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Soil and Water Research

Modelling soil organic carbon changes on arable land under climate change – a case study analysis of the Kočín farm in Slovakia

Balkovič J., Schmid E., Skalský R., Nováková M.:

Soil & Water Res., 6 (2011): 30-42

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We have estimated soil organic carbon and crop yield changes under distinct climate change scenarios for the Kočín farm in Slovakia. Two regional climate change scenarios, i.e. the A2 and B2 SRES emission scenarios, and a reference climate scenario have been included into the bio-physical process model EPIC to simulate the effects on the topsoil organic carbon stocks and crop yields for the period of 2010–2050. In addition, we have used the data from several fields of the Kočín farm including the soil data, crop rotational and management data as well as topographical data. The topsoil organic carbon stocks show a decreasing trend for the period of 2010–2050. Among all crop rotation systems and soil profiles, the losses over the period are 9.0%, 9.5%, and 10.7% for the reference, A2, and B2 climate scenarios, respectively. Increasing temperatures accelerate the decomposition of the soil organic carbon particularly when soils are intensively managed. The soil organic carbon changes are crop-rotation specific, which is partly due to the climate scenarios that

affect the crop biomass production differently. This is shown by comparison of the crop yields. We conclude that EPIC is capable to reliably simulate effects of climate change on soil organic carbon and crop yields.

Keywords:

arable land; climate change; Kočín farm; Slovakia; soil organic carbon

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