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Machaerium meridanum Meléndez (Fabaceae, Papilionoideae, Dalbergieae), a new species from Venezuela

Pablo Meléndez González & Manuel B. Crespo

Abstract

MELÉNDEZ GONZÁLEZ, P. & M. B. CRESPO (2008). *Machaerium meridanum* Meléndez (Fabaceae, Papilionoideae, Dalbergieae), a new species from Venezuela. *Candollea* 63: 169-175. In English, English and French abstracts.

The new species *Machaerium meridanum* Meléndez (Fabaceae, Papilionoideae, Dalbergieae) is described on the foothills of the Andean Cordillera of Mérida in western Venezuela. The species is morphologically most similar to *Machaerium acuminatum* Kunth and *Machaerium acutifolium* Vogel, from which it differs in the shape and number of leaflets, its subpedicellate flowers, and some features of the fruit. Its taxonomic affinities are discussed. An illustration, a map, and a key to identify the Venezuelan species of *Machaerium* sect. *Reticulata* (Benth.) Taub. are also included.

Key-words

FABACEAE – *Machaerium* – Venezuela – Taxonomy

Résumé

MELÉNDEZ GONZÁLEZ, P. & M. B. CRESPO (2008). *Machaerium meridanum* Meléndez (Fabaceae, Papilionoideae, Dalbergieae), une nouvelle espèce du Vénézuéla. *Candollea* 63: 169-175. En anglais, résumés anglais et français.

La nouvelle espèce *Machaerium meridanum* Meléndez (Fabaceae, Papilionoideae, Dalbergieae) est décrite au pied de la Cordillère des Andes de Mérida, à l'ouest du Vénézuéla. Cette espèce est proche morphologiquement de *Machaerium acuminatum* Kunth et de *Machaerium acutifolium* Vogel, dont elle diffère par la forme et le nombre de folioles, ses fleurs subpédicellées et quelques traits de ses fruits. Ses affinités taxonomiques sont discutées. Une illustration, une carte et une clé d'identification sont données pour identifier les espèces vénézuéliennes de *Machaerium* sect. *Reticulata* (Benth.) Taub.

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Introduction

PERSOON (1807) described *Machaerium* Pers. as a segregate of *Nissolia* Jacq. (nom. cons.), with *M. ferrugineum* (Willd.) Pers. as the type species. The name *Machaerium* was conserved against *Nissolius* Medik. and *Quinata* Medik., after a proposal by RUDD (1969). *Machaerium* is a well established genus belonging to *Dalbergieae* (*Fabaceae*, *Papilionoideae*), a tribe mostly accepted to consist of 19 genera and about 300 species by POLHILL (1981). However, recent molecular phylogenetic studies (LAVIN & al., 2001) have led to a re-circumscribed *Dalbergieae*, and the tribe includes 49 genera and ca. 1300 species (KLITGAARD & LAVIN, 2005).

Machaerium was revised by BENTHAM (1860), who grouped the 56 species into five series (sect. *Lineata*, sect. *Oblonga*, sect. *Acutifolia*, sect. *Reticulata* and sect. *Penninervia*), on the basis of leaflets characters and stipules spinescence. TAUBERT (1894) latter raised Bentham's series to the sectional rank. HOEHNE (1941) published a more complete revision of *Machaerium* which included 121 species.

In a compendium of the Venezuelan legumes, PITTIER (1944) recognised 28 species of *Machaerium*, and RUDD (1987) revised the circumscription of BENTHAM (1860) accepting only four sections: sect. *Machaerium* (including sect. *Penninervia*), sect. *Lineata*, sect. *Oblonga*, and sect. *Reticulata* (including sect. *Acutifolia*).

Machaerium is currently composed of 120-130 species, 35 of which are found in Venezuela (RUDD, 1999; KLITGAARD & LAVIN, 2005). It is restricted to tropical and subtropical America, with one species – *M. lunatum* (L. f.) Ducke – disjointly distributed in eastern South America and West Africa (cf. RUDD, 1977, 1987; LAVIN & al., 2001; KLITGAARD & LAVIN, 2005).

As a part of a taxonomic revision of *Machaerium* in Venezuela (MELÉNDEZ, 2009, in press), herbarium material gathered at the foothills of the Andean Cordillera of Mérida (western Venezuela), were carefully studied. These specimens showed a particular combination of characters making it impossible to assign them to any of the known *Machaerium* species. Morphological evidence is here reported that supports the recognition of this material as a species new to science.

Material and methods

Dried materials of *Machaerium* were exhaustively studied from about 1000 vouchers housed in the Venezuelan herbaria GUYN, MER, MERC, MERF, MY, PORT, TFAV, UCOB and VEN. Herbarium material from BM, K and MA was also examined, as well as the image databases of F, MO, NY, and US. When ever possible, observations were compared with living plants collected in the field. Gross morphological features

were studied on either fresh or dried material, under a binocular stereoscopic microscope when needed. Data from specialised bibliography were also used for comparison.

Results and discussion

Machaerium meridanum Meléndez, **spec. nova** (Fig. 1)

Typus: VENEZUELA. Estado Mérida: Tucupido del Río Camburito hacia Santa María de Caparo, Distrito Arzobispo Chacón, 4.VIII.1973, S. López-Palacios & J. Bautista 3223 (holo-: MERF!; iso-: MER!).

Species notabilis e sectio Reticulata, ab affinis M. acuminato and M. acutifolio facile distinguitur foliis 11-foliolatis conspicue acuminatis erostratis glabrisque, bracteolis suborbiculato-truncatis 3 mm latis et floribus 0.5-1 mm pedicellatis, quae in priore 5-7-foliolatis acuminato-rostratis, bracteolis ovatis et floribus sessilibus, et in posteriore 11-17-foliolatis acutis vel brevissime acuminatis subtus puberulis, bracteolis angustioribus et floribus etiam sessilibus sunt.

Tree up to 30(-40) m, not becoming a liana at maturity, unarmed. *Leaves* imparipinnate, glabrous. *Leaflets* 11, ovate (the terminal one elliptic-lanceolate), up to 7 × 3 cm, the surfaces dull, the upper one drying partly black, the lower leaflets rounded and slightly asymmetric at the base, the apical sub-cuneate; all the leaflets with an acute, conspicuous acumen at the apex, not rostrate; venation brochidodrome, the secondary veins ca. 5 mm apart, impressed in the upper and prominent on the lower surface, arcuate, forming a 45° angle with the midrib, and anastomosing ca. 1 mm below margin, the tertiary veins indistinctly reticulate; leaflet petiolule ca. 5 mm long. *Inflorescence* axillary racemes aggregate into panicles, 12-15 cm long; inflorescence axis lanate. *Bracteoles* 2, ca. 2-3 × 3 mm, suborbiculate, truncate at the apex. *Flowers* 8-10 mm long, dark-brown when dry, pedicellate; pedicel 0.5-1 mm, with idument similar to that of the inflorescence; calyx ca. 4 mm, glabrescent, many-striated; corolla ca. 4-5 mm, pubescent outside in all parts; standard orbiculate ca. 4-5 mm; wings lanceolate ca. 4 mm long; keel sacciform ca. 3 mm long; androecium monadelphous. *Fruit* 1-seeded samara, immature, dark-brown, hirsute all over.

Taxonomic affinities. – *Machaerium meridanum* belongs to *Machaerium* sect. *Reticulata* (Benth.) Taub., which includes taxa with leaflets mostly ovate, with camptodrome or brochidodrome veining.

Machaerium meridanum shows clear affinities with several taxa in the section (see Table 1). It is related to *M. acuminatum* Kunth, a species widely distributed from Mexico to Venezuela, in showing a monadelphous androecium and leaflets with a brochidodrome venation on (the secondary veins anastomose just below the margins). The leaves of

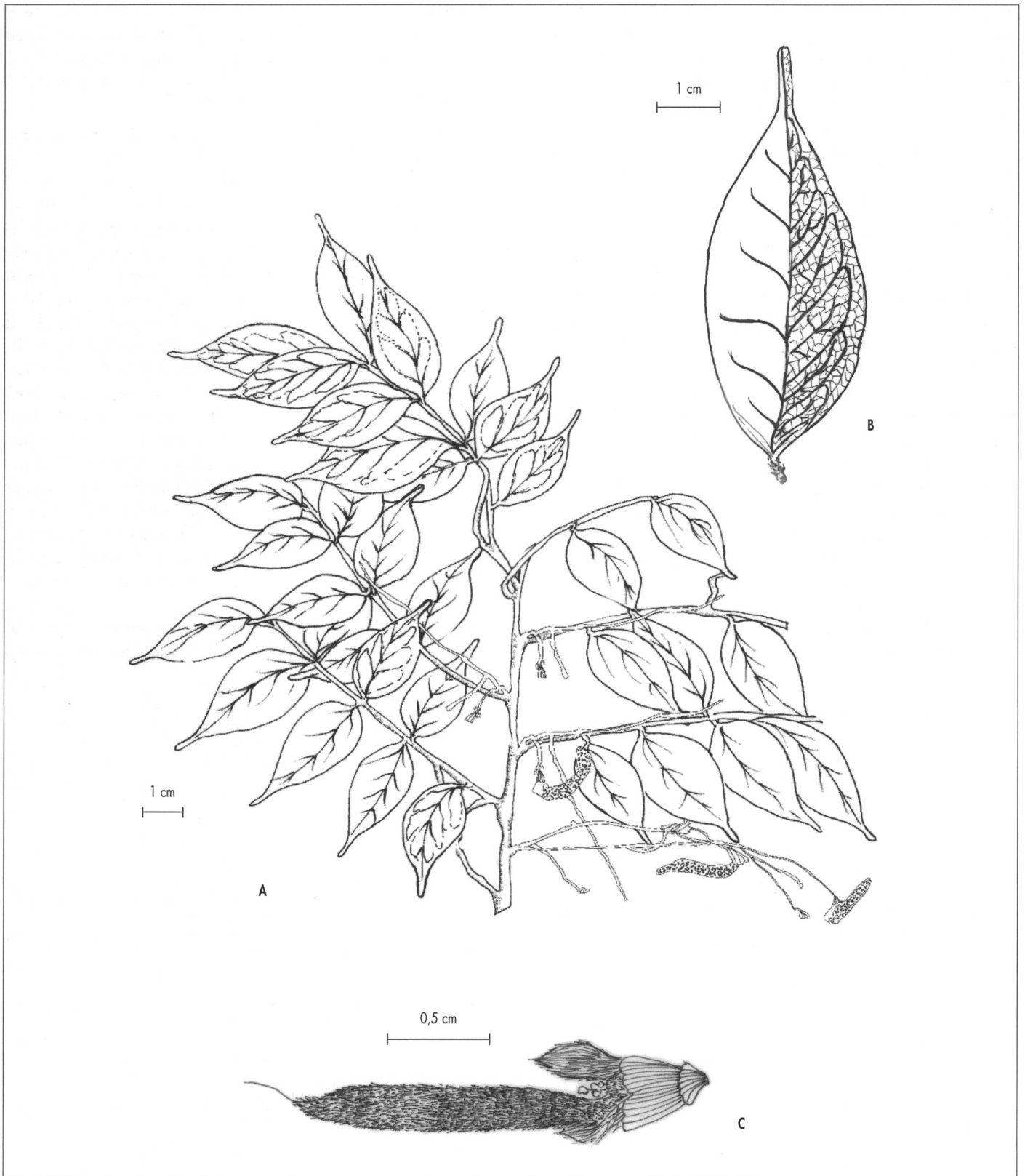


Fig. 1. – *Machaerium meridanum* Meléndez. **A.** Habit; **B.** leaflet and venation; **C.** immature fruit with withered flower.
[López-Palacios & Bautista 3223, MERF] [Drawn by Rut Sánchez]

M. meridanum are, however, 11-foliolate with the apex more conspicuously acuminate (not rostrate), the inflorescences have longer peduncles, and the flowers are pedicellate. It also is similar to *M. acutifolium* Vogel, a plant widespread in South America, by its many-foliolate leaves and suborbiculate bracteoles, but the flowers of *M. acutifolium* are sessile and the apices of the leaflets acute to very shortly acuminate. *Machaerium meridanum* also resembles *M. huanucoense* Rudd, a species from central-western Perú and Brazil according to TROPICOS (2007), as the species carry very similar leaves and pedicellate flowers. In contrast, stems of *M. meridanum* are not twining nor does it have conspicuous lenticels, and the leaflets are always ovate (vs. ovate or elliptic-lanceolate in *M. huanucoense*).

The similarities are less pronounced with the following species. *Machaerium caudatum* Ducke, a species native to Brazil (TROPICOS, 2007), differs in having 7-9 leaflets with camptodrome venation (the secondary veins not reaching the margins nor anastomosing), and their acumen is rostrate. Moreover, flowers in *M. caudatum* are sessile. *Machaerium chiapense* Brandegee, a species growing in southern Mexico, Guatemala and Belize (RUDD, 1977), mainly differs from *M. meridanum* in having 5-7-foliolate leaves, the leaflets showing also a rostrate acumen, and flowers are sessile. *Machaerium capote* Dugand, a species described from Colombia which is distributed from Panamá to Venezuela (TROPICOS, 2007), shows leaflets with broquidodrome venation and rounded to subacute apex. Finally, *M. arboreum* (Jacq.) Vogel and *M. seemannii* Benth. are distributed respectively from Guatemala and

Mexico to Colombia and Bolivia (TROPICOS, 2007), and which also grow in the border territories of Colombia and Venezuela, both differ from *M. meridanum* by their shorter bracteoles and sessile flowers (see below the «Identification key»). Relationships to other taxa are perhaps weaker.

Bioclimatic and biogeographic data. – *Machaerium meridanum* is only known from the type locality, which is located on the southeastern foothills of the Andean Cordillera of Mérida, at about 200-300 m altitude. This site is close to Depresión del Táchira and Los Llanos region, facing the alluvial valleys of Caparo and Uribante rivers. That area comprises partly the states of Barinas, Lara, Mérida, Táchira, Trujillo and Portuguesa, and suffered recently a strong human impact that changed the landscape dramatically. Biogeographically, it belongs to the Andean region, with a Tropical Pluvial bioclimate (RIVAS-MARTÍNEZ, 2007), to which a tropofile macrothermic subhumid forest corresponds as the potential vegetation. In that area, several geographic barriers appeared after the raising of the Venezuelan Andes which created particular habitats in both eastern and western slopes of the Cordillera of Mérida. They should have contributed to diverse speciation mechanisms in *Machaerium*. Thus, the related *M. acuminatum*, *M. acutifolium* and *M. meridanum* show allopatric distributions in that region, the two former being restricted to the northeastern and northwestern slopes of Cordillera of Mérida or Central Llanos, and the latter endemic to the southeastern slopes (Fig. 2). A similar phenomenon occurred in the ‘paramo’ habitats of northern Andes during the radiation and speciation

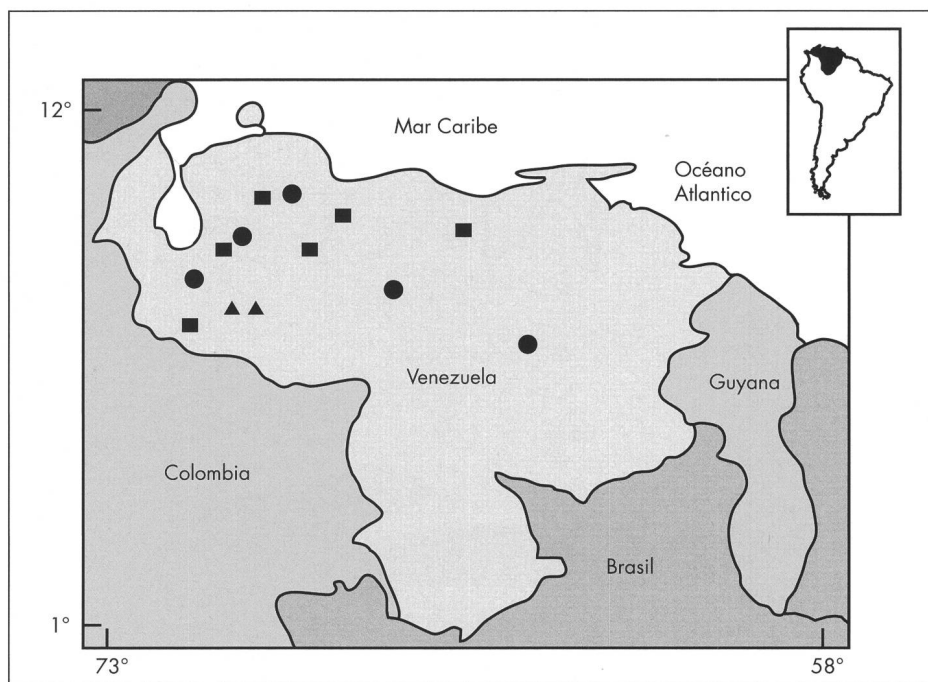


Fig. 2. – Map of Venezuela showing known distributions of *Machaerium meridanum* Meléndez (▲), *M. acutifolium* Vogel (●) and *M. acuminatum* Kunth (■).

processes of ‘frailejones’ (tribe *Espeletinae*, *Compositae*), after which vicarious species are found in particular altitude niches in both slopes of the Andean Cordillera of Mérida (cf. CUATRECASAS, 1986).

Our recent efforts to locate new populations of *M. meridanum* were unfruitful and no plants were found even in the type locality. The cited dramatical changes occurred in that area are probably responsible of the extreme rarity of the new species, which currently should be regarded as critically threatened, if not extinct.

Further herborization work is still needed to complete the current biogeographical knowledge of *Machaerium* in Venezuela. According to the number of taxa reported in the Andes region, this area appears as a main centre of diversity of *Machaerium* in the Neotropics.

Key for identification of the Venezuelan species of *Machaerium* sect. *Reticulata* (Benth.) Taub. (sensu RUDD, 1987), and other related taxa

1. Leaflets with craspedodrome venation (secondary veins reach margins) 2
- 1a. Leaflets with camptodrome (secondary veins do not reach margins) or more commonly brochidodrome venation (secondary veins anastomose below margins) 7
2. Secondary veins irregularly straight, not arcuate, ca. 3 mm apart. Leaflet apex rounded-subacute; petiolule 0.5-1 mm long..... *M. capote* Dugand
- 2a. Secondary veins arcuate or subarcuate, not straight, ca. 3 mm apart. Leaflet apex rounded to acute or acuminate; petiolule 2 mm or longer 3
3. Fruit a semi-lunate drupe. Biggest leaflets ca. 9 × 4 cm 4
- 3a. Fruit a winged samara. Biggest leaflets ca. 16 × 8 cm 5
4. Leaflets 5-9, ovate-elliptic; fruit ca. 9 cm long *M. dubium* (Kunth) Rudd
- 4a. Leaflets 11-13, oblong-lanceolate; fruit 3-4 cm long *M. leiophyllum* (DC.) Benth.
5. Branchlets with minute bristles or setae. Stipules spiny, conspicuous. Flowers up to 15 mm, with pedicel 3-4 mm long..... *M. kegelii* Meisn.
- 5a. Branchlets unarmed. Stipules not spiny, or inconspicuous. Flowers 6-8 mm, sessile or pedicellate 6
6. Unarmed trees. Leaflets acute or subacute at the apex. The seed chamber verrucose. Flowers pedicellate 1-2 mm long *M. grandifolium* Pittier
- 6a. Climbers or sometimes tall shrubs or trees, with spiny stipules. Leaflets acuminate at the apex. The seed chamber smooth. Flower sessile *M. madeirense* Pittier
7. Fruit a semi-lunate drupe. Leaflets 5-9; secondary veins forming a 30°-35° angle with the midrib. Flowers sessile *M. inundatum* (Benth.) Ducke
- 7a. Fruit a winged samara. Leaflets 3-17 with secondary veins forming an angle of 45° with the midrib (if they form an angle of 35°, then leaflets 13-17). Flowers sessile or pedicellate..... 8
8. Bracteoles suborbiculate, ca. 3 mm wide. Flowers pedicellate, pedicels 0.5-1 mm. Leaflets 11-foliolate *M. meridanum* Meléndez
- 8a. Bracteoles orbiculate, ovate or lanceolate, 1-2 mm wide. Flowers usually sessile. Leaves 3-17-foliolate 9
9. Seed chamber strongly geniculate 10
- 9a. Seed chamber only slightly or not geniculate..... 15
10. Leaves 3-7-foliolate, straight at the apex..... 11
- 10a. Leaves 7-17, sometimes curved or sigmoidal at the apex 13
11. Wing of fruit 1.8-2 cm wide, markedly veined. Leaves 5-7-foliolate *M. acuminatum* Kunth
- 11a. Wing of fruit ca. 3 cm wide, weakly veined. Leaves 3- or 5-foliolate 12
12. Leaves 3-foliolate, asymmetric at the base and with a rostrate-curved acumen, the terminal one ovate-elliptic, not subromboid..... *M. latialatum* Pittier
- 12a. Leaves 5-foliolate, symmetric at the base and with a very short, not rostrate acumen; the terminal one elliptic-lanceolate, sometimes subromboid *M. truxillense* Pittier
13. Petals white. Androecium diadelphous. Leaves 13-17-foliolate, straight at the apex. Fruit glabrous or without reddish pubescence *M. amazonense* Hoehne

- 13a. Petals bluish. Androecium monadelphous. Leaves 7-13-foliolate, slightly curved or sigmoidal at the apex. Fruit with reddish pubescence 14
14. Leaves 11-13-foliolate; leaflets with a dense ferruginous velutinum on the lower surface. Wing of fruit 2-2.5 cm wide *M. tovarense* Pittier
- 14a. Leaves 7-13-foliolate; leaflets sparsely puberulous (not ferruginous) on the lower surface. Wing of fruit ca. 1.5 cm wide *M. seemanii* Seem.
15. Leaves 11-17-foliolate, pubescent beneath; apex usually acute *M. acutifolium* Vogel
- 15a. Leaflets 3-7-foliolate, both surfaces glabrous sides; apex usually acuminate 16
16. Terminal leaflet elliptic-lanceolate, subcuneate at the base; leaves 5-7-foliolate, the upper surface dull *M. guaremalense* Pittier
- 16a. Terminal leaflet ovate-elliptic, rounded to subcordate at the base; leaves 3-5-foliolate, the upper surface usually glossy 17
17. Secondary veins of leaflets 5-10 mm far from each other; leaflet base subcordate. Seed chamber of fruit slightly geniculate *M. striatum* I. M. Johnst.
- 17a. Secondary veins of leaflets up to 4 mm far from each other; leaflet base rounded. Seed chamber of fruit straight 18
18. Wing of fruit straight *M. orthocarpum* Pittier
- 18a. Wing of fruit curved *M. arboreum* (Jacq.) Vogel

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Table 1. – Comparative characters of *Machaerium meridanum* Meléndez vs. other related species.

Species	Number of leaflets	Habit	Leaflet apex	Leaflet shape	Flowers	Bracteoles	Distribution
<i>M. acuminatum</i> Kunth	5-7	Tree; branches not twining, without lenticeles	Gradually acuminate, rostrate	Ovate, oblong or elliptic-lanceolate	Sessile	Ovate; 1.5 mm wide	Venezuela, Mexico, Colombia, and Costa Rica
<i>M. acutifolium</i> Vogel	11-17	Tree; branches not twining, without lenticeles	Acute to very shortly acuminate	Elliptic-lanceolate	Sessile	Suborbiculate; 2 mm wide	Venezuela, Argentina, Bolivia, Brazil, and Paraguay
<i>M. caudatum</i> Ducke	7-9	Tree; branches not twining, without lenticeles	Markedly acuminate, rostrate	Elliptic-lanceolate to ovate-elliptic	Sessile	Orbiculate; 2 mm wide	Brazil
<i>M. chiapense</i> Brandegee	5-7	Tree; branches not twining, without lenticeles	Markedly acuminate, rostrate	Ovate-lanceolate	Sessile	Ovate to suborbiculate; 2 mm wide	Mexico, Belize and Guatemala
<i>M. huanucoense</i> Rudd	11-13	Shrub; branches twining, with marked lenticeles	Gradually acuminate, subrostrate	Ovate or elliptic-lanceolate	Pedicellate; pedicel 1-2 mm	Ovate; 2 mm wide	Perú, Brazil
<i>M. meridanum</i>	11	Tree; branches not twining, without lenticeles	Markedly acuminate, not rostrate	Ovate, only the terminal elliptic-lanceolate	Subpedicellate; pedicel 0.5-1 mm	Suborbiculate; 3 mm wide	Venezuela

