# RECOVERING SOIL QUALITY IN VEGETABLE FARMING SYSTEMS BY REDUCED TILLAGE AND ORGANIC FERTILIZATION – A BIOPHYSICO-CHEMICAL ASSESSMENT

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Soil being a non-renewable resource makes maintenance of soil quality mandatory for ecosystem functioning. Soil microorganisms as key players of many soil processes mediate e.g. nutrient cycling, soil structure, plant growth and health. We are still lacking a clear understanding how the intensification in agriculture changes the soil microbiome, physico-chemical properties and thus soil quality. Here, we selected a field experiment in Uruguay which was established in 2012 to compare conventional vs. reduced tillage treatments combined with different fertilization variants to improve soil quality in vegetable farming systems. Bulk soil and rhizosphere samples from table beet (*Beta vulgaris*) cultivated in these soils were collected in November 2017. Physico-chemical parameters of bulk soil were determined. Total community DNA directly extracted from bulk soil and rhizosphere was used for 16S rRNA gene and ITS fragment-based analysis of the microbial community by Illumina MiSeq sequencing. Additionally, quantitative real-time PCR (qPCR) was performed to quantify bacterial and archaeal 16S rRNA genes, ITS fragment and antimicrobial resistance genes (ARGs). First results showed that conventional tillage with mineral fertilization had less soil aggregates >2mm, soil available phosphorus, exchangeable potassium and labile carbon than undisturbed soil. In contrast, the treatments with organic fertilization showed similarities with undisturbed soil regarding soil bacterial community composition. PERMANOVA analysis of the sequencing of 16S rRNA genes revealed that fertilization affected soil and rhizosphere prokaryotic communities, whereas the tillage affected only the soil ones. Moreover, manure application to the soils increased the relative abundance of most of the tested ARGs. When evaluating the sustainability of agricultural management strategies, the structural and functional prokaryotic community composition along with physico-chemical parameters in soil should be considered. Based on our results, we suggest that reduced tillage combined with organic fertilization presents a promising farming alternative for restoring or improving soil quality.



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