

2<sup>nd</sup> World Congress and Expo on

# Recycling

July 25-27, 2016 Berlin, Germany

## Use of the SWB-Sci model for nitrogen management in sludge-amended land

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Process-based computer simulation models are often used as reasoning support tools to integrate the complex processes involved in the soil-plant-atmosphere system. The objectives of this study were to evaluate the performance of the SWB-Sci model as a reasoning support tool for sludge management in agricultural lands, and use the validated model to assess the long-term agronomic and environmental implications of water availability and crop intensity on sludge-amended land. The model was calibrated for the test crops, maize (*Zea mays* Pan6966) and oats (*Avena sativa* L.), using data collected during the 2004/05 growing season from irrigated plots at the East Rand Water Care Works, Gauteng, South Africa. Model validation was performed using independent data sets collected during the 2004/05 to 2007/08 growing seasons. The model was successfully calibrated for maize and oats as all the statistical parameters were within the prescribed ranges [index of agreement ( $d$ ) $>0.8$ ; relative mean absolute error (MAE%) $<20\%$ ; coefficient of determination ( $r^2$ ) $>0.8$ ]. The model predicted nitrate leaching and crop N uptake reasonably well ( $d>0.85$ , MAE% $\leq 14\%$ , and  $r^2>0.8$ ), with slight overestimation of TDM and GY N uptake by 11–57 and 4–48 kg ha<sup>-1</sup>, respectively. Long-term model simulations indicate that fixed sludge application rate recommendations generated from laboratory incubation studies may in the long-term result in spontaneous excessive nitrate leaching below the active root zone during high rainfall events, if recommendations do not consider N contribution from soil organic matter. Modelling also showed that leaving room for rain during each irrigation event may minimize the risk of nitrate leaching.

### Biography

Eyob Habte Tesfamariam has completed his PhD from University of Pretoria. He is an agricultural systems Modeler and a Lecturer of Soil Physics and Irrigation Management in the Department of Plant Production and Soil Sciences at the University of Pretoria. He has published more than 10 papers in reputed journals and has been serving as reviewer of various national and international journals of repute.

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