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EFFECT OF DAYS OF FERMENTATION AND PALM OIL ON THE LEVELS OF CYANIDE IN GARRI SAMPLES

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ABSTRACT

Investigation of the levels of cyanide in garri samples, a widely consumed food from cassava *(Manihot esculenta crantz*) was carried out. Ground cassava roots from where the garri was prepared were allowed to ferment for different days (interval of 1-5 days). The effect of palm oil on the samples was also investigated. The levels of cyanide on the different garri samples were measured using UV Spectrophotometer. Results showed that the cyanide levels in the garri samples were 0.054, 0.044, 0.037, 0.031, 0.025 for the samples without palm oil and fermentation days 1 to 5 respectively, and 0.052, 0.042, 0.035, 0.029, 0.023 for the samples with palm oil and 1 to 5 fermentation days respectively. The results show that cyanide levels reduce with increase in the number of days of fermentation of the cassava and vice versa. Addition of palm oil reduced the level of cyanide in the garri samples studied but the effect was little.

INTRODUCTION

Cyanide is a chemical compound with the cyano group of which carbon is triply bonded to nitrogen atom. It can interact with metals and organic compounds. Cyanide ion is a conjugate base of a weak acid. Hydrogen cyanide is an extremely poisonous gas with an almond odor. Example of cyanide compounds are sodium cyanide (NaCN), hydrogen cyanide (HCN) and potassium cyanide (KCN). Consumption of foods that contain low level of HCN over time leads to the development of health challenges that damages the central nervous system (CNS) and thyroid gland [10]. Cassava root (*Manihot esculenta crantz*), a dietary stable food in many tropical countries contains cyanogenic glycosides which release cyanide (CN) when metabolized [6]. The consumption of cassava and its derived products which contain large amount of HCN may be responsible for visible manifestations as goiter and cretinism (Tewe, 1983; Bradbury, 1991Cassava meal provides dietary energy to over 500 million people in the world [3].

Garri is a granular starchy food prepared from cassava mash. After some hours or days of fermentation, the mash is roasted and reconstituted with hot water into stiff dough (*Eba)* and eaten with vegetable soup or soaked in cold water with sugar, coconut, roasted groundnut; dry fish or boiled cowpea as complements. The characteristics taste and flavor of garri is said to be from its lactic acid content produced during fermentation [14].

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Since high concentration of hydrogen cyanide is fatal to human and animals, it is important to reduce it to a safe level for consumption. Proper and thorough processing of garri can reduce the concentration of cyanide which in high level can lead to eye defects, intestinal issues and worsening of ulcer. It is said that palm oil has a way of neutralizing cyanide in garri [15]. Some garri producers prefer to add palm oil to the milky colored garri to improve the appearance. The effects of the number of days of cassava fermentation and palm oil on the levels of cyanide in garri samples were investigated in this study to confirm if these treatments could lead to the reduction of the cyanide level.

Earlier researchers, [9] reported that consumption of unfermented cassava tubers causes some health hazards such as dysentery, running stomach etc. The knowledge of the effect of days of fermentation on level of cyanide will be of great guide to both garri producers and consumers since garri is a staple food in Nigeria. Garri that has sweet taste is an indication of high level of cyanide while sour taste signifies properly fermented low-level cyanide garri [2].

Traditional methods used around Africa to process cassava tubers into garri include: sun drying, heap fermentation and bag de-watering using local hydraulic press. De-watering and fermenting in the production of garri completes the process of removing cyanide from the cassava mash. Bag dewatering method was used in this study. The grinded cassava paste was allowed to ferment for a period of one to five days before roasting.

An earlier researcher in 2005, worked on cyanide and aflatoxin load in processed cassava (*Manihot Esculanta)* tubers (garri) in Njaba [12]. He reported that the longer the fermentation period, the less the residual cyanide content in the final garri product. However, he attributed the variation in the cyanide concentration of the individual garri samples to differences in the cassava cultivars.

An investigation on the level of cyanide aflatoxin load of processed cassava tubers (garri) in Imo State, Nigeria and concluded that fermentation scheme for garri production in 48 h caused significance reduction ($P< 0.05$), in cyanide level which further reduced when the samples were treated with palm oil [4]. Another group of researchers [7] worked on the determination of cyanogenic glucosides in cassava products (fufu, cassava flour and garri) sold in Okada, Edo State, Nigeria. Their results showed that the cyanogenic content of three different samples indicates that fufu had the highest cyanogenic content of 10 ppm, cassava flour had 6 ppm and garri had 5 ppm.

The cyanide content in white and deep yellow garri was determined in 2005 [5] and it was observed that the cyanide content in white garri was more compared to that of the light and deep yellow garri but although all were considered safe

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for consumption if they undergo longer days of fermentation. Similar report has also been given [8].

MATERIALS AND METHOD

Materials

Cassava tubers, Weighing balance, Palm oil, UV Spectrophotometer, Alkaline picrate solution, KCN (10 ug/ml), matured cassava (*M. Esculenta crantz*) tubers from private farm in Port Harcourt, Rivers state.

The samples that were not treated with palm oil were labeled A while the samples that were treated with palm oil were labeled B. The cyanide level was determined according to standard method described by earlier researcher [1].

Methods: The garri processing steps are represented in the chart below.

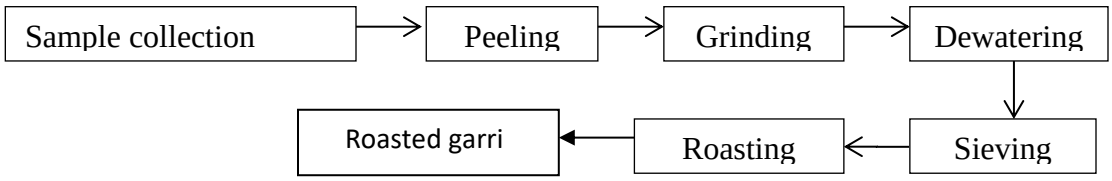

Figure 1: Flow chart illustrating steps in garri processing

RESULTS AND DISCUSSION

RESULTS

Table 1: Absorbance and Cyanide levels in the Garri Samples

	Absorbance (510 nm)		CN Levels (µg/ml)	
Days	A	B	A	B
1	0.367	0.35	0.054	0.052
2	0.289	0.279	0.044	0.042
3	0.269	0.26	0.037	0.035
4	0.255	0.249	0.031	0.029
5	0.201	0.123	0.025	0.023

DISCUSSION

From the results shown in table 1, cyanide levels reduced from 0.054 to 0.025 (µg/ml) in the sample without palm oil and 0.052 to 0.023(µg/ml) in the sample with palm oil. This shows that the cyanide levels decreased in both samples with increase in the number of days of fermentation. These values are below the set

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standard of 30mg/kg for safe cyanide level in food-stuff meaning that fermentation helps in the removal of toxins from cassava tuber thereby making it save for human consumption.

Absorbance level reduced in both samples with increase in number of days of fermentation. This may be as a result of reduction in cyanide level as fermentation progressed, indicating that the longer they stay in the stake, the more the cyanide is removed. Addition of palm oil made only little change in cyanide levels as seen in table 1.

CONCLUSION

Fermentation of cassava reduced the cyanide levels as the days of fermentation increased, therefore longer days of fermentation should be encouraged. Addition of palm oil helps to reduce the level of cyanide in garri samples.

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