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## Study on leaf morphology of rough lemon (*C. jambhiri* Lush.)

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**Abstract**

Rough lemon (*C. jambhiri* Lush.) is a valuable citrus species of North-Eastern India. This fruit stands third in position among the citrus fruits in this region. Although used as a rootstock all over the world, this species are more popular and demanded for its nutritious fruits here. There is a tremendous variation in various types of rough lemon available in the region. Moreover, many people confuse it with other citrus species during its juvenile period. Hence, this article might be helpful in identification of *jambhiri* with the description of its leaf morphological characters.

**Keywords:** leaf, morphology, venation, rough lemon

**Introduction**

Rough lemon (*C. jambhiri* Lush.) is one of the most important citrus fruits. This citrus species is mainly used as rootstock across the world (Kaur and Singh, 2012). But, it is noticeable that in the state of Assam, located in North Eastern region of India, rough lemon has attained third rank among the citrus fruits consumed in the region. It might be because of the strong aroma, flavour and acidic taste of the fruits which is preferred by local people. Although, the fruits of rough lemon have high market demand in the region yet least attention has been given to its production, improvement and marketability. However, some earlier works have been done describing the plant morphology of rough lemon after fruit bearing (Bhattacharyya and Dutta, 1956, Akhter *et al.*, 2009 and Sayed *et al.*, 2016) [3, 1, 5] Fruits are mostly collected by the vendors from backward of households without any proper species identification. Therefore variety of rough lemon types is available in the market. Keeping this under consideration, the present work was undertaken for identification of rough lemon in its juvenile period by studying its leaf morphology.

**Methodology**

The leaf morphological characters are judged in reference with Manual of Leaf Architecture Morphological description and categorization of dicotyledonous and net-veined monocotyledonous angiosperms by Leaf Architecture Working Group.

**Observations****Leaf Morphology**

- Leaves are alternately arranged one leaf at each node. Rough lemon consists of simple leaves of single lamina.
- Laminal symmetry: It is symmetrical, lamina approximately the same shape on either side of the mid vein.
- Position of petiolar attachment is marginal, Petiolar insertion at the margin of the leaf.
- Leaf is unlocked

**Vein Orders**

- According to 1° vein category, the leaves are pinnate with single primary vein.
- According to 2° vein category the leaves are weak brochidodromous (*i.e* is secondary join together in a series of arches).
- 2° vein spacing found to be irregular and increasing towards the base.
- 2° vein angle to the primary vein angle found to be uniform.
- Inter 2° vein: Strong inter secondary veins are present.

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- 3° veins: Alternate percurrent, tertiary cross between secondary's with an offset (An abrupt angular discontinuity).
- The tertiaries are exhibits random reticulate behaviour that is the tertiaries anastomose (Rejoin) with other tertiary and secondary veins at random angles.
- The tertiary vein angle to the primary vein is observed to be inconsistent i.e angle of tertiaries vary randomly over the lamina.
- 4° Vein category: 4° veins are regular reticulate i.e this vein anastomose with other veins to form polygons of similar shape and size.

### Areolation

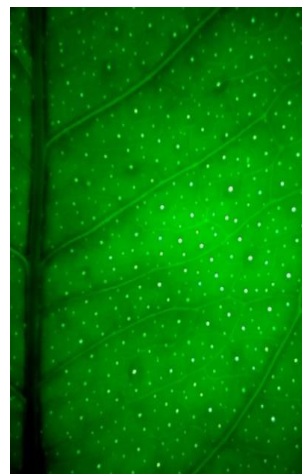
Areoles are moderately developed i.e. areoles are irregular shape, more or less variable in size, usually fewer sided (often less than 7). The marginal ultimate venation is looped. i.e marginal ultimate veins recurved to form loops.



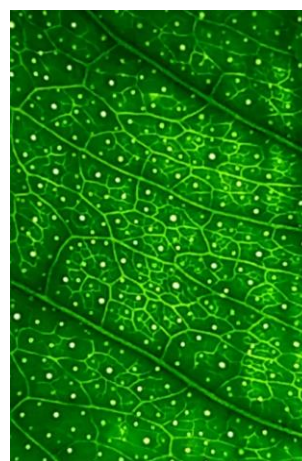
**Fig 1:** Leaf shape



**Fig 2:** 1° vien



**Fig 3:** 2° vien



**Fig 4:** 3° and 4° vien

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