

Multi-Feed Biomass Gasifier Project: Promoting good human and environmental health and food production

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Abstract

Across Africa, a lot of people cook over open fires or with solid fuels. Cooking this way emits small particles and carbon monoxide, which can be harmful to women and children who spend a lot of time in the kitchens. The cookstoves are also inefficient and slow in cooking, which further increases deforestation and climate change. The agricultural soil in Africa is also increasingly losing fertility and becoming acidic due to continuous cropping. This study, conducted through a project funded by Agricultural Innovation MKTPlace, designed a multi-feed biomass gasifier (MFBG) cookstove, which has a dual function of cooking and producing biochar. The MFBG was tested for its thermal efficiency, cooking time and fuel consumption using the water boiling and kitchen performance tests protocols as recommended by the Global Alliance of Clean Cookstoves. The biochar produced from the gasifier was tested in maize and cabbage farms at three levels of application rates. The MFBG has an efficiency of 42.4% and reduces emissions by 80% as compared to open fire. Kitchen Performance tests revealed that the MFBG cooks banku in 11.5 minutes and rice in 18.5 minutes whilst the gyapa – the reference stove - cooks banku in 42 minutes and rice in 33 minutes. Field tests of biochar revealed that plots with biochar were less acidic and had higher organic carbons and exchangeable cations. This caused an increase in the yield of the cabbage and maize in plots that biochar was applied. Its strengths (project addresses a serious problem and simple device design) and opportunities (possible government investments,

international agency funding, products' commercialization, afforestation tool) were found to far outway its weakness and threats. We are now working in a next-steps proposal regarding biochar validation and MFBG improvement.

Keywords: MKTPace; Biomass Gasifier; Biochar; Cookstove; Fuel Use.