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Estimation of carbon stock and nitrogen in the semiarid region

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The management and use of the soil in semi-arid areas, over time have caused significant decreases of carbon (C) and nitrogen (N) in these soils, due to the fact that it is a region where normally enough conditions are found favorable to the different decomposition processes of MOS, with man being the main agent responsible for these phenomena. The use of mathematical models can be a useful tool to improve understanding and to assist in more compatible practices of land use and management of the characteristics of this ecosystem. The Century model has been used in several ecosystems, but the model has not been adapted yet to simulate ecosystems of dry tropical forests, such as the caatinga in northeastern Brazil. With this, the objective of the present work was to validate the Century model for simulations of C and N stocks in caatinga areas under different cropping systems. The data used for the calibration of the model were obtained in field plots with preserved vegetation, in the municipality of São João do Piauí, located in the semiarid region of Piauí, Brazil, under the dominance of the Caatinga biome. For the validation, we used data from the municipality of Santa Teresinha-PB, with a distance between them of 740 km and similar soil-climatic conditions, but different soil types. Thus, it was possible to analyze the behavior of the C and N stocks of the soil. In the native vegetation areas, simulated values of C and N stocks (23.76 and 5.27 Mg ha⁻¹) were similar to the values observed in the field (25.72 and 5.77 Mg ha⁻¹), where the differences between simulated and found values are well below the maximum allowed which is 20%. Therefore, the Century model can be used to simulate the C and N cycling in the soil system, in addition to being able to present future scenarios for improvements in caatinga areas of the Brazilian semiarid region.

Keywords: Modeling; white forest; simulation; stocks of C and N

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