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**PHYTOCHEMICAL PROPERTIES  
OF THE LEAVES AND STEMS OF  
*Piper umbellatum* Linn., *Piper guineense* Schum. & Thonn**

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**ABSTRACT:** Phytochemical analysis of leaves of *Piper umbellatum* Linn. and *Piper guineense* Schum. and Thonn (Piperaceae) were carried out. Chemo-microscopic examination revealed the presence of starch, proteins, calcium oxalate crystal and mucilage, were present in both *Piper umbellatum* and *Piper guineense*. Phytochemical screening of the leaves revealed the presence alkaloids, tannins, and cardiac glycosides in both plants while saponins was found to be present only in *Piper guineense* and flavonoids was found only in *Piper umbellatum*. Quantitative evaluation of the powdered leaves gave moisture contents of 10% in *Piper umbellatum* and 8% in *Piper guineense*, ash contents as 12.1% in *Piper umbellatum* and 11.0% in *Piper guineense*, acid insoluble ash of 2.2% for both *Piper umbellatum* and *Piper guineense*. The results obtained could be useful for preparation of a monograph on the species studied.

### INTRODUCTION

Plants have been used in making local cures for common ailments and some commercial uses (Dutta, 2007). Food comes primarily from plants in the form of cereals, millets, pulses, vegetable, fruit etc. Plants are indispensable sources of fibres for the manufacture of garments. No plant can really be considered useless even if it has not been the subject of a thorough study, since it may have value in the future, (Trease and Evans, 2002).

Nowadays people are being bombarded with thousand of unhealthy products, the level of sensibility in front of diseases is very high and that is why the use of medicinal herbs or plants can represent the best solution because it contains a variety of active substances that act upon the body (HM 2005).

*Piper umbellatum* Linn. and *Piper guineense* Schum and Thonn are some of the medicinal herbs used in tropical Africa for curing of many ailments. Medicinal plants are widely known and used because of the active properties that are stored in the plants like the leaves, fruits, barks and roots, these properties include the chemical constituents of each plant like the tannins, alkaloids and glycosides and others (Awosika, 1993).

*Piper umbellatum* is a perennial herbs or scrambling shrub up to 4m tall, much-branched from near the base, stems from a woody root stock, succulent, ribbed, rooting at the nodes. Leaves are alternate, simple and entire. Their fruits occur around January and March (Hutchinson and Dalziel, 1963). The leaves of *Piper umbellatum* are widely used in folk medicine as diuretic, emollient, vulnerary and antiseptic remedies, they are employed in poultices on swellings, boils and burns (Akendengue and Louis, 1994). The juice is taken as an emmenagogue, galactagogue and diuretic or used as ear drops against ear ache. (Noumi, 1984). A decoction of leaves or roots is taken to relieve jaundice, malaria (Bidla *et al.*, 2004). The root is considered stimulant, diuretic and to promote the flow of bile (Tane *et al.*, 2005).

The leaves, roots and seeds of *Piper guineense* are used internally as medicinal agents for the treatment of bronchite, gastrointestinal diseases, venereal diseases and rheumatism. The powder obtained from the ground seeds is used for its stimulating properties (Sofowora, 1982). *Piper*

*guineense* is reported to have cosmetic (Dalziel, 1955) and insecticidal (Fasakin and Aberejo 2002) properties.

*Piper guineense* is a climbing vines that can grow up to 20m in length. They are small trees, shrubs, subshrubs or rarely herbs, erect or reclining, glabrous or pubescent. The leaves are alternate, pubescent, elliptic in shape (Lei *et al.*, 1998).

The aim of this paper is to establish constituents of the leaves which would be useful in preparing a monograph on the plants for its identification. Significance of the study is to help contribute suitable information of *Piper umbellatum* and *Piper guineense* that have various therapeutic uses for the synthesis of drugs and medicinal plants.

## MATERIALS AND METHODS

The fresh leaves and stems of *Piper umbellatum* Linn. and *Piper guineense* Schum. and Thonn were collected from a farm land in Obio ofot village in Uyo Local Government Area of Akwa Ibom State, Nigeria.

### Chemo-Microscopical Examination

The leaves of *Piper umbellatum* and *Piper guineense* were exposed to mild sunlight for few days until they dried up. The dried leaves were heated in 90% ethyl alcohol for 20 minutes in the oven at 60°C to remove chlorophyll and boiled in 5% Sodium hydroxide solution for about 30 minutes until the material became decolourized. They were later washed thoroughly to remove alkaline solution. The partially cleared leaves were further cleared in 5% domestic bleach (Jik) for about 20-30 minutes under sunlight. The cleared leaves were treated with various chemical reagents such as iodine, phloroglucinol, concentrated Hydrochloric acid, Picric acid solution, Sudan III, Ruthenium red among others to detect the presence or absence of different chemical constituents such as cellulose, lignin, starch, tannins, calcium oxalate crystals, cutins, oils, mucilage, proteins and fats.

### Quantitative Evaluation

The moisture content of the powdered leaves was determined by the loss on drying method. Nickel crucibles were heated to a constant weight and its exact weights were recorded, cooled and stored in a desiccator. Three grams of the powdered leaves were weighed into each crucible. The crucibles were then placed with its content in an oven at 105°C and dried to constant weight. Two consecutive weights confirmed a constant weight. The weights of the moisture as well as its percentage content with reference to the initial weight of the powdered drug were calculated. Same procedure was applicable to the ash. The crucibles were heated with its contents gently until it was moisture-free and was completely charred. The heat was gradually increased until most of the black residue vapourised and finally heated strongly until the residue was almost white. The weights of the ash and percentage values were calculated with reference to its initial weight. For the acid insoluble ash, the crucible containing the residue obtained from the determination of ash, 25ml of 10% Hydrochloric acid was poured into a beaker containing the ash, and was boiled for 15 minutes, after which it was filtered using the ashless filter paper, then it was rinsed gently with 5ml of distilled water and allow to filter completely. Then the filter-paper containing the insoluble matter was transferred to the original crucible and incinerated at 600°C.

### Phytochemical Screening

The leaves used for this experiment were separated from the plant. The fresh leaves were air dried and reduced to powder with the aid of a mortar and pestle. The powdered leaves were accurately weighed and then macerated in cold ethanol and distilled water for 72 hours at room temperature following the method suggested by Sofowora (1993). The liquid extracts were recovered by filtration using cotton wool and glass funnel. The filtrate obtained was concentrated in a vacuo at 40°C to yield semi-solid mass. The extract obtained was accurately weighted and then used for phytochemical screening.

Basic phytochemical screening on the plant extract was performed using suitable reagents to detect the presence or absence of secondary plant metabolites such as alkaloids, anthraquinones, tannins, saponins among others. The method of Trease and Evans (2002) and Sofowora (1993) were used.

### RESULTS

Table 1: Chemo-microscopical result of powdered leaves

Test reagents	<i>Piper umbellatum</i>	Inference <i>Piper guineense</i>
50% iodine	Starch (++)	Starch (++)
1% picric acid Solution	Protein (+++)	Protein (+++)
Phloroglucinol + Conc. Hcl.	Lignin (-)	Lignin (-)
80% H <sub>2</sub> SO <sub>4</sub>	Calcium oxalate present (+++)	Calcium oxalate present (+++)
Sudan III	Mucilage (+)	Mucilage (++)
5% Ferric chloride solution	Tannins (+)	Tannins (+)

Key:

-	=	Absent
+	=	Trace
++	=	Moderately present
+++	=	Abundantly present.

#### Phytochemical Screening

The result of preliminary phytochemical screening of the leaves of *P. umbellatum* and *P. guineense* revealed the presence of alkaloids, tannins, cardiac glycosides in both plants while saponins was found to be present in *Piper guineense* and flavonoids was found only in *Piper umbellatum*.

Table 2: Result of phytochemical screening metabolites

Species	Saponins	Tann-ins	Alkal-oids	Flavon-oids	Anthraqu-inones	Salkwo-ski's	Liebe rmans	Keller Killiani
<i>Piper umbellatum</i>	-	+++	+++	+	-	+++	+++	+++
<i>Piper guineense</i>	++	+++	+++	-	-	++	+	+

Key:

-	=	Absent
+	=	Trace
++	=	Moderately Present
+++	=	Abundantly present

Table 3: Quantitative Evaluation of the Powdered Leaves

Evaluation parameters	Values (%W/W)	
	<i>Piper umbellatum</i>	<i>Piper guineense</i>
Moisture content	10	8
Ash content	12.1	11.0
Acid insoluble ash	2.2	2.2

## DISCUSSION

Saponins which have anti-inflammatory, anti-yeast, anti-abortifacient activities were present in *Piper guineense*. This corroborates with reported works (Barroso, 2005 and Gill, 1988) and confirms its usefulness to traditional medicine practitioners. Tannins which have astringent and detergent properties were also present in both plants and can be used against diarrhoea (Trease and Evans, 2002; Iwu, 1993). The detection of tannins in these plants lends further credence to these uses. Flavonoid which was found in *Piper umbellatum* exhibit a broad range of biological activity such as antimicrobial, anticancer, antiallergic as well as antitumour properties on balance, a considerable body of evidence suggests that plant flavonoids may be health promoting, disease-preventing dietary compounds. It is now also widely recognized that diets rich in fruits and vegetable appear to be associated with a reduced frequency of cancer of various organ system. The presence of this compound in *Piper umbellatum* corroborates Carles and Roersch (2010), Trease and Evans (2002), Kunle and Egharevba (2009), Ellioh (1996), Sengupta and Ray (1987), Harborne and Herbert (1993) confirms its usefulness to traditional medicine practitioners. Alkaloids are chemical constituent from plants that can work on the nervous systems of the human body, and used as analgesic because they are capable of relieving pain. They have bactericidal and antispasmodic effects, and can be used in the manufacture of sedatives, or can be used to achieve the same effect when given in the natural state (Ganelin and Robets, 1993; Babajide *et al.*, 1999). The presence of alkaloids in both *Piper umbellatum* and *Piper guineense* suggests that these plants might have antispasmodic and analgesic properties and support their ethno-use by herbalists. This corroborates with GHP (2007) and Carles and Roersch (2010) in *Piper umbellatum*.

There has been an assertion by Trease and Evans (2002) that natural cardiac glycosides are used for treatment of various diseases associated with the heart such as in controlling supraventricular (atrial) cardiac arrhythmias, it also exerts a slowing and strengthening effect of failing heart. The presence of this compound in *Piper umbellatum* and *Piper guineense* could be useful in the treatment of diseases associated with the heart. The thin layer chromatography confirm the presence of alkaloid in both plants. The chemo-microscopical result revealed the presence of phenolic compounds which are known to possess anti-microbial activities which could justify the use of the plant in ethnomedicine. Starch was present in the leaf of both plants species and starch is used in rolling of pill masses, prevention of pills and lozenges from adhering together, as efficient disintegrating agent for compressed tablets, and in the production of dusting powders, because of its better absorbent of moisture. Being a carbohydrate that is readily converted into sugars, by enzyme action, starch is widely used for dietetic purposes, especially in the preparation of food for the infants and invalids (Wallis, 1985).

The quantitative evaluation is an important means of providing preliminary information on the quality of crude drugs and the physical constant parameters could be useful in detecting any adulterant in the drug. Proper moisture content is essential for maintaining fresh and healthy foods (Schuna, 2010). According to Musa *et al.*, (2005) the result of moisture content that is not high indicates the less chances of microbial degradation of the drug during storage. The general requirement for moisture in crude drugs is that it should not be more than 14% (BP, 1980). The minimum value of acid insoluble is expected to be around 5%. The values obtained in this research work revealed that moisture content of 10% for *Piper umbellatum* and 8% for *Piper guineense*, total ash value is 12.1% for *Piper umbellatum* and 11.0% for *Piper guineense* and acid insoluble ash value is 2.2% for both *Piper umbellatum* and *Piper guineense*. These values therefore are within the accepted range and could thus aid in the proper identification and collection of plants.

Edward *et al.* (1971) also emphasized that excessive moisture is considered an adulterant because of its added weight as well as the fact that excess moisture is conducive to the promotion of mold and bacterial growth, and subsequently to deterioration and spoilage of the

drug. Total ash value and acid insoluble ash value determination is equally important in the evaluation of crude drugs. The total ash is particularly important in the evaluation of purity of drugs, i.e. the presence or absence of foreign inorganic matter such as metallic salts and /or silica (Harborne, 1998).

### CONCLUSION

*Piper umbellatum* and *Piper guineense* have been distinguished on the basis of chemomicroscopy, quantitative evaluation and phytochemical studies. Several types of drugs could be produced from these plants, such as anti-microbial, astringents and anti-inflammatory drugs. The bioactive agents contained in the leaf shows a great medicinal value of the plants to man and edible as fodder to poultry. These basis provide some justification for the identification and collection of the plants.

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