

***GILBERTIODENDRON GRANDISTIPULATUM* (LEGUMINOSAE- CAESALPINIOIDEAE), A SINGULAR SPECIES FROM WEST CENTRAL AFRICA AND NEW RECORD FOR CONGO (BRAZZAVILLE)**

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Resumen: *Gilbertiodendron grandistipulatum* (Leguminosae-Caesalpinioideae), una especie singular del centro-oeste de África y nuevo registro para Congo (Brazzaville). *Gilbertiodendron* (Leguminosae-Caesalpinioideae) es un género endémico de África con ca. 30 especies, las cuales en su mayor parte son árboles que crecen en bosques primarios. El mayor número de especies y la mayor variabilidad morfológica se encuentra en la región Guineo-Congoleña, y el particular en Gabón. Una de esas especies es *G. grandistipulatum*, que se reconoce fácilmente por sus estípulas (de hasta 18 cm de longitud) y flores (con pétalos adaxiales de hasta 12,5 × 14 cm). En el presente trabajo se discute la taxonomía, hábitat y distribución de *G. grandistipulatum*, extendiendo su área de distribución a Congo. Se proporciona una descripción completa, un mapa de distribución y dos iconografías por primera vez para esta especie.

Palabras clave: Bosque tropical, Congo, Detarieae, Gabón, taxonomía.

Summary: *Gilbertiodendron* (Leguminosae-Caesalpinioideae) is an endemic tropical African genus of ca. 30 species, most of which are trees of primary forest. The highest concentration of species and morphological variation is found in the Guineo-Congolian region, particularly in Gabon. One of those species is *G. grandistipulatum*, which is easily recognized by its stipules (up to 18 cm long) and flowers (adaxial petal up to 12.5 × 14 cm). The taxonomy, habitat and distribution of *G. grandistipulatum* are discussed, extending its known distribution to Congo. A full description, distribution map and two illustrations are provided for the first time for this species.

Key words: Congo, Detarieae, Gabon, taxonomy, tropical forest.

INTRODUCTION

Gilbertiodendron is an endemic tropical African genus of ca. 30 species, most of which are trees of primary forest (Léonard, 1957; Mackinder, 2005; Estrella *et al.*, 2012a). Species belonging to this genus have leaflets with marginal or submarginal glands, a pair of bracteoles that enclose the flower bud, five reduced sepals, five petals, lateral and

abaxial petals that are much reduced, alternate to sepals, and similar to them; and a single well-developed adaxial petal, the base unguiculate and apex bilobed. The androecium is usually formed by six staminodes and three stamens that are fused with the staminodes to a short fleshy tube, although there are few exceptions, such as *G. splendidum*, that have nine well-developed stamens. The ovary, usually located on a small stipe, develops into a pod with longitudinal and transverse nerves, and the valves twist when mature to disperse the seeds (Polhill & Raven, 1981; Tucker, 2002; Estrella *et al.*, 2012a).

The highest concentration of species and morphological variation is found in the Guineo-Congolian region, particularly in Gabon which is a high diversity area for Legumes (Estrella *et al.*, 2012b) and where at least 18 species have been previously reported with 10 species considered

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endemic or subendemic (Sosef *et al.*, 2006). Several new species are to be described during the ongoing taxonomic revision of the genus.

In 1775 *Vouapa*, a new genus of Caesalpinioideae from the French Guyana was published (Aublet, 1775) afterwards it was rejected against the nomina conservanda *Macrolobium* (Schreber, 1789; Hutchinson, 1964). New *Macrolobium* species growing both in tropical America and Africa were described until Palisot de Beauvois (1806) published *Anthonotha*, a closely related new genus of African trees. Baillon (1865) considered that *Anthonotha* should be included within *Macrolobium* and the species were treated together again.

In 1949 Louis in his *Essences forestières et bois du Congo* (Louis & Fouarge, 1949) wondered whether the *Macrolobium* species growing in tropical Africa and tropical America where the same or belonged to different entities.

All species from tropical America stay in the genus *Macrolobium*, but in a succession of works Léonard reinstated *Anthonotha* (Léonard, 1955) and published three new genera to accommodate the African species: *Gilbertiodendron* (Léonard, 1952a), *Paramacrolobium* (Léonard, 1954) and *Pellegriniodendron* (Léonard, 1955).

Anthonotha and two related genera *Englerodendron* and *Isomacrolobium*, have been recently revised by Breteler (2006, 2008, 2010 and 2011). *Paramacrolobium* is a genus with only one species (Léonard, 1957). By contrast *Pellegriniodendron* (one species) has been transferred to *Gilbertiodendron* according with recently published phylogenies (Bruneau *et al.*, 2008) and with a morphological re-evaluation of its status (Estrella *et al.*, 2012a).

Gilbertiodendron is a genus that is important both economically (Burkill, 1995), with its species used for timber or traditional medicine, and ecologically, with many species reported as growing gregariously (Burgt *et al.*, 2012; Estrella *et al.*, 2012c; Estrella & Devesa, 2014).

The lack of adequate material has always been a problem faced by those wishing to study this genus (Léonard, 1957: 236). *Gilbertiodendron grandistipulatum* is probably the species within the genus that presents more spectacular flowers, with an adaxial petal up to 12.5 × 14 cm. The aim of this work is to provide a full comprehensive description using the modern collections available, including a

distribution map and a detailed black and white line drawing and colour art illustration of the species.

MATERIAL AND METHODS

This taxonomic treatment of *G. grandistipulatum* is based on eighteen specimens, which represents all the available specimens after consulting the following herbaria (acronyms following Index Herbariorum): A, AAU, B, BM, BR, C, COI, E, FBC, FHO, G, GH, H, HBG, K, L, LD, LISC, M, MA, MO, NY, P, PR, PRE, S, SL, U, UPS, US, WAG, WU, and Z. Seventy quantitative characters were recorded and measured using a Mitutoyo CD-15CD digital calliper (Tokyo, Japan) for all the specimens when possible. Measurements follow the common practice in morphological studies (Estrella *et al.*, 2009). Each character was analyzed for its mean, median, range, standard deviation, and significance using the STATISTICA package (www.statsoft.com). Indumentum terminology and species descriptions follow a standard format used by Wieringa (1999) adapted for other Caesalpinioideae genera (Estrella *et al.*, 2010). Label data from each specimen was recorded in a database from which reports and outputs were generated to produce a list of numbered collections, the representative material studied, and a file with coordinates used to produce the distribution map. Information on the uses and vernacular names is included. We also include available references for further information on these topics.

RESULTS AND DISCUSSION

Gilbertiodendron grandistipulatum (De Wild.) J. Léonard in *Bulletin du Jardin Botanique de l'État* 22: 191 (1952). *Macrolobium grandistipulatum* De Wild. in *Repertorium Specierum Novarum Regni Vegetabilis* 13: 370 (1914).

Type: Congo (Kinshasa), Ganda-Sundi, 1913, *De Briey 65* (lectotype designated by Léonard 1957: 237, BR!). (Figs. 1 and 2).

Macrolobium le-testui Pellegr. in *Bulletin de la Société Botanique de France* 69: 745 (1922).

Type: Gabon, Ngounié, Pays Itsogho, Moundou, 4 Nov. 1916, *Le Testu 2177* (holotype P!; isotypes, BR!, WAG!).

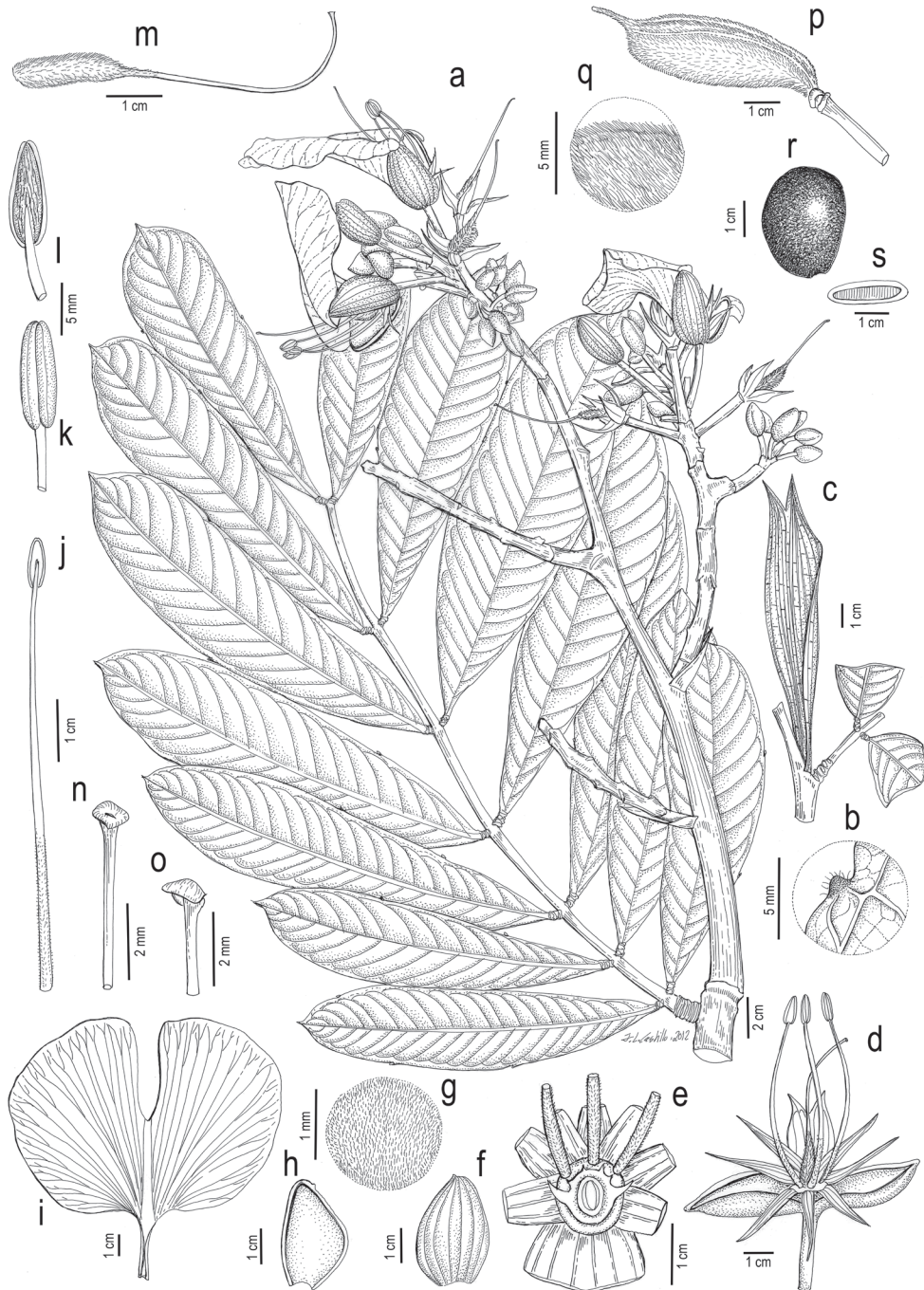


Fig. 1. *Gilbertiodendron grandistipulatum*. a: Leaf and inflorescence. b: Gland on edge of leaflet. c: Pair of stipules. d: Flower without adaxial petal. e: Staminodial tube with staminodes and base of stamens, exposed by removal of ovary. f: Bracteole outside. g: Detail of bracteole indumentum. h: Bracteole inside. i: Large, adaxial petal. j: Stamen. k: Anther ventral view. l: Anther dorsal view with indumentum. m: Gynoecium. n and o: Stigma detail. p and q: Juvenile fruit, with close-up of indumentum. r: Seed. s: Seed transversal view. Drawn from: L.J.G. van der Maesen & al. 5734, a-b, p-q; Wieringa & al. 4687, c-i, m; P. Bissiengou & al. 604, j-l; F.J. Breteler & al. 10428, n-o, r-s. Drawing by Juan L. Castillo.



J. L. Castillo 2012

Fig. 2. *Gilbertiodendron grandistipulatum*. Drawing by Juan L. Castillo.

Tree, to ca. 25 m tall and 50 cm dbh. Twigs and branches glabrous to pubescent. Stipules in pairs, covered with hairs -mainly at base and margins- to glabrous, with parallel nerves, 75-180 × 19-30(-43) mm, oblong-lanceolate, persistent, completely fused. Leaves alternate, 6-7(-8)-jugate, (25-)36-85 × 19-30(-43) cm, largest pair of leaflets is the upper or previous pair; petiole 6-17 mm long, 5-11.5 mm diameter, ± terete, densely covered with hairs to glabrous; rachis (12.5-)24-38(-47) cm long, rounded abaxially, canaliculate and slightly articulated at the insertion of each pair of leaflets adaxially, pubescent to glabrous; stipels absent; petiolules 2.5-7.5 mm long; leaflets opposite, coriaceous, 12-29 pairs of main lateral veins, brochidodromous, pubescent to glabrous at petiolules and midrib on leaflet blade in the abaxial surface; 0-3 glands along each margin of the leaflet, and a gland at or near the midrib top; midrib prominent on the abaxial face, rounded, slightly canaliculate in adaxial face; base of the leaflet asymmetric, proximal half of the leaflet lamina wider at base than distal half, proximal margin inserted at 2-4 mm below the distal margin insertion; basal leaflet 9.5-19(-23) × 3-5.5(-7.5) cm, oblong, apex acuminate (up to 3 mm long), terminating in a gland at the top of the midrib; largest leaflet 12-31(-38) × 4-9(-11.5) cm, oblong-obovate, apex emarginate to slightly acuminate (up to 7 mm long), terminating in a gland at the top of the midrib. Inflorescence a raceme or panicle, 24-40 cm long, axillary, sessile or slightly pedunculated; rachis densely covered with hairs ca. 0.1 mm long, with sparse hairs up to 0.5 mm long intermixed, 4-6 lateral branches, each 130-180 mm long and 11-30-flowered. Bracts 18-19 × 9-10 mm, caducous, foliaceous, ovate-lanceolate, cup-shaped in the middle, densely hairy on outer surface, inner surface glabrous with hairs located at the margin; pedicel 19-32(-47) mm long, 2.5-4.5 mm diameter, with 4 ridges when dehydrated, densely covered with short and longer hairs; bracteoles red to brown outside, inside more pinkish-white, 33-44 × 18-26 mm, caducous, oblong, cupuliform concave and slightly beaked in outline, outside densely covered with short and longer hairs, inside glabrous, edge with a ciliated margin, with a beak 2.3-4 mm long culminating in a gland at apex. Receptacle white, 3.5-6 × 5-8 mm, slightly hairy at the margins to glabrous. Sepals 5, pink red with white margin, 17-21 × 3-6 mm, triangular, broadest at base, glabrous, adaxial sepals united for 11-17.5 mm

covering part of the adaxial petal claw; the other 3 sepals free. Petals 5, alternate to sepals; adaxial petal large, white to cream with pink to red nerves, deeply bilobed, 100-125 × 105-140 mm, including claw 18-28 × 3.5-6 mm, glabrous except the external face of the claw -near the petal blade- which is pubescent to glabrescent; lateral and abaxial petal pairs pinkish white, almost equal in size to sepals, 13-27 × 3-7 mm, triangular, broadest at base, glabrous. Fertile stamens 3, alternate with abaxial petals, filaments 49-62 mm long, long hairy at lower 3/4; anthers pinkish-white, 12-14 × 4-6 mm, glabrous to slightly hairy at the point of filament insertion on external face; staminodes 6, filiform, fused into a short intrastaminal tube, 3-8 mm long, glabrous. Ovary 13-21 mm long, rectangular-rhombic in shape, densely hispid, stipe 1-2 mm long, hispid; style 35-55 mm long, white, lower third hairy; stigma 1-1.2 mm in diameter, capitate. Pod 20-30 × 8-9 cm (measure based in literature records), oblong, up to 7-seeded, broadly beaked, sparsely hairy, 2 longitudinal veins. Seeds suborbicular, wrinkled, brown-black, ca. 35 × ca. 25 × ca. 7.5 mm.

Distribution. Species found in Gabon, Congo (Brazzaville), and Congo (Kinshasa). The species has been previously reported from Gabon and Congo (Kinshasa) (Lock, 1989: 12; www.ildis.org, V-2013), and although the Congo (Brazzaville) specimen recollected by *J. Koechlin* 7863 (P) was dated in 1957 the species has not been previously reported from the country (Fig. 3).

Habitat. Primary and secondary forest, river banks and swampy areas; 40-650 m.

Phenology. Flowering specimens are recorded from October to December; the only fruiting specimen is the type but unfortunately we don't have the information on which month it was collected.

Vernacular Names. Gabon: *Pokussa des marais* (Pellegrin, 1949: 59). Congo (Kinshasa): *M'Pokussa, Possa* (Léonard, 1952b: 435).

Uses. Wood quite dense and it could be used in joinery (Pellegrin, 1949: 59; Léonard, 1952b: 435).

Notes. *Gilbertiodendron grandistipulatum* is here illustrated for the first time and the species

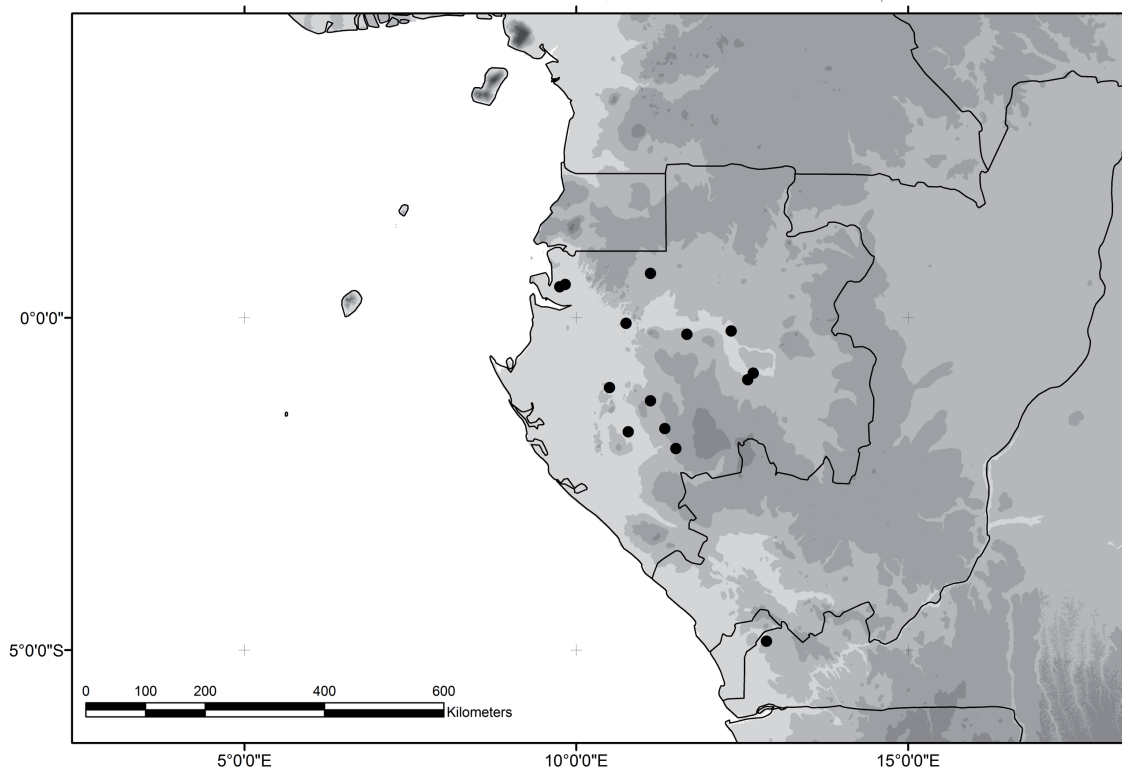


Fig. 3. Known distribution of *Gilbertiodendron grandistipulatum* (circles).

is easily recognized by its stipules (up to 18 cm long) and flowers (adaxial petal up to 12.5×14 cm). Although *G. grandiflorum*, a species growing in West Central Africa, also presents large adaxial petals (up to 9×11 cm) the stipules are smaller (2-2.5 cm long) and the leaves only has 2 pairs of leaflets instead of 6-7(-8) in *G. grandistipulatum*. *Macrobium grandistipulatum*, in which the former combination is based, was described from material collected by De Briey in Congo (Kinshasa) by De Wildeman (1914: 370), who referred it to a single collection: “Belgisch-Kongo: Ganda-Sundi, 1913 (Comte de Briey, no. 65)”. Because this author does not indicate this specimen as nor indicate where it was deposited it is not clear the holotype. Léonard (1957: 237) selected De Briey 65 (BR) as the lectotype of *M. grandistipulatum*. Eight years later Pellegrin (1922: 745) described *Macrobium le-testui* and he stated: “Pays Itsogho. Moundou (Icobé), le 4 novembre 1916 (Le Testu, n° 2177)”. Since Pellegrin worked in P, the original sheet at P, with the more detailed label data by G. Le Testu,

constituted the holotype of this species. After the study of the type material we conclude, as other authors did previously, that this name should be placed as a synonym of *G. grandistipulatum*.

Additional specimens studied. CONGO (BRAZZAVILLE): Mabombo, (droite du Niari), Madingou, *J. Koechlin* 7863 (P). CONGO (KINSHASA): Ganda-Sundi, $4^{\circ}52'S$, $12^{\circ}52'E$, *De Briey* 65 (BR); Ganda-Sundi, $4^{\circ}52'S$, $12^{\circ}52'E$, *Gilbert* 612 (BR). GABON: Ngounié, 37 km E. of Mouila, along the road to Yeno, $1^{\circ}40'S$, $11^{\circ}20'E$, *J.C. Arends, J.J.F.E. de Wilde & A.M. Louis* 480 (WAG); Ngounié, village de Ndjemba, entré vers chantier EFT (Exploitation Forestière de Tsamba), route Fougamou-Lambaréné, $1^{\circ}03'S$, $10^{\circ}30'E$, *P. Bissiengou, F.J. Breteler, R. Niangadouma & J.-N. Boussiengui* 604 (WAG); Moyen-Ogooué, Missanga, 5-15 km NW of Ndjolé, $0^{\circ}5'S$, $10^{\circ}45'E$, *F.J. Breteler & C.C.H. Jongkind, J.J. Dibata* 10428 (WAG); Estuaire, 5 km au NW de Mebba, $0^{\circ}28'N$, $9^{\circ}45'E$, *J.J. Floret & A.M. Louis*

1455 (P); Ogooué-Ivindo km 18, piste d'Ivindo vers Lastoursville, 0°12'S, 12°20'E, *J.J. Floret, A.M. Louis & A. Mounngazi 1910* (P); Ngounié Moundou (Icobé), 1°15'S, 11°7'E, *M.G. Le Testu 2177* (BR, P, WAG), Ngounié, region de Mouila, Mitingo (Wano), 1°58'S, 11°30'E, *M.G. Le Testu 6376* (BM, BR, MA, P, WAG), Ogooué-Lolo, Lastoursville, 0°50'S, 12°40'E, *M.G. Le Testu 7570* (BM, BR, P), Woleu-Ntem, Afaghé Nzoc, 0°40'N, 11°7'E, *M.G. Le Testu 9368* (BM, BR, P); Estuaire, Near Mvoum, 18 km NE of Ntoun, 0°30'N, 9°50'E, *A.M. Louis, F.J. Breteler, J. de Bruijn 289* (WAG); Ogooué-Lolo, km 13 on Chantier 19, SBL, branching off from km 21 Lastoursville to Koulamoutou, 0°56'S, 12°35'E, *L.J.G. van der Maesen & A.M. Louis, J. de Bruijn 5734* (BR, WAG); Ogooué-Ivindo, Lope Reserve, *L.J.T. White 1118* (PRE, WAG), 1227 (WAG); Ngounié, road Mouila to Yombi, 1°43'S, 10°47'E, *J.J. Wieringa, T. Nzabi, J.-N. Boussiengui 4687* (WAG).

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