TITLE: EXTREME CLIMATIC EVENTS HAVE DIFFERENTIAL IMPACTS ON THE BACTERIAL COMMUNITIES OF THE PHYLLOSPHERE, LITTER AND RHIZOSPHERIC SOIL IN THE AMAZON RAINFOREST

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ABSTRACT

Extreme climatic events on the Amazonia are mainly linked to El Niño-Southern Oscillation (ENSO), resulting in extremely high temperatures and prolonged drought periods in several regions of the biome. Is has been shown that extreme climatic events, such as prolonged drought and increases in temperature, may affect ecosystem functionally in tropical forests. However, the effects of such events on the microbial communities in the Amazon forest are not known. To examine the drivers of bacterial community structure in forest habitats and the effect of a prolonged drought period in the Amazon forest, we evaluated the bacterial community structures associated with the phyllosphere, litter and rhizospheric soil of nine tree species at three time points in an old-growth forest in Brazil, using high-throughput sequencing of the 16S rRNA gene. Our results indicated that drought was an important factor modulating the bacterial community in the phyllosphere, litter and rhizospheric soil. The prolonged drought decreased bacterial species richness and alpha diversity, and increased dissimilarities in bacterial community structure. Tree species was an important driver of the assemblage of bacterial communities in the phyllosphere, and plant functional traits represented by index of epiphyllous coverage, leaf water repellency, plant height, leaf mass per area explained most of the variability of these bacterial communities. In addition, chemical composition of leaf, litter and soil attributes throughout the seasons partially explained the variability of bacterial communities in the phyllosphere, litter and rhizospheric soil. Indicator species analyses revealed that a small number of bacterial indicator genera in the phyllosphere, litter or rhizospheric soil were not affected by climate variations. Our results indicate that prolonged drought strongly impacts the diversity and structure of bacterial communities in the Amazon forest, and the magnitude of that impact is dependent on forest habitat.

Keywords: Bacterial Diversity; Microbiome; Plant-bacteria interaction; Tropical forest

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