

Grazing exclusion regulates bacterial community in highly degraded semiarid soils from Brazilian Caatinga biome

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Abstract

Grazing exclusion (GE) has been applied as a suitable strategy to soil conservation worldwide, mainly in semiarid soils. However, it is unclear how GE management reduces the negative effects of overgrazing on the microbial community. In this study, we assessed the bacterial community in three different soil management belonged to a semiarid region from the Brazilian Caatinga biome, as follows: Native Caatinga (NC), Grazing exclusion (GE), and a highly degraded area by Overgrazing (OG). The bacterial community was assessed through the sequencing of the V4 region of the 16S rRNA gene. We also analyzed soil chemical and physical properties and correlated with bacterial community composition, and α - and β - diversities. Our results demonstrated that GE increases the content of soil C, N, and bacterial diversity. However, the changes in bacterial diversity were significant in a specific site (nº 1), suggesting that GE strategy could be a context-dependent and a complex approach to Caatinga soils. Moreover, overgrazing might restrain the potential of bacterial diversity to sustain ecosystem functions, since non-beneficial elements (e.g., Na⁺ and Al³⁺) increased in OG, which presented a negative correlation with the bacterial community. Our study provides novel evidence that high-intensity disturbance by overgrazing could not only reduce soil fertility, but it may also restrain bacterial composition, with implications on environmental functioning. Thus, the Caatinga soil microbiome may be unable to maintain ecosystem services such as plant and animals' development under overgrazing management.

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