



Effects of tillage practices on the functional diversity of microbial community in arable soil

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It is widely accepted that soil perturbation by tillage management is one of the main factors which causes soil organic carbon loss and affects soil fertility. The use of soil microbial community and activity as a bioindicator for soil perturbations can be considered as a tool for the assessment of the changes driven by different agricultural practices. The aim of this study was to assess the changes of the community level physiological profile (CLPP) under different tillage practices. Soil samples were taken from a long term experiment with minimum tillage and conventional tillage managements, under wheat, corn and soybean as crops. MicroResp multi-SIR approach was used to assess the soil microbial functional diversity. Analyzed soil samples were prepared and loaded into the deep-well plates and incubated for six hours at 25 °C with the 15 carbon sources (30 mg g⁻¹ soil H₂O concentration). The detection plates were read at 570 nm before and after the six hours of incubation. Significant variations on microbial catabolic activity were driven both, by tillage (F=7.131) and crop (F=2.057). The carbon utilization pattern was the same despite of tillage treatment and crop. Highest respiration was recorded for carboxylic acids, followed by carbohydrates, amino sugars and amino acids, but there were differences in utilization of certain carbon sources. The greater activity was given by α -ketoglutaric acid, citric acid, malic acid, fructose and glucose, while the lowest respiratory activity was obtained in case of arginine. Average microbial catabolic rates for all carbon sources were similar for both tillage practices, while the highest catabolic activity was given by wheat for CT treatments and by corn in MT treatments. Also, PCA presents a separation between microbial communities driven by tillage practices. This suggests that tillage management can change the microbial functional diversity.