



Erosion Plot Monitoring: Impact of different Tillage Systems on average annual Soil Erosion and the Significance of Extreme Rainfall Events

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Since 1994 when the erosion plot monitoring program started at various sites in Lower Austria, a deeper insight in the local behaviour of the soil erosion processes under field conditions could be enabled. The major objective of this long-term field study was the comparison of different tillage systems with respect to surface runoff, soil loss, and the loss and availability of nutrients and applied pesticides.

Thereby three tillage systems were compared:

- 1) Conventional tillage system (CT)
- 2) Reduced tillage system with winter crop cover (RT)
- 3) Direct seeding with winter crop cover (NT)

The field experiments were conducted at three sites in the hilly regions of Lower Austria, whereby the slopes of the erosion plots were determined between 5% and 16%. The surface soil layers are specified as silty clay loam, loam and silt loam soil texture. Due to the traditional crop rotation systems, the monitored erosion characteristics have to be dedicated to the multiple crop types – or have to be decoded as long term average behaviours, occurring in this agricultural region.

The 45 m² and 60 m² large erosion plots in the fields were bordered by metal sheets to separate the observed areas by a defined size. At the downhill boundary of the plots, an outlet was embedded to collect and divert the surface runoff, as well as the eroded and transported sediment. Runoff and eroded soil were piped to an automated erosion wheel for runoff measurement and taking of a representative sample for further physical and chemical analyses.

In addition, precipitation and temperature data are recorded continuously. By relating the meteorological data to the observed data of the erosion plots, the local impact of different plot conditions – primarily the different tillage systems – could be observed.

According to this monitoring project a high potential in soil conservation methods by means of reduced tillage – and even more in the case of no tillage systems – could be validated. As the rainfall driven soil erosion relates sensitively to extreme events, the appearance of low frequent, but highly intensive rainfalls have a major impact on estimating the long term behaviour.

For investigating the effect of extreme rainfall events on the long-term soil erosion it is essential to compare scenarios with almost similar conditions. Not least because of the high diversity in scenario conditions, the resulting range between the event based soil erosion amount and the erosion rates predicted by commonly used physical equations should be considered.