Tropentag, October 5-7, 2011, Bonn

"Development on the margin"

Horizontal Nutrient Flows and Balances in Irrigated Urban Gardens of Khartoum, Sudan

Sahar Babiker Abdalla, Jens Gebauer, Martina Predotova, Andreas Buerkert

University of Kassel, Organic Plant Production and Agroecosystems Research in the Tropics and Subtropics, Germany

Abstract

The role of urban and peri-urban agriculture (UPA) for the supply of fresh vegetables, fruits and meat for local markets is well-known. The periodically flooded Gerif soils on the River Nile banks in the core of Khartoum city harbour vegetable gardens that supply perishable leafy vegetables with a short life cycle. In an effort to assess their sustainability and possible negative environmental externalities we used a horizontal balance approach (total outputs minus inputs for N, P, K and C) to determine the nutrient use efficiency of four intensively cropped UPA gardens. Two of the gardens were located in downstream lowlands (L1 & L2) and the other two belonged to the upstream highlands (H1 & H2). Deposits of river sediments were estimated to contribute 752, 994, 389 and 189 kg N ha^{-1}, 5, 8, 2 and 1.1 kg P ha^{-1}, 7, 6.5, 4 and 1 kg K ha^{-1} and 6 943, 9 691, 2 760 and 1 116 kg C ha^{-1} for gardens L1, L2, H1 and H2, respectively. Taking into account management related fluxes, yielded positive horizontal balances for N and C and negative balances of P and K. These were estimated at 1 553, 1 508, 969 and 745 kg N ha^{-1} yr^{-1}, 19 410, 17 772, 9 949 and 3 201 kg C ha^{-1} yr^{-1}, -4, -29, -36 and -0.9 kg P ha^{-1} yr^{-1} and -8,055, -6,181, -4,886 and -450 kg K ha^{-1} yr^{-1} for garden L1, L2, H1 and H2, respectively. While the River Nile floods contribute significantly to soil fertility maintenance, the negative P and K balances call for a better integration of UPA gardening with livestock husbandry and the regular addition of animal manure in these cropping systems.

Keywords: Gerif soils, nutrient fluxes, sediment deposits, soil nutrient status

Contact Address: Andreas Buerkert, University of Kassel, Organic Plant Production and Agroecosystems Research in the Tropics and Subtropics, Steinstraße 19, 37213 Witzenhausen, Germany, e-mail: tropcrops@uni-kassel.de