

CHALLENGES AND PROSPECTS FOR PROCESSING AND UTILIZATION OF TRADITIONAL GRAINS IN UGANDA

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INTRODUCTION

Traditional grains such as sorghum, finger millet, and cowpeas are some of the major grain foods grown and consumed in Uganda. The respective output/input ratios of sorghum, finger millet and cowpeas are higher than those of maize and beans that are produced in higher quantities (Table 1), which makes the production of traditional grains more profitable. The high profitability can be partly attributed to grains' low production inputs and their ability to withstand semi-arid conditions.

In spite of the advantages associated with their production, sorghum, finger millet and cowpeas have received little attention in terms research and development funding. Most of the research on these grains has focused on increasing yield through breeding for high yielding and disease resistant varieties, improving soil management and agronomic practices (Tenywa et al., 1999). However, the strategy of increasing yields alone without addressing issues of post harvest losses, value addition and market access cannot fully harness the potential of agriculture in addressing development challenges in Africa. This paper therefore, is aimed at giving an insight into the challenges, prospects and possible areas of intervention for increased production and utilisation of the traditional grains namely sorghum, finger millet and cowpeas in Uganda.

Table 1. Annual production, consumption and profitability of selected grain foods in Uganda

Crop	Annual production (x10 ³ metric tons) ^a	Food consumption (%) ^b	Output/input ratio ^e
Maize	1,170	76.1	1.11 ^c
Rice	153	122	1.83 ^c
Sorghum	449	66.2	1.6 ^c
Finger millet	672	85.3	2.14 ^c
Beans	497	94.8	1.24 ^c
Cowpeas	71	-	2.36 ^d

^a UBOS (2006), ^b FAO (2007), ^c NAADS (2003), ^d NARO, (1999), ^e Ratio calculated for small scale farms using costs of all inputs per hectare, yield per hectare and farm price

UTILISATION OF TRADITIONAL GRAINS

Most of the traditional grains produced are consumed as food (Table 1). The grains are also sold to buyers who use them for different purposes. To farmers, the role of traditional grains as cash crops is increasing (Tenywa et al., 1999). Traditional products made from these grains include beers, thick porridges, gruels and a variety of sauces. These products are made at household level using technologies such as drying, malting, roasting, milling and fermentation. One of the popular fermented traditional products is *obushera*, a non-alcoholic gruel made from malted finger millet and/or sorghum. In rural areas, *obushera* is mainly produced for home consumption

(Muyanja et al., 2003); while in urban areas it is increasingly getting commercialized as refreshment (Kyamuhangire & Byaruhanga, 2002). The estimated gross profit from *obushera* is 100-200% depending on the formulation.

Concerning alcoholic fermentation, about 23.4 and 7.5% of sorghum and millet are used for brewing, respectively (FAO, 2007). The major brewing products are traditional opaque beers, which include, *ajon* made from finger millet; *omuramba* made from sorghum; and *kweete* made from maize flour and millet malt. On average, these beers contain 5–8% (v/v) alcohol and are a source of vitamins and minerals. Historically, traditional beers have cultural and social importance (Mwesigye & Okurut, 1995). Although these beers originate from different parts of the country, they are now widely produced and sold in urban areas. Recent technological innovations have enabled one of the leading breweries to use sorghum to produce lager beer. Production of the lager beer has benefited over 8,000 small scale farmers through contract production of sorghum (Inspiris, 2006). This is a clear indication that product development and value addition to traditional grains can increase their utilisation and improve incomes to small scale farmers.

Regarding milling, small millers using hammer mills of less 10 tons capacity constitute about 85% of millers in the country and handle over 50% of the total grain production. Such mills are distributed allover the country (RATES, 2003). Thus, on the market shelves, the commonest product forms from sorghum, finger millet and cowpeas are hammer milled whole grain flours, the dry grains themselves and to a lesser extent composite bread. Non-food uses include animal feeds.

THE TRADITIONAL GRAINS PRODUCTION AND SUPPLY CHAIN

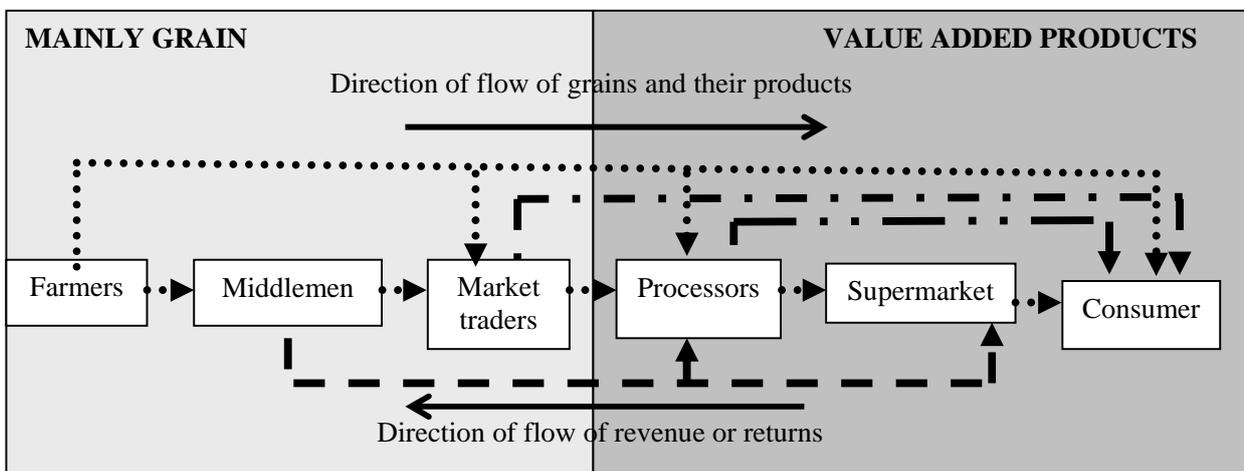


Figure 1. General schematic of the production and supply chain for sorghum, finger millet and cowpeas. Dashed arrows indicate the different paths through which the grains and their products move between players.

The production and supply chain for traditional grains can be generally divided into two areas, namely the grain and the value added products areas (Figure 1). The division is, however,

theoretical as there is no clear boundary between the two areas. The chain is composed of different players, mostly operating individually, with different roles and interests. It is also possible that sorghum, finger millet and cowpea value chains could have peculiarities when considered individually. The different grain paths may carry varying amounts of grain at different times, but the reasons for this are not well understood.

CHALLENGES AND PROSPECTS FOR THE UTILISATION OF TRADITIONAL GRAINS

Challenges

At the farm, major challenges include diseases, pre- and post-harvest pests, declining yields per hectare, lack of safe and appropriate storage, and labour saving technologies in weeding, harvesting and immediate post harvest processes (Tenywa et al., 1999). Regarding the middlemen and market traders, the major challenges include transportation and the lack of proper storage facilities as well as lack of accurate and timely market information. However, a lot remains unknown about the operations and decision making processes of middlemen and market traders dealing in traditional grains.

Well researched products such as *obushera* pose challenges of applying the research findings for commercialisation. Other traditional products with commercial potential are not researched. Markets for products such as flours made from traditional grains are underdeveloped. The grain quality parameters required by different processors are not established, while grain quality from farmers is inconsistent. Some grains e.g. finger millet may require appropriately developed equipment for post-harvest processes. Most processing equipments currently in use are inefficient leading to high operational costs through online losses, poor quality products and high energy consumption.

The policy environment also impacts on the utilisation of traditional grains e.g. the deregulation of trade in agricultural produce negatively affected agricultural productivity. Thus, although domestic markets appear to be working, there is inequitable distribution of revenue along the production and supply chain (Bakunda, 2005). The cost of packaging materials and technologies in Uganda are high, making it one of the major constraints to the development of the food industry in general. There is a general lack of vital market information and even when available, it is never passed on to where it most required in time.

Prospects

High prospects for increased utilisation of traditional grains lie in the development and industrialisation of traditional products such as beers and *obushera*. Regarding *obushera*, the process and the microorganisms involved in its production have been documented (Muyanja et al., 2003; Muyanja et al., 2002). Also, starter cultures for *obushera* production have been tested (Muyanja et al., 2001) and its shelf life can be increased from 2 days to over a month by pasteurisation (Byaruhanga & Ndifuna, 2002). Current work is aimed at further development of starter cultures, process optimisation and piloting the production of *obushera* for commercialisation.

Other prospect lie in creating markets for flours from traditional grains through developing value added products such as nutrient enhanced porridges, convenience foods and specialty products

e.g. gluten free bread. A variety of malt drinks, snacks and breakfast cereals can also be developed from these grains. Traditional grains also contain biopolymers that can be used to develop bioplastics for both food and non-food applications. For example, kafirin from sorghum has been used in the production of edible films and coatings that can be used in environment friendly packaging (Buffo et al., 1997; Da Silva & Taylor, 2005). Sorghum and millet can also be used in the production of ethanol for energy generation.

CONCLUSIONS

With increased utilisation, traditional grains have a high potential in improving farmers' livelihoods and contribute to economic development. This, however, requires a better understanding of the traditional grains production and supply chain to identify areas of intervention and opportunities for new viable enterprises. A number of traditional products made from traditional grains have commercial potential and should therefore be developed for industrialization. Innovative ways are required to engage the different players in the production and supply chain to work together for the common goal of developing the traditional grains into a vibrant industry.

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