



Tropentag, September 18-21, 2016, Vienna, Austria

“Solidarity in a competing world —
fair use of resources”

Effect of Mineral and Organic Fertilisers on Maize Productivity in an Inland Valley in Uganda

SIMON ALIBU¹, DANIEL NEUHOFF², KALIMUTHU SETHILKUMAR³, MATHIAS BECKER⁴, ULRICH
KÖPKE²

¹National Agricultural Research Organisation (NARO), National Crops Resources Research Institute (NaCRRI), Uganda

²University of Bonn, Inst. of Organic Agriculture, Germany

³Africa Rice Center (AfricaRice), East and Southern Africa, Tanzania

⁴University of Bonn, Inst. Crop Sci. and Res. Conserv. (INRES) - Plant Nutrition, Germany

Abstract

We carried out field experiments in three hydrological zones along the gradient of an inland valley in Namulonge, Uganda to compare the effects of organic and mineral nitrogen fertilisers on productivity of maize (Longe-10 Hybrid). The maize was sown in December 2014 and 2015 (after the long rainy season) at a plant spacing of 0.45 m by 0.45 m. Two organic N rates equivalent to 60 and 120 kg (N) ha⁻¹ season⁻¹ using chicken manure and green manure were tested in comparison to equivalent mineral N rates and an N-free control. Plots were arranged in a randomised complete block design with four replications. Maize grain yield, total biomass at physiological maturity and harvest index were measured, and subjected to ANOVA. Total biomass averaged for all treatments in the first season was highest (10.42 t ha⁻¹) in the centre and lowest (4.80 t ha⁻¹) in the fringe zone, while the mid-slope zone produced 5.80 t ha⁻¹. Correspondingly, grain yields were significantly higher in the centre (4.86 t ha⁻¹) than in the middle (2.30 t ha⁻¹) and fringe (1.47 t ha⁻¹). Likewise, maize in the centre had a significantly higher harvest index than in the fringe and middle zones. In contrast, grain yield response of maize to mineral N fertilisation was low in the centre, with a maximum 22% increase compared with the standard reference. No clear response to mineral nitrogen was found in the fringe zone. Application of green manure (*Sesbania rostrata*) only tended to increase grain yield in the middle zone, while chicken manure did not affect grain yield. These results suggest that the greatest potential for maize production in the dry season lies in the centre zone of inland valleys, albeit with low resource use efficiency of intensive production systems.

Keywords: Chicken manure, green manure, hydrological zone, wetlands