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Improved Food Security via On-Farm Wood Production and Consumption. Evidence from Subsistence Farmers in Tanzania

Johannes Michael Hafner[1], Götz Uckert[1], Frieder Graef[1], Harry Konrad Hoffmann[1], Stefan Sieber[1], Todd Rosenstock[2], Anthony Kimaro[3]

[1] *Leibniz Centre for Agricultural Landscape Research (ZALF), Sustainable Land Use in Developing Countries (SusLAND), Germany*

[2] *World Agroforestry (ICRAF), Land Health Decisions, Congo, The Democratic Republic*

[3] *World Agroforestry Centre (ICRAF), Tanzania Country Programme, Tanzania*

Abstract

Food security is a persistent challenge for many small-scale farmers in Tanzania. Fuelwood availability can affect food insecurity at household level by determining the amount of cooking that can be done and the degree meals can be cooked. Growing fuelwood (e.g. intercropping shrubs/ trees) and using on-farm fuels during cooking as well as the utilisation may therefore indirectly improve food security while having positive outcomes for forest degradation and soil erosion but also provide on-farm organic fertiliser.

We assessed the foliage production potential from intercropped shrubs of the species *Gliricidia sepium* with a spacing of 4 m by 4 m in a complete randomised block design. The tested intercropping systems were (1) maize and *G. sepium* and (2) maize, pigeonpea and *G. sepium*. In addition, we conducted a controlled cooking test to assess consumption patterns of on-farm fuels *G. sepium* and pigeon pea and compared it to the off-farm species (*Mimusops obtusifolia*) with regard to cooking time and firewood consumption per meal. In total 46 cooking tasks using traditional three-stone-fire stoves with the meal "rice and vegetables" were conducted.

We found that integrating agroforestry species on farm can increase available biomass and increase efficiency cooking time. Biomass production, after 3 years of establishment, for *G. sepium* was 7.1 tons ha^{-1} ha in year 4 and 5.6 tons ha^{-1} in year 5 under when intercropped with maize, respectively 5.0 tons ha^{-1} in year 4 and 4.1 tons ha^{-1} in year 5 under when intercropped with maize and pigeonpea. With regard to the cooking time, *G. sepium* (-24.7 %) and pigeon pea (-34.6 %) used significantly ($p < 0.05$) less time compared to the off-farm species to conduct the cooking task. The controlled cooking tested showed that less *G. sepium* (-20.1 %) and significantly less pigeonpea (-31.8 %) fuel was required for completing the cooking task.

The results show that *G. sepium* adds substantial amount of green manure towards the soil improving its properties. As shown, on-farm fuels enhance the amount of fuel at household level and might have knock-on effects such as better-quality diets, reduced greenhouse gas emissions during cooking as well as positive impacts on biodiversity and wildlife.

Keywords: Agroforestry, biodiversity, controlled cooking test, environmental degradation, intercropping

Contact Address: Johannes Michael Hafner, Leibniz Centre for Agricultural Landscape Research (ZALF), Sustainable Land Use in Developing Countries (SusLAND), Müncheberg, Germany, e-mail: johanneshafner@gmx.net