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CHAPTER 5

Phytochemical and Nutritional Assessment of
Justicia Insularis

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Abstract

Justicia insularis T. Anders is an entbotanically important vegetable among the people of Akwa Ibom State. Although not one of the popularly consumed vegetables, it is commonly used in the weaning of infants and feeding of post natalis. It is a common weed of shady places. Phytochemical analysis revealed the presence of alkaloids, saponins, flavonoids, cyanogenic glycosides, tannins, anthraquinones and cardiac glycosides. Proximate composition analysis revealed that moisture content was 86.66%, dry matter 13.34%, ash content 8.00%, crude fibre 3.33%, crude fat 9.40%, crude protein 34.13%, carbohydrate 45.14% and caloric value of 373.48. Mineral composition analysis revealed the presence of Phosphorous (500mg/100g), Magnesium (300mg/100g). This vegetable is being recommended for wider consumption and for more investigation into its pharmaceutical potentials.

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1.0 Introduction

Justicia insularis T. Anders, is one of the vegetables eaten by the people of Akwa Ibom State of Nigeria who are noted for their vegetable-rich diets. It is a common weed found in shady places, a straggling herb of about 30cm-92cm high rooting at the lower nodes. The stem is angular, swollen at the nodes, pubescent with soft white hairs. It is succulent with reddish streaks towards the nodes. The leaves are up to 8cm long and 5cm wide, ovate to ovate lanceolate; acuminate, cuneate, pubescent, with margins entire.

The petioles are up to 4cm long. The flowers are lilac coloured, 2-lipped with streaks of white on the throat. They are axillary and up to 1.5cm long.

J. insularis, T. Anders, belongs to the family Acanthaceae. It is called “meme” in the Ibibio language. This refers to its softness as a vegetable and probably also to its perceived softening ability as a laxative. It is used in the preparation of indigenous delicacies like “ekpang” and “abak” or “ubo.” It is the vegetable of choice in the rural areas for preparing dishes for babies during or after weaning them. It is also recommended for those having chest or cardiac problems. Etuk, et al (56:7-12), reported the use of Portulaca oleracea and Assystasia gangetica as a mild laxative for infants. They also found that A. gangetica was desirable for weaning infants. Plants with secondary metabolites like alkaloids have possible use in the pharmaceutical industry for the formulation of new drugs (Trease & Evans; 832).

Based on the above mentioned uses of this plant, the purpose of this work was to investigate the chemical composition of the plant and assess its nutritional value.

2.0 Materials and Methods

Fresh samples of J. insularis, T. Anders were collected in Uyo Metropolis and brought to the botany laboratory of the University of Uyo. The samples were duly identified and authenticated by the taxonomist and a voucher specimen deposited in the herbarium.

2.1 Extraction

This was by cold extraction: 200g of fresh leaves were soaked in 200mls of 90% ethanol in a conical flask and left for 72 hours. Thereafter, the extraction was filtered out and the ethanol was
vacuum evaporator. The remaining liquid was
into paste by drying on low heat.

Analysis

Methods adopted in the Phytochemical analysis were those of
Chemical constituents screened (832). Chemical constituents screened
were: anthraquinones, flavonoids, alkaloids, and cyanogenetic glycosides.

Methods used to analyse the above are those of the
American Chemical Society (AOAC) of 1975. Moisture
content, crude protein, crude fat, ash content, and caloric values were all determined.

Potassium were determined by flame photometry
AOAC of 1975, procedure. Calcium and magnesium
were determined by a versenate titration method. Phosphorous was
determined by the subbovannate method of AOAC in 1975.

Characterizes the results of the phytochemical analyses; presence of alkaloids, tannins, flavonoids, saponins, cardiac glycosides and cyanogenetic glycoside in its seeds and tannins were the least in quantity while the cardiac glycosides was the reference content of the secondary
alkaloids. The proximate composition shows that the caloric value is 373.48k/cal. The moisture content is 86.66%
and the crude fat was 9.40%, the crude protein was 34.13, carbohydrate was 45.14, and caloric value was 373.48k/cal.

The mineral composition of the plant in mg/100g,
including potassium (1,870mg/100g) followed by
sodium (70mg/100g). The sodium content is comparably
higher than other minerals.

Table 1: Phytochemical Composition of J. insularis

<table>
<thead>
<tr>
<th>Secondary metabolite</th>
<th>Test done</th>
<th>Inference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alkaloid</td>
<td>Dragendorf's test</td>
<td>++</td>
</tr>
<tr>
<td></td>
<td>Mayer test</td>
<td>++</td>
</tr>
<tr>
<td>Flavonoids</td>
<td>Shinoda's test</td>
<td>++</td>
</tr>
<tr>
<td></td>
<td>Sodium hydroxide test</td>
<td>++</td>
</tr>
<tr>
<td>Saponins</td>
<td>Frothing test</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>Fehling test</td>
<td>+</td>
</tr>
<tr>
<td>Tannins</td>
<td>Ferric chloride test</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>Bromine test</td>
<td>+</td>
</tr>
<tr>
<td>Anthraquinones</td>
<td>Borntragers test</td>
<td>++</td>
</tr>
<tr>
<td>Cardiac glycosides</td>
<td>Liebermann's test</td>
<td>+++</td>
</tr>
<tr>
<td></td>
<td>Salkowski test</td>
<td>+++</td>
</tr>
<tr>
<td></td>
<td>Keller-Kilian test</td>
<td>+++</td>
</tr>
</tbody>
</table>

Table 2: Proximate Composition of J. insularis

<table>
<thead>
<tr>
<th>Test</th>
<th>Composition in %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moisture content</td>
<td>86.66</td>
</tr>
<tr>
<td>Ash content</td>
<td>8.00</td>
</tr>
<tr>
<td>Crude fibre 3.33</td>
<td></td>
</tr>
<tr>
<td>Crude fat</td>
<td>9.40</td>
</tr>
<tr>
<td>Crude protein</td>
<td>34.13</td>
</tr>
<tr>
<td>Carbohydrate</td>
<td>45.14</td>
</tr>
<tr>
<td>Caloric value</td>
<td>373.48k/cal.</td>
</tr>
</tbody>
</table>

Table 3: Mineral Composition in J. insularis

<table>
<thead>
<tr>
<th>Mineral Tested</th>
<th>Composition in mg/100g</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phosphorous</td>
<td>500</td>
</tr>
<tr>
<td>Calcium</td>
<td>200</td>
</tr>
<tr>
<td>Sodium</td>
<td>70</td>
</tr>
<tr>
<td>Potassium</td>
<td>1,870</td>
</tr>
<tr>
<td>Magnesium</td>
<td>300</td>
</tr>
</tbody>
</table>
4.0 Discussion and Conclusion

According to Trease and Evans (832) alkaloids are used as emetic, anesthetic, adstringent, antispasmodic, analgesics, and antihelmintic and can be used for the treatment of stomach problems. Alkaloids have also been reported from the leaves of Papaver somniferum by Puyelde, et al in 1990. They also reported the presence of saponins in Quillaga saponaria. Saponins when taken orally relieves fever, are haemolytic and highly toxic when injected into the blood stream. Sofowora (2-3) stated that saponins though highly toxic are comparatively harmless when administered orally.

Cardiac glycosides have also been reported in Morinde citrifolia (Farine, legal, Moreteau and Quee, 1996) and in Digitalis purpurea (Trease and Evans, 1989). They are said to be useful in treatment of diseases associated with the heart.

This confirms the local use of J. insularis for the same purpose since the results in this work shows a high presence of cardiac glycosides.

Anthraquinones have laxative and purgative properties according to Trease and Evans (832). The presence of this compound in J. insularis confirms its usefulness ethnobotanically to “soften” the bowels and thus improve bowel movement in both adults and infants.

The moisture content of 86.66% in J. insularis compares favourably with other succulent vegetables like Talinum triangulare which has a moisture content of 96.80% (Oyenuga, 20-35) and Portulaca oleracea, 90.1% (Etik et al., 34-5-7).

The ash content of 8% in J. insularis is low when compared to other vegetables. In the young crozier of Diplazium sammatii it is 10% (Bassey, et al 56:7-12) while in: Telfairia occidentalis it is 11% (Iton and Bassir, 6:263-267).

The low value of crude fibre (3.33%) is comparable to those Asystasia gangetica (4.4%) and Prosercaea (4.5%) as reported by Etik et al., (34:5-7).

The crude protein value as reported by Oyenuga (20-35) was 22% for T. occidentalis and 22.2% for Vernonia amygdalina. These are commonly consumed vegetables; however the crude protein content of J. insularis is higher (34.13%) than both.

J. E. D.

The calcium content for lima beans ranges from 100-120mg/100g according to Oyenuga (20-25). This figure is lower than the level of calcium found in J. insularis which was 200mg/100g. Calcium is important for bone development particularly in infants.

J. insularis, T. Anders is very rich in potassium (1,870mg/100g). This compares well with D. sammatii which has a potassium content of 1,600mg/100g (Bassey et al., 56:7-12). Potassium is important in the formation of protein and glycogen (Stare and Williams, 27:35).

In conclusion, nutritionally, J. insularis, T. Anders is comparable with the more popularly consumed vegetables because of its moisture, carbohydrate and protein content. Its low fibre content confirms its suitability in infant diets. The presence of secondary metabolites like alkaloids, flavonoids, cardiac glycosides, anthraquinones and others confirms the medical value of the plant. It is therefore highly recommended for wider consumption and for further investigation as to possible pharmaceutical uses.

References


