



Pharmacognostic Evaluation of *Maesobotrya barteri* (Baill) Hutch and *Maesobotrya dusenii* Pax (Euphorbiaceae) Leaves

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Abstract

Background and objectives: Pharmacognostic evaluations have paved the way for compilation of African Pharmacopeia. This study reports the pharmacognostic profile of *Maesobotrya dusenii* (Pax) Pax and *Maesobotrya barteri* (Baill.) Hutch. **Method:** The two plants were collected from the Etche Area of Rivers State. Macroscopic and microscopic evaluations of the stomata number and palisade numbers were done. Phytochemical screening was conducted using standard methods and physicochemical parameters were evaluated to determine moisture content, extractive values and ash content. The flavonoid content of *M. barteri* was also evaluated using quercetin equivalent. **Results:** *Maesobotrya dusenii* revealed anomocytic type of stomata while *M. barteri* showed a mixed type of stomata involving anomocytic and anisocytic. Phytochemical screening revealed the presence of triterpenoids, saponins and carbohydrates in *M. dusenii*, while in *M. barteri* flavonoid, cardiac glycosides, saponin, triterpenoids and alkaloids were present. *Maesobotrya dusenii* and *M. barteri* showed the highest extractive value by chloroform. **Conclusion:** The study revealed distinctive features between *M. dusenii* and *M. barteri* that can be used in their identification, authentication and preparation of monograph for the plants.

Keywords: flavonoid content; *Maesobotrya*; palisade; stomata

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Introduction

The use of herbal products in therapeutics, nutraceuticals, and cosmetics is becoming more popular. In this era of revolution in herbal medicines, the need of the day is the development of an evidence base for validation, production, evaluation, regulation, safety, and allied aspects of natural products. Herbal medicines are evaluated, validated, and regulated in various countries according to their systems [1]. The world health organization has set up guidelines for standardizing these drugs, which are used by most countries [2].

Standardization of the medicinal plants will indirectly ensure that the plants are conserved for their medicinal and nutritive values.

Standardization confirms the medicinal plants' safety and their efficacy must be judged clinically or in the laboratory. Safety and efficacy should be recorded for years together; their data base should be generated, and analyzed statistically to see the difference in quality and quantity of the chemical compounds [3].

Maesobotrya barteri Bail and *Maesobotrya dusenii* Pax are species belonging to the Euphorbiaceae family. They are mostly found in the rainforest of Southern Nigeria, West and East Cameroun and Equatorial Guinea [4]. The decoction of the bark of *M. barteri* is taken for dysentery, urethra discharge, abortion, and aphrodisiac, while the infusion is taken for gonorrhoea. They are also

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used in treating jaundice and respiratory problems. The leaves are applied in dressing wounds [5]. The leaves of the species are used locally in the management of diabetes. The roots are cut and infused in gin to treat arthritis [6]. The stem bark of *M. barteri* and *M. dusenii* have been reported to have antimicrobial activity [7,8]. The leaves of *M. dusenii* have also been reported to have antihyperglycemic and antihyperlipidemic effects in animal studies [9]. Alpha amylase inhibition and membrane stabilization effect of the stem bark of *M. dusenii* have been demonstrated [10]. Hexadecanoic acid, methyl ester, 6-Octadecenoic acid, 13-Docosenamide, Z- were reported by the stem bark of *M. dusenii* [10]. A triterpenoid, β -amyrin was isolated from the stem bark of *M. barteri* [7]. The aim of this work was to study the pharmacognostic properties of the leaves of *M. barteri* and *M. dusenii* due to their medicinal importance. These include the qualitative and quantitative microscopy as well as physicochemical parameters.

Materials and Methods

Ethical consideration

The study was carried out as approved by the ethics committee of the University of Port Harcourt, vide: UPH/R&D/REC/04.

Plant material

The leaves of *Maesobotrya barteri* and *Maesobotrya dusenii* were collected from Etche Local Government Area of Rivers State, Nigeria. They were properly identified at the Herbarium of the Department of Pharmacognosy and Phytotherapy, University of Port Harcourt, where specimens with voucher numbers UPHE120 and UPHE121 for *M. barteri* and *M. dusenii*, respectively, were deposited. The two plants were used fresh, also air dried, and pulverized separately by grinding with an electric grinder. The pulverized plant materials were stored separately in air-tight containers.

Macroscopy and microscopy of the leaves

The descriptive and organoleptic characters of the fresh leaves were studied. The diagnostic features of the leaves' epidermis were examined on the upper epidermis, lower epidermis, and transverse section of the two plant leaves using described procedures [11].

Phytochemical screening

Phytochemical screening was performed on the

powdered leaves of the two species to detect the presence of secondary metabolites using standard procedures [12,13].

Palisade ratio

The palisade cells lying beneath each group were located and counted. [2].

Stomata number/stomatal index

The number of epidermal cells and stomata was determined after which the stomatal index was calculated [2].

Determination of parameters

Moisture content, extractive value, total and acid insoluble and water-soluble ash value were determined [2]

Total flavonoids content

Total flavonoids content was determined according to the method of Ovais et al. [14].

Results and Discussion

Pharmacognostic evaluation of plants is an inestimable instrument in the identification of drug to prevent adulteration. Investigation into drug-plants character has also aided the compilation of monographs for African pharmacopeia.

The macroscopic characteristics of the leaves of the two species did not show any difference with respect to their leaf shape, arrangement, venation, size, and colour (Table 1). The leaves are just being described anatomically for the first time in this study. *Maesobotrya dusenii* showed the presence of lignified cell structures such as lignified xylem and parenchyma, (Figure 1). The stomata are of anomocytic and anisocytic types. The trichomes are unicellular and uniseriate trichomes with smooth surface and thin cuticle, concave outer wall with acute apex bearing narrow lumens that are occurring in clusters in the lower epidermis. This type of trichome is not at variance with the one reported in the species of *Euphorbia pulcherima*, *E. tirucalli* and *E. neriifolia* although the former are cluster form [15]. The palisade ratio was 10 and the stomata index was 12.19. Stomatal index has been shown to be a fairly constant parameter at any age of plant and a significant parameter in the identity of the plant leaf. *Maesobotrya barteri* has a uniseriate trichome and anomocytic type of stomata. After staining with phloroglucinol and concentrated hydrochloric acid, the presence of lignified structures was also recorded.

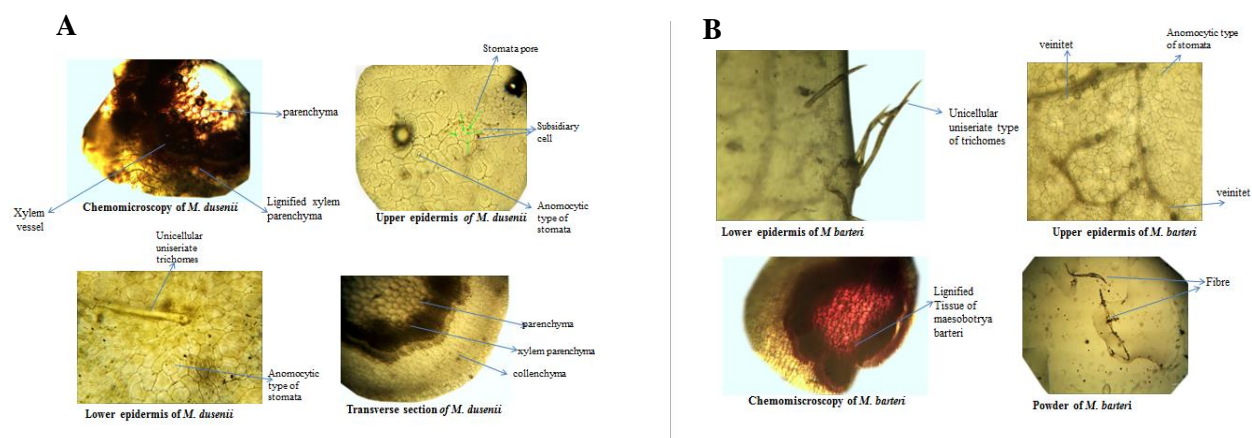


Figure 1. Anatomical structure of *Maesobotrya dusenii* (A) and *M. barteri* (B)

Table 1. Macroscopic features of the leaves of *Maesobotrya barteri* and *Maesobotrya dusenii*

No.	Features	<i>Maesobotrya barteri</i>	<i>Maesobotrya dusenii</i>
1	Margin	Crenate	Crenate
2	Apex	Aristate	Aristate
3	Base	Obtuse	Obtuse
4	Petiole	Petiololed	Petiololed
5	Stipule	Non-stipulated	Non-stipulated
6	Venation	Pinnate/Bronchidodromous	Pinnate/Bronchidodromous
7	Shape	Elliptical/obtuse	Elliptical/obtuse
8	Leaf arrangement	Spiral-dextrose	Spiral-dextrose
9	Colour	Dark-green	Dark-green
10	Texture	Smooth	Smooth

Table 2. Leave constant* of *Maesobotrya barteri* and *M. dusenii*

Sample identity	Stomatal index	Palisade ratio
<i>Maesobotrya barteri</i>	25.00±0.13	12.00±0.55
<i>Maesobotrya dusenii</i>	12.19±0.48	10.00±0.015

* n=5

Table 3. Phytochemical Screening of *Maesobotrya barteri* and *M. dusenii*

Secondary metabolites	<i>Maesobotrya dusenii</i>	<i>Maesobotrya barteri</i>
Triterpenoids	+	+
Alkaloids	-	+
Saponins	+	-
Free Anthraquinones	-	-
O-Glycosides	-	-
C-Glycosides	-	-
Cyanogenetic glycoside	-	-
Cardiac glycosides	-	+
Tannins	+	-
Carbohydrate	+	-

+: present⁷ -: absent

Table 4. Moisture content, extractive and ash values of *M. barteri* and *M. dusenii*

Parameters (%)	<i>Maesobotrya barteri</i>	<i>Maesobotrya dusenii</i>
Moisture content	15.3	14.0
Chloroform soluble extractives	65.2	50.0
Water soluble extractives	3.3	25.9
Ethanol soluble extractives	27.0	43.8
Total ash	18.8	11.4
Acid insoluble ash	1.8	0.2
Water soluble ash	4.9	0.6

The powdered sample revealed the presence of fibers. Although the two plants are similar morphologically, the palisade ratio and the stomata index revealed differences between the two species as presented in Table 2.

They also exhibited differences in their phytochemical constituents whereby *M. dusenii* contained saponin and carbohydrates which were absent in *Maesobotrya barteri* [9]. *Maesobotrya barteri* contained alkaloids that *Maesobotrya dusenii* did not contain. Both of them did not contain anthraquinone and cyanogenetic glycosides. The presence of triterpenoids in the two species justifies their antimicrobial properties as claimed in their usage in treating dysentery, urinary discharge, and gonorrhoea [7,8]. The moisture contents of the dried powder of *M. dusenii* and *M. barteri* were 14% and 15.3%, respectively which suggest that the two plants contain high moisture content that can easily lead to the growth of microorganisms that can deteriorate crude drug since the recommended maximum limit is 10-14% [1]. *Maesobotrya barteri* and *M. dusenii* have shown the highest extractive value in chloroform followed by ethanol and then water as shown in Table 4. This indicates that the two species contain few water soluble constituents which could be attributed to

the presence of triterpenoids that are not generally water soluble. *Measobotrya barteri* exhibited higher ash content 18.8 compared to 11.4 of *M. dusenii* which also suggests that *M. barteri* may contain some impurity. The total flavonoid content of *M. barteri* showed 55.56 µg of quercetin equivalent while *M. dusenii* did not contain flavonoids.

Conclusion

The leaves of the two species of *Maesobotrya* have the same macroscopic features but are different in microscopic and physicochemical properties. This information could serve as a means of identification most especially when it comes to crude drug identity.

The pharmacognostic profiles presented in this study can serve as a form of identity for *Maesobotrya barteri* and *M. dusenii* in drug preparations and writing of monographs.

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Author contributions

The research was conceptualized, supervised and written by Suleiman Mikailu while the bench work and results were obtained by Oko-Orji Onyekachi Kalu.

Declaration of interest

The authors declare that there is no conflict of interest. The authors alone are responsible for the accuracy and integrity of the paper content.

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Abbreviations

None