International Journal of Agricultural Policy and Research Vol.2 (4), pp. 113-124, April 2014
Available online at http://www.journalissues.org/ijapr/

ISSN 2350-1561

Original Research Paper

Cassava processing among small-holder farmers in Cameroon: Opportunities and challenges

Accepted 3 March, 2014

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The study was conducted in three regions (Southwest and Littoral, South and Centre, West and Northwest) of Cameroon to document cassava processed products and to assess processing constraints among small-holder farmers. A total of twelve small-scale processing units and five marketer groups with six fabricators were contacted and interviewed. In addition, two operational and two non-operational medium-scale processing factories was visited. Key informant interviews and focused group discussions was conducted to collect information on their activities. Results indicate that 68.75% of women and 31.25% of men are involved in cassava processing and marketing activities with Bamenda recording (100%) in gari processing and Ebolowa (100%) in baton processing. The percentage score for all products is in the order; fufu (95.00%), chips (86.25%), gari (72.50%), baton (62.50%) and flour (18.75%) with cassava flour having the least score in the entire antenna; Ebolowa (10.71%), Douala (20:00%) and Bamenda (25.93%). Apart from baton (steamed fermented cassava paste wrapped and tied in leaves) that was reported processed among groups, other products were processed at individual and household levels. The profit margins of these processed products are small due to poor quality products, although labour investments are high compared with those of medium and large-scale processing factories. Market linkage needs strengthening among the stakeholders and national sensitization on cassava processing could help create awareness and get the attention of the government for policy drive.

Key words: Cameroon, cassava, indigenous foods, processing, smallholder farmers

INTRODUCTION

Cassava *(Manihot esculenta Crantz)* is a major staple cash crop. It fits well into smallholder farming systems, thriving across a wide range of ecological zones and available all year round (Nweke, 1998). Cassava is efficient in carbohydrate and about 70 million people are estimated to obtain more than 500 Kcal per day from cassava and more than 500 million people consume 100 Kcal per day (Kawano, 2003). Moreover, cassava is a perennial food crop, which produces roots that are harvested 8 - 12 months after planting and its leaves are used as complementary food source rich in protein (Nagib and Antonio, 2006). In countries where the commercialization of cassava has reached an advanced stage such as Thailand, Costa Rica and Brazil, technologies have been developed to make planting, harvesting and post-harvest processing more efficient and less time-consuming (Hillocks et al., 2001). The demand across Africa for cassava by-products such as cassava cake, high-quality cassava flour (HQCF), starch and glucose is expected to rise due to urbanization and global increases in grain prices (Markelova et al., 2009). These factors have convinced manufacturers of consumer and industrial products that cassava can be used

as a substitute for higher-priced raw materials, and this is an opportunity for small-holders that currently grow cassava only for home consumption and sale in local markets (Markelova et al., 2009). In Cameroon, cassava offers an affordable source of calories and contributes to household food security; as areas devoted to its cultivation was estimated at 204,548 hectares with an annual production of 2.3 million tons (PNDRT, 2005). While it is a key dietary staple, cassava has remained a subsistence crop because of its rapid spoilage after harvest, caused by an inadequate/irregular supply to feed the few processing facilities and inefficient processing methods for the market (Njukwe et al., 2012b). Cassava is mainly produced by small-holder farmers whose average cultivation area does not exceed one hectare. Such farms are usually established on marginal and sub-marginal lands, received low input of agricultural practices and often subjected to pest attack (Akinbade et al., 2010; Zundel et al., 2010; Njukwe et al., 2012a). Cassava is primarily produced for food because processing facilities are absent and its cultivation is dominated in areas with limited infrastructural development. Traditional processing methods of cassava are characterized by high cost and reduced quality, which prevents products of small-holders from entering local and/or regional markets (Markelova et al., 2009). Ultimately, the harvested cassava is sold at farm gate due to its bulky nature and short shelf life; causing major wastes during harvest periods (Sanni et al., 2010). Moreover, cassava producing areas in Cameroon often lack reliable post-harvest facilities and infrastructure such as roads, means of communication and input supply systems, while farmers are poorly organized. These post-harvest and market constraints hamper the development of cassava trade (Bakia et al., 1999).

However, the private sector and small-holder cassava farmers, the national program for roots and tubers development (PNDRT) of the ministry of agriculture and rural development are working with government to change these dynamics. They have been involved with research on varietal improvement, while NGOs have been instrumental in seed multiplication and distribution. There has been the dissemination of improved varieties in traditional areas, with varietal switching to the non-cassava drought-prone northern regions.

Other interventions to promote cassava production are capacity building in small-scale processing of cassava into flour and chips for sale to the milling industry and some food and livestock feed firms. This initiative is rapidly changing the role of cassava from a traditional fresh human food commodity to an efficient crop for agro-industrial processing (Essono et al., 2008). Together with the International Institute of Tropical Agriculture (IITA), these interventions, are helping to build cassava value chains and at the same time improve the income of small-holder farmers.

Nonetheless, small-holders' cassava processing in Cameroon is characterized by technical, financial, institutional and infrastructural setbacks which adversely affect the sector. Due to its rapid spoilage, inadequate transportation and few processing facilities, raising cassava as a commercial crop has not been feasible. This paper examines the challenges faced by small-holder's cassava processing in Cameroon and what needs to be done for the benefit of farmers. To achieve this, cassava marketers was visited. Information about cassava processing, quality of processed products and type of equipment was assessed and evaluated. Processing constraints among small-holder farmers was evaluated through participant observation, key informant interviews and focused group discussions.

MATERIALS AND METHOD

Study area

Cameroon is located on the west coast of Central Africa and covers an area of 475,400 square kilometres (183,695 square miles). The topography of Cameroon is varied, ranging from tropical rain forests in the south to mountainous highlands in some western central regions, and semi-arid savannah in the far north. The population was estimated at 15,421,937 in July 2000 and is growing at an annual rate of 2.47 percent (PNDRT, 2005). Cameroon has ten regions with distinct regional culture, religion as well as ethnic differences. The division of the country into British- and French-ruled League of Nations mandates after World War I created Anglophone and Francophone fractions. The English-speaking fraction consists of the Southwest and Northwest regions and derives its educational system and legal practices from England. The French-speaking fraction consists of the remaining eight regions and the French school system is used, and the legal system is based on the statutory law of continental Europe.

Cameroon has a diverse population comprising approximately 250 ethnic groups that form 5 regional/cultural groups. These are western highlanders (also called grass fielders), which include the Bamileke, Bamoun, and many smaller groups in the northwest; coastal tropical forest people, which include the Bassa, Douala, and many smaller groups in the southwest; southern tropical forest people, which include the Beti, Bulu, Fang, and Pygmies; the northern semi-arid regions and central highlands, which include the Fulani; and the Kirdi people of the northern desert and central highlands. In most areas, women are responsible for feeding their families. They grow staple food crops, while men clear the land and provide meat and oil as they grow the cash crops. Among the pastoral populations, men herd the livestock and women process dairy products.

And to aid this study, cassava processing small-holder farmers in three PNDRT regions (Southwest and Littoral, South and Centre, West and Northwest) of Cameroon

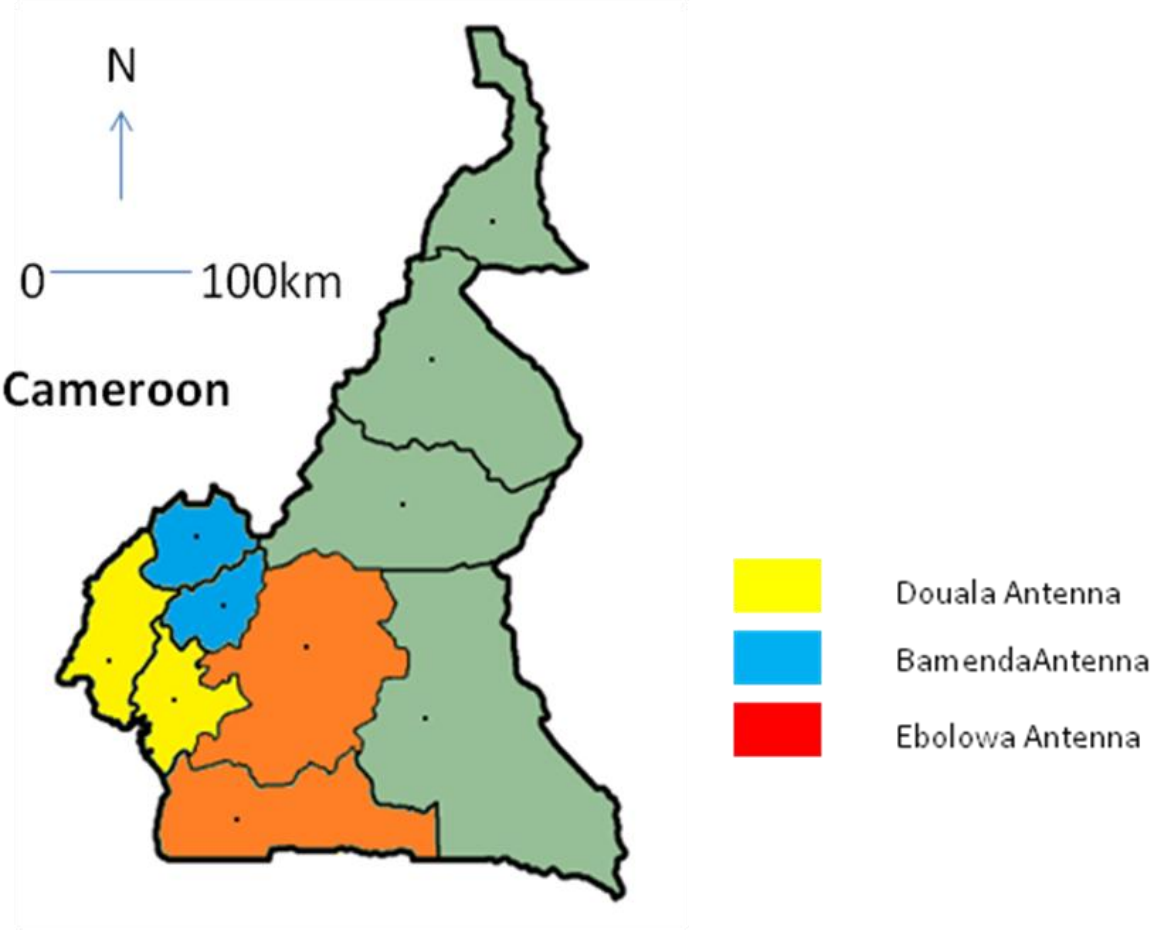

Figure 1: Provinces of Cameroon indicating Douala, Bamenda and Ebolowa antenna

were visited and interviewed.(Figure 1)

Bamenda antenna

This antenna covers the Northwest and West regions with head office in Bamenda. The relief constitute essentially of highlands between 1000 and 2300 masl but mountainous massifs and important craters do exist. The climate is of humid tropical type with two big seasons; an active relatively shorter dry season from November to February and the rainy season with high relative humidity. The soils are of ferralitic type with enrichment of the volcanic ashes that confer fertility on some villages. Because of high slopes and precipitation, soils undergo heavy erosion. The population of wild fauna is rare because of poaching. The demographic growth rate of the region is one of the most elevated of the country at around 3%. This rate is relatively more important in urban environment than in rural areas. Some farming localities present densities of high population between 450 and 700 habitants/km^2 and majority of the population (above 80%) practice agriculture. Agricultural system practiced is essentially subsistence with few surpluses for sale. Livestock production is common and well integrated in the production systems. Accessible road network favour coffee, cocoa, tea and other agricultural products of high economic value for domestic market and to the ports for export. The two regions are the main zone for the production of potato, and the strong associative dynamics is a major asset to generate funds. Numerous NGO exist in the region, micro finance institutions, banks and lead farmers who encourage the development of agriculture. Also present in the region are agricultural research stations, training centres and the University of Dschang with focus on Agriculture.

Douala antenna

This antenna covers the Littoral and Southwest regions with head office in Douala and occupies a surface area of 4.5 million hectares of which 282.000 million (or 6.3%) is cultivated. The land consists of volcanic soils from Mount Cameroon and sediments of rock origin along the coast of the Atlantic Ocean. The relief varies between the plain and the mountain while the altitude also varies from 0 to 4100

masl with four mountains; the Mount Cameroon (4100 m), the Mount Manengouba (2396 m), the Mount Koupé (2050 m) and the Rumpi hill (1885 m). The slope of Mount Cameroon is cultivated up to 1100 m because of its volcanic soil fertility. Other Mountains also have volcanic origin with fertile soil auspicious to a range of varied cultures serving as support to tropical dense forests. The climate is characterized by two seasons; a long season of rain from mid-March to mid-November and a dry season from mid-November to mid-March. The rainfall is high with an annual average of 3000 mm spread on about 150 days of rain. The area with the highest amount of rainfall (the second in the world) is 'Debunsha', with annual average of 5000 mm. The maximum and minimum temperatures are 38°c and 10°c respectively. The relative humidity is very high in rainy season and varies between 70% and 80%. The climate is hot due to the influence of hot currents coming from the Atlantic Ocean but the temperatures in areas of high altitudes of Buea, Bangem, Alou, Dikome Balue, Koupe and Manengouba are relatively cold. Soils of the Southwest region are volcanic and suit perennial as well as food crops but ferralitic and saline soils are also found in some locations. The Coastal region is an area of variable ecology with ferralitic, alluvian and organic hydromorphic soils in the precinct of Santchou (Mbo and Mama Plain). In general these soils are in majority of yellow ferralitic type; moderately fertile and acidic; pH (3.8 to 4.8) on metamorphic rocks (for most) or sedimentary (coastal zone), and developing aluminium toxicity in some places.

This antenna presents a very big ethnic diversity with classified and 'headless' societies. Apart from the city of Douala, the majority of the population lives in farming environment with the fundamental potential. As in 1997, Nkam has (8 habitants/Km^2), Sanaga Maritime (17 habitants/Km^2), Manyu (17 habitants/Km^2), Ndian (19 habitants/Km^2) and the precinct of Kribi (15 habitants/Km^2). Farmers, state cooperation and multinational companies are involved in the cultivation of coffee, cocoa, tea, palm oil, banana, rubber, for export and cassava, plantain, cocoyam and vegetables are cultivated for subsistence. Livestock raising is of traditional type and concentrate on small ruminants and poultry.

Ebolowa antenna

This antenna covers the South and Centre regions with head office in Ebolowa. It is a region with lot of swampy areas and predominated by forest and savanna in Mbam and Inoubou, Mbam and Kim, and Lékié divisions. Soils are in majority of ferralitic (firm land) and hydromorphic (shallow). It is a region with bimodal rainfall pattern that permits two cropping season per year and sub-equatorial climate of Guinea type with 2 rainy (a big season from mid-August to mid-November and a small season from mid-March to May) and 2 dry seasons (from November to mid-March and from June to mid-August). The mean annual rainfall is 1700 mm whereas the average temperature is 23°C with amplitude of 3°C. There are communication channels and good road infrastructural network that aid the supply of agricultural produce and products to the markets and cities. However, most roads linking villages in the region are not accessible in the rainy season and constitute a blockage for out-flow of perishable agricultural produce from the villages. About 70% of the population in this region lives in farming zone and 80% of the active population evolve in the primary sector where agriculture is the main activity. The main ethnic groups are; the Beti, Bassa, Bafia, Yambassa, Ngoumba, Batanga, and the Pygmy. The villages generally present the same structure; regrouping/clustering of dwellers along the road axes with cacao plantations behind the houses and food/vegetables cultivated further away from the homestead. The region is endowed with fertile soils and land that is not exploited. The current farming practice is shifting cultivation and slash-and-burn agriculture in mixed cropping systems for food crops. Plantain and melon are cultivated in association and in rotation with cassava and groundnut after fallow between 4 and 7 years. The topography of land makes the region ideal for the establishment of large-scale perennial production. The main perennial crops are; cacao, palm oil, rubber and coffee, while the main food crops are cassava, groundnut, melon, plantain, cocoyam and in some extent yam, sweet potato and maize in large-scale.

Cassava leave is consumed as vegetable and it constitute an important basis of nutritional balance (vitamins, mineral salts and proteins) in farming environment. Cacao cultivation is the main economic crop for export to big cities and border markets in Abang Minko and Kyé Ossi. About 15% of the active population is engaged in the economic sector due to its proximity with Gabon and Equatorial Guinea. The region is rich in natural resources and the population hunt in dry season, because it is the period without agricultural activities while fishing is practiced in the numerous rivers and streams across the region. The extensive system is livestock keeping within the homestead.

Data collection and analysis

A total of twelve small-scale processing units and five marketer groups with six fabricators were contacted and interviewed at various processing/marketing scales. This was to determine the types of cassava products, their quality and the persons directly involved in their production, and to evaluate the methods (including equipments) used in cassava processing, with the final aim of identifying constraints and opportunities for cassava processing**.** In this mission, both operational and non-operational processing units were identified and visited. The operational ones were assessed on their operational activities, successes and challenges while the non-

operational ones were interviewed on reasons behind their folding up.

The marketer groups (those selling cassava processed products), were randomly interviewed and their responses recorded. In each unit and location, date of establishment, number of members, sex, how they obtain raw material and products for sale, how efficient and profitable is the sector has been were asked. In addition, two operational and two non-operational medium-scale processing factories were visited and interviewed. Key informant interviews and focused group discussions were conducted to collect information on their activities. Physical assessment of the processing sites was also used to gather information and local equipment fabricators were visited to assess practices, competencies and possibility of empowerment. Questionnaire data were entered into Excel and subsequently converted to Statistical Package for Social Scientists SPSS 16th version (Carver and Nash, 2009) and analyzed using both Excel and SPSS. Interview notes were taken during the focus groups and key informant interviews. This was recorded and summarized on paper. Data were analyzed using descriptive statistics such as frequency distribution tables, percentages, means, figures and ratios.

Cassava processing opportunities in Cameroon

The role of cassava is rapidly changing from a traditional fresh human food commodity to an efficient crop for agro-industrial processing in Cameroon. It is increasingly gaining importance as a cash crop for smallholders and a boost of economic growth. Varietal improvement for higher yield and root dry matter content is bringing additional cash income to a great number of smallholder farmers. Although traditional cassava products continue to dominate domestic markets, the government of Cameroon through PNDRT is developing a competitive cassava commodity chains for reliable supply of processed products for food and non-food industrial use. This is being carried out through the upgrading and expansion of traditional processing techniques by providing widely accepted traditional products and developing high quality cassava flour (HQCF).

Over the years, IITA has adopted a value chain approach in research-for-development and has developed a variety of cassava processing techniques to broaden the range of products derived from cassava. These technologies are of great importance and help to ensure that farmers generate cash income from increased cassava production. In late 2012, the government of Cameroon released five improved cassava varieties from IITA help improve yield and income of small-holders.

Cassava processing challenges

One of the key constraints to cassava production is lack of mechanization or of appropriate production and processing tools. Smallholder cassava farmers in Cameroon are under pressure to increase production and fulfil consumer preferences with increasingly scarce natural and financial resources. Cassava is primarily produced for food, because, processing relies largely on family labour; due to absence of processing facilities and cultivation is dominated in areas with limited infrastructural development and difficulties to access markets. In areas where processing facilities do exist, it is limited to very few hands, with less efficient equipment, low product quality, and product diversification.

The perishability of the fresh cassava roots and high weight (due to about 70% moisture content) makes storage and transportation of the tubers difficult and expensive. It is therefore, desirable to process the tubers as close as possible to production areas immediately after harvesting. The drudgery associated with smallholders processing is enormous and the products from traditional processing methods are often contaminated with undesirable extraneous matter. Some of the products are therefore not hygienic and of poor market value. The competitiveness of processed products at the regional/international market is low because the crop is produced and processed for subsistence and not for commercial use and market opportunities are limited.

The existing capacity for manufacturing quality cassava processing equipment is limited. Manufacturers obtain prototypes from foreign manufacturers and fabricate them, which reduces the quality of some of the locally made equipment. On the other hand, manufacturers of quality equipment are few and reluctant to exchange manufacturing designs for fear of piracy and subsequent loss of market. To improve this sector, smallholders need labour-saving cassava production and processing technologies that optimize labour requirements during field and processing operations. Also it is essential for the government to promote indigenous foods.

RESULTS AND DISCUSSION

The groups and location visited are shown in Table 1 and cassava local products in Table 2. The twelve small-scale processing units and five marketer groups visited and interviewed were reported as a percentage of total respondents. Marketers of cassava processed products were randomly sampled and questioned. Results indicate that 68.75% of women and 31.25% of men are involved in cassava processing and marketing activities (Table 3). Bamenda antenna (N= 27) had 5.32% more women involvement above the total percentage (68.75), while Ebolowa (N= 28) and Douala antenna (N= 25) had 4.46% and 0.75% more men involvement respectively above the total percentage (31.25).

For processed products, both finished and intermediate which include chips, flour, fufu, gari, starch and other foods

Table 1. Group and location visited with observation

A. Processing units			
Antenna	**Association**	**Location**	**Observation**
Bamenda	Mbouda women group, Mbouda main and Bamenda food market	Mbouda	Operational with warehouse for Chips and Fufu to Gabon and Equatorial Guinea
	Bamendjin women association	Bamendjin	Operational with warehouse for Chips to Mbouda market
Douala	Bombe cooperative, Limbe and Muea main markets	Bombe	Operational with warehouse for Gari to Nigeria
	Pouma factory	Pouma	Non-operational, high capacity factory, lack raw material and rely on farmers, provide low price for cassava, poor organization, no incentives, high operation costs, centralized unit, ownership problem, low quality product, many products to handle and poor management.
	Food processing centre and Douala food market	Yoke/Muyuka	Non-operational, limited raw material, centralized unit, ownership problem and poor management.
Ebolowa	Catholic Mission processing unit and Yaounde food market	Nkeng-likock	Operational with warehouse for Baton to Prison and Schools, Fufu and Starch to Douala market.
	SOCAMAK Cooperative	Ngoumou	Non-operational due to closure of Mbalmayo Plywood company for chips and Ngoumou railway station for Baton.
B. Equipment fabricators			
Ebolowa	Ets DAMAS & DANY	Yaounde	University graduate with good technical Skills
	ESIFOM	Yaounde	Primary and vocational training
Douala	GIFAMA	Douala	Secondary and vocational training with good technical skills
	SELUNG	Douala	University graduate with good technical Skills
Bamenda	CEPAB	Bafoussam	University graduate with good technical Skills
	WINCO	Bamenda	Secondary and vocational training

like baton, mintumba, nkonda, are produced at small and medium scale. Products found in the market during the survey and reported as frequently sold are gari, baton, fufu, chips and flour. Figure 2 shows the percentages of these products per antenna with Bamenda recording (100%) in gari processing and Ebolowa (100%) in baton processing. It was observed that preferences for gari and baton differ in both antenna as Bamenda recorded (22.22%) in baton and Ebolowa (28.57%) for gari with Douala antenna recording (92%) in gari and (64%) in baton. Fufu was ranked second and almost equal in the three antenna; Bamenda (96.30%), Douala (88.00%) and Ebolowa (100%) indicating that fufu is common and consumed across the three antenna. (Table 4)

Chips was ranked third in the three antenna and had similar score to fufu; Bamenda (81.48%), Douala (84.00%) and Ebolowa (92.86%) probably because fufu is obtained from milled chips. Flour had the least score in Ebolowa (10.71%) and Douala (20:00%) while Bamenda antenna recorded (25.93%) which is still very low. The score in flour also varied in importance where cassava flour is used to substitute wheat flour for bread making. In general, percentage score for all products is in the order; fufu (95.00%), chips (86.25%), gari (72.50%), baton (62.50%) and flour (18.75%). (Table 5) and Figure 3.

It was also reported that at household level, production is characterized by small farm size and rely on family labour for processing, in order to meet family food requirements and generate incomes. Apart from baton that was processed among groups, other products were reported at individual and household levels. The profit margins of these processed products are small due to poor quality, although labour investments are high compared with those of medium and large-scale processing factories. Involvement of smallholders in association also varied with Bamenda antenna having (70.37%), followed by Ebolowa (48.00%) and lastly Douala (21.43%); indicating that smallholder farmers are more organized in Bamenda antenna.(Figure 4)

Smallholders' cassava processing in Cameroon is characterized by a number of drawbacks including technical, financial, institutional and infrastructural, which adversely affect the sector. In areas where processing facilities are available, product quality is low, packaging is poor, and marketing of the products is weak despite the fact that Cameroon exports huge quantities of cassava products

Table 2. Local Cassava products and Utilization

Product	Recipe	Utilization
Boiled cassava	Peel and wash fresh cassava roots and steam	Eaten with groundnut sauce, stew or vegetable. This is very common in the forest zone where cassava is eaten fresh. In the Anglophone regions, it is commonly eaten with stew/palm oil, plums or pear.
Gari	Peel and wash fresh cassava roots Grate the root into a mash Dewater the mash by pressing inside a clean bag Break the pressed mash into fine granules Sieve Add palm oil and fry in a metallic tray or oven to dry (yellow gari) For white gari, fry without adding palm oil Package in airtight container	Gari can be soaked instantly in cold water with or without sugar before eating or eaten with fried groundnut. It can also be cooked in hot water and eaten with stew, vegetable or groundnut sauce. Gari is very common among the Anglophones and it has high economic value, easy to store and transport.
Fufu	Peel roots and wash Soak in water (2 – 3 days) Remove from water, break in pieces and dry Store in airtight container at room temperature **Note:** For white fufu product, drying should be completed in one day.	Fufu is cassava flour cooked in hot water and eaten with groundnut or vegetable sauce. It is common in all the regions in Cameroon but predominate in Bertoua and Ngaoundere area.
Baton (also known as Bobolo, Myondo and Chikwangue)	Peel and wash fresh cassava roots Soak in warm water for 3 – 4 days to ferment (to facilitate fermentation, place container near the fire or cover with pawpaw leaves) Wash fermented product properly and put in a clean bag and press to dewater Sieve to remove lumps and fibers Grind to form a paste Wrap in leaf and boil	Product could be served with groundnut sauce, stew, groundnut and egusi pudding. This is very common in the forest zone where the leaf for wrapping is easily obtained. Baton is sold by the roadside with roasted fish and it has high economic value.
Cassava paste	Peel and wash fresh cassava roots Soak in warm water for 3 – 4 days to ferment (to facilitate fermentation, place container near the fire or cover with pawpaw leaves) Wash fermented product properly and put in a clean bag and press to dewater Sieve to remove lumps and fibers Grind to form a paste	Cassava paste is cooked in hot water and eaten with groundnut or vegetable sauce. It is common in all the regions in Cameroon but predominate among the Anglophones.

to neighbouring countries. It is evident that fabricators in Cameroon have good knowledge of equipment for oil palm processing with little knowledge on cassava machines and need capacity development. In addition, there is need for the establishment of cassava stakeholders' forum where needs of cassava enterprise can be addressed and expanded. Again it is essential to develop new products and equipment in order to reduce processing drudgery. Oluwemimo (2010) indicates that policy efforts should be geared towards accessing processors with locally fabricated

Table 2. continues

Starch	Peel and wash fresh cassava roots. Grate, or chip and grind smoothly. Mix with a lot of clean water. Filter through a fine mesh sieve or through muslin cloth. Allow the filtrate to settle. Decant the supernatant. Wash off the starch residue several times with water to get white, odourless, and tasteless starch. Put in a clean bag and press to dewater. Spread thinly on a tray and sundry. Mill the dried cake finely and sift if necessary. Package in airtight containers.	Starch is produced at a small-scale for commercial purpose and sold to clothe dry cleaners for hardening.
Flour	Peel roots and wash Soak in water (2 – 3 days) Remove from water, break in pieces, dry and mill	Cassava flour is produced at a small-scale for commercial purpose and sold to bakeries for bread making. It is common in the Anglophone regions.
Mintumba	Peel and wash fresh cassava roots. Soak in warm water for 3 – 4 days to ferment (to facilitate fermentation, place container near the fire or cover with pawpaw leaves). Wash fermented product properly and put in a clean bag and press to dewater. Sieve to remove lumps and fibers. Grind to form a paste. Salt to taste. Add palm oil to preference. Wrap in leaf and boil.	Product could be eaten directly or served with tea, sugar and chocolate. It is sold along Douala-Yaounde highway, has high economic value and common with the Bassa people.
Beignets de manioc (macalah banana)	Peel and wash fresh cassava roots. Grater the fresh roots. Sieve to eliminate fibre and stalk. Pound ripe banana or plantain and mix with sieved product. Add palm oil to give cream colour when fried. **Note:** The cassava / banana mixture should not be sticky when rolled for frying.	Fried product could be served with pepper sauce or taken with pap or tea.
Ndas	Peel and wash whole cassava root. Soak in fresh water for 3 – 4 days. Remove whole root. Wrap and boil.	Product could be served with sauce and preferred by the old because it is very easy to chew contrary to baton de manioc and common in the south region.

machines while policy, research and extension regarding food processing at the rural farm-gate should be tailored to meet the needs and constraints of women. Market linkage needs strengthening among the stakeholders and national sensitization on cassava processing could be a way to create awareness and get the attention of the government for policy drive. Cassava enhancement strategy should therefore be geared towards the goal of reducing cassava production costs and increasing the output of high quality products and also strengthen the capacity of smallholders. Developing infrastructure such as energy, water, roads and communications is essential so as to improve the competitiveness of emerging cassava-based factories and to attract investors, both local and foreign. Westby (2002)

Table 2. continues

Fresh couscous (Water foufou)	Peel and wash fresh cassava roots. Soak in warm water for 3 – 4 days to ferment (to facilitate fermentation, place container near the fire or cover with pawpaw leaves). Wash fermented product properly and put in a clean bag and press to dewater. Sieve to remove lumps and fibers. Grind to form a paste. Put product in a clean bag, put on some weight on tied bag or compress to drain water. **Note:** Product could be wrapped in poly bags and store in freezer for several weeks.	Product could be served with vegetable especially Eru or with sauce and common in the Anglophones regions.
Konda	Peel and wash fresh cassava roots Grater cassava roots Sieve product Mix product with groundnut paste Add salt, pepper, crayfish and palm oil Wrap in leaf and boil Allow to dry in a dryer or band	Product is eaten directly. It is served in a gathering or eaten when at work and common in the south region.
Beignets shuffle	Take 1Kg of cassava flour Add 3 table spoon of butter (margarine) Add 3 yolk of egg Add one sachet of baking powder Add fifteen cubes of sugar Mix with warm water to have a homogenous paste Fry with palm oil	Fried product could be served with pap or tea.
Cossettes (Chips)	Peel and wash fresh roots. Cut in small pieces. Soak for 24 hours. Remove and sundry or oven dry.	Chips are further processed into flour and fufu and has high economic value, easy to store and transport.
Medoume-mbong	Peel and wash fresh root. Cook slightly. Cut in small slices. Soak and wash after every 24 hours.	Eaten after 72 hours with coconut.
Alcohol	Peel and wash fresh roots. Put in a drum or cemented chamber. Cover with nitrogen fixing leaves for 3 days (absence of water). Transfer to a second drum for 3 days in water. Add some sugar and do not seal drum tightly. Make an outlet on the upper surface of the drum. Steam and collect condensed vapour after 6 days. Distilled product may have up to 95^{o} alcohol.	Local beer/spirit and common in the forest zone.
Mbom kwem	Harvest fresh cassava leaves. Pound. Boil with salt. Dewater by pressing inside a clean bag. Boil palm nut and extract oil. Mix leaf, palm oil, salt, magi, crayfish, groundnut paste, pepper, and bush spices to taste. Wrap and dry in oven.	Eaten with boiled cassava and common in the south region
Kwem sans sel	Harvest fresh cassava leaves. Pound to mash. Boil for 15 – 20 minutes. Boil palm nut to extract oil. Mix and boil. Add local spices and pepper to taste.	Product is served with boiled cassava or plantain and common in the forest zone.

Table 3. Gender and in percentage of respondents per antenna

Regions	PNDRT Antenna	Total	Females	Males	% Females	% Males
Northwest and West	Bamenda	27	20	07	74.07	25.93
Littoral and Southwest	Douala	25	17	08	68.00	32.00
South and Centre	Ebolowa	28	18	10	64.29	35.71
	All Antennas	80	55	25	68.75	31.25

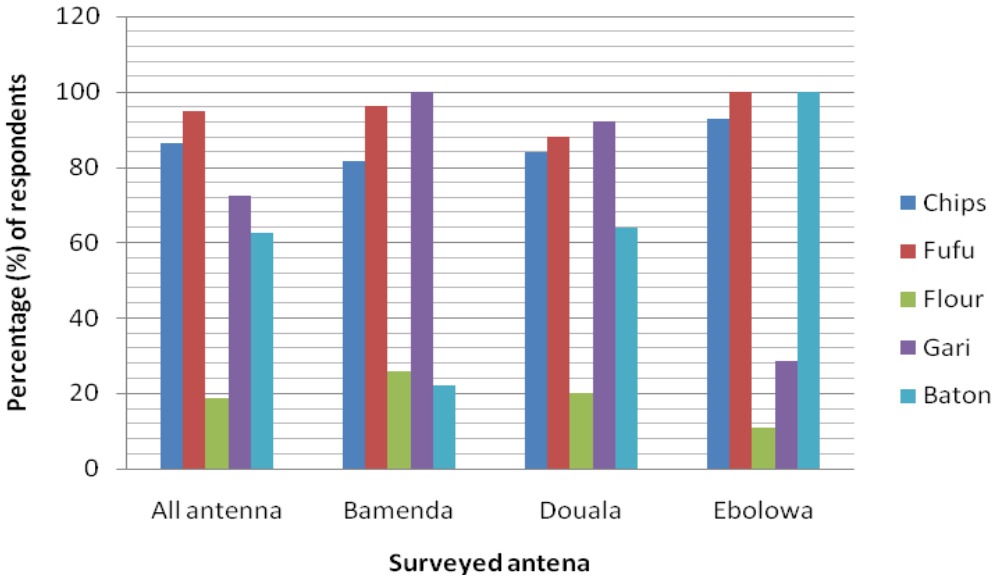

Figure 2: Cassava local products in percentage of respondents per antenna

Table 4. Member of an association in percentage of respondents per antenna

N = 80	Yes	%	No	%
All Antenna	37	46.25	43	53.75
Bamenda	19	70.37	8	29.63
Douala	6	21.43	22	78.57
Ebolowa	12	48.00	13	52.00

Table 5. Absolute value and percentage of respondents per antenna

N = 80	Chips	%	Fufu	%	Flour	%	Gari	%	Baton	%
All antenna	**69**	**86.25**	**76**	**95.0**	**15**	**18.75**	**58**	**72.5**	**50**	**62.5**
Bamenda	22	81.48	26	96.3	7	25.93	27	100.0	6	22.22
Douala	21	84.00	22	88.0	5	20.00	23	92.00	16	64.00
Ebolowa	26	92.86	28	100	3	10.71	08	28.57	28	100

indicates that the processing of cassava into more storable forms offers an opportunity to overcome the perishability of the fresh produce but the transportation of cassava roots from the field to the roadside or household is one of the major limitations in post-harvest processing. Moreover, in production areas, concentration of supplies, efficient contracting and quality control through group marketing is necessary to reduce transaction costs of buyers and

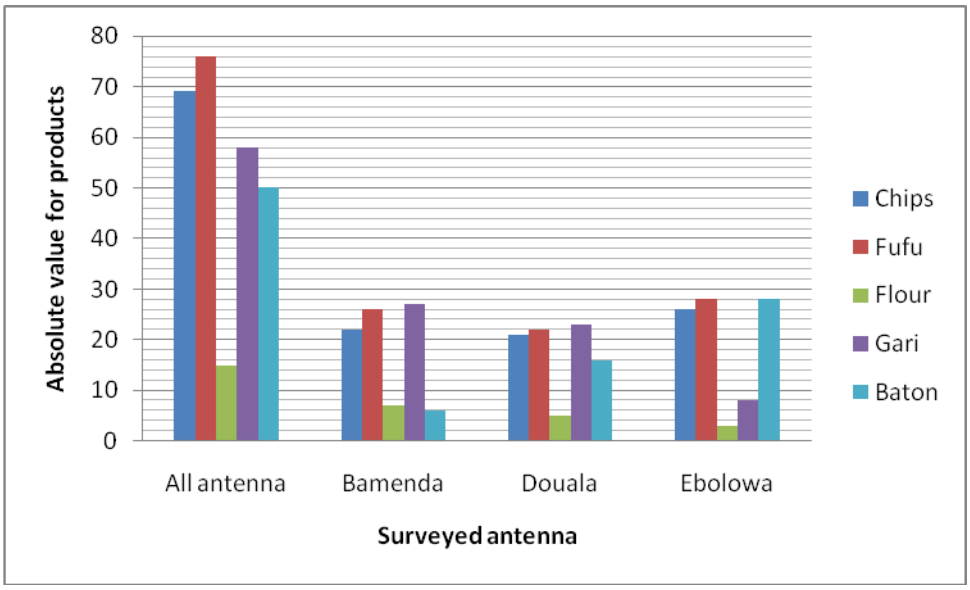

Figure 3: Absolute value for products per antenna

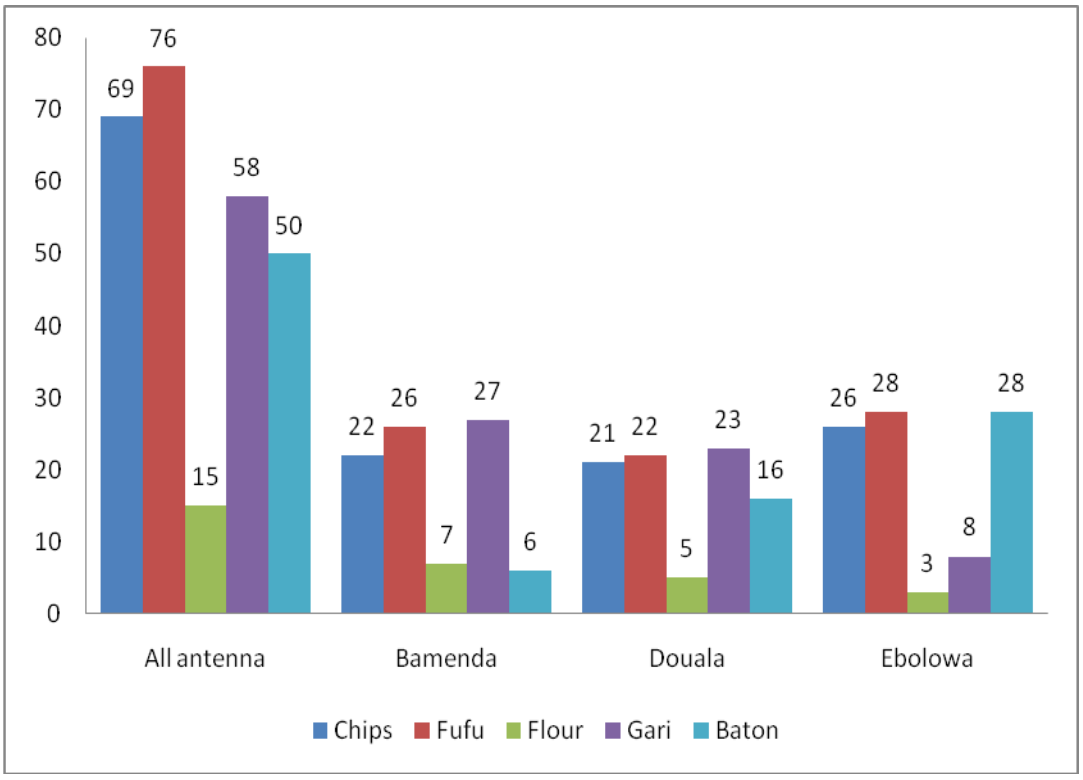

Figure 4: Indicated absolute value for products per antenna

increasing the competitiveness of cassava.

Similarly, investment in local processing units and the necessary power and water supplies, which could be small-scale community or group-based enterprises, will create employment. However, small-holder farmers are associated with inadequate planning, poor management, lack of know-how and insufficient capital making. And it is very difficult for them to sustain the production of high quality cassava products and they are ignorant of key issues in market norms and standards. They should therefore, be

encouraged to produce indigenous foods like gari, chips, baton, mintumba, nkonda, beignets de manioc that are of high demand and value in local markets.

ACKNOWLEDGMENT

The authors wish to acknowledge the financial support of IFAD through the government of Cameroon roots and tuber development programme (PNDRT) and partners for providing valuable information that led to the success of this research.

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