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DETERMINATION OF NUTRITIONAL COMPOSITION OF *Citrullus lanatus* (WATER MELON) FRUIT

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ABSTRACT

The nutritional quality of pulp, rind and seed, of *Citrullus lanatus* were determined. The study was carried out on dried sample. The percentage composition of pulp, seeds and rind tested were found to be low in Ash content for pulp, seeds and rind of *C. lanatus* (0.46, 0.62, & 0.94%) and high in carbohydrates content (91.49, 84.31 & 37.89%) respectively. Similarly the concentration of mineral elements potassium (K) was found to be low in pulp, seeds and rind and high in sodium (Na)in different part of the *C. lanatus*. The nutrients content obtained from the different part of the plant may contribute to the maintenance of good nutritional status and hence good health for both man and livestock.

Keywords: Nutritional Compositions, *Citrullus lanatus*, fruit.

INTRODUCTION

Human posses great capacity to adapt physiologically to different types of foods in spite of this, nutrition science has demonstrated that there are certain food that cannot be eliminated such as fruits and fresh vegetables.[1]Fruits offer the most rapid methods of providing adequate supplies of vitamins, minerals and fibers to people living in the tropics. Most of fruits and vegetable have low energy density and are recommended for weight management[2]. The optional diet for everyone as recommended by the world health, food and agriculture organization is a low-fat and fibre diet rich in complex carbohydrates characterized by a frequent consumption of fruits and vegetable atleast 400g daily as well as whole-grains, cereals and legumes atleast 30g daily[3]. Water melon (*Citrullus lanatus*) belongs to the gourd family called cucurbitaceous and the genus *Citrullus*. The entire content of the water melon constitutes 96% water that is very sweet and refreshingly tasty. The outer cover of the fruit is relatively hard compound to the pulp, the pulp initially is white and changes colour as it mature to ripening. The ground dried to constant

weight, water melon serve as typical beverage, which could be used in the place of bournvita, pronto in tea preparations[4]. Report that water melon fruit is made up of 95% moisture, 0.5% Ash, 0.1% oil, 0.5% fibre 5% carbohydrate, 250,000 vitamin A, 0.004mg thiamine, 0.03mg Riboflavin, 8.0mg calcium, 9.00mg phosphorus, 0.200mg iron, 0.6mg Niacin, 15.0mg Ascorbic Acid, and 6.0mg potassium[5].Water melon is rich in carotenoids some of which include lycopene , phytofluenes, phytoene, Beta-carotene, lutein. Hycopene make up the majority of the carotenoids in water melon, the carotenoid content varied depending on the variety of the water melon. Water melon seeds are excellent sources of protein (both essential and non-essential amino acids) and oil [6].

Water melon diet helps to regulate acid-base equilibrium, removes/lowers the cholesterol level, has strong diuretic tendencies (that is increases as the amount of water in urine) remove excess water from the body contribute to clearing the kidney/prevents the formation of bladder stones, kidney stones, among others. Water melon contains 96% of water and vitamin and traces of cholesterol. It also contains thirst quencher and also some anti inflammatory compounds responsible for the asthma, arthrosclerosis, diabetes, colon cancer and arthritis. It contains high levels of hycopene, antioxidants that may help the body fight cancer [7]. In view of nutritional importance of water melon, the study was carried out to determine the nutritional contents of water melon in Sokoto metropolis.

MATERIALS AND METHODS

Sample Collection

The fresh pulp, rind seeds of *C. lanatus* were collected from sokoto central market of Sokoto metropolis, Sokoto state of Nigeria. The pulp, rind and seeds were air dried and grounded into fine powder using motor and pestle and sieved using 0.2mm mesh screened, kept in separate container prior to be used.

Determination of Proximate Compositions

Determination of Moisture Content

The total water component of a sample is described as the moisture content of the food sample. It determines the storage capacity of the sample the crucibles were oven dried at 90^0c for 30min and transferred into desiccators to cool. After cooling 5g of each of the samples were weight in crucible and dried. At 110^0c to a constant weight

The percentage content of each sample was then calculated as follows:

Moisture content (%) = $\frac{W_3 - W_1}{W_2 - W_1} X\ 100$

Where:

W_1 = weight of crucible

W_2 = weight of crucible and sample before drying

W_3 = weight of the crucible and sample after drying.

Determination of Ash Content

The ash of a Biological material is an analytical term for the organic residue of that remains after organic dried in an oven has been burnt off. The crucible were dried in an oven at 90^0c for 30min and were transferred into desiccators to cool and weighed, 5g if each of the sample were weighed into the crucible and heated in a muffle furnace set at 500^0c for 2 hours after which crucible were transferred into desiccators to cool and weighed the percentage ash was then calculated as follows:

Crude Ash (%) = $\frac{W_3 - W_1}{W_2 - W_1} X\ 100$

Where:

W_1 = weight of crucible

W_2 = weight of crucible and sample before ashing

W_3 = weight of the crucible and sample after ashing.

Determination of Crude Fat

The lipid content of each sample was extracted by soxhlet with the use of an extraction apparatus. Each thimble used for the extraction was weighted, labeled before 10g of the powdered sample was transferred into the thimbles. The weight of the thimble plus the sample then were recorded, and the apparatus filled with $250cm^3$ petroleum ether. The top of the condenser were then plugged with cotton wool and cold water from tap was circulated through the condenser. This apparatus gently and the extraction allowed to continue until the solvent around each thimble become colourless after 4 hours indicating the end of the extraction. The thimbles were then removed from the apparatus and the cotton wool removed before they were dried to constant weight in an oven set at 70^0c, the thimbles were cooled and the re-weighed. This was repeated for each of the sample. The lipid content of each content was calculated as follows using the formula.

Crude fat (%) = $\frac{W_1 - W_2}{W_3} X\ 100$

Where:

W_1 = weight of the thimble plus dried sample before extraction

W_2 = weight of thimble plus residue after extraction

W_3 = weight of the dried sample used in grams.

Determination of Crude Fibre

Crude fibre represents the organic residue left behind after the material has been treated under standardized condition with petroleum ether boiling dilute sulfuric acid, boiling dilute sodium hydroxide solution and dilute hydrochloric acid. A soxhlet apparatus was used to extract fat from l0g of grounded sample, 100$cm^3$of boiled 1.3% H_2S0_4 was poured into the extracted sample and allowed to boil for 30minute. It was filtered the excess acid was washed down from the sample with warm water, and transferred into a beaker. 100cm^3 boiled 2.5% NaOH was added and allowed to boil for 30min. It was filtered, excess NaOH removed from the residue by washing down with, warm water. The filter paper containing the residue was folded and place in a crucible of known weight, and placed in an oven, dried at 105^{0}c for 3 hours the weight was recorded, and dried further for 15min to constant weight. The crucible was transferred to a furnace and burnt at 500^{0}c to complete ash.

Crude fibre (%) = $\frac{W_1 - W_2}{W_3} X\ 100$

Where:

W_1 = weight of residue + crucible before ashing

W_2 = weight of residue + crucible after ashing

W_3 = weight of the dried sample.

Determination of Crude Protein

This analysis was carried out using the distillation Microkjedahl method described by Oyeleke (1984). This process involves digestion, distillation and titration. Powdered water melon (100mg) was weighed into micro Kjedahil flask for digestion, 0.04 (achip) of a mixed catalyst (from a mixture of 1g of $Cuso_4$, 8g $K_2So_4$and 1g selenium dioxide) with a spatula was added to the samples, along with 5ml of nitrogen free concentrated sulphuric acid. This was heated gently on a digestion stand until funes of sulphuric acid were freely evolved. Blank solution prepared by heating 2ml of concentrated sulphric acid and mixed catalyst without any sample in the digestion flask. A Markham distillation apparatus was used for the distillation of this digest. The apparatus was steamed for 10 min before use. The digest in the digestion flask was washed out

twice into the distillation flask followed by addition of 2ml of distilled water and 10ml 40% NaOH. The ammonia that was liberated from the digest was condensed in the condenser of the apparatus and collected in 25ml beaker containing 5ml 2% boric acid plus 2 daps of mixed indicator (a mixture of 6ml methyl red 0.16% in 95% alcohol, 2ml Bromo cresol green 0.04% in water and 6ml of 95% alcohol). The tip of the condenser was set up to touch the surface of the solution in the beaker and the position was maintained throughout the distillation period to arrest any escape of ammonia. The distillation was continue till the 2ml mark in the beaker was reached. After distillation of each sample, the apparatus was washed thoroughly with distilled water before next sample was introduced into it.

The distillate collected was titrated against 0.02N Hcl solution until a faint prink colour was obtained. The procedure was repeated for each sample. Percentage nitrogen content of each sample was calculated using the formula.

% of nitrogen = $\frac{(A-B)N \times 14.001}{W} \times 100$

Where,

A = Quantity of hydrochloric acid used to neutralized test sample.

B = Quantity of hydrochloric acid used to neutralized blench

W = weight of sample taken in mg.

The % of protein content of each sample was calculated as follows protein (%) = nitrogen (%) x conversion fact or (6.25)

Determination of Mineral Elements

The analytical method employed was that of atomic absorption spectrophotometry (AAS). The technique is a very sensitive one, in which the absorption of radiant energy by the atoms of the metal in question is determined. Here a solution of the element of interest is aspirated into the flame where the bulk of the atoms remains in the ground state while only 1% are excited to higher electronic state by absorbing some of the radiant energy from a characteristic wavelength hollow cathode lamp which is passed through the flame. Decrease in radiation is the measured using a monochrometer and a detector system. The extent of absorption depends on the number of atoms in the ground state and the decrease in intensity is related to the concentration of the element in solution.

The ashed sample was digested in 50ml distilled water, 20ml Nitric acid (HNO_3) was added then the mixture was heated to dryness on an electronic mantle,

allowed to cool, 40ml distilled water added and filtered. The filtrate was made upto 100ml wit distilled water until a clear solution was formed

RESULT

The proximate composition of water melon pulp, rind, and seeds showed the percentage composition of moisture ash, fat, fibre, protein and carbohydrates. It has indicated that carbohydrates content (91.49, 84.31 and 37.84mg) of the different part of the plant is high and the ash contents (0.46, 0.62 and 0.94%) is low as shown in the table 3.1 below. Similarly table 3.2 showed the concentration of mineral elements tested such as sodium, potassium, calcium and magnesium in pulp, rind and seeds of water melon which showed high concentration of Na (597.4, 488.5 and 94.4mg) in different part of plant and low concentration of K(0.005, 0.14 and 1.16mg)

Table 3.1: Nutritional Composition of Pulp, Rind and Seeds of *C. lanatus*.

Parameters analyzed	Part of plant		
	Pulp %	Rind %	Seeds %
Moisture	5.22	3.85	4.92
Ash content	0.46	0.62	0.94
Fat content	1.33	0.82	29.13
Crude fibre content	0.82	4.73	2.38
Crude protein content	0.68	5.66	25.15
Carbohydrate	91.49	84.31	37.84

Table 3.2: Mineral Elements Content in Pulp, Rind and Seeds of *Citrullus lanatus*.

Element analyzed	Part of plant		
	Pulp (mg)	Rind (mg)	Seeds (mg)
Sodium	597.4	488.5	94.4
Potassium	0.005	0.14	1.16
Calcium	0.16	0.74	4.47
Magnesium	4.33	6.08	25.87

DISCUSSION

The dried pulp, rind and seeds of *Citrullus lanatus* were analysed and interpreted. The values of the nutritional composition of *Citriullus lanatus* that is moisture crude, fibre, ash, fat, protein and carbohydrate agrees with the finds of [7, 8, 9, 10, 11, & 12] who worked on nutritional components of food. Reported

a range value of fibre 0.1-6.8g for fruit and 0.5-5.2g for seeds. This report is similar to the finding in this study, the seeds have higher value than the pulps. The carbohydrate content is of the pulp and rind in this samples are high then the seeds of *C. lanatus*.

It was observed that the seeds of *C. lanatus* have high levels of proteins and lipid. This agrees with previously published work on these seeds [12]. The variation in protein content of the pulp, seed and rind of the fruit in this study agrees with the earlier work by [9]. Who reported that fruits are low in total nitrogenous components as compared to seeds leaves and some other plant parts and tissues [9] also reported that fruit are not very good sources of fats and are thus recommended as part of weight reducing diet as observed in the pulps of *Citrullus lanatus*[14] reveals that seed of *C. lanatus* are rich in oils. The seeds of *Citrullus lanatus* are excellent sources of protein (35g) and (50g) as reported by [14] and has high content of protein and oils C. lanatus contains an amino acids that may plays on important role in human body's urea cycle as reported by [15]. The mineral elements content of this part of the plant was similar to the finding of [15].

CONCLUSION

The proximate study of *Citrullus lanatus* has no doubt been confirmed to have nutritional contents and it may be recommended for use as a source of nutrients for human and livestock.

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