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Comparative Study of the Nutritional and Anti Nutritional Composition of *Phyllantus niruri* and *Carica papaya*

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Abstract The leaves of *Phyllanthus niruri* and *Carica papaya* were dried and ground for antimicrobial and physiological properties. The data generated were subjected to basic statistical analysis with both samples having low levels of oxalate (1.05 mg/100g) for *Phyllanthus niruri* and (1.06mg/100g) for *Carica papaya*, but high in phytate, glycoside, and steroids. The proximate analysis revealed that the moisture content was (9.2±0.01 and 7.54±0.01) and the percentage ash content was (2.50±0.15 and 2.56±0.0015) respectively, which indicates that the mineral composition of both samples were high. The crude fat and protein of the *Carica papaya* doubled that of the *Phyllanthus niruri*. The crude fibre content of *Phyllanthus niruri* was (10.25±0.25) and *Carica papaya* was (10.03±0.01), the carbohydrate content were (72.08±0.01) and (69.79±0.01) respectively. Tannin levels were low in both (0.62±0.05, 1.05±0.06) but Saponin levels were (1.52±0.06, 1.48±0.05) which are marginally higher in *Phyllanthus niruri* and *Carica papaya* respectively. The moisture content (9.20±0.01, 7.54±0.01) were quite comparable and the ash content was within reasonable limits, which makes them suitable for animal feeds. Both samples have low crude protein levels, but high fiber content. The calcium content of *Carica papaya* (85.20±0.02g/100g) is higher than that of *Phyllanthus niruri (26.53±2.85g/100g)*. The Pb, Cu and P were of the least abundant in both samples while K was found to be the most abundant. The leaves of *Phyllanthus niruri* and *Carica papaya* are rich in important nutrients, according to the findings. It comprises a number of important phytochemicals and the anti-nutrient levels are low in both leaves.

Keywords Antimicrobial, Anti-nutrient, Natural product, Physiological Properties, Phytochemicals

1. Introduction

Nature has bestowed upon us a vast botanical wealth, with a large number of diverse plant species growing in various parts of the globe. There has been a growing interest in the medicinal properties of natural products all over the world [1]. Humans have relied on nature for their essential needs for shelter, clothes, fertilizer, flavors and fragrances and most importantly food and medicinal remedies throughout history.

Natural products have played an important role in the treatment and prevention of diseases; it is estimated that more than half of all medications in clinical use are higher plant-derived natural products [2]. According to the World Health Organization (WHO), approximately 80% of people in developing countries still depend on conventional medicine for primary health care, which involves the use of plant extracts [3]. The enzyme papain is found in the fruits stem and leaves of *Carica papaya* [4]. Wrapping meat in a papaya leaf before cooking softens it because it contains biologically active compounds including Chymopain and papain, which help digestion. Orally, papain has been used to treat less severe digestive problems such as bloating and chronic indigestion [5]. Papain is also used to

treat arthritis and intestinal worms. Papain's phytochemicals can boost the immune system and encourage the release of natural chemicals that attack tumor cells [6]. Any part of the *Carica papaya* is economically valuable and its applications range from nutritional to medicinal. Fruit is widely used and processed into juice and wine, as well as being cooked as a vegetable. The seed is medically important in the treatment of sickle cell disease and poisoning-related disorders [7]. It is also used in the treatment of digestion and other ailments such as overweight, obesity, high blood pressure, and heart weakening due to its anti-oxidant and fiber content [8].

Phyllanthus niruri is an animal herb that grows wild in India after a monsoon shower. It is commonly found along the coast, particularly during the second week of June and bears fruit until mid-July or August. Hassan *et al.,* [9] found that it can be found in the wild until the end of the rainy season, so the aim of this study is to compare the chemical and phytochemical composition of *Carica Papaya* and *Phyllanthus niruri* leaves.

Estimating metal content analysis was also essential in order to determine the safety profile of the leave.

Anti-nutrient analysis: The procedure described by Sofowora [10] was used to quantify oxalate, phytate, tannins, cyanogenic glycoside, tannins and saponins in triplicate.

The goal of this study is to compare the chemical and phytochemical composition of *Carica papaya* and *Phyllantus niruri* leaves, as well as estimate the metal content in others, in order to determine the safety profile of leaf consumption.

2. Material and Methods

2.1 Collection and identification of Plant Samples:*Carica papaya* and *Phyllantus niruri* leaves were collected from Rufus Giwa Polytechnic's medicinal plant garden in Owo, Ondo state, and the leaves were identified in the department of Agricultural Technology in Rufus Giwa Polytechnic,Owo.

- Preparation of Plant Samples: The leaves were dried and milled with an electric mill, and the powdered sample was stored in an airtight container and held at 4°C until required for analysis.
- **Nutritional and Phytochemical Composition:** All the parameters for determination of nutritional composition were followed from the method adopted by AOAC [11].

2.2 Phytochemical screening: standard phytochemical screening procedures were used to identify the existence of secondary metabolites in powdered samples [11].

Proximate and Meal content Analyses: The powdered sample was proximately analyzed using a standard protocol [11], with the following parameters determined: Ash content, moisture content, protein content, lipid content, fiber content, and carbohydrate content. The Atomic Absorption Spectrophotometer (Bulk Scientific VGP 210) was used to analyze the sample for mineral content in triplicate [11].

Statistical Analysis: The data was analyzed using basic percentages, mean(s), and standard deviation. Using the student's t-test and basic percentages, the data was statistically evaluated for discrepancies.

3. Results and Discussion

Table 1: Proximate Composition (%) of *Phyllanthus niruri* and *Carica papaya* leaves

Parameter (%)	*Phylanthus niruri*	*Carica papaya*
Moisture	9.2 ± 0.01	7.54 ± 0.01
Ash	2.50 ± 0.15	2.56 ± 0.015
Crude fat	2.15 ± 0.02	4.25 ± 0.04
Crude protein	3.05 ± 0.20	6.84 ± 0.25
Crude fiber	10.25 ± 0.25	10.03 ±0.01
Carbohydrate	72.08 ± 0.01	69.79 ± 0.01

Values are mean ± standard deviation of triplicate determination.

The proximate composition of both *Phyllanthus niruri* and *Carica papaya* leaves are shown in Table 1. Moisture content were 9.2±0.01 and 7.54±0.01 and the percentage ash content was 2.50±0.15 and 2.56±0.0015 respectively, which indicates that the mineral composition of both samples were high. The crude fat and crude protein of the

Carica papaya are double that of the *Phyllanthus niruri*. The crude fibre content of *Phyllanthus niruri* was 10.250.25 and *Carica papaya* was 10.03 0.01.This helps in the digestivity and absorptivity of food in the colon and the carbohydrate content were 72.08±0.01 and 69.79±0.01 respectively.

Since the moisture content of *Phyllanthus niruri* is higher than that of *Carica papaya*, both samples' moisture content findings are within the appropriate range. That is, it can be stored for a long time without spoiling. In this analysis, the ash content of both samples was (2.50 ± 0.15, 2.56 ± 0.05) and according to [12], the ash content of nuts, seeds, leaves and tubers should be between 1.5 and 2.5 % in order to be suitable for animal feeds. Both samples have an ash content that is within the acceptable range, so they can be used in animal feeds.

Fat is essential in diets because it aids in the absorption of soluble vitamins [13]. It contains high-energy nutrients and does not make up a significant portion of most people's diets. Though *Carica papaya* has a higher fat content than *Phyllanthus niruri*. Apart from the nutritional value of protein as a source of amino acids, it also plays a role in the organoleptic properties of foods. The crude protein of both samples is very poor as compared to protein of rich foods such as Cowpea, soyabean, and pigeon pea seeds flour [14]. Fiber is considered important since it absorbs water and provides roughage for the intestine, aiding intestinal transit. Fiber in food is beneficial to the digestive process, but it inhibits the action of vitamins and enzymes in the food [15]. When compared to yam and tubers, both samples have a rather high fiber content. For *Phyllanthusniruri* and *Carica papaya*, the carbohydrate content was found to be significantly higher (72.08 ± 0.01 and 69.79 ± 0.06 respectively). The presence of carbohydrate in both samples suggested that they are healthy sources of energy and that they should be included in diets.

Table 2: Mineral composition of *Phyllanthus niruri* and *Carica papaya* leaves (g/100g)

Mineral	Phyllanthus Niruri	*Carica papaya*
Ca	26.53 ± 2.85	85.20 ± 0.02
Mg	76.00 ± 0.02	65.72 ± 0.03
Na	10.20 ± 0.01	17.01 ± 0.15
K	74.56 ±2.89	82.81 ± 0.00
Fe	11.52 ± 0.02	19.25 ± 0.25
Mn	8.52 ± 0.06	9.25 ± 0.52
P	2.65 ± 0.25	1.42 ±0.02
Cu	1.25 ± 0.02	0.96 ± 0.06
Pb	0.82 ±0.01	2.81 ±0.03

Values are mean ± standard deviation of triplicated determination.

Table 2: showed the mineral content (g/100g) of *Phyllanthus niruri* and *Carica papaya*. Pb, Cu, and P were found to be the least abundant minerals, while K was found to be the most abundant mineral in both samples (74.56 ± 2.89, 82.81 ± 0.00 g/100g). This is in line with Olaofe and Sanni [16] who found potassium to be the most prevalent mineral in Nigerian agricultural products. The next highest mineral variable was discovered to be magnesium (71.00 ± 0.02, 62.72 ± 0.03). Magnesium has been shown to activate a variety of enzyme systems and sustain nerve electric potentials [17]. *Carica papaya* has a higher calcium content than *Phyllanthus niruri* (85.20 ± 0.02, 26.53 ± 2.53) g/100g. Calcium is involved in bone formation along with Phosphorus, Magnesium, Manganese, Vitamin A, C and D, Chloride, and Protein (Fleck, 1976). Calcium also plays a role in blood clotting, muscle contraction, and the activity of certain enzymes in metabolic processes.

Phosphorus has a lower mean value than calcium (2.65 ± 0.25, 1.42 ± 0.02) g/100g in both samples. Phosphorus is often present in the body with calcium, leading to a low Ca^{+}/P ratio in the blood, meaning that it will be a good mineral source for bone formation [18]. The sodium-to-potassium ratio in the body is crucial for preventing high blood pressure; Na^{+}/K is recommended [19]. This suggests that combining the two samples would likely minimize the risk of high blood pressure.

Table 3: Phytochemical profile of Methanolic Extract of *Phyllanthus niruri* and *Carica papaya*

Phytochemicals	***Phyllanthus niruri***	***Carica papaya***
Alkaloid	-	-
Flavanoids	+	++
Tannins	++	+++
Saponin	++	++
Phytate	+	+
Glycosides	+	-
Stereoids	+	++

Note: + = slightly Present ++ = moderately present +++ = highly present.

Table 3 revealed the phytochemical profile of *Phyllanthus niruri* and *Carica papaya* methanoic extracts, which showed that both samples are high in flavonoids, saponin, tannins, and have a minor amount of phytate, glycoside, and steroids. While alkaloids were not present in either sample, flavonoids, saponin, and tannin are known to have antimicrobial and physiological properties [20]. In mammalian and other biological systems, flavonoids have a broad variety of biochemical and pharmacological activities [21]. Anti-inflammatory, antioxidant, anti-allergic, antiviral and anti-carcinogenic properties are all present in these secondary metabolites found in two samples [18].

Table 4: Some Anti nutritional content of Methanolic Extract of *Phyllanthus niruri* and *Carica papaya* (mg/100g)

Phytochemicals	**Phyllanthusniruri**	**Carica papaya**
Oxalate	1.05 ± 0.02	1.06 ± 0.01
Phytates	4.05 ± 0.10	4.15 ± 0.05
Tannins	0.62 ± 0.05	1.05 ± 0.06
Saponin	1.52 ± 0.06	1.48 ± 0.05
Glycosides	0.03 ±0.03	0.01 ± 0.01

Values are mean ± standard deviation of triplicate determination.

Table 4 revealed the concentrations of each of the anti-nutrients. As compared to other plant leaves such as *Solanum nigrum*, which had 5.81mg/100g, and *Anetum africanmum*, which had 20.9 mg/100g, the findings showed that both samples had low levels of oxalate (1.05 ± 0.02, 1.06 ± 0.01) for *Phyllanthus niruri* and *Carica papaya* respectively [22].

Tannin content was low in both samples, but saponin content was slightly higher (0.62 ± 0.05, 1.05 ± 0.06)mg/100g than the saponin value content of *Solanum nigrum* seed (1.66 ± 0.01)mg/100g. Saponin has been shown to have both beneficial and deleterious properties, as well as structure-dependent biological activity [18]. For *Phyllanthusniruri* and *Carica papaya*, the phytate amounts were (4.05 ± 0.10 and 4.16 ± 0.05 respectively). The presence of phytate in food is needed because high concentrations have a negative impact on digestion [23]. Cu^{2+}, Zn^{2+}, Co^{2+}, Ca^{2+} and Mg^{2+} form stable complexes with it as well.

Conclusion

According to the results, the leaves of *Phyllanthus niruri* and *Carica papaya* are high in essential food nutrients and it can be used for the fortification of human and animal foods It contains some essential phytochemicals. According to the phytochemical screening and anti-nutrients analysis, both leaves have low levels of some anti-nutrients.

References

[1]. Maruyama Y., Begum K., Kim H.S., Wataya Y., Tran Q.K and Kadota S. (2003). *In vitro* antiplasmodial activity of antimalarial medicinal plant used in Vietnamese traditional medicine. *J. Ethnopharmacol 86; 249-252*.

[2]. Abolaji O.A., Adebayo A.H. and Odesanmi O.S. (2007). Nutritional quantities of three medicinal plants parts (*Xylopia aethiopica*, *Blighla sapida* and *Parinari polyandra*) commonly used by pregnant women in the western part of Nigeria. *Park. J. Nutr.* 6. 665-668.

[3]. Anosike C.A., Ogbodo N.E, Ezegwu A.L., Ani C.C. and Abonyi O. (2005). DPPH(1,1 Diphenyl-2-picrylhydrazyl) Radical scavenging activity of some ethanol medicinal plant in Nigeria. *American Eucrasian J. Toxicology Sci* .7(2).

[4]. Krishna K.L., Paridhavi M. and Jugrutti A.P. (2008) Review, A nutritional Medicinal and pharmacological properties of *Carica papaya*. *Natural products radiance*. 7. 364-373.

[5]. Afolabi I.S., Marcus G.D., Olanrewaju T.O., Chizea V. (2011) Biochemical effect of some food processing methods on health promoting properties of under-utilized *Carica papaya* seed. *Journal of Natural process* 4, 17-24.

[6]. Eno T., Shama. K. and Ogbeide B. (2000). The biochemistry of various parts of *C. papaya*. *Int. J. med. Arom Plants*, 2(4) 573-578.

[7]. Saran P.L. (2010). Screening of Papaya cultivars under Doon Valley conditions Pantnagar. *J. Res.* 8(2) 246-247.

[8]. Odu E.A., Adedeji O., Adebowale A. (2006) Occurrence of hermaphroditic plant of *Carica papaya* (caricaceae) in south western Nigeria. *J. Plant Sci*, 1: 254-263.

[9]. Hassan H.H., Habib H.I.,Gonaid M.H. and Islam M. (2011) comparative phytochemical and antimicrobial investigation of some plants growing in Al jabal. *Alakh-dal J. Nat.prod. Plant Resource* 1(1):15-23.

[10]. Sofowora A. (1980) Guideline for research promotion and development of traditional medicine. *Nig. J. Pharmacy* 11: 117-118.

[11]. AOAC. (2005) Association of Analytical Chemist Official Method of Analysis 19th Edition Washington D.C.

[12]. Pomeran Z.V. and Clifton (1981). Properties of deltated soya bean, peanut, field pea and Pecan flour. *J. Food science* 42, 1440-1450.

[13]. Borget J.L., Briggs G.M., Galloway D.H. (1994) Nutrition and physical fitness. *Int. J. food Sci. Nut.* 45, 223-230.

[14]. Aremu M.O., Olonisakin D.A., Bako and Madu P.C. (2006) Compositional studies and physicochemical characteristic of Cashew nuts (*Anarchadium occidentale*) flour. *Park. J. Nutr. 5. 328-333.*

[15]. Jide Alfred O., Aladekoyi Gbenga, Karimu O., Alademeyin J.O. (2018) Proximate and physicochemical properties of flour and oil Extracted from raw and boiled locus Bean (*Parkia biglobosa*). *The pharmaceutical and chemical journal* 5(4): 1-5.

[16]. Olaofe O. and Sanni C.O. (1998). Minerial contents of agricultural products. *Food Chem* 30: 73-77

[17]. Ferra J.E.M., Ferro A.M.B.C and Antures A.M.G. (1987) Bambara groundnut (*Vigna subteranean*) Aspect of its Nutritive value. *Gracia Deoita Seriede Estuada Agroonomics* 141 35-39.

[18]. Ekeanyanwu C., Rapheal, Ogu I., Gideon and Nwachukwu (2010) Biochemical characteristics of the Africa Nutmeg (*Monodara myristrica*) *Agricultural Journal* 5(5) 303-308.

[19]. Nieman D.C., Butterworth D.E., Niema C.N, (1992) Nutrition WMC Brown publisher. Dubaguepp 50.

[20]. Evans W.C. (2005) Trease and Evan, Pharmacognosy 15th edition Division of Reed Elsevier india Pvt Ltd, New Dehli ISBN 13 978-81-312-0087-2.

[21]. Middleton H.C., Kandaswami and Theoharides T.C (2000).The effect of plant flavonoids on mammalian cells implications for inflammation heart diseases and cancer. *Pharmacol Revision 52.678-751*.

[22]. Amaechi. N.C. (2009) Nutritive and anti-nutritive Evaluation of wonderful Kola (*Bucecholz iracoricea*) seeds. *Park. J. Nutr.* 8. 1120-1122.

[23]. Akintayo E.T. and Bayer E. (2002). Characterization and some possible uses of *Plukenetia camphora* and *Adonophopus breviflorus*. *Seed and seed oil Bioresource Technology* 85. 95-97.