

## Improving the uptake of postharvest innovations by farmers: A Cameroon Experience

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### Abstract

The uptake of postharvest innovations by Cameroonian farmers is generally low. In an attempt to improve on the situation a new extension strategy was tested. Multiple participative activities were carried out with members of a rural organisation as a strategy to encourage them to adopt new cassava processing technologies that could improve on the product, "garri" (a fermented and roasted granular meal) and its marketing. The activities included a participative appraisal of the problems and constraints of their existing garri making practices, field visits to improved garri processing facilities elsewhere in the country, practical training on more efficient garri processing technologies and group discussions/decision on the most appropriate strategy that they could use to adopt the new techniques. The group discussions showed that the farmers were enthusiastic to adopt the techniques. The adoption strategy unanimously agreed upon was that of capital build-up through individual savings and gradual acquisition and introduction of the innovations into their existing garri processing system.

### Introduction

Despite the existence of a wide range of appropriate postharvest tools and methods developed by research (Olorunda *et al* 1980; Jeon and Halos 1991; IITA, 1995), most Cameroonian farmers continue to use traditional technologies which have been shown to be inefficient and involve a lot of drudgery (Numfor and Lyonga, 1987; Uehara, 1989; Nickel, 1989; Roger, 1995; Forje, 1995;). Although the reasons for lack of uptake are unclear, it is generally believed that they sometimes include the inappropriateness of the technologies in the first place, lack of credit facilities and/or poor extension services and techniques (Nickel, 1989; Rogers, 1995; Engels, 1995; GTZ, 1998; Massaquoi, 1999). Furthermore, postharvest technical innovations are often not readily available in remote villages to allow rural farmers to experience them before making any adoption decisions. (Van de Ban and Hawkins, 1996). This appears to be one of the major problems affecting the uptake of postharvest innovations by farmers, particularly those living in remote areas. This article describes a participative multiple-activity approach that was used as a strategy to encourage farmers of a rural organisation to adopt improved cassava processing technologies that could enhance their garri processing and marketing capacity.

### Material and methods

The work was carried out with members of rural farmer's organisation (union) made up of eleven different farmers' groups with a total membership of one hundred and thirty three men and women living in four villages. The Union's main objective is to cultivate cassava and process it into

garri for marketing. The members use mainly inefficient traditional techniques to process their crop. To enable the group members to experience and possibly adopt alternative improved and more efficient techniques, the following activities were organised and carried out with them. They included a diagnosis, field visit, training & demonstrations and group discussions.

**Diagnosis:** The objective of the diagnosis was to discover the opportunities and constraints of the existing garri processing system used by the farmers of the group. The researchers met each group separately in its village following a pre-plan. A semi-structured questionnaire, used as a checklist, was administered and participatory discussions were held with each group. The results of the diagnosis were analysed and in subsequent interventions emphasis was placed on the major constraints identified.

**Field visits:** The main objective of the field visits was to enable a select technical committee of the union to discover and learn about improved garri processing systems elsewhere in the country. A total of eleven persons (one from each group) was taken round to visit the food related installations in the country. A pre-visit meeting with the committee members was held during which the purpose of the visits was explained. Members were then assigned specific areas on which to collect detailed information during the tour. These included:

- (a) Raw materials and processing procedures.
- (b) Garri processing machinery,

equipment and tools.

- (c) Packaging materials, measure and labelling.
- (d) Quality control, classification of product and food laws and regulations.
- (e) Sources of equipment and packaging materials and other useful information.
- (f) All aspects of marketing.

The following food-related installations were visited:

- (a) A Rural Training Centre that produces small-scale processing equipment and operates an improved garri processing unit.
- (b) A medium-scale cassava processing facility funded by the United Nation Development Program and operated by a Women's Association.
- (c) A small-scale food processing equipment manufacturer.
- (d) A food packaging material manufacturer.
- (e) A Research-operated Postharvest Training and Demonstration Unit.
- (f) Several rural and urban markets where garri is sold.

After each stage of the visit, discussions were held with the group and all relevant information collected was recorded.

**Training:** The objective of the training session was to impart to the farmers of the union in particular and emphasise to the technical committee members in general, notions of improved garri processing techniques which if adopted could result in a more efficient and increased-income generating garri process.

The training consisted of theoretical lectures and participative practical demonstrations. Each operations in the garri processing was discussed pointing out the weaknesses of the traditional operation and the advantages of the improved alternative. Relationship between quality of raw materials, complete quality control of the process and final product quality and financial benefits was emphasised. A broad range of processing aids and equipment was presented through descriptions and visual aids. The practical session consisted of:

- (a) Construction of a simple improved but inexpensive roasting oven.
- (b) Demonstration of weighing, packaging and labelling of final product.
- (c) Observation and testing of garri types processed using different systems, noting advantages and disadvantages of each system of processing
- (d) Observation of various garri processing tools, equipment and machinery.

In order to allow for continued training of the union members by the select Technical Committee, after the end of the intervention, training materials and manuals on improved garri processing were handed over to the union.

**Group Discussions:** A general assembly of all the members of the organisation was held. During this meeting a report of the preceding activities was given by both the researchers and the technical committee members. Open discussions were held on whether the innovations experienced should be adopted and if so, what strategy to use.

## Results and Discussions

**Diagnosis:** The participatory diagnosis showed that the occupation of the groups included food crop farming, animal rearing, garri, processing and marketing. All groups were involved in cassava cultivation, garri processing and marketing. All the groups also had communal farms grown mainly with cassava. Communal farm sizes ranged from 1-4 hectares. Mostly traditional techniques were used in the cultivation of these farms and only the local varieties of cassava were grown. It is known that these local varieties yield below ten tons

of fresh storage roots per hectare as compared to improved research varieties which could yield up to 40 tons per hectare (Besong, 1989). Most of the farmers said they were not aware of the existence of the improved cassava varieties and more efficient cultural practices developed by research.

All the farmers reported using the traditional method of processing the crop into garri. In this technique, nearly all the operations are carried out manually using mainly family labour without pay. These operations include peeling, washing, grating, bagging, fermenting for two to three days, sieving and roasting. Hygienic conditions are generally not good. The final product has a short shelf life and it is not packaged before marketing. However all groups reported using a hired motorised grater, the only mechanised operation in the whole process (Table 1).

Some differences were observed in the operation carried out by the different groups. Some groups reported adding palm oil to the cassava pulp before fermentation. Others add the oil at the time of roasting the dewatered pulp while others reported adding part of the oil before fermentation and the rest during the roasting of the pulp. For the union to be able to market good and consistent garri, the operations carried out by the various groups must be improved upon and harmonised. This was suggested to the union during subsequent discussions.

It was also found that garri was processed by the various groups and delivered to the central union for marketing all year round. Delivery schedules per group

varied from weekly to monthly. The schedule and quantities of garri processed by each group varied from group to group with quantities ranging from two to ten basins (a basin of garri weighs about 30 Kg) of finished product per processing session. Each group delivered only part of the product to the union and sold the rest at the local market. It was suggested to the union that a processing and supply timetable, including quantities be worked out and given to each group. The groups also complained of late or non-payment of dues after the union had marketed the product. This constraint must be mutually addressed by the union and its members.

The only mechanised operation, the grating was also found by the Researchers to be unsatisfactory as the hired grating machine was hardly ever washed after use. Also the design of the machine was not hygienic. Cassava pulp left on the surface of the grating drum after use poses the danger of microbial contamination of subsequent fresh pulp. Furthermore, the grating drum is made of cast iron which eventually rusts and poses the danger of contaminating subsequent pulp. For an improved system, subsequent choice of processing equipment must take these constraints into consideration.

In order to get a clearer view of the situation, the union's environment was assessed by the researchers. Some issues of concern were discerned. Sanitation was found by the researchers to be a major concern as it was observed that not enough good quality water was available for the processing operations. Secondly, the member groups of the union were found to be based in four villages

**Table 1.** Reported use of traditional and improved labour saving devices by the eleven farmer groups in major gar processing operations

Operation	Traditional methods/ devices	Improved method/devices	Number using Traditional method/ devices	Number using improved method / devices	% using improved method / devices
Peeling	manual	peeling device	11	0	0
Washing	manual	washing machine	11	0	0
Grating	hand grater	motorised grater (stainless steel)	0	11	100
Mixing	manual	mixer	11	0	0
Bagging	manual	bagging device	11	0	0
Pressing	sticks	mechanical/hydraulic press	11	0	0
Sieving	cane sieve	metallic sieve	11	0	0
Frying	three stone fire stone	improved oven/fryer	11	0	0
Packing	basin	labelled bags	11	0	0
Transportation	head load	hand pushed trucks	11	0	0

separated by distances ranging from 5 to 10 kilometres. Any future attempt to set up a single centrally located processing unit, to be operated by members will be impractical. These issues were pointed out to the group during the general discussions.

None of the groups reported the need to improve on the existing processing techniques suggesting that they were unaware of the existence of improved processing systems. It was thought that exposing the groups to improved processing techniques and facilities will ignite their interest to acquire such systems and eventually improve on their processing efficiency and capacity - hence the field visits.

**Field Visit:** The first visit was to a Rural Training Centre. Here the team saw among others a cassava processing unit which consisted of a grating machine powered by water turbines, a screw press and improved roasting ovens. The visitor learned that the unit was owned and operated by a group of village women. The source of energy for operating the equipment was a water turbine. The unit, apart from processing the group's garri also provided services to the public for a fee. The improved ovens saved a lot of energy. The peels of cassava are processed into animal feed for additional income.

The next visit was to a UNDP sponsored women's garri factory. The processing line consisted of motorised grater, fermentation tanks, a screw press, a motorised sieve, improved roasting ovens and an electric sealing machine. The manager of the unit explained its working and answered questions from the committee members.

The next cassava processing unit had the following features:

- Quality control was practised
- The product was graded, weighed, packaged and labelled.
- The product was reported to be well dried so that it could keep for more than one year.
- Most of the operations were mechanised.
- The machinery was reported to be made of stainless steel. Although these equipment was said to be imported, they can also be manufactured locally.

The team next visited a machinery manufacturing workshop where various materials and the process of machine manufacture was observed. Information on the types of machines, capacities and costs was obtained. The next visit to a packaging materials manufacturer exposed the group to the wide range of materials available for packaging garri and other granular products. There included plastic, paper and synthetic bags. Electric sealing machines were also observed.

At the Research Training and Demonstration Centre, the members were exposed to a wide range of crop processing equipment and notions of the processing of good quality garri.

Finally the group gathered information on the marketing of garri in other areas other than their villages. Marketing channels and tactics and variation in price were observed in the various regions during the tour. As a whole, the field visits enabled the Technical Committee to see and learn about other garri processing systems other than traditional one which they are used to. The following issues were of particular importance and were noted by the team.

**Raw materials:** The various units visited used various varieties of cassava processing. The group was convinced that the use of a high yielding and good quality cassava was necessary.

**Machinery:** The Team realised that the use of labour-saving devices was good. Machinery parts coming into direct contact with food should be made of food grade materials. The different sources of energy to power these devices and costs were of interest to the group.

**Quality Control:** The group noted that products from units where quality control was practised were superior and agreed that the practice was desirable and necessary.

**By-products:** The group was convinced that extra income could be generated from the use of the by-products of garri processing instead of discarding them as practised by their groups.

**Re-drying of product:** Re-drying of the product to a low moisture content was observed in one factory. The product could thus be stored for over a year. This increased its market value.

On the whole, the visits exposed the technical team members to information that could enable the union formulate a new strategy for setting up a more efficient and more profitable garri processing system commensurate with their financial capacity and which will reduce drudgery, increase productivity and hence higher incomes.

**Training:** The training exposed members of the group to new skills of processing garri that were more efficient. They learnt to construct an improved oven, using local materials, methods that could result in a more stable product with a longer shelf life and the use of appliances that could reduce drudgery and improve sanitary practices. They noted differences in the final product resulting from the use of traditional and improved techniques.

**Group discussions:** During the general assembly of all the members of the union, it was unanimously agreed that the existing system of crop production, processing and marketing should be changed for the better. Members agreed to adopt the improved cassava varieties, improved processing equipment and methods and a modified marketing procedure. It was agreed that minimally equipped decentralised processing units would be set up (one for each group). The individual group members would provide the raw materials, labour and management. The finished product would be delivered to the union for reconditioning, packaging, storage and marketing. Profits, after cost reduction would be shared to the groups in proportion to garri supplied. The information acquired by the groups during the field visits and training would be integrated into these new processing units with product presentation and quality receiving high priority. A strategy of gradual introduction of the innovations into the existing garri process was unanimously adopted. Members agreed to start a saving scheme that would allow them to gradually acquire the new processing aids and methods. It remains to be seen to what extent this strategy will succeed.

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