CASSAVA AS FOOD IN GHANA

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CONSIDERED only in terms of proteins, cassava (Manihot esculenta) has been rightly labelled by nutritionists as a poor food. As a fresh tuber, cassava contains much moisture and provides only bulk in the diet (Table 1). The tender leaves of cassava are rather good sources of protein as well as Vitamin C and A (seven per cent protein in the fresh form and 36 per cent in the dry matter).

In the processed form, however, cassava makes valuable contribution to the carbohydrate content of the diet. Cassava products such as gari, kokonte, tapioca and yakayake are good sources of carbohydrate—(See Table II) a nutrient which supplies fuel for energy and assists in the normal metabolism of other foodstuffs.

In a country like ours, where protein is an expensive nutrient and cannot be provided in sufficient quantities in many homes, it is important to have protein spared for its principal function—that of building and repairing the body. In this regard, such carbohydrate containing foods become our "Saviour" because of the protein sparing action of this nutrient. It is no wonder then that we in this country tend to eat more of the carbohydrate foods. In particular, cassava in one form or the other, is a favourite food in the diet of Ghanaians. In a food consumption survey conducted in the rural and urban areas of the Eastern Region of Ghana in 1966 (unpublished) it was found that between 35-40 per cent of the Calories in the diet of those surveyed were derived from cassava and cassava products.

"*Agbeli*" which is the Ewe name for this root is interesting. Literally, the word means "There is life". This indicates the hope for life that people have in this crop. The ease with which it is grown and its high yielding and cheapness are all characteristics which account for the high consumption of cassava.

Cassava is eaten in varying forms throughout the country. In the coastal grassland and forest areas, it is eaten mostly in the unprocessed form and to some extent in the form of gari. In the Coastal Plains, cassava is used more in the form of dough and gari. In the dry Savanna areas, it is used largely as flour known as "kokonte". All these products are made into nourishing and palatable dishes with a serving of meat, or fish, or leguminous foods.

Household uses

In the fresh form, the sweet variety, is simply washed, peeled and cut into pieces and boiled till soft. After seasoning with salt, it is served with sauce. This manner of serving not only cassava but also other root crops, is referred to as "Ampesi" (Akan) or Nuko (Ewe). The boiled pieces may be pounded into a sticky mass known as *fufu* (Akan) or *fufui* (Ga). It is common practice to combine cassava with other starchy crops such as yam or green plantain to make fufu as well as ampesi.

The cooked pieces may also be mashed and seasoned with fried sauce to make one dish meal. Or the pieces may be cubed, adding sufficient water and made into a thin porridge which contains ground dry smoked fish or shrimps, tomatoes, onions, salt and cooking oil. For snacks, the root is cut into strips and grilled or fried as chips.

Cassava products

Cassava is commercially processed into other food products. The sequence of operation consists of peeling, washing and grating into dough. Previously, the grating was done on perforated tin sheets. Nowadays, the process is some what mechanised. Grating machines locally designed and manufactured have largely replaced the perforated tin sheets especially in the commercial production of cassava dough (See Fig. 1). A number of such machines are now used throughout the country notably along the Accra-Ada road, Cape Coast and Nsawam.

Following the initial grating, the dough is packed into fibre bags or baskets and covered

with a piece of sack. The liquid is squeezed out by placing heavy stones on the bags. Drying takes about 2 to 3 days during which period fermentation takes place. The dough serves as bases for many cassava food products either for household consumption or for commercial purposes. The fresh dough is used for a variety of snacks. It may be partly dried and sifted through a large mesh sieve which is made of bamboo strips. (Fig. 2). The sifted dough is seasoned with salt and formed into balls or other fancy shapes and deep fried. The same mixture may be formed into biscuit shapes and baked. Both products are served with roasted groundnuts or dry coconut as snacks. In the fermented form, the dough is used for a number of products. It is sifted and seasoned with salt and steamed in small quantities. (Fig. 3). In some areas, especially among the Ewes, the dough is combined with maize dough to make "Akple" a thick porridge which is served as an accompaniment to soups and stews. The cassava dough for this particular purpose, is ground very finely and is often impregnated with ground mouldy pieces of cassava. This is supposed to hasten the fermentation process and to produce dough that is very smooth. The mouldy pieces are made by leaving soaked pieces of cassava in a dark room for three to four days until a mycoflora is formed (Fig. 5). The cassava dough is also cooked into a thick porridge which is known among the Ga people as '*fufu*'. People who are not familiar with this dish, may confuse the name with pounded root crops.

GARI—The most popular end-product of fermented cassava dough is gari. In making gari,

Fig. 1 *Grating the cassava*

Fig. 2 *Sifting the dough*

the dough is allowed to ferment for an extended period (about 3-4 days) in order to develop an acidic taste which is highly desired in this product. The dough is then partly dried and sifted and roasted in a hot shallow earthernware pot, tossing it constantly with a flat piece of calabash until it is formed into gelatinized grains (Fig.4). The product is again sifted to obtain uniform grains of gari, after which it is further dried and packed into fibre bags for sale. Gari with a moisture content of about 12 to 13 per cent can keep for months if stored in a dry place.

Gari forms a very significant component of the diet of many Ghanaians. As a convenient food, it is extremely popular with boarding homes including schools, prisons and workers'

Fig. 3 *Making Yakayake* →

Fig. 4 *Roasting gari*

camps. Among students, gari is eaten as a quick relief for hunger by simply soaking it in water and adding sugar and sometimes milk. For this reason and also because of its satiety value, it has been dubbed variously as the "College Saviour," the "Foundation" or "Concrete." Apart from serving it as a snack, it is used for making many nourishing dishes and is also served with other foods as a main meal. Gari is combined with meat, fish or egg sauce to make a one dish meal known as 'Garifoto'. Gari is served with cooked cowpeas and seasoned oil and is also combined with other bean preparations. For a main meal, gari may be dampened with cold or hot water or stirred into boiling water to make a thick porridge.

Quality Attributes of Gari as an Index For Consumer Acceptability.

Consumers look for certain qualities in gari for its acceptance. The criteria for good gari are crispness, fine and uniform grain, cream colour, and a moderate degree of sourness (pH of about 4.1), stickiness when soaked and its swelling capacity. A good gari should double its volume when dampened with water and should be fluffy and not too sticky. Gari is usually so treated before use. Rough textured, large grain gari is often unacceptable. Extremely white gari is considered not well cooked and a high degree of acidity is regarded off taste.

In an exercise at the Food Research Institute to assess a sample of mechanically produced gari obtained from Nigeria, in comparison with traditionally produced ones in respect of acceptable characteristics, presented interesting results. The indication is that gari whether produced traditionally or mechanically will be acceptable if it has the characteristics that make for good gari. In fact, the 'Mechanised gari' ranked highest in acceptability.

KOKONTE—is another popular cassava product. Its preparation is very simple. After peeling and washing, the root is cut into pieces and dried in the sun. The dried pieces are first pounded in a mortar to reduce the size of the pieces and then ground in a mill into flour, which is further dried for storage.

In most areas the bitter type of cassava is used in making kokonte because it is more abundant and cheaper. In this regard, the pieces are first soaked in water for a day before drying. Depending on the weather, the pieces may take from four to six days to dry thoroughly to a moisture content of 11-12 per cent. In the process, the pieces are exposed alternately to dew and sunlight which cause them to become mouldy, fermented and dark in colour. The discolouration and the fermented taste are important characteristics of traditionally produced kokonte.

Kokonte flour is used throughout Ghana but more extensively in the Northern regions and the Lower Tongu areas of the Volta Region. The flour is simply stirred into boiling water and cooked into a sticky porridge known commonly by the same name "kokonte" or 'Dzidzi' (Ga).

Hydrocyanic Acid:

As mentioned earlier the bitter type of cassava which is known to contain cyanogenetic glucoside, is used for making dough, gari, kokonte and starch. Fortunately, this toxic substance is known to be concentrated in the peel which

is always removed before the tubers are used. Besides, heat is known to destroy most of this acid. The traditional processes employed in the manufacture of cassava products can then be assumed to render inert much of the glucoside present in the tuber. As such, kokonte and especially gari are safe for consumption. In case of kokonte however, cases of poisoning after its consumption are occasionally reported in Northern Ghana (Dry-Savanna Area). Since the extent of the content of this acid in the tuber, depends upon the type of soil and the climate where the plant is grown, it will be worth to study the soil in the North so as to determine its effect on Cyanic Acid content of cassava that is grown there.

STARCH—Another important use of cassava is for starch production. Starch making is also a simple operation. The tuber, after initial washing and peeling is ground with water into a starch slurry which is then strained and allowed to settle. The liquid is decanted and fresh water is added to produce another starch slurry and left to set. The process may be repeated until the desired whiteness of starch is achieved. The purified block of starch is then dried.

Starch is used for food as well as for non-food uses. Making starch biscuits is a big domestic industry at Abor in the Volta Region. For household uses, starch is a good base for puddings, pies and other products.

TAPIOCA—is also an important commercial product made from starch. In making tapioca, the starch is partly dried and sifted and tossed in a hot earthernware pot (which has been previously greased) until it forms into gelatinised granules, Tapioca is served as a snack or dessert, by simply soaking it in water until it is soft adding sugar and milk. It is also boiled to make breakfast porridge as well as for making puddings.

Prospects

There are good prospects for cassava products. Instant cassava fufu powder has already been developed at the Food Research Institute and is being commercially produced. Cassava flour is suitable for making bread, cakes and biscuits with suitable proportions of wheat flour.

Fig. 5 *Mouldy pieces of Cassava*

For enrichment purposes, cassava products are good media. Studies, are already going on both in Ghana and Nigeria towards the enrichment of gari and kokonte.

Traditional fermentation methods employed in the manufacture of cassava products, such as kokonte, provide the basis for the use of micro-organisms in the enrichment of cassava. In East Africa, the process of making cassava flour involves soaking pieces of the root until they become mouldy before drying and grinding into flour. Similarly, in Ghana, mouldy pieces of cassava are ground into cassava dough.

Attempts are being made to isolate the right type of organism from mouldy cassava for enrichment purposes. It has been possible at the Tropical Products Institute to enrich cassava with microbial protein. Although cassava leaves contain appreciable amount of protein and vitamin C, their use is not as popular in Ghana as in other West African countries. I should like to recommend the use of this valuable leafy vegetable to Ghanaian housewives.

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SOME POPULAR CASSAVA DISHES

1. **Yakayake**—(Steamed cassava dough)
   Sift one pound of slightly fermented cassava dough using a large mesh sieve. Add salt to taste and steam in small quantities. (See Fig. 4)

2. **Agbelikaklo**—(Fried cassava dough)
   Wash, peel and grate one pound of fresh sweet cassava. Squeeze out the liquid using a fine muslin. Sift the dough and add salt to taste. Form into balls or any fancy shapes and deep fry. Serve with roasted groundnuts.

   Note: This mixture can also be formed into biscuit shapes and dry toasted to make—Agbelikpono

3. **Garifoto**—(For 3 or 4 people).
   You will require:
   1 cup of gari; 3 medium size tomatoes; 1 large onion sliced; 1 tablespoon ground smoked shrimps; half cup of groundnut oil or any cooking oil; 2 eggs; half teaspoon ground ginger, 1 cup of water; salt and pepper according to your taste.

   Method

   Sprinkle gari with the water and put aside to soak. Using the oil, fry the sliced onion, and tomatoes, and add ground shrimps, pepper, ginger and salt and cook for 5-10 minutes. Beat the eggs and add to the sauce. Remove from fire and sprinkle gari into the sauce a little at a time and mix well. Serve hot or cold. For variety, use corned beef, or fried shrimps or sardines in place of egg.

Cassava Leaves Sauce

You will need the following ingredients
1½ lbs. beef or mutton
1 dried fish e.g. snapper
1 lb young cassava leaves
4 cups water (2 pints)
1 cup dzomi (superior palm-oil)
2 ozs smoked shrimps
2 large fresh tomatoes
1 large onion
Some freshly ground ginger (1½ teaspoon)
½ cup cooked broad beans (optional)
Pepper and salt according to taste.

METHOD

Cut the meat into pieces and wash.
Put into a saucepan, add salt and some chopped onions.
Put on fire to simmer.
Add water and boil gently for an hour or until the meat is tender.
While the meat is boiling, peel and slice onion, grind tomatoes, shrimps, pepper, etc. Pick and wash cassava leaves well.
Dry with a clean towel and chop. When the meat is tender add the dried fish that has been washed and cut into pieces and the condiments. Add the leaves and the beans and continue boiling until much of the liquid is evaporated.
Add Dzomi and simmer to desired thickness. Add salt to taste. Serve with rice, or boiled yam and plantain.

CASSAVA

TABLE 1

NUTRIENTS IN THE RAW CASSAVA COMPARED WITH OTHER STARCHY CROPS REPRESENTATIVE VALUES PER 100 GRAMS OF EDIBLE PORTION

	Calories	*Water* Gm	*Protein* Gm	*Fat* Gm	*Carbohydrate*	*Fibre* Gm	*Ash* Gm
Cassava	168	57.6	0.7	0.1	40.7	0.5	0.9
Yam	136	64.8	1.9	0.1	32.3	0.4	0.9
Cocoyam	182	53.5	2.6	0.2	42.9	0.2	0.8
Sweet potato	140	65.1	1.0	0.2	33.5	0.8	0.2
Unripe plantain	153	56.7	1.3	0.6	41.0	0.3	0.9
Rice	359	11.9	6.8	3.9	75.1	0.9	0.6
Maize	359	10.9	8.8	3.9	75.1	0.9	1.3
Guinea Corn Sorghum	371	10.8	9.7	3.0	74.1	1.2	1.6
Millet	380	9.8	8.4	4.3	75.8	1.2	1.7

From F.R.I. Food Composition Table

TABLE 2

NUTRIENTS IN SELECTED CASSAVA PRODUCTS COMPARED WITH OTHER PRODUCTS REPRESENTATIVE VALUES PER 100 GRAMS OF EDIBLE PORTION

	Calories	*Water* Gm	*Protein* Gm	*Fat* Gm	*Carbohydrate*	*Fibre* Gm	*Ash* Gm
CASSAVA							
Dough	201	49.6	0.6	0.2	49.4	0.5	0.3
Yakayake	185	53.2	0.3	0.5	45.7	0.7	0.8
Kokonte Flour	350	11.5	1.3	0.4	85.2	1.2	1.6
Gari	342	14.3	1.4	0.4	83.1	1.0	0.8
Tapioca	348	13.6	0.1	0.1	86.1	0.5	0.1
Fufu	141	64.3	0.6	0.2	33.9	0.3	1.0
YAM							
Flour	352	8.5	5.4	0.3	82.8	0.6	3.0
Fufu	108	71.3	2.5	Tr	25.1	0.2	1.1
MAIZE							
Dough	201	48.0	5.1	0.2	46.0	0.7	0.7
Roasted Meal	368	7.9	10.0	4.0	76.5	1.0	1.6
Kenkey (Ga)	110	71.8	2.8	0.3	24.5	0.1	0.6
Abolo (Steamed)	108	71.7	3.9	0.1	23.8	0.3	0.5

From F.R.I. Food Composition Table