



Tropentag, September 17-19, 2013, Stuttgart-Hohenheim  
“Agricultural development within the rural-urban continuum”

## Nitrogen Availability during Decomposition of Wheat (*Triticum aestivum*) and Guar Crop Residues (*Cymopsis tetragonoloba*) in a Desert Soil

FATOOMA ALI MOHAME REZIG<sup>1</sup>, NAZAR OMER HASSAN SALIH<sup>2</sup>, MUBARAK ABDALLA<sup>3</sup>, ELSADIG ELHADI<sup>1</sup>, ALI AHMED HASSABO<sup>4</sup>

<sup>1</sup>National Center for Research, Desertification Research Institute, Sudan

<sup>2</sup>University of Al-Neelain, Dept. of Crop Production, Sudan

<sup>3</sup>University of Khartoum, Desertification and Desert Cultivation Studies Institute, Sudan

<sup>4</sup>West Kordofan University, Animal production, Sudan

### Abstract

A two year field experiment was conducted to evaluate the effects of crop residue applications on a desert soil and the potential decomposition rate using litterbag method. Net-N mineralisation at sowing of the 3<sup>rd</sup>, 4<sup>th</sup> and 5<sup>th</sup> crops was 19.2, 8.5 and 11.6 mg N kg<sup>-1</sup> soil, respectively. Accordingly, 54.5, 79.5 and 24.3 kg N ha<sup>-1</sup> was made available in the 0-20 and 20-40 cm soil layers. Mineral N measured immediately before sowing subsequent crops was significantly higher in the plots with crop residues that were supported with inorganic fertilisers. Mass loss and nutrients released from wheat residue followed the exponential model from which decay rate constants (k) and half-life (T0.5) were calculated. The T0.5 values were in the following order: fertiliser with crop residues (6.7 weeks) < sewage sludge (8.0 weeks) < crop residues alone (9.6 weeks) < control (11.91 weeks). The remaining dry matter followed the same order: control (73.3%) > crop residues only (66.5%) > sewage sludge (59.9%) > combined crop residues with inorganic fertiliser (53.9%). A 50% loss of residue N was found after 8.88 weeks in the control treatment and 5.04 weeks in the combined application of crop residues and fertiliser treatment. Generally, nutrients released were in the order of Mg > K = N > Ca > P. Our results indicated that, in dry tropics, managing crop residues after harvest is a useful practice in sustaining soil quality.

**Keywords:** Inorganic fertilisers, mass loss, organic residues, sewage sludge