PHARMACOGNOSTIC CHARACTERISTICS OF AN UNEXPLORED TRADITIONAL MEDICINE ARECA CATECHU L. ROOT.

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ABSTRACT

Areca catechu L. (Areaceae) is commonly known as Betel palm or Betel nut tree. It is cultivated primarily for its kernel obtained from the fruit, which is chewing in different forms. Uses for areca nut other than chewing are negligible. Extensive studies on the medicinal properties and chemical constituents of Areca fruit especially the nut is there but that of root is scarce. Areca catechu root is using in the traditional medicines of Kerala against worm disturbances, skin irritations and in urinary tract disorders. In order to ensure the purity of the drug in its dried form pharmacognostic standardization of the plant has carried out in the present work. Microscopic, histochemical and physico-chemical characters of A. catechu root were noted down. Phytochemical screening results the presence of alkaloids, phenols, terpenoids, cardiac glycosides, tannins, flavonoids, phlobatanins, steroids and quinones. All these pharmacognostic characters can use as diagnostic tools for the correct identification of the plant and which will prevent the adulterations.

Key words: Areca, microscopy, phytochemistry, ash analysis, traditional medicine.

INTRODUCTION

Plants have been utilized as medicines for thousands of years [1]. These medicines initially took in the form of crude drugs such as tinctures, teas, poultices, powders, and other herbal formulations [2]. The specific plants used and the methods of application for particular ailments were passed down through oral history. Eventually information regarding medicinal plants was recorded in herbals [3].
Drug discovery from medicinal plants has evolved to include numerous fields of inquiry and various methods of analysis. The process typically begins with a botanist, ethnobotanist, ethnopharmacologist, or plant ecologist who collects and identifies the plant(s) of interest. Collection may involve species with known biological activity for which active compound(s) have not been identified and isolated (e.g., traditionally used herbal remedies) or may involve taxa collected randomly for a large screening program \(^4\), it may take more time and effort. Therefore, the easier method is to select a traditionally proved, unexplored plant, it is one of the emerging trends in pharmacology.

*Areca catechu* Linn. (Palmae, Areaceae) commonly known as Betel palm or Betel nut tree is a species of palm. Areca palms are growing in India, Malaysia, Taiwan and many other Asian countries for their economically important seed crop. It is a medium-sized tree growing to 20 m tall with a trunk 20-30 cm in diameter. The leaves are 1.5-2 m long, pinnate with numerous crowded leaflets \(^5\).

Areca nut palm is cultivated primarily for its kernel obtained from the fruit, which is chewing in its tender, ripe or processed form. Uses for areca nut other than chewing are negligible. Its export prospects are also very much limited \(^6\). That is most of the people are not know its medicinal properties. Powdered nuts are prescribing in diarrhea and urinary disorders \(^7\). Extensive studies on the medicinal properties and chemical constituents of Areca fruit especially the nut is there.

Nevertheless, studies on root are scarce. *Areca catechu* root is using in the traditional medicines of Kerala against various ailments like urinary tract disorders, skin irritations, worm disturbances and as a component in health tonic preparation \(^8\) and young leaf sheath is used in the treatment of migraine \(^9\). In our preliminary screening, Areca root crude extract showed prominent antimicrobial, anthelmintic and antioxidant properties \(^8\).

Now a days ‘adulteration’ and ‘substitution,’ are prevalent in trade. Adulteration, in a broad and legal sense, is the debasement of any article, which involves conditions such as inferiority, spoilage, deterioration, admixture, sophistication, and substitution. Adulterating the crude drugs by any of the said conditions is considering undesirable in the crude drug industry \(^10\). Generally, medicinal plants are sailing in the market in its dried form, so there may be chance for unintended adulteration in case of root and bark due to the lack of morphological identifying features. Therefore, a detailed study on the pharmacognostic
characters of *Areca catechu* root is necessary to identify the drug properly. The further procedures of identification and isolation of active principles in Areca root is in progress.

**MATERIALS AND METHODS**

**Collection of plant material**

The fresh roots of *A. catechu* were collected in the months of November 2013 from Mannamangalam village of Thrissur district Kerala.

**Microscopic characters of the root:** *Free hand transverse sections of the root was taken, stained with safranin and observed for their peculiar characters.*

**Histochemical localization of alkaloids:** Thin sections of the root were treated with Mayer’s reagent and Wagner’s reagent for the localization of alkaloids.

**Physicochemical parameters of the root:** Ash value is a measure of the quality and purity of the crude drug. So in the physicochemical evaluation, ash values, viz. total ash, acid soluble ash, acid insoluble ash, water insoluble ash and water soluble ash were determined as per standard procedure \(^{[11]}\).

**Fluorescence analysis:** The powdered root was treated with various chemicals like picric acid, acetic acid, concentrated nitric acid, sulphuric acid, hydrochloric acid, ammonia solution, ferric chloride, iodine, methanol, sodium hydroxide and observed under daylight and ultra- violet light of shorter and longer wavelengths (254 nm, 366nm) \(^{[12]}\).

**Preparation of extracts:** Roots of the plant were shade dried for several days. The dried plant materials were ground to a course powder and 50g of the powdered plant material was soaked in 95% ethanol (1:5) for 72 hours. Then, the solvent removed by rotary evaporation. The dried extract was stored in refrigerator for further studies.

**Phytochemical screening:** The preliminary phytochemical analysis of the plant extracts were performed using standard protocol given by Harborne \(^{[13]}\).

**RESULTS AND DISCUSSION**

**Microscopic characters of *A.catechu* root**

Transverse section of the Areca root is circular in shape and showing a single layered outer epidermis (Fig:1). Epidermis follows heterogeneous cortex, which consist of 3-4 layers of
compactly arranged parenchyma cells, many layers of loosely packed parenchyma cells with number of stone cells (Fig 2), many layers of aerenchyma with large air cavities, finally, 3-4 layered compactly packed collenchyma cells represent the end of cortex, in aerenchyma and collenchyma layers scattered bundles of schlerenchyma cells present. Cortex follows single layered endodermis with casparian thickening. Vascular tissue forms a continuous circle. Xylem and phloem arranged side by side, xylem is exarch. Layers of schlerenchyma cells surround vascular tissue (Fig 3). Pith consists of homogenous aerenchyma cells with central small cavity.

Fig 1: T.S of Areca root, C: - cortex, A: - air cavity, R: - origin of rot hair, V: - vascular tissue, P: - pith.

Fig 2: cortex bearing stone cells. S: - Stone cells. Fig 3: - Enlarged portion of vascular tissue. S: - patch of schlerenchyma, X: - xylem, P: - phloem, E: - endodermis with casparian thickening, C: - Collenchyma cells.

Histochemical localization of alkaloids
Our previous study reveals that alkaloids present in large quantities in Areca root \(^8\). Therefore, it was localized using Mayer’s reagent and Wagner’s reagent. With Mayer’s reagent, whole section becomes the characteristic grey color (Fig 4) and with Wagner’s reagent, the section becomes golden yellow color (Fig 5). So deposition of alkaloids observed in cortex, vascular bundles and in pith.

Physicochemical standards of the root

The result given in table 1 is very important in determining the purity of the given crude drug.

| Sl No | Physico-chemical parameter         | Constant value-
|-------|-----------------------------------|-----------------
| 1     | Total ash                         | 9.24%           |
| 2     | Acid soluble ash                  | 1.12%           |
| 3     | Acid insoluble ash                | 8.125%          |
| 4     | Water soluble ash                 | 0.89%           |
| 5     | Water insoluble ash               | 8.35%           |

Fluorescence analysis of root powder

Result of fluorescence analysis presented in table 2, the characteristic appearance of root powder upon treated with various chemicals and their difference in day light and UV lights are important diagnostic characters for the proper identification of crude drug in its dried and powdered form.

<table>
<thead>
<tr>
<th>POWDERED DRUG</th>
<th>VISIBLE/DAY LIGHT</th>
<th>UV 254 nm (SHORT)</th>
<th>UV 365 nm (LONG)</th>
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</thead>
<tbody>
<tr>
<td>Powder as such</td>
<td>Coffee brown</td>
<td>Light Brown</td>
<td>Light brown</td>
</tr>
<tr>
<td>Powder + 1M NaOH</td>
<td>Black colour + wine red border</td>
<td>Coffee brown</td>
<td>Black</td>
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<tr>
<td>Powder + 1% Picric</td>
<td>Yellow</td>
<td>Bluish yellow</td>
<td>Black</td>
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<tr>
<td>Acid</td>
<td>Powder + Acetic acid</td>
<td>Powder + HCl</td>
<td>Powder + 5% Iodine</td>
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<tr>
<td></td>
<td>Reddish brown</td>
<td>Dark brown</td>
<td>Red</td>
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**Phytochemical screening**

Phytochemical screening of the crude ethanolic drug results the presence of various valuable secondary metabolites like alkaloids, phenols, terpenoids, cardiac glycosides, tannins, flavonoids, phlobatans, steroids and quinones.

**CONCLUSION**

The pharmacognostic characters highlighted in this paper can use for the correct identification of the drug. Phytochemical screening shows the presence of valuable secondary metabolites, so there is no doubt about that this traditional medicinal plant will give clues for the preparation of new drugs.

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**REFERENCES**


