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On-farm Evaluation of Yields and Yield Gaps of Rainfed Lowland Rice Using Good Agriculture Practices

Julius Kwesiga[1], Daniel Neuhoff[1], Kalimuthu Senthilkumar[2], Ulrich Köpke[1], Mathias Becker[3]

[1] *University of Bonn, Inst. of Organic Agriculture, Germany*
[2] *Africa Rice Center (AfricaRice), Tanzania*
[3] *University of Bonn, Inst. Crop Sci. and Res. Conserv. (INRES) - Plant Nutrition, Germany*

Abstract

Smallholder rice farmers in Tanzania often obtain yields of less than 2 t ha^{-1}. The vast majority of them use local varieties and no mineral fertiliser at all. We investigated whether good agriculture practices (GAP) could help to improve yields and reduce the yield gaps in farmer fields.

Field trials with cv. SARO5 were carried out in three hydrological zones (Fringe, Middle and Center) of the Kilombero flood plain in Ifakara in 2015 and 2016 using different GAP. Eight treatments with four replications were compared in a one RCB design including; i) farmers practice (no bunding and no fertiliser, one hand-weeding), ii) unfertilised control (bunding, leveling and weeding), iii) ii + 60 kg N ha^{-1}, iv) ii + 120:60:60 kg NPK ha^{-1}, v) ii + pre-rice green manure (*Lablab purpureus*), vi) ii + farmyard manure (60 kg N ha^{-1}), vii) ii + post rice forage legume (*Stylosanthes guianensis*) and viii) vi + residues of post-rice *Vigna unguiculata*). Crop growth parameters and yield were assessed and data submitted to ANOVA.

Grain yields ranged between 2.1 and 10.7 t ha^{-1}. Significantly higher yields were recorded in 2015 compared with 2016 and in the fringe versus the middle zone. Plant height, tiller number and biomass at different rice growth stages were significantly increased by GAP, irrespective of the hydrological position. Simple bunding and levelling of the plots increased yields by 35 % compared to traditional farmers practice. Green manure application provided an additional 8 % yield benefit and the combination of FYM and cowpea added another 35 % of yield gain, however only in 2016. Application of urea and of NPK fertilisers resulted in the highest yield increase (40 and 53 %) compared with the unfertilised control. Thus, the site-specific adoption of different GAP components can contribute to reduce the rice yield gaps in the Kilombero floodplain.

Keywords: Farmyard manure, field bunding, floodplain, green manure, mineral fertiliser, SARO 5, Tanzania

Contact Address: Julius Kwesiga, University of Bonn, Inst. of Organic Agriculture, Bonn, Germany, e-mail: kwesigajulius@yahoo.com