

PHYSICAL QUALITY OF A CHROMIC LUVISOL UNDER AGROFORESTRY SYSTEMS



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INTRODUCTION

Agroforestry systems (AFSs) in semi-arid regions have many environmental benefits, such as the preservation of plant species, nutrient cycling, erosion reduction, among others. Despite the numerous advantages, cattle trampling and agricultural practices can degrade the soil physical quality.

OBJECTIVE

The aim of this study was to evaluate the degree of compaction and the compression behavior of a Chromic Luvisol after 14 years of agrosilvopastoral (ASP) and silvopastoral systems (SILV), in comparison with a soil under natural vegetation (NV).

MATERIAL AND METHODS

The study area is part of a long-term experiment with AFSs developed by Embrapa Goats and Sheep on the Fazenda Crioula, Sobral – CE, Brazil. Five samples of disturbed and undisturbed soil were collected at a depth of 0-5 cm in order to assess the degree of compaction (DC), compression index (Cc), preconsolidation pressure (σ_p), maximum density (Bd_{Max}), critical water content (WC_{crit}) and stocks of total organic carbon (E_{Toc}), light organic matter (E_{Lom}), light organic matter carbon (E_{Clom}) and light organic matter nitrogen (E_{Nlom}) in the soil. Means comparison between the usage systems was carried out by t-test at 5, 10 and 20% probability.

RESULTS AND DISCUSSION

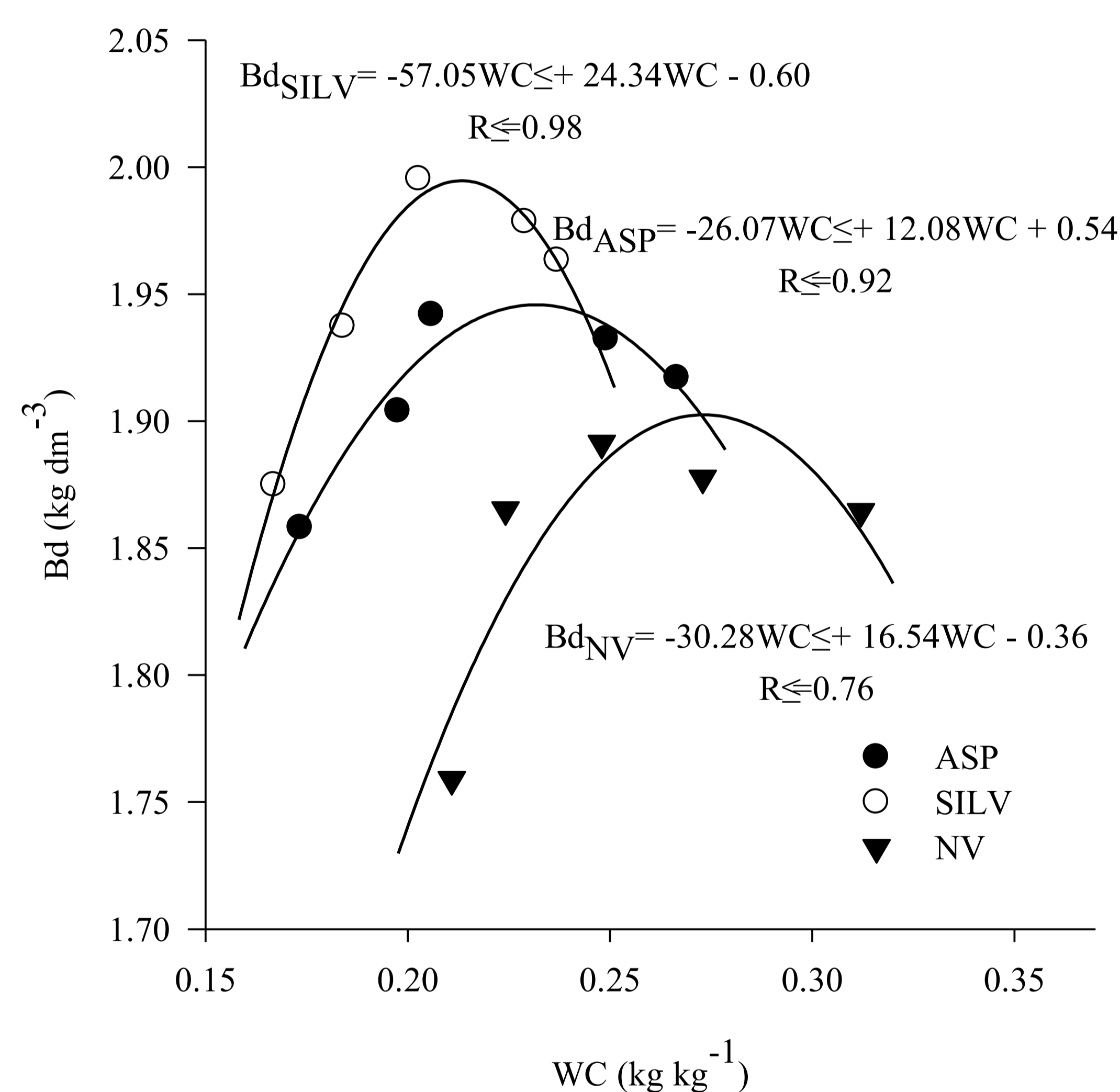


Figure 1 Bulk density (Bd) as a function of water content (WC) obtained in the Proctor test in Chromic Luvisol under agroforestry systems (ASP and SILV) and natural vegetation (NV) in Sobral. ASP: agrosilvopastoral; SILV: silvopastoral and NV: natural vegetation

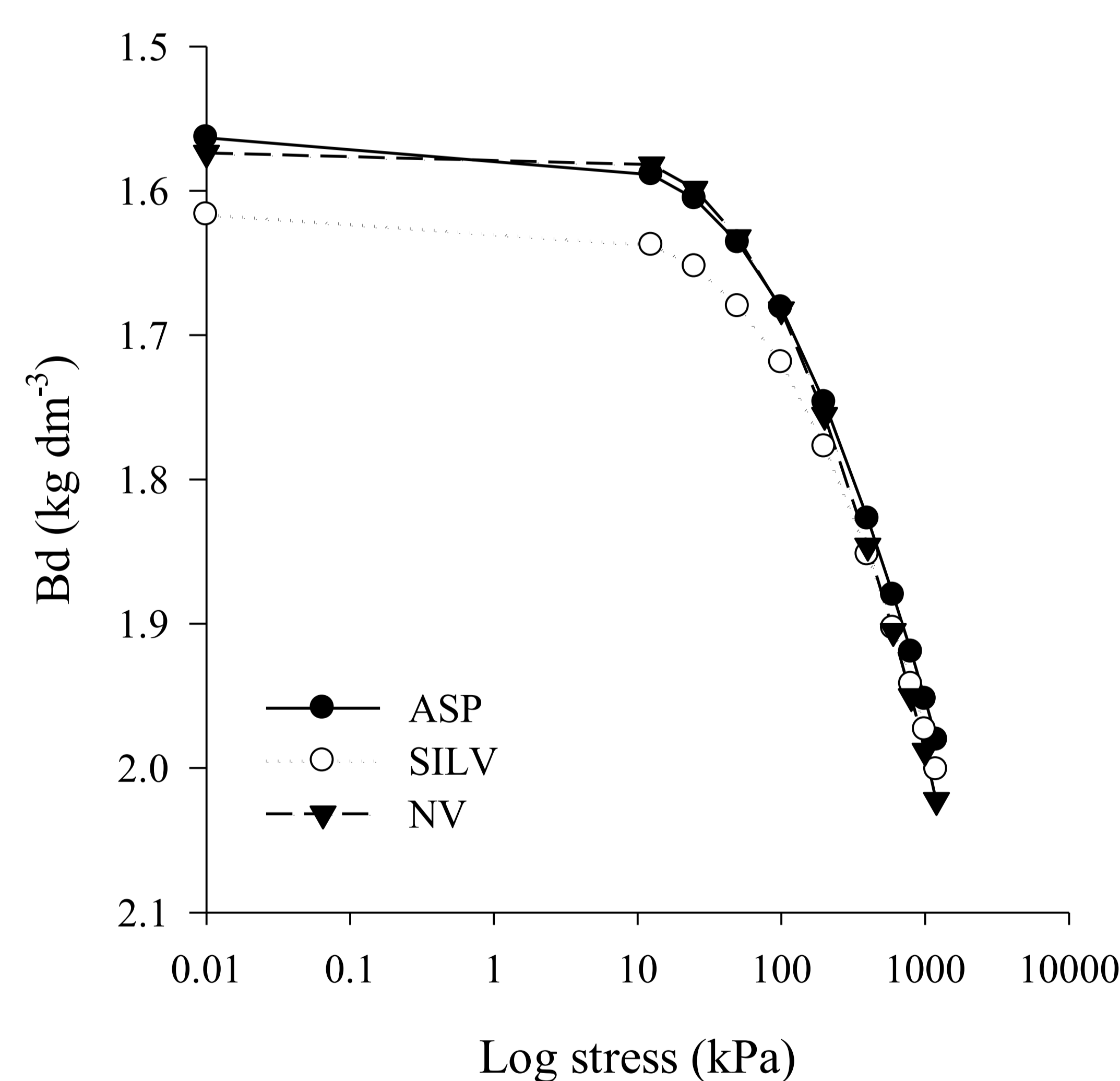


Figure 2 Soil density as a function of the applied stress in the uniaxial compaction test on a Chromic Luvisol under agroforestry and natural vegetation (NV) in Sobral -CE. ASP: agrosilvopastoral; SILV: silvopastoral.

- The results indicated that AFS increased Bd_{max} ($p < 0.05$) and reduced WC_{crit} ($p < 0.05$) and the St_{Nlom} ($p < 0.10$). This suggests a change in the organic matter quality, as evidenced by the lower St_{Nlom} in AFSs while σ_p was unaffected ($p > 0.20$).
- The DC means were statistically equal in ASP, SILV and NV, demonstrating that the changes induced by AFSs did not affect the pore space.
- After 14 years, the DC and σ_p of the AFS soils were not increased, being suitable for plant growth.

CONCLUSIONS

After 14 years of agroforestry land use (in silvopastoral and agrosilvopastoral systems), the soil compression behavior was stable, with no increases in the compaction degree and load-bearing capacity, indicating suitability for plant growth.

