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Physicochemical and Microbiological Properties of Amazonian Soils under Intensive Crop System

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Abstract

Pitahaya (*Selenicereus megalanthus*) is among the promising crops that have gained an important space in international markets during the last years, becoming a source of incom. for farmers worldwide. However, the intensive production system of this crop is poorly studied until now. Having this background, our research had as objectives, to determine the influence of the intensive crop system of pitahaya on physicochemical and microbiological parameters, as well as the diversity of microorganisms of soils. Soil sampling was carried out in two farms, one with pitahaya and another with tea, as a representative non-intensive crop system. In all farms, two soil depths were assessed (0–10 cm and 10–30 cm). Composite soil samples were processed for chemical and physical properties analysis, as well as the texture of the soils. Bacteria and fungi communities were determined by colony forming units (CFU) and the Most Probable Number method. The growth kinetic was performed for each microbial group, counting the colonies at several times points. Subsequently, the morpho-cultural characterisation of the colonies was carried out to determine the diversity of both microbial groups using the Shannon and Simpson indices. The results for the chemical soil properties showed significant differences for % of total nitrogen (%NT) and organic matter in tea crop compared with pitahaya at 0–10 cm of depth. From 10–30 cm pitahaya crop increased the %NT. The physical properties and texture of the soils showed no significant differences between both crops. Regarding the depths, from 0–10 cm improved the aeration porosity for tea and hydraulic conductivity for pitahaya, while from 10–30 cm, the retention porosity increased significantly for tea. When comparing the microbial communities between both systems, a positive influence of tea was shown, having an increase of 67 % for bacteria and 52 % for fungi compared to pitahaya. However, diversity indices showed that although there was a high microbial diversity for both crop systems, there are no remarkable differences between them. These results open the gap to seek alternative systems for pitahaya cultivation and improve essential elements of agroecosystems, such as, organic matter and microbial communities.

Keywords: Amazon soils, bacteria, colonies forming units, diversity, edaphology, fungi

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