Phytochemical, Proximate and Total Antioxidant Analysis of Ogbu
(Ficus exasperata) and Uvuru (Anthocleista djalonensis) Healthygreen Leaves

C.J. Okenwa, O.R. Chikelu and C.E. Nwogbo

Department of Pure and Industrial chemistry, University of Nigeria, Nsukka, Nigeria
Institute of Management and Technology, (IMT) Enugu state, Nigeria

Abstract: The demand for more nutritional leafy vegetables among wild unconsumed trees and vegetables known in Africa for nutritive, therapeutic and ethnomedicine purpose spur this research. The phytochemical, proximate and total antioxidant analysis of Ogbu (Ficus exasperata) and Uvuru (Anthocleista djalonensis) leaves were carried out. The young and healthy leaves of the samples under study were plucked from their respective trees; shade dried for seven days and ground into powdery form using a grinder and stored in an airtight container before been used for analysis. The result of the study, shows that in Ogbu (Ficus exasperata); the flavonoids, saponins, steroids, tannins and glycosides were present in the following quantities 23.42%, 1.94%, 1.74%, 0.50%, 0.39% and 0.17% respectively. In Uvuru (Anthocleista djalonensis), the flavonoids, saponins, phenols, tannins and glycosides are present in the 26.62%, 4.62%, 1.80%, 0.53% and 0.01% respectively. From the results of the proximate analysis of Ogbu (Ficus exasperate); carbohydrates, fiber, ash content, protein, moisture content and lipids content of the sample were observed to be present in the following percentage of: 43.81%, 21.55%, 14.15%, 12.25%, 5.05% and 3.49% respectively. In Uvuru (Anthocleista djalonensis), carbohydrates, fiber, protein, ash content, moisture and lipids content of the sample were observed to be present in the following percentage of: 48.88%, 16.35%, 15.75%, 10.10%, 6.70% and 2.22% respectively. Also, in the results of the antioxidant analysis of Ogbu (Ficus exasperate); it was observed that vitamin E, vitamin A and vitamin C were present in the following concentrations of: 12.23 mg/g, 6.99 mg/g and 0.189 mg/l respectively. In Uvuru (Anthocleista djalonensis); vitamin E, vitamin A and Vitamin C were observed to be present in the following concentrations of: 15.20 mg/g, 6.72 mg/g and 0.086 mg/l respectively. Hence, we thereby recommend the use of both Ogbu and Uvuru leaves as vegetables in our diets since they contain important phytochemicals and their nutrient level falls within other popular edible vegetables. We also suggest that it be used as a source of raw material for drug synthesis; to make vaccines and supplements that can control and prevent diseases.

Key words: Proximate • Total Antioxidant • Phytochemical and vegetables

INTRODUCTION

The African continent is one of the continents endowed with the richest biodiversity in the world. It has an avalanche of many food plants used as herbs; health foods and for therapeutic purposes. Over 5000 different species of plants substances have been recognized to occur in these areas and many of them have been found to be useful in traditional medicine for prophylaxis and cure of diseases [1]. Amongst the numerous plant species are Anthocleista djalonensis and Ficus exasperata etc.
is two-fold in the development of new drugs: (a) they may become the base for the development of a medicine, a natural blueprint for the development of new drugs and (b) a phytomedicine to be used for the treatment of diseases [4].

Phytochemicals also known as phytoneutrients are naturally occurring substances found in plant [5]. These substances have been found to be beneficial to human health as well as possessing antioxidant activity [6]. Many common plants based foods and herbs contain powerful phytochemical substances that can improve the quality of our health. Phytochemical can also protect us against many diet related disease.

Phytochemicals can act as an antioxidant and anti-inflammatory. It plays vital role in detoxification of harmful and deleterious chemicals of the body. Vegetables are mostly annual crops belonging to the group of plant called horticultural crops that are diverse in nature. Vegetable can be grouped into leafy and fruity vegetables on the nature of their consumable products or parts. Typical examples of fruits vegetable are those that produce fruit like okro, tomatoes, garden egg. While that of leafy vegetables are lettuce, spinach, fluted pumpkin and pumpkin. Iwu, [7] point out that fluted pumpkin (Telfairia occidentals) seeds are consumed for their nutritional and medicinal benefit.

*Ficus exasperata* belongs to the family Moraceae and is commonly called sand paper or fig tree/plant, widely spread in all eco-regions of Nigeria. The plant has been ethnobotanically reported to have diverse medicinal uses. The leaf extract is reported to have diverse medicinal uses such as treating hypertensive patients [8], haemostatic, ophthalmia, coughs and haemorrhoids (Odunbaku et al., 2008). The root bark is reported to be used in the treatment of high blood pressure [9]. The leaf is used to scratch skin parts affected by ringworm while the grounded leaves applied topically are used to treat boils [10]. Furthermore, the young leaves are prescribed as a common anti-ulcer remedy. Various pharmacological actions such as anti-diabetic, lipid lowering and anti-fungal activities have been reported for *Ficus exasperata*. Other industrial uses of sand paper leaves are for polishing woods [11], stabilization of vegetable oils, suppression of foaming, supplement as food stock and antimicrobials [12]. The activities of the leaf extract of *Ficus exasperata* against some pathogenic organisms have been extensively investigated [13]. Furthermore, it was reported that the viscid non-milky sap is used for treating sores eye trouble and stomach pains in Ivory Coast [14].

The sap is used to arrest bleeding in Ghana [15]. The liquid in which the bark is boiled is given to cows to hasten the expulsion of the after birth [16]. It is also used by traditional birth attendants (TBAS) in Congo to ease childbirth [17]. In Southern Africa scrapings of the bark is used in an embrocating of the body and also as a stimulant [18]. In Upper Ivory Coast it is applied to leprous sores (Bouquet 1969). In Zaire a leaf poultice is used in medication for ring worm [19]. Chest complications are treated in the Gambia by steam inhalation of the leaves boiled in water.

*Anthocleista djalonensis* is a species of the genus *Anthocleista*, their types, the English common name "Cabbage Tree" or "Candelabrum Tree" bear, within the family of gentian (Gentianaceae). It is located in West Africa widespread. *Anthocleistadjalonensis* grows as a small tree and reaches stature heights of up to 15 meters. Its slender trunk has a diameter of 40 cm. On the branches sometimes located at the leaf axils two upright spikes or upholstery. *Anthocleista djalonensis* has soft white wood grows as a mostly annual crops belonging to the group of plant called horticultural crops that are diverse in nature. Its slender trunk has a diameter of 40 cm. On the branches sometimes located at the leaf axils two upright spikes or upholstery. *Anthocleista djalonensis* has soft white wood grows as a mostly annual crops belonging to the group of plant called horticultural crops that are diverse in nature. Its slender trunk has a diameter of 40 cm. On the branches sometimes located at the leaf axils two upright spikes or upholstery. *Anthocleista djalonensis* has soft white wood.
of Institute of management and technology (IMT) Enugu. The samples were washed with distilled water to remove dirty particles and shade dried for 7 days before grinding. After grinding, 5 grams of the Ogbu leaf (sample A) was weighed into a washed dried bottle labeled A another 5 grams of grinded Uvuru leaf (sample B) was weighed and poured inside a washed dried bottle labeled B. The phytochemical, proximate and total antioxidant analysis were carried out in the laboratory of Project Development Agency (PRODA) Emene, Enugu.

The phytochemical which involve the determination of phenol, alkaloid, terpenoids was done using the method described by Harborne [17], steroid was determine using Okeke and Elekwa [18] method, tannin and flavonoids was done using Boham and Kocipai [19] method. For saponin, [20] and for Cynogenic glycoside, [23]; for proximate analysis, AOAC [22] and total oxidant determination was done using the method described by AOAC [23].

RESULTS

Phytochemicals:

Table 1: The comparison of the qualitative analysis of sample A [ogbu (Ficus exasperata)] and sample B [Uvuru (Anthocleista djalonensis)] green healthy leaves using different solvents

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Water</th>
<th>Methanol</th>
<th>N-hexane</th>
<th>Acetone</th>
<th>Diethyl ether</th>
<th>Ethanol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample A</td>
<td>A</td>
<td>B</td>
<td>A</td>
<td>B</td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>Alkaloids</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Tannins</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Phenols</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Steroids</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Terpenoids</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Glycosides</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Saponin</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Flavonoids</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>+</td>
</tr>
</tbody>
</table>

Table 2: The comparison of the quantitative analysis of sample A [ogbu (Ficus exasperata)] and sample B [Uvuru (Anthocleista djalonensis)] green healthy leaves

<table>
<thead>
<tr>
<th>Samples</th>
<th>Parameters (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample A</td>
<td>Tannin Phenol Steroids Saponin Glycosides Flavonoids Terpenoids</td>
</tr>
<tr>
<td>A</td>
<td>0.50 1.94 0.17 1.74 0.39 23.42 1.05</td>
</tr>
<tr>
<td>B</td>
<td>0.53 1.80 N.D 4.62 0.01 26.62 N.D</td>
</tr>
</tbody>
</table>

A = Ogbu leaves.
B = Uvuru leaves.
N.D = Not detected.

Proximate Analysis:

Table 3: The comparison of the result of the proximate analysis of sample A [ogbu (Ficus exasperata)] and sample B [Uvuru (Anthocleista djalonensis)] green healthy leaves

<table>
<thead>
<tr>
<th>Sample</th>
<th>Moisture</th>
<th>Ash</th>
<th>Lipids</th>
<th>Protein</th>
<th>Fiber</th>
<th>Carbohydrate</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>5.05</td>
<td>14.15</td>
<td>3.49</td>
<td>12.25</td>
<td>21.55</td>
<td>43.81</td>
</tr>
<tr>
<td>B</td>
<td>6.70</td>
<td>10.10</td>
<td>2.22</td>
<td>15.75</td>
<td>16.35</td>
<td>48.88</td>
</tr>
</tbody>
</table>

Sample A = Ogbu leaves.
Sample B = Uvuru leaves.

Vitamins:

Table 4: The comparison of the result of the total antioxidants analysis of sample A [ogbu (Ficus exasperata)] and sample B [Uvuru (Anthocleista djalonensis)] green healthy leaves

<table>
<thead>
<tr>
<th>Sample</th>
<th>Vitamin A (mg/g)</th>
<th>Vitamin C (mg/l)</th>
<th>Vitamin E (mg/g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>6.99</td>
<td>0.189</td>
<td>12.23</td>
</tr>
<tr>
<td>B</td>
<td>6.72</td>
<td>0.086</td>
<td>15.20</td>
</tr>
</tbody>
</table>

A = Ogbu leaves
B = Uvuru leaves
DISCUSSION

The result of the phytochemical qualitative analysis of Ogbaru (Ficus exasperata) and Uvuru (Anthocleista djalonensis) green healthy leaves using different solvent as shown in Table1 shows that alkaloid, tannin, terpenoid, glycoside, saponin was present in Ficus exasperata and Anthocleista djalonensis while flavonoid was sparingly present but steroids and phenol were absent in both. Alkaloids have been implicated in the inhibition of activities of some bacterial species (Tor-Anyiin, 2009). But boiling the vegetables in hot water reduces the anti-nutrients in the plant products [25], saponin in excess causes hypocholesterolaemia because it binds to cholesterol making it unavailable for absorption and also reduces protein digestibility. (Soetan, 2009). Flavonoids provides protection against diseases such as cancer, ageing, inflammation ischaemic injury and neuro-degenerative diseases [27].

Phytochemicals have varying amount in leafy vegetable. Levels of plant chemicals may vary depending on species and varieties of green leafy vegetables [27]. The quantitative analysis of the samples under study, shows that in Ficus exasperata; flavonoids, phenols, saponins, steroids, tannins, terpenoidsand glycosides were present in the following concentrations of 23.42%, 1.94%, 1.74%, 0.17%, 0.5%, 1.04% and 0.39% respectively. In Anthocleista djalonensis, flavonoids, saponins, phenols, tannins and glycosides are present in the in water, n-hexane and acetone extracts and absent in other solvents while in Atlantisida djalonensis, glycosides was observed to be abundantly present in acetone solvent, slightly present in n-hexane solvent and absent in other solvents. In Ficus exasperata, terpenoids was observed to be abundantly present in acetone solvent, slightly present in n-hexane solvent and absent in other solvents. In Ficus exasperata, glycosides was observed to be moderately present in methanol solvent, slightly present in n-hexane and acetone solvents and absent in water solvent. In Ficus exasperata, phenols was observed to be moderately present using n-hexane solvent while absent in all other solvents while in Anthocleista djalonensis, phenols was observed to be moderately present in water solvent, slightly present in diethyl ether solvent and absent in all other solvents. In Ficus exasperata, steroids were observed to be abundantly present in water solvent, slightly present in n-hexane solvent and absent in other solvents. In Ficus exasperata, terpenoids was observed to be abundantly present in acetone solvent, slightly present in n-hexane solvent and absent in other solvents.

From the results of the vitamin analysis of Ficus exasperata, it was observed that vitamin E, vitamin A and vitamin C were present in the following concentrations: 12.23 mg/g, 6.99 mg/g and 0.189 mg/l respectively. In Anthocleista djalonensis, vitamin E, vitamin A and Vitamin C was observed to be present in the following concentrations of: 15.20 mg/g, 6.72 mg/g and 0.086 mg/l respectively.

The comparative result of the qualitative analysis of the samples under study it was observed that in Ficus exasperata, tannins was observed to be slightly present in all extract while in Anthocleista djalonensis, tannins was observed to be moderately present in methanol, diethyl ether and ethanol solvents, slightly present in n-hexane and acetone solvents and absent in water solvent. In Ficus exasperata, flavonoids was observed to be moderately present using n-hexane solvent while absent in all other solvents while in Anthocleista djalonensis, flavonoids was observed to be abundantly present in water solvent, slightly present in diethyl ether solvent and absent in all other solvents. In Ficus exasperata, phenols was observed to be moderately present in methanol solvent, slightly present in n-hexane and acetone solvents and absent in all other solvents. In Ficus exasperata, glycosides was observed to be abundantly present in methanol solvent, slightly present in n-hexane and acetone solvents and absent in all other solvents. In Ficus exasperata, saponins was observed to be abundantly present in acetone solvent, slightly present in n-hexane solvent and absent in other solvents.

From the comparative analysis of the result of the quantitative analysis of both samples it was observed that for the tannin content of the samples under study, Anthocleista djalonensis leaves contains a little bit more
tannins (0.53%) than *Ficus exasperate* leaves (0.50%); for phenol content of both samples, *Ficus exasperate* leaves contains more phenols (1.90%) than *Anthocleista djalonensis* leaves (1.80%); for steroids content of both sample, *Ficus exasperate* leaves contains more steroids (0.17%) than *Anthocleista djalonensis* leaves which has non (N.D); for saponin content of both samples, *Anthocleista djalonensis* leaves contains more saponin (4.62%) than *Ficus exasperate* leaves (1.74%); for glycosides content of both samples, *Ficus exasperate* leaves contains more glycosides (0.39%) than *Anthocleista djalonensis* leaves (0.01%), while for flavonoids content of both samples, *Anthocleista djalonensis* leaves contains more flavonoids (26.62) than *Ficus exasperate* leaves (23.42).

From the comparative analysis of the result of the proximate analysis of both samples it was observed that for the moisture content of *Anthocleista djalonensis* leaves contain more moisture (6.70%) than *Ficus exasperate* leaves (5.05%), for ash content of both sample, *Ficus exasperate* leaves contains more ash (14.15%) than *Anthocleista djalonensis* leaves (10.10%), for lipids content, *Ficus exasperate* leaves contains more lipids (3.49%), than *Anthocleista djalonensis* leaves (2.22%), for protein content, *Anthocleista djalonensis* leaves contain more protein (15.75%) than *Ficus exasperate* leaves (12.25%), for fiber content, *Ficus exasperate* leaves contains more fiber (21.55%) than *Anthocleista djalonensis* leaves (16.35%), while for carbohydrate content, *Anthocleista djalonensis* leaves contain more carbohydrate (48.88%) than *Ficus exasperate* leaves (43.81%).

From the comparative analysis of vitamins, it was observed that for the vitamin A content, *Ficus exasperate* leaves contains more vitamin A (6.99 mg/g) than *Anthocleista djalonensis* leaves (6.72 mg/g), for vitamin C content, *Ficus exasperate* leaves contains more vitamin C (0.189 mg/l) than *Anthocleista djalonensis* leaves (0.086 mg/l), while for vitamin E content, *Anthocleista djalonensis* leaves contain more vitamin E (15.20 mg/g) than *Ficus exasperate* leaves (12.23 mg/g).

**CONCLUSION**

The evaluation of the nutrient composition of *Ficus exasperate* leaves (Ogbu) and *Anthocleista djalonensis* (Uvuru) leaves has confirmed that varying number of phytochemicals are present in both samples and in different proportions. In other words, the leaves are highly rich in nutrients and good for human consumption for good and healthy living. They may be utilized for various therapeutic purposes since these nutrients are available during the dry season.

**Recommendations:** It is therefore recommended that the young leaves *Ficus exasperate* leaves (Ogbu) and *Anthocleista djalonensis* (Uvuru) should be taken as a source vitamin in our diets. This study supports the idea that both Ogbu and Uvuru leaves can be useful in the Pharmaceutical and Medical science to make vaccine and supplements that can prevent diseases. It can be useful also in various manufacturing industries as raw material.

**REFERENCES**