A European team of scientists has recently modelled soil losses on traditional and conservation sugar beet cultivation systems in Central Europe under projected precipitation changes induced by climate change. Climatic simulations predicted strong seasonal shifts in precipitation which resulted in a net decline of soil losses in conservation systems by 11% to 24%. These results highlight the importance of seasonal change in climatic parameters and the high potential of adaptive land-use management for climate change response strategies.

Besides temperature, most climate change models predict that precipitation patterns will change and that extreme climatic events are likely to occur more frequently. The severity of climate change impacts will vary widely in scale and intensity in different regions, depending on their vulnerability and adaptive capacity. Nevertheless, it is likely that climate change will aggravate the problem of soil erosion in most areas around the world. Erosion is even more problematic for farmland, as soil losses impoverish soils and thus reduce productive surfaces. A possible measure to mitigate soil erosion is the adoption of conservative land-use management. Common conservation agriculture schemes include reduced tillage and no-tillage systems, often combined with intercrop cultivation and mulching to preserve the natural soil structure and a vegetative soil surface cover. In this context, it is therefore of significant importance to assess potential climate change impacts on agricultural soils in order to develop adapted land-use management strategies.

In a recent study, a European team of scientists used climatic models calibrated with field data to generate two 30-year time-series of rainfall data in Upper Austria. The first time-series represented the climatic baseline from 1960 to 1989 and the second the rainfall patterns under a climate change scenario. Rainfall projections were then combined with soil erosion models and field data to assess the magnitude of soil losses on one conventional and three conservation agriculture systems of sugar beet. Their main results were as follows:

- While no significant difference in annual precipitation amounts was predicted for the climate change scenario (a 4.7% decrease was observed), a seasonal shift of precipitation from summer and autumn to winter and spring months was simulated.
- Higher precipitation rates in spring and winter resulted in a seasonal increase of soil erosion rates in these seasons. This increase was outweighed by decreasing soil losses in autumn and summer. Overall, soil erosion rates across the four tillage systems decreased between 10.6% and 21.1%. This is explained by the strong seasonal shift of precipitation amounts towards erosion insensitive months. Indeed, sugar beet crops are usually sensitive to erosion from May to July when intensive rainfalls coincide with low vegetative cover.
- Independent from the climatic circumstances, conservation tillage practice reduced soil erosion by from 41% to 87%, which corroborates the protective effects of conservation tillage systems observed in field data and other studies.

Though the climatic models used in this study consider only seasonal variations of rainfall and do not account for frequency changes in extreme weather events under climate change, which could have major impacts on soil losses, the authors conclude that the applied methodology is an adequate approach for a preliminary assessment of soil erosion in a climate change perspective. Despite the uncertainty, their results show that climate change induced seasonal rainfall variation does not have a major impact on soil erosion in Central Europe for spring sown crops such as sugar beet. Though these results might be different for other crops, they also confirm the high potential of adaptive land-use management for climate change response strategies in the agricultural sector.

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