



What governs soil respiration under different tillage practices?

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We present here the result of a five-year-long study on soil respiration (Rs) and its relationship to its main biotic and abiotic drivers in different tillage treatments. The Józsefmajor Experimental and Training Farm (JETF) study site is located in Western Hungary, near city Hatvan, set up in 2002. Two treatments were selected to study the effect of systematic soil disturbance on soil CO₂ emission: mouldboard ploughing (P) and no-tillage (NT). In the crop rotation each year presented different crops sown including both winter and summer crops. Soil respiration measurements were carried out using the static chamber method, once per week in seven spatial replicates during the vegetation season and less frequently in dormant season. Besides soil respiration, basic meteorological parameters as well as soil water content and soil temperature was monitored. Measurement indicative of plant development such as above and belowground biomass, plant height, were performed as supplementary information. The average measured Rs ranged between 0.09 – 0.1 mg CO₂ m⁻² s⁻¹ in NT and 0.08 – 0.11 mg CO₂ m⁻² s⁻¹ in P throughout the year. We detected moderate correlation between soil temperature and Rs but not between SWC and Rs throughout the vegetation period. During the whole year vegetation activity as a response to changing temperature can override the effect of soil water content, which is probably more detectable in governing the spatial pattern of soil respiration. Average CO₂ emission in the NT treatment was higher in the 5-year period compared to P, but the phenomenon could not be explained solely by data on plant development and yield in the different treatments. SWC was significantly higher in NT treatment, but we found no significant differences in soil temperature data between the two treatments.