

Microbial quality and proximate composition of dried *Hibiscus sabdariffa* calyces in Uyo, Eastern Nigeria

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ABSTRACT

Dried *Hibiscus sabdariffa* calyces collected from different markets in Uyo, Eastern Nigeria were evaluated for microbial quality, Aflatoxin contamination and proximate composition. The results showed that all the calyces were contaminated with microorganism. The total bacteria count ranged from 5.0×10^4 to 8.1×10^7 cfu/g in which the highest count was obtained from dried calyces from Itam Market. Coliform were not detected in most of the sample except samples from Uyo main market and Ikot Ekpene market in which the coliform level is below the acceptable limit. *Salmonella/Shigella* was not detected in the sample. The fungi count ranged from 3.4×10^4 to 7.3×10^6 . The associated bacteria were *Staphylococcus aureus*, *Bacillus subtilis*, *Bacillus* sp., *Enterococcus faecalis*, *Micrococcus* sp. and *Klebsiella* sp. The associated fungi were *Aspergillus flavus*, *A. terreus*, *A. glaucus*, *Penicillium citrinum*, *Fusarium oxysporum*, *Rhizopus* sp. and *Mucor* sp. *A. glaucus* had the highest frequency of occurrence among the isolated fungi. Out of the sample obtained Aflatoxin B₁ was detected in two samples and it ranged from 1.57 to 17.6 µg/kg. The proximate analysis revealed that the crude protein ranged from 8.34 – 9.97%, crude fibre (7.26 – 7.82%) and fat (8.51 – 9.26%). The moisture content ranged from 13.13 – 14.85%.

Keywords: *Hibiscus sabdariffa* calyces, microbial quality, Aflatoxin, *Aspergillus glaucus*.

INTRODUCTION

Roselle (*Hibiscus sabdariffa*) an herbaceous upright plant species from the family Malvaceae is widely grown in the North Eastern and middle belt regions of Nigeria (Akanya et al., 1997). It is locally called "Zoborodo" (Hausa), "leape" (Yoruba) and Sorrel in English. Many parts of Roselle are of value, in countries like India, roselle calyces are utilized in producing refreshing beverages, jellies, jam, sauces and food preserves. (Cydescale et al., 1979). In Nigeria, the dried roselle calyces are prepared into a nutritious refreshing drink called 'zobo'. The drink is becoming popular because it is easily prepared at home and served chilled, packed in plastic bottles or polyethylene films. It serves as income generation source for many women.

However, the dried calyces like any other raw material or food is susceptible to deterioration by food borne microbes which can lead to reduction in quality of the drink in terms of color, taste and nutrition. Most of the fungal contaminant can cause spoilage and they are known to produce mycotoxins which are detrimental to human health. Aflatoxin, a group of toxic metabolites produced by certain *Aspergillus* species have been found to be carcinogenic, tetragenic and mutagenic to several species of experimental animals (Butler and Barnes 1968, Gopalan et al., 1972 and Adamson et al., 1973). Now despite the consumer acceptability of drinks from *H. sabdariffa* calyces and physicochemical evaluation of the

'zobo', (Amusa et al., 2005, Oaurtogun and Aboaba 2004) inhibition of fungal isolates from sorrel drinks (Bondu and Iloh 2007), fermentation studies on Roselle (Oyokoh et al., 2002), research has not been done on the microorganism that causes *H. sabdariffa* calyces deterioration during storage.

The aim of this study was to investigate, detect and evaluate the presence of microorganism, aflatoxin and proximate composition of *H. sabdariffa* calyces marketed in Akwa Ibom State, Eastern Nigeria with special references to its public health hazard.

MATERIALS AND METHODS

Collection of Samples

Hibiscus sabdariffa calyces (Red variety) were obtained from different spot in a local market in Uyo (Akpan Andem Market, Uyo main market, and Itam market) Akwa Ibom State, Nigeria.

One hundred grams of the calyces were thoroughly washed in distilled water to remove sand and extraneous materials. 10 g of the washed calyces was weighed into 90 mL sterile 0.1% peptone water as described in the Bacteriological Analytical Manual (FDA, 1991). Ten fold dilutions of each of the samples were made and 0.1 mL of the diluents were pour plated in triplicate plates on Nutrient agar for total bacteria counts, MacConkey agar (Oxoid) for coliform count, *Salmonella/Shigella* agar for

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