

Roles for Herbaceous and Grain Legumes, Kraal Manure, and Inorganic Fertilizers for Soil Fertility Management in Eastern Uganda

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Abstract

Grain sorghum [*Sorghum bicolor* (L.) Moenich] is an important food crop in semi-arid areas of sub-Saharan Africa. Crop yields are generally low and declining partly due to low soil fertility. Therefore on-farm research was conducted on 108 farms at three locations over 3 years to evaluate alternative low-input strategies for soil fertility improvement in sorghum-based cropping systems. The strategies were use of herbaceous legumes in improved fallow, a grain legume in rotation with sorghum, use of cattle manure, and application of low levels of N and P fertilizers. *Mucuna* (*Mucuna pruriens*) on average produced 7 t ha⁻¹ of aboveground dry matter containing 160 kg N ha⁻¹. Application of 2.5 t ha⁻¹ of kraal manure and a combination of 30 kg N and 10 kg P ha⁻¹ both increased grain yield by a mean of 1.15 t ha⁻¹. A combination of 2.5 t ha⁻¹ manure with 30 kg N ha⁻¹ increased grain yield by 1.4 t ha⁻¹ above the farmer practice (1.1 t ha⁻¹ grain). The increase in sorghum grain yield in response to 30 kg N ha⁻¹, to a *Mucuna* fallow, and to a rotation with cowpea (*Vigna unguiculata*) was 1.0, 1.4, and 0.7 t ha⁻¹, respectively. These alternative strategies were found to be cost-effective in increasing sorghum yield in the predominantly smallholder agriculture where inorganic fertilizer is not used. Results of the study indicated that on-farm profitability and food security could be improved through integration of inorganic fertilizers, herbicides, manure, *Mucuna* fallow, and cowpea rotation into grain sorghum cropping systems.

Keywords: Herbaceous & Grain Legumes, Kraal Manure, Inorganic Fertilizers, Soil Fertility Management, Eastern Uganda

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