

COMPARATIVE MORPHOLOGICAL AND ANATOMICAL
STUDY ON LEAVES OF TWO CUBAN
RONDELETIA TAXA

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Some morphological and anatomical leaf characteristics of two evergreen Cuban Rubiaceae shrubs were studied. Differences in the epidermis and venation justified the separation of the recently described subspecies *Rondeletia pachyphylla* Krug et Urb. subsp. *myrtilloides* Fernandez et Borhidi from the *Rondeletia pachyphylla* Krug et Urb. subsp. *pachyphylla*.

Key words: *Rondeletia*, leaf anatomy, epidermis, venation

Introduction

A series of taxonomic studies has been carried out by A. Borhidi (Institute of Ecology and Botany, Hungarian Academy of Sciences, Vácrátót) and Maira Fernandez Zequeira (Institute of Ecology and Taxonomy Academy of Science of Cuba, La Habana) on different genera and species belonging to the Rondeletieae tribe of *Rondeletia*, for the purposes of the New Flora of Cuba Project (Borhidi 1993, Fernandez 1995, Fernandez and Borhidi 1985).

Within the frame of the series “Studies in *Rondeletieae* (Rubiaceae)” in the article number VIII. – among others – the variability range of the species *Rondeletia pachyphylla* Krug & Urb. was studied. The species belongs to the sectio *Pedicellares* (Fernandez 1995). The authors found that the individuals living in the humid lowland pine woodland of the Sierra de Moa differ in some morphological features of the leaves from those of the montane pine woodland of the much drier Nipe Mts (Fernandez and Borhidi 1985). Since the type was described from the Nipe Mts, the populations of Moa Mts have been separated under the name subsp. *myrtilloides*. Being the main differences of the two taxa in the size and shape and the venation of leaves, Dr Babos was asked by them to make some anatomical studies in addition to confirming or rejecting the validity of the new taxon.

Material and methods

Leaf samples of both taxa were taken for measuring the length and width of leaf-blade, length of petiole, further, the shape of the leaf-blade and the formation of the main rib on the abaxial surface were studied.

The fine structure of the leaf veins and their anatomical characteristics were examined on refined preparations. For these examinations three parallel refined leaf preparations of both subspecies were made. The leaves were refined and the preparations made with the commonly used microtechnical methods (Sárkány and Szalai 1964).

The microscopic examination of the refined leaves was performed after the description of Hickey (Metcalfe and Chalk 1979; chapter 4).

Of the preparations of refined leaves and of the places marked out suitably magnified micrographs were taken.

Size and morphology of the leaves

The shape of the leaf-blade in *Rondeletia pachyphylla* subsp. *pachyphylla* is mostly ovate with rounded or truncate base, while that of subsp. *myrtilloides* is usually obovate with shortly attenuate blade to the base. In *R. pachyphylla* subsp. *pachyphylla* the main rib is emergent on the abaxial sur-

Table 1
Size of leaf-blades and petioles

Species and subspecies		Length of leaf-blade (mm)	Width	Length of petiole (mm)
<i>Rondeletia pachyphylla</i> subsp. <i>pachyphylla</i>	minimum	22.0	8.0	2.0
	average	25.0	9.2	2.7
	maximum	30.0	10.0	3.0
<i>Rondeletia pachyphylla</i> subsp. <i>myrtilloides</i>	minimum	16.0	6.0	4.0
	average	18.5	7.0	5.0
	maximum	20.0	8.0	4.0

Note: The measurements were taken of fully developed foliage leaves. Average values were calculated based on 10 parallel measurements of each characters. The leaves were selected from herbarium specimens. Since leaves are extremely variable organs of woody plants, the values given in the table only are of informative nature.

face and clearly visible. While in *R. pachyphylla* subsp. *myrtilloides* the main rib is slightly impressed on the abaxial surface and inconspicuous. The average values of the measurements obtained from the two materials examined are found in Table 1. They show that the average leaf-blade size of *R. pachyphylla* subsp. *myrtilloides* is smaller in both length (18.5 mm) and width (7.0 mm), while its petiole is longer (5.0 mm) than in the *R. pachyphylla* subsp. *pachyphylla* (length of leaf-blade: 25.0 mm, width of leaf-blade: 9.2 mm, length of petiole: 2.7 mm).

Leaf structure

The comparison of the morphological and anatomical characteristics of the leaf-blades in the two taxa studied are compiled in Table 2. It can be established that there are differences in some major characteristics between them as follows:

Characteristics	<i>R. pachyphylla</i>	
	subsp. <i>pachyphylla</i>	subsp. <i>myrtilloides</i>
leaf base	asymmetrical, rounded or truncate	symmetrical, shortly attenuate
leaf apex	pointed	blunt
trend and size of main rib	remarkably inclining, moderate	straight, weak
trend of secondary veins	reclinate, veins inside the margin rarely form curves (Fig. 1)	slightly reclinate, veins along the margin join in curves over several sections (Fig. 2)
branching of veinlets	double (Fig. 3)	triple (Fig. 4)
shape of areoles	quadrangular or pentagonal (Fig. 3)	triangular or quadrangular (Fig. 4)

Discussion

According to the results of the comparative examination of some morphological and anatomical leaf-characteristics of both *Rondeletia pachyphylla* subsp. *pachyphylla* and *R. pachyphylla* subsp. *myrtilloides*, differences in several features were found which confirm the separation of the two subspecies within the frame of the species *R. pachyphylla*.

Table 2
Characteristics of leaf anatomy

Characteristics	<i>R. pachyphylla</i> subsp. <i>pachyphylla</i>	<i>R. pachyphylla</i> subsp. <i>myrtilloides</i>
leaf	simple	simple
leaf-blade	symmetrical	symmetrical
shape	oblong-ovate	narrow elliptic to oblong-obovate
length-width ratio of leaf-blade	2.71 : 1	2.64 : 1
base of leaf blade	asymmetrical, rounded or truncate	symmetrical, attenuate decurent
leaf apex	acute, pointed	rounded, blunt
leaf margin	entire, convex	entire, convex
leaf texture	thick and stiff, coriaceous	thick and stiff, coriaceous
petiole	normal	normal
	(without perceptible thickening or projection)	
venation	pinnate	pinnate
main rib	remarkably protruding	plate
joining of secondary veins to the main rib	moderately strong, 45–56°	moderately strong, 45–56°
relative thickness of secondary veins	thick	moderate
trend of secondary veins	recline (veins inside the leaf margin)	slightly reclinate (veins inside the rarely form- ing loops)
leaf margin join forming loops)		
looping branches of secondary veins	joint at acute angles	joint at blunt- or right angles
arrangement of tertiary veins	irregular reticulate, forked	irregular reticulate, forked
veinlets	start at right angles from the primary, secondary and tertiary veins	
branching of veinlets	double	triple
	the veinlets form well developed areoles of rela- tively uniform size and shape	

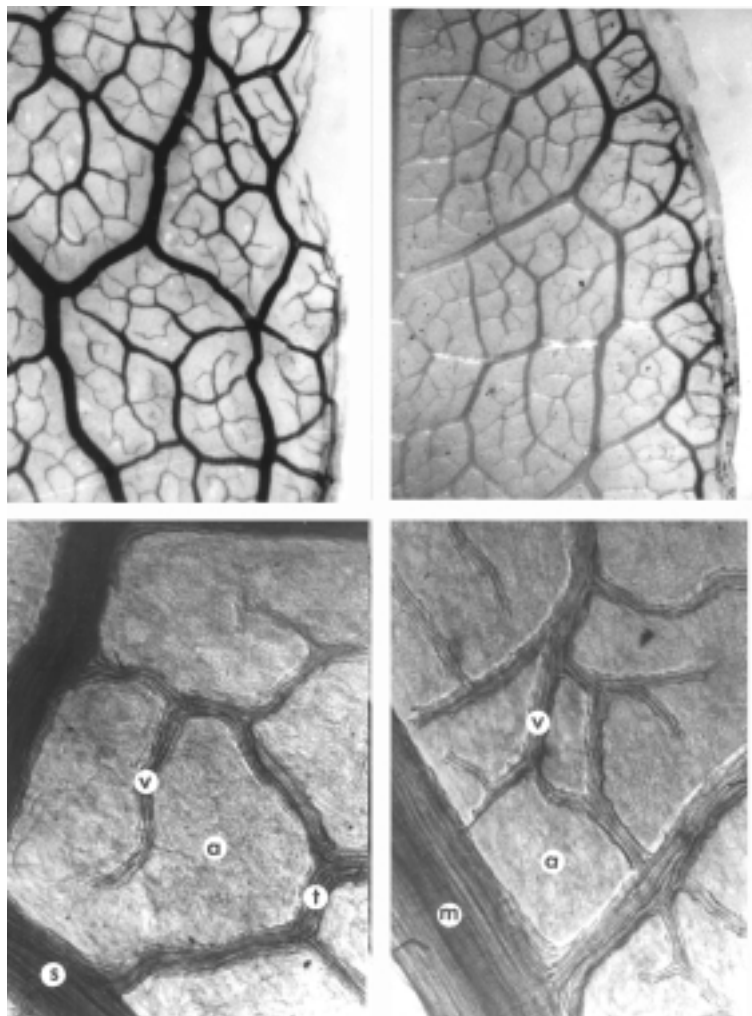


Fig. 1. *Rondeletia pachyphylla* Krug et Urb. subsp. *pachyphylla*, part of leaf-blade. LM micrograph: 6.25 \times . Secondary, tertiary veins and veinlets

Fig. 2. *Rondeletia pachyphylla* Krug et Urb. subsp. *myrtilloides* Fernandez et Borhidi, part of leaf-blade. LM micrograph: 6.25 \times . Secondary, tertiary veins and veinlets

Fig. 3. *Rondeletia pachyphylla* Krug et Urb. subsp. *pachyphylla*, part of leaf-blade. LM micrograph: 120 \times . Ramifying of veinlets and the areoles. s = secondary vein; t = tertiary vein; v = veinlet; a = areole

Fig. 4. *Rondeletia pachyphylla* Krug et Urb. subsp. *myrtilloides* Fernandez et Borhidi, part of leaf-blade. LM micrograph 120 \times . Multiple branches of veinlets and areoles. m = main rib; v = veinlet; a = areole

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