

# WEST AFRICAN SMALL GRANTS PROGRAM

## Synthesis Report on Technology Transfer and Commercialization Programme in Ghana

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Focal Unit Report by

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**OAU/STRC-SAFGRAD/CSIR Collaborative Program**  
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## 1.0 INTRODUCTION

In April, 1998 the Council for Scientific and Industrial Research (CSIR), Ghana and the Semi-Arid Food Grain Research and Development Agency (SAFGRAD) of the Scientific, Technical and Research Commission of the Organization of African Unity (OAU/STRC) signed a memorandum of understanding to promote the transfer and commercialization of agricultural technologies.

During the first meeting (30<sup>th</sup> and 31<sup>st</sup> May, 1998) of the Regional Technical Committee three projects were approved for implementation in Ghana. This was followed by the approval of two more projects during the committee's second meeting (12<sup>th</sup> and 13<sup>th</sup> May, 1999 held in Dakar, Senegal.

This report provides information on the implementation status of these five projects. It also provides information on various capacity building activities.

## 2.0 PROJECTS

### 2.1 CAPACITY BUILDING FOR PROCESSING OF AGRICULTURAL PRODUCTS

#### 2.1.1 Promotion of Appropriate Household and Small-Scale Soybean Utilization Technologies for Selected Rural Communities in Ghana

##### (a) Introduction

The project is being implemented through the Food Research Institute of the Council for Scientific and Industrial Research (CSIR) as the lead institute in collaboration with the Home Science Department of the University of Ghana, and the Crops Services Directorate of the Ministry of Food and Agriculture (MOFA). The general objective of the project is to develop and encourage the adoption of soybean utilization technologies appropriate for household and small-scale enterprises in order to stimulate soybean production, encourage small enterprise development, make available more utilization technologies, improve economic and social benefits to primary producers, processors and rural communities in Ghana. The project was conceived to extend the experiences obtained in earlier projects by a multidisciplinary team of researchers on promoting the production and utilization of soybean in rural communities.

##### (b) June – December 1998

##### (i) Activities

Activities undertaken within the first six months of implementation (June – December, 1998) were geared towards the achievement of the following specific objectives (i) to

document the status of soybean production, processing and utilization in Samsam Odumase and Mimpemihossem – two villages in the Greater Accra Region (ii) to determine the food consumption patterns and food preparation techniques in these two villages (iii) to train rural communities and extension personnel in soybean production, processing and utilization techniques.

## **(ii) Outputs**

Results from baseline studies undertaken towards the achievement of the first two objectives showed that there had been no attempts to cultivate soybeans by farmers in the two villages at any time. In terms of utilization, some of the inhabitants have some knowledge of the use of soybeans in soups and stews due to nutritional programmes of the staff of the Ministry of Food and Agriculture (MOFA) where the use of soybean in traditional diets has been demonstrated in the two villages.

The baseline studies further revealed that there were no legumes in their diets. Legumes such as cowpeas and groundnuts constitute a second major source of protein after fish in Ghana. Therefore observations on weight-for-age, height-for-age, and weight-for-age of young children up to five years showed that values obtained on these indicators were below the standards set by the World Health Organization (WHO). When these values were used as indicators of nutritional status of the two villages, the need for a nutritional intervention was established.

## **(C) January – June, 1999**

### **(i) Activities**

To meet this need, various soy recipes based on traditional staple foods, soy recipes for traditional stews and soups, and soy recipes for beverages were developed. Soy recipes developed based on traditional staple foods were *soy banku*, *soy kokonte*, *soy kenkey*, *soy abooloo*, *soy aprapansa*, *soy mpotompoto*, *soy koko* and *soy tom brown*. Those developed for soups and stews were *soy gravy*, *soy stew*, *soy gardens egg stew*, *soy palaver sauce*, *soy vegetable soup* and *soy beverage recipes*. Also developed were *soymilk* and *choco soymilk* soy beverage recipes.

Two major and six minor training sessions were held as part of efforts to promote these recipes. The minor training sessions involved mainly small groups of mothers at a time, while the major sessions were held for the whole village.

### **(ii) Outputs**

All recipes were found to have high sensory values for attributes of taste, aroma, mouthfeel, texture and appearance when they were for consumer acceptability. It was, however, observed that because of novelty, the soy beverages had slightly lower acceptability scores than recipes based on existing traditional foods. These high sensory

values for the recipes indicates the possibility of their being effectively promoted in the project villages.

101 adults were trained in household utilization of soybeans. 71% were women and 29% were men.

**(d) July – January, 2000**

**(i) Activities**

Two plots of land were acquired to serve as demonstration plots for training farmers in soybean production techniques. Farmers were then taken through planting in rows and correct spacing (i.e 60 to 70 cm wide and 5 cm between plants in a row). The importance of weed control in ensuring that optimum yields was stressed. Farmers were also taught to avoid delays in harvesting as over dried pods will shatter and the seeds will be scattered. Timing of harvesting was also stressed. Other aspects of soybean production taught were drying, threshing and storage.

**(ii) Outputs**

39 farmers were trained in soybean production techniques.

**(e) Technologies Transferred**

- Soybean processing
- Fortification of traditional diets
- Soybean production

**(f) Recommendations**

Micro-enterprise development in soybean processing should be promoted in the two villages.

**(g) Lessons Learnt**

- Adoption rate of new technologies will improve when built on existing practices or knowledge of local communities
- The promotion of any new crop into the farming system of any community should be preceded by an evaluation of sensory attributes of its products to determine its compatibility with their diets and consumer preferences

## **2.1.2 Appropriate Canning/bottling systems for Training Small-scale Food Processors in Ghana with particular reference to pepper sauce (shittor) Producers**

### **(a) Introduction**

The project aims at up-grading the technical and food processing skills of indigenous small-scale processors who produce pepper sauce (shittor), jams, fruit juices and honey through acquisition of appropriate canning/bottling equipment and setting it up for training and for pilot production using the idea of 'community canning centres'. These processors are members of the Glass Jar Users Association (GJUA) formed through support provided under the FIT Programme – a collaborative assistance programme between ILO and TOOL – Dutch NGO.

### **(b) 1998 - 2000**

#### **(i) Activities**

After some initial difficulties, the equipment for canning arrived from France in November, 1999. The group, the GJUA has since then been faced with how to get funds for the installation of the equipment. In the interim linkages have been established with the Institute of Industrial Research (IIR) of the CSIR. This linkage has resulted in the production of a positioning plan for the various equipment and a preliminary estimate of US \$ 3,600.00 made as the costs for their installation and acquisition or manufacture of some local equipment by the IIR. Members on their own have contributed US \$ 720.00 representing 20% of the funds needed. It is intended to borrow the difference in order to get the equipment installed as soon as possible.

#### **(ii) Outputs**

- Linkages established with IIR
- Positioning plan drawn

#### **Technologies to be transferred**

- Canning
- Sterilization

#### **Linkages to be established**

- Linkages to be established with Ghana Standards Board and Food Research Institute to analyse products for quality control
- Linkages to be established with farmers and fishermen for supply of raw materials (i.e. pepper, ginger, smoked-dried anchovies and shrimps)

### **2.1.3 Improving the Utilization and Commercialization of Soy Processing Technologies<sup>1</sup>**

#### **(a) Introduction**

Results of a survey showed that many small and micro agro processing enterprises lack adequate technical knowledge and expertise as well as control facilities resulting in products of low nutritional quality. They also lack appropriate equipment and efficient processing techniques.

Technologies, however, exist at the Food Research Institute (FRI) for overcoming these constraints. Small and micro enterprises (SMEs) do not have easy access to these technologies due to inadequate attention to the non-farm sector by technology transfer agencies.

This project was therefore started in 1999 under the Technology Transfer and Commercialization Programme to improve the utilization and commercialization of soybean processing technologies developed at the FRI.

Darkraby Enterprise is involved in the production of Soyflour, Soygari (a fortified cassava product) and Soymilk while Delabac produces Soyavita (a blend of soy, sorghum, maize and groundnut with vanillin flavouring), Soyalac (soy, cereal blends fortified with milk), Soyavita Plus (a soyavita product fortified with unripe plantain supposed to be an iron supplement) and soyflour.

#### **(b) October 1999 – March 2000**

##### **(i) Activities**

Several visits were paid to the premises of the two companies to appraise their operations and collect samples of products for analyses. The product quality of these products were evaluated by analysing their chemical composition, nutrient content, microbiological quality and sensory attributes. For chemical composition the samples (raw, intermediate and final products) were analysed for proximate composition and trypsin inhibitor activity, as an indication of inadequate processing. The infrastructural facilities were also assessed.

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<sup>1</sup> This project was originally approved as 'Processing and Marketing of Micro-Nutrient Enriched Soybean Flour and By-Products'. This name has been changed to the above as the soy products been produced needs to be perfected before any efforts are made to enrich them with micro-nutrients.

## (ii) Outputs

### **Darkruby Enterprise**

#### • **Products**

All the products had high protein contents and approximately low levels of anti-nutritional factors with regards to trypsin inhibitor activity. Soybeans used in the preparation of the soy products are known to contain trypsin inhibitor activities of 20 – 25 mg pure trypsin per gram sample. The processing techniques used by Darkruby however reduced this value to about 3 mg/g which represents a decrease of 88% trypsin inhibitor activity which is sufficient to achieve maximum Protein Efficiency Ratio in soy products.

Sensory evaluation of soymilk samples showed that Darkruby's soy milk was acceptable in terms of colour and consistency. The product however had a poor sensory score for taste which could affect its acceptability. This was because it had a beany aftertaste with some degree of bitterness detected.

Analysis of microbiological quality of the soy milk and the roasted flour showed that they are fairly high quality products with low total viable counts.

#### • **Infrastructural Facilities**

For efficient operation, it was assessed that Darkruby would need:

1. Building – to ensure that all operations are undertaken under one roof.
2. Mill
3. Milk press
4. Hot air drier

### **Delabac Ventures**

#### • **Products**

Products have high nutrient content due to good proportions of ingredients used and high fat contents. The high contents of fat indicate the need to take measures to improve the shelf life of the products.

Products also have relatively low total viable counts as well as mould and yeasts.

#### • **Infrastructural Facilities**

For efficient operations, it was assessed that Delabac would need the following facilities and equipment:

1. Building – so that all activities can be undertaken under one roof.

2. Roaster
3. Hot air dryer
4. Industrial hammer mill
5. Packaging and sealing equipment
6. Dry mix blender

(c) **April – July, 2000**

(i) **Activities**

#### **Darkrudy Enterprise**

Financial support provided to Darkrudy used to purchase

1. Mill
2. Milk Press
3. Strainer
4. Dehuller
5. Mechanical Roaster

The cold break technique used by Darkrudy to produce soymilk was changed after analysis by the FRI to the hot break technique.

(ii) **Outputs**

More people employed by Darkrudy. Before the purchase of equipment Darkrudy had seven temporary and three permanent workers. After the purchase of equipment, the enterprise now employs 12 permanent workers.

The purchase of equipment has also resulted in the processing of 15 kg of soybeans per day as against 7.5 kg which was being processed per day.

Analysis of samples taken after the change over from the cold break technique to the hot break for the production of soymilk resulted in the removal of the bitter, beany aftertaste which characterised the cold break technique.

#### **Delabac Ventures**

Unfortunately, this enterprise has been faced with the problem of finding appropriate accommodation ever since financial was provided.

(d) **Lessons Learnt**

- Adoption of improved and new technologies especially requires acquisition of new skills in addition to appropriate capital



- Agro-processors require regular tests of their products to ensure maintenance of excellent quality.
- Support to SMEs can generate employment.

## **2.2 IMPROVING FARMERS INCOME SMALL FARMERS GENERATING CAPABILITIES**

### **2.2.1 Increasing Vegetable Oil Seed Production and Processing in Northern Ghana**

#### **(a) Introduction**

Soybean production in Northern Ghana has been on the increase in recent times. Yields are, however, low due to the use of grains bought from markets as seed by farmers due to inadequate supply of improved seeds. Developing the crop is also hampered by lack of markets for farmers' produce.

To overcome these problems, the Savanna Agricultural Research Institute (SARI) in collaboration with the Ministry of Food and Agriculture (MOFA) and Bosbel Oil Mills established the project titled 'Increasing Vegetable Oilseed Production and Processing in Northern Ghana'.

The objectives of this project are to: supply farmers with improved varieties of groundnut and soybean seeds which have a high oil content; transfer the technology of growing these varieties to obtain yields close to the potential yields to farmers; guarantee farmers of a market for their produce by linking them to vegetable oil mills and guarantee the oil mills high quality raw materials in required amounts.

#### **(b) 1998**

##### **(i) Activities**

Community seed project activities of SARI and MOFA were expanded within six districts in the Northern Region of Ghana. Seed grower groups were assisted to acquire foundation seeds of soybeans, groundnuts and cowpeas which were cropped to an area of 41.6 ha.

Other forms of assistance were:

- Preparation of 54 hectares of land and acquisition of seed for the production of soybean grains by 122 farmers for sale to Bosbel Vegetable Oil Mill.
- Technical advice to a group of 100 farmers involved in a nucleus farmer/outgrower (i.e. Tiyumtaba Farms) scheme in the Gushiegu-Karaga district.

**(ii) Outputs**

- 3.5, 5.4 and 0.8 tonnes of certified cowpea, soybean and groundnut seeds produced
- Tiyumtaba Farms produced 22 tonnes of soybeans
- 122 farmers in other districts produced 2.9 tonnes
- Linkages were established between a research institute (SARI), a technology transfer agency (MOFA), farmers and an industry (Bosbel).

**(c) 1999**

**(i) Activities**

Similar forms of assistance were provided to farmers as in 1998.

Number of farmers increased from 100 to 309 under the nucleus farmer/outgrower scheme at Tiyumtaba farms.

**(ii) Outputs**

- Tiyumtaba Farms produced 93 tonnes of soybean
- 20 farmers at Jimili produced 4.5 tonnes
- Tiyumtaba Farms sold produce to Raktia Holding International through arrangements with Catholic Relief Services (an NGO)
- Linkages established with Bosbel Oil Mill broke down
- New linkages established with Catholic Relief Services.

**• Technology Transferred**

Improved seeds of soybean, groundnut and cowpeas  
Pest control practices.

**Lessons Learnt**

- Nucleus farmer/outgrower scheme can be used to improve the transfer and commercialization of technologies
- Nucleus farmer/outgrower scheme can help small-scale farmers improve their access to inputs and markets for their produce.
- Finding markets for the products of small scale can be a complex undertaking.

**2.2.2 Improving the Income Generating Ability of Women Groups In Small Ruminant Production**

**(a) Introduction**

Small ruminants (sheep and goats) serve as a source of protein in the diet of most Ghanaians and also serve as a ready source of income to the farm family. They are owned

mainly by subsistent rural households and generally managed by women and children. Productivity is low due to high mortality, poor management and inadequate nutrition.

This project therefore aims at providing strategies in the form of tested husbandry and veterinary packages that are cost effective for the development of small ruminants in the traditional smallholder production system.

**(b) February – April, 2000**

**(i) Activities**

With the assistance of the District Director of Agriculture, three villages were selected in the Dangbe West District for implementation of the project. Diagnostic surveys were carried out to assess the production and productivity of small ruminants in these three villages Sota, Minya and Babi. The focus was on women groups.

**(ii) Outputs**

- All women in three villages combine crop and livestock rearing.
- All animals are left to graze and browse continuously. Improper housing
- Veterinary care is minimal
- Dry season feeding is a problem.
- Water is also problem in the dry season
- 20% of animals sampled were found to have signs of mange, diarrhoea and eye disorders.

**(b) May – July, 2000**

**(i) Activities**

Meetings were held with women groups in the three villages. Interventions in the form of simple improved housing and feed gardens were discussed and introduced to them. They were told that this would help them to improve the management of their ruminants so as to increase productivity.

**(ii) Outputs**

Improved housing technology being adopted at a very fast rate in all three villages.

- **Minya**

13 improved houses under construction.

5 have been roofed

Feed garden planted with Gliricidia and Leucaena have been established.

- **Babi**

13 improved houses under construction  
Four have been roofed  
7 back yard feed gardens established.

- **Sota**

11 improved houses under construction  
Feed garden established and planted with Gliricidia.

### **Technologies Transferred**

Improved housing for small ruminants.  
Feed gardens.

### **Lessons Learnt**

- Rate of adoption of technologies will improve if it meets a felt need.
- Improved or new technologies have higher chances of adoption when they are based on local materials
- Improved or new technologies have higher chances of success when they are compatible with local practices
- The fast rate of spread of this technology over this short period has also been facilitated by the use of women agents to reach women farmers.

## **3. CAPACITY BUILDING**

**1998**

Focal unit was established  
National Co-ordinator was appointed.

**1999**

### **Workshop**

Two day workshop held on the 20 and 21 April under the theme ' Transfer and of Agricultural Technologies: Prospects for Small and Micro-Enterprises Development in Ghana'. It was attended by 43 participants including Directors of Research Institutions, Heads/Representatives of Technology Transfer Agencies, Small Scale Entrepreneurs and Information Specialists.

## **Training**

Community seed producers were helped to produce quality seed of oil crops.  
122 farmers in Northern Region were assisted to produce soybeans with emphasis in the use of improved varieties and proper agronomic practices to produce quality raw material for vegetable oil mills.

101 adults (71 % women) were trained in household utilization of soybeans.  
39 farmers (36 % women) were trained in soybean production techniques in the Greater Accra Region.

## **Initiatives Taken**

Studies on the poultry industry related to feed requirements particularly to use locally grown crops to create demand for maize or sorghum.

Socio-economic impact of vegetable oil seed production and processing in Northern Ghana.

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