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Increasing Crop Productivity in Rainfed Rice Systems of Central Uganda

SUSANNE ZIEGLER¹, DANIEL NEUHOFF¹, KALIMUTHU SENTHILKUMAR², MAUREEN NAMUGALU³,
KRISTINA GROTELÜSCHEN⁴, BJÖRN GLASNER⁵, MATHIAS BECKER⁴, ULRICH KÖPKE¹

¹*University of Bonn, Inst. of Organic Agriculture, Germany*

²*Africa Rice Center (AfricaRice), Tanzania*

³*Makerere University, Faculty of Agronomy, Uganda*

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

⁵*Johannes Gutenberg University, Geographical Institute, Germany*

Abstract

Smallholder farmers in Uganda generally obtain low rice yields. With increasing rice consumption and high (but volatile) local production is rapidly expanding. Aiming to improve crop management and maintain soil fertility, this study explores management strategies for rainfed rice production in valley swamps of Uganda. The research is embedded in a GLOBE Project, which assesses the potential of wetlands to contribute to food security while promoting a sustainable use.

Management practices compare single-season rice cropping applying common farmers' practice, with different improved management strategies (bunding, levelling and weeding), nutrient management (mineral vs. organic) and intensified rice double cropping. A randomised complete block design was repeated at three toposquence positions of an inland valley swamp for three consecutive seasons at Namulonge, Central Uganda. We assessed crop biomass accumulation, grain yield and nutrient uptake, as well as changes in soil attributes.

Simple soil and crop management practices such as field bunding and levelling, and increased frequency of weed control significantly increased grain yield from 1.8 to 3.1 t ha⁻¹ in 2015. Maximum attainable yields of 6.3 to 7.2 t ha⁻¹ were reached with full mineral NPK (120:60:60) application and the provision of supplementary irrigation. The application of chicken and green manure appear to be promising alternatives to mineral fertilisers, increasing average yields to 5.0 t/ha. The benefits of the suggested management options differed by hydrological position. In 2015, rice yielded less in the flood-prone centre positions. Response to applied mineral fertiliser was highest in the middle positions. Grain yields and response to organic amendments tended to be highest in fringe positions. In consequence, there is a need for site-specific management strategies, depending on the hydrological situation within the wetland.

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