

COMPRESSION BEHAVIOUR OF SOILS IN IRRIGATED AGROECOSYSTEMS



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INTRODUCTION

Knowledge of the compression behaviour and the load-bearing capacity of the soil can contribute to maintaining the sustainability of agricultural production in irrigated environments, which see a greater intensity in land use and different hydro-physical dynamics.

OBJECTIVE

This study aimed to evaluate the degree of compaction and the effects of usage on the preconsolidation pressure and compression index in irrigated areas under different systems of usage and cultivation.

MATERIAL AND METHODS

This study was carried out in the Jaguaribe-Apodi Irrigated Area, located in the Apodi Plateau, near the town of Limoeiro do Norte, CE, Brazil. Four irrigated areas were evaluated: banana of 2 and 15 years cultivation (B2 and B15), pasture (P), succession planting of corn and beans (CB) and areas under natural vegetation. Samples were collected at depths of 0.00-0.10 m and 0.20-0.30 m, being collected both in and between the crop rows for B2 and B15. The following were determined: the degree of compaction (DC), maximum density ($D_{SM_{max}}$), critical moisture (U_{crit}), preconsolidation pressure (σ_p), compression index (C_c), total organic carbon (TOC) and light organic matter (C_{lom}). The t-test was used at 5, 10, 15 and 20% probability.

RESULTS AND DISCUSSION

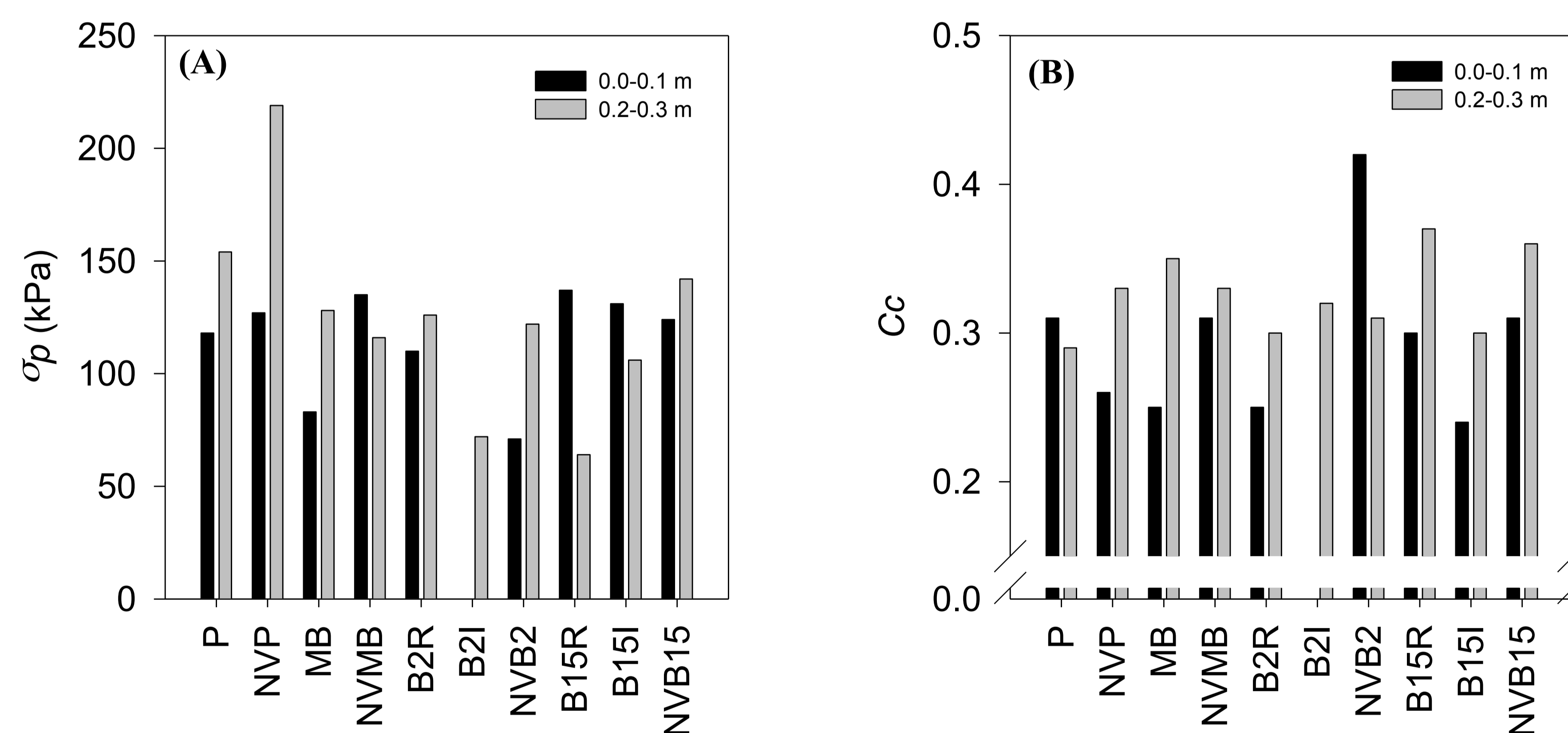


Figure 1: Mean preconsolidation pressure (σ_p) (A) and compression index (C_c) (B) for irrigated soils under pasture (P), maize and beans in succession (MB) and banana (B2 and B15), and natural vegetation (NVP, NVMB, NVB2 and NVB15) in the Jaguaribe/Apodi Irrigated Perimeter.

- An increase in DC was found at a depth of 0.20 to 0.30 m for MB ($p < 0.15$), showing the effects of preparing the soil by ploughing and scarification, together with the effects of heavy machine traffic.
- The TOC had a greater influence on Bd_{Max} than did the stocks of C_{lom} . Irrigated crops promoted a reduction in the soil compression index, however with no effect on the preconsolidation pressure when at field capacity (matric potential of -10 kPa).
- The results for preconsolidation pressure and the compression index show that the soils under evaluation had high load-bearing capacity and low susceptibility to compaction compared to those under natural vegetation.

CONCLUSIONS

Irrigated crops promoted a reduction in the physical quality of the soil in relation to the areas under natural vegetation. In the areas under P and MB, there was increased compaction in the 0.20 to 0.30 m soil layer. For banana crops it is still necessary to investigate whether compaction takes place at the time of implantation and establishment of the crop or during crop treatment; however, controlling soil moisture is a key factor in mechanised operations.

