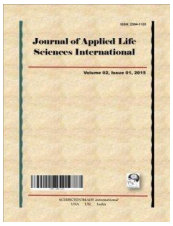

Journal of Applied Life Sciences International

21(4): 1-5, 2019; Article no.JALSI.49873
ISSN: 2394-1103

Comparative Analysis of Phytochemicals Screening, Proximate and Elemental Analysis of *Anacardium occidentale* L. Nuts and *Carica papaya* Seeds

Abubakar Hayatuddeen[1*], Timothy Musa Chiroma[2], Barambu Nafiu Umar[3] and Mohammed Bashir[4]

[1]Chevron Biotechnology Centre, Modibbo Adama University of Technology, P.M.B. 1079, Yola, Adamawa State, Nigeria.
[2]Department of Chemical Engineering, School of Engineering and Engineering Technology, Modibbo Adama University of Technology, P.M.B. 1079, Yola, Nigeria.
[3]Department of Chemical Engineering, School of Engineering and Engineering Technology, Abubakar Tafawa Balewa University, Bauchi, Nigeria.
[4]Department of Microbiology, School of Life Science, Modibbo Adama University of Technology, P.M.B. 1079, Yola, Nigeria.

Authors' contributions

This work was carried out in collaboration among all authors. Authors AH and TMC designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors AH and BNU managed the analyses of the study. Author MB managed the literature searches. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/JALSI/2019/v21i430111
Editor(s):
(1) Dr. Martin Koller, University of Graz, Research Management and Service, Institute of Chemistry, Austria.
Reviewers:
(1) Maria Bintang, IPB University, Indonesia.
(2) Rosany Piccolotto Carvalho, Universidade Federal do Amazonas, Brazil.
(3) Raju Senthil Kumar, Swamy Vivekanandha College of Pharmacy, India.
Complete Peer review History: http://www.sdiarticle3.com/review-history/49873

Original Research Article

Received 25 April 2019
Accepted 02 July 2019
Published 03 August 2019

ABSTRACT

Aims: The aim of this study was comparative analysis of phytochemicals screening, proximate and elemental analysis of *Anacardium occidentale* L nut and *Carica papaya* seeds extracts.
Study Design: The samples were cleaned, washed with water, dried, and grinded with a laboratory mortar and pestle, packed in an air tight container and stored ready for further analysis.

**Corresponding author: E-mail: hayatumautech@gmail.com;*

Place and Duration of Study: The research was conducted at the Chevron Biotechnology Centre, Modibbo Adamawa University of Yola, Nigeria which lasted for about three months.
Methodology: The nuts were manually separated from fruit pulp, cleaned, washed with water, dried, roasted and grinded with a laboratory mortar and pestle, packed in an air tight container and stored ready for further analysis.
Results: The result of *Anacardium occidentale* L nut phytochemicals screening showed that with Glycosides (-), Tannins (+), flavonoids(+++), Alkaloids(++), Saponins(-) and the proximate composition (%) were as follows: moisture content (9.7 ± 0.2), ash content (3.46±0.3), crude fat (26.79± 0.5), crude protein (14.26 ± 0.01) carbohydrate (by difference) (45.78± 0.01) Calorific (Energy) value 482.00 Kcal. The mineral analysis (mg/100g) revealed that magnesium (3.50 ± 0.01), Manganese (2.00 ± 0.01), Nickel (3.22 ± 0.01) and Cobalt (0.13 ±0.01) while the phytochemical screening for *Carica papaya* seeds extracts also showed Glycosides (+), Tannins (++), flavonoids(++), Alkaloids(++), Saponins(-) for the moisture content (8.59 ± 0.3), ash content (4.09±0.16), crude fat (15.60± 0.2), crude protein (15.84 ± 0.01) carbohydrate (by difference) (41.63) Calorific (Energy) value 1549.25 Kcal. The mineral analysis (mg/100g) revealed that magnesium (3.02 ± 0.02), Manganese (0.22 ± 0.01), Nickel (3.41 ± 0.01) and Cobalt (0.18 ± 0.01).
Conclusion: The study therefore indicates that the *Anacardium occidentale* L nut and *Carica* may not provide all the nutrients required by human in the right proportion though it contains an appreciable quantity of some essential nutrients like Fats, Proteins, Carbohydrate and some minerals.

Keywords: Anacardium occidentale L; Carrica papaya; elemental analysis; phytochemicals and proximate.

1. INTRODUCTION

Phytochemicals can be referred to as natural occurring compounds in plant. They contribute to colour, smell and flavor of plants and are plant natural defense mechanism against most disease with many therapeutic value and diseases prevention for human beings [1]. Few examples of phytochemicals are saponin, tannins, flavoniods and alkaloids [2]. Most plants have active compounds which are usually extracted from the plant structures such as roots, flowers, seeds or fruits, corms, stem and bark but, the concentration of the active compounds vary from structure to structure. The structure with the highest amount is usually preferred to be use as therapeutic purpose [3]. The pungent, repulsive smell and bitter taste in many plants are usually responsible for repressive ability over the metabolic activities of many microorganism [4,5].The screening of photochemical compounds helps in knowing the presence of bioactive compounds which can also be used for antimicrobials analysis of the plant extracts. The phytochemistry of plants shows that the extracts can be use for medicinal applications from different localities [6,7,8].

Carrica papaya can be described as a herbaceous fruit crop that comes from the family of Caricaceae. It is native to places like America which is mostly grown in the tropics in subtropics and tropics. The plant has some medicinal values such as antibacterial, cardiotonic, analgesic, amebicide, cholagogue, hypotensive, digestive, emenagogue, febrifuge, vermifuge, pectoral, stomachic and laxative. It is also rich in three vital antioxidant such as vitamin E,vitamin A and vitamin C and some minerals such as potassium and magnesium, it also contain B vitamin, pantothenic acid, fiber and folate. It also contains digestive enzymes like papain which successfully treats allergies, sport injuries and cause of truma [9]. It is also widely distributed in places like Asia, Nigeria and other countries of the world and it is ranked first amongst major food crops which was recommend for deficiency cause by childhood blindness [10,11]. There are many biological active phytochemicals compounds that have been isolated from C. papaya and studies for various applications. All the parts of C. papaya have been such as leaves, fruits, peal, latex and roots have been found to have important biological active compounds which have various pharmaceutical uses [12].

The cashew plant with botanical name *Anacardium occidentale* L it belongs to the family Anacardiaceae, also has potential for use as medicinal plant. The stem barks and the leaves has been use for the treatment of diarrhea, bronchitis, dysentery, cough, impotence and syphilis-related skin disorders [13,14]. Nigeria is the largest producers of cashew nut in the worlds with its shell where the cashew nut is a popular

snack and food source [15]. Cashew nut oils and its many applications in polymer based friction epoxy resins, varnishes, linings, primers and foundry chemicals [16]. The phytochemicals analysis reveals that it has phenolic glycosides, saponins, phenols, flavonoids and glycosides [17,18]. In this present study, the comparatively analysis of phytochemicals screening, proximate and elemental analysis of *Anacardium occidentale* L nut and *Carica papaya* seeds extracts were analyze.

2. MATERIALS AND METHODS

2.1 Samples Processing

The samples for this experimented were collected from Gerei Local Government of Adamawa State, Nigeria and taken to Chevron Biotechnology Centre, Modibbo Adama University of Technology. The nuts of *Anacardium occidentale* L were manually separated from fruit pulp, cleaned, washed with water, dried, roasted and grinded with a laboratory mortar and pestle, packed in an air tight container and stored ready for further analysis. The seeds of *Carica papaya* were manually separated from fruit pulp, cleaned and washed with water. It was shelled manually to remove seed coat and air-dried for one week. They were sorted to remove bad ones, shelled, grinded with a laboratory mortar and pestle, packed in an air tight container and stored ready for further analysis.

2.2 Phytochemicals Analysis

The phytochemicals analysis for flavonoids, alkaloids, saponins, tannins and glycosides were both tested according to Sofowora [19].

2.3 Elemental Analysis

Mineral compositions for Magnesium, Manganese, Nickel and Cobalt of *Anacardium occidentale* L nuts and *Carica papaya* were determined by atomic absorption spectrophotometer according to [20].

2.4 Proximate Analysis

After bringing the samples to uniform size, they were analysed for moisture content, crude protein, crude fat, ash content, carbohydrate and energy value according to [20].

3. RESULTS AND DISCUSSION

The proximate composition of the cashew nut contained crude fat (26.79±0.5) and protein (14.26±0.01). It also contained (9.71±0.2) moisture, ash (3.46±0.3), and carbohydrate by difference (45.78± 0.01). Some of these values were in agreement with those reported by Achal [21]. The moisture content of cashew nut was 9.8%. This value fell within the range of mean values of moisture of legumes (between 7.0% and 11.0%) reported by Arkroyed and Doughty [22]. Seeds with low moisture content could store for a longer time without spoilage. Ash content of cashew nut in this study was 3.4%. Previous studies showed ash content of kolanut and cowpea to be 3.1% and 3.2% respectively Arogba [23], and of cashew nut flour 4.4±0.1% [24]. An ash content of 1.5 - 2.5% for nuts has been recommended for suitability as animal feeds [25], but with the value of ash reported in this study, cashew nut may be unsuitable for animal feeds. The values of fat and protein were also comparable to those obtained by Pearson [26]. The fat content values ranged from 16.41-44.34%. The fat and oil content of cashew nut contributes substantially to its energy content.

Carica papaya the five elements analysed, magnesium was present in (3.02 ± 0.02ppm), nickel was present in (3.41 ± 0.01ppm), cobalt was detected in (0.18 ± 0.01ppm), and manganese was detected in (0.22 ± 0.01 ppm). However, chromium was not detected. These minerals serve as cofactors for many physiological and metabolic functions [27]. For the proximate composition, the percentage ash content was presented in (4.09 0.16). This low ash content indicates that the seed is low in mineral contents and high in organic contents [28]. The percentage of moisture is 8.59 0.3 and this low moisture indicates that the seed can be stored for sometime without undergoing spoilage. The percentage of fibre content (14.09 0.1) is low and will decrease nutrient digestibility in animals since high fibre contents enhance nutrient digestibility. The percentage fat content (15.6 0.2) is also 40 low and contributes small amount of energy to animals and humans. Also, the percentage protein content (15.84 0.1) is low compared to the RDA for protein which is in the range of 28-65g for children, lactating mothers, pregnant women and adults [29]. However, the carbohydrate content (41.63%) which was calculated by difference is relatively high and this carbohydrate provides necessary calories in diet. The high carbohydrate content of the seed suggested that it could be a good source of

Table 1. Qualitative phytochemical analysis

Inference	Cashew nut	*Carica papaya*
Flavonoids	+++	++
Alkaloids	++	++
Saponins	–	–
Tanins	+	++
Glycosides	–	+

Key: + present, ++ moderately present, +++ adequately present and – absent

Table 2. Elemental analysis

Parameters	Cashew nut	*Carica papaya*
Magnesium	3.50 ± 0.01	3.02±0.02
Manganese	2.00 ± 0.01	0.22±0.01
Nickel	3.22 ± 0.01	3.41±0.01
Colbat	0.13 ± 0.01	0.18±0.01

Table 3. Proximate analysis

Parameters	Cashew nut concentration (%)	*Carica papaya* concentration (%)
Moisture Content	9.70 ± 0.2	8.59±0.3
Crude Fat	26.79 ± 0.5	15.60±0.2
Ash Content	3.46 ± 0.3	4.09±0.01
Crude Protein	14.26 ± 0.01	15.84±0.1
Carbonhydrate	45.78 ±0.01	41.63±0.01
Energy Value	482.00 (kcal)	1549.25 (kcal)

energy [30]. The calculated energy value of *Carica papaya* seed (1549.25kcal) is also relatively high. The high energy value is mainly linked to the high carbohydrate content and this makes the seed a useful source of energy.

4. CONCLUSION

The study therefore indicates that the *Anacardium occidentale* L nut and *Carica papaya* may not provide all the nutrients required by human in the right proportion though it contains an appreciable quantity of some essential nutrients like Fats, Proteins, Carbohydrate and some minerals.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Okwu DE. Phytochemicals and vitamin content of indigenous species of South Eastern Nig. J. Sustain. Agric. Environ. 2004;6:30-34.
2. Chikezie PC, Agomuo EN, Amadi BA. Biochemistry, Practical/Research Method, A fundamental approach. Mega Soft Publishers. 2008;2:51-53.
3. Kafaru E. Immense Help from Natives Workshop, 1st Ed, Elizabeth Kafaru, Lagos, Nigeria.1994;11-14.
4. Mitscher LA, Ryey Ping L, Bathala MS, Wu-wu-Nan D, Roger W. Antimicrobial agents from Higher Plants: Introduction, Rational and Methodology. Llaydia. 1992; 35(2).
5. Baladrin MF, Clocke JA, Wurtele ES, Bolinge WH. National Plant Chemicals: Source Industrial and Medicinal Materials Science. 1985;228:1154-1160. Diabetes Prevention Program Research Group. A study of digit fusion in the mouse embryo. J Embryol Exp Morphol. 2009;49(2):259–276.
6. Gali AI, Abudulhamid AA, Effa EB, Adebiyi A, Useh MU, Etuk-Udo G. Physicochemical characterization and antibacterial activity of *Senna occidentalis* Linn. Journal of Chemistry and Chemical Sciences. 2016;6(1):9-18.
7. Ngwu NW, Effa EB, Ftepti BJ, Gali AI, Useh MU, Samuel CJ. Biochemical Studies of *Ocimum sanctum* and *Olax subscorpioidea* leaf extracts. British Journal of Pharmaceutical Research. 2016;12(4):1-9.
8. Adebiyi A, Bassey EE, Ayo R, Bello I, Habila J, Ishaku GA. Anti-mycobacterial, antimicrobial and phytochemical evaluation

of Pulicaria crispa and Scoparia dulcis plant extracts. Journal of Advances in Medical and Pharmaceutical Sciences. 2016;7(4):1-11.
9. Aravind G, Bhowmik D,Duraivel S, Harish G. Traditional and medicinal uses of Carica papaya. Journal of Medicinal Plants Studies. 2013;1:7-15.
10. Gouado I, Schweigert FJ, Ejoh RA, Tchouanguep MF, Camp JV. Systemic levels of carotenoids from mangoes and papaya consumed in three forms juice fresh and dry slice. Eur. J. Clin. Nutr. 2007; 61:1180-1188.
11. Afolayan AJ. Extracts from the shoots of arctotis artotoides inhibit the growth of bacteria and fungi. Pharma Biology. 2003; 14:22-25.
12. Flath RA, Forrey RR. Volatile components of papaya (*Carica papaya* L., solo variety). Journal of Agricultural and Food Chemistry. 1983;25(1):103-109.
13. Bilcalho B. Volatile compounds of cashew apple (*Anacardium occidentale* L.). Z. Naturforsch. 2001;56(12):35-39.
14. Franca F, Cuba CA, Moreira EA, Miguel O, Almeida M, das Virgens ML, Marsden PD. An evaluation of the Effectof a bark extracts from the cashew (*Anacardium occidentale* L.) on infection by Leishmania (Viannnia) brasiliensis. Rev. Soc. Bras. Med. Trop. 1993;26:151-155.
15. Hammed LA, Anikwe JC. Cashew Nuts and Production Development in Am-Euras. J Sci Res. 2008;3:54-61.
16. Mahanwar PA, Kale DD. Effect of Cashew nut shell liquid (CNSL) on properties of phenolic resins. J. Appl. Polymer Sci. 1996;61:2107-2111.
17. Shahidi F, McDonald J, Chandrasekara, A, Zhong Y. Phytochemicals of foods, beverages and fruit vinegars: chemistry and health effects. Asia Pacific J Clin Nutr. 2008;17:380-382.
18. De-Fatima A, Modolo LV, Conegero LS, Pilli RA, Ferreira CV, Kohn LK, et al. Lactones and their derivatives: Biological activities, mechanisms of action and potential leads for drug design. Curr. Med. Chem. 2006;13:3371-3384
19. Sofowora EA. Medicinal plants and traditional medicine in Africa 2nd edition spectrum book Ltd. Ibadan; 1993.
20. AOAC. Official methods of analysis of the association of official‟s analytical chemists, 17th edition., Arlington, Virginia; 2003.
21. Achal DB. Cashew: Nutrition and medical Colarado State University. 2002;159-165.
22. Arkroyed WR, Doughty J. Legumes in human nutrition food and Agricultural Organization nutrition studies publication .19; 1994.
23. Arogba SS. Studies on kolanut and cashew kernels moisture absorption isotherm: Proximate composition and functional properties, Food Chemistry. 1999;67:223-228.
24. Aremu MO, Olaofe O, Akintayo TE. A comparative study on the chemical and a composition of some Nigerian underutilized legumes flours. . 2006;34-38.
25. Pomeranz, Clifton D. Food analysis theory and practices. 1991;17.
26. Pearson DA. Chemical analysis of foods 7th edition. 1996;422-511.
27. Balogun IO, Olatidoye OP. Chemical composition and nutritional evaluation of Velvet bean seeds (Mucuma utilisis) for domestic consumption and industrial utilization in Nigeria. Pak. J. Nutr. 2012;11: 116-122.
28. Egharevba HO, Kunle FO. Preliminary phytochemical and proximate analysis of the leaves of *Piliostigma thonningii* (Schumach) milneredhead. Ethnobotanical Leaflets. 2010;14:570-577.
29. Adinortey MB, Sarfo JK, Quayson ET, Weremfo A, Adinortey CA, Ekloh W, Ocran J. Phytochemical screening, proximate and mineral composition of *Launaea taraxacifolia* leaves. Res. J. Med. Plant, 2012;6:171-9.
30. Yisa J, Egila JN, Darlinton AO. Chemical composition of *Annona senegalensis* from Nupe land, Nigeria. Afr. J. Biotech. 2010;9: 4106-4109.

Peer-review history:
The peer review history for this paper can be accessed here:
http://www.sdiarticle3.com/review-history/49873