



Modelling the dynamics of organic carbon in fertilization and tillage experiments in the North China Plain

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Modelling of the carbon dynamics in arable soils is complex and the accuracy of the predictions is unknown before the model is applied to each specific site. Objectives were (i) to test the accuracy of predictions of the carbon dynamics using the Rothamsted Carbon (RothC) Model in a long term field trial in Quzhou, North China Plain, using different initializations and estimations of carbon input into the soil and (ii) to test the applicability of the RothC model not only for plots with conventional tillage (CT), but also for no-tillage (NT) plots. A field trial was conducted with applications of differing amounts of N, P and wheat straw in differing combinations with either CT or NT for 18 years. CT and NT affected stocks of soil organic carbon (SOC) similarly. Carbon inputs from crops were either estimated from published regression functions that relate C inputs to crop yield including rhizodeposition (models 1 and 2) or published root:aboveground biomass ratios (model 3). Model 1, which was not calibrated to the site conditions, was successful in predicting the carbon dynamics in seven out of nine treatments, whereas for two treatments, EF indicated an unsuccessful prediction. The prediction of the C dynamics in NT experiments using model 1 was generally successful, but this may have been due to the fact that NT did not have a specific effect on SOC stocks for this trial. Model 2, which was the same as model 1 except for an optimization of the stock of inert organic matter using one treatment, predicted SOC stocks in the remaining eight treatments overall better than model 1. Model 3 was less successful than models 1 and 2 in all treatments. The results indicate that the RothC model may successfully predict C dynamics – for the site studied even without prior calibration as in model 1 –, but care should be taken in choosing an appropriate approach for estimating C inputs into the soil.