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Community level physiological profile of soil microbial community in arable Romanian soils under minimum and conventional tillage

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It is widely accepted that soil tillage induces changes in the structure and functions of the soil microbial community. The practices like minimum tillage have been reported as being beneficial to soil biotic community while conventional tillage is often considered as being detrimental for soil biota. For arable soil it is under question if soil management can drive the diversity of microbial community and related processes.
The aim of this study was to assess the changes of the soil microbial functional community (measured as CLPP) under different tillage practices in a network of farms located in the North-Western part of Romania. To do this, we sampled soil in 9 different farms where two kinds of treatments were selected: conventional tillage (ploughing) and minimum tillage (unploughing soil with low-till). Soil samples were taken during spring from fields where wheat was growth. 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 ºC with the 15 carbon sources (30 mg g-1 soil H_2O concentration). The detection plates were read at 570 nm before and after the six hours of incubation.
In general, average microbial catabolic rates for all carbon sources were higher in conventional treatments compared with minimum treatments. The carbon utilization pattern was similar for both kind of tillage treatment. The highest respiration rates was recorded for carboxylic acids, followed by carbohydrates, amino sugars and amino acids with some differences for some specific carbon sources. In minimum tillage treatments malic acid, fructose and glucose showed higher respiration values than in conventional tillage while α-ketoglutaric and citric acid registered higher values in conventional treatments. The lower respiration activity was measured for arginine in both tillage treatments. The obtained results suggests that soil tillage can affect the microbial functional diversity as different carbon sources utilization pattern was recorded for both minimum and conventional tillage practices.