Traditional Preparation and Uses of Cassava in Nigeria[1]

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Various methods of cassava preparation are practised by different ethnic groups in Nigeria. These methods involve peeling cassava roots, soaking roots in streams, grating cassava, and pressing grated cassava. Other methods include heating sieved, grated cassava, boiling peeled cassava roots, and pounding boiled or dried cassava roots. The traditional, cassava-based products are gari, fufu, akpu, *cassava flour, edible starch, and tapioca. Detoxification of fresh cassava roots is partly achieved through cell rupture during cutting and grating, soaking in running or standing water in earthen pots for 3–5 days, heating, drying, and boiling.*

Cassava (*Manihot esculenta* Crantz, Euphorbiaceae) is one of the major staple food plants in the world, utilized by approximately 300 million people (Seigler and Pereira, 1981). Although it originated in South America, cassava has been widely cultivated throughout the tropics for human consumption, animal feed, and the starch industry. Philips (1982) reported that the plant was introduced into Nigeria and other parts of West Africa by the Portuguese but was unknown north of the river Niger until 1914 (Purseglove, 1968). It has now almost become one of the most important staple food crops of the inhabitants in Nigeria. In fact the preparation of cassava products using traditional methods has helped to reduce the problem of carbohydrate deficiency in areas where cassava is extensively cultivated in Nigeria.

Cassava is known by different names among the various ethnic groups of the country. The Yoruba call it *gbaguda* or *ege,* the Hausa, *rogo, karaza,* or *doyar kudu,* the Ibo, *akpu, abaca* or *jigbo,* the Benin, *igari,* the Efik, *iwa unene,* while the Urhobo refer to it as *imidaka.*

There are various traditional methods of preparing foods from the cassava roots in Nigeria but some of them are restricted to particular ethnic groups. The aim of this investigation is to bring together information from all the major ethnic groups in Nigeria to focus attention on the diversity of the traditional preparations and uses of cassava.

PREPARATION AND USES OF CASSAVA

The species of cassava cultivated for food in Nigeria is *Manihot esculenta.* The cassava roots are used for the preparation of *gari,* edible starch, *fufu, akpu,* cassava flour, and tapioca cakes. They are also eaten directly in the boiled or roasted form.

Gari

Gari is one of the major food items consumed in Nigeria (Phillips and Ladell, 1959; Oke, 1968). To prepare gari, the cassava roots are peeled with a cutlass and are washed in several changes of clean water to remove the earth particles. They

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are then coarsely grated (Fig. 4) with the help of a locally made tin grater (Fig. 2). The grated cassava is collected in cotton or raffia sacks and pressed by means of heavy stones or logs—a common practice among the Yoruba. Sometimes the necks of the sacks are tied around strong sticks in such a way that by twisting the sticks the sacks are gradually tightened. Alternatively the sacks are sandwiched between 4 wooden planks (2 above and 2 below) that are strongly tied together with ropes (Fig. 1)—a technique used by the Urhobo, Benin, and Ibo. These sacks are left for 3–4 days during which the starch solution, if required for edible starch, is squeezed out and collected in a container. The ropes are tightened frequently resulting in the extraction of the maximum amount of starch solution.

The grated cassava becomes fermented and develops a sour taste. The moist grated cassava is then taken out of the sacks and sieved to remove the fibres by means of a sieve made of bamboo (Fig. 6). The sieved, grated cassava is now heated with constant stirring (Fig. 7) in wide, shallow, nonsticky metal pans till it becomes light or crisp gari (Fig. 3). The gari is thoroughly sundried before storing and marketing. During the process of heating, red palm oil (extracted from the husks of palm fruits, *Elaeis guineensis* Jacq.) may or may not be added. The red palm oil when added helps to prevent burning of the gari during the process of heating and also gives a light yellow colour to the finished product, thus yielding 2 types of gari, namely yellow gari and white gari. Generally the quality of gari is judged by its creamy yellow colour with uniformly sized grains.

Gari is consumed in various forms such as cooked gari (*eba*): The dried gari is added to boiling water to cook and soften it. It now assumes a partially sticky and solid mass, which is taken with fish, meat, vegetable soup or stew. Gari gruel: The dried gari is soaked directly in cold water to make a gruel to which milk and sugar or table salt is added to taste. This gruel is taken directly with dried or tinned fish, dried meat or corned beef, groundnut, cononut, palm kernels, avocado pear or cooked beans (*Vigna unguiculata* (L.) Walp.) Dried gari: Sometimes the dried or wet gari is mixed with red palm oil, crayfish, onion, red chillies, and salt. This mixture is either taken directly or slightly heated before it is consumed. Dried gari is also eaten directly with fried fish, meat, groundnut, coconut, or cooked beans.

Gari in its various forms is a very popular meal among the Benin, Itsekiri, Ibo, and Urhobo, but less popular among the Yoruba and the Hausa.

Edible starch

Different techniques are used to obtain starch. It may be precipitated from the solution pressed out of the grated cassava roots during the preparation of gari. Sometimes starch is also obtained from the grated cassava that is soaked directly in water. Starch is then collected from the suspending water and put into a wide metal pan that is already smeared with red palm oil. Water is added to the starch and with the aid of the hand, the starch is completely dissolved. The pot is put on the fire and the solution constantly stirred with a wooden rod until it is

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Fig. 1–3. Fig. 1. Pressing of grated cassava by means of planks and logs tied together with ropes. Fig. 2. A locally made tin grater used for grating peeled cassava roots. Fig. 3. Finished crisp *gari*.


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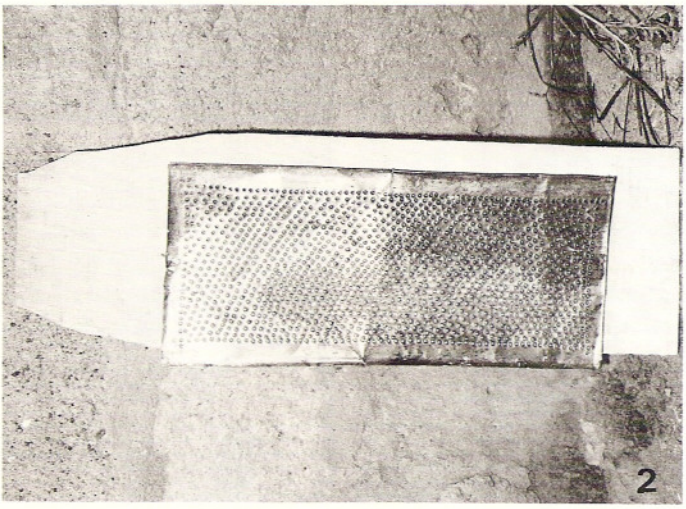
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Fig. 4–7. Fig. 4. Grating of peeled cassava by means of a tin grater. Fig. 5. Mortar and pestle for pounding dried cassava and *fufu*. Fig. 6. Sieving of grated cassava to remove fibres. Fig. 7. Heating of sieved, grated cassava in a nonsticky metal pan to convert into *gari*.

converted into a very sticky, light-yellow mass. This is eaten with any oil, or with pepper soup. Edible starch is one of the major staple foods of the Itsekiri and Urhobo, who refer to edible starch as *usi.*

Fufu

The term *fufu* and its variants is used widely in West Africa when referring to a sticky dough or porridge prepared from any pounded starchy food, including yam, cocoyam and plantain, as well as cassava (Lancaster et al., 1982). Fufu is prepared in various forms depending on the bitter or sweet taste of the cassava. Fufu from the bitter cultivars of cassava: The washed unpeeled cassava roots are cut at both ends and soaked either in streams, drums or preferably earthen pots for 3–5 days to undergo fermentation. During this period the soaked cassava develops an unpleasant smell. When sufficiently soft, the roots are taken out and the fibres removed by sieving. The fine, clean filtrate is put into raffia or cotton bags, squeezed to remove the starch solution and left overnight to get rid of excess water. The starch is then collected and rolled into large balls, wrapped in wilted clean banana or plantain leaves and partially steam cooked. The balls are removed and pounded in a wooden mortar (Fig. 5) to give a fine, smooth, and soft mash. This mash is rolled into small balls, wrapped in leaves as usual, and thoroughly steam cooked. The balls are finally pounded together with cooked yam. This type of fufu is known as *nni akpu* among the Ibo, who take it as one of their major staple foods. The Efik call it *udep utim.*

The preparation of fufu is slightly different among the Yoruba. The cassava roots are first peeled, cut into small sizes, washed and put in drums or earthen pots for 3–5 days to undergo fermentation. The soft pieces are collected and the fibres removed by sieving. The starchy solution is boiled directly and stirred constantly with a wooden rod until it is converted into a dough.

Fufu from the sweet cultivars of cassava: The peeled cassava roots are cut into small pieces, cooked in water to soften them and put in a mortar and pounded to give a soft and smooth cassava mash, a popular food among the Yoruba. Fufu is usually taken with fish, meat, vegetable stew or soup.

Cassava flour

Two different methods are used to prepare cassava flour. First, the peeled tubers are washed and cut into small pieces, which are boiled and sundried to remove the moisture content. The dried pieces are later stored in bags; to prevent fungal and insect attack the bags are often kept on rafters built over a fireplace. When required the dried cassava pieces are ground or pounded in wooden mortars (Fig. 5) into a fine flour and sieved to get rid of fibres. Second, the fresh pieces of the peeled cassava are soaked in water in earthen pots for 3–4 days to facilitate thorough fermentation. This process also results in softening the cassava pieces. The fermented pieces are sundried to remove moisture, and later collected in baskets or bags and stored. The dried pieces are later ground into cassava flour when necessary. The cassava flour prepared from either method is called *elubo lafun* by the Yoruba. The flour is usually put in boiling water with constant stirring to prepare a creamy-white, starchy, semisolid paste known as *lafun,* which is taken

with fish, meat, vegetable soup or stew by the Yoruba. Amongst the Hausa and Fulani, cassava flour is mixed with guinea corn flour to prepare a type of porridge called *tuwo,* with cowpea flour to make *dan-wake* cakes, and with millet flour to make *waina* cakes (Lancaster et al., 1982). The Ibo also mix cassava flour with maize flour, together with onion chips, chillies, and palm oil, and moulded into small balls that are deep fried in red palm oil. The fried balls are called *akple.*

Tapioca cakes

The unsieved grated and fermented cassava is sundried to remove moisture and then partially heated in a frying pot during which period they are converted into amorphous cassava cakes called tapioca. This is referred to as *kpokpogari* among the Urhobo, Isoko, Benin, and Ishan, who eat it directly with dried fish, groundnut or coconut kernel.

Other preparation and uses

The tuberous roots of the sweet cultivars of cassava are used to feed horses and to fatten pigs (Cresswell, 1978; Oyenuga, 1961; Oyenuga and Opeke, 1957) and cattle. The roots are cut into small pieces to feed livestock. It is believed that when cattle are fed cassava plus cottonseed meal or protein food, milk yield is increased and that this animal feed gives a richer colour to both the milk and butter prepared from the milk. The fresh tubers are also ground along with protein food and used as poultry feed (Ademosun and Eshiett, 1980; Adegbola, 1977; Omole, 1977). The liquid starch extracted from grated roots is mixed with hot water to form an emulsion that is used to strengthen washed cotton fabrics and clothing. The peeled cassava chips are fried in red palm oil and used as bait to catch farm rodents. The boiled tubers of the sweet cultivars of cassava are also taken directly, like Irish potatoes, with or without stew. The Hausa eat boiled cassava with roasted groundnut. Sometimes the boiled cassava is cut into chips, kept in water for 12–24 h, and then eaten with coconut kernel. This preparation is very common among the Urhobo and Ibo who eat it as a snack. The Ibo call it *abacha* or *iwuakpu.* The Yoruba sometimes roast sweet cassava roots in ashes covered with hot charcoal. The roasted cassava is then peeled and eaten directly or with any oil soup. Young cassava leaves are eaten in various parts of West Africa and elsewhere (Irvine, 1969). The Ibo use the young leaves as a boiled vegetable or as crushed leaves in meat or smoked-fish soup. Terra (1964) has stated that cassava leaves are a good supplementary source of proteins and vitamins.

DETOXIFICATION

Cassava contains 2 cyanogenic glycosides, linamarin and lotaustralin, the former being present in much larger quantities, usually up to 90% of the total. The normal range of cyanogen content of cassava tubers falls between 15 and 400 mg hydrogen cyanide (HCN)/kg fresh weight.

The roots are detoxified by hydrolysis of the cyanogenic glycosides and subsequent elimination of the liberated HCN. Contact between enzyme and substrates only occurs when the tissues are mechanically damaged or there is loss of phys-

iological integrity, such as during post-harvest deterioration or wilting of the leaves (Lancaster et al., 1982). In Nigeria, detoxification is partly achieved by cutting into slices, grating or pounding the cassava roots that lead to cell rupture. Drying, boiling and fermentation that are widely practised in Nigeria are also effective in reducing the HCN content of cassava tubers. A survey of the effectiveness of these various methods in depleting the HCN content of cassava roots has been reported by Lancaster et al. (1982) and Nartey (1981).

In Nigeria various methods are followed to achieve fermentation. Cassava roots are cut into chips of convenient sizes, put into large earthen pots and sufficient water is added to immerse them completely. These pots are covered or left open in the courtyard for 3–5 days—a usual practice among the Yoruba. The common method among the Ibo, Urhobo, Benin, and Ishan is to peel the cassava roots, and the grated cassava is put into sacks that are kept pressed by wooden planks for 3–5 days to remove the liquid content, during which process fermentation takes place. The Yoruba and Ibo soak the whole peeled or unpeeled roots in running streams for about 3–5 days, after which the skins of the unpeeled roots, peel off easily. Subsequent washing and sieving with baskets separate the fibers from the starch, which is now largely detoxified by the prolonged soaking in running water.

Indigenous fermentations are very complex, in that several microorganisms from the soil and the atmosphere infect the different substrates at different stages (Nartey, 1981). The fermentation of cassava has been shown to occur with the aid of *Corynebacterium manihot, Geotrichum candidum* (Collard and Levi, 1959), and other bacteria and fungi (Nartey, 1981).

Although various traditional methods are practised to detoxify cassava products, recent investigations show that almost all the products still retain HCN (Nartey, 1981). However, Ermans et al. (Lancaster et al., 1982) believe that if one considers the millions of people who consume cassava as a staple food, it might be possible to conclude that the traditional detoxification techniques are generally effective except in a few highly specific localities. These traditional methods are, however, gradually being replaced by modern preparation methods, introduced because of the research in Nigerian universities and research institutes.

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