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MICROBIOLOGICAL TOOLS FOR ASSESSING IMPACTS ON SOIL ORGANIC MATTER CONTENT

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Soil organic matter (SOM) is fundamental to soil quality and has been suggested as the single most important indicator of soil quality and productivity. For any given soil and climate, the amount of SOM is determined by land use and soil management, but the usefulness of SOM data for soil quality monitoring is constrained by the difficulty of experimentally verifying changes over short periods of time. Long-term experiments seem to offer only a partial solution to this problem.

Soil microorganisms accounts for only 1-3 per cent of total soil organic carbon, but they play a key role in the soil forming processes, including in SOM transformations.

Significant correlations between SOM content and soil microbial parameters (soil microbial biomass, and/or basal respiration, and/or metabolic quotient) were observed in the moderately and poorly humified Typical chernozems from the Moldovan long-term field experiments that included 6 traditional (10-field) and 5 ecological (7-field) crop rotations (with and without alfalfa, mineral fertilizers and/or farmyard manure), continuous black fallow, and 5 continuous crops (with and without mineral fertilizers with farmyard manure). These correlations open practical possibilities of using soil microbial parameters as a tool for timely SOM related assessments and predictions. Once a new soil management practice is introduced, the substantial difference in the soil microbial biomass (SMB) and SOM turnover rates will allow the soil microbial parameters to reach a new equilibrium (reflecting the peculiarities of this management) much sooner than the SOM content. As soon as that equilibrium of the microbial parameters is established, the future SOM content becomes predictable/calculable from the established correlational relationships, assuming that given enough time SOM will tend to fit the same correlational relationship that was observed in the long-term field experiments. These predictions may be beneficial in such important fields as protection and enhancement of soil quality and biodiversity, carbon sequestration, development/assessment of sustainable soil management practices, and others. The implementation of the possibility may provide farmers with better opportunities for investing into soil quality/biodiversity and may contribute to solving problems related to the climate change and others.

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