

The Response of Soil Biodiversity to Agriculture Practice in Rhizosphere

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Abstract : Soil microbial diversity is one of the important parameters to assess the soil fertility and soil health, even stability of the ecosystem. In this paper, we aim to reveal the soil microbial difference in rhizosphere and root zone, even to pick the special biomarkers influenced by the long term tillage practices, which included four treatments of no-tillage, ridge tillage, continuous cropping with corn and crop rotation with corn and soybean. Here, high-throughput sequencing was performed to investigate the difference of bacteria in rhizosphere and root zone. The results showed a very significant difference of species richness between rhizosphere and root zone soil at the same crop rotation system ($p < 0.01$), and also significant difference of species richness was found between continuous cropping with corn and corn-soybean rotation treatment in the rhizosphere statement, no-tillage and ridge tillage in root zone soils. Implied by further beta diversity analysis, both tillage methods and crop rotation systems influence the soil microbial diversity and community structure in varying degree. The composition and community structure of microbes in rhizosphere and root zone soils were clustered distinctly by the beta diversity ($p < 0.05$). Linear discriminant analysis coupled with effect size (LEfSe) analysis of total taxa in rhizosphere picked more than 100 bacterial taxa, which were significantly more abundant than that in root zone soils, whereas the number of biomarkers was lower between the continuous cropping with corn and crop rotation treatment, the same pattern was found at no-tillage and ridge tillage treatment. Bacterial communities were greatly influenced by main environmental factors in large scale, which is the result of biological adaptation and acclimation, hence it is beneficial for optimizing agricultural practices.

Keywords : tillage methods, biomarker, biodiversity, rhizosphere

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