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Soil tillage induced impacts on soil microbial activity of agriculturally used soils in Austria

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Soil can act as a net sink for sequestering carbon and thus attenuating the increase in atmospheric CO2 if appropriate soil and crop management is applied. The objectives of this study are to determine the impacts of different tillage treatments on soil microbial activity. Soil microbial respiration (MR), substrate-induced respiration (SIR), ß-glucosidase activity (GLU) and dehydrogenase (DHY) activity were analysed for five agricultural fields in Lower Austria and Styria in 2007 and 2008. These investigations are part of a research project about the influence of soil tillage on CO2 emissions and carbon dynamics of Austrian cropland. The study sites differ in climatic conditions, soil texture, slope and crop rotation. All fields belong to long-term tillage treatment experiments performed by agricultural schools. Three different tillage systems are investigated: Conventional tillage (CT), Reduced tillage (RT) and No-tillage (NT). RT and NT use cover crops during the winter period. Each tillage system is replicated three times per site. In spring, summer and autumn 2007 and 2008, soil samples were taken from each plot at the soil depth of 0-10 cm, 10-20 cm and 20-30 cm. Samples were sieved (2 mm) and stored at 4°C in a refrigerator. Analyses were performed within one month after sampling. In addition, soil moisture, pH value and carbon and nitrogen content of the soil samples were determined. Preliminary results show that the amount of microbiological activity differs between the five sites during experimental years depicting the influence of soil texture. The influence of tillage treatment on soil microbial parameter was best represented by SIR. For all fields, values changed during the vegetation period. The impact of soil texture and soil depth could be analysed by all investigated soil microbial parameters whereas the tillage treatment showed a significant influence only for SIR.