International Journal of Chemical Science
Online ISSN: 2523-2843, Print ISSN: 2523-6075
Impact Factor: RJIF 5.22
www.chemicaljournals.com
Volume 2; Issue 4; July 2018; Page No. 13-15

Proximate composition of selected fruits consumed in Ihima metropolis of Okehi local government area, Kogi State

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Abstract
Five commonly consumed fruit samples Carrot, Coconut, Garden egg, Pineapple and Sweet Orange were purchased from Oboroke main market located in Ihima Metropolis of Okehi local government area of Kogi State and analyzed for proximate composition at National Research Institute for Chemical Technology (NARICT) Zaria, Nigeria. The results indicated that Sweet orange (*Citrus sinensis* L. Osb) has the highest moisture content (84.0 ± 0.05%) among the tested fruits and Coconut (*Cocos nucifera L.*) has the least moisture content (37.0 ± 0.02). The analysis also shows that Garden egg has the highest Crude protein (24.1± 0.15%) and this was followed by Carrot (*Daucus carota* L.) 13.0± 0.07% and Pineapple (*Ananas comosus* L.Merrill) has the lowest Crude protein (1.0± 3.40%). Coconut (*Cocos nucifera* L.) has the highest percentage of Crude fibre (12.0± 0.05%) with eggplant (*Solanum melongena*) having the lowest content (1.0± 0.11%). Coconut (23± 0.53%) and Carrot (5.76 ± 0.12%) has the highest Crude fat and ash respectfully. As enhancement and a guard against spoilage of products, provision of storage facility and soft loan to horticultural farmers were recommended among others.

Keywords: fruits, ihima, proximate, composition

Introduction
There are some basic characteristics of fruits that make them appealing to most people. All fruits are healthy when eaten in moderation. They are great sources of dietary fiber and most fruits are low in calories and fat. Those that have a high fat content, such as avocados, are actually good sources of healthy fats. Fruits are great snacks and they can also be used as combination of sugars: Water makes up 80% to 95% of fruits. Nigeria has abundant variety of fruits which are rich sources of nutrients and minerals to the populace. Nigeria as a developing country is experiencing food shortage as a result of population growth, competition for fertile land, poverty, lack of agricultural inputs, poor loan scheme and incentives (Bello *et al.*, 2008) [3]. The diets of most Nigerians are high in carbohydrates and deficient in protein. Nutritionists have advised that eating at least five portions of fruits and vegetables a day can help people to maintain good health throughout their lives, protecting them from heart disease and cancer, type 2 diabetes and kidney stones (Wenkam, 1990) [7]. Fruits, such as oranges, banana, watermelon, pineapple, guava, pawpaw abound in Nigeria and are consumed heavily in season because storage technology is not available to preserve the excess production. Fruits contain organic acids especially ascorbic and citric acids with the latter predominating. The water content in fruits keep their caloric content low and also provides fruit juice. Almost all fruits can be eaten raw juiced for a beverage, used in frozen desserts, preserved, or dried. Fresh whole fruits are considered to be the most nutrition (Abdullah *et al.*, 2010) [1]. Fruits are an excellent source of nutrition and should be consumed inmoderation as part of a healthy diet. Like vegetables fruits are a great source of vitamin, minerals, antioxidants, fiber and water. In the fruit group, several fruits are considered to besuper foods (Abdullah *et al.*, 2010) [1]. What determines a fruits (or any other plant food) to be a super food is its nutrient density. The super foods in the fruit group include berries citrus, coconut, mangoes, papaya and melons. All of these super foods contain a large supply of various nutrients. One of the most profound health benefits of fruits is that they are an excellent source of both types of dietary fiber (soluble and insoluble). The aim of this study is to carryout Proximate Composition analysis of some selected fruits consumed in Ihima Metropolis of Okehi Local Government Area, Kogi State.

Materials and Methods
The five fruit samples (Carrot, Garden egg, Sweet orange, Coconut and Pineapple) were bought from were bought from Oboroke main market located in Ihima Metropolis of Okehi local government area of Kogi State) and analyzed for proximate composition. The analysis was conducted at National Research Institute for Chemical Technology (NARICT) Zaria, Nigeria

Determination of moisture content
The moisture content of the samples was determined in accordance with AOAC (2000) [2] in which the sample were introduced in to an oven maintained at 105°C for one to four hours until uniform weight was attained. The moisture value was obtained using the equation, thus:

$$MC = \frac{W1-W2}{W2} \times 100$$

Where MC= Moisture Content, W1= weight of original sample and W2= weight of oven dry sample

Determination of Crude Protein (CP)

This analysis was conducted with an aid of micro Kjedhal system in accordance with AOAC (2000) [2]. 2g of the sample was introduced in to the digestion tube (Kjeltec 2400 FOSS) and, a catalyst (2 tablets of 5g K2SO4 and 5mg of Se) and 12ml of concentrated tetraoxosulphate VI acid (H_2SO_4) were added. The digestion was run for one hour at 420ºC. 80ml and 40ml of water and sodium hydroxide (NaOH) respectfully were used in the distillation using 2400 FOSS distillation unit and the distillate was collected in 4% Boric acid.

Percentage Nitrogen was calculated thus:

$$\%N = \frac{(\text{Titre- Blank}) \times 14.007 \times 0.1 \times 100}{1000 \times \text{sample weight (mg)}}$$

$$\%CP = \%N \times 6.25$$

Determination of Crude Fiber (CF)

The crude fiber of the sample was determined according to AOAC (2000) [2]. 2g of the sample was defatted with petroleum ether and then boil under reflux for 30minutes with 200ml of a solution containing 1.25g of H_2SO_4 per 100ml of solution. The solution was then filtered through linen on a fluted funnel. It is then washed with boiling water until the washings are no longer acid. The residue was then transferred to a beaker and boils for 30minutes with 200ml of a solution containing 1.25g of carbonate free NaOH per 100ml. the final residue was then filtered through a thin but close pad of washed and ignited asbestos in a Gooch crucible and dried in an electric oven and weigh. It was then incinerated, cooled and weighed. The percentage crude fiber was calculated as: %CF = Loss of weight after incineration x 100

Determination of Crude Fat

The fat contents were determined using Fat extractor with automated control unit (FOSS Soxtec 2055) according to AOAC (2000) [2]. The equipment has six extraction units with each unit carrying a thimble which accommodate the samples and aluminum cups for collection of the extracted fat. These units enable six samples to be analyzed within 75minutes. Percentage of fat is the differences between weight of the pre-weighed cups and after extraction. One gram of the samples was weighed into the thimble and its mouth plugged with defatted cotton wool, after which it was inserted in to the extraction unit. 80ml of petroleum ether were dropped in to each cup and maintained at 135ºC. Each cup was aligned with its corresponding thimble. The extraction and rinsing were done for 30minutes each, after which the sample was aerated for 15minutes and crude fat calculated as:

$$\%Fat = \frac{W3-W2}{W1} \times 100$$

Where W1 = weight of sample, W2 = weight of empty cup and W3 = weight of cup with the extracted oil

Determination of ash

The instruction of AOAC (2000) [2] was adhered to in the running of this analysis. Crucibles were rinsed and dried in hot air oven (SM9053) maintained for 30minutes at 105oC. These were cooled in desiccators and weighed. 2.5g of the sample was burnt on a heater inside a fume cupboard to get rid of smoke. The samples were moved to preheated muffle furnace (JENWAY 5600) maintained at 550ºC until such a time when a light grey ash was noticed. The crucibles were cooled in desiccators and weighed. The ash content was calculated as:

$$\%\ Ash = \frac{(\text{weight of crucible + Ash}) - \text{weight of empty crucible}}{\text{Weight of sample}} \times 100$$

Results and Discussions

Fruits	Moisture content (%)	Crude Protein (%)	Crude Fibre (%)	Crude fat (%)	Ash Content (%)
Cocos nucifera (Coconut)L.	37.0 ± 0.02	7.2± 0.11	12.0± 0.05	23± 0.53	1.34 ± 0.04
Citrus sinensis (Sweet Orange)L.	84.0 ± 0.05	8.1± 0.61	2.0 ± 0.01	0.02 ± 0.01	0.44 ± 0.56
Daucus carota(Carrot)L.	76.3 ± 0.07	13.0± 0.07	1.1± 0.13	0.19 ± 0.07	5.76 ± 0.12
Solanum melongena (Garden egg)	80.5 ± 0.18	24.1± 0.15	1.0± 0.11	0.03 ± 0.05	0.27 ± 0.02
*Ananas comosus (Pineapple)*L.Merill	79.3 ± 0.03	1.0± 3.40	8.2± 0.14	0.31± 0.02	0.22 ± 0.01

As shown in table 1 above, *Citrus sinensis* L. (orange) has the highest moisture content (84.0 ± 0.05%) at the time of the analysis. This was followed by *Solanum melongena* (80.5 ± 0.18%) *Ananas comosus* L. Merill (79.3 ± 0.03%), *Daucus carota* L. (76.3 ± 0.07%), and *Cocos nucifera* L. (37.0 ± 0.02%) respectfully. These moisture values were higher than that of *Pachira glabra* (8.17%) as reported by Oni *et al.*, 2015. *Solanum melongena* has the highest protein content (24.1± 0.15%) among thefive fruits studied. Ogunlade *et al.*, 2011 and Oni *et al.*, 2015 reported 10.38% and 7.67% protein for *Pachira glabra*. This shows that *Solanum melongena* (garden egg) can be a good source of plant protein and hence may help in body building and repairs. Tabitha (2013) reported a protein content of same species (*Solanum melongena*) to be 16.25%. The variation may be attributed to the source of the species. The samples of this study were collected from Sudan Savanna ecological zone while that of Tabitha were collected from northern Guinea Savanna zone. *Daucus carota* has the second protein ranking (13.0± 0.07%) among the fruits analyzed and was closely followed by Citrus sinensis (8.1± 0.61%), *Cocos nucifera* (7.2± 0.11%) and *Ananas comosus* has the least protein content even though higher than the report of Oni *et al.*,2015 which says that the protein content of *Pachira glabra* was found to be 7.67±0.82. The result of the analysis also

indicated that *Cocos nucifera* has the highest value of crude fiber (12.0± 0.05%) and can therefore helps in the maintenance of cholesterol and lower blood sugar in addition to prevention of constipation among adults (Gopalan *et al.*, 1997) [4]. *Ananas comosus* has the second crude fiber value (8.2± 0.14%) and was followed by *Citrus sinensis* (2.0 ± 0.01%), *Daucus carota* (1.1± 0.13%) and *Solanum melongena* (1.0± 0.11%).

Table 1 also reveals that *Cocos nucifera* has the highest value for crude fat (23± 0.53%). Fat is good source of energy and a medium for dissolving vitamin A, B, E and K and its deficiency may results in suboptimal growth, fatty liver problem and susceptibility to respiratory disease (Ogunmoyela *et al*.,2013) [5]. *Ananas comosus* has 0.31± 0.02% and *Daucus carota* has 0.19 ± 0.07%. *Citrus sinensis* and *Solanum melongena* has equal crude fat value (0.03 ± 0.05%). *Daucus carota* has the highest quantity of ash (5.76 ± 0.12%) indicting high mineral composition.

Conclusion

In conclusion, the results of the proximate analysis of the commonly used horticultural products indicated that, carrot, coconut, eggplant, pineapple and ora*nge* contain very useful quantity of food classes necessary for the maintenance of good body health. In order to improve on the present production level and for economic enhancement of the farmers involved, the following were recommended.

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