

TITLE: THE ROLE OF THE *Urochloa* SPP. INTERCROPPING IN COFFEE PLANTATION UPON BACTERIAL COMMUNITY AND FUNCTIONAL GENES

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ABSTRACT:

Intercropping is a growing agricultural practice to improve soil quality, sustainable crop, and plant performance. However, little is known about the intercropping influence on the bacterial community. Here, we investigated the effect of 3 years old *Urochloa* spp. (formerly Brachiaria) intercropping with coffee on bacterial community comparing to conventional cultivation. We evaluated bacterial communities from topsoil to 15 cm depth in four soil layers, being them 0 – 2.5, 2.5 – 5, 5 – 10, and 10 – 15 cm depths. Our results showed that intercrop improved soil organic matter from 2.5 to 10 cm, β -glucosidase activity in 2.5 – 5 cm, and acid-phosphatase activities in 0 – 2.5 and 5 – 10 cm depth. Intercrop presented a higher abundance of nitrogen fixation gene (*nifH*) in 5 – 10 cm, whereas there was no difference in phosphorus solubilizing marker (*phoD*). Bacterial richness and diversity, determined from 16S rRNA sequencing, were similar between the two crop systems, but PCoA analysis showed structural differences in response to distinct practices. Network analysis and topological parameters demonstrated that intercrop promoted higher and more intimate connections between the active nodes. In addition, we identified higher competitiveness and modular structure under intercrop than conventional coffee. Taken together, our results indicate intercrop system may provide a more quality and stable environment for soil bacterial communities functioning. Moreover, intercrop improved bacterial interactions and may contribute to ecosystem services and efficient resources use in agriculture.

Keywords: *nifH*; *phoD*; network co-occurrence

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