



## Original Article

## Morpho-anatomy of the leaf of *Myrciaria glomerata*

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## ABSTRACT

*Myrciaria glomerata* O. Berg., Myrtaceae, popularly known as “cabeludinha”, has high content of ascorbic acid and anti-inflammatory property and is used in folk medicine. The objectives of this study were the morphological, anatomical and histochemical characterization of the leaves. Leaf studies were made with optical, scanning electron and confocal microscopy. The collection of botanical material was held at the Tijuca Forest, Rio de Janeiro, RJ. Histochemical tests aimed the identification of lipids, starch grains, phenolic compounds and crystals. The leaves are simple, opposite, lanceolate, pinnate, hairy, with involute margins, hypostomatic and dorsiventral. The stomata are anomocytic. The epidermis presents simple trichomes. Epidermal cells show uneven thickening of their periclinal outer walls, mainly on the adaxial side of the leaf. Secretory cavities of essential oils are subepidermal and exceed, in height, the palisade parenchyma, formed by one cell layer. Four to five cellular layers, rich in phenolic compounds and lipids form the spongy parenchyma. The bundles are collateral and there are many crystals of calcium oxalate spread throughout the mesophyll. In the midrib and petiole the bundles are bicollateral. Analysis by scanning electron revealed epicuticular wax rod-shaped and as grains. In confocal microscopy, the adaxial epidermis, the fibers and the secretory epithelium of the cavities show autofluorescence. The data obtained are important in quality control exams of samples of this species.

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## Introduction

Contemporary therapeutic uses drugs obtained from various sources, which may be synthetic or natural. Natural sources are plants, animals or mineral (Kwiecinski, 2013). Since the beginning of humanity, man has used plants for relief and healing to many diseases, thus constituting one of the oldest forms of medical practices (Serafin, 2006; Fischer, 2007; Salvagini et al., 2008; Lopes, 2008; Niehues et al., 2011). The use of medicinal plants has been encouraged by the World Health Organization since it realized that about 80% of the population turns to the popular culture to get rid of diseases (Salvagini et al., 2008; Niehues et al., 2011). Many factors have collaborated in the development of health practices using medicinal plants, including economic and social.

The allopathic therapy showed to be effective against various diseases, but in many, it appears a low survival time, as in the case of lung cancer. Several therapies are associated in order to reach better results (Begalli, 2013), such as chemotherapy, which is the use of drugs that aim to destroy the cancerous cells by blocking their

development. According to Mesquita (2009), the majority of these medicines are obtained from plants, microorganisms and marine organisms in which there is a wide variety of compounds that act by different mechanisms.

In this sense, the use of plants with medicinal properties as extracts, essential oils and phytochemical have grown in importance in the current therapy (Franco et al., 2005; Pereira et al., 2006; Mesquita, 2009; Kwiecinski, 2013).

The object of this study was *Myrciaria glomerata* O. Berg., popularly known as “cabeludinha”. It belongs to Myrtaceae family, which stands out in the plant kingdom because presents a wide range of species with medicinal potential (Fevereiro, 1996). Besides the high ascorbic acid content in *M. glomerata* (Malavolta et al., 1956) and positive antimicrobial property (Serafin et al., 2007), recent studies are highlighting its analgesic properties, which would be much more powerful than the leaders of market in this category (Fischer et al., 2008; John, 2010). In this scenario, the use of *M. glomerata* as a natural drug is highly encouraged. This plant is also known by the synonyms *Plinia glomerata*, *Eugenia cabeluda* and *Eugenia tomentosa* (Serafin et al., 2007; Fischer et al., 2008).

The objectives of this work were to study the morphological and anatomical characteristics of the leaves of *Myrciaria glomerata* to subsidize quality control tests.

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## Material and methods

### Morphological and anatomical study

The material studied was collected in the Tijuca Forest, Estrada das Furnas, n° 1984, Alto da Boa Vista (collection permit ICMBIO 43972-1) inserted in the Atlantic Forest, which is characterized by having high rainfall and mild temperatures. Machado (1992) refers to the forest of the Tijuca National Park as dense tropical rain forest. *Myrciaria glomerata* O. Berg., Myrtaceae, has approximately 3–4 m in height and 10 cm in diameter. The identification of the material was performed by Carlos Alberto Leal de Oliveira and confirmed in comparative analysis at the Herbarium Alberto Castellanos – GUA. Exsiccatae have been deposited in the Herbarium of the University of the State of Rio de Janeiro under the registration number HRJ 012450.

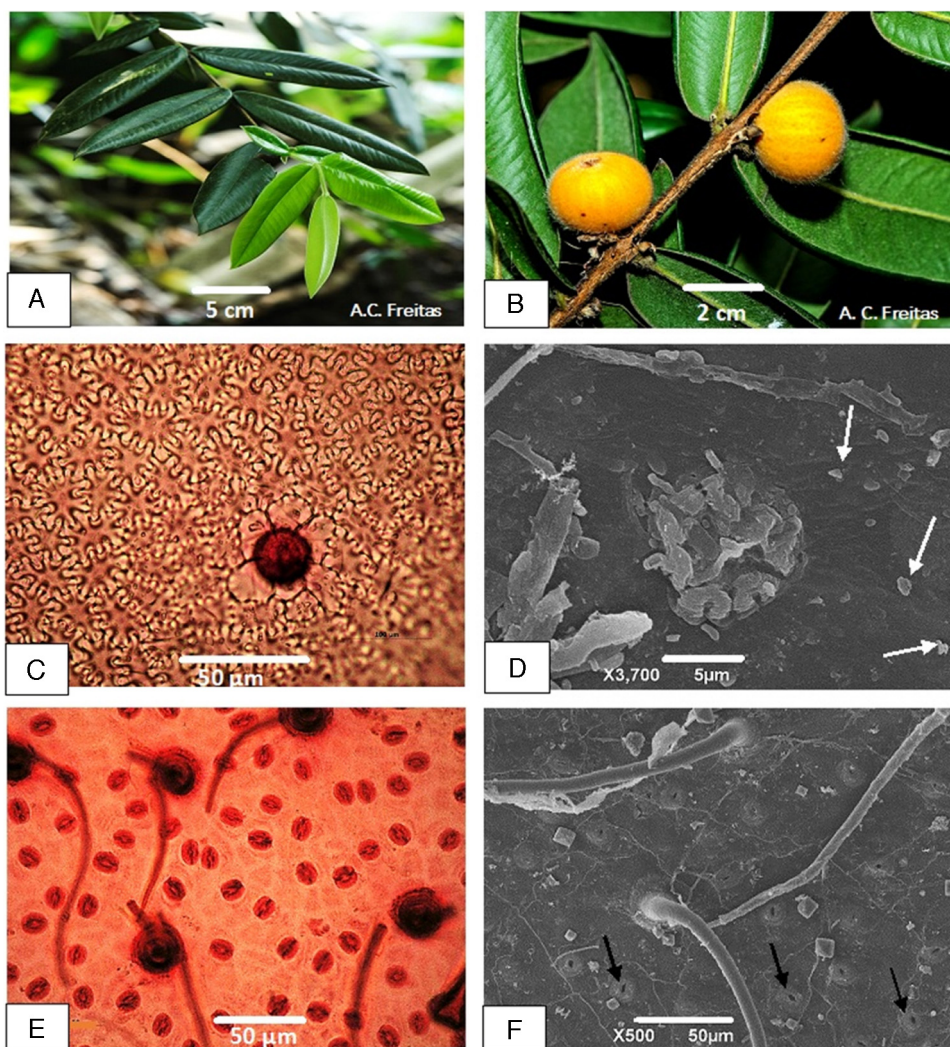
The morphological study was held by examining the samples with naked eye and a ruler was used to make the measurements of the leaf blade and petiole. Thirty leaves were used and the arithmetic mean was calculated, considering the width and length of the blade and the length of petiole. The venation pattern was established based on Oliveira and Akisue (1989).

The anatomical study was performed using fully developed leaves from the 3rd to 5th node obtained in the periphery of the crown, which is well exposed to light. The samples were fixed in FAA 70 and stored in 70% alcohol (Johansen, 1940). Histological slides were made by free hand sections from the median third of the leaf blade and petiole, according to the usual techniques (Kraus and Arduin, 1997). Epidermal fragments were removed for surface analysis, using Jeffrey's solution (Johansen, 1940). The stain was a mixture of safranin and astra blue (Bukatsh, 1972).

Histochemical tests to highlight the occurrence of starch grains, lipids and phenolic compounds were performed in fresh sections of the material, using lugol, Sudan IV and solution of iron salts, respectively (Johansen, 1940). The chemical nature of the crystals was analyzed by its solubility in acids (Howarth and Warne, 1959).

The registration of anatomical sections was held in photomicrographs obtained with the aid of an optical photomicroscope Primo Star Zeiss coupled to a computer. Slides used for the optical microscopy (OM) were also analyzed and photographed in confocal microscope (CM) Zeiss 510 META with ZEN 2009 software.

For examination with JEOL scanning electron microscope (SEM), leaf fragments were dehydrated in ascending ethanol series, taken



**Fig. 1.** *Myrciaria glomerata* – (A) Branch with opposite leaves; (B) Detail of the abaxial side of the leaves and ripe fruits. Note the incurved margins. (C) Epidermal surface of the adaxial side of the leaf in OM. Note the intense sinuosity of anticlinal walls and the cover cells of the secretory cavity (darker color). (D) Surface of the adaxial side of the leaf in SEM. Note the region of the secretory cavity (clustered) and the granules of epicuticular wax (white arrows). (E) Epidermal surface of the abaxial side of the leaf, in OM, showing stomata and trichomes. (F) Epidermal surface of the abaxial side of the leaf in SEM. Note the simple trichomes, stomata (black arrow) and wax in the form of prismatic crystals and grains.

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