INTRODUCTION

Plants have been associated with the health of mankind from time immemorial. In the past, sickness was viewed as a punishment from the god’s and hence was treated with prayers and rituals that included what may have been considered "magic portion" prepared from local herbs. The tree spinach (Cnidoscolus chayamansa Mc Vaugh) belonging to the family Euphorbiaceae, is a shrub with attractive appearance and is a popular leafy vegetable in Mexico and central America. It is popular in Mexico and central America and has been introduced into the United States (mainly south Texas and Florida) and now present in the northern latitudes, under dryer environments. The plant is an attractive shrub 3 to 5 m tall. The leaves are broad and may consist of 3 or more lobes with fleshy petioles. The white colored flowers which are usually borne on cyme branched inflorescences, may contain 3-forked arrangement in which the pistillate flowers are located on the basal fork. Even though this plant has gained scientific importance recently, there is a need for the pharmacognostical standardization. Therefore in the present studies the leaf part of the plant was subjected to various microscopic and physical evaluations. In the microscopic studies like leaf constants, powder microscopy and physical evaluation like ash values and extractive values were studied. The different pharmacognostical constants were obtained which could help in the development of a suitable monograph for the plant.

Keywords: Cnidoscolus chayamansa, Fluorescences analysis, Herbs, Leaf constants, Proximate analysis.

ABSTRACT

The tree spinach Cnidoscolus chayamansa Mc Vaugh called “Chaya” belonging to the family Euphorbiaceae. The plant is an attractive shrub 3 to 5 m tall. The leaves are broad and may consist of 3 or more lobes with fleshy petioles. The white colored flowers which are usually borne on cyme branched inflorescences, may contain 3-forked arrangement in which the pistillate flowers are located on the basal fork. Even though this plant has gained scientific importance recently, there is a need for the pharmacognostical standardization. Therefore in the present studies the leaf part of the plant was subjected to various microscopic and physical evaluations. In the microscopic studies like leaf constants, powder microscopy and physical evaluation like ash values and extractive values were studied. The different pharmacognostical constants were obtained which could help in the development of a suitable monograph for the plant.

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Chemicals and reagents
All the chemicals and reagents used were of laboratory grade.

Microscopical studies\textsuperscript{11-14}

Transverse section and cross section of \textit{Cnidoscolus chayamansa} leaf

Free hand sectioning was done for fresh leaf to obtain a thin section. Phloroglucinol and hydrochloric acid in the ratio 1:1 was used as a stain and mounted on a glass slide and focused under a microscope.

Powder microscopy

The leaf powder of \textit{Cnidoscolus chayamansa} was soaked in distilled water separately. The soaked powders were boiled with chloral hydrate solution for few minutes. Powered materials were cleaned with sodium hydroxide and mounted in glycerine medium, after staining with phloroglucinol, hydrochloric acid and iodine solution. The diagnostic characters were identified by microscope using normal bright field and reported. From the above observation, crystals, starch grains and lignified cells, polarized light was employed, under polarized light appear bright against background.

Determination of \textit{Cnidoscolus chayamansa} leaf constants

The different parameters like stomatal number, stomatal index, vein islet number and vein termination number was determined as per standard procedure.

Fluorescence analysis\textsuperscript{15}

Powdered leaf were subjected to analysis under day light, ultra violet light (254,366 nm) after treatment with various chemical and organic reagents like ethanol, 50% sulphuric acid, 10% sodium hydroxide and dilute hydrochloric acid.

Physicochemical Studies

Physicochemical parameters were determined as per guidelines of WHO.\textsuperscript{16} loss on drying, Total ash value, acid insoluble ash, water soluble ash, sulphated ash , alcohol soluble extractive value, ether soluble extractive value and water soluble extractive value were determined by taking the powdered leaf.\textsuperscript{17,18}

RESULTS AND DISCUSSION

Transverse section of \textit{Cnidoscolus chayamansa} leaf

Microscopic observation revealed that the leaf provided with the paracytic type of stomata. There are more number of stomata are present (43.00±1.50) in the lower surface of the leaf whereas, less numbers are present (2.60±0.50) on the upper surface. The stomata measures about 23.75±0.00 µm in length and 15.75±1.25 µm in breadth. Transverse section of the leaf revealed that the epidermal cells consist of straight anticlinal walls. Beneath every epidermal cell there are about 2.78±0.20 palisade parenchyma cells are present. Below the palisade parenchyma there are loosely arranged spongy parenchyma cells are present. Larger vascular bundle cells are present in the midrib region of the leaf below the vascular bundles lactiferous cells are present in half lunar manner. The quantitative leaf parameters are listed in Table 1.

![Figure 2: Microscopic T.S. of \textit{Cnidoscolus chayamansa} leaf](image)

**Table 1: Leaf constants of \textit{Cnidoscolus chayamansa}**

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Range</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Palisade ratio</td>
<td>2.31 - 3.24</td>
<td>2.78±0.20</td>
</tr>
<tr>
<td>Stomata number Upper surface</td>
<td>0.42 - 4.77</td>
<td>2.60±0.50</td>
</tr>
<tr>
<td>Stomata number lower surface</td>
<td>33.57 - 52.42</td>
<td>43.00±1.50</td>
</tr>
<tr>
<td>Stomatal index upper surface</td>
<td>0.15 - 1.84</td>
<td>1.00±0.20</td>
</tr>
<tr>
<td>Stomatal index lower surface</td>
<td>25.33 - 37.62</td>
<td>31.48±0.02</td>
</tr>
<tr>
<td>Epidermal cells Upper surface</td>
<td>226.18 - 288.41</td>
<td>257.30±8.00</td>
</tr>
<tr>
<td>Epidermal cells lower surface</td>
<td>30.97 - 68.83</td>
<td>95.80±3.00</td>
</tr>
<tr>
<td>Stomata length</td>
<td>21.04 - 26.45</td>
<td>23.75±0.00</td>
</tr>
<tr>
<td>Stomata Breadth</td>
<td>13.69 - 17.80</td>
<td>15.75±1.25</td>
</tr>
<tr>
<td>Vein islet number</td>
<td>60.49 - 100.10</td>
<td>80.30±6.26</td>
</tr>
<tr>
<td>Vein termination number</td>
<td>70.08 - 92.91</td>
<td>81.50±3.61</td>
</tr>
</tbody>
</table>

*Stomatal no, Epidermal cells, vein islet, termination counts per 1 mm square area (1mm\(^2\)); Stomatal length in µm.*

Powder microscopy of \textit{Cnidoscolus chayamansa} leaf

The powder microscopy of leaf was done and the data mentioned below is correlated with Figure 3.

1. **Epidermis:** The cells of epidermis of leaf are thin walled, sinuous and showing anisocytic type stomata.
2. **Stomata:** Anisocytic or cruciferous type of stomata surrounded by subsidiary cells of wavy walled.
3. **Trichomes:** The covering trichomes, which are slightly curved and usually unicellular, the walls are thick.
4. **Vessels**: Lignified annular thickened, bordered pitted vessels.

5. **Crystals**: The calcium oxalate crystals which are fairly abundant, they are found scattered or they are usually in the form of single or twinned prisms but are very irregular in shape.

6. **Lamina**: The fragments of lamina in sectional view showing the tubular epidermal cells with striated cuticle, the single thin walled palisade cell and the irregular cells of the spongy Mesophyll.

**Cross section of Cnidoscolus chayamansa leaf**

C.S. of *Cnidoscolus chayamansa* shown in figure 4 indicates the presence of upper epidermis, stomata, trichomes, upper palisade, collenchymas, spongy parenchyma, xylem, phloem and lower epidermis.

**Figure 4**: Microscopic Cross section of *Cnidoscolus chayamansa* leaf

**Proximate analysis**

The results obtained for the leaf are tabulated in Table 3.

**Table 3**: Proximate analysis of *Cnidoscolus chayamansa* leaf

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Values (%w/w) ± S.D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loss on drying</td>
<td>5.21±0.02</td>
</tr>
<tr>
<td>Total ash</td>
<td>4.08±0.35</td>
</tr>
<tr>
<td>Acid insoluble ash</td>
<td>1.21±0.10</td>
</tr>
<tr>
<td>Water-soluble ash</td>
<td>0.55±0.04</td>
</tr>
<tr>
<td>Sulphated ash</td>
<td>5.21±0.05</td>
</tr>
<tr>
<td>Alcohol soluble extractive value</td>
<td>12.0±0.8</td>
</tr>
<tr>
<td>Ether soluble extractive value</td>
<td>10.2±0.12</td>
</tr>
<tr>
<td>Water soluble extractive value</td>
<td>8.3±0.02</td>
</tr>
</tbody>
</table>

**CONCLUSION**

*Cnidoscolus chayamansa* is used for the treatment of various physiological conditions. But so far the plant has not been Pharmacognostically evaluated. The detailed pharmacognostical evaluation like microscopical studies such as determination of leaf constants, transverse section, cross section, Powder microscopy, fluorescence analysis, proximate analysis and physical constants such as ash value, extractive value which would be a useful for compilation of a suitable monograph for its proper identification and will help in establishing some biological indices. For easier identification of powdered crude drugs UV estimation for leaf powder will be helpful. The Pharmacognostic constants for the leaves of this plant, the diagnostic microscopic features and the numerical standards reported in this work could be useful for the compilation of a suitable monograph for its proper identification and future studies.

**REFERENCES**


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