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COMPARATIVE STUDY ON THE PHYTOCHEMICAL CONTENTS OF *Zingiber officinale, Carica papaya* and *Garcinia kola* LEAVES CULTIVATED IN AKWA IBOM STATE, SOUTH-SOUTH NIGERIA

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AUTHOR'S CONTRIBUTION

The sole author designed, analysed, interpreted and prepared the manuscript.

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ABSTRACT

Phytochemical composition of the leaves of *Zingiber officinale, Carica papaya,* and *Garcinia kola* were studied. The phytochemical analysis carried out revealed the presence of Tannins, Saponin, Alkaloids, Flavonoids and Cyanogenic glycoside. Tannins content for *Zingiber officinale, Carica papaya* and *Garcinia kola* were 2.47±0.0019 mg/100 g, 4.47 ± 0.663 mg/100 g and 0.0046 ± 0.0092 mg/100 g respectively. Saponins content for *Zingiber officinale, Carica papaya* and *Garcinia kola* were 7.20 ±0.282%, 2.40 ±0.141% and 1.35 ± 0.353% respectively. Alkaloids content for *Zingiber officinale, Carica papaya* and *Garcinia kola* was 5.35 ± 0.212%, 5.35 ± 0.063% and 5.4 ± 0.141% respectively. Flavonoids content for *Zingiber officinale, Carica papaya* and *Garcinia kola* were 20.03 ± 0.042%, 16.25 ± 0.353% and 11.45 ± 0.586% respectively. Cyanogenic glycosides content for *Zingiber officinale, Carica papaya* and *Garcinia kola* were 2.95 ± 0.05 mg/100 g, 4.51 ± 0.184 mg/100 g and 0.608 ± 0.02 mg/100 g respectively. The concentration of phytochemicals varied with different plant leaves. The presence of tannin in all the three plant leaves indicate that they could be used in the treatment of burns and wounds, while the presence of alkaloid indicate that they can be exploited for the treatment of malaria.

Keywords: *Zingiber officinale*; *Carica papaya*; *Garcinia kola*; phytochemicals.

1. INTRODUCTION

Phytochemicals are compounds that occur naturally in plants. They contribute to the colour, flavour and smell of plants. Also, they form part of a plants natural defense mechanism against diseases. Their therapeutic values to human health and disease prevention have been reported [1]. Phytochemicals are present in fruits, vegetables, legumes, whole grains, nuts, seeds, fungi, herbs and spices [2]. phytochemicals played important roles in the protection of human health, when their dietary intake is significant [3].

Ginger (*Zingiber officinale*) is a widely used herb and food-flavouring agent. 1st hevtraceutical properties have long been of interest to the food processing and pharmaceutical industries. The roots are commonly used as specified. It is medicinally used for its antioxidant, androgenic and hypoglycemic actions [4]. On the other hand, bitter kola (*Garcinia kola*) also known as African wonder nut belong to the family of

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clusiaceae and it grows in the coastal rainforests in the south western and south eastern parts of Nigeria. Traditionally, these nuts were chewed to stimulate the flow of saliva. Presently, it is widely consumed as snack in the west and central Africa. The kernels of the nuts are widely traded and eaten as a stimulant; it is also locally used medicinally to treat cough and hypertension [5]. Unlike other kola nuts, bitter kola, is believed to clean the digestive system, without side effects. Bitter kola is used for the treatments of ailments such as liver disorders, hepatitis, diarrhea, laryngitis, bronchitis and gonorrhoea jaundice, high fever as a purgative [6].

Pawpaw (*Carica papaya*) is a plant that belongs to the family of Caricceae. It is an herbaceous succulent plant with self-supporting stems [7]. *Carica papaya* is an example of a medicinal plant with numerous therapeutic values. It is self pollinated plant [8]. Elizabeth [9] reported that unripe pawpaw fruit has therapeutic potentials on patients with ulcer and importance. Leaves, bark and twig tissues possess both anti-tumor and pesticidal properties. The high level of natural self-defence compounds in the plant makes it highly resistant to insect and disease infestation [10]. Pawpaw leaves extract has been reported as a tumor-destroying agent [11]. *C. papaya* leaf tea or extract has a reputation as a tumor-destroying agent [11]. The juice has been in use on meat to make it tender [12] (Wilson, 1994). The high level of natural self-defense compounds in the plant makes it highly resistant to insect and disease infestation [10].

Fresh, green pawpaw leaf is an antiseptic, it promote digestion and aids in the treatment of ailments such as chronic indigestion, overweight and obesity, arteriosclerosis, high blood pressure and weakening of the heart [13,14]. The brown, dried pawpaw leaf is the best as a tonic and blood purifier [15]. Chewing the seeds of ripe pawpaw fruit also helps to clear nasal congestion [9].

Although there is sufficient information on the phytochemical constituents of these fruits, there is scarcity of such information on the leaves, hence this work aimed at comparatively investigating the phytochemical composition of the leaves of three Nigerian medicinal plants namely; bitter kola, papaw and ginger leave extracts.

2. MATERIALS AND METHODS

2.1 Sample Collection/Preparation

The samples were collected from a farm at Ikot Oku Etim in Essien Udim L.G.A. of Akwa Ibom State. The samples were conveyed in a different black polythene bag to Chemistry laboratory, Akwa Ibom State polytechnic, Ikot Osurua for analysis. Furthermore, the samples were destalked washed with tape water and then rinsed with distilled water to remove all the dirt. It was then cut into tiny pieces, and sundried for seven days. The samples were then ground using an electric grinder into powdered form which was further stored in airtight containers before the analysis.

2.2 Determination of Phytochemicals

Alkaloid content in the samples was determined using the method of Harbone [16] while tannin was determined using the method of Van-Burden and Robinson [17]. Saponin and Flavonoid were determined using the method of Obadoni and Ochuko [18]. Cyanogenic glycosides content of the samples was done by the alkaline titration method of the AOAC [19].

3. RESULTS AND DISCUSSION

3.1 Results

The results of the Comparative study of Phytochemical content in Z*ingiber officinale, Carica papaya* and *Garcinia kola* leaves are presented in Table 1:

Table 1. Phytochemical composition of the leaves of *Zingiber officinale, Carica papaya* and *Garcinia kola*

Parameters	***Zingiber officinale***	***Carica papaya***	***Garcinia kola***
Tannins (mg/100 g)	2.42 ± 0.001	4.473 ± 0.663	0.004368 ± 0.009
Saponin (%)	7.20 ± 0.282	2.4 ± 0.141	1.35 ± 0.353
Alkaloids (%)	5.35 ± 0.212	5.35 ± 0.063	5.4 ±0.141
Flavonoids (%)	20.03 ± 0.042	16.25 ± 0.353	11.42±0.586
Cyanogenic Glycoside (mg/100 g)	2.95 ± 0.050	4.51 ± 0.184	0.61 ± 0.02

Data are mean ± standard deviation of triplicate determinations on dry weight basis

3.2 Discussion

The tannins content in ginger was observed to be 2.42 ± 0.001 mg/10 g, that of pawpaw was 4.47 ± 0.663 mg/100 g and that of bitter kola was 0.004368 ± 0.0092 mg/100 g. It was observed that pawpaw has the highest tannins content followed by Ginger and bitter kola has the least. Tannins are dietary anti nutrients that are responsible for the sour or bitter taste of foods and drinks. However the tannin content in these plant leaves is lower than that of the bitter kola seed of 5.08±0.02, reported by Omeh et al. [20]. This shows that tannin is higher in bitter kola seed than leaves.Tannins bind to both proteins and carbohydrates which have several implications for commodities containing tannins their presence can because browning or other pigmentation problems in both fresh foods and processed products.

The presence of tannin in the plants implies they may have astringent properties and in addition, could quicken the healing of wound and burns [21]. Pawpaw leaves with high tannins contents is recommended for usage in the healing of wounds, varicose ulcers, hemorrhoids, frost- bite and burns.

The saponin content of Ginger was observed to be 7.20 ± 0.282%, that of pawpaw was 2.4 ± 0.41% and that of bitter kola was 1.35 ± 0.353%. It was observed that ginger has the highest saponin content followed by pawpaw and bitter kola.

Saponin has the property of precipitating and coagulating red blood cells. Some of the characteristics of saponins include formation of foam in aqueous solutions, haemolytic activities cholesterol-binding properties and bitterness. Saponins cause a reduction of blood cholesterol by preventing its re-absorption [22]. Also, it has also been documented that saponins have antitumor and anti-mutagenic activities and can lower the risk of human cancers, by preventing cancer cells from growing. Saponins are believed to react with the cholesterol rich membranes of cancer cells, thereby limiting their growth and viability [23].

The Alkaloid content of Ginger was observed to be 5.35 ± 0.2212%, that of pawpaw was 5.35 ± 0.063% and that of bitter kola was 5.4 ± 0.141%. It was observed that alkaloid content in bitter kola has was slightly higher while pawpaw and ginger have the same alkaloid content. Alkaloid is basic natural products occurring primarily in plants. They occur as one of more heterocydic nitrogen atoms. Alkaloid is the most efficient therapeutically significant plant substances. Pure isolated alkaloid and their synthetic derivatives and used as basic medicinal agents' parasite because of their analgesic, antispasmodic and antibacterial properties [24].

The presence of alkaloids in these samples shows the potential of these plants to have an analgesic, anti-inflammatory and adaptogenic effects, which help the host or the consumer of the extract to develop resistance against disease and endurance against stress [25].

The flavonoids content of Ginger was observed to be 20.03 ± 0.042%, that of pawpaw was 16.25 ± 0.353% and that of bitter kola was 11.415 ± 0.586%. It was observed that ginger has the highest flavonoids content followed by pawpaw and bitter kola has the least flavonoids content. The large amounts of flavonoids in all the plants investigated infer that the plant have biological functions such as protection against allergies, inflammation free radical, platelet.

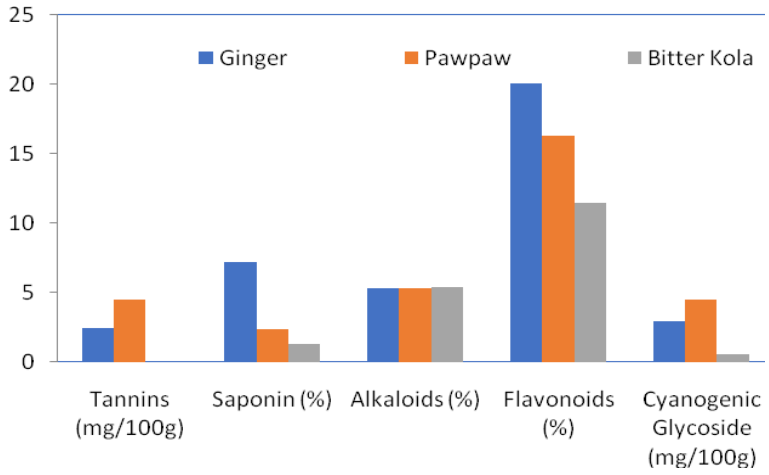

Fig. 1. Different ingredient shows in the leaves of *Zingiber officinale*, *Carica papaya* and *Garcinia kola*

4. CONCLUSION

From the research work, it could be concluded that the three samples are highly medicinal due to the level of phytochemical composition in the samples. Based on this, these samples are highly recommended to pharmaceutical industries and traditional herbalists for formulation of drugs. Meanwhile, researchers should also evaluate other parameters such as vitamins, mineral contents, proximate composition, anti-nutrients etc.

COMPETING INTERESTS

Author has declared that no competing interests exist.

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