

Reasons for extreme preference for locally grown foods in the communities

- *Nutritious, healthy and tasty*
- *Fresh and natural*
- *Have less or no chemicals*
- *Local foods are real food not artificial*
- *Eating habits are more culturally related/part of our social value*
- *Local foods are easily available and inexpensive*
- *We feel good about local foods/give us identity*
- *"However not easy to cook"*

Title: Tailoring Food Science and Technology to endogenous patterns of Food Supply – A case study in Northern Ghana

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Abstract

An on-going interdisciplinary PhD interdisciplinary research aimed at tailoring Food Science and Technology to endogenous patterns of Food Supply is being implemented in Ghana, India and Ecuador. The interdisciplinary team comprised of plant breeder, food technologist, nutritionist and social scientist who influence each other. The research hypothesis is that conventional technology practices, developed from the idea of global chains, are not necessarily appropriate for local food networks. Therefore there is the need to re-design or tailor applied sciences and technologies to the needs of these networks. This abstract presents preliminary findings from a network survey conducted by the interdisciplinary research team in Ghana aimed at bringing indigenous knowledge to bear on technology development and to demonstrate the significance of strengthening local food networks to enhance food sovereignty. A Stratified random sampling technique was used to provide appropriate representation of farmers, processors and consumers for one-on-one interviews as well as focus group discussions. Survey findings revealed that small scale farmers who sometimes find themselves on marginalized lands build resilience to food insecurity through local food sovereignty strategies and naturally shy away from varieties that rely heavily on external inputs. Using cowpea as a reference crop, the varietal needs of farmers and their social relevance were explored for breeding considerations. This will go a long way to improve rural livelihoods and their adaptive capacities to global environmental change hazards.

Introduction

Overview of theme - This study forms part of an interdisciplinary research program called Tailoring Food Sciences to Endogenous Patterns of Local Food Supply for Future Nutrition (TELFUN), consisting of plant breeders, food technologists, nutritionists and social scientists from Benin/Ghana, Ecuador and India with funding from Interdisciplinary Research and Education Fund (INREF). The central theme is enhancing Food Sovereignty through strengthening local food networks. The networks researched are the mungbean network in India, the cowpea network in West Africa, the lupine network in Ecuador. The West Africa team from Benin and Ghana conducted this survey with the aim of finding possible solutions to the problem of disconnection of Agriculture

from the local environment under the Tailoring Food Sciences to Endogenous Patterns of Local Food Supply for Future Nutrition (TELFUN) research project.

Food Sovereignty is a concept proposed by social movements (Via Capesina) for the governance of food and agriculture. The concept addresses pressing issues of hunger and poverty that has characterized rural economies over the years (Pretty and Koohafkan, 2002; Altieri, 2002 ; Desmarais, 2002, Windfuhr 2005; Rosset 2008). Food Sovereignty covers specific right issues like the right to nutritionally and culturally accepted food, productive resources, ecologically sound food production practices and access to markets especially local markets. In the debate not much attention is paid to possible contributions of Science and Technology to food Sovereignty, therefore this research.

Links to Ecosystem/Environmental change- By definition an ecosystem is a community of animals and plants interacting with one another and with their physical environment. Ecosystems include physical and chemical components, such as soils, water, and nutrients that support the organisms living within them. These organisms may range from large animals and plants to microscopic bacteria. Ecosystems also include the interactions among all organisms in a given habitat. People are part of ecosystems. The health and wellbeing of human populations depend upon the services provided by ecosystems and their components — organisms, soil, water, and nutrients. *Natural ecosystems produce services upon which we are dependent. For example, they:*

- *provide us with clean water and air*
- ***pollinate our crops and disperse seeds (current research interest)***
- *protect us from extreme weather and ultraviolet light*
- *control pests and disease-carrying organisms*

Tailoring research and development efforts to social needs, particularly in the area of Ecosystem Services, to effect social change has been a challenge in recent times. It has become imperative to work around the clock to use and maintain ecosystem services sustainably especially in order to build resilience to the effects of climatic change. This research is on Tailoring Food Science and Technology to endogenous patterns of Food Supply – A case study in Northern Ghana. The research hypothesis is that conventional technology practices, developed from the idea of global chains, are not necessarily appropriate for local food networks. Therefore there is the need to re-design or tailor applied sciences and technologies to the needs of these networks to enhance food sovereignty

The Problem - The identified research problem has been that conventional food security policies have failed to impact desired development especially in developing economics (UNDP 2005). These policies turn to benefit the wealthy more than the less well-off (Raynolds 2004; Windfuhr 2005). Conventional food policies have been described as “failed medicine”, supporting globalization and liberalization policies that intensify the structural causes of hunger and malnutrition. These policies have forced markets open to

dumping of agricultural produce, privatized communal and public natural resources and concentrated resources in the hands of a few giant corpora Agriculture has been separated from its natural environment therefore the need to reconnect research to social needs in local food networks to enhance food sovereignty. Food technologies development in industrialised food systems have also failed to generate desired food security in developing economies, apparently due to the neglect of societal and decision makers' participation in research agenda settings (Ruivenkamp 2003 and 2005). Concerns over disconnection of local production and consumption patterns were reechoed by over 700 representatives of civil society, including farmer, fisher folks, pastoralist, indigenous and women organizations in Rome at the forum for Food Sovereignty in June 2002.

Objective – Specifically, this paper investigates how farmers in marginalised areas build resilience to food insecurity, conservation of biodiversity and their varietal needs for breeding considerations.

Methodology

Methods

- Focus group discussions with an interview guide/checklist
- Semi-structured interviews with key Informants (e.g. local people who have adequate information on indigenous knowledge, traders, Ghana School Feeding Programme (GSFP) committee members, chiefs, community assembly members, etc, etc.)
- Questionnaire was designed for structured interviews with appropriate representation of target groups; farmers, consumers and processors.

Sampling technique and data collection

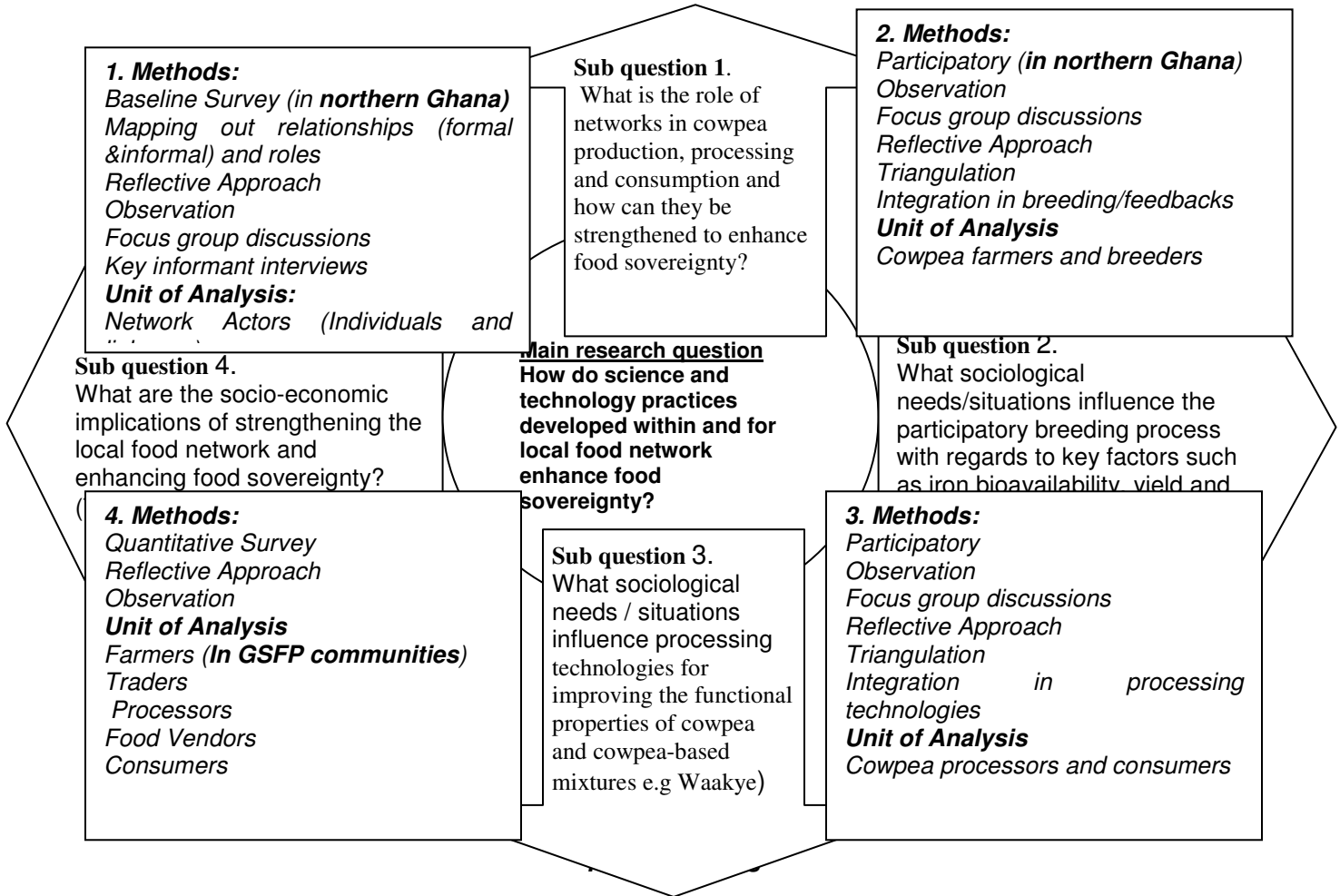
- a. **A snowball sampling technique** – This was used to locate key informants who have adequate knowledge about the cowpea network at both district and community levels; regarding production and consumption pattern, farming practices, varieties and community level networks in production, processing and consumption.
- b. **Stratified random sampling** - To provide appropriate representation of subgroups (farmers, processors and consumers) in the population. Actual Sample size was determined based on the population of selected communities and availability of resources. A total of 100 people were interviewed in *Tibung, Wantigu, Nyamkpala, Gbanlilugu* and *Kpaligu* all in *Tolon- Kumbugu* district

The conceptual framework underlying my research topic is based on the idea that food technology development should be socially determined with endogenous focus.

Analytical Frame Work

Hypothesis:

Local food networks can be strengthened to enhance food sovereignty by tailoring food science and technology to endogenous patterns of local food supply



*Food supply is internally generated instead of imports
 Agriculture is reconnected to the local Environment instead of foreign Environment
 Agricultural products are reconnected to local consumption patterns
 Food product regains its social significance, nutritive value and health
 Market is internally generated, jobs are created
 Local people (especially small-scale farmers and processors) regain their economic power*

Findings and Discussions

This paper focuses on how farmers in marginalised areas build resilience to food insecurity, conservation of biodiversity and farmers' varietal needs for breeding considerations from the social science perspective.

How farmers in marginalised areas build resilience to food insecurity

The large and expanding populations in developing countries derive their livelihoods from agriculture. They produce what they eat first, before considering what to market. Using cowpea farmers interviewed, major food crops grown include cereals (maize, rice, sorghum and millet), root and tubers (cassava, yam and potatoes), legumes (groundnut, cowpea, soyabean, pigeon pea and bambara beans), vegetables (Okro, tomatoes, pepper, onions, garden eggs, leafy vegetables) Fruits (cashew, mangoes, water melon, shea fruits. Farming was basically done at the subsistence level. The average farm size cultivated was less than 1 hectare except yam which recorded an average of 1.13 hectares per farmer.

Farmers in marginalised lands are vulnerable to climate change effects like unpredictable weather conditions, excessive drought, floods and soil infertility. Poor soil fertility and environmental degradation were some of the factors militating against agricultural productivity. To get around this problem, the survey findings established that farmers practise mixed cultivation and sometimes crop rotation to avert the impact of complete crop failure and improve soil fertility. Some also practice organic farming. For the cowpea farmers interviewed, the major role of cowpea in the local farming system is its nitrogen fixation ability for soil fertility improvement. This was reported by 46.5 percent of the farmers interviewed.

Cropping system adaptations strategies such as changing varieties and planting times are practiced. From the survey, farmers also cope with the problem of food insecurity by cultivating early maturing varieties. In the case of cowpea, early maturing varieties are seen as gap-stop crop usually consumed during hunger and planting seasons. Quaye (2008) established that the northern region experiences 5 months of food inadequacy and the first most important way of obtaining food when stocks run out was to buy the same food staples consumed from the market if the household could afford. The next alternative was to obtain less preferred foods from the market if the most preferred foods were either not available or not affordable.

Food is rationed when households' food runs out. Frequency of food intake reduced from three to two while the portions/sizes of meals served reduced drastically. Sale of livestock to obtain money for household food purchases is predominant. Rearing of livestock is therefore crucial in building household resilience to food insecurity. In another study, Nyanteng and Asuming-Brepong (2003) reported that household strategies to sustain food security in Ghana include shifting to less expensive and less preferred foods, borrowing food or money to buy, purchasing food on credit, seeking assistance from friends and relatives and purchasing street food. Where the quantity falls short,

some households limit portion size at mealtimes, limit intake by adults for children to get enough, reduce the number of meals per day and skip whole days without eating.

Conservation of biodiversity and farmers' varietal needs for breeding considerations

Farmers' role in biodiversity conservation with respect to seed cannot be over emphasized. Farmers interviewed generally preferred using their own seeds. However seeds were also sourced from seed dealers. Farmers used their seeds from own farm when yields are good and from other farmers who preserve seeds for sale. Ash is used to preserve seeds. In the communities surveyed no community gene banks were identified but some individual farmers at the community level preserve seeds for sale as a means to conserve biodiversity and maintain cultural legacy of the community. Farmers are the custodians of indigenous knowledge relating to landraces and their interaction with the environment. There is therefore a strong collaboration between local farmer, researchers and extension agents of the Ministry of Food and Agriculture (MOFA) when it comes to crop improvement and participatory breeding. Local seed growers, who are custodians of genetic resources and indigenous farming related knowledge, play the information provision and management roles in participatory breeding programs.

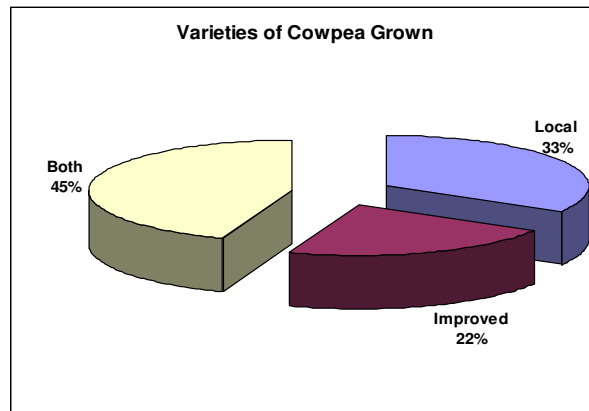
Autonomy in seed network is critical in building resilience to food insecurity (Smale *et al* 2009). The ever increasing cost implications with regards to access to seeds and other productive resources, farmers interviewed complained about over-reliance to the seed industry. This was more worrying with improved varieties which are also heavily dependent on chemical fertilizer inputs. Farmers were convinced that seeds can be produced locally as has been done over the years with local varieties. Farmers stressed the role of local varieties in food security; with local varieties one is assured of something though little but with improved varieties without spraying and good weather condition there is no hope. In terms of cost, a farmer spends \$15/acre on improved seed as compared to \$3/acre for local seed. Cost of spraying in the case of cultivating improved variety was approximately \$20/acre. It was reported that some farmers in the surveyed areas called the improved varieties names like 'Apaabala' meaning *how many wives you have* in the local language. The improved varieties are high yielding and therefore the need for more hands to harvest. Another local name is 'Gumpawee' which means eat and become weak apparently due to improper agrochemical application.

Varieties of cowpea, characteristics, and their maturity as well as potential yields are presented below. Varietal difference in cowpea is commonly identified by the seed colour. Sanze is the local name of cowpea and therefore the colour of the seed is added to differentiate the various varieties in the local dialect.

Cowpea Varieties and their Characteristics

Varieties	Type	Characteristics	Potential yield(MT /Ha)	Local Knowledge
<i>Akpaagbala</i>	Improved	Erect, white seed coat	1.8	Have many wives due to high labour demand
<i>Vallenga</i>	Improved	Red Seed Colour	2.0	
<i>Nandanbaaya</i>	Improved			Good for the poor man
<i>Bengpla</i>	Improved	Erect, White Seed colour Not easy to boil	1.5	-
<i>Marfo-Tuya</i>	Improved	Erect, White Seed colour	2.0	-
<i>Sanze zee</i>	Local	Red seed colour	0.3	-
<i>Sanze sabli</i>	Local	Black seed colour	-do-	-
<i>Sanze -peli</i>	Local	White seed colour	-do-	-
<i>Tuya</i>	Local	late maturing – variety	-do-	-

* Erect, high yielding, not tolerant to insects and low storability



Farmers who cultivated local varieties explained that they have low cost implications. Local varieties are insect tolerant, no need for chemical application and most importantly the leaves can be consumed. Local varieties are liked for the unique taste when used in preparing local dishes. Cultivation of improved cowpea varieties was motivated by their high yielding characteristics and high market value. Prices for local cowpea varieties were low and some

Varieties of cowpea grown by respondents

farmers were discouraged from producing them. Disadvantages associated with the improved varieties are the high cost of agrochemicals for spraying and difficulty in preserving seed for propagation. One therefore has to buy seeds for planting each year-over-reliance to the seed industry. Small scale farmers who sometimes find themselves on marginalized lands build resilience to food insecurity through local food sovereignty strategies and naturally shy away from varieties that rely heavily on external inputs.

One farmer commented- The one without fertilizer/chemical is very tasty. Local people like the black variety because of its short maturity period/early maturing and food security purposes. It provides food (fighting against hunger) when other crops are scarce.

From the survey, farmers are just not interested in improved varieties with high yields with equally high external input application but rather a balance between high yielding and tolerance to diseases and pests, self pollinating seeds that can be produced locally and varieties that also respond to local market preferences like seed colour, taste and cooking time.

Conclusions

A preliminary network survey was conducted in Northern Ghana, as part of a PhD work aimed at strengthening local food networks. The survey sought to investigate how farmers in marginalised areas build resilience to food insecurity, conservation of biodiversity and farmers' varietal needs for breeding considerations among other things. Survey finding revealed that small scale farmers who sometimes find themselves on marginalized lands build resilience to food insecurity through local food sovereignty strategies and naturally shy away from varieties that rely heavily on external inputs. Farmers produce what they eat first, before considering what to market. Farmers practise mixed cultivation to avert the impact of complete crop failure. They sometimes practice organic farming and crop rotation to improve soil fertility. Cropping system adaptations strategies such as changing varieties and planting times are practiced. Using cowpea as a reference crop, the varietal needs of farmers and their social relevance have been explored for breeding considerations in future research. A balance of high yielding and insect tolerance as well as self pollinating seeds that can be produced locally is what local farmers in marginalised lands need.

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