

## Introduction

Declining agricultural and natural resource (NR) productivity in sub Saharan Africa (SSA) call for concerted efforts in view of an increasing population, rising poverty levels, low technological innovations and adoption amidst inadequate institutional arrangements and structures for supporting sustainable natural resources management (NRM). This project aimed at promoting increased adoption of NRM technologies by establishing effective farmer-market value chains for honey (Tanzania), grain amaranth (Kenya) and ground nuts and banana (Uganda), and strengthening NRM governance institutions in selected areas of Kenya, Tanzania, Uganda (Figure 1).

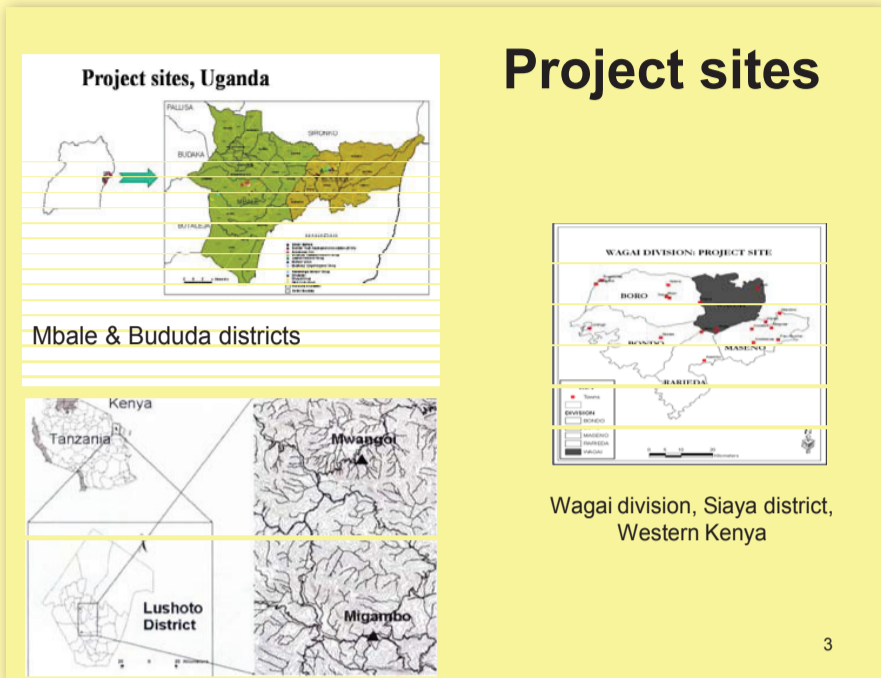


Figure 1. Location of project sites

Table 1. Summary of the technological interventions by the project

Country	Sites	Interventions
Tanzania	Usambara Mtn Lushoto district	<ul style="list-style-type: none"> <li>Better <b>honey</b> production using improved bee hives;</li> <li>Value addition (packaging)</li> <li>Rehabilitation of degraded water sources</li> </ul>
Kenya	Siaya district, Wagai division	<ul style="list-style-type: none"> <li>Improved <b>grain amaranth</b> growing using DAP, FYM, soil &amp; water conservation</li> <li>Value addition (post harvest handling, packaging, milling, different recipes)</li> </ul>
Uganda	Mbale and Bududa districts	<ul style="list-style-type: none"> <li>Improved <b>groundnut and banana</b> varieties &amp; production (erosion control, FYM, SSP)</li> <li>Gnut value addition (drying, sorting, packaging, various recipes)</li> <li>Banana value addition of banana (Table wine)</li> </ul>

### 1. Grain amaranth as an adaptation to Climate change

Grain amaranth (improved variety) is a comparatively profitable enterprise, coupled with Integrated Soil Fertility Management (FYM and DAP). Marginal returns were higher for grain amaranth compared to Maize (Figure 2). Being a short duration, low moisture requirement crop, Grain amaranth could therefore be better climate change adaptation option compared to maize! A grain amaranth threshing machine was developed to minimise post harvest losses (Figure 3), and exposed farmers to different options for milling, packaging plus making various recipes. Grain amaranth producers were linked to different marketing options.

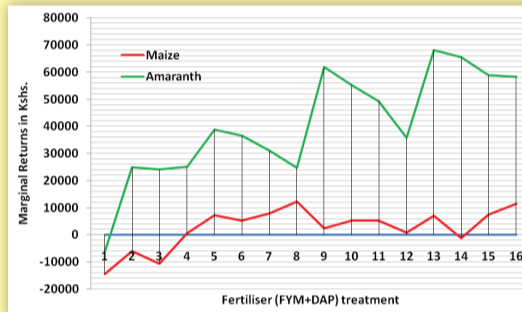


Figure 2. Marginal returns of Grain Amaranth compared to maize from the applied Soil Fertility treatments in Western Kenya, 2009-2010.



Figure 3. A Grain amaranth field and a threshing machine to minimize post harvest losses.

### 2. Groundnut product value chain

Despite its high demand, groundnut productivity is low, partly due to low soil P and rosette disease. The project introduced rosette-resistant varieties (serenut 2, 3 and 4) and demonstrated optimal use of single superphosphate (SSP). Groundnut response was observed up to 13.1 kg Pha<sup>-1</sup> (150 kg SSPha<sup>-1</sup>); however, highest Gross Margin (US\$ 47 ha<sup>-1</sup>) was realised at 4.4 kg Pha<sup>-1</sup> (50 kg SSPha<sup>-1</sup>) (Figure 4). The project introduced a curing rack for improved groundnut drying (hence better quality seed and viability), and trained farmers in processing of groundnuts into different recipes (butter (*odii*), SOSPPA flour) (Figure 5).

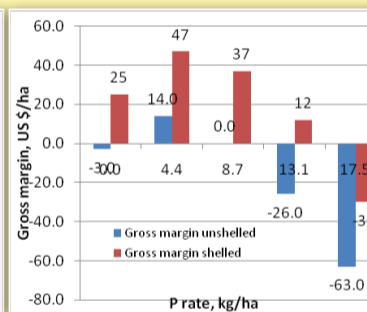
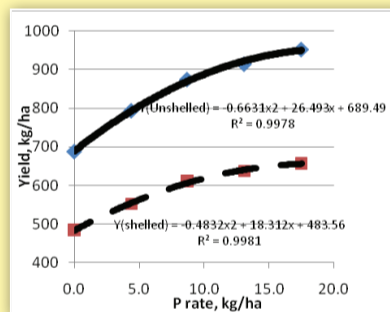


Figure 4. Response to and profitability of phosphorus use to groundnuts, Mbale, Uganda

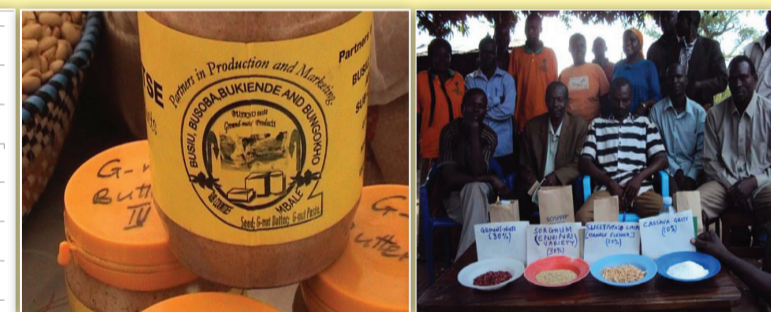


Figure 5. Groundnut paste (*odii*) made by project-supported farmers, and farmers trained in making nutritious SOSPPA porridge flour from groundnuts, Uganda.

### 3. Honey product value chain

The project introduced the SUA improved Top Bar bee hives with a provision for closing and opening the only hole on the hive. This provision enabled farmers to put hives on the farm and manage the bees at will (Figure 6). Hives were also put on degraded water sources and river banks, and used as 'police' to scare off the would-be degraders. Over a two-year period, this resulted in restoration of vegetation cover and biodiversity on previously degraded lands (Figure 7). Farmers were linked to honey dealers in bigger towns like Dar es Salaam, for better market access.



Figure 6. The SUA top bar beehive installed on-farm



Figure 7. Changes in vegetation cover following installation of bee-hives on a degraded river bank, Tanzania

### 4. Banana product value chain

The project trained farmers to undertake improved banana production using integrated soil fertility management (soil erosion control and use of farmyard manure) and value addition (processing of ripe Fhia bananas into Table wine, Figure 8). Partial budget analysis showed that the relative financial benefits from Fhia banana Table wine were 2-3 times higher than that from ripe unprocessed Fhia bananas.

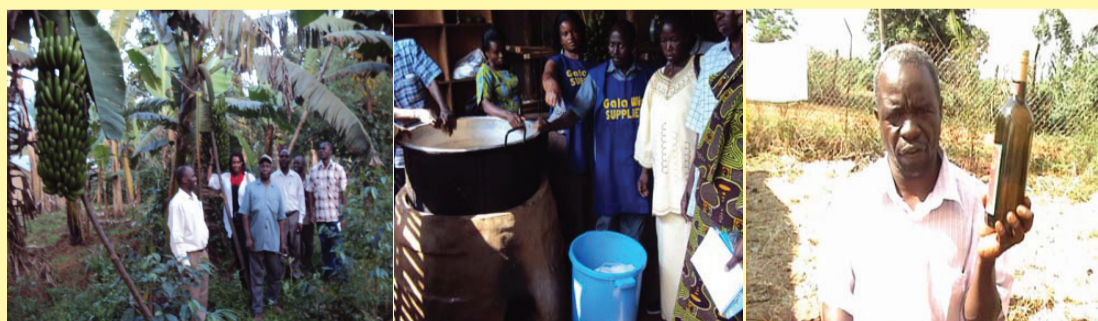


Figure 8. Training of farmers into processing of Fhia bananas into Table wine in Bududa district, Uganda.

Partial budget analysis of value addition: relative financial benefits from ripe Fhia bananas and homemade Fhia banana table wine in Bududa district, UG. Sept. 17, 2011

Change in parameters in Ug. Shs.	Fhia Bananas	Fhia Wine
<b>1. Credits</b>		
Output	13 kg, 30,000	26 bottles, 182,000
<b>2. Debits</b>		
Ripe bananas	1 kg, 2,000	
Passion fruits	4 fvt, 400	
Lemons	5.5, 13,200	
Sugar	0.5 kg, 750	
Soya bean (for soya milk)	4 tsp, 100	
Maize flour	0.25 tsp, 500	
Campden (sodium metabisulphite)	3 tsp, 1,500	
Yeast	21 L, 500	
Water	1 bal, 1,500	
Firewood	2 pd, 6,000	
Labour (preparations)	3 pd, 9,000	
Labour (packaging)	2 pd, 6,000	
Packaging materials	26 btl, 39,000	
<b>Total debits</b>		110,450
<b>Financial benefits (1-2)</b>	30,000	71,550

The net financial benefit from banana wine is 2 to 3 times higher than that from ripe unprocessed Fhia bananas.

### Best practices & lessons learnt

- Market-focused approach to production can have a positive impact on natural resource conservation.
- For small scale farmers to engage in conservation of natural resources, economic interest is vital.

- There is need to mobilise small scale farmers into groups, strengthen them and raise awareness on natural resource management issues.
- Value addition options are built over time and require a foot in the market to effectively tap emerging opportunities.

- Win-win conditions serve as incentives to value chain multi-actors.
- Many NR challenges require a collective effort involving different stakeholders in order to be addressed. Support of local leadership has been vital in this project.