Interactions between earthworms and soil microbiota under green sugarcane production

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Due to public health issues traditional practices of sugarcane burning are being replaced by mechanical harvesting in Brazil, the world's largest sugarcane producer. In green sugarcane available residues (trash) become an important source of biomass, but questions remains regarding its best use. Trash is being used to feed mill´s boilers for energy generation but maintaining it on the soil surface protects the soil, contributes to nutrient and water balances, increases organic matter content and favors populations of organisms related to soil health such as earthworms and rhizobacteria. As both management and land use changes affect the soil microbiota, which plays crucial role in biogeochemical cycles, it is important to explore the forces driving soil microbial populations and activity in order to improve sustainable production. The present study was guided by the following questions: if trash contributes to more sustainable use of soil resources in agroecosystems, could this be related to changes in microbiota? What is the role of earthworms in this process? We defend the hypothesis that organic matter (trash) input and earthworms are the priming forces that activate a specific bacterial diversity involved in more energy efficient agroecosystem. Molecular biology data will be correlated with environmental data in a factorial greenhouse experiment including a one year cycle of sugarcane production in the presence and absence of: 1) earthworms (*Pontoscolex corethrurus*), 2) sugarcane trash and 3) fertilizers. N_2O, CH_4 and CO_2 emissions from soil will be measured throughout the experiment and, physical-chemical and biochemical analysis will be performed and related to the three factors. The soil

microbial profile will be investigated using Illumina MiSeq shotgun of whole DNA and GeoChip methods and the same molecular approach will also be applied to sugarcane soil samples from sugarcane fields nearby . We hypothesize that earthworms will increase microbial activity and greenhouse gas emissions, and that there will be significant changes in both microbial pools and activity due to the three factors.