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Correlations between microbial activity and soil texture in Hungarian soils

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As part of a national survey, 129 soil samples were taken countrywide across Hungary, in order to be representative of both soil types and intensity of cultivation of the country. The bulk samples were taken from 20 points of the diagonals of each sampling parcel, from the 0-30 cm surface layer. Among other soil physical parameters, samples were classified into soil textures based on the Arany yarn number. Microbial measurements were selected so that they could give an overall look at the actual biological soil state.

Our goal was to find out, whether we could detect correlations between soil texture, and clay content in particular with the measured microbial parameters regarding such a heterogeneous and large group of natural soil samples.

Biological activity of the soil samples were evaluated applying three tests: fluorescein-diacetate (FDA) and sucrose (invertase) enzyme activity tests as well as substrate induced respiration (SIR) measurement. The *FDA test* is suitable for estimating the soil's microbial activity. The hydrolysis of FDA is based on the process of several soil enzymes hydrolysing colourless fluorescein-diacetate added to the soil. Released coloured fluorescein can be measured by spectrophotometry. Determination of *sucrose (invertase) enzyme activity* is founded on quantitative measurement of reducer monosaccharides emerging from the hydrolysis of sucrose. This test provides information on the carbohydrate metabolism processes in the soil. The most important indicator of soil biological activity is the degree of soil respiration that can be measured through the quantitative analysis of the CO₂ produced by the decomposition of organic matter. *Substrate induced respiration (SIR) method* is based on a so-called respiration answer given by the microbial biomass in the presence of an easily utilisable substrate (glucose) being in saturated concentration. Statistical analysis of the data was performed with the programme StatSoft Statistica (Version 12 and 13).

The results showed that according to the Kruskal-Wallis tests, correlations could be detected

between soil texture and all three microbial parameters. Microbial activity raised in accordance with increasing clay content. It could therefore be verified that although microbiological state and activity of the soil is affected by several environmental factors, FDA and sucrose activity as well as SIR in our samples all depend on the content of clay minerals of the soil, as these can produce favourable conditions for the accumulation of enzymes. This research was funded by TDR project (KEOP-6.3.0/2F/09-2009-0006).