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## **The Nutritional Quality of Three Varieties of Zobo (*Hibiscus sabdariffa*) Subjected to the Same Preparation Condition**

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### **ABSTRACT**

This study aimed to determine the variety of zobo that will give a desired colour and at the same time retaining most of the nutrient imbedded, after boiling for 10 min. The nutritional quality of non-alcoholic drink obtained from three varieties of zobo calyx (*Hibiscus sabdariffa*); dark red, bright red and wine subjected to the same preparation conditions were Investigated. Hundred grames of each of the samples were boiled separately in 4 L of water for 10 min to extract the juice into the water. The zobo drinks thus produced were analysed for their nutritional quality. It was observed that dark red zobo drink has the highest percentage of Vitamin C ( $7.5 \text{ mg g}^{-1}$ ), calcium (4 ppm) and ash (15.5%) content, the bright red recorded a high value in only magnesium (13.25 ppm) and the wine however, recorded the highest value in sodium (50.67 ppm), potassium (235 ppm), iron (1.17 ppm). The pH was noted to be high in all the three varieties i.e., 2.53. 2.50 and 2.67 for dark red, bright red and wine, respectively. The sensory evaluation also showed that the dark red zobo drink has the highest acceptability. It was therefore, concluded that the three varieties had their peculiar nutritional benefits therefore the choice depends on the producer and consumer; however, from the sensory evaluation the dark red was more preferred.

**Key words:** Zobo, nutrition, dark red, bright red, wine

### **INTRODUCTION**

Zobo drink (Sorrel, zoborodo) is a non alcoholic local beverage made from different varieties of dried petals, acid-succulent calyces of the flower *Hibiscus sabdariffa* by boiling and filtration (Ogiehor *et al.*, 2008; Kolawole and Okeniyi, 2007). *Hibiscus sabdariffa* is an annual erect, bushy herbaceous sub shrub with smooth or nearly smooth, cylindrical and typically red stem. This flower is highly cultivated in the northern part of this country probably because of the climate. It is gaining wide acceptance, being consumed by several millions of people from different socio-economic classes and background in the West Africa sub-region, especially amongst the youth, who sees zobo drink as an alternative source of cheap and relaxing non alcoholic drink in social gathering (Ogiehor and Nwafor, 2004). The calyces of *Hibiscus sabdariffa* have been found to be rich in Vitamins, natural carbohydrate, protein and Vitamin C and other antioxidants (Wong *et al.*, 2002) and also minerals (Babalola *et al.*, 2000) which constitute the major reason(s) for consuming soft drink and fruit juiced (Okoro, 2003; Ogiehor and Nwafor, 2004). The leaves of roselle are used as vegetables and the seeds are source of oil. Zobo drink if well prepared and packaged will compete favorably with most of the imported non alcoholic beverages available in the country, considering

the increasing acceptance, socio-economic potentials and ready source of protein and Vitamin C and other minerals, there is need to know the variety that can produce the highest amount of nutrient after preparation. The variety and preparation procedures for zoborodo, however, vary from one locality to another thereby leading to variations in the quality attributes especially the nutrients and appearance of the product. This study therefore sought to determine the variety that will not only give the desired colour but will also retain most of the nutrient imbedded after boiling for 10 min.

## MATERIALS AND METHODS

**Source of sample and processing:** Matured dried dark red, bright red and wine petals of *H. sabdariffa* used for this study were obtained from the open market in Kano, Kano State, Nigeria in March 2010 and processed. They were picked to separate dirt; 200 g of each were weighed into clean sterile 5 L beaker, washed lightly and boiled over a Bunsen flame with 4 L of water for 10 min. The extracts were collected immediately and thereafter filtered with the aid of a clean sterile muslin cloth. The filtrates were collected in pre-sterilized wide mouth glass bottles and kept for further analysis.

**Chemical analyses:** A pH meter (JENWAY, model 3020) was used to determine the pH of the samples. The protein content (%), minerals (ppm) and the Vitamin C ( $\text{mg g}^{-1}$ ) content were determined according to the methods of AOAC (1990).

**Sensory analysis:** A ten-member panel familiar with zobo drink assessed for colour, taste, flavor and overall acceptability. Scores were based on the nine-point hedonic scale where one equals extremely like and nine equals extremely dislike.

## RESULTS AND DISCUSSION

The result of the analyses which include the pH, minerals, protein and ash conducted on the three varieties of zobo calyx subjected to same condition of preparation are shown in Table 1. The Vitamin C content of the dark red zobo variety was higher than the bright red and the wine variety, 7.5 to 5.0  $\text{mg g}^{-1}$ .

The pH of the three varieties of zobo calyx drink ranges from 2.50 to 2.67 with the dark red having the highest which is on the acidic side. The minerals present include; calcium which is high in dark red and low in bright red variety, magnesium is high in bright red and low in dark red, sodium and potassium is high in wine as compared to the two other varieties. The protein is found to be of equal percentage in dark and bright red making it to compare favorably but low in wine variety. Ash content is high in dark red with percentage of 15.5 as compared with bright red and wine having 14 and 12%, respectively.

Table 2 shows the sensory evaluation of the three varieties; the dark red was preferred above the other variety drink in all parameters.

Table 1: The nutritional quality of the three varieties of zobo

Samples	Ash	pH (%)	Protein (ppm)	Ca (ppm)	Mg (ppm)	Na (ppm)	K (ppm)	Fe (ppm)	Vitamin (%)
Dark red	15.5	2.53	0.0875	4.00	5.75	35.78	220	0.67	7.5
Bright red	14.0	2.50	0.0875	2.00	13.25	25.11	219	0.67	5.0
Wine	12.0	2.67	0.04375	2.67	7.88	50.67	235	1.17	5.0

Table 2: Sensory properties of zobo

Samples	Taste	Color general	Acceptability (%)
Dark red zobo	8.9	11.2	55
Bright red zobo	7.8	2.3	15
Wine	3.3	6.5	30

Duke (1985) has earlier noted that zobo contains Vitamin C which raises the immune system of the body and this study confirmed it with the presence of moderate amount of Vitamin C which is higher in dark red variety. The ash content of dark red zobo drink was fairly higher than the other two samples indicating its high mineral value. Rao (1996) recorded that roselle generally contained high amount of ash which indicates that the plant provides appreciable quantity of minerals required by the body. The pH of the zobo drinks were all on the low side indicating and confirming the high acidity usually noticed in zobo drinks, it is found to be a naturally acidic fruit rich in organic acids: Oxalic, tartaric, malic and succinic (Wong *et al.*, 2002). The high acid level will also inhibit the growth of some microorganisms that are not tolerant to it according to Jay (1996). the excellent keeping quality of fruits and soft drinks is due to low pH. This is because low pH tends to inhibit bacterial growth. There was only a little difference in the amount of protein in the samples although all the samples are generally low in protein as recorded in the three samples of zobo tested but the three zobo samples were found to be rich in the various minerals tested in this research (Table 1). The level of Vitamin C and minerals found in this work were found to meet the daily requirement in juices and natural fruit drinks (Holden *et al.*, 1999) and all samples are having almost equal amount of the minerals tested, macro and micro nutrients inclusive (Table 1). Potassium which is a principal intracellular cation of most body tissues and participate in a number of essential physiological processes (Kolawole and Okeniyi, 2007) was found to be highest in the dark red variety. However, consuming a high concentration of potassium from either drugs, foods or drinks sources could result into cardiac arrest and small bowel ulcer. Bernie (1991) also observed the relatively low concentration of sodium ion in the three varieties (i.e., 35.76, 25.11 and 50.67 in dark red, bright red and wine, respectively) coupled with higher concentration of potassium had been shown to possibly be involved in reduction of blood pressure hence the antihypertensive effect of zobo drinks generally (Omemu *et al.*, 2006). In term of cost of production, dark red zobo is cheaper and produces more quantity of zobo drinks than other samples used at the same concentration.

The sensory evaluation result (Table 2) revealed that the dark red zobo drinks was rated higher than the other zobo drinks in terms of taste/ flavor, general acceptability and in color.

## CONCLUSION

With the present increase in the demand for zobo drinks due to its low prices, nutritional and medicinal properties (Obloh and Elusiyani, 2004; Osueke and Ehirim, 2004), the three varieties analyzed in this study is good for consumption since it was discovered that all the three varieties have their own peculiar nutrients embedded. However, the consumption of variety of zobo should be based on the choice of individual producer and consumer. But based on this research work, it is suggested that dark red zobo variety with high retention of Vitamin C content after 10 min of boiling and its acceptance by evaluators should be consumed more than other varieties.

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