

**PHYTOCHEMICAL COMPOSITION OF *AFRAMOMUM MELEGUETA*  
AND *PIPER GUINEENSE* SEEDS**

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**ABSTRACT:** Samples of two spice plants; *Aframomum melegueta* and *Piper guineense* were analyzed for phytochemical composition. The result of the phytochemical screening of the two seeds reveals the presence of alkaloids, flavonoids, tannins, saponin, steroids, cardiac glycosides and terpenes. The percentage of alkaloids in *Aframomum melegueta* 2.17% was higher than that in *Piper guineense* which contained 1.67%. *Aframomum melegueta* contained 2.03% flavonoids, 35.40% phenols and 58.67% of cardiac glycosides while *Piper guineense* contained 1.92% flavonoids, 37.10% phenols and 39.33% of cardiac glycosides. This results shows that the percentage composition of all the phytochemicals in *Aframomum melegueta* was higher than those in *P. guineense* except in phenols where *P. guineense* recorded 37.10% higher than that of *A. melegueta* which had 35.40%. The phytochemical constituents found these two plants have shown that these medicinal plants can be used in modern medicine in producing drugs that would be of significant value in management of convulsion, leprosy, inflammation, rheumatoid pains, cancer and other related illness.

**KEYWORDS:** *Aframomum melegueta*, *Piper guineense*, Phytochemical Analysis.

**INTRODUCTION**

In Nigeria many spices are used as food and medicine, however, a great number of these plants are traditionally used due to the medicinal and pesticidal properties. Spices are products of plants, which are mostly used for seasoning, flavouring and thus enhancing the taste of food, beverage and drugs (Manandhar, 1995). The knowledge and use of plants as spices is as old as the history of mankind (Garland, 1972). Plants used as spices are usually aromatic and pungent (Achinewu et al., 1995). Iwu (1993) had reported that these plants owe these properties to the presence of varying types of essential oils. *Aframomum melegueta* (plate 1) is a spice plant and specie in the family, Zingiberaceae. It is commonly known as grains of paradise and is an herbaceous perennial plant native to the West Africa. It is found in South-South and South-East States in Nigeria. It possesses tufted leafy stem to 1.5m high. It has lanceolate leaves up to 30cm long and the fruits are fleshy and indehiscent. It is used as a stimulant etc. It is used in the preparation of pepper soup in the Southern part of Nigeria. In the Eastern parts, the fruits are used to prepare soups for mothers from the first day of delivery to

prevent post-partum contraction. Methanolic extracts of the plant have molluscidal properties and can provide a solution to bilharzia. The plant is claimed to be therapeutically useful in the management of convulsion, leprosy, inflammation and/or rheumatoid pains.



**Plate 1:** *Aframomum melegueta*

*Piper guineense* (plate 2) is a spice plant from the family, piperaceae and from the genus piper. It is a

West African spice plant and is commonly called Ashanti pepper. The seeds, leaves and sometimes the stems are used in preparing soup. It imparts "heat" and a spicy pungent aroma to food. The medicinal properties of *Piper guineense* exert bacteriostatic and bacteriocidal effects on some bacteria. The leaves are considered aperitive, carminative and eupeptic. They are also used for the treatment of cough, bronchitis, intestinal disease and rheumatism. The leaves are also used for female infertility while the fruits are used as an aphrodisiac. It is a climbing plant that can grow up to 20m in length. The seeds are smooth and are prolate-elliptically shaped.



**Plate 2:** *Piper guineense*

*Aframomum melegueta* and *Piper guineense* have enormous reservoirs of many secondary metabolites and nutritive compounds which exhibit some medicinal and nutritional properties. The extract of the leaves and stem bark of *Morinda lucida* (Benth) has been recommended for the prevention and treatment of hypertension and its cerebral complications (Iwu, 1993). Aja et al., (2010) reported on the qualitative and quantitative analyses of *Talinum triangulare* (water leaf) leaf and found out that the leaves contain an appreciable amount of bioactive compounds. Ekeanyawu et al., (2010) reported on the biochemical characteristics of the African nutmeg, *Monodora myristica*. The results revealed the presence of glycosides, cyanogenic glycosides, flavonoid, saponins, tannins, steroids, oxalates and phytates. The result also suggests that the African nutmeg is relatively safe for consumption. This present study is aimed at determining the qualitative and quantitative properties of *Aframomum melegueta* and *Piper guineense* which

will help in revealing their medicinal importance and consumption rate.

#### MATERIALS AND METHODS

The seeds of *Aframomum melegueta* and *Piper guineense* were purchased from Itam market, Itu L.G.A of Akwa Ibom State. The plant materials (seeds of *Aframomum melegueta* and *Piper guineense*) were identified and authenticated in pharmacognosy laboratory, university of Uyo. The seeds of the samples were washed, sundried and ground into powder using porcelain mortar and pestle (Rosenthal 181/250). The ground samples were stored in air-tight containers. The ground samples were weighed respectively. *Aframomum melegueta* weighed 250g while *Piper guineense* weighed 240g. These weights were determined using Electronic precision balance with model TL: 5000. However, 50g from each of the ground samples were extracted in 70% ethanol and kept for 24hours. The solutions were filtered using cotton wool and the filtrate were poured into 200ml beaker and kept in a digital water bath maintained at a temperature of 50°C. These extracts were used in the qualitative phytochemical screening.

##### 2.1. Qualitative Phytochemical Screening

Tests for cardiac glycosides (Salkowski Test) about 0.5g of each of the extract was dissolved in 2ml of chloroform. Sulphuric acid was carefully added to form a lower layer. A reddish brown colour at the interface indicated the presence of steroidal ring.

Test for saponins (frothing test). About 0.5g of each of the extract was shaken with water in a test tube. Frothing which persists on warming may be taken as evidence for the presence of saponins of saponins in both extracts.

Test for tannins (ferric chloride test). About 5g extract of each of the plants was stirred with 10ml of distilled water, filtered, and ferric chloride reagent was added to the filtrate. A blue precipitate was taken as evidence for the presence of tannins (Trease and Evans, 1989).

Test for flavonoids. About 0.5g from each of the extracts was stirred with few drops of magnesium strips (metal) and conc. HCl was the added. The formation of red colouration indicated the presence of flavonoids.

Test for alkaloids. About 0.5g from each of the extracts was stirred with 1% HCl and heated in a water bath, filtered, and 1ml of the filtrate each were treated with Dragendoffs reagent. Turbidity

was taken as evidence for the presence of alkaloids in the samples. (Harborne 1973; Trease and evans, 1989).

**Test for terpenes** About 0.5g of each of the extracts was added to chloroform and filtered. 10 drops of acetic anhydride was added to the filtrate with conc. H<sub>2</sub>SO<sub>4</sub>. A light green ring at the interface indicated the presence of terpenes.

**Test for steroids.** 0.5g of the extract each was dissolved in 2ml of acetic anhydride and cooled well in ice. Concentrated H<sub>2</sub>SO<sub>4</sub> was then added carefully. A color change from violet to blue indicated the presence of a steroidal nucleus.

### 2.2. Quantitative phytochemical determination

**Determination of phenols** (spectrophotometric method): 5g of each of the samples were boiled with 50ml of ether for the extraction of the phenolic component for 15mins. 5ml of the extracts were pipetted into a 250ml flask, and then 10ml of distilled water was added. 2ml of ammonium hydroxide solution and 5ml of conc. Amylchol were also added. The samples were made up to mark and left to react for 30 minutes for color development. This was measured at 550nm.

**Determination of Alkaloid** (Harborne, 1973) method: 2g from each of the samples were weighed into a 250ml beaker and 200ml of 10% acetic acid in ethanol was added and covered and allowed to stand for 4hrs. This was filtered and the extracts were concentrated on a waterbath to one quarter of the original volume. Conc. ammonium hydroxide was added dropwise to the

extracts until the precipitation were complete. The whole solution was allowed to settle and the precipitate were collected and washed with dilute ammonium hydroxide and then filtered. The residue is the alkaloid, which dried and weighed.

**Determination of flavonoid method:** 2g of each of the samples were extracted repeatedly with 50ml of 50% methanol at room temperature. The whole solution was filtered through what man filter paper No.1 (110mm). The filtrates were later transferred into a crucible and evaporated into dryness over a water bath and weighed to a constant weight.

**Procedure for fractionation of glycosides:** 1g of crude ethanolic extract from each of the samples was warmed in a water bath, cooled and 5% lead acetate was added, the precipitate was filtered out using Whatman filter paper No.1 (110mm). The residue on the filter paper was dried to a constant weight using oven.

## RESULTS AND DISCUSSION

**Table 1:** Phytochemical constituents of the seeds of *Aframomum melegueta* and *Piper guineense*

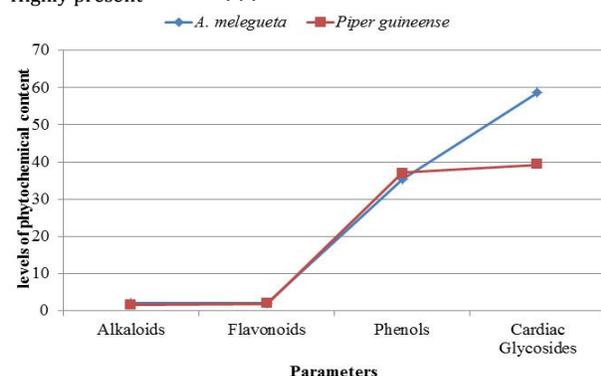
Parameters	<i>Aframomum melegueta</i>	<i>Piper guineense</i>
Alkaloids	2.17±0.29	1.67±0.29
Flavonoids	2.03±0.07	1.92±0.03
Phenols	35.40±0.76	37.10±0.43
Cardiac glycosides	58.67±1.1	39.33±1.10

Data were expressed in mean and standard error (X ±S.E) in triplicate.

**Table 2:** Phytochemical screening of *Aframomum melegueta*

Samples	Alkaloids	Flavonoids	Tannins	Saponin	Terpenes	Steroids	Cardiac glycosides
<i>Aframomum melegueta</i>	+++	++	++	+	++	+++	+++
<i>Piper guineense</i>	++	++	++	+	++	+++	+++

Slightly present +  
Moderately present ++  
Highly present +++



**Figure 1:** Phytochemical constituents of the two spice plant.

The phytochemical screening and quantitative determination of the percentage yields of phytochemical constituents of *Aframomum melegueta* and *Piper guineense* showed that the seeds of these two plants contained alkaloids, flavonoids, tannins, saponins, steroids, terpenes, phenols, and cardiac glycosides. These phytochemicals exhibit a wide range of biological effect as a consequence of their antioxidant properties (Okwu, 2005). The presence of alkaloids, flavonoids, phenols and cardiac glycosides suggest the dispersive nature of these phytochemicals present in the seeds of *Aframomum melegueta* and *Piper guineense*

respectively. Alkaloid has been used as CNS stimulant, topical anaesthetic in ophthalmology, powerful pain relievers, antipiretic action, among other uses ([Heikens et al., 1995](#)). The presence of tannins in *Aframomum melegueta* seed in a very high concentration supports its usage in ulcers, wounds cuts to accelerate their healing, ([Inyang, 2003](#)). The screening of these two plants revealed the presence of the cardiac glycosides in very high concentrations, [Trease and Evans \(2002\)](#) had stated that cardiac glycosides are useful in the treatment of diseases associated with the heart. Also [Basse et al., \(2004\)](#) reported that cardiac glycosides are functional for heart diseases. Epidemiological studies have shown that flavonoids intake is inversely related to mortality from coronary heart diseases and the incidence of heart attacks ([Donald and Cristobal, 2006](#)). Saponins are glycosides of both triterpene and steroids having hypotensive and cardiodepressant properties ([Olaleye, 2007](#)). Saponins have anti-carcinogenic properties and other health benefits. They may also play a significant role in antimalarial activity of plants ([Adesokan and Akanji, 2010](#)). The seeds of the two samples screened were found to contain steroids, steroidal compounds which are of importance in pharmacy due to their relationship with sex hormones ([Okwu, 2001](#)). [Kubmarawa et al \(2007\)](#) reported the importance of alkaloids saponins and tannins in various antibiotics used in treating common pathogenic strains. It can be concluded that *Aframomum melegueta* and *Piper guineense* are good medicinal plants that should always be included in our daily diet.

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