Biochar to Climate Change Adaptation

Sonsol Gondim R*[1], Rodrigues Muniz C[1], Chaves Gurgel M[1], Nonato de Assis Júnior R[2], Levi Anastácio dos Santos C[2]

[1]Brazilian Agriculture Reserarch Corporation - Embrapa Tropical Agroindustry - Rua Dra. Sara Mesquita, no 2.270, Bairro Planalto do Pici, CEP 60511-110, Fortaleza, CE, Brazil
[2]Ceará Federal University - UFC - Av. Mister Hull s/n - Campus do Pici Bloco 807, Fortaleza, CE, Brazil.
E-mail: rubens@cnpat.embrapa.br

Abstract

Rain-fed agriculture in the semi-arid northeast of Brazil faces stronger challenges regarding water for agriculture. Biochar is recognized to promote soil water holding capacity. Its properties vary widely with feedstock material and processing conditions, so it is recognized the importance of its characterization and performance evaluation, before use. The objective of this study was to identify best regional available biochar for soil water-holding capacity increase, based on laboratory tests and microstructural porosity evaluation. Types of biochar were compared, according to wood source. Cashew tree and two species from caatinga biome were used, jurema-preta (*Mimosa tenuiflora* (Willd.) Poir. and marmeleiro (Croton sonderianus Müll. Arg.). For water holding evaluations, both biochar were submitted to Hainnes Funel. Samples were crushed and brought to the laboratory and separated using sieves of 16 mm; 8 mm; 4 mm; 2 mm; 1 mm; 0.5 mm; 0.25 mm; 0.12 mm and <0.12 mm mesh. Samples with particle size diameters of 2 mm and 4mm were submitted to Hainnes Funel. Transversal sections of both biochars were prepared to be observed under a scanning electron microscope, identifying macropores and micropores. Caatinga wood biochar demonstrated greater water holding capacity than cashew wood one in all evaluated diameters. Greater levels are observed related to caatinga wood biochar, 1.89 g g^{-1} for to particle size diameter of 2 mm and 2,27 g g^{-1} for 4mm and cashew wood biochar demonstrated water holding capacity of 0.57 and 0.53 g g^{-1} to 2mm and 4 mm particle size diameters respectively. The fewer quantity of macropores and larger number of micropores may give caatinga wood biochar higher water holding capacity, while thickly lignified cell walls of cashew wood biochar supports the idea that a hydrophobic effect may contribute to its lower holding capacity.

Keywords: water holding capacity, adaptation strategy, climate change, biochar

Acknowledgments

The authors would like to thank National Research Council - CNPq for funding this study.