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Simulation of soil organic carbon changes in Slovak arable land and their environmental aspects

Barančíková G., Makovníková J., Skalský R., Tarasovičová Z., Nováková M., Halás J., Gutteková M., Koco Š.:

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[fulltext]

One of the key goals of the Thematic Strategy for Soil Protection is to maintain and improve soil organic carbon (SOC) stocks. A decline of SOC stocks is politically perceived as a serious threat to soil quality and functions. A suitable tool for acquiring the information on SOC stock changes is modelling. The RothC-26.3 model was applied for long-term modelling (1970–2007) of the SOC stock in the topsoil of croplands of Slovakia. Simulation results show a gradual increase in the SOC stock in the first phase of modelling (1970–1995) mainly due to higher carbon input in the soil. A significant linear correlation (r = 0.4**, n = 275) was found between carbon input and the final simulation of SOC stock. A close relationship between the SOC stock and soil production potential index representing the official basis for soil quality assessment in Slovakia was also determined and a polynomial relationship was found which describes the relation at the 95% confidence level. We have concluded from the results that balanced or positive changes in the SOC stock

dynamics that are important for sustainable use of soils could be influenced positively or negatively in Slovakia by political decisions concerning the soil management. Moreover, the soil production potential index can be used as soil quality information support for such decision-making.

Keywords:

agricultural management; long-term simulation; RothC model; soil organic carbon; soil quality

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