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PROXIMATE AND MINERAL COMPOSITION OF SOME NIGERIAN FRUITS

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ABSRACT

Fresh fruit samples of guava (Psidium guajava), banana (Musa esculentus), pawpaw (Carica papaya), orange (Citrus sinensis), apple (Malaudomistica), watermelon (Citrus lanatus), soursop (Annonamuricata), bush mango (Irvingiagabonensis), pineapple (Ananuscomosus) were collected from Rumuolumeni market in Rivers state of Nigeria and analysed for nutrients and mineral contents. The nutrients compositions of the fruits showed that the amount of crude fibre ranged 0.00-3.55g/100g; crude protein, 0.29 – 1.28g/100g; Lipid, 0.10- 0.99g/100g; protein, 0.29 – 1.28g/100g; carbohydrate, 7.50 – 18.46g/100g; dry matter 10.40 – 27.44g/100g;ash, 0.27 – 2.50g/100g and moisture, 77.30 89.60g/100g.Elemental analysis of minerals gave the range of concentrations as zinc, 0.06 –1.26mg/g magnesium 14.67 – 45.71mg/g, iron 0.40 – 03.28mg/g, calcium,07.00 – 84.90mg/g. and potassium 26.15 – 380.05mg/g.Concentrations of iron were highest inA. comosus, magnesiumand potassium inM. paradisaca,zinc was highest inI. gabonensis and calcium was found to highest in C. papaya. The results showed that these fruits have safe and adequate dietary nutrients if consumed in the right proportion.

KEY WORDS: Fruits, mineral content, proximate, water, Nigeria

INTRODUCTION

In most developing countries like Nigeria, food shortage is becoming evident as a result of population growth, competition for fertile land and poverty (Bello et al., 2008). Lack of agricultural inputs, poor loan scheme and incentives are responsible for food shortage. Fruits have been a part of human diet and food supplement over the years. They contain high quantity of water, carbohydrate, vitamins A, B1, B2, C, D and E; and minerals such as Ca, Mg, Zn, Fe, K and organic compounds which are required in small amounts, to make the body function properly (Okwu and Emelike, 2006;Onibonet al., 2007;Dosumuetal., 2009; Dimari and Hati, 2010).Many fruits are used to make beverages, such as fruit juice (Orange, apple grape juices etc.) or alcoholic beverage such as wine,brandy or vinegar. Nutritionist have advised that eating at least five portions of fruits and vegetable a day can help people to maintain good health throughout their lives, protecting them from heart disease and cancer, Type 11 diabetes, kidney stones(Wenkam, 1990; Food Commission, 2009; USDA, 2003).Studies on metals have revealed their function in plants and animals which includes their role in osmotic regulations of the body fluids, enhances growth, and ensures healthy crops and animals, act as coenzyme and information of chlorophyll. Besides their dietary importance, they are also useful as nutrient supplement and recommended internationally as superior to processed foods. In view of the nutritional and health benefits of fruits, this study was designed to determine the proximate and mineral composition of nine known fruits obtained from Iwofe market Rumuolumeni, Rivers State of Nigeria.

MATERIALS AND METHODS

SAMPLE PREPARATION:

Fresh ripe samples of pawpaw (Carica papaya), banana (Musa paradisaca), apple (Malusdomistica), orange (Citrus sinensis) and guava (Psidiumguajava), watermelon (Citrus lanatus), soursop (Annonamuricata), bush mango (Irvingia gabonensis), Pineapple (Ananus comosus) were obtained at Iwofe market in Rumuolumeni, Rivers state, Nigeria. They were washed in distilled water and refrigerated for a day to prevent spoilage before extraction of juice and laboratory analysis. Banana, guava, bush mango, pineapple, soursop and pawpaw were blended in moulinex blender separately and the juice were sieved into different clean beakerswhile the apple, orange, and watermelon juices were extracted using juice extractor into a clean beaker before the analysis.

PROXIMATE COMPOSITION

The ash, moisture and dry matter composition of samples were determined using the standard methods (AOAC, 1990).

DETERMINATION OF MINERAL COMPOSITION

Two gram of each sample of fruits was dried and ashed at 500^{o}C for 1hr. The ash was dissolved in 10% 25ml HCl and made up to 100ml with deionized water in a standard flask. Ca, Mg, k, Zn, Fe, contents were determined according to AOAC, (1990) using Atomic Absorption Spectrophotometer(AAS) (Perkin-Elmer Model 372).

RESULTS AND DISCUSSION

Table 1 shows the proximate composition of the fruits investigated, moisture content varied between 75.00% in Citrus sinensis to 89.60% in Citrus lanatus with mean value of 82.17%. Moisture determination followed the following trend Citrus lanatus > Carica papaya >Ananas comosus>Molus domistica >Psidium guajava>Annona muricata>Musa paaradisiaca>Irvingia gabonensis>Citrus sinensis. These values are comparable to the work of Ashaye et al.,(2005). All the fruits studied had high moisture content which is typical of fresh fruits at maturity (Umoh, 1998).

The ash value ranged from 0.3% to 2.50% and had mean value of 1.32%. The ash content value compared favourably with most fruits value (Brain and Alan, 1992) but lower than those reported by (Amoo and Lajide, 1999 and Belloet al., 2008). The percentage ash of the sample gives an idea about the inorganic content of the samples from where the mineral content could be obtained. This study shows that Citrus lanatus had the highest ash value (2.50%). Samples with high percentages of ash contents are expected to have high concentrations of various mineral elements, which are expected to speed up metabolic processes and improve growth and development (Bello et al., 2008)

The observed wide range in moisture and dry matter in the fruits are similar to those reported by (Kohler and Bickoff, 1970) and this accounts for rapid deterioration of fruits if left unprocessed for long after harvesting.

The carbohydrate content of the fruits are low (7.50% to 18.60%). Samples with low carbohydrate content might be ideal for diabetic and hypertensive patients requiring for low sugar diets.

The protein concentration ranged from 0.29% to 1.28% for Malusdomistica and Psidium guajava. Proteins are essential component of diet needed for survival of animals and humans, their basic function in nutrition is to supply adequate amounts of required amino acids in nutrition (Pugalenthal et al., 2004). Protein deficiency causes growth retardation, muscle wasting, edema, abnormal swelling of the belly and collection of fluids in the body(Perkins – Veazieet al., 2005).

Table 1: proximate composition of fruit samples (mg/g)

Samples of fruits	K	Fe	Ca	Mg	Zn
Banana (Musa paradisacia)	380.05	00.86	07.24	45.71	00.45
Guava (Psidiumguajava)	166.18	02.40	16.46	15.67	00.06
Pawpaw (Carica papaya)	358.37	00.46	84.90	44.04	00.24
Watermelon (Citrus lanatus)	125.00	00.40	07.00	30.21	00.75
Soursop (Annonamuricata)	026.15	01.40	17.43	32.50	00.57
Bush mango (Irvingiagabonensis)	077.95	03.21	14.35	14.67	01.26
Orange (Citrus sinensis)	126.36	01.19	33.35	20.10	00.35
Apple (Malaudomistica)	280.10	00.43	18.65	27.12	00.51
Pineapple (Ananuscomosus)	261.03	03.28	16.45	25.20	00.15
Mean	187.37	1.49	21.66	26.36	0.68
Standard deviation	118.16	1.04	22.65	11.64	0.67
Coefficient of variation	1.59	1.43	0.96	2.26	1.01

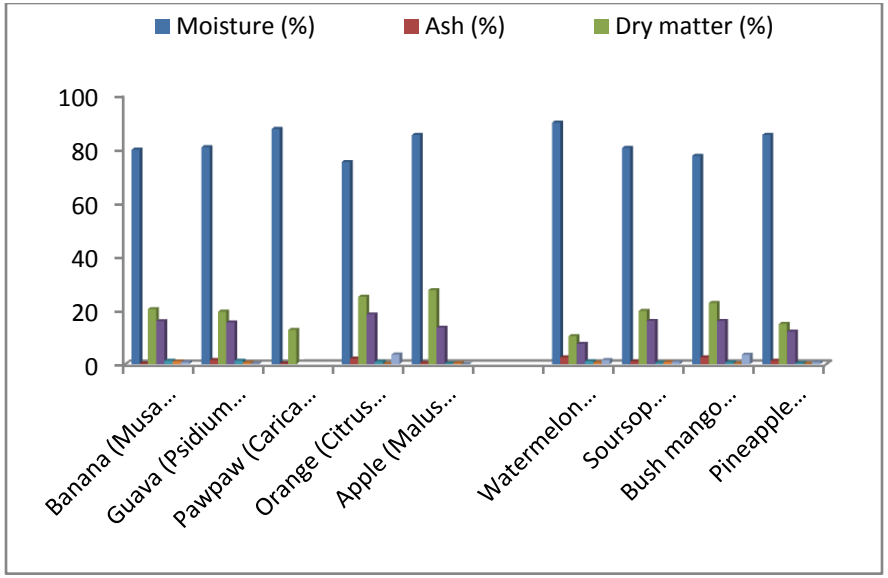

Fig.1. Proximate composition of nine fruits

Table 2. Mineral composition of nine fruits (mg/g)

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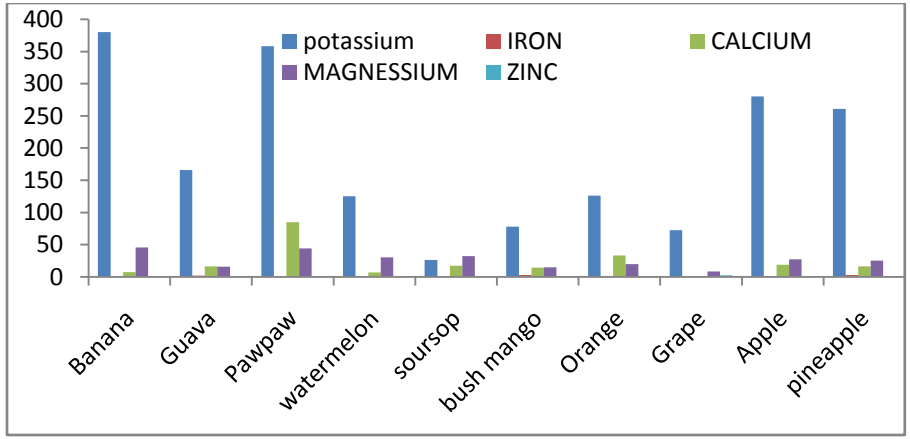

Fig.2. Mineral composition of nine fruits (mg/g)

Table 2 (figure 2) shows the result of the mineral composition of the nine fruits studied. Iron (Fe) is said to be an important element in the diet of pregnant women, nursing mothers, infants,convulsing patients and the elderly to prevent anaemia and other related diseases, (Oluyemi et al., 2006). Fe is required for energy and endurance because it delivers oxygen throughout the body. Butit is necessary only in small amounts for optimal health. The fruits with the highest iron content were Ananuscomosus (3.28mg/g) and Irvingiamuricata (3.21mg/g) respectively. The recommended daily allowance of iron for men is 7mg /day and 12-18 mg/day forwomen during pregnancy (NHMRC, 1991; Waller and Haymes, 1996; Dimari and Hati, 2010).

Magnesium (Mg) is needed for over 300 of our bodies 'most important biological processes, not the least of which is ATP energy production and muscular contractions. Nonetheless, it is most typically used by active individuals to prevent muscle cramping; to enhance muscle and nerve functioning; to relieve tight sore muscles; and to help improve bone density. Mg plays a major role in relaxing muscles along the airway to the lung thus allowing asthma patients to breathe easier. The daily value for Mg is 400mg. It plays fundamental roles in most reactions involving phosphate transfer, believed to be essential in the structural stability of nuclei acid and intestinal absorption while deficiency of magnesium in man is responsible for severe diarrhoea, migraines, hyper-tension, cardiomyopathy, arteriosclerosis and stroke (Bello et al., 2008). The highest magnesium content was obtained from Musa paradisaca and the least is from Irvingiagabonensis.

Psidium guajava contained the lowest concentration of zinc (00.06g/g) while Citrus lanatus (00.75mg/g) had the highest. Zinc is involved in thousands of bodily functions, such as proper cell growth and testosterone production (Dimari and Hati, 2010). Zinc is said to be an essential trace element for protein and nucleic acid synthesis and normal body development. It plays a central role in growth and development, vital during periods of rapid growth such as infancy, adolescence and during recovery from illness. Zinc deficiency has been largely attributable to the high phytic acid content of diets leading to poor growth, impaired immunity, and increased morbidity from common infectious diseases and increased mortality (Melakuet al., 2005).

CONCLUSION

These essential elements are needed for growth, production of bones, teeth, hair, blood, nerves, skin, vitamins, enzymes and hormones. The healthy function of nervous transmission, blood circulation, fluid regulation, cellular integrity, energy production and muscle contraction are influenced by essential elements and too little of any essential element can lead to deficiency disease and too much of it any can be toxic (Schauss, 1995).

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