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Biochemical study of *balanites aegyptiaca* and *parinarium macrophylum* fruits in northern Nigeria

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ABSTRACT

The fruits of *Balanites aegyptiaca* and *Parinarium macrophylum* were analysed for moisture, solid, crude protein, crude fibre, lipids, carbohydrates, acidity, ash, organic matter, ascorbic acid, potassium and sodium contents. The average mass of each fruit was 4.12 ± 0.68g and 50.52 ± 6.25g respectively. The percentage ash, organic matter, and crude fibre were 8.12 ± 0.87%, 91.89 ± 0.97% and 2.09 ± 0.00% for *Balanites aegyptiaca* and 4.51 ± 0.07%, 95.49 ± 0.07% and 96.32 ± 0.46% for *Parinarium macrophylum* respectively. The percentage vitamin C content was 0.04 ± 0.00% and 0.02 ± 0.00%, while total acidity was found to be 0.19 ± 0.00M and 0.05 ± 0.00M for each fruit. The sodium and potassium content was 4.33 ± 0.02% and 0.94 ± 0.04% for *Balanites aegyptiaca* and 17.99 ± 0.03% and 0.73 ± 0.07% for *Parinarium macrophylum.*

Introduction

Balanites aegyptiaca (*Balanitaceae*) belongs to the family, *Zygophyloceae*, with the common names like Desert date, Soapberry, Thorn tree while the local names in various languages are: Arabic - *bhanitez*, Hausa - *Aduwa*, Kanuri - *bito*, Fulani – *tanni*. Many parts of the tree are the fruits, bark, roots, stem and leaves (Hutchinson and Dalziel, 1958). *Parinarium macrophylum* also known as ginger-bread-plum-tree or *Gawasa* in Northern Nigeria is a *Rosaceae* which is found in Tropical Africa. The fruits are yellow and deep brown in colour respectively (Iwu, 1993).

The composition of various elements in body varies due to the variation in the type of food eaten and air breath (Brown, 1990). The various food eaten in various communities contain nutritionally useful substances like carbohydrates, proteins, fats, minerals, vitamins and moisture in varying proportion (Arlin,1977). Fruits can provide a reasonable proportion of these nutrients, as well as a body defense provider of antioxidant. This is mostly due to their free radical scavengers' properties (Howell, 1975).

Moisture content is the amount of water in a given substance which occurs in food in three forms as bound water, adsorbed water and bulk or free water which vary depending on the type of food, storage factors, geographical location and the time of the year, whether raining or dry season (Pearson, 1973). It is not easily determined because water form complexes with many natural products in which it may be tightly bound. Bound water is chemically bound as water of crystallization or hydrates. While adsorbed water is physically bound as monolayer to the surface of the constituents and free water is that which essentially separate constituents, which can easily be lost by evaporation or drying (AOAC, 1975). Water is the solvent in which all substance required for cell's existence are dissolved or suspended (Devlin, 1997). The importance of the ash content is that it gives an idea of the amount of mineral elements present in a sample while the organic matter gives an estimate of proteins, lipids, carbohydrates plus nucleic acid content in the sample (Charles and Guy, 1999). Carbohydrates are energy producing constituents of foods and based on their digestibility is divided into two; *available carbohydrate* - these are carbohydrates that are digestible, absorbed and therefore utilizable nutritionally and *unavailable carbohydrate* - these are dietary fibre or roughages (Kilgour, 1987). Lipid or fat can be defined as the material soluble in organic solvents (Lehninger, 2000). The lipids serve culinary, physiological and nutritional functions in foods (Kummerow, 1986). Direct extraction gives the proportion of free fat but gives no clue to the particular fatty acid involved (Pearson, 1981). Protein is the major compound containing nitrogen (amino acids, purines, ammonium salts etc), so nitrogen is used as an index of the protein termed 'crude protein' as distinct from true protein (Oyeleke, 1984). Protein is important for their amino acids source which is essential for all body functions (McDonard *et al.*, 1988). Vitamin C (ascorbic acid) is a water-soluble vitamin present in citrus fruits and juices, green peppers, cabbage, spinach, broccoli, kale, cantaloupe, kiwi, and strawberries. The RDA is 60mg per day. Vitamin C, also found in green leaves, is essential to rebuild collagen breaks in the blood vessels and skin (Lind, 1973).

Since a major way in which the nutritional status of a society can be maintained is through reliable information on the nutrient composition of the foods we eat. This research was carried out to investigate some biochemical component of these two locally available and consumed fruits to ascertain their nutritional importance.

Materials and Methods

Sample source and preparations

The two fruits were purchased from Kurmi market in Kano. The sample were then air-dried and ground to powder using mortar and kept in the refrigerator.

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Proximate Analysis

Proximate analysis was carried out on the sample and was analyzed for carbohydrates, moisture, ash and organic matters, crude protein (N X 6.25), and crude fat were determined according to standard A.O.A.C (1980), Pearson (1981), Johann Kjeldahl (1848 - 1900) and modified by Bradstreet (1952) procedures.

Crude fibre was determined by method described by Whitehouse *et .al*., 1945). The crude fat was based on the usual procedure of continuously extracting the fat content of a sample using a suitable solvent, e.g. petroleum ether (40 - 60^0C/ 60 - 80^0C), diethyl ether, etc, in a convenient extractor such as soxhlet. The total carbohydrate content was determined by the hydrolysis of polysaccharides into constituent free sugar employing dilutes acid. The hydrolysis is followed by spectrophotometer measurement using the Anthrone reagent at wavelength of 620nm. Mineral analysis was carried out according to standard A.O.A.C (1980) procedure.

Total Acidity Determination

1g of sample was extracted in 20cm^3 of distilled water. 10cm^3 of the filtrates was then titrated against 0.1M NaOH solution using phenolphthalein indicator. Acidity was calculated as: cm^3 of 0.1M NaOH per 10g of sample.

Vitamin C content Determination

5.0g of the ground sample was dissolved in water in a 50cm^3 volumetric flask and made up to mark and filtered 50cm^3 of this was pipetted into a 100cm^3 volumetric flask, 25cm^3 of 20% metaphosphoric acid was then added and made up with water. 10cm^3 of the solution was then pipetted into a flask and 2.5cm^3 acetone added. This was titrated with the indophenol solution until a faint pink colour persisted for 15 seconds. The concentration was calculated as mg/g i.e. as mg of ascorbic acid equivalent to 1cm^3 of the dye solution.

Vitamin C (mg/100cm^3) = $\frac{T}{S}$ x 2 x Dilution factor.

Results and Discussions

Table 1: The nutrient constituents of the fruits of *Balanites aegyptiaca* and *Parinarium macrophylum*

Parameter/sample	*Balanites aegyptiaca* (a date)	*Parinarium macrophylum* (a plum)
Moisture content	8.70 ±1.18	65.67 ± 0.01
Solid matter	91.30 ±1.18	34.33 ±1.14
Crude protein	2.09 ± 0.00	0.03 ± 0.00
Total lipids	11.72 ± 2.73	10.17 ± 0.95
Carbohydrates	68.67 ± 4.62	18.33 ± 1.53
Ash	8.2 ± 0.87	4.51 ± 0.07
Organic matter	91.89 ± 0.89	95.49 ± 0.07
Crude fibres	0.65 ± 0.18	96.32 ± 0.46
sodium	4.33 ± 0.20	17.00 ± 0.30
Potassium	0.94 ± 0.04	0.73 ± 0.07
Vitamin C	0.04 ± 0.00	0.21 ± 0.00
Total acidity	0.02 ± 0.00	0.04 ± 0.00

Values are mean of three determinations ± SEM.

Table 1 above shows the determined nutrient constituents present in the fruit samples of *Balanites aegyptiaca* (a date) and *Parinarium macrophylum* (a plum). The moisture content of fruits of *Balanites aegyptiaca* and *Parinarium macrophylum* was found to be low compared to earlier finding of Sood *et al.*(1982) of 75.3% and 75-95% range given for most fruits (Pearson, 1968). The lower moisture content could be adaptive feature by the fruit to prevent growth of microorganism as observed from their shelve life compared to fruits like banana and oranges.

The higher ash and organic matter compared to most fruits makes the fruit good and cheap sources of these nutrients. Sodium and lipids was found to be significant in these two fruits. Though *Balanites aegyptiaca* was observed to be a better source of carbohydrates and protein, however compared to most fruits the vitamin C level and total acidity were very low. The fruit was obtained when it was out of season, which could account for this. It was the dried epicarp fruit that was used in carrying out the study.

Conclusion

The high ash value suggested that a reasonable consumption of these cheap and locally available fruit with lower moisture content than most fruit makes it available all season when most fruits are out of season. This can thus provide the required daily intake of most body required mineral elements it contains.

Reference

AOAC (1975). Official methods of Analysis, 12th edition, Association of Official Analytical Chemists, Washington D. C.

AOAC (1980). In: Official Methods of Analysis, 12th edition, Association of Official Analytical Chemists, Washington D. C.

Arlin, M. (1977). The Science Nutrition. 2nd edition. Macmillan C. Inc. New York.

Brown, M (1990). Present knowledge in nutrition 6th edition. Washington DC; International life science institute.

Bradstreet, (1952). Laboratory techniques in protein analysis.

Charles, A. and Guy, L. (1999). Food Biochemistry, by Aspen Publishers, Inc. Gaitherurg, Maryland. Pg. 13, 14, 15.

Hutchinson, J and Dalziel J.M (1958). Floral of West Africa, Vol. I, part 2, by Crown Agents for Overseas Govt. and Administration, Milbank, London. Pg. 363.

Howell, M. A. (1975). Diet as an aetiological factor in the development of cancers of the colon and rectum. J. Chron. Distribution. 28: 67 – 80.

Ihekoronje, A.T. and Ngoddy, P. O (1985). Integrated food science technology for Tropics. Macmillan Press Ltd. London.

Iwu, M. M. (1993). Handbook of African Medicinal Plants, Pharmacological, Profile of selected plants. CRC Press New York

Johann, K. (1848 - 1900). Kjehdahl method for laboratory techniques in protein.

Kilgour, O. F. A (1987). "Mastering Nutrition", Macmillan Master Series, London. Page 113 - 114.

Kummerow, F. A. (1986). Dietary effects of trans fatty acids. Journal Environmental Pathology, Toxicology & Oncology. Pg. 6, 123 – 149.

Lehninger, A. L. (2000). Principles of Biochemistry, 3rd edition. Worth Publishers Inc., USA, Pg. 1152.

Lind, J (1973). A treaise of scurvy, Reprinted, 1953, Edinburg University Press, Edinburg.

Oyeleke, O. A. (1984). Analysis of Food Science. Department of Biochemistry, University Of Ilorin, Nigeria.

Pearson, P. (1973). Laboratory Techniques in Food Analysis, Buthermuthus, London.

Pearson, P. (1981). The Chemical Analysis of Food J.A Churchill, London Production

Sood, D. R.. (1982): Composition variations in dried date palm fruit varieties. Indian journal of nutrition and diabetics. 19 (5): 146 – 148.

Whitehouse, Zarrow and Shay (1945): Trichloroacetic acid method for crude fibre determination, J. A.O.A.C. 28 (1).