

TITLE: FACTORS THAT MODULATE THE MICROBIAL COMMUNITY: INFLUENCES OF PH AND VEGETABLE COVERAGE

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ABSTRACT:

Soil is a complex and heterogeneous environment that serves as the reservoir of nutrients from several biogeochemical cycles and has one of the greatest diversity of microorganisms on the Planet. Most soil microorganisms are associated with plants, maintaining positive ecological relationships for both the plant and microorganisms. Plant-associated microbiomes are influenced by several environmental factors, especially pH and plant species. The understanding of the behavior of the microbiome in relation to these factors is of great importance for possible management of the microorganisms in soil. To quantify the influence that changes in pH and vegetation coverage have on microorganisms, a factorial experiment using two species of plants and four pH ranges as factors were established. In the experiment, the pH of soil samples was modulated with the addition of CaCO₃ to four different ranges (4.3, 5.5, 6.7 and 7, 9). Each pH range was combined in quadruplicate with two distinct plants (maize and beans), adding 32 vessels. These were incubated and monitored in a greenhouse. At the end of the 60 days, the total DNA was extracted from the rhizospheric soil samples from each of the vessels, and the DNA was sent for sequencing the gene encoding the ribosomal subunit of the 16s RNA. The genetic sequences obtained were submitted to bioinformatics analysis using the Mothur software. A significant effect of pH factor was observed over the alfa-diversity indexes, with significant interaction between plant and pH. That is, the pH can modulate the diversity, but the response depends on the type of plant analyzed. For legumes the pH 5.5 was more diverse, and there is a decline of diversity in the more extreme bands. On the other hand, for grasses an increase of the diversities in the extremities occurs, being the pH 4.4 with higher diversity. In all treatments, the Firmicutes, Proteobacteria, and Actinobacteria were predominant. Of the 20 most abundant phyla, only the Acidobacteria and Actinobacteria phyla were influenced by pH, which was observed by the Spearman correlation. Analyzing β -diversity through a non-metric multidimensional ordering, based on the Bray-Curtis similarity index, we observed a significant effect of the two factors on community structuring. The pH acts strongly on modulating the community, but vegetation cover also acts to change the community, but to a lesser extent.

Keywords: microbiome, modulators, soil microbiology, soil pH, rizhosphere

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