



How does soil management affect carbon losses from soils?

A. Klik and G. Trümper

Universität für Bodenkultur Wien, Department of Water, Atmosphere & Environment, Vienna, Austria
(andreas.klik@boku.ac.at, 00431 36006 5499)

Agricultural soils are a major source as well as a sink of organic carbon (OC). Amount and distribution of OC within the soil and within the landscape are driven by land management but also by erosion and deposition processes. At the other hand the type of soil management influences mineralization and atmospheric carbon dioxide losses by soil respiration.

In a long-term field experiment the impacts of soil tillage systems on soil erosion processes were investigated. Following treatments were compared: 1) conventional tillage (CT), 2) conservation tillage with cover crop during the winter period (CS), and 3) no-till with cover crop during winter period (NT). The studies were carried out at three sites in the Eastern part of Austria with annual precipitation amounts from 650 to 900 mm. The soil texture ranged from silt loam to loam.

Since 2007 soil CO₂ emissions are measured with a portable soil respiration system in intervals of about one week, but also in relation to management events. Concurrent soil temperature and soil water content are measured and soil samples are taken for chemical and microbiological analyses.

An overall 14-yr. average soil loss between 1.0 t.ha⁻¹.yr⁻¹ for NT and 6.1 t.ha⁻¹.yr⁻¹ for CT resulted in on-site OC losses from 18 to 79 kg ha⁻¹.yr⁻¹. The measurements of the carbon dioxide emissions from the different treatments indicate a high spatial variation even within one plot. Referred to CT plots calculated carbon losses amounted to 65-94% for NT plots while for the different RT plots they ranged between 84 and 128%. Nevertheless site specific considerations have to be taken into account.

Preliminary results show that the adaptation of reduced or no-till management strategies has enormous potential in reducing organic carbon losses from agricultural used soils.