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Evaluation of some Phytochemical Contents in *Spondias monbin* (Hog plum) Leaves

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ABSTRACT

Phytochemical analysis of *Spondias mombin* (hog plum) leaf extract was studied. This study identified and analyzed the concentration of various phytochemicals present in metabolites in *Spondias mombin* (hog plum) leaf extract using methods as described. The result revealed that *Spondias mombin* (Hog plum) leaf extract contains alkaloid (29.66±5.446mg/g), flavonoid(76.21±8.73mg/g), Glycoside (28.3 l±5.32mg/g),Steroid (86.89±9.32mg/l),Tanin (0.885±0.940mg/g), Terepenoid (0.914±0.956mg/g), Saponin (0.742±0.861mg/g). From the findings, *Spondias mombin* leaf extract contains these seven secondary metabolites with steroid at highest concentration and Saponin at the lowest concentration. The leaves were ..air dried for 2 weeks and grounded in other to expose the enzymes and to reduce its surface area and was kept air tight prior to phytochemical composition of *spondias mombin* leaf extract and have established the plant extract as a potential source of highly medicinal and nutritious feed stuff, folk medicine and phytomedicine as a result of its aromatic asterigent and refrigerant nature. The tree exudes gum used as a glue root and bark decoctions are. used as purgative and remedies for diarrhea, dysentery and hemorrhoids iohile leaves extract have been reported to have anxiolytic, antipsychotic hypoglycemic. With increasing consumption of Spondias mombin fruit, considerable attention is required for analysis of its nutrients and natural compounds. Although considerable amount of literature exist on the importance and usefulness of the different parts of the plants. There is little information about aqueous extract of leaves. This study therefore seeks to investigate its possible phytochemical contents of aqueous leaf so as to unravel new information on the leaf.

Keywords: Evaluation, phytochemical, content, hog plum leaves.

INTRODUCTION

Plants play significant roles in human health and welfare, they yields foods, fibre, wood for shelter, medicine, raw materials, for industries, environmental amelioration, religious, social- cultural and ceremonial functions. Utilization of plants for medicinal purpose had been a major aspect of social-cultural heritage in African for centuries before the introduction of orthodox medicine in the region [1]. There is increased interest in the use of traditional botanic knowledge as instrument in bio-prospecting of useful plants and animal medicine globally. This result is ethno-medicinal research methods and techniques which contribute to the validation and development of new plant based drugs [2]. Important local medicinal plants have been surveyed and documented in different cultures with the aim of developing novel drugs to treat debilitating disease such as cancer, diabetes mellitus and hypertension amongst others [3]. Up till now, large percentage of populations in developing countries

relies on local medicinal plants for health care delivery [4] observed that complementary and alternative medicine enjoy about 50 percent and 20 percent patronage in Australia and united state of American respectively while in Nigeria, traditional bone setters (TBS) provide about 70 percent to 90 percent of primary facture care [5]. [6] said that about 80% of persons in developing African countries visit herbal medicine practitioners for treatment of certain diseases such as sexually related diseases and other chronic ailments after consulting orthodox hospitals. Use of plant for medicine is usually associated with cultural beliefs and heritage especially In sub-Sahara West Africa. Generally, use of plants is not restricted to medicine, Plants and plant products are utilized in numerous ways such as shelters, domestic Utensils and instruments, souvenir, decorations, religious and ceremonial functions locally.

Spondias mombin linn (Anacardiaceae) commonly known as Hog plum grows well in secondary or disturbed rain forests and coastal areas of Nigeria. *Spondias mombin* is found in the most tropical regions of the world. Among the Yoruba folks it is known as Iyeye, Ekika, or Okika in south west Nigeria and Uvuru or Ichikara among the Igbos of south east Nigeria. Mature tree usually possess massive branches and can reach a height of 15to22m, trunk has deep incisions in the bark, which often produces a brown resinous substance. *Spondias mombin* is commonly planted for shade, live fences, fruit and shelter by artisans. The fruits are edible and sometimes called monkey-plum, but the wood is of low quality and used to make huts, garden poles, axes and hoe handles. The plant can be propagated by seeds and stem cultings while the leaves and roots are used as medicine locally to treat diarrhoea, dysentery and athlete's fort in Edo state, Nigeria. Of the numerous woody plants of the forest eco-system, *Spondias mombin* can be unarguably listed among the avalanche non-exploited but fast disappearing group of non-timber forest product considering its vast ethno-botanical potential hardly exploited fully nor maximally commercialized. The non-timber forest products are plants or plant parts that have a perceived economic or consumption value sufficient to encourage their collection and removal from the forest. Highlighting further the attention given to non-timber forest product in the last decades revealed that 'there' has been a growing awareness on the importance of non-timber forest products especially for food and medicinal uses and this growing awareness is not only for the role they play in the subsistence economy, but also for their potential and real contribution to the economies of many developing countries [7]. However, this study was carried out to investigate photochemical constituent of *Spondias mombin* leaf.

Statement Of Problem

Findings have established *Spondias Mombin* as a Potential source of highly nutritious feed stuff, folk medicine and phytomedicine as a result of its aromatic astringents and refrigerant nature [8]. The tree exudes gum used as glue, root and bark decoctions are used as purgative and remedies for various diseases such as dysentery and diarrhea [9] while leaf extract have been reported to have anxiolytic and antimicrobial effect. With increasing consumption of *Spondias mombin* fruit, considerable attention is required for analysis of its nutrient and natural compounds. Although, considerable amount of literature exist on the importance and usefulness of different parts of the plant.

Aim of the study

To determine the phytochemical constituents of Ichikara *Spondias mombin* leaf.

MATERIALS AND METHOD

Sample Preparation

The sample *Spondias mombin* (hog plum) leaf were air dried using an open pan at room temperature for two weeks, after air drying, the sample were homogenized into fine power using a manual grinder. The homogenized sample was kept in an air-tight container prior to analysis.

Extraction Methods

In this study, ethanol was used for extraction, 250g of the homogenized

samples *Spondias mombin* (hog plum) leaf was weighed using electric weighing balance into a big bottle and 800ml of ethanol was added and it was allowed to stand for two days (48hours) for properextraction. After 48hours, it was filtered with muslin cloth into a conical flask. After the extraction, the sample was concentrated using water bath to heat dry to reduce the volume of the liquid for phytochemical analysis.

Phytochemcial Analysis Qualitative Phytochemical analysis of the Extract

The methods described by [10], [11] were used.

Test for Tannin: Extract (0.1g) were stirred with 10ml of distilled water and then filtered. Few drops of 1% Ferric chloride solution were added to 2ml of each filtrate. The presence of a blue-black precipitate indicates the presence of Tannin.

Test for Alkaloid: A quantity of the extract (0.1g) were boiled with 5ml of 1% aqueous HC1 on a steam bath. The mixture was filtered and 1ml of the filtrate were treated with 2 drops of Dragendorff s reagent, an orange-red precipitate shows the presence of alkaloids.

Test for Terpenoid: Each extract (0.1g) were dissolved in ethanol. Acetic anhydride (1ml) was added followed by the addition of concentrated H_2SO_4. A change in colour from pink to violet precipitates shows the presence of terpenoid.

Test for Flavonoid: A quantity (0.1g) of the extract were dissolved in water and filtered. To 5ml of each of the filtrates, 3ml of lead ethanoate solution were added. Appearance of a coloured of a coloured (pale yellow-brown) precipitate indicated the presence of flavonoid.

Test for Steroid: To 0.1gof each extract, 2ml of acetic acid were added. The solutions were cooled well in ice followed by the addition of concentrated H_2SO_4 carefully. Colour development from violet to blue or bluish-green indicated the presence of a steroidal ring.

Test for Saponin: A quantity of each extract (0.1g) were boiled with 5ml of distilled water and filtered. To each filtrate, about 3ml of distilled water were further added and shaken vigorously for about 5mins. Frothing which persist on warning were taken as an evidence for the presence of saponins.

Test for Glycoside: a quantity of each extract (0.1g) were boiled with 10ml of distilled water and heated on water bath for 5mins. To 5ml each of the filtrate, 0.3ml of fehling solution A and b was added until it turns alkaline. Solution was heated on a water bath for 7 mins. A brick red precipitate indicates the presence of glycoside quantitative phytochemical analysis of the extract.

Quantitative Phytochemical Analysis of *Spondias mombin*

Determination of Alkaloids (Harbone Method, 1973)

The sample *Spondias mombin* was weighed (0.1g) using electric weighing balance into a 250ml beaker; 100ml of 10% acetic acid in ethanol was added to the sample and covered. The mixture was allowed to stand for hours for proper extraction to take place. The sample as filtered with paper and extract was concentrated on a water bath to one quarter of the original volume. 20ml of ammonium hydroxide was added drop wisely to from precipitate of the alkaloid in the filtrate. The filtrate was weighed with NH4OH and filtered. The filter paper was weighed before using it to filter. After filtering, the filter paper and the precipitate was dried in an oven at 40°C and weighed. The Alkaloid content was determined using the following formula in appendix B.

Determination of Saponin

Spondias mombin was weighed (0.1g) using an electric weighing balance into 250ml conical flask and soaked with 50ml of 20% ethanol for three (3) minutes and heated for three hours at 55°C for proper extraction then filtered. The residue was re-extracted with another 50ml of 200% ethanol. The two extracts were combined and heated at 40ml at 90°C on a water bath. The concentrate was transferred into a 500ml separating funnel and 20ml of petroleum ether was added and shaken vigorously, the upper layer was discarded.

The purification process was repeated and 60ml of n-butanol was added, the lower layer was discarded while the upper layer was collected. The combined n-butanol extract was washed with 10ml of 5% aqueous NaCl and the lower layer was discarded while the upper layer was collected in a weighed beaker and heated to dryness. The beaker is allowed to cool in a desiccators and reweighed. The saponin content was determined using the following formula in appendix B.

Determination of Tannins (Using Robinson method, 1981)

(0.1g) of *Spondias mombin* extract was weighed into a plastic bottle and 50ml of distilled water was added and shaken for 3 hours in a vibrator. The sample was filtered into a 50ml volumetric flask and make up to mark. 5ml of the filtrate was dispensed into a test tube and mixed with 1mlof 0.1m FeCl2 in 0.1N HC1 and 0.008m potassium ferrocyanide, the absorbance was measured at 720nm for 10mins. The tannin concentration was determined using the relation in appendix B.

Determination of flavoniods (was done using Bohn and Kocipal - abyassan method 1994).

Ichikara leaf extract (0.1g) was repeteadly extracted with 20ml of 80% aqueous ethanol at room temperature; the solution was shaken for 30 mins and filtrate was transferred **into a weighed** beaker and evaporated to dryness over water bath and weighed again. The time for the first extraction was 1 hour, 30mins and 4 5 mins for the second extraction and 30min for the third extraction, (flavonoid was determined using the formular in appendix B)

Determination of Steroids (Okeke and Eloku method)

(0.1g) of *Spondias mombin* extract was dispersed in 100ml of distilled waater into aconical flask, the mixture was shaken for 3 hours and allowed to stand overnight. Then it was filtered, the filtrate was eluted with 100ml normal ammonium hydroxide solution, 2ml of the elute was put into a test tube and mixed with 2ml of chlorofoam and also 3ml of acetic hydride was added to the mixture, followed by 2ml of concentrated H_2SO_4 drop wisely. The absorbance was measured in a spectrophotometer at 240 nm. The steroid concentration was determined using the following relationship in appendix B

Quantification of Tarpenoidd Content

The determination of terpenoid was carried out according to the method of [12]. A quantity (0.1g) of the extract was weighed out separately, macerated with 20ml of ethanol and filtered through whatman No. 1 filter paper. The filtrates (1ml) were pipette out and 1 ml of 5% phophorylbdic acid solution was added and shaken. Gradually 1ml of concentrated H2SO4 was added to each. The mixtures were left to stand for 30 minutes. Ethanol (2ml) was added and absorbance was measured at 700nm. Terpenoid was quantified using the following formular in appendix B

Quantification of Glycoside content

The determination of Glycoside was carried out according to the method of [13]. The extract (0.1g) was weighed out separately, meccerated with 20ml of distilled water and 2.5 ml of 15% lead acetate was added and filtered. Chlorofoam (2.5ml) was added to the filtrate, shaked vigorously and the lower layer collected and evaporated to dryness. Glacial acetic acid (3ml) was also added together with 1ml of 1% ferric chloride and 1ml of concentrated H2SO4. The mixture was shaken and put in the dark for 2 hours. Absorbance was measured at 530nm. Glycoside was quantified using the following formular in appendix B

RESULTS

Table 1: Shows the phytochemical concentration of *Spondias mombin* (hog plum) leaf extract

Parameters	**Concentration** (mg/g)
Alkaloid	29.66± 5.446mg/g
Flavonoid	76.21± 8.73mg/g
Saponins	0.742± 0.861 mg/g
Steroid	86.89 ± 9.32mg/g
Terpenoid	0.914± 0.956mg/g
Tannins	0.885± 0.940mg/g
Glycoside	28.31 ±5.32mg/g

DISCUSSION

This study revealed the various concentration of phytochemical content of *Spondias mombin* (hog plum) leaf extract as follows; Alkaloid (29.66mg/g), Flavonoid (76.21mg/g), steroid (86.89 mg/g), saponin (0.742mg/g), Terpemoid (0.914mg/g), Tannin (0.885mg/g), Glycoside (28.31mg/g). The leaf extract constitutes six secondary metabolites with alkaloid having the highest concentration of the leaf extract and flavonoid having the lowest concentration, hence, the level of alkaloid were highest when compared with others in the part of the leaf extract of *Spondias mombin* investigated. Alkaloids have been reported to uniformly invoke a bitter taste (Chalas,ef *al.,*2016), hence this finding has been attributed to natural bitter taste found in *Spondias mombin.* Generally, the quantities of concentration of these secondary metabolites in *Spondias mombin* leaf is a clear prove that they have rich phytochemical constituents of which attributed to several ethano medicinal uses of different parts of *Spondias mombin* in Nigeria, presumably. The leaves are used for treatment of abdominal pains, cough, diabetes, diarrhoea, diuretic, fever, kidney and urinary problem, increased lacneral disease and anti aging [14].

In addition, the leaves of *Spondias mombin* as well as its roots are used for infertility in women and week joint, roots for aphrodisiac and amenorrhea, leaves and stem for oedema. Lipid lowering effects of both aqueous and methanol extracts of *Spondias mombin* leaves have been reported [15]. The aforementioned medicinal usefulness of these plants might be basically as a result of alkaloid, flavonoid, saponin, steroid, terpenoid and tannin contents of the plant. The use of the leaves for the treatment of abdominal pains and painful uterus might be as a result of the analgesic property of alkaloid [16]. The usefulness of the leaves as antiaging agent might be as a result of the flavonoid content of the plant. Flavonoid acts as free radical scavengers.

Saponnins have been found to be potentially useful for the treatment of hypercholesterolemia which suggested that saponin might be acting by interfering with intestinal absorption of cholesterol, thus, have antidiabetic effects [17]. The utilization of these plants in treatment of diarrhoea is probably attributed to the anti-diarrhoea property of tannin. Tannin was reported to possess anti-diarrhoea ability [18].

In addition, high value of protein in the leaves of these plants presented them as excellent sources of it of which would be used to enrich our staple starchy foods.

Generally, the nutritional and medicinal composition of the plant is very rich. These suggest that it could be used as food, hence, the leaves are squeezed in order to remove the bitter

taste and used in preparation of "ofe onugbu", a popular delicacy in South Eastern Nigeria.

CONCLUSION

The study shows that the leaves of *Spondias mombin* is rich in phytochemical and nutritional composition. These suggest that it could be used as food. Also, the presence of bitter taste in alkaloid is also a source of medicinal value, however the leaves could be used as both food and drugs.

Therefore, *Spondias mombin* leaves could be recommended as medicinal and nutritional valued plant.

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