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Proximate Analysis and Phytochemical Screening of *Irvingia Gabonensis* (Agbono Cotyledon)

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Abstract: Chemical analyses on agbono cotyledon was carried out in order to identify the various proximate(s) that constitute the agbono cotyledon as well as to establish also the forms of phytochemicals present in agbono cotyledon by simple extraction processes using three different solvents (petroleum ether, ethanol and distilled water). The results from the analysis showed that agbono cotyledon displayed the following proximates; carbohydrates, protein, lipids (fats and oil), moisture and ash. The later were established to be responsible for agbono cotyledon's drawability, colour, taste and aroma when used as condiment. However, values of 0.17%, 0.13%, 80.41%, 19.14% and 0.15% were obtained for the petroleum ether extract; while the data; 0.25%, 0.13%, 15.17%, 84.31% and 0.14% were recorded for the ethanol extract, and then 0.25%, 0.35%, 4.91%. 94.41% and 0.08% values were acquired for the distilled water extract with respect to carbohydrates, protein, lipids (fats and oil), moisture and ash contents. Furthermore, the phytochemical tannins, alkaloids, flavonoids, glycosides, phytate, oxalate, saponins and steroids were observed to be present (+), highly present (++), present (+), present (+) absent(-), absent(-), present(+) and absent(-) in the petroleum ether extract, then present(+), present(+), highly present(++), absent(-), absent(-), present(+) and present(+) in the distilled water extract, but were highly present(++), present(+), present(+), present(+), absent(-), absent(-), present(+) and present(+) in the ethanol extract. The results in all showed that both proximates and phytochemicals were present at different levels in agbono cotyledon.

Keywords: Cotyledon, proximate, phytochemical and *Irvingia*

INTRODUCTION

Soup is a tasty, popular food that is nutritious, wholesome and stimulates the human appetite. Soup thickening usually improves its taste, but most significant is the nutritional value of foods been thickened. In fact, every time the soup is thickened its nutritive value is determined by the ingredients of the thickener added to it[1]. Generally, condiments which when added to an aqueous mixture increases its viscosity without substantially modifying its other properties, such as taste, aroma and draw ability are termed soup thickeners or thickening agents. Thickeners provide the soup body, increase its stability and improve suspension of added ingredients[2]. Food thickening can be important for people facing medical issues with chewing or swallowing, as foods with a thicker consistency can reduce the chances of choking or of inhalation of liquids or foods particles, which can lead to aspiration pneumonia[1]. The use of thickeners such as *Afzelia Africa* (Akpalata), *Brachystegia* (Achi/ofor), *Irvingia gabonensis var excels* (ugiri/agbono) in soup preparations requires more investigations into the nature and compositions of the constituents so as to ascertain their actual nutritional essence. Agbono (*Irvingia gabonensis)* frequently called "African mango" is a native forest tree fitting to the group of plants classified as "non-timber forest products" (NTFPs),[3] and the family of *Irvingiaceace*. Usually of two species *Irvingia gabonensis* and *Irvingia excelsa*[4], which are found in normal forest, family gardens and fields [5]. *Irvingia gabonensis* fruits, can be eaten fresh with their kernels collected from wild forest (60%) and from the family gardens (10%) and fields (30%). Researchers[6-8] reports that different families depend on the fruit collection (consumption and for sale) enterprise for survival. The kernel of *Irvingia gabonensis* contain 54-67% of fatty matter and serves as condiment used in thickening and flavouring soup[3, 8]. The more *Irvingia gabonensis* in soup, the more acceptable it becomes [9]. This work is hence intended to investigate the drawability and rancidity of agbono soup identifying the various proximate(s) and the phytochemicals contained in agbono cotyledon.

MATERIALS AND METHODS

Preparation of the Agbono Cotyledon: The agbono (*Irvingia gabonensis*) cotyledon was bought from Iwofe daily market (4 cups) taken to the Chemistry Department laboratory, Ignatius Ajuru University of Education, Rumuolumeni, Port Harcourt, properly cleaned using kitchen knife, and afterwards ground to powder using mortar and pestle. Three fractionating columns were adopted to extract the wax of agbono (*Irvingia gabonensis)* cotyledon using ethanol, petroleum ether and distilled water as solvents.

Petroleum Ether Extract: A 100g of the ground agbono (*Irvingia gabonensis*) cotyledon was weighed and gradually transferred into a soxhlet extractor using spatula. The cotyledon was submerged with petroleum ether (60-80%, 400 mL). The soxhlet extractor set up with its mixture content was heated using heating mantle to enhance full extraction of the agbono wax.

Ethanol Extract: To 450mL ethanol solution in a soxhlet extractor, 100g of the ground *Irvingia gabonensis* was transferred gradually with the aid of a spatula and the wax were fully extracted on a heating mantle.

Distilled Water Extract: The same processes as explained above were adopted with slight modifications. Distilled water (300 mL) was used as the extraction solvent.

Methods of Analysis: After all extraction processes, the three extracts were analyzed for proximate and phytochemical compositions at the Plant Anatomy and Physiology Research Laboratory, University of Port-Harcourt. The cotyledon was analyzed proximate contents using the Furnace method (for ash content); air oven

method (for moisture content); Cleg anthrone method (for carbohydrate content); Kjeldahl method (for protein content); Phase separation method (for lipids content), while the phytochemical composition were determined through qualitative analysis.

RESULTS AND DISCUSSIONS

Table 1 revealed that *Irvingia gabonensis* contains the following proximate contents; carbohydrate, protein, lipids, moisture and ash at different quantities of 0.17%,.80.41%, 19.14%, 0.15% and 0.13% respectively for the petroleum ether extract. The proximate contents can be represented as lipids > moisture > carbohydrate > ash > protein. Also, the proximate contents for the ethanol extract displayed values of 84.31%, 15.17%, 0.25%, 0.14% and 0.13% for moisture, lipids, carbohydrate, ash and protein respectively. It can also be represented as; Moisture > lipids > carbohydrate > ash > protein. The distilled water extract presented the content of the moisture, lipids, protein, carbohydrate and ash as 94.41%, 4.91%, 0.35%, 0.25% and 0.08% which can be represented in the order moisture > lipids > protein > carbohydrate > ash.

Generally, the carbohydrate contents were lesser in content compared to other proximate contents. On the other hand, the protein content for the petroleum ether extract equaled that of ethanol extract, while the content obtained from the distilled water extract was greater than that of extracts.

Table 1: Proximate Analysis of Agbono Cotyledon

Proximate Contents	Petroleum Ether Extract (%)	Ethanol Extract (%)	Distilled Water Extract (%)
Carbohydrate	0.17	0.25	0.25
Protein	0.13	0.13	0.35
Lipids (fat and oil)	80.41	15.17	4.91
Moisture	19.14	84.31	94.41
Ash	0.15	0.14	0.08
Fibre	Nil	Nil	Nil
Total	100.00	100.00	100.00

Apparently, the lipid (fat and oil) contents obtained for the petroleum ether extract was greater than that of ethanol extract, while that of the ethanol extract displayed greater content than that of the distilled water extract. Similarly, the moisture content for the distilled water extract was higher compared to the ethanol extract, though the ethanol extract content was larger than that of the petroleum ether extract content. Finally, the ash content for the petroleum ether extract stood greater than the ethanol extract content, whereas that of the ethanol extract remained bigger compared to the distilled water extract content.

Critical examination of Table 2 indicated that the two major phytochemical compositions of *Irvingia gabonensis* are tannins and alkaoids which encompasses bioactive secondary metabolites that may find useful applications in medicine and pharmacology. Other phytochemicals determined include saponins, flavonoids,

glycosides, steroids, phytate and oxalate. The obtained data revealed that tannins was present (+) in petroleum ether extract, highly present (++) in ethanol extract, and averagely present (+) in the distilled water extract. However that of alkaloids was extremely present (++) in petroleum ether extract, normally present (+) in ethanol extract, and averagely present (+) in distilled water extract. Likewise, the result showed that flavonoid was just present (+) in petroleum ether extract, present (+) in ethanol extract and highly present (++) in distilled water extract; glycosides was observed present (+) in the petroleum ether extract, normally present (+) in ethanol extract and completely absent (-) in the distilled water extract. The phytate and oxalate were also completely absent (-) in the three (petroleum ether, ethanol and absent distilled water) extracts. However, saponins were noticed averagely present (+) in all the (petroleum ether, ethanol and absent distilled water) extracts, while steroids was absent (-) in petroleum ether extract, present (-) in ethanol extract and averagely present (+) in distilled water extract.

Table 2: Phytochemical Analysis of Agbono Cotyledon

Phytochemicals	Petroleum ether extract	Ethanol extract	Distilled water extract
Tannins	+	+	++
Alkaloids	++	+	+
Flavonoids	+	++	+
Glycoside	+	-	+
Phytate	-	-	-
Oxalate	-	-	-
Saponins	+	+	+
Steroids	-	+	+

Key: (+) = present; (++) = highly present, (-) absent

Summarily, this work has established that various proximates make up the agbono cotyledon (*Irvingia gabonensis*). The work also showed that phytochemicals constitute the compositions of *Irvingia gabonensis*. The obtained results has it that *Irvingia gabonensis* contains bioactive secondary metabolites (tannins and alkaloids) such as; flavonoids, saponins, glycosides, steroids, phytate and oxalate; that both the proximate and phytochemical contributes to its drawability, aroma, taste and colour; and rancidity when used to prepare soup; the moisture and ash (water) contents were solely responsible for its drawability; the lipids (fat and oil) contents gives rise to its colour; the protein content backs majorly its taste; and the carbohydrate contents were responsible to its aroma. This work recommends that agbono should be consumed by everybody especially people that are fat, people that are suffering from diabetes and people that have excess cholesterol in their body.

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