



The effect of soil disturbance on soil respiration in a long-term tillage treatment experiment

E. Tóth (1), Gy. Gelybó (1,2), Cs. Farkas (1), and M. Birkás (3)

(1) Institute for Soil Sciences and Agricultural Chemistry, Centre for Agricultural Research, Hungarian Academy of Sciences, (2) Eötvös Loránd University, Department of Meteorology, Budapest, Hungary (gyoresz@elte.hu), (3) Szent István University, Faculty of Agricultural and Environmental Sciences, Institute of Crop Production, Department of Soil Management

Possible increase of atmospheric CO₂ concentration caused by agricultural soil CO₂ emission due to cultivation is slight compared to the CO₂ emission of agricultural machinery or CO₂ emission originating from deforestation. Even so cultivation methods conserving and protecting soil carbon stocks became more and more important reflecting the importance of soils as a natural resource for humanity. Soils play an important role in the carbon cycle, hence it is one of the most important questions to address how soil carbon stocks react to changing climatological conditions and anthropogenic disturbance. In our research we examined the effects of two different tillage treatments (causing different degree of soil disturbance) on soil CO₂ emission in a long-term tillage treatment experiment set up 12 years ago in 2002. We measured soil CO₂ emission in ploughing and the direct drilling treatment of the experiment during the vegetation period with manual static chamber and gas chromatography detection. Beside emission measurements the main soil physical (soil water content, soil temperature), chemical (N, P, K, humus content, pH, soil organic carbon content) and biological properties (substrate induced respiration-SIR, water extractable organic carbon / nitrogen content –WEOC, WEON, microbial biomass carbon / nitrogen content) were also determined. Higher emission was observed in the direct drilling treatments almost on every measurement days. We concluded that not only soil chemical properties but also properties closely connected to microbiological activity (such as SIR, WEOC, WEON, soil microbial biomass content) are in close relationship with soil CO₂ emission.