

**TITLE:** EFFECTS OF FOUR QUANTITIES OF SUGARCANE STRAW ON SOIL COVERAGE UPON BACTERIAL COMMUNITY AND FUNCTIONAL GENES

**AUTHORS:** BRESCIANI, L.; ANDREOTE, F. D.

**INSTITUTION:** "LUIZ DE QUEIROZ' COLLEGE OF AGRICULTURE - UNIVERSITY OF SÃO PAULO (AV. PÁDUA DIAS, 235 - AGRONOMIA, PIRACICABA - SP, 13418-900, BRAZIL)

**ABSTRACT:**

Sugarcane straw maintenance in soil surface has been described as a promising practice to improve soil quality and crop sustainability. However, sugarcane straw is highly profitable to bioenergy industries and there is a gap about how much of it is recommendable to provide soil benefits. Here, we studied the effect of four levels of straw maintained in soil surface [total remove (TR), high remove (HR), low remove (LR), and no remove (NR)] on soil bacterial community after a six-year experiment. We evaluated bacterial community in five soil depths, being them 0 – 2.5, 2.5 – 5, 5 – 10, 10 – 15, and 15 – 20 cm depths. Our results showed that straw release increased soil organic matter compared to TR, especially NR, which presented the highest or the second higher values of soil OM in all the layers. NR presented the highest ammonium N value and potential nitrogen fixation (nifH gene relative abundance) from 10 to 20 cm depth. Bacterial richness and diversity, assessed by 16S rRNA sequencing, showed that TR and NR presented similar bacterial diversity indices, although different structures in the first 5 cm soil depth. Network analysis and topological parameters presented that bacterial community under TR have high average path length and network diameter, while under NR showed lower modularity and higher density assembly. In addition, in 15 – 20 cm, NR presented higher connectivity and intimate between the nodes. Taken together, this study indicates that straw maintenance provides a more stable environment for bacterial behavior. Besides, NR may provide higher values of N supply from 10 cm further, thus contributing to the ecological system and crop fertility. In summary, the soil bacterial community interplay with the straw management, and its outcomes may potentialize beneficial functions and pathogen suppression to boost plant performance.

**Keywords:** nifH; phoD; bacterial assembly; co-occurrence analysis.

**Development Agency:** Fundação de Amparo à Pesquisa do Estado de São Paulo (FAPESP)