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Potential of Agronomic Management Options on Rice Productivity in Valley Swamps of Uganda

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Abstract

With year-round water availability and relatively fertile soils, the so far largely unused wetlands of East Africa are expected to contribute substantially to regional food security in future. We comparatively evaluated different cropping systems (single rice vs. rice-maize rotations), different fertiliser strategies (mineral vs. organic) and crop and land management strategies (open vs. banded fields; weeding frequency and green manure crops) in a randomised complete block design for two seasons and three toposquence positions of an inland valley swamp at Namulonge, Central Uganda.

Both the crop production potential and the effectiveness of technical options are likely to vary with the position in the valley (fringe, mid-section, centre). We assessed biomass and yield parameters and nutrient uptake by rice. Performance parameters differed between toposquence positions and production systems. On average, farmer´s practice (unbanded field, one hand weeding and no mineral fertiliser applied) resulted in average grain yield of 3.1 t ha⁻¹. Clean-weeding combined with field bunds increased rice yields to 4.3 t ha⁻¹. Optimal crop management with high external inputs (N:P:K at 120:60:60 kg ha⁻¹) provided an attainable yield of up to 7.1 t ha⁻¹, which is about 75% of the potential yield for this region. Combined application of green and chicken manure provided an N input of 120 kg N ha⁻¹ and gave yields up to 5.4 t ha⁻¹. The application of green manure such as lablab corresponding to 60 kg N ha⁻¹ achieved higher aboveground biomass and grain yield compared with equal amounts of mineral fertiliser applied. Soil and crop nutrient analysis is still ongoing, however first results indicate that treatments with mineral fertiliser had a higher nutrient uptake in the first two month after transplanting than organic and non-fertilised plots. Regarding location in the valley, yield parameters indicated that rice can perform better in the fringe than in the centre and mid-section, possibly due to a high initial soil fertility.

The findings of our research reflect yield potential in the region and we will discuss the need for site-specific targeting of options, their extrapolation and implications for the regional food security.

Keywords: Green manure, *Oryza sativa*, yield gaps