

TITLE: HOW DESERTIFICATION AFFECTS THE DIVERSITY OF THE SOIL MICROBIOME IN THE CAATINGA BIOME?

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ABSTRACT:

The Caatinga Biome is endemic of Brazil and encompasses about 10% of the national territory. Despite this, both anthropogenic and natural drivers have generated processes of desertification in several areas, leading to the destruction of topsoil followed by loss of the land's ability to sustain crops, livestock or human activity. Nevertheless, it is yet not known how desertification affects the diversity and functional activity of the soil associated-microbiome in the Caatinga Biome. In this study we analyzed the soil microbiomes across a native Caatinga area, grazing exclosure areas (after 17 years of natural regeneration), and desertified areas aiming to evaluate the benefits of the exclosures on the microbial community and its relationship with vegetation recovery and soil quality. The study was conducted in a desertification site of Irauçuba municipality, Ceará, Brazil. Soils were collected at 0 - 20 cm depth in each site in dry season (2015) and wet season (2017) and analyzed regarding edaphic properties, viable cell counting and taxonomic diversity retrieved by the next-generating sequencing at Illumina MiSeq platform. The dataset revealed a remarkable predominance of Actinobacteria, with similar abundance, in all the analyzed sites. Proteobacteria (Alphaproteobacteria class) was the second phylum most abundant in native Caatinga, while in grazing exclosures and desertified areas an enrichment of Chloroflexi was observed. All diversity descriptors showed that native Caatinga presents the greatest alpha-diversity, followed by grazing exclosures and desertification areas. The analysis of beta diversity confirmed the differences between the three sites, but showed a trending on similarity between the native Caatinga and natural regeneration, demonstrating that the establishment of long-term grazing exclosures within desertified areas in the Caatinga biome had positive impacts on microbial community as well as in the vegetation restoration and soil physico-chemical properties. This knowledge should lead to better ways to predict and cope with expansion of desertification in the Caatinga Biome.

Keywords: Soil microbiome, Caatinga, desertification, natural regeneration.

Development Agency: Conselho Nacional de Desenvolvimento Científico e Tecnológico – CNPq.