



Tropentag, September 16-18, 2015, Berlin, Germany

“Management of land use systems for enhanced food security:
conflicts, controversies and resolutions”

Parametrisation of a Simulation Model for Tropical Soils for the Development of Sustainable Nutrient Management Strategies

DENNIS MELZER¹, CLAAS NENDEL¹, WILSON MOZENA LEANDRO², ANGELIKA WURBS¹, MARCOS
ALBERTO LANA¹

¹*Leibniz Centre for Agricultural Landscape Research (ZALF), Institute of Landscape Systems Analysis,
Germany*

²*Federal University of Goiás, Dept. of Agronomy, Brazil*

Abstract

Simulation models are a key instrument for the development of sustainable agricultural management strategies. However, the majority of the existing crop models were designed and parameterised for soils of temperate regions. Consequently the soil simulation routines, embedded in the crop models, are not able to correctly mimic the processes that occur in tropical agroecosystems. In order to obtain a high accuracy of the simulations, the models require a precise parameterisation of the particular conditions. Therefore, an observation of field data is essential.

In the course of the German-Brazilian joint project PURESBio (BMBF, start 09/2014) the agroecosystem model MONICA will be parameterised for tropical soils of the Cerrado region in Central Brazil. To obtain the required data for parameterisation (coefficients for decomposition, mineralisation and nitrification), a micro-lisimeter field experiment is established in Goiânia, Goiás, Brazil. Three different, typical soils of the Cerrado (Latosolo amarelo, Latosolo acrico, Neosolo) are incubated in soil columns on field level. On weekly bases the percolate will be collected and analysed for its NO_3^- and NH_4^+ content. Due to this, the carbon turnover and nitrogen dynamic of the soils can be described as a function of the soil type and local climate, further enabling the parameterisation of the model by inverse simulation. Thus, MONICA will be able to simulate the processes involved in the conduction of sustainable agronomic management strategies, focusing on the usage of residues of the Ethanol production process (vinasse and presscake), with higher precision. The overall objective is to increase and maintain adequate levels of soil organic matter and soil fertility of sugarcane fields in Central Brazil.

Keywords: Brazil, carbon turnover, decomposition, mineralisation, nitrogen dynamic, simulation models, soil organic matter, tropical soils