Original Article

Assessment of nutritional value of *Culcasia scandens* P. Beauv leaves

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Abstract

*Culcasia scandens* P. Beauv is a tall climbing plant which grows abundantly in the southern part of Nigeria. It is acclaimed by traditional users to be a potent anti-inflammatory herb. Current study was designed to investigate the nutritional values of *Culcasia scandens* to rule out the possible therapeutic effects of the herb. The study was carried out by employing spectrophotometric methods for determining the overall nutritional content of the herb. The result of proximate analysis showed that the *Culcasia scandens* had high levels of dry matter (91.17±0.01), carbohydrate (45.89±0.02), crude protein (21.71±0.01) and crude fibre 10.97±0.01 with relative low percentage of lipid (2.74±0.00), moisture (8.83±0.01). The result also recorded high levels of retinol (184.00±0.00), niacin (54.00) and folic acid (28.40±0.00) with low levels of ascorbic acid (0.08±0.01), thiamin (0.24±0.00), riboflavin (0.66±0.00) and tocopherol (1.03±0.00). The higher amounts of the proximate contents and vitamins indicated that besides the leaves are being used as traditional medicinal, this herb can serve as good source of nutrients to human as well.

Keywords: Plant leaves, nutrients, proximate, Vitamins, *Culcasia Scandens* P. Beauv.

Introduction

Traditional societies have exploited edible plants in order to have sufficient nutrition, food security and income generation [1]. These plants served as an indispensable constituent of human diet supplying the body with minerals, vitamins and certain hormone precursors, in addition to protein and energy [2, 3]. However, many of these economical nutritive plants have not been assessed for their nutritional values or are yet to be adequately studied and utilized by human [4]. *Culcasia scandens* P. Beauv. is a climber that belongs to the order of Arales, family Araceae and subfamily Aroidae. It belongs to genus *Culcasia schott* and about 28 species of this plant exist. *Culcasia* species are native of Africa [5].

It is often epiphytic, with slender, wiry stems, up to 5 m long clinging to tree trunks by means of clasping roots, and growing on forest and stream margins and savanna from Liberia, Ivory Coast, Sierra Leone, Nigeria and Cameroun [6, 7].

The sap, leaves, bark, infusions, decoctions and pulp prepared from the plant are used to treat a variety of ailments and conditions as analgesic for earache, toothache, tonsillitis and stomach complaints [8]. It is also used as an anti-emetic, for various skin conditions, taken during pregnancy as an anti-abortifacient, and for venereal diseases [7]. The sap is a skin-irritant, rich in alkaloids and leading to its use as a fish poison and as veterinary medicine for goat ailments. Some African tribes mix maize seeds with powdered *Culcasia* roots and seeds and claim
that better crops result, probably due to Culcasia’s insecticidal and repellent properties [5]. The extracts from Culcasia scandens has been reported to show antimicrobial activity against E. coli, S. aureus B. subtilis, P. aeruginosa and S. typhi [9].

### Materials and Methods

#### Materials

Fresh leaves of Culcasia scandens were collected from Ogboji Ezzagu in Ishielu L. G. A. of Ebonyi State, Nigeria. The plant samples were identified and authenticated by Dr. Nnamani, K., a taxonomist in the Department of Applied Biology, Ebonyi State University, Abakaliki, Ebonyi State, Nigeria. All chemicals and reagents were of analytical standard.

#### Preparation of plant material

The leaves of Culcasia scandens were sorted, washed thoroughly with distilled water to remove dirt and debris, cut into smaller pieces before it was shade dried at room temperature (28±3°C). The dried leaves were pulverized into fine powder using manual grinder.

#### Methods

##### Proximate analysis:

The standard method of A.O.A.C (2004) [10] was used. This method was used to determine the major components, which include moisture, crude protein, lipids (fats), ash (mineral), crude fibre, carbohydrate and dry matter values.

##### Measurement of selected vitamins

Selected Vitamins: thiamin, riboflavin, niacin, ascorbic acid, tocopherol, retinol and folic acid were determined using atomic absorption spectrophotometer (AAS) based on association of official Analytical chemist A.O.A.C (2004) [10].

#### Statistical Analysis

The data was analyzed by ANOVA and results expressed as mean ± standard deviation of triplicate determination.

#### Results

The results of proximate analysis showed that the plant leaves contained variable amount (%) of proximate composition with high levels of dry matter, carbohydrate, crude protein and fibre and low levels of lipids (Table 1).

<table>
<thead>
<tr>
<th>Proximate contents</th>
<th>Values (mg/100g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moisture</td>
<td>8.83±0.00</td>
</tr>
<tr>
<td>Ash</td>
<td>9.87±0.01</td>
</tr>
<tr>
<td>Lipid</td>
<td>2.74±0.01</td>
</tr>
<tr>
<td>Crude fibre</td>
<td>10.97±0.01</td>
</tr>
<tr>
<td>Crude protein</td>
<td>21.71±0.01</td>
</tr>
<tr>
<td>Carbohydrate</td>
<td>45.89±0.02</td>
</tr>
<tr>
<td>Dry matter</td>
<td>91.17±0.03</td>
</tr>
</tbody>
</table>

The results are presented as mean ± standard deviation of the triplicate determination of leaves of Culcasia scandens.

The results of vitamin analysis showed that the plant leaves contained high levels of retinol, niacin and folic acid with low amounts of ascorbic acid, riboflavin and tocopherol (Table 2).

<table>
<thead>
<tr>
<th>Vitamin contents</th>
<th>Values (mg/100g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retinol</td>
<td>184.00±0.00</td>
</tr>
<tr>
<td>Riboflavin</td>
<td>0.66±0.00</td>
</tr>
<tr>
<td>Niacin</td>
<td>54.00±0.00</td>
</tr>
<tr>
<td>Folic acid</td>
<td>28.40±0.00</td>
</tr>
<tr>
<td>Ascorbic acid</td>
<td>0.08±0.00</td>
</tr>
<tr>
<td>Tocopherol</td>
<td>1.03±0.00</td>
</tr>
<tr>
<td>Pyrodoxime</td>
<td>Nf</td>
</tr>
</tbody>
</table>

The results are presented as mean ± standard deviation of the triplicate determination leaves of Culcasia scandens. Nf= Not found

The result of proximate analysis revealed that the plant leaves contained high amounts of dry matter (91.17%). This high amount of dry matter indicates that the plant is rich in energy supplements and also contributes to the formation of hormones. This makes the leaves of Culcasia scandens an important source of dietary energy compared to other foods as reported by Okwu and Josha, 2006 [11].

The results of current analysis showed a high carbohydrate content of 45.89%. However, the carbohydrate content of the plant is higher than that reported in Cymbopogon citratus leaves (19.64%) by Uraku et al. (20015a) [4] but lower than that reported in Boerhavia diffusa (10.56%) and Commelina nudiflora (5.67%).

The analysis showed crude protein content of 21.71%. These levels were found to be higher than that of 3.33% recorded by USDA Nutritional Database reference [12]. The protein content of C. scandens demonstrates it as better rich sources of protein than wild Clarias gariepinus.
Nutritional value of Culcasia scandens

(19.2%), Amaranthus (6.1%) and Moringa oleifera (4.2%) as reported by Nwali et al. (2015) [13] and lower than Solanum nigrum L. Var. virginicum leaves (24.90%) and Blighia unijugata (24.13%) reported by Offor et al. (2015) [12].

Fiber content was 10.97 %. The concentration was higher than “oha” (Pterocarpus soyauxii) (13.1%) as reported by Ekumankama (2008) [14]. Additionally, it was higher than leaves and seeds of Solanum nigrum L. Var. virginicum (6.81% and 6.29%). Crude fibre content of C. scandens might have beneficial effects in health as fibre aids in elimination of indigestive waste through the bowel.

The moisture content was found to be 8.83%. This observation of low moisture content implies that the plant can be stored for a long period of time with lower chances of microbial attack or growth since microorganisms that cause spoilage thrive in foods having high moisture content and it is also an indicative of low total solids [15].

The ash content of the leaves (9.87%) is similar to the values reported for some commonly consumed leafy vegetable in Nigeria, including Ocimum graticinum, Hibiscus esculenta and Ipomea batata. It is however; lower than the reported value of 20.05% for Talinum triangulare [2, 16]. This value is comparatively in agreement with reported value of 7.18% for S. nigrum from Congo Brazzavile [15]. The lipid content observed for Cymbopogon citratus leaves is similar to those reported for Calchorus aferca, Amaranthus hybidus and Talinum triangulare but about half of the value for Bacsilla alba leaves as reported by [16].

The determination of vitamin composition of C. scandens revealed that the leaves contained a good amount of vitamins. The results of the study showed high concentrations of retinol, niacin and folic acid with low concentration of ascorbic acid and thiamin. The high concentrations of retinol, niacin and folic acid obtained in the study were higher than that obtained from Cymbopogon citratus leaves according to Uraku et al. (2015a) [4]. The presence of retinol in high concentrations is an indication that the leaves could be a good source for growth and development, maintenance of immune system and good vision [17, 18]. There were also appreciable amounts of niacin and folic acid. The higher levels of folic acid suggested that the plant might be required by pregnant women in red blood cell formation and for normal foetal growth [19]. The concentration of niacin obtained was consistent with the result of Olayiwola (2013) [20] from the leaves of Bambusa vulgaris but disagree with the results obtained by Uraku et al. (2015b) [21] from the leaves of T. occidentalis, A. cruentus and M. pruriens while that of folic acid was in agreement with the result reported by Akubuogwo et al. (2007) [1] from the Solanum nigrum L. Var. virginicum leaves and seeds. The low level of thiamin in the leaves was in line with report of Offor et al. (2015) [12] but disagree with the results obtained from the same plant by the same group with regard to ascorbic acid and tocopherol levels.

In conclusion, the results of the current study confirmed that the leaves of Culcasia scandens contains substantial amounts of some nutrients and an appreciable amount of vitamins making it a good source for growth and development and therapeutic agent but warrants further analysis for understanding the mechanism of action by employing different biological models.

Conflict of Interest

Authors declare that there is no conflict of interest to reveal.

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