



Comparison of two methods for determining soil CO₂ emission on an oat field

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We measured soil CO₂ emission in a long-term experiment including two tillage treatments (mouldboard ploughing and no tillage) at Józsefmajor Experimental and Training Farm, Hungary.

In this study we investigated the correlation between two different sampling/measurement techniques: the static chamber method (SC) combined with GC analyses and in situ soil CO₂ emission measurement by EGM-4 (PP Systems, MA USA). During the static chamber method gas samples were collected in seven replicates from the headspace of the chambers, and the samples were analysed by GC- FID. The EGM-4 gas analyzer was also used with collars in seven replicates from the vegetation period of 2017. The collars of the different methods were placed close to each other minimizing the spatial heterogeneity. Total of 16 samples were collected between May to September, the sown crop was winter oat.

Both emission time series (SC and EGM-4) showed the same decreasing trend in CO₂ emission during the second half of the vegetation period. The soil CO₂ emission values collected from no till treatment varied between 0.041 to 0.212 and 0.046 to 0.239 mg CO₂ m⁻² s⁻¹ in case of static chamber and EGM-4, respectively. In the mouldboard ploughing treatment the values varied between 0.058 to 0.152 and 0.053 to 0.281 mg CO₂ m⁻² s⁻¹ (SC and EGM-4, respectively). In no till treatment the annual mean standard deviation of the values collected with EGM-4 was lower (0.016) than the one collected with static chamber method (0.038).

Data showed good correlation (R²=0.85) between the two measurement techniques in case of no till treatment, and there is a moderate correlation (R²=0.39) in case of ploughing. The variability of the sampling spots might be the reason of this unclear finding.