Pharmacognostic Study of Leaves of *Cordia rothii* Linn.

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**Abstract**

Introduction: *Cordia rothii* Linn. syn. *Cordia sinensis*. (Family – Boraginaceae) is found commonly in India. Recent pharmacological findings indicate that its fruits possess significant activities like astringent, demulcent, diuretic, purgative, anti-ulcer, hepatoprotective, which comply with the claims made in the traditional medicinal texts. However, no conclusive pharmacognostic study of its leaves has been performed yet. Methods: The present investigation deals with the qualitative and quantitative microscopic evaluation of the leaf material and establishment of its quality parameters, including physicochemical and phytochemical evaluation. Results: Chief microscopic characters include vascular bundles having patches of perimedullary phloem and very long unicellular covering trichomes. Chief characters of powder include cylindrical shaped trichomes, calcium oxalate prisms, cluster crystals and xylem vessels in spiral shape. Conclusion: Such a study would serve as a useful gauge in standardization of the leaf material and ensuring quality formulations.

**Key words:** *Cordia sinensis*, Boraginaceae

**Introduction**

*Cordia rothii* Linn. syn. *Cordia sinensis*. (Family – Boraginaceae) is also known as (Gujrati) gundi, (Hindi) gondi, (Sanskrit) laghushleshmataka and (Sind) liai.[1] Its fruits are used traditionally in several disorders like bronchitis, ulcers, dysentery, diuretic, abscess, chronic fever.[2] The present investigation deals with the qualitative and quantitative microscopic evaluation of the leaf material.

**Materials and Methods**

Collection and authentication of leaves

Leaves of *C. rothii* were collected from the herbal garden of R. K. College of Pharmacy, Rajkot in March, 2010. Herbariums and voucher sample were prepared and deposited in Department of Pharmacognosy, R. K. College of Pharmacy (Voucher no. RKCP/COG/09/2010). Authentication was done by the taxonomist of Department of Botany, Saurashtra University.

Pharmacognostic studies

Morphology of fresh leaves of *C. rothii* was studied. Photomicrography of stained and unstained transverse sections of fresh leaves was performed using Win DVR software. Leaf constants were established using camera lucida. The leaves were dried under shade, powdered to 60#, stored in airtight containers and used for powder study and quantitative microscopy (Table 1).[3-11]

**Results and Discussion**

Pharmacognostic study

**Macroscopical characteristics**

The leaves are 12-14 cm in length and 2.5-4 cm in width. The upper surface is dark green while lower surface is light green in color. It is a simple leaf containing reticulate venation and papery texture. It has entire margin with obtuse apex. The general outline is lanceolate and base is asymmetrical. The lamina surface is very rough. It has short petiole about 1.3 cm long and stipules are absent. The arrangement of leaves is sub opposite and they have characteristic taste and odor (Figure 1).

Microscopy: Transverse section

Lamina of the transverse section has no prominent hypodermis beneath the upper epidermis. Underlying the upper epidermis a double-layered, compact, radially elongated palisade cells followed by spongy mesophyll composed of 3-4 layers of loosely arranged parenchymatous cells with scattered calcium oxalate cluster crystals. Midrib consists of a well-developed collenchyma below upper epidermis and above lower epidermis. Ground
tissue consists of loosely arranged polygonal parenchymatous cells having calcium oxalate prisms and cluster crystals. Vascular bundle is very significantly arranged, having patches of perimedullary phloem. Starch grains are scattered throughout the ground tissue. Trichomes are covering, very long, unicellular and few having a cylindrical shape (Figure 2, 3).

**Microscopy: Powder characteristics**

It is a dark green powder with no distinct odor or taste. The important diagnostic features of the powder include parts of epidermis in surface view showing straight walled

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**Table 1: Quantitative microscopy**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Mean value ± SD</th>
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<tbody>
<tr>
<td>Stomatal Index</td>
<td></td>
</tr>
<tr>
<td>Upper surface</td>
<td>25 ± 0.5</td>
</tr>
<tr>
<td>Lower surface</td>
<td>28 ± 0.5</td>
</tr>
<tr>
<td>Stomatal Number</td>
<td></td>
</tr>
<tr>
<td>Upper surface</td>
<td>345 to 360</td>
</tr>
<tr>
<td>Lower surface</td>
<td>367 to 385</td>
</tr>
<tr>
<td>Palisade ratio</td>
<td>6 ± 1</td>
</tr>
<tr>
<td>Vein islet number</td>
<td>7 ± 0.5</td>
</tr>
<tr>
<td>Vein termination number</td>
<td>5 ± 1</td>
</tr>
<tr>
<td>Cluster crystal diameter</td>
<td>12.88 µ – 23.39 µ – 37.2 µ</td>
</tr>
<tr>
<td>Length of covering trichome</td>
<td>32.55 µ – 54.85 µ – 88.15 µ</td>
</tr>
</tbody>
</table>

Number of observations = 10
SD = Standard Deviation

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**Figure 1:** Leaves of *Cordia rothii*

**Figure 2:** Diagrammatic and Detailed T. S. of leaf (X40)
(UCo, Upper Collenchyma; UEp, Upper Epidermis; LCo, Lower Collenchyma; LEp, Lower Epidermis; Pal, Palisade; Vb, Vascular bundles; Cvt, Covering Trichomes; Phl, phloem; Xlm, Xylem; St, Stele; Spm, Spongy Mesophyll)

**Figure 3:** T. S. of leaf showing single enlarged portions (X400)
(UCo, Upper Collenchyma; UEp, Upper Epidermis; LCo, Lower Collenchyma; LEp, Lower Epidermis; Pal, Palisade; Vb, Vascular bundles; Cvt, Covering Trichomes; Phl, phloem; Xlm, Xylem; St, Stele; Spm, Spongy Mesophyll)
CONCLUSION

The present work deals with the pharmacognostical evaluation of the leaves of *C. rothii*. Main microscopic characters include very long unicellular covering trichomes, epidermal cells and anisocytic stomata, xylem vessels with spiral shape or reticulate thickening, calcium oxalate cluster crystal, calcium oxalate prisms, starch grains and numerous covering trichomes, unicellular or cylindrical, narrow, conical, pointed (Figure 4).

Figure 4: Powder study (X400)
(A, Epidermis in surface view; B, Covering trichome; C, Xylem vessels with reticulate thickening; D, Calcium oxalate crystals; E, Anisocytic stomata; F, Starch grains)
and very different vascular bundles having patches of perimedullary phloem. Diagnostic characters of powder include cylindrical shaped trichomes, calcium oxalate cluster crystals, calcium oxalate prisms, starch grains, anisocytic stomata and xylem vessels with spiral shape and reticulate thickening. Such a pharmacognostic study is useful for standardizing crude drugs and can be used to differentiate closely related species.

REFERENCES