



## **A synopsis of the *Sabicea floribunda* group (Rubiaceae) from Central Africa, including three new species**

Authors: Lachenaud, Olivier, Zemagho, Lise, and Sonké, Bonaventure

Source: *Candollea*, 75(1) : 115-143

Published By: The Conservatory and Botanical Garden of the City of Geneva (CJBG)

URL: <https://doi.org/10.15553/c2020v751a12>

---

BioOne Complete ([complete.BioOne.org](https://complete.BioOne.org)) is a full-text database of 200 subscribed and open-access titles in the biological, ecological, and environmental sciences published by nonprofit societies, associations, museums, institutions, and presses.

Your use of this PDF, the BioOne Complete website, and all posted and associated content indicates your acceptance of BioOne's Terms of Use, available at [www.bioone.org/terms-of-use](https://www.bioone.org/terms-of-use).

Usage of BioOne Complete content is strictly limited to personal, educational, and non - commercial use. Commercial inquiries or rights and permissions requests should be directed to the individual publisher as copyright holder.

---

BioOne sees sustainable scholarly publishing as an inherently collaborative enterprise connecting authors, nonprofit publishers, academic institutions, research libraries, and research funders in the common goal of maximizing access to critical research.

# A synopsis of the *Sabicea floribunda* group (Rubiaceae) from Central Africa, including three new species

Olivier Lachenaud, Lise Zemagho & Bonaventure Sonké

## Abstract

LACHENAUD, O., L. ZEMAGHO & B. SONKÉ (2020). A synopsis of the *Sabicea floribunda* group (Rubiaceae) from Central Africa, including three new species. *Candollea* 75: 115–143. In English, English and French abstracts. DOI: <http://dx.doi.org/10.15553/c2020v751a12>

This paper presents a taxonomic revision of the *Sabicea floribunda* K. Schum. group (*Rubiaceae*). Eight species are recognised, of which three are newly described: *Sabicea couteronii* O. Lachenaud, Zemagho & Sonké (Cameroon, Gabon and Republic of Congo), *Sabicea dichrosepala* O. Lachenaud, Zemagho & Sonké and *Sabicea rubiginosa* O. Lachenaud, Zemagho & Sonké (both endemic to Gabon). One subspecies is also described: *Sabicea sanguinosa* subsp. *viridis* O. Lachenaud, Zemagho & Sonké and two varieties: *Sabicea floribunda* var. *anisostegia* O. Lachenaud, Zemagho & Sonké and *Sabicea floribunda* var. *paludosa* O. Lachenaud, Zemagho & Sonké. Lectotypes are selected for *Sabicea floribunda* var. *paucinervis* Wernham, *Sabicea nobilis* R.D. Good, *Sabicea segregata* Hiern and *Sabicea henningsiana* Büttner. All species are illustrated with photographs, and the three new ones also with line drawings; distribution maps and IUCN conservation status assessments are also presented for all taxa.

## Résumé

LACHENAUD, O., L. ZEMAGHO & B. SONKÉ (2020). Synopsis du groupe *Sabicea floribunda* (Rubiaceae) en Afrique centrale, avec trois espèces nouvelles. *Candollea* 75: 115–143. En anglais, résumés anglais et français. DOI: <http://dx.doi.org/10.15553/c2020v751a12>

Cet article présente une révision taxonomique du groupe *Sabicea floribunda* K. Schum. (*Rubiaceae*). Huit espèces sont reconnues, dont trois nouvellement décrites: *Sabicea couteronii* O. Lachenaud, Zemagho & Sonké (Cameroun, Gabon et République du Congo), *Sabicea dichrosepala* O. Lachenaud, Zemagho & Sonké et *Sabicea rubiginosa* O. Lachenaud, Zemagho & Sonké (tous deux endémiques du Gabon). Une nouvelle sous-espèce est également décrite, *Sabicea sanguinosa* subsp. *viridis* O. Lachenaud, Zemagho & Sonké, ainsi que deux variétés: *Sabicea floribunda* var. *anisostegia* O. Lachenaud, Zemagho & Sonké et *Sabicea floribunda* var. *paludosa* O. Lachenaud, Zemagho & Sonké. Des lectotypes sont désignés pour *Sabicea floribunda* var. *paucinervis* Wernham, *Sabicea nobilis* R.D. Good, *Sabicea segregata* Hiern et *Sabicea henningsiana* Büttner. Toutes les espèces sont illustrées avec des photographies, et les trois nouvelles espèces également avec des dessins au trait; des cartes de distribution et des évaluations du statut de conservation selon les critères de l’IUCN sont également présentées pour tous les taxons.

## Keywords

RUBIACEAE – *Sabicea* – *Pseudosabicea* – Central Africa – Lower Guinea – Gabon – Cameroon – Republic of Congo – Taxonomy – New species

Addresses of the authors:

OL: Meise Botanic Garden, Nieuwelaan 38, 1860 Meise and Herbarium et Bibliothèque de Botanique africaine, CP 265, Université Libre de Bruxelles, Boulevard du Triomphe, B-1050 Brussels, Belgium. E-mail: [olivier.lachenaud@botanicgardenmeise.be](mailto:olivier.lachenaud@botanicgardenmeise.be)

LZ: Plant Systematics and Ecology Laboratory, Higher Teacher's Training College, University of Yaoundé I, P.O.Box 047, Yaoundé, Cameroon.

BS: Plant Systematics and Ecology Laboratory, Higher Teacher's Training College, University of Yaoundé I, P.O.Box 047, Yaoundé, Cameroon; International Joint Laboratory DYCOFAC, IRD-UYI-IRGM, BP1857, Yaoundé, Cameroon.

Submitted on July 12, 2019. Accepted on May 11, 2020

First published online on June 17, 2020.

ISSN: 0373-2967 – Online ISSN: 2235-3658 – *Candollea* 75(1): 115–143 (2020)

© CONSERVATOIRE ET JARDIN BOTANIQUES DE GENÈVE 2020

## Introduction

The genus *Sabicea* Aubl. (*Rubiaceae-Sabiceae*), considered here in the broad sense, includes around 150 species, of which 100 occur in tropical Africa (WCSP, 2019). The remainder are found mostly in tropical America (43 species: KHAN, 2007) with six species in Madagascar (RAZAFIMANDIMBISON & MILLER, 1999) and one in Sri Lanka. The genus includes mostly lianas or creepers of forest edges, and is characterised by the combination of axillary inflorescences, valvate corolla aestivation, soft berries with numerous small seeds, and absence of raphides (KHAN et al., 2008).

The African species of *Sabicea* are quite diverse morphologically, and have been variously treated as a single genus (e.g. HEPPER, 1958, 1963) or up to four different genera, namely *Sabicea* s.s., *Pseudosabicea* N. Hallé, *Ecpoma* K. Schum. and *Stipularia* P. Beauv. (HALLÉ, 1963, 1966). In his worldwide monograph of the genus, WERNHAM (1914) adopted a broad concept of *Sabicea*, recognising only *Stipularia* as a separate genus on account of its peculiar urn-shaped involucre. HEPPER (1958) later included *Stipularia* in *Sabicea*, thus recognising a single genus. By contrast, HALLÉ (1963) adopted a narrow delimitation of *Sabicea*, which he restricted to twining species with 5-locular ovaries. He reinstated *Stipularia* (also with 3- to 5-locular ovaries) on account of its erect habit and particular involucre, and transferred species with 2-locular ovaries to *Ecpoma* and the new genus *Pseudosabicea* (the former including erect plants, and the latter creeping or sarmentose ones). He divided *Pseudosabicea* in three sections, sect. *Anisophyllae* N. Hallé with unequal leaves and unbranched inflorescence, sect. *Sphaericae* N. Hallé with equal leaves and unbranched inflorescence (which ought to have been called sect. *Pseudosabicea*, as it includes the type species of the genus) and sect. *Floribundae* N. Hallé with equal leaves and branched inflorescence. He later described several new taxa of *Pseudosabicea* (HALLÉ, 1964, 1966, 1971), amounting to a total of 13 species for the genus.

Phylogenetic studies (KHAN et al., 2008; ZEMAGHO et al., 2016) have shown generic distinctions in this group to be untenable, and led to the inclusion of all the segregate genera back into *Sabicea*. A new infrageneric classification of *Sabicea* has been proposed, including four subgenera (ZEMAGHO et al., 2016): subg. *Stipularia* (P. Beauv.) Zemagho et al., subg. *Stipulariopsis* Wernham, subg. *Anisophyllae* (N. Hallé) Zemagho et al., and subg. *Sabicea*. The two former subgenera correspond respectively to *Stipularia* and *Ecpoma*, and include only a few species each. Subgenus *Anisophyllae* corresponds to *Pseudosabicea* sect. *Anisophyllae*, with the addition of one species (*Sabicea arborea* K. Schum.) placed in *Pseudosabicea* sect. *Sphaericae* by HALLÉ (1963). This subgenus has recently been revised (ZEMAGHO et al., 2017) and includes 15 African species, characterised by sessile inflorescences, a creeping or sarmentose habit, 2-locular ovaries, and strongly discoloured, usually anisophyllous leaves. Finally, subgenus *Sabicea*, by far

the largest, is quite polymorphic: it includes mostly twining species with 5-locular ovaries (i.e. *Sabicea* s.str. in the system of HALLÉ, 1963) but also some of the former *Pseudosabicea* species (Hallé's *Pseudosabicea* sect. *Floribundae*, plus the type species of the genus and of *Pseudosabicea* sect. *Sphaericae*) which are here referred to as the *Sabicea floribunda* group.

Members of the *S. floribunda* group resemble those of subg. *Anisophyllae* in being sarmentose lianas with 2-locular ovaries, but differ from them by having pedunculate inflorescences (in the fruiting stage at least) and a corolla throat with short inflated hairs (vs. usually long, non-inflated hairs); they are not (or only slightly) anisophyllous, and their leaves are often green below, while in subgen. *Anisophyllae* the lower surface is always covered with a dense felt of white to buff woolly hairs. Phylogenetic studies (ZEMAGHO et al., 2016) suggest that the *S. floribunda* group is sister to the recently described *S. mabouniensis* O. Lachenaud & Zemagho (a presumed close relative of the latter, *S. golgothae* O. Lachenaud & Zemagho, was not included in the analysis). While *S. mabouniensis* also has 2-locular ovaries, it is a low creeping plant with strong anisophylly, thus quite different morphologically from the *S. floribunda* group (LACHENAUD & ZEMAGHO, 2015) where it is therefore not included.

The *S. floribunda* group so far included five species: *S. floribunda* K. Schum., *S. nobilis* R.D. Good, *S. proselyta* (N. Hallé) Razafim. et al., *S. sanguinosa* (N. Hallé) Razafim. et al., and *S. segregata* Hiern. However, recent field work in Central Africa has shown the need for a complete taxonomic revision of this group, which is presented here. In the current work eight species are recognised, three of which are newly described: one from Cameroon, Gabon and the Republic of Congo, *S. couteronii* O. Lachenaud, Zemagho & Sonké, and two from Gabon, *S. dichrosepala* O. Lachenaud, Zemagho & Sonké and *S. rubiginosa* O. Lachenaud, Zemagho & Sonké. Two subspecies (one new) are recognised in *S. sanguinosa*, and four varieties (two new) in *S. floribunda*; the other species of the group are monotypic. All species are illustrated with photographs, and the three new ones also with line drawings. Distribution maps and IUCN conservation assessments are provided for all taxa.

## Material and methods

The descriptions are based on the study of living material, herbarium specimens, and material preserved in spirit. Material of the following herbaria was consulted: BM, BR, BRLU, COI, G, K, LBV, P, WAG and YA, as well as photographs of the FHI material. All specimens cited have been seen, unless otherwise stated. Specimens were databased and, if possible, georeferenced using the following sources: 1) specimen labels; 2) the Leiden herbarium database; 3) the botanical gazetteers of LETOUZEY (1968) for Cameroon and BAMPs (1982) for Democratic Republic of Congo (D.R. Congo), Rwanda and Burundi; 4) the U.S. Board on Geographic Names gazetteers;

5) online gazetteers [<http://www.fallingrain.com/worlds>; <http://www.worldgazetter.com>]. The georeferenced specimen data were imported into ArcMap 10.3 (ESRI, Redlands, California) geographic information software to produce distribution maps. Ecological and geographical data were collected from specimen labels and field observations. Measurements, colours and other details given in the descriptions are based on living material, spirit and herbarium specimens, and data derived from field notes. Descriptive terminology follows ROBBRECHT (1988) and ANONYMOUS (1962). Delimitation of infraspecific ranks follows STACE (1989). Phytogeographical considerations follow WHITE (1979, 1983, 1993).

A risk of extinction assessment was assessed using the IUCN Red List Categories and Criteria (IUCN, 2012, 2014). The extent of occurrence (EOO) and area of occupancy (AOO) were calculated using GEOCAT (2020; see BACHMAN et al., 2011) with a cell size of 2 km<sup>2</sup>. The number of 'locations' (as defined by IUCN, 2012) was calculated with regard to the kind of threats, such that a single location may encompass more than one adjacent subpopulation.

### Morphological characters of the *S. floribunda* group

Characters of the *S. floribunda* group are illustrated by electron micrography (Fig. 1–2), line drawings (Fig. 3, 5, 11) and field photographs (Fig. 6, 7, 12, 13). All species are sarmentose lianas, which may sometimes trail on the ground. The leaves are either in equal pairs or, especially in *S. segregata*, slightly anisophyllous. Leaves of *S. couteronii* (Fig. 6B) and *S. nobilis* (Fig. 7C) are strongly discoloured, with a dense felt of buff woolly hairs on the lower side; in other species the leaves are green on both sides (Fig. 7E, 12B) with hairs sparser and not woolly. The upper leaf surface is conspicuously bullate in the fresh state in *S. sanguinosa* (Fig. 12F) and more or less flat in other species. The stipules are interpetiolar, opposite and entire, usually ovate in outline, truncate to slightly auriculate at base and acute to acuminate at apex; they are held erect (not reflexed as in most other *Sabicea* species) and more or less longitudinally plicate, which is especially conspicuous in the fresh state (Fig. 3B, 5D, 11B). The inflorescences are axillary, paired at nodes or sometimes solitary (as often in *Sabicea*, this may vary in the same species). They vary from cymose and very lax to densely glomerulate; in the latter case they may be sessile at anthesis, but in the fruiting stage a peduncle is always apparent, though sometimes short. The bracts are free, and vary from short and inconspicuous to well-developed and foliaceous, but never form an involucre; in colour they are usually green or greenish-brown, sometimes mottled green and whitish (*S. floribunda*: Fig. 7A) or dark red (*S. rubiginosa*, *S. sanguinosa* subsp. *sanguinosa*). Their arrangement is somewhat peculiar in that, usually, a pair of bracts is present at the

basal node of the inflorescence, while the second order nodes have no bracts, and the third and higher order nodes bear a single bract; the uppermost bracts are inserted at the base of the pedicels (some of which may lack them, however). HALLÉ (1960: 345–346) described a similar arrangement in *Cuviera letestui* Pellegr., and interpreted the bracts (except the basal ones) as being recaulescent, i.e. the bracts of the second node being displaced upwards (“remontées”) to the third, and so on. Occasionally the basal bracts are inserted slightly above the basal node along the secondary ramifications, which is a more typical case of recaulescence.

The flowers are 5-merous, as usual in the genus. The calyx has a short tube 0.5–1(–2) mm long; the lobes are semicircular to lanceolate, 0.8–6 × 0.5–2.5 mm, acute to rounded at apex, and alternating with minute colleters. The calyx is usually green, whitish or brownish but in *S. rubiginosa* and *S. sanguinosa* subsp. *sanguinosa* is dark red (Fig. 12C, E), while in *S. dichrosepala* it is characteristically dark red at base and green at apex (Fig. 6D). The corolla has a very short tube for the genus, 2.5–5 mm long × 1–2.5 mm wide, which is either cylindrical, or slightly constricted around the middle and enlarged in the upper part, while the lobes are triangular, 0.5–1.8 mm long, not or hardly longer than broad, patent at anthesis. In most species the whole corolla is white or greenish (Fig. 6A, D; 12C, E; 13A) but in *S. floribunda* and *S. segregata* the lobes are brown at anthesis (Fig. 13D). The corolla tube is pubescent inside in the upper ½ or ¼ of its length, with whitish multicellular hairs, and bears short and inflated, usually unicellular hairs around the throat. As usual in the genus, the flowers are heterostylous, with either the anther tips (in short-styled flowers) or the stigmas (in long-styled flowers) visible in the throat. The style is bifid at apex, with dorsally flattened stigmas, and the ovary is bilocular, which is relatively unusual in the genus.

Fruits are soft, ellipsoid to globose berries, which are most often white or pale grey, but in some species (*S. couteronii*, *S. segregata*) become red or black when mature. They do not exsude any coloured juice (as e.g. in *S. venosa* Benth. and related species). The mesocarp is usually white or whitish (purple in *S. couteronii*), often with scattered darker granules. Fruits of three species at least (*S. nobilis*, *S. rubiginosa*, *S. segregata*) are reported to taste bitter. The fruits are 2-locular and each locule includes numerous small brown seeds (around 0.5 mm long), which are compressed and polyedric in outline. The surface ornamentation of the seeds (Fig. 1–2) is an important specific character in the group: in *S. dichrosepala*, *S. proselyta*, and to a lesser extent *S. couteronii*, the surface of the seeds is rather coarsely reticulate, while in other species it shows close parallel striations, which is the usual condition in the genus.

## Ecology and distribution

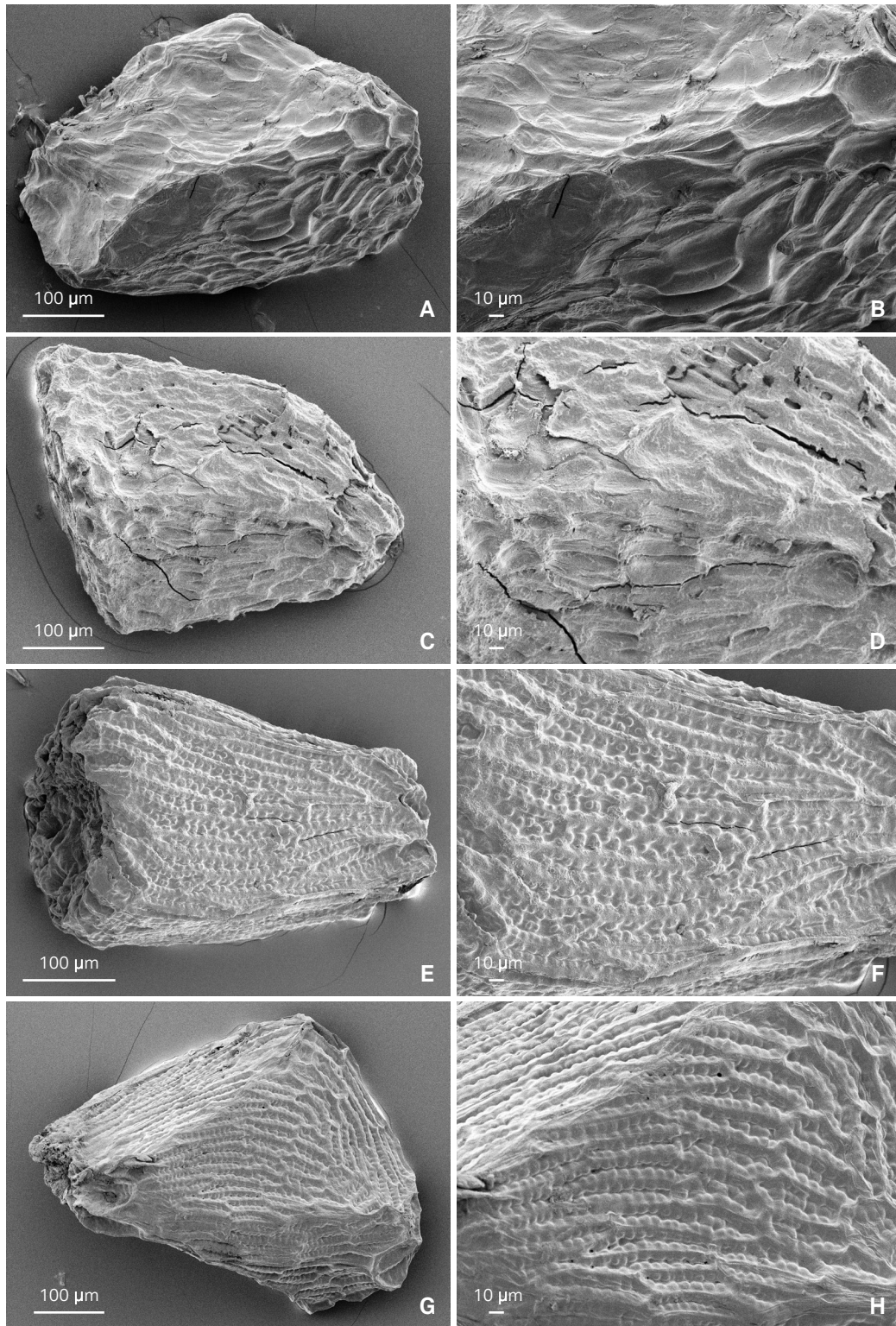
All species of the *S. floribunda* group occur in forest edges and young secondary regrowth, where they are often very abundant (especially along roads); as other *Sabicea* spp., they play an important role in forest reconstitution. They are restricted to central Africa, from south-eastern Nigeria to the Democratic Republic of Congo. The most widespread species is *S. floribunda*, which is found all over this area (and includes four varieties with mostly distinct ranges). All other species are restricted to the area known as Lower Guinea (WHITE, 1979) and more specifically to its southern part, which extends from south Cameroon to the mouth of the Congo River. The center of diversity of the group is Gabon, where all taxa are found and three species are endemic (*S. dichrosepala*, *S. rubiginosa*, and *S. sanguinosa* including its two subspecies).

No information is available on the reproductive biology of the group. One may expect that the flowers are pollinated by insects, and the fruits dispersed by birds, but no observations have yet been made to confirm this.

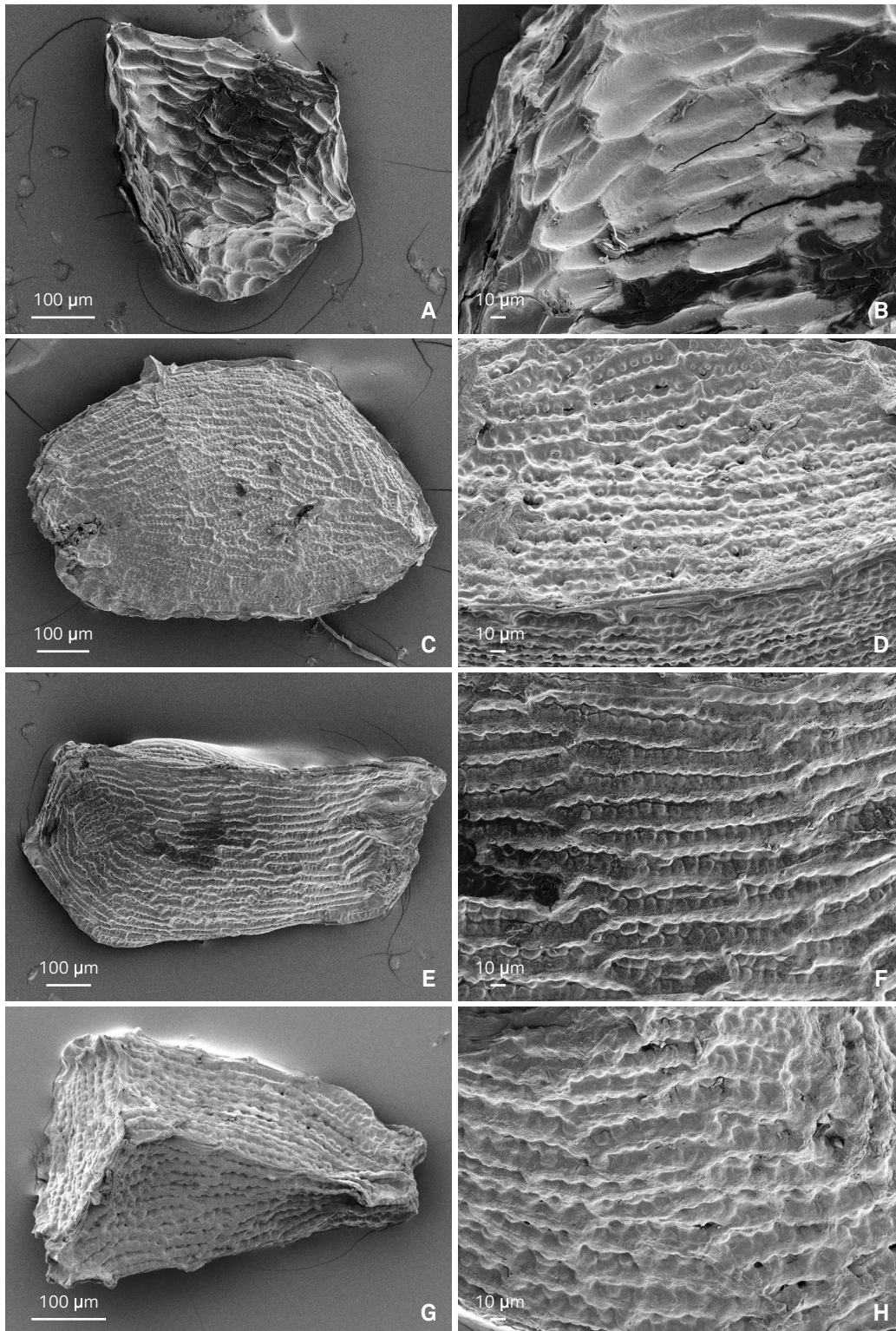
No human uses of these species have so far been recorded. Several species of *Sabicea* produce edible fruits, but those of the *S. floribunda* group apparently have a bitter taste (see above) and for this reason are presumably not eaten.

## Key to the species of the *Sabicea floribunda* group

1. Leaves strongly discoloured, the lower side covered with dense buff woolly hairs (these occasionally sparser in older leaves) ..... 2
  - 1a. Leaves green on both sides, the indumentum not woolly ..... 3
2. Stems, petioles and lower leaf surface with uniform woolly indumentum; inflorescence capitate or rarely developing short ramifications in fruiting stage; fruits white; seed surface with close parallel striations (SE Cameroon to Cabinda) ..... 4. *S. nobilis*
  - 2a. Stems, petioles and lower leaf surface with both woolly hairs and long straight hairs (the latter not present between the veins); inflorescence with ramifications already distinct at flowering stage; fruits purplish-red when young, blackish when mature, seed surface reticulate (S Cameroon, Central Gabon, SW Republic of Congo) ..... 1. *S. coueronii*
3. Leaves hirsute on both sides and conspicuously bullate in life (not so when dry); stipules and stems also hirsute ... 4
  - 3a. Leaves glabrescent or with very sparse hairs above (except sometimes on veins), never bullate; stipules glabrescent or with appressed hairs; stems mostly with appressed hairs (sometimes hirsute in *S. floribunda* and *S. segregata*) .... 5
4. Bracts and calyces dark red (W Gabon: mostly Wonga-Wongué Reserve) .... 7a. *S. sanguinosa* subsp. *sanguinosa*
  - 4a. Bracts and calyces pale green (W Gabon: Ogooué delta) ..... 7b. *S. sanguinosa* subsp. *viridis*
5. Calyx lobes bicoloured (when fresh) with pinkish-red base and green apex; inflorescence subsessile (peduncle < 3 mm) and glomerulate at anthesis, becoming cymose in fruit; stipules auriculate at base; fruit pure white, without granules in mesocarp; seed surface coarsely reticulate (NW and Central Gabon) ..... 2. *S. dichrosepala*
  - 5a. Calyx lobes not as above; inflorescence with peduncle > 3 mm and ramifications usually apparent at anthesis; stipules not auriculate; fruit variable in colour, with darker granules in mesocarp; seeds usually with close parallel striations (coarsely reticulate in *S. proselyta*) ..... 6
6. Corolla lobes white or greenish at anthesis; leaves with tertiary veins markedly raised below and much stronger than quaternary veins; fruits ellipsoid, white or pale grey; inflorescences 1.2–7.5 cm long; stipules densely pubescent, at least in central part ..... 7
  - 6a. Corolla lobes brown at anthesis; leaves with tertiary veins not or hardly raised below, not or hardly more apparent than quaternary veins; fruits globose, or if ellipsoid maturing red or black; inflorescences 3–37 cm long; stipules glabrescent (apart from the margins) to densely pubescent ..... 8
7. Calyx lobes dark red, villose outside and puberulous inside; seed surface with close parallel striations; indumentum of lower leaf surface erect, consisting of a mixture of short whitish and longer rufous hairs; calyx tube glabrous inside (SW Gabon) ..... 6. *S. rubiginosa*
  - 7a. Calyx lobes green or brownish green, puberulous on both sides; seed surface coarsely reticulate; indumentum of lower leaf surface usually appressed (sometimes erect except on veins) and uniformly whitish; calyx tube villose inside (S Cameroon to SW Republic of Congo) ..... 5. *S. proselyta*
8. Calyx lobes shortly elliptic, 0.8–3 × 0.4–2 mm, rounded and often spotted dark green at apex, 1.4–2(–2.3) times as long as broad; bracts mostly suborbicular to broadly elliptic (obovate in var. *paludosa*), the largest ones 6.5–16 × 3.5–13 mm; fruits small, 3.5–6 × 3.5–6 mm when dry; corolla (except sometimes in var. *paludosa*) glabrous outside or pubescent only at the apex of the lobes ..... 9
  - 8a. Calyx lobes narrowly ovate to elliptic, (2–)2.5–6 × 0.7–2.5 mm, acute to obtuse at apex, plain white or pale green, more than twice as long as broad; bracts ovate to obovate, the largest ones 5.5–11.5(–14) × 2.2–4.5 mm; fruits larger, 5–9 × 5–8.5 mm when dry; corolla lobes and upper part of tube pubescent outside (Cameroon to Republic of Congo) ..... 8. *S. segregata*
9. Inflorescence with a few much enlarged bracts occurring at irregularly scattered nodes, the other bracts much smaller (Cameroon to D.R. Congo) ..... 3b. *S. floribunda* var. *anisostegia*



**Fig. 1.** – Seeds of *Sabicea* spp. viewed in electron microscopy. *Sabicea couteronii* O. Lachenaud, Zemagho & Sonké: **A.** Entire seed; **B.** Detail of seed surface. *Sabicea dichrosepala* O. Lachenaud, Zemagho & Sonké: **C.** Entire seed; **D.** Detail of seed surface. *Sabicea floribunda* var. *anisostegia* O. Lachenaud, Zemagho & Sonké: **E.** Entire seed; **F.** Detail of seed surface. *Sabicea nobilis* R.D. Good: **G.** Entire seed; **H.** Detail of seed surface. [A–B: Sonké & Zemagho 6334; C–D: Dessein et al. 2028; E–F: N. Hallé 2951; G–H: Sosef et al. 2529] [Photos: I. van der Beeten]



**Fig. 2.** – Seeds of *Sabicea* spp. viewed in electron microscopy. *Sabicea proselyta* (N. Hallé) Razafim. et al.: **A.** Entire seed; **B.** Detail of seed surface. *Sabicea rubiginosa* O. Lachenaud, Zemagho & Sonké: **C.** Entire seed; **D.** Detail of seed surface. *Sabicea sanguinosa* subsp. *sanguinosa*: **E.** Entire seed; **F.** Detail of seed surface. *Sabicea segregata* Hiern: **G.** Entire seed; **H.** Detail of seed surface. [A–B: van Valkenburg et al. 3140; C–D: Lachenaud et al. 2105; E–F: A. M. Louis & Reitsma 2004; G–H: J.J.F.E. de Wilde et al. 9485] [Photos: I. van der Beeten]

- 9a. Inflorescence with bracts becoming gradually smaller and narrower towards the ultimate ramifications ..... 10
10. Bracts obovate, densely pubescent on both sides (NE Gabon and D.R. Congo) ..... 3c. *S. floribunda* var. *paludosa*
- 10a. Bracts suborbicular to broadly elliptic, glabrous or with very sparse hairs ..... 11
11. Leaf secondary veins few (8–13) and widely spaced; twigs glabrous or with very sparse hairs; leaves glabrous except for sparse hairs on veins (S Cameroon to Gabon, mostly coastal) ..... 3d. *S. floribunda* var. *paucinervis*
- 11a. Leaf secondary veins more numerous (15–25) and rather close; twigs densely pubescent; leaves rather densely pubescent on the veins, and often (but more sparsely so) between them (Nigeria to Gabon) .....  
..... 3a. *S. floribunda* var. *floribunda*

## Taxonomic treatment

1. *Sabicea couteronii* O. Lachenaud, Zemagho & Sonké, **sp. nov.** (Fig. 1A–B, 3, 6A–C).

**Holotypus:** CAMEROON. **Reg. South:** 13 km E Sangmelima, 24.V.2016, fl., Sonké & Zemagho 6341 (BR!; iso: BRLU!, K!, MO!, WAG!, YA!).

*Habitu sarmentoso, ovario biloculare, foliis valde discoloribus subtus indumento denso lanato et persistente munitis, corolla fauce pilis brevibus inflatis munita S. nobile similis, a quae differt ramis et foliis subtus ad nervis indumento mixto pilis lanatis et rectis (nec pilis omnibus lanatis) munitis, inflorescentiis ad anthesim breviter ramosis (nec capitatis), fructibus rubro-purpureis deinde nigrescentibus (nec albis), seminibus grosse reticulatis (nec striolatis).*

*Sarmentose liana*, c. 3 m high; stems cylindrical, 3.5–6 mm thick, covered with a dense buff indumentum of straight ± appressed hairs c. 1.5 mm long, intermingled with shorter crispate hairs. *Stipules* interpetiolar, pale green, 10–15 × 4–12 mm, erect, ovate and longitudinally plicate (except on buds), truncate at base, gradually acuminate at apex, uniformly pubescent outside with same indumentum as the stems, more sparsely so inside. *Leaves* opposite, slightly unequal; petiole (1–)1.8–5 cm long, with same indumentum as the stems; lamina (9–)10.7–19.3 × (3.8–)5.8–10.3 cm, elliptic to ovate, obtuse to rounded at base, gradually acuminate at apex, slightly coriaceous, discolorous; upper side dark green, densely pubescent on the veins with same indumentum as the stems, very sparsely so between them; margin densely ciliate with appressed hairs; lower side pale buff, with dense woolly hairs covering most of the surface (sparser on old leaves), and long straight hairs on the veins; secondary veins 13–16 pairs, weakly to moderately ascending, eucamptodromous; tertiary veins raised on the lower leaf surface and distinctly

more prominent than quaternary veins, the latter densely reticulate but ± hidden by indumentum. *Inflorescences* axillary, paired at nodes or sometimes solitary, densely cymose, many-flowered, 1.7–5 cm long, densely pubescent with same indumentum as the stems; peduncle 0.5–2.5 cm long; primary ramifications 0.3–1 cm long. *Bracts* green, free, pubescent on both sides, all recaulescent except the basal pair; basal bracts broadly ovate, 7.5–12 × 5–6 mm, entire or dentate, acute at apex; median bracts broadly ovate, 6–14 × 3–7 mm, entire, acute to obtuse at apex; upper bracts narrowly elliptic, 3–6 × 0.8–2 mm, entire, acute at apex. *Flowers* 5-merous; pedicels 0–1 mm long, densely villose. *Calyx* pale green; tube c. 1 mm long, densely villose on both sides; lobes elliptic to obovate, 1.5–2.5 × 0.8–1.5 mm, obtuse and curved outwards at apex, villose on both sides, alternating with minute colleters. *Corolla* white; tube cylindrical or nearly so, 4–5 × 1–1.5 mm, outside mostly glabrous but sparsely appressed-pubescent at apex, inside pubescent from the upper ¼<sup>th</sup> to the throat, the latter with short inflated unicellular hairs; lobes triangular, c. 1.3 × 1.3 mm, patent, pubescent with stiff appressed hairs outside, glabrous inside; flower buds obtuse, slightly enlarged at apex. *Stamens* included, attached around the upper ¼<sup>th</sup> of the corolla tube; anthers sessile, elliptic, 0.75–1 × 0.25–0.4 mm, glabrous. *Ovary* 1.5–2 mm long, densely villose, 2-locular. *Disk* cylindrical, c. 0.7 mm long, glabrous, shorter than the calyx tube. *Style* 4–4.5 mm long, just reaching the corolla throat, glabrous, bifid, with shortly stipitate elliptic flattened stigmas c. 1 mm long. *Fruits* purplish-red when young, blackish when mature, ellipsoid, with persistent calyx, 8–11 × 7–9 mm in life, 6–9 × 4.5–8 mm when dry, villose, with pedicel c. 1 mm long; mesocarp very soft, purple, c. 1.5 mm thick, with numerous darker granules. *Seeds* numerous, dark brown, polyedric, c. 0.6 × 0.4 mm, the surface rather coarsely reticulate.

*Etymology.* – The species is named after Dr Pierre Couteron (Institut de Recherche pour le Développement, Montpellier, France) in recognition for his constant support to the second and third authors.

*Distribution, ecology and phenology.* – *Sabicea couteronii* has an apparently very scattered distribution (Fig. 4), being known from one locality in south Cameroon (near Sangmelima), one in central Gabon (Waka National Park) and two in southwestern Republic of Congo (Mayombe and Chaillu massifs). It occurs in secondary forest, edges and regrowth, c. 685 m in elevation (probably also lower).

Flowers have been collected in May–June, fruits in November and January (immature) and June (mature).

*Conservation status.* – The extent of occurrence (EOO) of *S. couteronii* is calculated to be 73,728 km<sup>2</sup>, exceeding the limit for “Vulnerable” status under subcriterion B1, while its area of



occupancy (AOO) is estimated to be 16 km<sup>2</sup>, within the limit for “Endangered” status under subcriterion B2. The species occurs in Atlantic Central Africa (Cameroon, Gabon and Republic of Congo) and is known from six specimens, representing four subpopulations. Two of them occur in protected areas, Waka National Park in Gabon and Dimonika Biosphere Reserve in Congo. The other two subpopulations occur along roads, and the Cameroonian one at least is threatened by habitat destruction due to agricultural activities. A decline in habitat extent and quality and number of individuals is therefore expected. The four subpopulations represent four locations in the sense of ICUN (2012), and the species qualifies for “Endangered” [EN B2ab(iii,v)] using the IUCN Red List Categories and Criteria (IUCN, 2012).

*Notes.* – *Sabicea couteronii* resembles both *S. nobilis* and *S. proselyta*, which both occur in its range, and at first sight might be suspected to be a hybrid between them; this is however unlikely, as it differs from both by the colour of its fruits, which are purplish-red when young and blackish when mature (vs. white or greyish-white). It is further separated from *S. proselyta* by its strongly discoloured leaves with dense woolly indumentum below (Table 1), and from *S. nobilis* by its (shortly) branched inflorescences, reticulate seed surface, and the presence of long silky hairs (in addition to woolly ones) on the stems, petioles and underside of the leaf veins.

The specimens from Gabon and Congo are either vegetative (*Cusset 875*) or with immature fruits (*Boussengui-Nongo et al. 309*, *Kimpouni 600*) but match very well the Cameroonian material, differing only in the longer peduncles (probably not a very significant character), and, in the case of the Gabonese material, sparser indumentum of the lower leaf surface (probably because the leaves are older). Therefore, we regard them as conspecific. *Kimpouni 600* was previously cited as *Pseudosabicea proselyta* (LACHENAUD, 2009) of which it was the only record from the Republic of Congo; however, authentic Congolese specimens of *S. proselyta* have since been found (see that species).

It is not known if *S. couteronii* is heterostylous; only the type specimen bears flowers, which are of the long-styled form.

*Paratypes.* – CAMEROON. **Reg. South:** 13 km E Sangmelima, 28.VI.2015, fr., *Sonké 6248* (BR, BRLU, K, MO, WAG, YA); *ibid. loco*, 16.V.2016, fr., *Sonké & Zemagho 6334* (BR, BRLU, K, MO, WAG, YA).

GABON. **Ngounié:** Parc national de Waka, 1°10'34"S 11°08'02"E, 28.XI.2007, imm.fr., *Boussengui-Nongo et al. 309* (LBV).

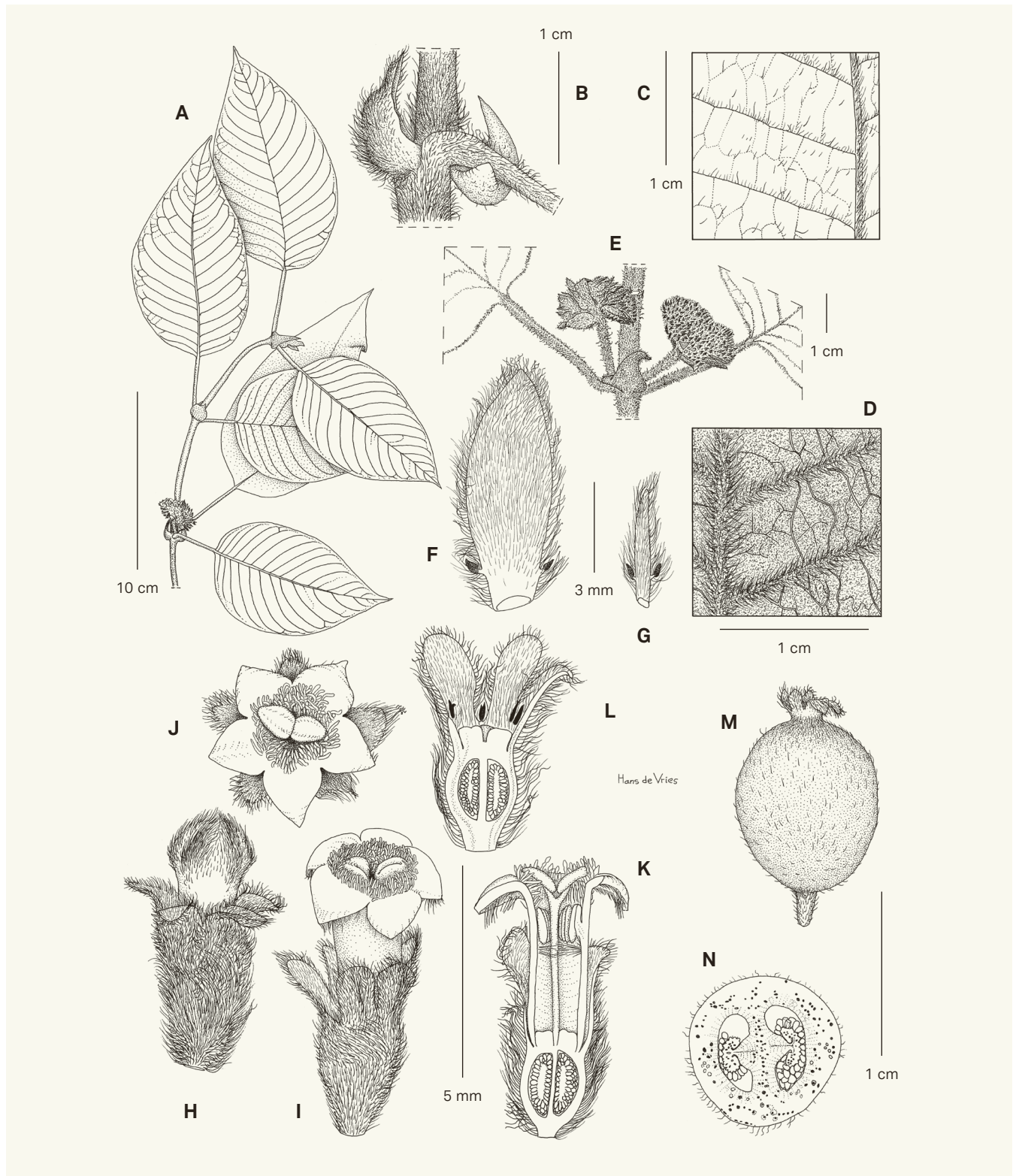
REPUBLIC OF CONGO. **Kouilou:** env. de Dimonika, source Paris Sangha, 5.III.1980, ster., *Cusset 875* (P). **Niari:** Rte Komono–Mossendjo, 2 km du camp SIDETRA, 8.I.1989, imm.fr., *Kimpouni 600* (BRLU).

2. *Sabicea dichrosepala* O. Lachenaud, Zemagho & Sonké, **sp. nov.** (Fig. 1C–D, 5, 6D–E).

**Holotypus:** GABON. **Ngounié:** km 43 Mouila–Yéno, 21.II.2008, *Dessein et al. 2028* (BR [BR0000013945923]); iso-: LBV!, WAG!).

*Habitu sarmentoso, ovario biloculare, seminibus grosse reticulatis, foliis utrinque viridibus subtus ad nervis indumento albido valde appresso munitis, corollaque fauce pilis brevibus inflatis munita S. proselyta similis, a quae differt calyce bicolore apice viride et basi rubro-vinaceo (nec omnino viride), inflorescentiis ad anthesim glomerulatis deinde cymosis (nec semper laxae cymosis), pedunculis nullis vel brevissimis usque 0.3 cm longis (nec 0.7–3.8 cm longis), stipulis basi auriculatis et extus sparsissime pubescentibus (nec basi rotundatis et extus ± dense pubescentibus), foliis subtus venulis tertiariis conspicuis sed haud prominentibus, fructuque albissimo (nec albo-griseo) mesocarpio granulis atris nec munito.*

*Sarmentose liana*, 2–4 m high; stems cylindrical, 2–3 mm thick, densely covered with straight whitish appressed hairs c. 1 mm long, intermingled with shorter uncinuate hairs. *Stipules* interpetiolar, pale green, 9–14 × 6–9 mm, erect, ovate and longitudinally plicate (except on buds), slightly auriculate at base, acute or acuminate at apex, minutely and very sparsely appressed-pubescent outside (except the base with indumentum similar to the stems), sparsely villose inside. *Leaves* opposite, often slightly unequal; petiole 1–5 cm long, with same indumentum as the stems; lamina 8–16 × 3.5–9 cm, elliptic to ovate, acute to subcordate at base, gradually acuminate at apex, papyraceous, discoloured; upper side medium green, minutely and sparsely appressed-pubescent to glabrous (except for the midrib which often has longer hairs); lower side pale green with ± orange-tinged secondary veins, minutely and sparsely appressed-pubescent, more densely so on the veins; margin densely ciliate with appressed hairs; secondary veins 13–19 pairs, weakly ascending, forming inconspicuous loops near the margin; tertiary veins conspicuous but not or hardly raised on lower leaf surface, slightly more prominent than quaternary veins, the latter densely reticulate forming areolae c. 0.5 mm in diameter. *Inflorescences* axillary and paired at nodes, many-flowered, glomeruliform and 1.2–2.5 cm in diameter at anthesis, becoming laxer and conspicuously cymose, 2.5–3 cm long in the fruiting stage, densely pubescent with stiff appressed whitish hairs 0.5–0.7 mm long; peduncle 0–0.3 cm long; primary ramifications not or hardly distinct at anthesis, c. 0.5 cm long in the fruiting stage. *Bracts* green, free, shortly pubescent on both sides, all recaulescent except the basal pair; basal bracts ovate, lobed at base, 7–8.5 × 2.5–4 mm; median bracts elliptic to obovate, 5–6 × 1–2 mm, entire; upper bracts narrowly elliptic to linear, 1.7–4 × 0.25–0.5 mm, entire. *Flowers* 5-merous; pedicels 0–1 mm long at anthesis, pubescent like the inflorescence. *Calyx* dark pinkish-red at base and green at apex; tube 0.7–1 mm long,



**Fig. 3.** – *Sabicea couteronii* O. Lachenaud, Zemagho & Sonké. **A.** Flowering stem; **B.** Node with stipules; **C.** Detail of upper leaf surface; **D.** Detail of lower leaf surface; **E.** Node with paired inflorescences; **F.** Lower bract, inside; **G.** Upper bract, inside; **H.** Flower bud; **I.** Flower, lateral view; **J.** Flower, seen from above; **K.** Longitudinal section of flower; **L.** Longitudinal section of ovary and calyx; **M.** Fruit; **N.** Cross section of fruit. [**A–L:** Sonké & Zemagho 6341, BR; **M–N:** Sonké & Zemagho 6334, BR] [Drawing: H. de Vries]

appressed-pubescent outside and more sparsely so inside; lobes obovate to elliptic, 2.5–4 × 1.5–2.3 mm, somewhat unguiculate at base, obtuse to acute and curved outwards at apex, covered on both sides with short patent hairs, and alternating with minute colleters. *Corolla* tube wine red, cylindrical, 5 × 1.5 mm, outside glabrous at base and sparsely puberulous in the upper half, inside with a ring of multicellular hairs around the upper third and short, inflated unicellular hairs at the throat, the intervening zone glabrous; lobes cream on both sides, triangular, 1.5 × 1.5 mm, reflexed, sparsely puberulous outside, inside with short inflated unicellular hairs at base and glabrous at apex; flower buds obtuse, slightly enlarged at apex. *Stamens* included, inserted around upper ¼<sup>th</sup> of the corolla tube with their tips just reaching throat; filaments c. 0.4 mm long; anthers cream, elliptic, c. 1.2 × 0.7 mm, glabrous. *Ovary* c. 1.5 mm long, densely covered with stiff appressed whitish hairs, 2-locular. *Disk* cylindrical, c. 0.5 mm long, glabrous, shorter than the calyx tube. *Style* c. 3.5 mm long, included, bifid, with elliptic flattened stigmas c. 1 mm long, these shortly stipitate. *Fruits* white, ellipsoid, with persistent calyx, 5–7 × 4–6 mm when dry, sparsely pubescent with appressed hairs, on accrescent pedicel 4–6.5 mm long; mesocarp very soft, entirely white (without darker granules). *Seeds* numerous, dark brown, polyedric, c. 0.5 × 0.3 mm, the surface prominently and rather coarsely reticulate.

*Etymology.* – The species epithet refers to the bicoloured calyx lobes, which are the plant's most striking character in the field.

*Distribution, ecology and phenology.* – *Sabicea dichrosepala* is apparently endemic to Gabon, where it occurs in the Cristal Mountains in the northwest and the Chaillu massif in the south (Fig. 4), two areas well-known for their endemism and floristic affinity. It might be expected in adjacent parts of Equatorial Guinea and the Republic of Congo. Although probably under-collected, it is clearly an uncommon species. It occurs in forest edges, especially along tracks or forest streams, 610–730 m in elevation.

Flowers have been collected in January–February (buds) and March (open); fruits in September (immature), February and March (mature).

*Conservation status.* – The extent of occurrence (EOO) of *Sabicea dichrosepala* is estimated to be 17,016 km<sup>2</sup>, and its area of occupancy (AOO) to be 28 km<sup>2</sup>, respectively within the limits for “Vulnerable” and “Endangered” status under subcriteria B1 and B2. The species is endemic to Gabon and is known from seven specimens, representing six subpopulations, one of which occurs in a protected area, the Crystal Mountains National Park. The species occurs in sparsely populated areas, and favours forest edge habitats, so is likely to benefit from small-scale forest clearing, e.g. that induced by selective

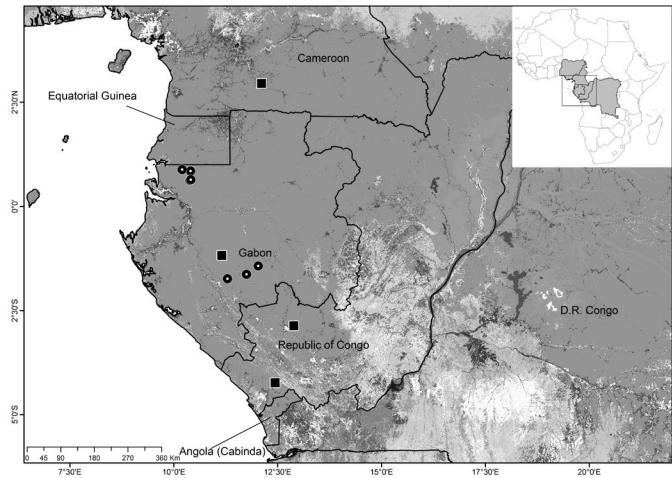


Fig. 4. – Distribution map of *Sabicea couteronii* O. Lachenaud, Zemagho & Sonké (squares) and *S. dichrosepala* O. Lachenaud, Zemagho & Sonké (circles).

logging. However, two of its known sites are very close to the Tchimbélé dam, the construction of which has presumably affected the extent and quality of habitat and number of individuals. The six subpopulations represent six locations in the sense of IUCN (2012), and the species qualifies as “Vulnerable” [VU B2ab(iii,v)] using the IUCN Red List Categories and Criteria (IUCN, 2012).

*Notes.* – The earliest collection of this species, *J.J.F.E. de Wilde et al. 284*, was cited as *Pseudosabicea proselyta* by SOSEF et al. (2006). *Sabicea dichrosepala* is indeed closely related to *S. proselyta* (the two share, in particular, a similar seed ornamentation) but differs by the characters mentioned in Table 1, the most conspicuous of which are the bicoloured calyx, and the inflorescences that are very dense and glomeruliform in the flowering stage.

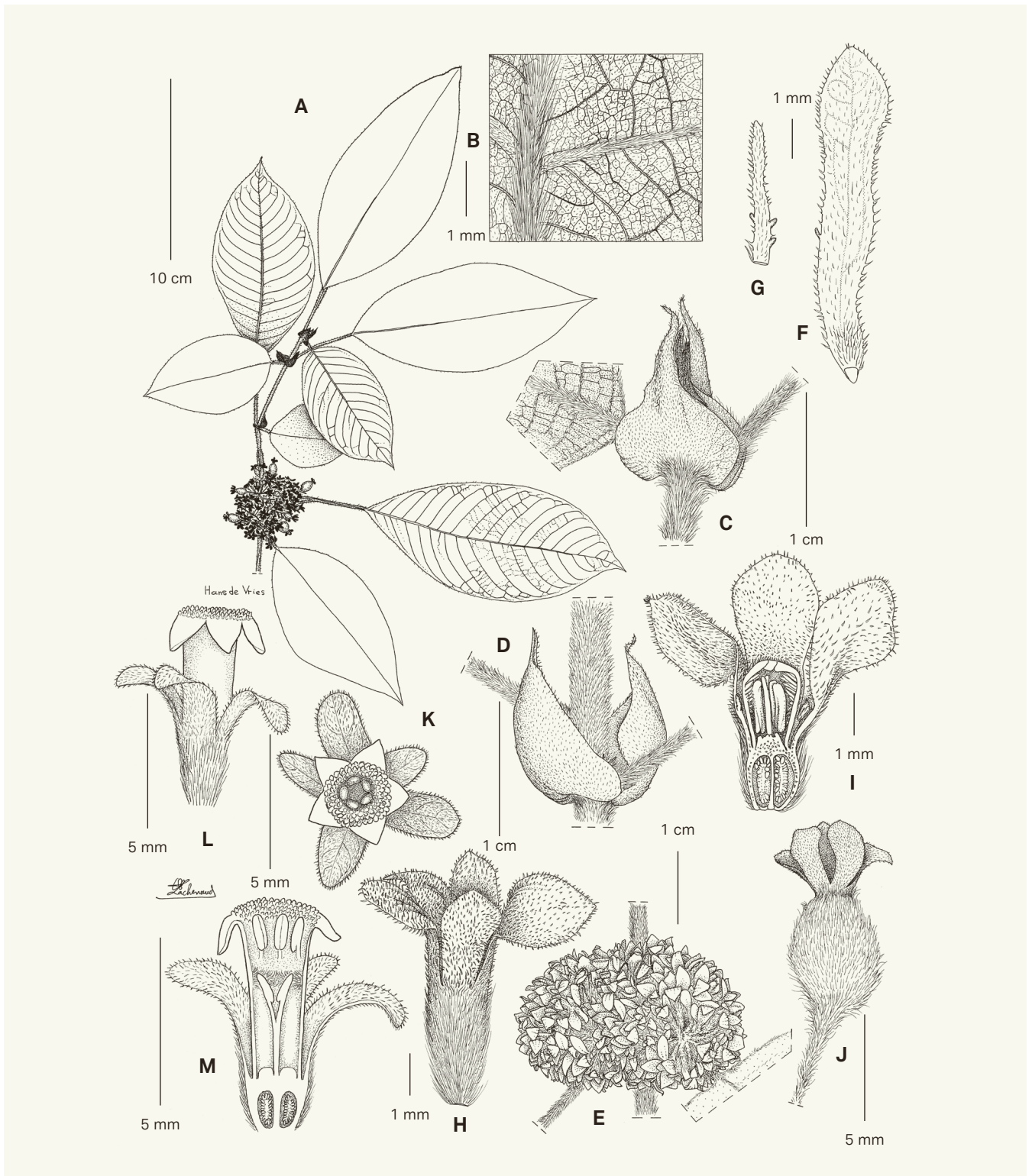
It is not known whether the species is heterostylous; the only open flowers seen (Fig. 6D) are short-styled.

*Paratypes.* – **GABON. Estuaire:** Mts de Cristal, vers le secteur Mont Séni, Concession BSG, 0°50'52"N 10°24'12"E, 8.III.2019, fl., *Bidault et al. 4401* (BRLU, LBV n.v., MO); forest exploitation Leroy, 20 km NW of Asok, 27.I.1983, buds, *J.J.F.E. de Wilde et al. 284* (BR, LBV, P, WAG); Mts de Cristal, Tchimbélé-Nkol Madouaka, 17.II.2007, fr., *Leal et al. 1396* (BR). **Ngounié:** Mouyanama falls, at base of Mt Songou, 23.II.2008, buds, *Dessein et al. 2111* (LBV); Massif du Chaillu au SE localité Moudouma, 21.IX.2001, imm.fr., *Mayombo-Nzengue 928* (LBV). **Woleu-Ntem:** 2 km N of Tchimbélé on former road to Asok, 6.II.2008, old fl., *Dessein et al. 1741* (BR, LBV).

3. *Sabicea floribunda* K. Schum. in Bot. Jahrb. Syst. 23: 428. 1897 (Fig. 7A–B).

= *Pseudosabicea floribunda* (K. Schum.) N. Hallé in Adansonia ser. 2, 3: 172. 1963.

**Lectotypus** (designated by HALLÉ, 1966: 216): **CAMEROON. Reg. South:** Lolodorf, 1896, *Staudt 1* (P [P00077586]);



**Fig. 5.** – *Sabicea dichrosepala* O. Lachenaud, Zemagho & Sonké. **A.** Fruiting stem; **B.** Detail of lower leaf surface; **C.** Node with stipules, lateral view; **D.** Node with stipules, dorsal view; **E.** Node with paired inflorescences; **F.** Lower bract, inside; **G.** Upper bract, inside; **H.** Calyx; **I.** Longitudinal section of young flower bud; **J.** Fruit; **K.** Flower, viewed from above; **L.** Flower, side view; **M.** Longitudinal section of flower. [A, C, J: Dessein et al. 2028, BR; B, D–I: J.J.F.E. de Wilde et al. 284, BR; K–M: Bidault et al. 4401, BRLU] [Drawing: A–J: H. de Vries; K–M: O. Lachenaud]

isolecto-: COI!, G [G00014620]!, S [S05-10061] image seen). **Syntypus:** CAMEROON. **Reg. South:** Lolodorf, 1896, imm.fr., *Staudt 159* (G [G00014619]!, K [K000414629]!, P [P03793513]!).

*Distribution, ecology and phenology.* – A common and widespread central African species, occurring from southern Cameroon to eastern D.R. Congo with an isolated population in eastern Nigeria. It grows in secondary forest, edges and regrowth, on both drained and flooded soils, 0–1250 m in altitude. For more precise information see under infraspecific taxa. Flowers and fruits throughout the year.

*Conservation status.* – The extent of occurrence (EOO) of *Sabicea floribunda* is calculated to be 2,017,090 km<sup>2</sup>, well above the limit for “Vulnerable” status under subcriterion B1. Its area of occupancy (AOO) is estimated to be 344 km<sup>2</sup>, which falls within the limit for “Endangered” status under subcriterion B2, but is an obvious underestimation given the low collecting density in most of its range. The species occurs from Nigeria to the Democratic Republic of Congo, and is known from 108 specimens. It is a common species of secondary forest habitats, and not in any way threatened; consequently, it is here assessed as “Least Concern” [LC] using the IUCN Red List Categories and Criteria (IUCN, 2012).

*Notes.* – The original description of *S. floribunda* (SCHUMANN, 1897) is based on two syntypes, *Staudt 1* and *159*. HALLÉ (1966: 216) cited the P sheet of *Staudt 1* as “type”, which can be accepted as an implicit lectotypification.

This species is the most widespread of the group, and the only one occurring east of the Congo River. It has usually been regarded as monotypic (e.g. HALLÉ, 1966) but a careful examination of the material shows that it can be quite easily separated into four distinct taxa, which differ mostly in characters of the bracts and the vegetative parts (Table 2) – the flowers and fruits being apparently identical. These taxa have mostly separate distributions but locally come in contact (Fig. 8) and are here recognised as varieties. When they are better studied in the field, especially in their areas of sympatry, some of them (in particular var. *anisostegia*) may eventually be raised to specific rank. The illustration of *S. floribunda* published in HALLÉ (1966: 217) represents var. *anisostegia*.

*Sabicea floribunda* is very closely related to *S. segregata*. The two species share, in particular, lax inflorescences and corolla lobes brown at anthesis, and are not safely separable by vegetative characters. Since they frequently grow side by side, mixed collections are occasionally made (e.g. *Champluvier 6019* was initially a mixture of both species). Fertile specimens can be identified with the characters mentioned in the key. The length of calyx lobes was used by HALLÉ (1966: 200) as the main

diagnostic character, but in fact shows some (limited) overlap between the two species.

### 3a. *Sabicea floribunda* var. *floribunda* (Fig. 7A).

*Distribution, ecology and phenology.* – This taxon occurs in Atlantic Central Africa, mostly from southern Cameroon to east-central Gabon with a disjunct occurrence in southeastern Nigeria and adjacent western Cameroon (Fig. 8). Its distribution marginally overlaps with those of var. *paucinervis* in the west of its range and of var. *anisostegia* in the east. It occurs in forest edges and regrowth, often along roads, 0–510 m in elevation, and is locally abundant.

Flowers probably all year (recorded from all months except March, June and September); fruits from February to June.

*Conservation status.* – The extent of occurrence (EOO) of *S. floribunda* var. *floribunda* is calculated to be 187,299 km<sup>2</sup>, well above the limit for “Vulnerable” status under subcriterion B1. Its area of occupancy (AOO) is estimated to be 84 km<sup>2</sup>, which falls within the limit for “Endangered” status under subcriterion B2, but is an obvious underestimation, given the low collecting density in most of its range. The taxon occurs in Central Africa from Nigeria to Gabon, and is known from 26 specimens. It is a locally common plant of secondary forest habitats, and not in any way threatened; consequently it is here assessed as “Least Concern” [LC] using the IUCN Red List Categories and Criteria (IUCN, 2012).

*Notes.* – This taxon is morphologically (and also geographically) intermediate between *S. floribunda* var. *paludosa* and var. *paucinervis*, differing from the former in the shape and indumentum of its bracts, and from the latter by its stems and leaves being more hairy, the latter with more numerous secondary veins.

*Additional material studied.* – CAMEROON. **Reg. South:** au S de Zingui, 20.I.1962, fl., *Letouzey 4043* (BR, K, P, WAG, YA); Ebemwok (55 km W Ebolowa), 13.III.1963, imm.fr., *J. & A. Raynal 10435* (P, YA); Bebai, Campogebiet, 14.XII.1908, buds, *Tessmann 716* (K); Bipindi, 1898, buds, *Zenker 1820* (BM, G, K, P, WAG); Bipindi, 1904, fl., *Zenker 3232* (BM, BR, K). **Reg. Southwest:** Abonando, 5.V.1902, buds, *Rudatis 52* (K).

EQUATORIAL GUINEA. **Centro-Sur:** Monte Mitra, 28.XI.1997, fl., *Obama 315* (BRLU, WAG); SE of Bata c. 50 km, Oborobikó, 25.II.1969, fl. (fallen), *Sanford 6034* (K); Ayaguening (Akonangui), 11.VIII.2001, buds, *Sonké 2518* (BR, BRLU); 8 km N de Mitong, 13.XII.2003, buds, *Sonké 3157* (BR, BRLU, K). **Litoral:** rte d'exploitation chantier SEMGE vers le 1er pont sur Mitemelé, 13.VI.1988, fr., *Dibata 451* (BR, K, WAG); de Sendje à Ongamnsok, 19.II.2001, imm.fr., *Lejoly 01/08* (BRLU); rte de Nco vers Misobong au niveau de la grande cascade, 9.I.1998, fl., *N. Nguema & Lejoly 206* (BRLU).

GABON. **Estuaire:** Forêt de Mondah on road Libreville–Cap Esterias, 26.II.1999, imm.fr., *Andersson & Nilsson 2277* (BR); c. 20 km NNE of Libreville, 11.III.1987, fr., *J.M. Reitsma & B. Reitsma 3142* (LBV, WAG); Crystal Mountains N.P., 8 km on road from Kinguélé to Tchimbélé, 26.III.2013, imm.fr., *Wieringa et al. 7801* (WAG). **Moyen-Ogooué:** Mboumi, 0°18–0°30S/10°45–10°48E, 16.I.2000, fl., *Champluvier 6019* (BR, K, WAG).



**Fig. 6.** – *Sabicea couteronii* O. Lachenaud, Zemagho & Sonké: **A.** Node with inflorescences; **B.** Fructing stem; **C.** Mature infructescence. *Sabicea dichrosepala* O. Lachenaud, Zemagho & Sonké: **D.** Inflorescence; **E.** Mature infructescence.

[**A:** Sonké & Zemagho 6341; **B–C:** Sonké & Zemagho 6334; **D:** Bidault et al. 4401; **E:** Dessein et al. 2028] [Photos: **A–C:** B. Sonké; **D:** E. Bidault; **E:** S. Dessein]

**Table 1.** – Diagnostic characters between *Sabicea couteronii* O. Lachenaud, Zemagho & Sonké, *S. dichrosepala* O. Lachenaud, Zemagho & Sonké, *S. proseilyta* O. Lachenaud, Zemagho & Sonké, *S. rubiginosa* (N. Halle) Razafim. et al.

	<b>S. couteronii</b>	<b>S. dichrosepala</b>	<b>S. proseilyta</b>	<b>S. rubiginosa</b>	<b>S. sanguinosa</b>
<b>Indumentum of stems</b>	+/- appressed, buff, with straight & crisped hairs intermingled	appressed, whitish, with straight hairs only	appressed, whitish to brownish, with long straight & shorter uncinuate hairs	appressed, rufous-brown, with long straight & shorter uncinuate hairs	<b>hirsute</b> , whitish, with straight hairs only
<b>Leaf surface (in life)</b>	+/- flat	+/- flat	+/- flat	+/- flat	<b>bullate</b>
<b>Indumentum of leaves (upper side)</b>	mostly on veins, long and +/- appressed	mostly on veins, short and appressed	mostly on veins, short and appressed	mostly on veins, short and appressed	<b>uniform, long and hirsute</b>
<b>Indumentum of leaves (lower side)</b>	<b>buff, woolly and very dense</b> (with additional straight appressed hairs on the veins)	whitish, straight and appressed, mostly on veins	whitish, straight and usually appressed (sometimes erect except on veins)	<b>long rufous hairs mostly on veins + short erect whitish hairs all over</b>	whitish, <b>straight and hirsute</b>
<b>Tertiary leaf veins (on lower leaf surface)</b>	raised, much stronger than 4° veins	<b>nor or hardly raised, only slightly stronger than 4° veins</b>	raised, much stronger than 4° veins	raised, much stronger than 4° veins	raised, much stronger than 4° veins
<b>Base of stipules</b>	not auriculate	<b>auriculate</b>	not auriculate	not auriculate	not auriculate
<b>Indumentum of stipules (outside)</b>	appressed, dense, uniform	appressed, <b>minute and very sparse</b>	appressed, dense at least in central part	appressed, dense, uniform	<b>hirsute</b> , rather sparse, uniform
<b>Colour of stipules</b>	pale green	pale green	pale green	dark red-brown	pale green / wine red
<b>Inflorescences</b>	densely cymose	<b>glomerulate at anthesis</b> , laxer and cymose in fruit	cymose, rather lax	cymose or rarely glomerulate at anthesis	cymose, +/- dense at anthesis and laxer in fruit
<b>Peduncle</b>	0.5–2.5 cm	<b>0–0.3 cm</b>	0.5–3.8 cm	0.3–3.5 cm	0.3–5 cm
<b>Size of largest bracts</b>	6–14 x 3–7 mm	7–8.5 x 2.5–4 mm	4.5–8 x 1.5–5 mm	4–11 x 1.3–3.5 mm	8–22 x 3–11 mm
<b>Colour of calyx lobes</b>	uniformly pale green	<b>pinkish-red at base and green at apex</b>	uniformly green to brownish green	dark red (sometimes greenish/white at base)	pale green / wine red
<b>Size of calyx lobes</b>	1.5–2.5 x 0.8–1.5 mm	2.5–4 x 1.5–2.3 mm	1.3–2 x 0.7–1.3 mm	1.5–3 x 0.5–1.2 mm	2.5–5 x 0.6–2 mm
<b>Apex of calyx lobes</b>	rounded	rounded	obtuse/rounded	obtuse/rounded	acute
<b>Indumentum of calyx lobes</b>	villose on both sides	puberulous on both sides	puberulous on both sides	villose outside, puberulous inside	hirsute on both sides
<b>Inside of calyx tube</b>	villose	sparsely and shortly pubescent	villose	glabrous	glabrous / sparsely pubescent
<b>Fruit colour</b>	<b>purplish-red (young) to blackish (mature)</b>	white	greyish white	greyish white	greyish white
<b>Granules in mesocarp</b>	present	<b>absent</b>	present	present	present
<b>Seed surface</b>	reticulate	coarsely reticulate	coarsely reticulate	finely striolate	finely striolate
<b>Distribution</b>	SE Cameroon, central Gabon, SW Congo Republic	Gabon (Cristal Mts & Chaillu massif)	south Cameroon to Congo Republic	west-central Gabon	coastal Gabon

**Ogooué-Lolo:** Chantier Bambidie, c. 52 km on the road to Okondja-Lelama, along Sebe river, 31.X.2005, fl., *Sosef et al. 2122* (BR, LBV, WAG). **Ogooué-Maritime:** Région du Lac Alombié, ± 7 km au N de Mpaga, 18.X.2014, buds, *Lachenaud et al. 2007* (BRLU, LBV, MO). **Woleu-Ntem:** SEEG road near Tchimbélé, pylone 7, 6.II.2008, buds, *Dessein et al. 1724* (BR, LBV, WAG); Angoum, 28.VII.1933, fl., *Le Testu 9198* (BM, P); Monts de Crystal, Tchimbélé, 14.IV.2006, imm.fr., *Leal et al. 1109* (BR, LBV).

**NIGERIA. Cross River State:** Oban, 1911, buds, *Talbot 228* (BM, K); New Ndebiji, 30.IV.1952, fl., *Ejiofor FHI 21883* (FHI, K).

3b. *Sabicea floribunda* var. *anisostegia* O. Lachenaud, Zemagho & Sonké, **var. nov.** (Fig. 1E–F).

**Holotypus:** CAMEROON. **Reg. East:** près Yenga Port Gentil, village situé à 35 km au NNE de Moloundou, 21.IV.1971, fl., *Letouzey 10716* (BR!; iso-: K!, P!, YA!).

*Ab alteribus varietatibus differt bracteis valde inaequales majoribus in inflorescentia dispersis (nec bracteis superioribus gradualiter minoribus quam inferioribus).*

**Etymology.** – The varietal epithet *anisostegia* refers to the bracts of very unequal sizes, which are the main diagnostic character of this taxon.

**Distribution, ecology and phenology.** – This variety occurs from southeastern Cameroon to southwestern D.R. Congo, and disjunctly in eastern D.R. Congo (Fig. 8), but is mostly absent from the central depression of the Congo basin (“cuvette congolaise”) where replaced by var. *paludosa*. Its range closely approaches that of the latter in both Gabon and D.R. Congo, and locally overlaps that of var. *floribunda* in Gabon. It is found in forest edges and regrowth, 180–1250 m in elevation.

Flowers have been recorded from October to January and April to July, probably all year; fruits from January to July and in September–October, probably all year as well.

**Conservation status.** – The extent of occurrence (EOO) of *S. floribunda* var. *anisostegia* is calculated to be 1,349,092 km<sup>2</sup>, well above the limit for “Vulnerable” status under subcriterion B1. Its area of occupancy (AOO) is estimated to be 124 km<sup>2</sup>, which falls within the limit for “Endangered” status under subcriterion B2, but is an obvious underestimation, given the low collecting density in most of its range. The taxon occurs in Central Africa from Cameroon to the Democratic Republic of Congo, where it grows in secondary forest, and is known from 40 specimens. Its situation is rather comparable to that of the species as a whole, and it is assessed as “Least Concern” [LC] using the IUCN Red List Categories and Criteria (IUCN, 2012) for the same reasons.

**Notes.** – This is the most distinctive variety of *S. floribunda*, and further work may show it to be specifically distinct. It is best recognised by the arrangement of the bracts in the inflorescence: var. *anisostegia* has a few large bracts occurring at scattered nodes and the remainder much smaller, while in

other varieties the bracts are more or less gradually decreasing in size from lower to upper nodes (except the lowest pair, which is often smaller than those above it). It is also usually more hairy than other varieties, especially on the stems.

**Paratypi.** – **ANGOLA. Cabinda:** near the village Caio in the Hombe country, 9.I.1917, fl. & imm.fr., *Gossweiler 7665* (BM, K).

**CAMEROON. Reg. Central:** Réserve forestière Mbalmayo, 15.IV.1967, fl., *Mezili 80* (BR, P); Atotzok, 1953, fl. & imm.fr., *Surville 312* (YA). **Reg. East:** 22 km E of Lomié, 12.II.1977, fr., *Lowe 3149* (K, YA); Near Echiambor, 18.II.1977, fr., *Lowe 3500* (YA); Nkamouna, 11.VI.2004, fl., *Sonké 3481* (BR, BRLU); *ibid. loco*, 11.VI.2004, fr., *Sonké 3482* (BR, BRLU); Mbalam II: Mbarga, 24.VI.2008, fl., *Sonké 4943* (BR). **Reg. South:** Bitye, 1917, fl., *Bates 885* (BM); Bitye, 1917, buds, *Bates 1120* (BM); à l’W d’Alati (100 km SE de Djoum), 12.I.1973, imm.fr., *Letouzey 11832* (BR, P, YA).

**DEMOCRATIC REPUBLIC OF CONGO. Ituri:** Ituri, Lodjo, near AGK mining camp, 25.I.2011, imm.fr., *Bytebier et al. 3343* (BR); Ituri, mont Hoyo, 2.VIII.1975, imm.fr., *Lisowski 40879* (BR). **Kongo Central:** Kimuenza, X–XI.1900, fl., *Gillet 1749* (BR); Entre Luzumu et Sanda, vallée de la Ma Ngo, 25.II.1965, fr., *Paurwels 4905* (BR). **Nord-Kivu:** entre Walikale et Kalehe (Kivu), III.1932, fl. & imm.fr., *Lebrun 5267* (BR, WAG); Rte Kavumu-Walikale, vers km 110, env. d’Irangi, 11.III.1960, fr., *Troupin 12067* (BR). **Tshopo:** km 58, rte de Kisangani vers Ubundu (rive gauche), 6.IV.1977, fr., *Lejoly 1278* (BR, BRLU); rte Kisangani-Ubundu, km 58, 7.IV.1977, fr., *Lisowski 44605* (BR, K).

**GABON. Haut-Ogooué:** 5 km rte Moanda-Bakoumba, 16.IX.1970, fr., *F.J. Breteler 6475* (BR, K, LBV, P, WAG); de Zanaga à Franceville, 21.X.1954, fl., *Trochain 9099* (P). **Ogooué-Ivindo:** 7 km N of km 49 Makokou-Mekambo road which is bifurcation with Bélinga road, near Djadie R., 15.XI.1977, fl., *Leeuwenberg 11545* (BR, K, P, WAG); Babiël-Nord ridge, 4 km from camp Bélinga, X.1987, fl., *A.M. Louis et al. 2312* (BR, LBV, WAG); Rte de Babiël Nord, few km W of Belinga, 18.VII.1985, fl. & imm.fr., *Bos et al. 10658* (BR, K, LBV, P, WAG); Bélinga, 9.VI.1978, fr., *Florence 1217* (P); Belinga, 25.VII.1981, fr., *Gentry 33569* (P); piste du Bouéni, 20 km SE Makokou, 11.II.1961, fr., *N. Hallé 1130* (K, P); 7 km NE Makokou, 11.III.1961, fr., *N. Hallé 1454* (P); Bélinga, 26.X.1964, fl., *N. Hallé 2804* (K, P); *ibid. loco*, 28.X.1964, buds, *N. Hallé 2866* (BR, P); *ibid. loco*, 31.X.1964, fl. & fr., *N. Hallé 2951* (BR, K, P); *ibid. loco*, 11.XI.1964, buds, *N. Hallé 3126* (P); *ibid. loco*, 1.I.1980, fl., *Pierre-Baltus 98* (P); 25 km on road Mékambo to Madjingo, 27.XII.2000, fl., *Wieringa et al. 3648* (BR, LBV, WAG). **Ogooué-Lolo:** Chantier Bambidie, c. 52 km on the road to Okondja-Lelama, along Sebe river, 31.X.2005, fr., *Sosef et al. 2123* (LBV, WAG). **Woleu-Ntem:** behind the WWF-station, at entrance to Bordamur concession area, 8.X.2002, fr., *Strijk 54* (WAG); *ibid. loco*, 1 km from Assock Begue, 8.X.2002, fl., *Strijk 59* (LBV, WAG).

**REPUBLIC OF CONGO. Bouéza:** forêt de la Bouéza, piste de l’Espérance du village de M’Boumou vers la Bouéza, 16.XI.1964, buds, *Bouquet 757* (P). **Sangha:** West slope of Mt. Nabemba, 15.XI.1991, buds, *Thomas et al. 8892* (WAG).

3c. *Sabicea floribunda* var. *paludosa* O. Lachenaud, Zemagho & Sonké, **var. nov.**

**Holotypus:** DEMOCRATIC REPUBLIC OF CONGO. **Tshopo:** Lilanda (Yangambi), 15.VIII.1940, fl., *Germain 449* (BR!; iso-: K!).

*Ab alteribus varietatibus differt bracteis ± obovatis utrinque dense pubescentibus (nec orbicularibus, ovatis vel late ellipticis, glabris vel pilis sparsis munitis).*



**Etymology.** – The epithet *paludosa* refers to the fact that this taxon is most commonly found in swamp and riverine forests, while other varieties usually grow on drained soils.

**Distribution, ecology and phenology.** – This taxon occurs in northeastern Gabon, and in D.R. Congo where it is found mostly in the central depression of the Congo basin (“cuvette congolaise”) with isolated records further east (Kivu) and south (near the border with Angola) (Fig. 8). Its range closely approaches that of var. *anisostegia* in both Gabon and D.R. Congo. It grows mostly in swamp and riverine forest, but apparently also in secondary forest regrowth on drained soils, 350–1000 m in elevation.

Flowers have been recorded in January, from April to June and from August to October; fruits from April to October.

**Conservation status.** – The extent of occurrence (EOO) of *S. floribunda* var. *paludosa* is calculated to be 759,404 km<sup>2</sup>, well above the limit for “Vulnerable” status under subcriterion B1. Its area of occupancy is estimated to be 64 km<sup>2</sup>, which falls within the limit for “Endangered” status under subcriterion B2, but is an obvious underestimation, given the low collecting density in most of its range. The taxon occurs in eastern Gabon and the Democratic Republic of Congo, and is known from 21 specimens representing 15 subpopulations, one of which occurs in a protected area (Kahuzi-Biega National Park in D.R. Congo). It is found in swamp forest and secondary forest regrowth, and appears to be not rare in its range. Given its ecology and wide distribution there is no evidence of a particular threat, and it is here assessed as Least Concern [LC] using the IUCN Red List Categories and Criteria (IUCN, 2012).

**Notes.** – This taxon differs from other varieties by its more or less obovate and densely pubescent bracts (vs. orbicular, ovate or broadly elliptic, with indumentum sparse or absent) which are also usually narrower in proportion – hence a similarity with *S. segregata*, but that species does not occur in its range. In all other characters, especially leaves and indumentum, it comes very close to var. *floribunda*.

**Paratypes.** – **DEMOCRATIC REPUBLIC OF CONGO. Bandundu:** Iküma, 13.X.1948, fl., *Jans 807* (BR). **Equateur:** Ikelemba, VI.1934, fl., *Dubois 423* (BR); rte Bikoro-Inongo, km 27, 17.X.1957, imm.fr., *Evrard 2674* (BR); rte Flandria-Makako (territoire Ingende), 9.IV.1959, fl., *Evrard 6054* (BR); Bondombe, 9.IX.1942, buds, *Hulstaert 843* (BR); Lac Tumba-I.R.S.A.C. Mabali, 20.VI.1958, imm.fr., *Thonet 221* (BR, K). **Kwango:** entre Popokabaka et Kimabaka, près rivière Pumbu, 18.IV.1959, fl., *Pauwels 2495* (BR, P). **Kwilu:** vallée de la Djuma, VII.1902, imm.fr., *Gentil s.n.* (BR); région de Bampumu, X.1922, fl., *Vanderyst 12481* (BR). **Sud-Kivu:** Kiaselela, territoire Shabunda, 19.IV.1959, imm.fr., *A. Léonard 3900* (BR, P). **Tshopo:** Opala, 15.VI.1949, imm.fr., *Germain 5116* (BR, WAG); Yabahondo (rive gauche du Lomami), 15.X.1952, fl. & imm.fr., *Germain 8116* (BR); Yangambi, 3.VI.1958, imm.fr., *A. Léonard 759* (BR, K); env. de Kisangani, à 3 km à l'E de Kabondo, 24.X.1977, buds, *Lisowski 47453* (BR, K); Kisangani, Kabondo, 6.V.1979, fl. (fallen), *Lisowski 52401* (BR, K); 20 km à l'W de Yangambi, 27.X.1938, fl., *J. Louis 12110* (BR). **Tshuapa:** Befale, IX.1934, imm.fr., *Dubois 767* (BR); Befale-Tolongote, 5.VI.1958, fl., *Evrard 4185* (BR, K, WAG). **Sine loco:** *sine loco*, s.d., fl., *Pauwels 660* (BR).

**GABON. Ogooué-Ivindo:** 10 km on road Malassa to Madouma, 8.I.2001, fl., *Wieringa et al. 4028* (LBV, WAG).

3d. *Sabicea floribunda* var. *paucinerwis* Wernham, Monogr. Sabicea: 73. 1914 (Fig. 7B).

**Lectotypus** (designated here): **CAMEROON. Reg. South:** Gross-Batanga, 3.XII.1890, imm.fr., *Dinklage 743* (P [P03793520]!; isolecto-: WAG [WAG0034480]!). **Syntypus:** **CAMEROON. Reg. South:** Kribi, 24.X.1891, buds, *Dinklage 1391* (P [P03793519]!, WAG [WAG0034479]!).

**Table 2.** – Diagnostic characters between the varieties of *Sabicea floribunda* K. Schum.

	var. <i>anisostegia</i>	var. <i>floribunda</i>	var. <i>paludosa</i>	var. <i>paucinerwis</i>
<b>Indumentum of stems</b>	patent to half-erect, with long and short hairs intermingled	half-erect to appressed, uniform, dense	patent to appressed, uniform, dense	<b>absent, or appressed and very sparse</b>
<b>Indumentum of lower leaf surface</b>	dense on veins and sparse between	dense on veins and sparse between	dense on veins and sparse between	<b>glabrous except sparse hairs on veins</b>
<b>Secondary leaf veins</b>	(12–)14–18 pairs	15–25 pairs	14–20 pairs	<b>8–13 pairs</b>
<b>Arrangement of bracts (discard the lower pair)</b>	<b>very unequal, the larger ones scattered</b>	gradually smaller from base to apex	gradually smaller from base to apex	gradually smaller from base to apex
<b>Shape of larger bracts</b>	orbicular to broadly elliptic	orbicular to ovate	<b>obovate</b>	orbicular to ovate
<b>Indumentum of bracts</b>	hairy on midrib outside, and sometimes sparsely inside	sparsely hairy (at least outside)	<b>densely hairy on both sides</b>	glabrous or with very sparse hairs
<b>Distribution</b>	SE Cameroon to E D.R. Congo (inland)	Nigeria to Gabon	NE Gabon and D.R. Congo	S Cameroon to Gabon



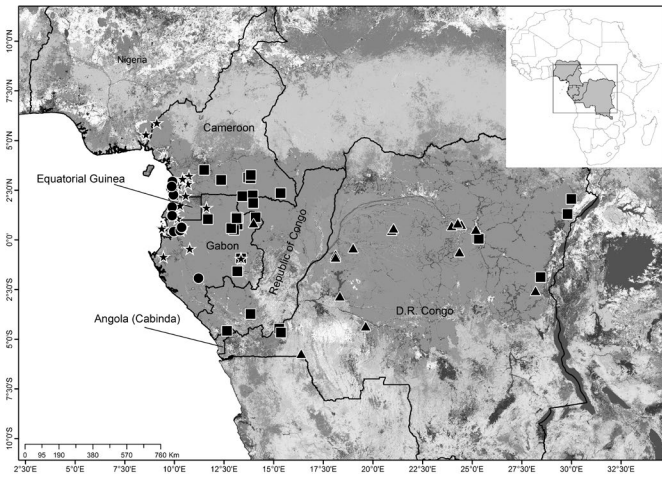
**Fig. 7.** – *Sabicea floribunda* var. *floribunda*: **A.** Inflorescence. *Sabicea floribunda* var. *paucinervis* Wernham: **B.** Fruits.

*Sabicea nobilis* R.D. Good: **C.** Lower side of leaf; **D.** Stem with mature infructescence.

*Sabicea proselyta* (N. Hallé) Razafim. et al.: **E.** Fruiting stem; **F.** Mature infructescence.

[**A:** near Tchimbélé, Gabon, plant not collected; **B:** Sonké 5915; **C–D:** Texier et al. 706; **E:** Sonké & Zemagho 6329; **F:** van Valkenburg et al. 3140]

[Photos: **A:** S. Dessein; **B:** B. Sonké; **C–D:** N. Texier; **E:** B. Sonké; **F:** J. Degreef]



**Fig. 8.** – Distribution map of *Sabicea floribunda* K. Schum. (squares: var. *anisostegia* O. Lachenaud, Zemagho & Sonké; stars: var. *floribunda*; triangles: var. *paludosa* O. Lachenaud, Zemagho & Sonké; circles: var. *paucinervis* Wernham).

**Distribution, ecology and phenology.** – This variety occurs in southern Cameroon from Kribi to Campo, in Equatorial Guinea (Rio Muni) and in Gabon, where it is found mostly in the northwest (Crystal Mts) with one record further south in the Chaillu massif (Fig. 8). Its range locally overlaps with that of var. *floribunda* in Gabon and Equatorial Guinea. It grows in secondary forest regrowth, often along roads, 0–540 m in elevation.

Flowers have been recorded from March to May and October to December; fruits in August–September and from November to March.

**Conservation status.** – The extent of occurrence (EOO) of *S. floribunda* var. *paucinervis* is calculated to be 21,218 km<sup>2</sup>, a little above the limit for “Vulnerable” status under subcriterion B1. Its area of occupancy (AOO) is estimated to be 80 km<sup>2</sup>, which falls within the limit for “Endangered” status under subcriterion B2, but is certainly an underestimation given the low collecting density in most of its range. The taxon occurs in Atlantic Central Africa (Cameroon, Gabon and Equatorial Guinea) and is known from 21 specimens. It is found in secondary forest habitats where it appears to be locally common, and given its ecology there is no evidence of a particular threat; consequently, it is here assessed as “Least Concern” [LC] using the IUCN Red List Categories and Criteria (IUCN, 2012).

**Notes.** – This taxon differs from other varieties by its leaves with fewer secondary veins (8–13 pairs only) and the generally sparser indumentum of its vegetative parts – the stems being glabrous or nearly so, and the leaves glabrous except on veins. Its original description is based on two syntypes, *Dinklage* 743 and *Dinklage* 1391 (B), both of which were presumably destroyed in the Second World War but have extant duplicates

in P and WAG. The P sheet of *Dinklage* 743, which is the most complete, is chosen here as lectotype.

**Additional material studied.** – **CAMEROON. Reg. South:** Kribi-Campo, 35 km S de Kribi, 4.I.1983, imm. fr., *van der Zon* 1983 (WAG); 3 km S of Kribi, Grand Batanga road, 25.X.1968, fl., *Bos* 3134 (BR, K, P, WAG, YA); 5 km S of Kribi, Grand Batanga road, 26.II.1969, fr., *Bos* 4005 (BR, P, WAG, YA); near Eboudja I, km 20 road Kribi-Campo, 4.I.1983, imm.fr., *de Kruif* 1020 (WAG, YA); Eboudja 2, village along road from Kribi to Campo, 17.III.2007, buds, *Dessein* 1640 (BR, P); 45 km on the road from Kribi to Campo, 3.XII.1974, fl., *J.J.F.E. de Wilde* 7784A (BR, WAG); 10 km ENE Ebodje, soit 40 km S Kribi, 7.XII.1979, fl., *Letouzey* 15322 (BR, P, YA); Campo Ma’an National Park, 12.II.2012, fr., *Sonké* 5915 (BR, MO, YA); Campo-Ma’an area, Massif des Mamelles, Along the path to Mamelles highlands, 23.IV.2001, buds, *Tchouto Mbatchou et al.* 3223 (WAG); Dipikar, road to centre of Island, 7.V.2001, fl., *van Andel et al.* 3421 (WAG); Campo Ma’an National Park, road Kribi-Ebodje along small logger’s road, c. 2.7 km from Lolabé village, 4.VIII.2001, fr., *van Andel et al.* 3827 (WAG).

**EQUATORIAL GUINEA. Littoral:** Bata-Monson-Dibolo, Estrada kms 54–55, 15.X.1991, fl., *Carvalho* 4887 (BR, WAG); Bata-Mari, Estrada kms 62–63, 15.XI.1991, imm.fr., *Carvalho* 4949 (WAG). **Centro-Sur:** 4 km N de Mitong, 12.XII.2003, buds, *Sonké* 3136 (BR, BRLU, K).

**GABON. Estuaire:** 89 km along the road Libreville-Assok, Mts de Cristal, 14.VIII.1978, imm.fr., *F.J. Breteler & J.J.F.E. de Wilde* 7 (BR, LBV, WAG); Crystal Mountains, 3 km NE of Kinguélé, 11.IX.1994, fr., *F.J. Breteler et al.* 12808 (LBV, WAG); km 10 Tchimbélé-Kinguélé, 11.II.1986, fr., *Breyne* 5102 (BR, LBV); Crystal Mountains, 8 km on the road Tchimbélé to Kinguélé (= 74 km on SEEG road), 15.XI.2004, fl. & fr., *Wieringa et al.* 5440 (BR, K, LBV, WAG). **Ngounié:** Chantier Leroy, rte à 13 km de Masika vers Yeno sur rte Mouila-Yeno, 12.II.1988, imm.fr., *A.M. Louis* 2733 (LBV, WAG). **Woleu-Ntem:** Tchimbélé, 0.5 km S of dam, 19.III.1990, fr., *Wieringa* 720 (BR, LBV, WAG).

4. *Sabicea nobilis* R.D. Good in J. Bot. 61: 86. 1923 (Fig. 1G–H, 7C–D).

= *Pseudosabicea nobilis* (R.D. Good) N. Hallé, Fl. Gabon 17: 2. 1970.

**Lectotypus** (designated here): **ANGOLA. Cabinda:** Belize, 16.XI.1918, fl., *Gossweiler* 7550 (BM [BM000902997]!; isolecto-: K [K000414624]!, LISC [LISC000807, LISC000808] images seen). **Syntypus:** **ANGOLA. Cabinda:** Belize, 12.III.1917, fr., *Gossweiler* 7043 (BM!, LISC [LISC000809, LISC000810, LISC000811] images seen).

= *Pseudosabicea mitisphaera* N. Hallé in Adansonia ser. 2, 3: 170. 1963. **Holotypus:** **GABON. Ogooué-Ivindo:** piste du Bouéni, env. 20 km SE Makokou, 11.II.1961, *N. Hallé* 1129 (P [P00077593]!; iso-: BR [BR0000008852137]!, K [K000414625]!, LISC [LISC002621] image seen, P [P00077594]!).

**Distribution, ecology and phenology.** – *Sabicea nobilis* occurs in southeastern Cameroon, Gabon (mostly in the east, absent from the coastal area), southwestern Congo Republic, and Angola (Cabinda) (Fig. 9) and is locally common in its range.

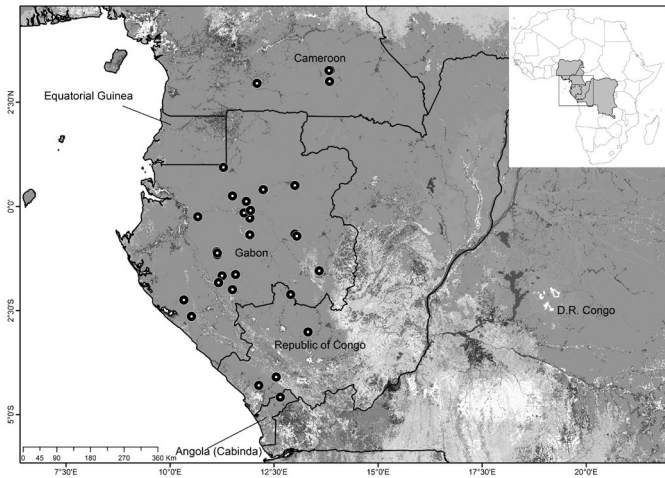


Fig. 9. – Distribution map of *Sabicea nobilis* R.D. Good.

It is found in secondary forest, edges and regrowth, always on drained soils, 160–800 m in elevation.

Flowers have been collected from May to August and October to January; fruits from January to May and September to November.

**Conservation status.** – The extent of occurrence (EOO) of *S. nobilis* is calculated to be 238,406 km<sup>2</sup>, well above the limit for “Vulnerable” status under subcriterion B1. Its area of occupancy (AOO) is estimated to be 132 km<sup>2</sup>, within the limit for “Endangered” status under criterion B2, but this is an obvious underestimation since most of its range is not well explored. It occurs in Atlantic Central Africa from southeastern Cameroon to Cabinda (Angola) and is known from 43 specimens representing 30 subpopulations. It occurs in two protected areas, the Doudou Mountains National Park and Batéké Plateaux National Park in Gabon. It is a locally abundant plant of forest edge habitats, and is thus favoured by small-scale forest clearing. Furthermore, most of the area where it occurs is sparsely populated. As a result, there is no particular threat to the species, which is here assessed as “Least Concern” [LC] using the IUCN Red List Categories and Criteria (IUCN, 2012).

**Notes.** – The original description of *S. nobilis* (Good, 1923) is based on two syntypes, *Gossweiler* 7043 and 7550, both at BM; the latter collection is here selected as lectotype, because it has a larger number of duplicates.

**Additional material studied.** – CAMEROON. **Reg. East:** South of Echiambor (Lomié to Ngoila), 18.II.1978, fr., *Lowe* 3515 (K); Nkamouna, 11.VI.2004, buds, *Sonké* 3480 (BR, BRLU, K); *ibid. loco.*, 15.VI.2004, fl., *Sonké* 3525 (BR, BRLU, K). **Reg. South:** E Sangmelima, 16.V.2016, fr., *Sonké & Zemagho* 6338 (BR, BRLU, K, MO, WAG, YA).

**GABON. Haut-Ogooué:** c. 5–10 km of Franceville along road to Okondja, 4.III.1999, fr., *Andersson & Nilsson* 2316 (BR); Lekoko forest exploitation, 70 km SSW of Moanda, near the border Congo–Gabon, 13.X.1970, fr., *F.J. Breteler* 6871 (BR, WAG). **Moyen-Ogooué:** CEFA Ayem, 10 km SW Ndjolé,

10.V.1963, fl., *N. Hallé* 1974 (BR, K, P, WAG); *ibid. loco.*, 10.V.1963, buds, *N. Hallé* 1974bis (P); *ibid. loco.*, 6.V.1963, fr., *N. Hallé* 2001 (K, P). **Ngounié:** Moukabo, ca 25 km E. of Mouila on the road to Yeno, 27.XI.1984, fl., *Arends et al.* 468 (BR, LBV, WAG); au N du PN de Waka, 1°09'51" S 11°08'04" E, 24.IX.2007, fr., *Boussengui-Nongo et al.* 192 (LBV); km 6 Mimongo–Yéno, 21.II.2008, fr., *Dessein et al.* 2039 (BR, LBV, MO, WAG); Distr. de Mimongo, rte de Lébamba à Etéké km 50, 14.V.1963, fr., *N. Hallé & Cours* 5873 (P); rte de Lébamba à Etéké km 50, 14.V.1963, fr., *N. Hallé & Cours* 5874 (BR, P); Rte chantier Leroy-Massika ente Mouila et Yeno, 27.IV.1989, fr., *A.M. Louis & Nzabi* 3031 (LBV, WAG); Oghoubi camp, on the NE border of Waka National Park, 24.III.2007, fr., *Sosef et al.* 2529 (BR, LBV, WAG); 25 km on the road Ikobey to Egoubi camp, 1.IV.2004, fr., *Wieringa et al.* 5203 (BR, LBV, WAG). **Nyanga:** chantier SFN, Igotchi, 23.XI.2003, fl., *van Valkenburg et al.* 2604 (LBV, WAG). **Ogooué-Ivindo:** Masenguelani (60 km SE de Lopé), 30.I.1998, imm.fr., *Binot & Lejoly* 197 (BRLU); NE du parc de la Lopé, ancienne rte Lopé-Booué, 14 km du carrefour Lopé-Booué, 6.III.2010, fr., *Bissiangou et al.* 1053 (LBV, WAG); Mintoume, 5.II.2005, fr., *Boupya & Mbazza* 186 (BRLU); La Nké, 8.X.1983, fl., *Floret et al.* 1735 (P, WAG); Booué, 31.VII.1966, fl., *N. Hallé & Le Thomas* 268 (P); Mintome, 30.III.2003, fr., *Mboma et al.* 61 (LBV, WAG); bac de l'Ogooué, 9.VIII.1983, fl., *Sita* 4983 (LBV). **Ogooué-Lolo:** c. 30 km E of Lastoursville, 22.XI.1991, fl., *F.J. Breteler & Jongkind* 10653 (BR, LBV, WAG); Bambidie, c. 30 km E of Lastoursville, 1.V.1992, fl. & fr., *F.J. Breteler et al.* 11205 (BR, G, LBV, WAG); Makande surroundings, c. 65 km SSW of Booué, 30.I.1999, imm.fr., *F.J. Breteler et al.* 14853 (BR, LBV, WAG); Makandé, Débardage Héron, 14.XI.1993, fl., *Dhetchuvi et al.* 11 (BRLU); Makandé, près de la station, 18.XI.1993, fl., *Dhetchuvi* 1308 (BR, BRLU, WAG); c. 50 km SE of Achouka, old forest in Région des Abeilles, 16.XI.1983, fr., *A.M. Louis et al.* 723 (BR, K, P, WAG); Camp Makande, 27.XI.1993, fl., *Moungazi* 928 (LBV); Forêt des Abeilles, Makandé, just NE of campsite, 12.I.2001, fl., *Wieringa et al.* 4075 (LBV, WAG); c. 30 km ENE of Lastoursville, east of Bambidie, 5.0 km on CEB exploration road NZ P/2, 22.III.2013, fr., *Wieringa et al.* 7673 (WAG). **Ogooué-Maritime:** Monts Doudou, W. of Doussala and Rés. de Faune de Moukalaba, 4.XII.1984, fl., *Arends et al.* 607 (LBV, WAG). **Woleu-Ntem:** Montagne Mengong sur rte Sam vers Mitzic, 25.II.1988, imm.fr., *A.M. Louis* 2688 (LBV, WAG).

**REPUBLIC OF CONGO. Kouilou:** Makaba, ancien village Manengue, 17.II.1987, fr., *de Foresta* 1291 (P); km 36–38, rte de Sounda à Pointe-Noire, 8.II.1966, fr., *Farron* 5030 (P); bord de la Loukomba, 19.I.1894, fl., *Lecomte* D6 (P). **Lékoumou:** village de Mitsiba, après Moetchè, 24.I.1965, fl., *Bouquet* 1087 (P).

5. *Sabicea proselyta* (N. Hallé) Razafim. et al. in *Taxon* 57: 20. 2008 (Fig. 2A–B, 7E–F).

≡ *Pseudosabicea proselyta* N. Hallé in *Adansonia* ser. 2, 3: 172. 1963.

**Holotypus:** GABON. **Estuaire:** Nkoulounga, 11.VII.1959, *N. Hallé* 748 (P [P00077595]!).

**Distribution, ecology and phenology.** – *Sabicea proselyta* occurs in southern Cameroon, Equatorial Guinea (Rio Muni), western and central Gabon (but not in the lower Ogooué basin) and the Mayombe range in southwestern Republic of Congo (Fig. 10). It grows in secondary forest, edges and regrowth, on drained soils or sometimes along rivers, 50–1080 m in elevation.

Flowers have been collected in April, June–July and November; fruits in January (immature), February to May (mature), July (immature) and November (mature).

**Conservation status.** – The extent of occurrence (EOO) of *S. proselyta* is calculated to be 162,301 km<sup>2</sup>, well above the limit for Vulnerable status under subcriterion B1. Its area of occupancy (AOO) is estimated to be 92 km<sup>2</sup>, within the limit for “Endangered” status under criterion B2, but is evidently underestimated because most of its range is not well prospected. The species occurs in Central Africa from south Cameroon to the Congo Republic, and is known from 28 specimens representing 22 subpopulations. It occurs in four protected areas, the Monte Alén National Park in Equatorial Guinea, Waka and Doudou Mountains National Parks in Gabon, and Dimonika Biosphere Reserve in the Republic of Congo. Most of its range is sparsely populated, and because it is a plant of forest edge habitats, it is likely to benefit from small-scale forest clearing, e.g. that induced by selective logging. As a result there is no evidence of a particular threat, and the species is here assessed as “Least Concern” [LC] using the IUCN Red List Categories and Criteria (IUCN, 2012).

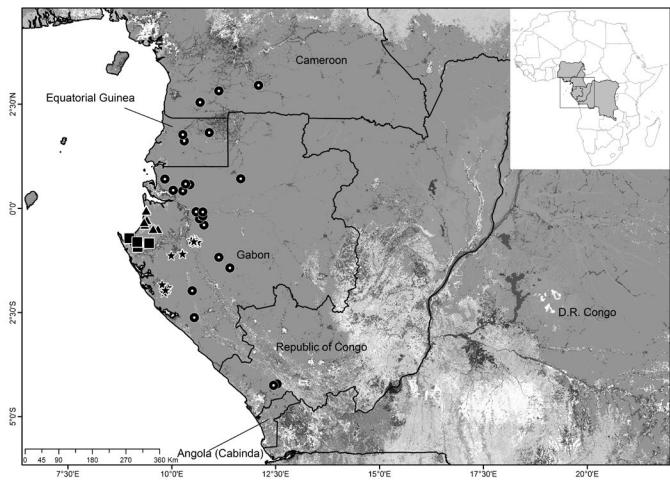
**Notes.** – Although the protologue (HALLÉ, 1963) does not specify in which herbarium the type of *S. proselyta* was deposited, this collection has only one sheet in P, which is therefore considered as the holotype.

Probably because *Sabicea proselyta* has no very striking characters, it has often been confused with its relatives *S. couteronii*, *S. dichrosepala*, *S. rubiginosa* and *S. sanguinosa*. The differences between them are summarised in Table 1. Among the 18 Gabonese specimens cited as *Pseudosabicea proselyta* by SOSEF et al. (2006), only nine are correctly identified; six belong to *S. rubiginosa* (*Breteler 9576*; *Haegens 222*; *van Nek 128 & 190*; *Wieringa 2389*; *J.J.F.E. de Wilde 9688*), one to *S. dichrosepala* (*J.J.F.E. de Wilde 284*) and two to *S. sanguinosa* subsp. *sanguinosa* (*Sosef 1613, 1745*). Another collection from the Republic of Congo, *Kimpouni 600*, cited by LACHENAUD (2009) as *Pseudosabicea proselyta*, actually represents *S. couteronii*. The two collections from the Republic of Congo cited here are therefore the first authentic records of *S. proselyta* from this country.

The indumentum of the lower leaf surface is usually appressed in this species, but in two collections (*J.J.F.E. de Wilde 7762* from Cameroon and *van Valkenburg et al. 3140* from Gabon) it is mostly erect with appressed hairs restricted to the veins. These collections match *S. proselyta* in other characters and are therefore regarded as conspecific.

**Additional material studied.** – CAMEROON. **Reg. South:** station du Cacaoyer de N'koemvone, S. of Ebolowa, 14 km on the road to Ambam, 28.XI.1974, fl. & fr., *J.J.F.E. de Wilde 7762* (BR, K, P, WAG, YA); E Sangmelima, 16.V.2016, fr., *Sonké & Zomagho 6329* (BR, BRLU, K, MO, WAG, YA); Campo Ma'an area, Onoyong, in the National Park, 20.III.2001, imm.fr., *Tchoutou Mbatchesou et al. ONOX 93* (WAG).

EQUATORIAL GUINEA. **Centro-Sur:** Monte Alén, 25.III.1997, fr., *Ngomo 78* (BRLU); Monte Alén, Transecto 3,900 m del transecto, 21.VII.1998, imm.fr., *Ngomo & Ndong 368* (BRLU); PN de Monte Alén, dalle rocheuse



**Fig. 10.** – Distribution map of *Sabicea proselyta* (N. Hallé) Razafim. et al. (circles), *S. rubiginosa* O. Lachenaud, Zomagho & Sonké (stars) and *S. sanguinosa* (N. Hallé) Razafim. et al. (triangles: subsp. *sanguinosa*; squares: subsp. *viridis* O. Lachenaud, Zomagho & Sonké).

d'Engong, 5 km à l'W du village d'Engong, 12.V.2002, fr., *Parmentier & Esoso 2780* (BRLU); PN de Monte Alén-transect de Monte Chocolate, 8.I.1998, imm. fr., *Van Reeth 141* (BRLU). **Litoral:** Rte de Nco vers Misobong au niveau de la grande cascade, 9.I.1998, imm.fr., *N. Nguema & Lejoly 202* (BRLU). **Wele-Nzas:** entre Nsuamayong et inselberg Akuom, 23.I.1998, imm.fr., *Obama & Lejoly 656* (BRLU).

**GABON. Estuaire:** km 18 Kougouleu-Kouamé road, 15.XI.1982, fl., *Leeuwenberg 12511* (BR, K, LBV, WAG); km 13 Tchimbélé-Kinguélé, 7.II.2008, fr., *Dessein et al. 1747* (BR, LBV, WAG); Monts de Cristal, 5 km de Kinguélé, 18.I.1968, imm.fr., *N. Hallé & Villiers 4540* (P); Crystal Mountains, 250 m on transect D4, 25.XI.2000, fl., *N. Nguema 1459* (BR, LBV, WAG). **Moyen-Ogooué:** Mboumi, 16.II.2000, imm.fr., *Champluvier 6163* (BR, K); c.10 km NNW of Ndjolé, on BSO forestry road, 26.II.2008, fr., *Dessein et al. 2150* (BR, LBV, WAG); C.E.F.A. Ayem, 10 km SW Ndjolé, 29.IV.1963, fr., *N. Hallé 1918* (K, P); *ibid. loco*, 29.IV.1963, buds, *N. Hallé 1918bis* (BR, K, P); *ibid. loco*, 30.IV.1963, fl., *N. Hallé 1955* (K, P); *ibid. loco*, 8.V.1963, fr., *N. Hallé 2022* (P); Abanga, chantier CEFA, 1.VI.1963, fl., *N. Hallé 2126* (P). **Ngounié:** Parc national de Waka, 1°10'34"S 11°08'02"E, 28.XI.2007, imm. fr., *Boussengui-Nongo et al. 312* (LBV); Ovale, 16.V.1963, fr., *N. Hallé & Cours 5937* (P). **Nyanga:** chantier SFN, 28.XI.2003, fl. & imm.fr., *van Valkenburg et al. 2646* (BR, K, LBV, P, WAG). **Ogooué-Maritime:** logging road CBG concession eastward of Peni, 20.IV.2005, fr., *van Valkenburg et al. 3140* (BR, K, WAG). **Woleu-Ntem:** 15 km SE of Mitzié, FOREENEX forest exploitation, road from FOREENEX forestry camp to Madouaka village, 7.XI.2009, fl., *Bissengou et al. 752* (LBV, WAG).

REPUBLIC OF CONGO. **Kouilou:** rte de Dimonika à Pounga, 24.XI.1978, fl., *Cusset 514* (P). **Niari:** Col du Bamba, 6.I.1969, imm.fr., *Attims 58* (P).

**6. *Sabicea rubiginosa* O. Lachenaud, Zomagho & Sonké, sp. nov.** (Fig. 2C–D, 11, 12A–D).

**Holotypus:** GABON. **Moyen-Ogooué:** Mabounié, 00°46'15"S 10°32'52"E, 31.X.2014, *Lachenaud et al. 2105* (BRLU); iso-: BR [BR0000024387101]!, G!, LBV!, MO!, P!, WAG!.

*Habitu sarmentosus, ovario biloculare, inflorescentiis cymosis, foliis utrinque viridibus supra inter nervis glabrescentibus, corolla fauce pilis brevibus inflatis munita, fructibusque*



**Fig. 11.** – *Sabicea rubiginosa* O. Lachenaud, Zemagho & Sonké. **A.** Stem with flowers and fruits; **B.** Node with stipules, lateral view; **C.** Detail of lower leaf surface; **D.** Same, much enlarged, showing close reticulation; **E.** Bracts from lower node of inflorescence; **F.** Upper bract, inside; **G.** Flower bud, lateral view; **H.** Flower bud, seen from above; **I.** Short-styled flower; **J.** Longitudinal section of short-styled flower; **K.** Short-styled flower, seen from above; **L.** Long-styled flower; **M.** Longitudinal section of long-styled flower; **N.** Long-styled flower, seen from above; **O.** Longitudinal section of calyx and ovary; **P.** Fruit; **Q.** Cross section of fruit. [Lachenaud et al. 2105, BRLU] [Drawing: H. de Vries]

*albogriseis cum granulis atris in mesocarpio S. proselyta similis, a quae differt calycis bracteisque atro-rubris (nec viridibus), seminibus striolatis (nec grosse reticulatis), calyce tubo intus glabro (nec villosa) et lobis extus villosis (nec puberulis), foliisque subtus cum indumento suberecto pilis brevibus albidis et pilis longioribus rufescentibus intermixtis (nec indumento omnino albido et appresso, raro inter nervis suberecto).*

*Sarmentose liana*, 1–2 m high, climbing or occasionally creeping on the ground; stems cylindrical, 2–5 mm thick, densely covered with c. 1 mm long rufous appressed hairs, intermingled with shorter uncinata hairs. *Stipules* interpetiolar, dark reddish-brown, 10–15 × 6–11 mm, erect, ovate and ± longitudinally plicate, rounded at base, acute at apex, uniformly pubescent outside with same indumentum as the stems, glabrous inside. *Leaves* opposite, equal; petiole 0.8–4.8 cm long, with same indumentum as the stems; lamina 6.5–17 × 2.3–7.7 cm, elliptic, acute at base, gradually acuminate at apex, slightly coriaceous, discoloured; upper side dark green, glabrous except for the midrib (and sometimes the secondary veins) with same indumentum as the stems; lower side pale green with brown-red veins, densely pubescent with both soft rufous hairs, 1–1.5 mm long appressed to half-erect, denser on the veins, and shorter whitish erect hairs 0.2–0.5 mm long; secondary veins 9–15 pairs, rather strongly ascending, eucamptodromous; tertiary veins markedly raised on lower leaf surface, much stronger than quaternary veins, the latter densely reticulate, forming areolae < 0.5 mm in diameter. *Inflorescences* axillary and paired at nodes, cymose or sometimes glomeruliform at anthesis, many-flowered, 1.2–6.5 cm long, densely covered with rufous hairs c. 1 mm long intermingled with shorter uncinata hairs; peduncle 0.3–3.5 cm long; primary ramifications (0–)0.2–2.3 cm long. *Bracts* dark red, free, appressed-pubescent outside and towards the apex inside, all recaulescent except the basal pair; basal bracts elliptic, entire or rarely dentate towards the base, 4–11 × 1.3–3.5 mm, acute at apex; median bracts elliptic, 4.5–8 × 1–1.7 mm; upper bracts narrowly elliptic, 1–4.5 × 0.2–0.8 mm. *Flowers* 5-merous, heterostylous; pedicels c. 0.5 mm long, densely villose. *Calyx* dark red, the base sometimes green or whitish; tube 0.6–0.7 mm long, villose outside like the inflorescence, glabrous inside; lobes narrowly spatulate, 1.5–3 × 0.5–1.2 mm, obtuse to subacute and curved outwards at apex, villose outside, puberulous inside except towards the base, alternating with minute collectors. *Corolla* pale green in bud, whitish at anthesis; tube cylindrical, 4–4.5 × 1.5 mm, outside glabrous at base and sparsely appressed-pubescent at apex, inside with a ring of multicellular hairs around the upper third and short, inflated unicellular hairs at the throat, the intervening zone with very sparse hairs; lobes triangular, 1.5–1.8 × 1.3–1.5 mm, patent, shortly appressed-hairy outside, glabrous inside; flower buds obtuse, the apex slightly enlarged and pentagonal. *Stamens*

included and attached around the upper third of the corolla tube (long-styled flowers) or half-exserted and attached near the apex of the tube (short-styled flowers); anthers sessile, elliptic, c. 1 × 0.6 mm, glabrous. *Ovary* c. 1.5 mm long, densely villose, 2-locular. *Disk* cylindrical, c. 0.5 mm long, glabrous, slightly shorter than the calyx tube. *Style* c. 4.3 mm long and just reaching throat (long-styled flowers) or c. 3.5 mm long and included (short-styled flowers), bifid, with elliptic flattened stigmas c. 0.8 mm long, these shortly stipitate in long-styled flowers and sessile in short-styled flowers. *Fruits* whitish, ellipsoid, with persistent calyx, 5–10 × 4–8 mm in life, 4–10 × 3–9.5 mm when dry, villose, with pedicel 0.5–3.5 mm long; mesocarp very soft, whitish, c. 1.5 mm thick, with numerous darker granules. *Seeds* numerous, pale brown, polyedric, c. 0.8 × 0.5 mm, the surface finely striolate.

*Etymology.* – The epithet *rubiginosa* refers to the rusty-coloured indumentum of the leaves and stems.

*Distribution, ecology and phenology.* – *Sabicea rubiginosa* is endemic to west-central Gabon, south to Rabi and north to the lower Ngounié river (Fig. 10) and is locally very abundant in its range. It occurs in forest edges, especially along tracks, at low elevations (20–165 m).

Flowers have been recorded in January, March, May, July and October–November, probably most of the year; fruits from January to March, in June–July and in October–November.

*Conservation status.* – The extent of occurrence (EOO) of *S. rubiginosa* is estimated to be 4312 km<sup>2</sup>, and its area of occupancy (AOO) to be 88 km<sup>2</sup>, both values being within the limit for “Endangered” status under subcriteria B1 and B2. The species is endemic to west-central Gabon and is known from 30 specimens, representing five subpopulations, none of which is protected. One of these is situated in a forestry concession, which does not seem to represent a serious threat since the species occurs in forest edges and is likely to be favoured by selective logging. Two subpopulations occur in oil concessions, and one in a mining concession where an important exploitation project is scheduled; a decline in habitat extent and quality and number of individuals is therefore predicted. The five subpopulations represent five locations in the sense of IUCN (2012), and the species qualifies for “Endangered” [EN B1ab(iii,v)+2ab(iii,v)] using the IUCN Red List Categories and Criteria (IUCN, 2012).

*Notes.* – *Sabicea rubiginosa* has previously been mistaken for *S. proselyta* (see that species), but differs by the indumentum of its lower leaf surface, the ornamentation of its seeds, the absence of hairs inside the calyx tube, and the dark red colour of its bracts and calyces (Table 1; Fig. 12A, C). The latter character is especially conspicuous in the field, and



**Fig. 12.** – *Sabicea rubiginosa* O. Lachenaud, Zemagho & Sonké: **A.** Plant with flowers and fruits; **B.** Lower side of leaf; **C.** Inflorescence; **D.** Inflorescence with mature (white) and immature fruits (green). *Sabicea sanguinosa* subsp. *sanguinosa*: **E.** Apex of flowering stem. *Sabicea sanguinosa* subsp. *viridis* O. Lachenaud, Zemagho & Sonké: **F.** Stem with flowers and fruits, note bullate leaves.

[**A:** Sonké & Ikabanga 6155; **B, D:** Lachenaud et al. 2105; **C:** Bidault et al. 1329; **F:** Bidault et al. 1691] [Photos: **A:** B. Sonké; **B, D:** O. Lachenaud; **C, F:** E. Bidault; **E:** J.-P. Vande weghe]



makes *S. rubiginosa* a remarkably attractive plant, which could certainly be grown for ornamental purposes. The typical subspecies of *S. sanguinosa* also has red bracts and calyces, but differs by the hirsute and whitish (not rufous) indumentum of its vegetative parts, its leaves that are markedly bullate in the fresh state, its calyx lobes acute at apex and its generally larger bracts (Table 1). The three species, *S. proselyta*, *S. rubiginosa* and *S. sanguinosa*, appear to have separate ranges (Fig. 10).

**Paratypi.** – **GABON. Moyen-Ogooué:** Mabounié, forest area south-west of camp, 6.V.2012, fl., *Bidault 470* (BRLU, P); zone de Mabounié, à 45 km au SW de Lambaréné, rive N de la rivière Ngounié, 16.XI.2013, fl., *Bidault et al. 1329* (BRLU); Concession froestière GWT, 5.VI.2012, fr., *Boupoya & al. 727* (BRLU); Ezanga, 1.II.1991, fr., *Dibata 727* (WAG); Mabounié, 13.X.2012, fl., *Sonké & Ikabanga 5999* (BR, BRLU, LBV, MO); *ibid. loco*, 13.X.2012, fr., *Sonké & Ikabanga 6001* (BR, LBV, MO); *ibid. loco*, 23.X.2012, fl., *Sonké & Ikabanga 6132* (BR, BRLU, LBV, MO); *ibid. loco*, 24.X.2012, fl., *Sonké & Ikabanga 6140* (BR, BRLU, LBV, MO); *ibid. loco*, 24.X.2012, fl., *Sonké & Ikabanga 6141* (BR, BRLU, LBV, MO); *ibid. loco*, 25.X.2012, fl. & fr., *Sonké & Ikabanga 6153* (BR, BRLU, LBV, MO); *ibid. loco*, 25.X.2012, fl., *Sonké & Ikabanga 6155* (BR, BRLU, LBV, MO); Mabounié, 1.V.2012, buds, *Stévant et al. 4125* (BRLU, LBV); *ibid. loco*, Ngounié River, 4.V.2012, fl., *Stévant & Issembé 4176* (BRLU, LBV); Mabounié mine, near Lambaréné, 9.II.2012, imm.fr., *Stévant & Droissart 4206* (BRLU, LBV, P). **Ngounié:** forêt sur la rive gauche (S) de l'Ikoy, à env. 10 km de l'embouchure avec la Ngounié, 26.X.2012, fl., *Dauby et al. 2938* (BRLU, LBV); concession Maurel & Prom, près du Lac Ezanga, 22.XI.2013, fl., *Lachenaud et al. 1531* (BR, BRLU, LBV, MO, P, WAG); Mabounié, le long de la rivière Ngounié, 12.X.2012, buds, *Sonké & Ikabanga 5972* (BR, BRLU, LBV, MO). **Ogooué-Maritime:** Rabi, 28.III.1990, fl. & fr., *F.J. Breteler et al. 9576* (BR, G, LBV, P, WAG); Rabi-Kounga, 8.VII.1998, fl. & imm.fr., *F.J. Breteler et al. 14350* (BR, LBV, WAG); Rabi-Kounga, S of Rabi, 1.I.1994, fl. & fr., *Haegens & van der Burgt 222* (BR, LBV, WAG); c. 15 km NW of Shell oil exploitation Rabi, 23.XI.1989, fl. & fr., *J.J.F.E. de Wilde et al. 9688* (LBV, WAG); Rabi (parcelle Smithsonian), 9.XI.2014, fl., *D. Nguema et al. 2843* (BRLU); Pechoud road southwards, 27.X.1990, fr., *van Nek 128* (BR, LBV, WAG); Rabi-E, near Pechoud camp, 4.XI.1990, fl. & fr., *van Nek 190* (BR, LBV, WAG); Rabi-Kounga, in between Shell-office and camp, 27.X.1992, fl. & fr., *von Asmuth & Vosmeer 35* (WAG); Rabi-Kounga, road to Echira, 5.XI.1992, buds, *von Asmuth & Vosmeer 58* (WAG); Rabi-Kounga, road to Echira, 5.XI.1992, fl., *von Asmuth & Vosmeer 59* (WAG); Rabi, 4½ km on road to Divangui, 4.III.1994, fr., *Wieringa & Haegens 2389* (LBV, WAG).

7. *Sabicea sanguinosa* (N. Hallé) Razafim. et al. in Taxon 57: 20. 2008 (Fig. 2E–F, 12E–F, 13A–B).

≡ *Pseudosabicea sanguinosa* N. Hallé in Adansonia ser. 2, 11: 313. 1971.

**Holotypus:** GABON. **Ogooué-Maritime:** Petit Bam Bam, 21.VIII.1966, *N. Hallé & Le Thomas 573* (P [P00077596]); iso-: K [K000414623], MO [acc. no. MO-05067088] image seen, P [P00077597, P00077598].

**Distribution, ecology and phenology.** – This species is endemic to coastal Gabon between the Ogooué and Komo estuaries, and grows in forest edges on coastal sandy soils; for more precise information see under infraspecific taxa.

Flowers have been collected in February, from May to July and in October–November; fruits in January–February, August and October.

**Conservation status.** – The extent of occurrence (EOO) of *S. sanguinosa* is estimated to be 4009 km<sup>2</sup>, and its area of occupancy (AOO) to be 48 km<sup>2</sup>; both values are within the limit for “Endangered” status under subcriteria B1 and B2. The species is endemic to coastal Gabon, and is known from 14 specimens, representing nine subpopulations, four of which occur in the Wonga-Wongué Presidential Reserve. In spite of its limited range, *S. sanguinosa* occurs in a sparsely populated region, and is a locally abundant plant of secondary forest habitats, which benefits from small-scale forest clearing (e.g. that induced by selective logging). As a result, there is no evidence of a particular threat, and the species is here assessed as “Least Concern” [LC] using the IUCN Red List Categories and Criteria (IUCN, 2012).

**Notes.** – This species, although endemic to Gabon, was omitted from the national checklist of Sosef et al. (2006) where two specimens (*Sosef et al. 1613* and *Sosef et al. 1745*, both of the typical subspecies) were cited as *Pseudosabicea proselyta*. It indeed shows some resemblance to *Sabicea proselyta* and *S. rubiginosa*, but is quite easily separated from both by the hirsute indumentum of its vegetative parts, and its leaves that are conspicuously bullate in life; it also has generally larger bracts and calyx lobes, the latter acute at apex (Table 1).

Two subspecies are here recognised in *S. sanguinosa*. They differ only by the colour of their bracts and calyx lobes (dark red in subsp. *sanguinosa* and pale green in subsp. *viridis*), a character which is obvious in the field but not so in dry material, and was found to be constant in all populations studied. The two subspecies have separate ranges as far as is known, but since the intervening zone is hardly explored botanically, it is not impossible that they may come in contact.

7a. *Sabicea sanguinosa* subsp. *sanguinosa* (Fig. 2E–F, 12E).

**Distribution, ecology and phenology.** – This subspecies is endemic to coastal Gabon, occurring in the Wonga-Wongué reserve and slightly further north (Nyonié) (Fig. 10) and grows in forest edges on coastal sandy soils, up to 150 m in elevation.

Flowers collected in January (buds), February, and from May to July; fruits in January–February and August.

**Conservation status.** – The extent of occurrence (EOO) of *S. sanguinosa* subsp. *sanguinosa* is estimated to be 860 km<sup>2</sup>, and its area of occupancy (AOO) to be 32 km<sup>2</sup>; both values fall within the limit for “Endangered” status under subcriteria B1 and B2. The taxon is endemic to coastal Gabon, and is known from nine specimens, representing five subpopulations, all but one



**Fig. 13.** – *Sabicea sanguinosa* subsp. *viridis* O. Lachenaud, Zemagho & Sonké: **A.** Inflorescence (short-styled flowers); **B.** Mature infructescence. *Sabicea segregata* Hiern: **C.** Flowering stem; **D.** Detail of inflorescence with short-styled flowers; **E.** Stem with immature fruits; **F.** Mature infructescence.

[**A–B:** Lachenaud et al. 1918; **C:** Dessein et al. 2148; **D:** Bidault et al. 1316; **E:** Dessein et al. 1862; **F:** Sonké & Ikabanga 6139]

[Photos: **A:** O. Lachenaud; **B:** D.I. Lafferty; **C, E:** S. Dessein; **D:** E. Bidault; **F:** B. Sonké]

of which occur in the Wonga-Wongué Presidential Reserve. Its situation is rather comparable to that of the species as a whole, and it is assessed as “Least Concern” [LC] for the same reasons using the IUCN Red List Categories and Criteria (IUCN, 2012).

*Additional material studied.* – **GABON. Estuaire:** Savane Boyam, 25.I.1997, fl.b., *Delègue 1.Trs* (LBV); Oyane, X.1990, st., *Minkoue 55* (LBV); Réserve de Wonga Wongué, 23.I.1986, fr., *A.M. Louis & J.M. Reitsma 2004* (LBV, WAG); Nyonyie survey, sondage W, 28.VI.1990, fl., *Wilks 2028* (WAG); Nyonyie, Transect M2, 15.VII.1990, fl., *Wilks 2252* (WAG). **Moyen-Ogooué:** Eastern part of the Presidential Reserve Wonga-Wongué, c. 100 km S of Libreville, 28.II.1983, fl. & fr., *J.J.F.E. de Wilde et al. 815* (BR, K, LBV, WAG). **Ogooué-Maritime:** à ± 10 km au SSE de Batanga, 21.V.2001, fl., *Sosef 1613* (K, LBV, P); ca 10 km à l'Est de Batanga, 26.V.2001, fl., *Sosef 1745* (K, LBV, P).

7b. *Sabicea sanguinosa* subsp. *viridis* O. Lachenaud, Zemagho & Sonké, **subsp. nov.** (Fig. 12F, 13A–B).

**Holotypus:** GABON. Ogooué-Maritime: région du Lac Alombié, ± 7 km au N de M'paga, 0°50'20"S, 9°27'14"E, 14.X.2014, fl. & fr., *Lachenaud, Ikabanga & Lafferty 1918* (BRLU!; iso-: BR!, G!, LBV!, MO!, P!, WAG!).

*A typo differt calycis bracteisque pallide viridibus, nec atro-rubris.*

*Distribution, ecology and phenology.* – This subspecies is endemic to the lower Ogooué delta in Gabon, between the coast and Lake Alombié (Fig. 10); it has thus a more southern range than subsp. *sanguinosa*. It occurs in the same habitat as the latter, and is locally very abundant.

Flowers recorded in October–November, fruits in October (probably in other months as well).

*Conservation status.* – The extent of occurrence (EOO) of *S. sanguinosa* subsp. *viridis* is estimated to be 483 km<sup>2</sup>, and its area of occupancy (AOO) to be 16 km<sup>2</sup>, both values being within the limit for “Endangered” status under subcriteria B1 and B2. The taxon is endemic to the Ogooué delta in Gabon, and is known from five specimens, representing four subpopulations. It is not known from any protected area, but probably occurs in the Wonga-Wongué Presidential Reserve since it has been collected very close to its limits. In spite of its restricted range, it occurs in a sparsely populated area, and is a locally abundant plant of forest edge habitats, which benefits from small-scale forest clearing (e.g. that induced by selective logging). As a result, there is no evidence of a particular threat, and the taxon is assessed as “Least Concern” [LC] using the IUCN Red List Categories and Criteria (IUCN, 2012).

*Paratypes.* – **GABON. Ogooué-Maritime:** Préfecture de M'paga, à env. 7 km au N du lac Alombié, au S de la réserve de Wonga Wongué, 11.X.2014, fl. & fr., *Bidault et al. 1691* (BR, BRLU, MO, P); delta de l'Ogooué en face de Port-Gentil, au S de la Pointe Fétiche, 22.XI.2016, fl., *Lachenaud et al. 2270* (BR, BRLU, G, K, LBV, MO, P, WAG); env. 5 km au SE de Mbilapé,

24.XI.2016, fl., *Lachenaud et al. 2314* (BR, BRLU, G, LBV, MO, P, WAG); riv. de Kendié en aval de Mbilapé, rive E, 25.XI.2016, fl., *Lachenaud et al. 2335* (BR, BRLU, LBV, MO, WAG).

8. *Sabicea segregata* Hiern in Oliv., Fl. Trop. Afr. 3: 77. 1877 (Fig. 2G–H, 13C–F).

= *Pseudosabicea segregata* (Hiern) N. Hallé in *Adansonia* ser. 2, 3: 172. 1963.

**Lectotypus** (designated here): **GABON** or **EQUATORIAL GUINEA:** River Muni, VIII.1862, *Mann 1766* (K [K000414626]!; isolecto-: P [P00077599]!).

= *Sabicea henningsiana* Büttner in Bot. Vereins Prov. Brandenburg 31: 79. 1889. **Lectotypus** (designated here): **GABON. Estuaire:** Sibangefarm, IX.1884, fl., *Büttner 437* (K!). **Syntypus:** **GABON. Estuaire:** Sibangefarm, X.1884, *Büttner 443* (B†).

*Distribution, ecology and phenology.* – This species occurs in southern Cameroon where rare, Equatorial Guinea (Rio Muni), Gabon where very common and widespread (though absent in southeast, extreme northeast, and lower Ogooué basin), and southwestern Republic of Congo (Fig. 14). It is found in secondary forest, edges and regrowth, and in fringing forest on inselbergs, always on drained soils, on various substrates (sandy or clayish), 0–1080 m in altitude.

Flowers and fruits have been recorded in all months.

*Conservation status.* – The extent of occurrence (EOO) of *S. segregata* is estimated to be 250,602 km<sup>2</sup>, and its area of occupancy (AOO) to be 396 km<sup>2</sup>. The latter value falls within the limit for “Vulnerable” status under criterion B2, but is an obvious underestimation given the low collecting density in most of its range and the fact that the species is generally common there. The species occurs from south Cameroon to the Republic of Congo, and is known from 124 specimens representing 71 subpopulations. It occurs in several protected areas: Campo Ma'an National Park in Cameroon, Monte Alén National Park in Equatorial Guinea, Lopé, Waka, Doudou Mountains and Ivindo National Parks in Gabon, and Dimonika Biosphere Reserve in the Republic of Congo. In view of its wide distribution, abundance, and preference for degraded forest habitats, it is here assessed as “Least Concern” [LC] using the IUCN Red List Categories and Criteria (IUCN, 2012).

*Notes.* – This species is closely related to *S. floribunda*, both having the corolla lobes brown at anthesis, unlike other species of the group. The differences between them are summarised in the key. The calyx lobes of *S. segregata* are usually longer and narrower than in other species of the group, but there is limited overlap with *S. floribunda* in this character.

Most collections of *S. segregata*, including the type, have stems with appressed hairs, but a variant with hirsute stems occurs in Gabon, particularly in the east of the country. The fruits apparently turn from whitish to red to purple-black; however, since the last colour is much less commonly reported than the other two, it is not sure whether this sequence is always followed.

The original description of *S. segregata* (HIERN, 1877) does not mention the type number, but the only possible candidates are *Mann 1766* in Kew, and *Mann s.n.* in Paris, the latter being almost certainly an unnumbered duplicate of the former. The Kew sheet is here selected as lectotype. It is not known on which side of the Muni River, which forms the border between Equatorial Guinea and Gabon, this material was collected.

The description of *S. henningsiana* (BÜTTNER, 1889) is based on two syntypes, *Büttner 437* and *Büttner 443*, both from Sibang in Gabon. The original sheets of both specimens have presumably been destroyed in Berlin, but a duplicate of the former remains in Kew, and is here selected as lectotype.

*Additional material studied.* – CAMEROON. **Reg. South:** Campo-Ma'an area, Ebojje, Along the beach, 20.II.2000, fr., *Elad et al. 1367* (WAG); Campo-Ma'an area, Mvini, Bigan, Along Tracet7, 16.II.2000, imm.fr., *Tchouto Mbatbou et al. 2524* (WAG); Bipindi, s.d., buds, *Zenker s.n.* (BR, P).

**EQUATORIAL GUINEA. Centro-Sur:** Parc National de Monte Alen, dalle rocheuse d'Engong, 5 km à l'W du village d'Engong, 12.V.2002, fr., *Parmentier & Esono 2781* (BRLU); 4 km N de Mitong, 12.XII.2003, imm.fr., *Sonké 3138* (BR, BRLU, K); 6 km N de Mitong, 12.XII.2003, fl., *Sonké 3151* (BR, BRLU, K); Engong, 14.VIII.2001, fl., *Sonké & Esono 2546* (BR, BRLU, WAG); Engong, 14.VIII.2001, fr., *Sonké & Esono 2552* (BR, BRLU, WAG). **Litoral:** Bata-Monson-Dibolo: Estrada kms 54–55, 15.X.1991, fl., *Carvalho 4889* (BR, BRLU, WAG); Bata-Nasanga: Estrada km 14, 17.X.1991, fl., *Carvalho 4890* (WAG); Bata-Mari: Estrada kms 62–63, 15.XI.1991, imm.fr., *Carvalho 4952* (WAG); Engong, 28.VII.1999, fr., *Eneme 439* (BRLU); Etembue, 15.IX.2001, buds, *Esono & Ndong 335* (BRLU); Ndote Nord, 28.VIII.1997, fr., *Lisowski M-153* (BRLU). **Reg. unknown:** Akanabot, 15.IX.2001, fr., *Esono & Ndong 351* (BRLU).

**GABON. Estuaire:** Mondah Forest on Cape Esterias, c. 22 km on the road from Libreville, 3.IX.1978, fl. & fr., *F.J. Breteler et al. 408* (BR, K, WAG); plantations de Assoukou, près du poste de Kango, 2.X.1912, buds, *Chevalier 26847* (K, P); plantation Stéphane, sur la Bokoué, 9.X.1912, fl., *Chevalier 26989* (P); vieux chantier 'Sango', Ntoun, 9.X.1987, fl., *Dibata 320* (BR, WAG); Nkoulounga, 31.I.1961, fl., *N. Hallé 1024* (P); *sine loco*, 15.X.1896, fl., *Klaine 100* (P); *sine loco*, 12.IX.1896, fl., *Klaine 123* (P); Env. de Libreville, 18.VIII.1898, fl. & fr., *Klaine 377* (P); env. de Libreville, 1897, fr., *Klaine 771* (P); Env. de Libreville, 15.VI.1897, fr., *Klaine 962* (P); env. de Libreville, 5.X.1901, fl. & fr., *Klaine 2432* (BR, K, P); km 31 Kougouleu-Atogafina, NE of Kouamé, 19.XI.1982, imm.fr., *Leeuwenberg 12554* (LBV, WAG); rte Cap Santa-Clara, 6 km à droite, 31.I.1985, fr., *A.M. Louis & J.M. Reitsma 1677* (BR, LBV, WAG); Forêt Classée de la Mondah, 0°32'48"N 9°19'40"E, 20.II.1994, fr., *Lowry 4566* (LBV); c. 15 km N. of Libreville, 18.III.1987, fr., *J.M. & B. Reitsma 3166* (LBV, WAG); forêt de la Mondah. 5 km on off road to Santa Clara from Cap Esterias road, 11.XI.1988, fl., *van der Maesen et al. 5440* (WAG). **Haut-Ogooué:** concession CEB, W of Okandja, 19.XI.2015, imm. fr., *Texier & Akouangou 174* (BRLU). **Moyen-Ogooué:** Mabounié, à 45 km au SW de Lambaréné, rives de la Ngounié, 15.X.2012, fl., *Bidault et al. 845* (BRLU, LBV, P); *ibid. loco*, 16.X.2012, buds, *Bidault et al. 906* (BRLU, LBV); *ibid. loco*, 15.XI.2013, fl., *Bidault et al. 1316* (MO); au S de Lambaréné, entre 5 et 10 km depuis la ville, entre l'Ogooué et la rte de Fougamou, 13.IV.2015,

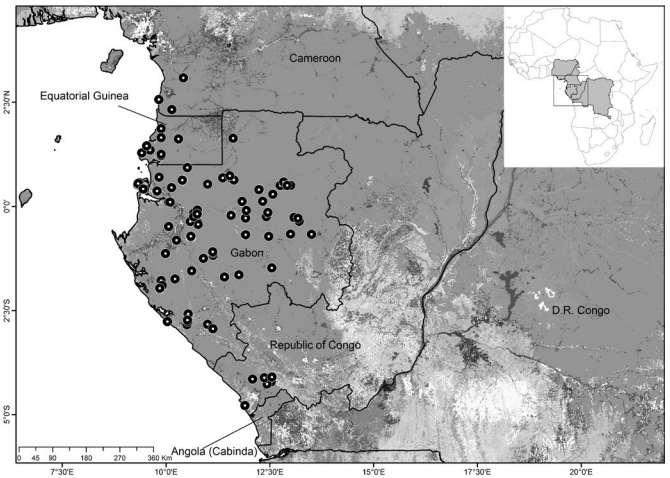


Fig. 14. – Distribution map of *Sabicea segregata* R.D. Good.

fr., *Bidault et al. 1922* (BR, BRLU); Concession forestière GWT (Global Wood and Trading), 5.VI.2012, imm.fr., *Boupya & al. 744* (BRLU); Mboumi, 16.I.2000, fr., *Champluvier 6008* (BR); *ibid. loco*, 16.I.2000, fr., *Champluvier 6019B* (BR); c.10 km NNW of Ndjolé, on BSO forestry road, 26.II.2008, fl., *Dessein et al. 2148* (BR, LBV, MO, WAG); Ayem, 10 km SW de Ndjolé, 11.IV.1963, fl., *N. Hallé 1621* (P); Ayem, 10 km SW de Ndjolé, 30.IV.1963, fl. & fr., *N. Hallé 1952* (P); Ayem, 10 km SW de Ndjolé, 6.V.1963, fl., *N. Hallé 2007* (P); N of lake Azingo, 4.VI.2014, imm.fr., *Libalah & Ikabanga 3* (BR, BRLU); Mabounié, 18.X.2012, fl., *Sonké et al. 6108* (BR, BRLU); *ibid. loco*, 23.X.2012, fl., *Sonké & Ikabanga 6127* (BR, BRLU); *ibid. loco*, 23.X.2012, fl., *Sonké & Ikabanga 6137* (BR, BRLU); *ibid. loco*, 23.X.2012, fl. & fr., *Sonké & Ikabanga 6139* (BR, BRLU, P); Rougier Logging Concession, Haut Abanga. East of Ndjolé, 17.II.2012, fr., *Stévant et al. 4301* (BRLU, LBV, P); Ndjolé, 1.1895, fr., *Thollon 117* (P); roadside between Ndjole town and railway station, 22.VII.1986, fr., *Thomas & Wilks 6589* (LBV, P, WAG). **Ngounié:** Waka forest exploitation road, 19.XI.1984, fl., *Arends et al. 301* (BR, K, LBV, P, WAG); PN de Waka, 1°10'34"S 11°08'02"E, 28.XI.2007, imm.fr., *Boussengué-Nongo et al. 313* (LBV); Mouyanama falls, at base of Mt Songou, 22.II.2008, fr., *Dessein et al. 2041* (BR, LBV); entre Pagha & Mouteti, 26.XI.1924, fl., *Le Testu 5104* (BM, BR, K, P, WAG); Parc national de Waka, près du Camp Oghoubi, 24.VI.2006, fr., *J. Mayombo et al. 1559* (LBV); 25 km on the road Ikobey to Egoubi camp, 1.IV.2004, fr., *Wieringa et al. 5204* (LBV, WAG); road Mouila to Yeno, c. 2 km before Issinga, 8.III.2013, fr., *Wieringa et al. 7169* (WAG). **Nyanga:** rte Tchibanga-Ndende, 25.X.2009, fl., *Bissengou et al. 540* (BR, LBV, WAG); 48 km SSW of Doussala, road Doussala-Igotshi, 21.III.1988, fr., *J.J.F.E. de Wilde et al. 9485* (BR, K, LBV, WAG); Tchibanga, IX.1915, fl., *Le Testu 2120* (BM, BR, K, P); concession SFN, 30.X.2003, fl. & imm.fr., *van Valkenburg et al. 2523* (BR, K, LBV, P, WAG); forestry concession of Bakker, 6 km N of Igotchi, 29.X.2003, fl., *Wieringa et al. 5025* (BR, K, LBV, WAG); forestry concession of Bakker, 15 km NNE of Igotchi, 31.X.2003, fl., *Wieringa et al. 5047* (LBV, WAG). **Ogooué-Ivindo:** concession forestière Rougier-Ivindo. En bordure du fleuve, au N de la concession, 29.X.2015, fl., *Bidault et al. 2269* (BR); Mintoume, 5.II.2005, fr., *Boupya & Mbazza 185* (BRLU); station de recherche de Mpassa, 10 km S de Makokou, 9.III.1984, fl., *Doumenge 191* (LBV, P); M'passa, Ile aux chauve-souris, 17.III.1977, fr., *Florence 55* (LBV, P); M'passa, 1.VI.1977, fl., *Florence 496* (LBV, P); La Nké, ancienne zone d'exploitation, 8.X.1983, buds, *Floret et al. 1732* (WAG); piste du Bouéni, 20 km SE Makokou, 11.II.1961, fr., *N. Hallé 1131* (P); Makokou, Mission Catholique, 16.II.1961, imm.fr., *N. Hallé 1185* (P); ± 50 km SE Makokou, 19.X.1964, buds, *N. Hallé 2695* (P); 9 km SSW of Makokou, near Ivindo R., right bank, 2.XI.1977, fl., *Leeuwenberg 11418* (BR, K, WAG); Mintome, 30.III.2003, fr., *Mboma et al. 64* (LBV, WAG); Ivindo National Park, rte Langoué, 11.IV.2004, fr., *Moungazi 1557* (BR, LBV, WAG); Ivindo

National Park, Massouna 2000, 0°08.90'S 12°27.10'E, 6.XII.2003, imm.fr., *D. Nguema Ekomo 507* (LBV) & 508 (LBV); bac de l'Ogooué, 19.VIII.1983, imm.fr., *Sita 4964* (LBV); Kongou waterfall area, 00°17'25"N 012°34'22"E, 8.II.2018, imm.fr., *Texier et al. 2282* (MO); Lopé, West Woods, 26.X.1990, buds, *L. White 172* (LBV); Lope Reserve, 15.X.1995, buds, *L. White 1495* (LBV, WAG). **Ogooué-Lolo:** Bambidie, c. 30 km E of Lastoursville, 2.V.1992, fl., *F.J. Breteler et al. 11248* (LBV, WAG); Makande surroundings, c. 65 km SSW of Booué, 2.II.1999, imm.fr., *F.J. Breteler et al. 14892* (WAG); Makandé, débardage Héron, 20.XI.1993, fl., *Dhetchuvi et al. 1372* (BRLU); Vers 10 km rte Makandé-Gongué, 3.XII.1993, fl. & imm.fr., *Dhetchuvi et al. 1597* (BR, BRLU, K, WAG); Lastoursville, concession forestière CEB, 30.XI.2012, fl., *Ikabanga & Haurez 343* (BRLU); c. 50 km SE of Achouka, old forest in Région des Abeilles, 17.XI.1983, fl., *A.M. Louis et al. 756* (BR, K, P, WAG); Camp Makande, 16.XII.1993, imm. fr., *Moungazi 967* (LBV); Camp concession SEEF, area of Mount Ngouadi, 00°16'12"S 013°05'00"E, 10.III.2017, fr., *Texier et al. 707* (LBV, MO); *ibid. loco*, 00°17'20"S 013°10'40"E, 11.III.2017, fl., *Texier et al. 795* (LBV, MO); *ibid. loco*, 11.III.2017, fr., *Texier et al. 798* (LBV, MO); SIAEFG logging concession, 30 km N of Pana, 01°28'44"S 12°32'55"E, 9.XII.2017, fl., *Texier et al. 1564* (LBV, MO); S of Road Lopé-Lastoursville, c. 60 km, 00°43'21"S 012°28'30"E, 18.XII.2017, imm.fr., *Texier et al. 1761* (LBV, MO). **Ogooué-Maritime:** Toucan, 12.X.2002, fl., *Bourobou et al. 993* (LBV, P, WAG); Rabi, c. 1°55'S 9°52'E, 13.X.2002, fr., *Bourobou et al. 1022* (LBV); Gamba, 24.IX.1968, buds, *Breteler & van Raalte 5675* (BR, WAG); Foot of Doudou Mountains, 25–35 km W of Mandji, 15.II.2008, fr., *Dessein et al. 1862* (BR, LBV); between Rabi and Echira, 27.III.1990, fr., *F.J. Breteler et al. 9557* (LBV, WAG); Rabi-Kounga, near Rabi 44, 1.I.1994, fr., *Haegens & van der Burgt 226* (LBV, WAG); Rabi-Kounga, 15.X.1991, fr., *Schoenmaker 33* (WAG); Pechoud road southwards, 27.X.1990, fl., *van Nek 124* (BR, LBV, WAG); Rabi, 4½ km on road to Divangui., 4.III.1994, fr., *Wieringa & Haegens 2387* (BR, LBV, WAG). **Woleu-Ntem:** c. 6 km SSW of Mitzié, FORENEX forest exploitation, 6.XI.2009, fl., *Bissiengou et al. 703* (LBV, WAG); Parc des Monts de cristal, 13.II.2010, fl., *Bissiengou & Niangadouma 975* (LBV, WAG); between Zomoko and Saint Germain, c. 10 km SE of Mitzié, 17.IV.1988, fr., *F.J. Breteler & Dibata 8771* (BR, K, LBV, WAG); 5–10 km E of Saint Germain, E of Okano River, 20.IV.1988, fl., *F.J. Breteler & Dibata 8866* (BR, K, LBV, WAG); Mts de Cristal, inselberg Milobo, 10km N Mbé Akélayong, 50km W Medouneu, 3.XII.2001, fl., *Degreef 254* (BR); SEEG road near Tchimbélé, pylone 7, 6.II.2008, fr., *Dessein et al. 1723* (BR, LBV); Angoum, VII.1933, buds, *Le Testu 9199* (BM, P); Along forestry road Oveng-Mitsic, 28.III.1985, fl., *J.M. Reitsma & B. Reitsma 731* (LBV, WAG); Tchimbélé Dam, Crystal Mountains, road N. of dam., 12.XI.2000, fl., *Walters et al. 499* (BR, LBV, WAG).

**REPUBLIC OF CONGO. Kouilou:** rte de Dimonika à Pounga, 24.XI.1978, fr., *Cusset 520* (K, P, WAG); env. de Dimonika, M'Bulu Pambu, 7.III.1980, fr., *Cusset 956* (P); env. de Dimonika, après Makaba carrefour, 13.XII.1982, fr., *Cusset 1173* (P); Makaba, ancien village Manengue, 17.II.1987, fr., *de Foresta 1296* (P); rte de Sounda (Pointe-Noire), 8.II.1966, imm.fr., *Farron 5024* (P); near Koulila, 6.XII.1990, imm.fr., *LaCroix 5005* (K); Kakamoeka, 11.X.1990, buds, *Lisowski B-8005* (BR, K, WAG); en allant vers Makaba, village à 17 km de Dimonika, 4.XII.1972, fr., *Makany 2045* (P); N'Tiétié, forêt à 3 km du village, 8.XII.1974, fl., *Sita 3807* (BR, P). **Niari:** Mayombe au col de Bamba, 8.XII.1990, fl. & imm.fr., *Dowsett-Lemaire 1392* (BR).

## Acknowledgements

Field work by OL and BS in Gabon, which formed the basis for this paper, was carried out under the Memorandum of understanding between the Centre National de la Recherche Scientifique et Technologique (CENAREST) and the Missouri Botanical Garden (MBG). We wish to thank the IPHAMETRA (Institut de Pharmacopée et de Médecine Traditionnelle), its former director, Dr Henri Paul

Bourobou Bourobou, and the former Curator of the National Herbarium of Gabon, Dr Nestor Obiang, for permission to conduct research in the country. Part of our field work was done for the botanical inventory of the Bas-Ogooué Ramsar site, organised by the MBG with support from WWF-Gabon and the Gabonese Ministry of Water and Forests, and for the Environmental Impact Study of the Mabounié mining project, also organised by MBG with support from the Maboumine company (Eramet). The National Geographic Society also supported the expedition during which the type of *Sabicea dichrosepala* was collected. We thank Steven Dessein, Steven Janssens, Yves Issembé, Thomas Nzabi, Ehoarn Bidault, Tariq Stévert, Eric Akouangou, Archange Boupoya, Davy Ikabanga, Jean-Yves Serein, John Kaparidi, Dietrich Ian Lafferty and Raoul Niangadouma for their assistance in the field, and the herbarium curators of BM, BR, BRLU, COI, G, K, LBV, P, WAG and YA for their assistance while working in their institutes and/or for sending specimens on loan. We are also grateful to Hans de Vries for his very nice drawings, and to Iris van der Beeten for her SEM photographs of the seeds. Ehoarn Bidault, Jérôme Degreef, Steven Dessein, Dietrich Ian Lafferty, Nicolas Texier and Jean-Pierre Vande weghe kindly allowed us to reproduce their field photographs of some species. Tariq Stévert is thanked for his help with the conservation status assessments, Gislain Mofack II for his help in preparing the distribution maps, and Vincent Deblauwe for sending us photographs of the FHI material. LZ received a research grant from the Deutscher Akademischer Austausch Dienst (DAAD) for the revision of *Sabicea* s.l. from Continental Africa; the International Foundation for Science (IFS) also supported her work on *Sabicea* (grant D/5833-1). BS's visit to Belgium in 2018, during which this paper was drafted, was funded by Nature+ asbl (Gembloux, Belgium). BS's visit to Belgium in 2019, during which this paper was improved and finalized, was funded by IRD (LMI DYCOFAC). Special thanks are due to Dr Jeannette Mapi-Sonké for various support and advice to the second and last authors. Finally, Martin Callmander and an anonymous reviewer are thanked for their useful comments on a first version of the paper.

## References

- ANONYMOUS (1962). Systematics Association Committee for descriptive biological terminology II. Terminology of simple symmetrical plane shapes (chart 1a). *Taxon* 11: 145–156.
- BACHMAN, S., J. MOAT, A.W. HILL, J. DE LA TORRE & B. SCOTT (2011). Supporting Red List threat assessments with GeoCAT: geospatial conservation assessment tool. *In*: SMITH, V. & L. PENEV (ed.), e-Infrastructures for data publishing in biodiversity science. *ZooKeys* 150: 117–126.

- BAMPS, P. (1982). *Flore d'Afrique centrale (Zaire-Rwanda-Burundi). Répertoire des lieux de récolte*. Jardin Botanique National de Belgique, Meise.
- BÜTTNER, R. (1889). Neue Arten von Guinea, dem Kongo und dem Quango. *Bot. Vereins Prov. Brandenburg* 31: 64–96.
- GEOCAT (2020). *Geospatial Conservation Assessment Tool*. [http://geocat.kew.org]
- GOOD, R.D. (1923). New tropical African Rubiaceae. *J. Bot.* 61: 86–87.
- HALLÉ, N. (1960). Sur les *Cuviera* (Rubiaceae) d'Afrique intertropicale et description pour ce genre de deux espèces et de deux variétés nouvelles. *Bull. Soc. Bot. France* 106: 342–348.
- HALLÉ, N. (1963). Délimitation des genres *Sabicea* Aubl. et *Ecpoma* K.Schum. en regard d'un genre nouveau: *Pseudosabicea* (Mussaendeae-Rubiaceae). *Adansonia* ser. 2, 3: 168–177.
- HALLÉ, N. (1964). Complément à l'étude du genre *Pseudosabicea* N. Hallé (Rubiaceae). *Bull. Jard. Bot. État. Bruxelles* 34: 397–402.
- HALLÉ, N. (1966). Rubiacées (1e partie). *Fl. Gabon* 12.
- HALLÉ, N. (1971). Rubiacées gabonaises nouvelles du genre *Pseudosabicea*. *Adansonia* ser. 2, 11: 313–317.
- HEPPER, F.N. (1958). *Sabicea* Aubl. and *Stipularia* P. Beauv. (Rubiaceae-Mussaendeae) in Tropical Africa. *Kew Bull.* 13: 289–294.
- HEPPER, F.N. (1963). *Sabicea*. *Fl. W. Trop. Afr.* ed. 2, 2: 169–174.
- HIERN, W. (1877). Rubiaceae. *Fl. Trop. Afr.* 3: 33–247.
- IUCN (2012). *IUCN Red List Categories and Criteria, version 3.1*. Ed. 2. IUCN Species Survival Commission, Gland & Cambridge.
- IUCN [STANDARDS AND PETITIONS SUBCOMMITTEE] (2014). *Guidelines for Using the IUCN Red List Categories and Criteria*. Version 11 (November 2015). Prepared by the Standards and Petitions Subcommittee [http://www.iucnredlist.org/documents/RedListGuidelines.pdf].
- KHAN, S.A. (2007). *New delimitations and phylogenetic relationships of Sabiceae (Ixoroideae, Rubiaceae) and revision of the Neotropical species of Sabicea Aubl.* PhD thesis, University of Bayreuth.
- KHAN, S.A., S.G. RAZAFIMANDIMBISON, B. BREMER & S. LIEDE-SCHUMANN (2008). Sabiceae and Virectariae (Rubiaceae, Ixoroideae): one or two tribes? New tribal and generic circumscriptions of Sabiceae and biogeography of *Sabicea* s.l. *Taxon* 57: 1–17.
- LACHENAUD, O. (2009). La flore des plantes vasculaires de la République du Congo : nouvelles données. *Syst. Geogr. Pl.* 79: 199–214.
- LACHENAUD, O. & L. ZEMAGHO (2015). Two new anisophyllous species of *Sabicea* Aubl. (Rubiaceae) from Gabon. *Candollea* 70: 219–229. DOI: <https://doi.org/10.15553/c2015v702a7>
- LETOUZEY, R. (1968). Les Botanistes au Cameroun. *Fl. Cameroun* 7.
- RAZAFIMANDIMBISON, S.G. & J. MILLER (1999). New taxa and nomenclatural notes on the flora of the Marojeje Massif, Madagascar. III. Rubiaceae. A new species of *Sabicea*. *Adansonia* ser. 3, 21: 41–45.
- ROBBRECHT, E. (1988). Tropical woody Rubiaceae. *Opera Bot. Belg.* 1.
- SCHUMANN, K. (1896). Rubiaceae Africanae. *Bot. Jahrb. Syst.* 23: 412–470.
- SOSEF, M.S.M., J.J. WIERINGA, C.C.H. JONGKIND, G. ACHOUNDONG, Y. AZIZET ISSEMBÉ, D. BEDIGIAN, R.G. VAN DEN BERG, F.J. BRETELER, M. CHEEK, J. DEGREEF, R.B. FADEN, P. GOLDBLATT, L.J.G. VAN DER MAESEN, L. NGOK BANAK, R. NIANGADOUMA, T. NZABI, B. NZIENGUI, Z.S. ROGERS, T. STÉVART, J.L.C.H. VAN VALKENBURG, G. WALTERS & J.J.F.E. DE WILDE (2006). Checklist des plantes vasculaires du Gabon. Checklist of Gabonese vascular plants. *Scripta Bot. Belg.* 35.
- STACE, C.A. (1989). *Plant taxonomy and biosystematics*. Ed. 2. Routledge, New York.
- WCSP (2019). *World Checklist of Selected Plant Families*. Royal Botanic Gardens, Kew [http://wmsp.science.kew.org].
- WERNHAM, H.F. (1914). *A monograph of the genus Sabicea*. British Museum, London.
- WHITE, F. (1979). The Guineo-Congolian Region and its relationship to other phytochoria. *Bull. Jard. Bot. Nat. Belg.* 49: 11–55.
- WHITE, F. (1983). *The Vegetation of Africa. A descriptive memoir to accompany the Unesco/AETFAT/UNSO vegetation map of Africa*. UNESCO, Paris.
- WHITE, F. (1993). The AETFAT chorological classification of Africa: history, methods and applications. *Bull. Jard. Bot. Nat. Belg.* 62: 225–281.
- ZEMAGHO, L., S. LIEDE-SCHUMANN, B. SONKÉ, S. JANSSENS, O. LACHENAUD, B. VERSTRAETE & S. DESSEIN (2016). Phylogenetics of tribe Sabiceae (Ixoroideae, Rubiaceae) revisited, with a new subgeneric classification for *Sabicea*. *Bot. J. Linn. Soc.* 182: 551–580. DOI: 10.1111/boj.12475
- ZEMAGHO, L., S. LIEDE-SCHUMANN, O. LACHENAUD, S. DESSEIN & B. SONKÉ (2017). Taxonomic revision of *Sabicea* subgenus *Anisophyllae* (Ixoroideae, Rubiaceae) from Tropical Africa, with four new species. *Phytotaxa* 293: 1–68. DOI: 10.11646/phytotaxa.293.1