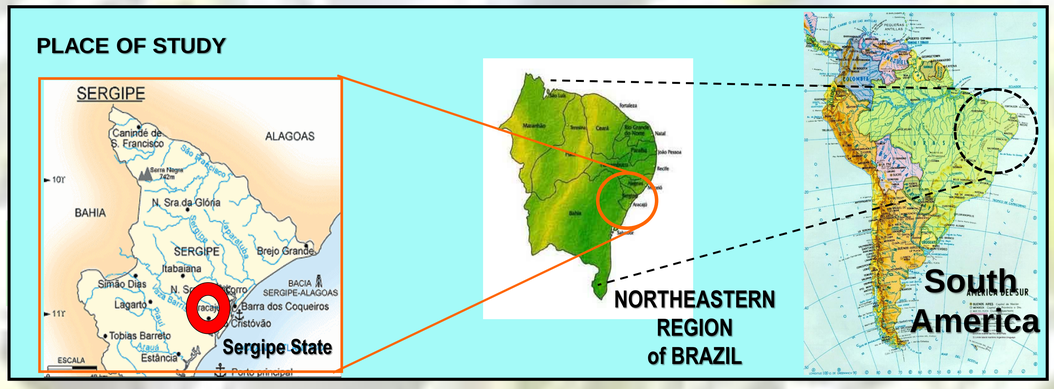


TABLE. Productivity of spikes of the sweet corn when submited cultures in sucession and many tillage systems.

Culturas	Productivity of spikes (Kg/ha.)		
	CT	MT	NT
Pigeonpea ("guandu")	6.473,4 aA	8.386,3 aA	12.470,2 aA
Milet ("milheto")	3.875,2 aC	6.687,5 aB	9.560,2 aA
Sunnhemp ("crotalária")	6.668,5 aA	9.625,1 aA	10.081,0 aA
Sunflower ("girassol")	5.488,7 aB	7.285,8 aB	11.252,3 aA
	VC(%)	31,6	

NT – No tillage, MT – Minimum tillage and TC – convencional tillage - Lowercase letters in the column, the capital letters in line, and different letters differ statistically by Tukey test at 5% probability

TABLE 6. The average commercial weight corn-ears (WCE) per hectare depending on cropping systems and cover of sequential crops

Cover of sequential crops	Cropping systems		
	CT	MT	NT
	---------- kg.ha^{-1} ----------		
Sunn hemp	51.582,93 aA[1]	67.853,22 aA	65.409,32 aA
Pigeon pea	37.09,19 aA	47.378,44 aA	82.381,88 aA
Millet	31.275,3 aA	66.538,18 aA	62.736,36 aA
Sunflower	51.324,87 aA	46.582,03 aA	71.639,75 aA

[1]Means followed by the same letter in the row, within each mode of application of fertilizers, and soil within each column, do not differ by Tukey test at 5% probability
CT = Conventional tillage; MT = Minimum tillage; NT = No tillage

CONCLUSIONS

1) The no-tillage treatment resulted in greater values of Mechanical Resistance top Penetration (MRP) in the soil surface layers, although pigeon pea and sunhemp in the rotation;
2) Better sustainability conditions were observed for the no-tillage system related to the highest levels of crop productivity, greatest number of plants and plant spikes, and also the highest values of average soil particle mean weight diameters, and percentage of water-stable aggregates compared to the other systems.
3) The no-tillage system was the one that provided the most important contributions to improving the soil physical properties.;
4) The rotations with sunhemp resulted in the best corn productivity in the conventional and minimum tillage systems. For the zero tillage system the rotation with pigeon pea provided the greatest corn productivity.
5) Plant residues left on the soil surface are important for soil quality, including improvement of soil microbiological activity and increased C/N ratio due to slow decomposition of straw and availability of nitrogen
6) Minimum tillage produced corn yields superior to conventional cultivation, indicating that the low soil disturbance combined with a high biomass culture can provide good productive results, but both are lower than in the NT (ZT).

SUPPORT:

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