

CAN TILLAGE MANAGEMENT INDUCE CHANGES IN FUNCTIONAL DIVERSITY OF THE SOIL MICROBIAL COMMUNITY?

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Agricultural soil management can have a large impact on soil physical, chemical and biological properties. Minimum tillage is increasingly used by farmers due to the economic and environmental benefits. Furthermore, minimum tillage have been reported as being beneficial to soil microbial community, but clear evidence of this benefits are still under questions. Because soil microorganisms are directly linked to soil biochemical processes, a dynamic and diverse community is essential for a healthy and fertile soil.

The aim of our study was to measure soil microbial catabolic activity in arable soils where conventional tillage (ploughing) and minimum tillage (unploughing soil with low-till) was applied. We selected 15 sampling points in different farms from N-W part of Romania where both kind of treatments was applied. Soil samples were taken during spring from fields where wheat was growth. We used MicroResp multi-SIR technique to assess the soil microbial catabolic activity. Briefly, soil samples were preincubated for 3 days at room temperature and 15% soil water content then loaded into the deep-well plates and incubated for six hours at 25°C with 15 different carbon sources (30 mg g⁻¹ soil H₂O concentration) in a closed system which includes also a detection microtitre plate with a colorimetric CO₂ trap. The color changes in the detection plate was measured at the beginning (T0) and after 6 hours of incubation (T6) at 570 nm. The difference in absorption between T1 and T0 was converted in C-CO₂ (μg·g⁻¹soil·h⁻¹) released from each carbon source used.

Average of microbial catabolic activity for all organic sources was higher in conventional treatments compared with minimum treatments. In both kind of tillage treatments the most used organic substrates were carboxylic acids, folowed by carbohydrates, aminoacids and amino sugar. For minimum tillage treatment 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 lowest respiration activity was measured for arginine in both tillage treatments. The obtained results suggests that tillage practices have an influence on soil catabolic activity and are able to direct the diversity of microbial community in arable soils.