Pharmacognostic Studies and Establishment of Quality Parameters for *Albizia altissimum* (Hook.f) Hutch et Dandy Leaf

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**ABSTRACT**

**Introduction:** A large population of Nigerians like in other parts of the developing world depend on the use of plants to meet their health needs and to address the perceived inadequacies associated with this form of therapy. It is essential that quality standards are established for plants used in traditional therapy. This study was carried out for *Albizia altissimum* (Hook.f) Hutch et Dandy, a plant widely used in the Niger Delta region of Nigeria for mental disorder among many other uses. **Methods:** The World Health Organization (W.H.O) guidelines for the establishment of quality parameters for medicinal plants were used to carry out all the determinations - microscopic, macroscopic, and quantitative parameters. **Results:** Transverse section of the leaf showed a single layer epidermis with cuticle and trichomes, mesophyll divided into palisade and spongy mesophyll as well as druse calcium oxalate crystals along the vein while physicochemical parameters such as total ash, water soluble ash and acid insoluble ash were also determined. **Conclusion:** The parameters determined above can serve as a platform for the preparation of a monograph for the leaf of *A. altissimum*. **Key words:** Macroscopic and Microscopic Characteristics, Medicinal plants, Standardization

**INTRODUCTION**

Plants have always been a part of mankind’s healthcare system and plants in the form of herbal medicine play an important role in the healthcare system of most developing countries, Nigeria inclusive. The use of plants, parts of plants and isolated photochemical for the prevention and treatment of various health ailments has been in practice from time immemorial.[1,2] The World Health Organization states that approximately 85-90% of the world’s population consumes traditional medicines and nearly 80% of African and Asian populations depend on this type of medicines for their healthcare and about 85% of traditional medicines involves the use of plants.[3,4] While there is an increase usage of herbal drugs throughout the world, reports on side effects and adulteration of herbal drugs have raised concern on their wide use and thus affecting their commercialization.

Adulteration or substitution involves intentional replacement with another plant species or intentional addition of foreign substances to increase the weight or potency of the product or to decrease its cost. The use of fake or wrong herbs has generated serious questions about the safety and efficacy of herbal drugs.[2] To ensure reproducible quality of herbal products proper control of starting materials is of utmost importance and the first step towards ensuring quality of starting material is authentication. Thus, in recent years there has been a rapid increase in the standardization of selected medicinal plants of potential therapeutic significance. Pharmacognostic studies are pivotal in herbal sciences as it ensures plant identity and prevents adulterations[5] hence for any drugs to be continually produced to the same standard of safety and efficacy all the time, it is necessary to establish quality control parameters that must be met at all times[6] and this is the major reason why quality standard must be established for medicinal plants used in traditional medicine with proven efficacy in the treatment of various diseases of man.

**The Plant Albizia altissimum** (Hook f) Hutch and Dandy

The plant is a deciduous tree that grows to about 15 m in height and about 25 cm in diameter and it s common in the riverine forest and secondary jungle from Sierra Leone.
to West Cameroon extending to Sudan, Uganda and Angola. The leaves, stem, root and fruits have various uses in traditional medicine such as in the treatment of snake bite, use as fish poison, treatment of tooth and stomach ache as well as in the treatment of mental illness.[7] The bark is used in traditional medicine in Sierra Leone and DR Congo; a decoction is used as an antidote to treat toothache and stomach-ache, and against pulmonary infections, and externally to treat sores. The bark also serves as fish poison. Scraped inner bark beaten up in water is used as soap to wash clothes.[8] In DR Congo a leaf decoction is used in a vapor bath to treat colds. Burned leaves are applied to snakebites. The fruits are used for tanning and dyeing, and to prepare ink and soap. The fruit pulp and the seeds are edible. In Nigeria fermented seeds called ‘oso’ are used as condiment in soups.[9] Scientific studies on the 50% Ethanol extract of the leaves has justified the traditional uses of the plants in treatment of mental disorder as it showed central nervous system depressant effect in mice.[10]

MATERIALS AND METHODS

The leaves for the study were collected from the back of Medicinal Plant garden of the Department of Pharmacognosy and Herbal Medicine, Faculty of Pharmacy of Niger Delta University Wilberforce Island Bayelsa State South-South Nigeria. It was authenticated by Mr. Benjamin Daramola a retired Taxonomist from the Forestry Research Institute of Nigeria and an herbarium specimen was kept in the Department of Pharmacognosy and Herbal Medicine Herbarium with Voucher Number PCGH 001. The leaves were air dried and ground to powder with a grinding machine and stored until needed.

Pharmacognostic studies

The World Head Organization guidelines[11] for quality control methods for medicinal plants were used for all the parameters determined. Fresh leaves of the plant were used to prepare surface preparation. The method as described by Bitasta and Swati[12] was used for the fluorescence analysis of the powder.[12]

RESULTS

<table>
<thead>
<tr>
<th>Parameters</th>
<th>mg/g</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moisture content</td>
<td>482.50</td>
</tr>
<tr>
<td>Total ash</td>
<td>30.60</td>
</tr>
<tr>
<td>Acid insoluble ash</td>
<td>0.027</td>
</tr>
<tr>
<td>Water soluble ash</td>
<td>0.051</td>
</tr>
<tr>
<td>Ethanol soluble extractive value (cold extraction)</td>
<td>150.00</td>
</tr>
<tr>
<td>Ethanol soluble extractive value (hot ethanol)</td>
<td>182.50</td>
</tr>
<tr>
<td>Water soluble extractive value (cold extraction)</td>
<td>130.00</td>
</tr>
<tr>
<td>Water soluble extraction value (hot extraction)</td>
<td>162.00</td>
</tr>
</tbody>
</table>

DISCUSSION

A transverse section of the leaves reveals the presence of a single layered epidermal cell on both surfaces covered with cuticle as well as trichomes. The mesophyll is differentiated into palisade and spongy mesophyll. The palisade mesophyll is two layered tightly packed long cylindrical cells while the spongy mesophyll is single layer with intercellular spaces in between the cells. The vascular bundles is located between the mesophyll.
Abaxial epidermis with paracytic stomata

Adaxial epidermal cells

Adaxial surface of A. altissimum under low power

Adaxial surface showing the presence of paracytic stomata

Adaxial epidermal cells under high power

Adaxial surface showing the presence of calcium oxalate crystals deposited along the veins under low power

Adaxial surface showing the presence of Calcium oxalate crystals under low power

Transverse section of A. altissimum under low power

Plate 1: Microscopical characteristics of the leaf of A. altissimum
Stomata are present only on the lower surface and the stomata type is paracytic.

Druse calcium oxalate crystals are present and are located along the veins.

The powdered microscopy shows the presence of fragments of epidermal cells, palisade cells and spongy mesophyll as well as crystals of druse calcium oxalate crystals on the surfaces. The physical constant evaluation of the drugs is an important parameter in detecting adulteration. The ash values, extractive values and moisture content of stems were determined.[13] Ash values of a drug give an idea of the earthy matter or the inorganic composition and other impurities present along with the drug. Extractive values are primarily useful for the determination of exhausted or adulterated drugs.[14]

**CONCLUSION**

The parameters obtained in this study can be used as a basis for the establishment of a monograph for the plant.

**ACKNOWLEDGEMENT**

Assistance of Ajibesin KK and Raji R.
REFERENCES