UTILIZATION OF EQUIPMENT AND BIOSAFETY OF CASSAVA PROCESSING IN THE MIDDLE BELT OF NIGERIA

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ABSTRACT

Cassava processing and equipment assessment is very important for safe consumption and utilization. The presidential initiatives in cassava production have led to many establishments of cassava processing industries in the middle belt of the country. Apart from being used as food, cassava is an important industrial raw material for the production of starch, alcohol, pharmaceuticals, gum and confectioneries. This study derived its data from secondary source to assess the utilization of equipment and biosafety of cassava processing in the middle belt of Nigeria. The study postulated among others that if adequate machinery is put in place, it will standardize the quality of the product for safe consumption and utilization. Cassava contains 77.9% of carbohydrates, 7.9%, 7.3%, 3.3% protein, water and fats respectively. Based on the empirical facts for the study, there is therefore the need to harness the total on-farm and off-farm agricultural capability of rural farmers through cassava production, processing and utilization in order to improve their lives and Nigeria as a whole.
Keywords: Equipment assessment, Biosafety, Cassava processing, utilization.

INTRODUCTION

The practice of agriculture in Nigeria is an occupation of the majority, predominantly subsistent practice in the rural areas. Cassava, botanically known as manihot specie belongs to the family of euphorbiaceae (Anyanwu A. and Anyanwu B., 1979). It is one of the major food crop grown in the middle belt and the southern part of the country. The crop originates from Tropical Brazil in Southern America (Komolafe, Adegbola, Are and Ashaye, 1980), from where it was introduced into central Africa in the 16th century by Portuguese settlers and then to sub-saharan Africa between the 18th - 19th century (Babasanya, 2008). Before 1950 the crop was regarded as emergency food and its cultivation thought to be women's business. As a result it became the last crop in mixed cropping systems and consequently left to grow with natural vegetation. At present, it has become a very vital staple crop in Nigeria within the reach of the poor. According to Onyeigwe (2005), Nigeria today is ranked the highest producers of cassava in the world. Nwachukwu (2005) estimates the household consumption of cassava to be 30 million metric tones, with a marketable surplus for industrial demand of about 10% of total production.

The global production of cassava is 203.80 million metric tons from about 18.63 million hectares with an average yield per hectare of 109,425 tons (FAO, 2005). In Africa, there has been a tremendous increase in the production of cassava in the last 15 years. Nigeria with a total of 4118 hectares of land cultivation of cassava (FAO, 2005) is the world's largest producer of cassava with about 31.4 million metric tons (FAO, 2006).

With the presidential initiatives on cassava production, the impact of the National Special Programme for Food Security (NSPFS), the International Institute for Tropical Agriculture (IITA), the National Root Crop Research Institute (NRCRI), the Root and Tuber Expansion Programme (RTEP) etc the potentials of cassava are being tapped with great prospects (Nwosu, 2005). The poisonous nature of the product makes it unsafe for human consumption if not well processed. The low proteins content (1.2gms) of the fresh tuber (Okigbo 1980; FOA, 1998) makes it not nutritious enough, and there is great relevance of the process equipment to food safety.

PROCESSING AND UTILIZATION OF CASSAVA

Processing deals with processes and machines required for converting agricultural raw materials or products into finished consumer goods. It therefore involves cleaning, cooling, drying, size reducing and many other processing operations. In doing all these, the material has to be conveyed from one place to another. Thus, this area includes machines for conveying products, discharging and packaging them (Onwualu, Akubo and Ahaneku, 2006). Yohanna (2003) defines agricultural processing as any farming or local activity, conditioning or operation that maintains, improves or raises the quality, changes the form or characteristics of a farm product for utilization, preservation and storage. Cassava can be processed into cassava flour (Lafun), garri and fufu. The methods of processing cassava focused mainly on how to get rid of the cyanic acid content (Onwbumwa, 2004).

Apart from its use as food, cassava is an important industrial raw material for the production of starch, alcohol, pharmaceuticals, gums and confectioneries (Okonkwo, 2002). Nwosu (2005) identifies some of the uses of cassava to include: ethanol production, livestock feeds, human consumption, confectioneries, monosodium glutamate, sweeteners, pharmaceutical products, glues, textiles etc. Through processing, the product becomes transformed with the aim of enhancing quality, reducing the risk in consumption, minimizing losses, facilitating storage, prolonging the shelf life and enhancing distribution. Rupert (1979) observes that cassava roots deteriorate rapidly a few days after and must be chipped and dried to less than 4% moisture content, average day time temperature of less than 23^0C and about 70% relative humidity (Babasanya, 2008). Roa (1979) also states that drying can be carried out under natural conditions, utilizing the sun and the wind in a manner similar to that used for grains, turned periodically for uniform drying below 14% moisture contents.

THE FORTIFIED GARRI

Garri is fermented, jelled and dehydrated product from cassava which after toasting becomes granulated, white or yellow, with 10 - 15% moisture content. Cassava tuber can be processed into garri by peeling, washing, grating, dewatering, fermenting, sieving and frying (IITA, 1992). The need to nutritionally fortify garri arose from the fact that the product is an energy source rich in carbohydrates but very low in protein and vitamins (Tables 1 and 2). CESAC (1980) contributes that cassava is a root vegetable that contains sodium, provides starch and very small quantity of protein. Cassava can also be processed into cassava flour by peeling, washing, slicing and drying or by peeling, washing, grating, fermenting/soaking, dewatering and drying (Anda and Yohanna, 2004).

Table 1: Nutrient consumption of Fresh Cassava Root Tubers (per 100gm of edible portion)

Nutrients	Unit	Cassava Root Tubers
Food Energy	Calories	146
Water	gms	62.5
CHO	gms	34.7
Protein	gms	1.2
Fat	gms	0.3
Calcium	mgs	33
Iron	mgs	0.7
Vitamin A	iu	Trace
Thiamine B_1	mgs	0.06
Riboflavin B_2	mgs	0.03
Niacin	mgs	0.06

Source: FOA (1998)

Attempt have been made to add certain ingredients that are of high nutrients value to garri, to increase its protein, vitamin and minerals contents but the product has not gained wide acceptability mainly due to change in the original flavor of the product.

Table 2: Nutrient Composition of Fortified Garri

Food Nutrients	Percentage
Water	7.3
Protein	7.9
Fat	3.3
CHO	77.9
Ca	0.073
P	0.140
Fe	0.003
Thiamine	0.0002
Riboflavin	0.0003

Source: Anochili: (1984)

EQUIPMENT ASSESSMENT IN CASSAVA PROCESSING

The relevance of food safety is a vital consideration in choosing any garri processing equipment. Contamination may occur as a result of intimate contact of food stuff with processing metals, chemicals, rancid oil, micro-organisms etc. Processing equipment is a potential source of food contamination because from harvest to consumption, the foodstuff is in one equipment or the other. However, the use of machines is very necessary as they make for an economy of 20% in terms of labour required for turning and drying especially with high wind speed (Than, Pescod and Muttamara, 1976).

During the design stage of the garri processing equipment, the materials to be selected should be such that they will be able to withstand mechanical and temperature stresses; and resists abrasive force that may wear and corrode it. Products of wear and corrosion in good processing constitute a major factor of metal contamination to foodstuff. Stainless steel, ceramic, aluminum, clay etc are generally accepted for machines selections that are in contact with food materials.

Nwachukwu (2005) sees a good processing equipment design as that which is either easy to clean or self cleaned and designed in such a way that some corners that retain food materials are not difficult to reach. As a result, pathogenic microbial organisms from left over residues of previous operations cannot contaminate the fresh food during processing. Protruding and sharp edges should be avoided at the design stage of the processing equipment because of the potential danger to the operator(s) as well as abrasion contamination.

BIOSAFETY OF CASSAVA PRODUCTS

Adequate fermentation process of cassava makes it safe for consumption. This is because the fresh tubers and leaves contain poisonous hydrogen cyanide (HCN) in the form of cyanogenic glycosides. These glycosides on hydrolysis, release HCN when the tissues are destroyed. The HCN is eliminated through processing method that involves peeling, grating, fermenting, sun drying, frying etc. Njoku (1997) observes that dehydrating causes loss of poisonous hydrogen cyanide in the form of prussic acid and that the drying process eliminates the remaining prussic acid to a considerable extent, thus reducing the problem of toxicity in the instant cassava food.

Agbo (2004) comments that depending on the method of production, garri could contain cyanide up to 20mg/kg of the product, as against 43 mg/kg of freshly peeled cassava tuber. He futher submits that after one month of storage, there are only cyanide traces of about 2mg/kg of garri and that sample that contains up to 30 mg/kg of the product is not safe for human consumption. Emecheta (2004) adds that the technology of pre-soaking the cassava tubers for about 2 days, washing the tubers, cutting into bits, dried and ground into flour which can then be dehydrated fufu, will help reduce the cyanide content and toxicity to humans. High moisture content may be indicative of the existence of micro-organisms because most of them thrive under high humidity.

CONCLUSION AND RECOMMENDATIONS

Cassava processing enterprise and equipment assessment for safe consumption and utilization is sustainable; hence need to be well developed to ensure an improvement in the living standard of the rural and urban populace and ensuring a substantial income. This is important more so that the presidential initiative on cassava product is encouraging the export of the products. There is therefore the need to harness the total on-farm and off-farm agricultural capability of the rural farmers so as to build better lives for themselves and families and their communities and for Nigeria as a whole through cassava production, processing and utilization. Based on the empirical facts for the study, the following recommendations are essential in promoting the living standard of the people through cassava production, safe processing and utilization.

(a) Credit facilities should be made available through community or micro finance banks within the project areas.

(b) Non-governmental agencies should support the business with capital for the running of the project.

(c) Adequate machinery should be purchased to help standardize the quality of the products for safe consumption and utilization.

(d) There should be workshops, seminars/conferences for training of un-skilled labour force through extension services/agencies and rural development centers.

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