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# *Gymnosporia cryptopetala* Reyes-Bet. & A. Santos (Celastraceae), a new species from the Canary Islands

Jorge Alfredo Reyes-Betancort & Arnaldo Santos Guerra

## Abstract

REYES-BETANCORT, J. A. & A. S. GUERRA (2010). *Gymnosporia cryptopetala* Reyes-Bet. & A. Santos (Celastraceae), a new species from the Canary Islands. *Candollea* 65: 189-196. In English, English and French abstracts.

*Gymnosporia cryptopetala* Reyes-Bet. & A. Santos, a new species from the easternmost Canary Islands (Lanzarote and Fuerteventura), is described and illustrated. It belongs to sect. *Tenuispinae* and shows a close relationship with geographically distant species such as *Gymnosporia tenuispina* (Sond.) Szyszyl. and *Gymnosporia emarginata* (Willd.) Thwaites, among others species.

## Key-words

CELASTRACEAE – *Gymnosporia* – Canary Islands – Taxonomy

## Résumé

REYES-BETANCORT, J. A. & A. S. GUERRA (2010). *Gymnosporia cryptopetala* Reyes-Bet. & A. Santos (Celastraceae), une nouvelle espèce des Iles Canaries. *Candollea* 65: 189-196. En anglais, résumés anglais et français.

*Gymnosporia cryptopetala* Reyes-Bet. & A. Santos, une nouvelle espèce des Iles Canaries les plus orientales (Lanzarote et Fuerteventura), est décrite et illustrée. Cette espèce, appartenant à la sect. *Tenuispinae*, est affine avec des espèces géographiquement éloignées telles que *Gymnosporia tenuispina* (Sond.) Szyszyl. et *Gymnosporia emarginata* (Willd.) Thwaites, entre autres espèces.

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## Introduction

The genus *Gymnosporia* (Wight & Arn.) Hook. f. has recently been reinstated to include all its thorny members, previously placed under *Maytenus* Molina. It comprises about 118 taxa, occurring in the whole of Africa, Madagascar and adjacent islands, southern Spain, the near Middle East, Afghanistan, Pakistan, India, Sri Lanka, Thailand, Vietnam, China, Taiwan, Ryukyu Islands (Japan), Malesia, Australia (Queensland), and the Polynesian Islands (JORDAAN & VAN WYK, 1999, 2003, 2006; SIMMONS, 2004). Molecular data also support that *Gymnosporia*, and *Putterlickia* Endl., are a natural group distinct from *Maytenus* (SIMMONS & al., 2001a, 2001b, 2008).

Besides the Canarian endemic *Gymnosporia cassinoides* (L'Hér.) Masf. (= *Maytenus canariensis* (Loes.) G. Kunkel & Sunding), recorded for all the Canary Islands except Lanzarote, a second species of the genus is found in the easternmost islands (Lanzarote and Fuerteventura). The first author who noted the presence of this second species was KUNKEL (1973) who reported *Gymnosporia* sp. from Lanzarote, but without detailed data about its location, awaiting a correct determination. After this the same author added new localities for Lanzarote but plants were included under the name of *Gymnosporia senegalensis* (Lam.) Loes. (KUNKEL, 1974, 1975, 1976). In spite of that, Kunkel showed doubts about the infra-specific range of Lanzarote plants (KUNKEL, 1977). SANTOS & FERNÁNDEZ (1984) recorded this species also from Fuerteventura under the name *Maytenus senegalensis* (Lam.) Exell. Finally, SCHOLZ (2005) added another locality for Fuerteventura, at Montaña de Cardones. The inaccessibility of the majority of plants in these two islands makes it difficult to study them, especially the flower and fruit characters. The study of new collections and the monitoring of some plants cultivated in the garden of the Instituto Canario de Investigaciones Agrarias at Valle Guerra (Tenerife) for more than twenty years led us to the conclusion that these plants belong to a new undescribed species.

### *Gymnosporia cryptopetala* Reyes-Bet. & A. Santos, **spec. nova** (Fig. 1)

- *Gymnosporia senegalensis* auct. Canar., non (Lam.) Loes. 1893.
- *Maytenus senegalensis* auct. Canar., non (Lam.) Exell 1952.

**Typus:** SPAIN. Canary Islands, Lanzarote: very rare in Famara cliffs, below El Castillejo, 1.IV.1980, A. Santos & M. Fernández 27078 (holo-: ORT; iso-: MA, PAL).

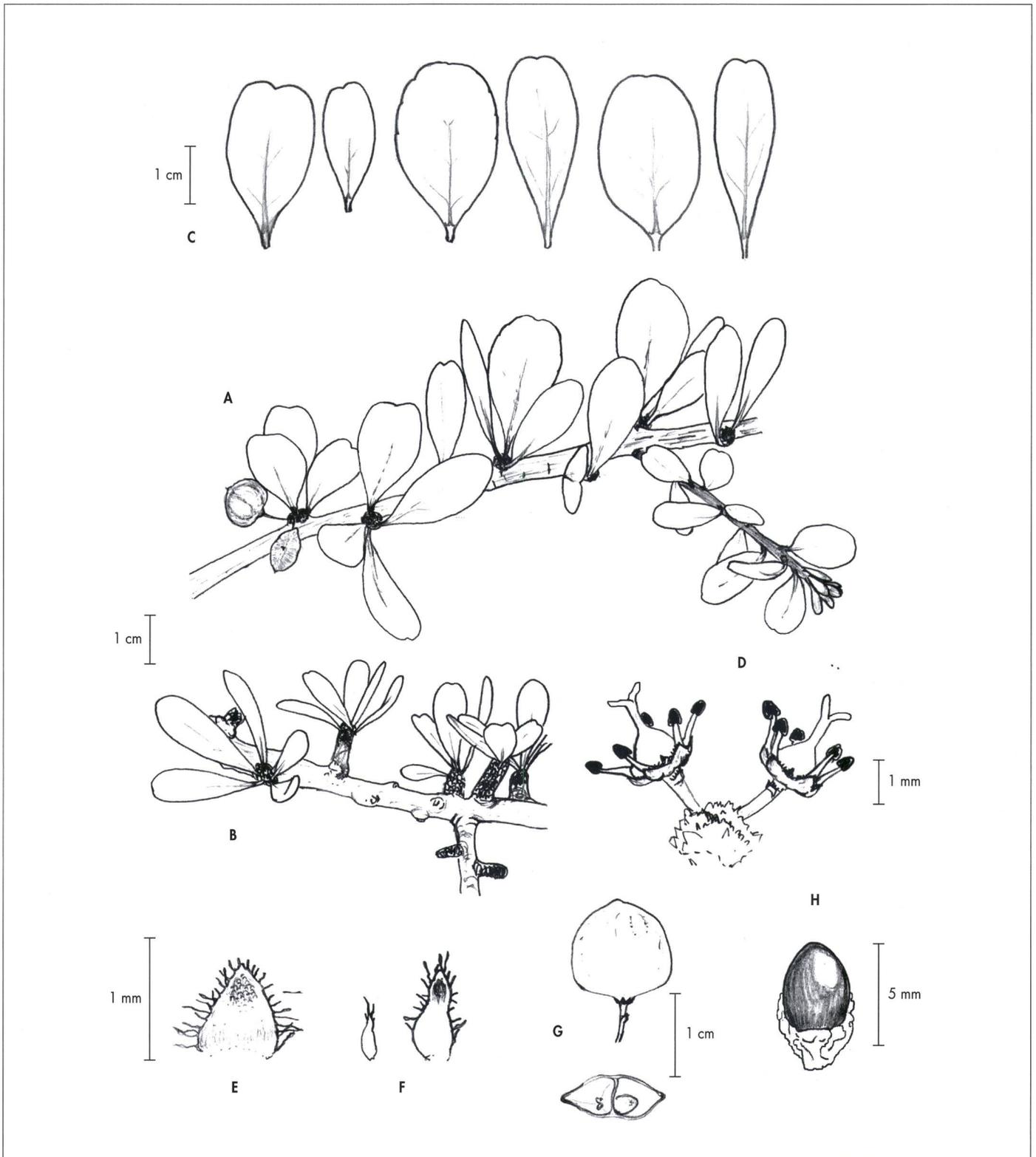
*Ab G. tenuispina affinis sed spinis patentis, robustioribus; foliis margine integro vel paucidentato; petalis brevioribus; capsula late conici-truncata vel subglobosa; arillo albo*

*differt. Ab G. emarginata, G. diversifolia, G. leptopus et G. commiphoroides similis sed ab eis petalis brevibus, capsula et semina maioribus dignoscenda. Praeterea a G. diversifolia differt frutice rigidi, ramosissimi, foliis saepissime fasciculatis in brachyblastis bene evolutis, atque ab G. emarginata differt semina castanea. Ab G. commiphoroides affinis sed frutex robustior, inermis vel parvo spinosus, ramis cinereis et semina castanea distinguitur. Ab G. leptopus similis sed inflorescentia breviter pedunculatae instructa.*

*Shrub* up to 1.5 m high, normally dioecious, many branched, unarmed or thorny (specially in young stage); bark gray, reticulate (reddish, smooth with small white lenticels when young); branches terete, with well developed brachyblasts up to 1.5 cm. *Thorns* (modified stem with sharp point), when present, robust, axillary, patent up to 2.5 cm. *Leaves* fasciculate towards tips of brachyblasts (alternate in young branches), glabrous, thick, coriaceous, pale green; lamina narrowly oblanceolate to obovate, rarely elliptic-oblong, 15-40 × 5-25 mm, apex rounded or emarginate, shortly mucronate, margin thickened, usually entire or remotely crenate, reticulate venation usually obscure above, more prominent below; petiole short, 2-5 mm long, reddish. *Inflorescence* cymose, axillary or crowded at upper part of a short-shoot, subsessile to pedunculate up to 7 mm. *Bracts* triangular-lanceolate, margin fimbriate. *Pedicels* glabrous, 1-7 mm long, articulate below the middle. *Flowers* green-reddish, ± 3 mm in diameter. *Sepals* 5, triangular, ± 0.6-0.8 mm long, apex acute, margin ciliate-fimbriate. *Petals* 5, ovate-lanceolate, 0.4-0.8 × 0.2-0.5 mm, margin ciliate-fimbriate, abaxially fused with brown at the tip. *Disc* narrow, fleshy, sub-pentagonal, adnate. *Male flowers*: stamens longer than ovary (filaments ca. 2 mm); anthers broadly ovoid; pistillode globose, small (semi-immersed), style very short, stigmas erect. *Female flowers*: disc narrower, staminodes shorter than stamens in male flowers (filaments ca. 1 mm); ovary 1/3 immersed in disc, 2 or 3 locular; 2 ovules per locule; style cylindrical, 2-3-branched (branches flattened), spreading. *Capsule* widely conic-truncate to subglobose, flattened (trigynous if 3-locular), flat-topped, apiculate, 2-valved or 3-valved, 7-10 × 8-11 mm, green-reddish to purple-red, turning light brown to purple-brown when dry. *Seed* 1-3, ellipsoid, brown, glossy, 4.5-5 × 3 mm; aril white (turning light brown when dry), cerebriform, an oblique basal rim.

*Etymology.* – The specific epithet refers to the inconspicuous petals of the plant.

*Distribution and habitat.* – Endemic to the easternmost Canary Islands, Lanzarote and Fuerteventura (Fig. 2). Growing on vertical, inaccessible cliffs, which constitute a refuge from goats and rabbits, very rare in lava flows, at altitudes of 80-650 m. *Gymnosporia cryptopetala* has its optimum in termophilous scrubs in the inframediterranean xeric semiarid



**Fig. 1.** – *Gymnosporia cryptopetala* Reyes-Bet. & A. Santos. **A.** Branch showing leaves, a young branch (on the right) and fruits (on the left); **B.** Branch showing well developed brachyblasts; **C.** Leaves; **D.** Female flowers; **E.** Sepal; **F.** Two petals; **G.** Lateral and cross section views of the fruit; **H.** Seed with aril.

[Drawings by J. A. Reyes-Betancort]

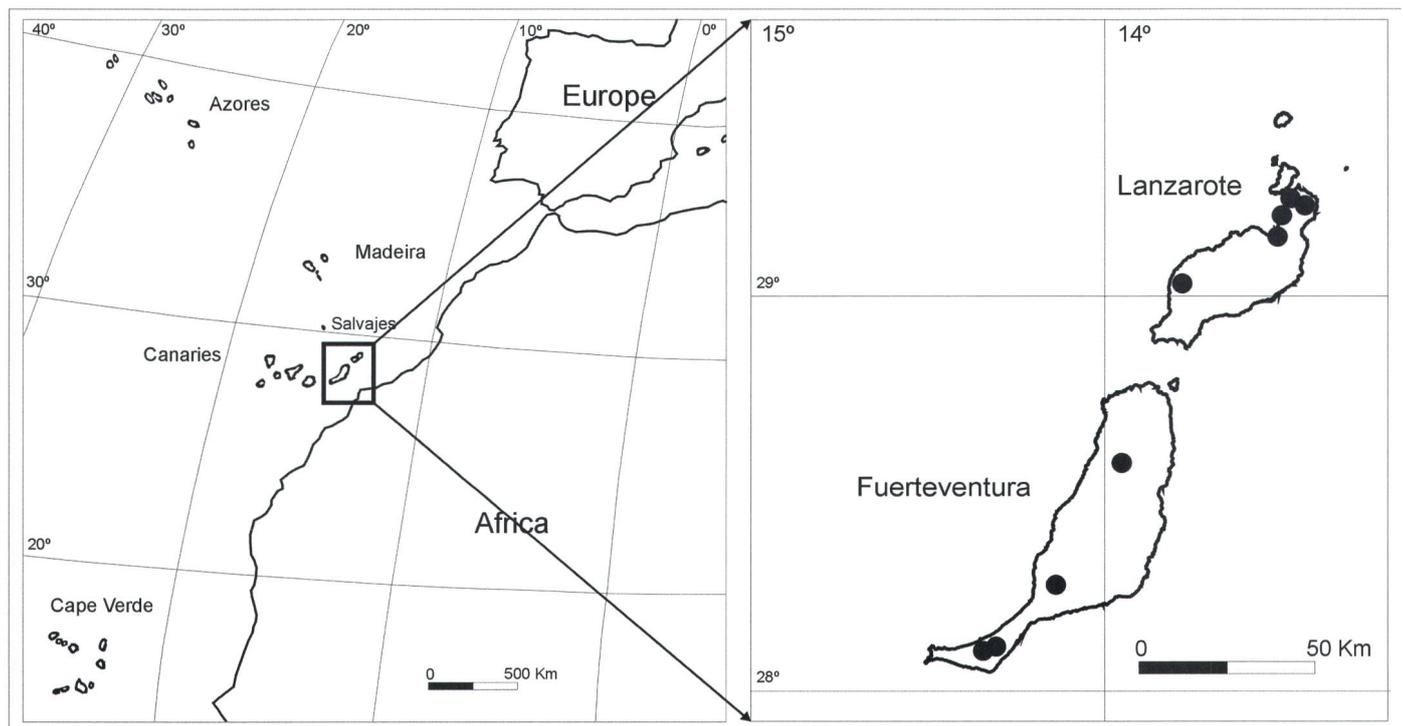


Fig. 2. – Present day distribution of *Gymnosporia cryptopetala* Reyes-Bet. & A. Santos (black dots) in the eastern Canary Islands.

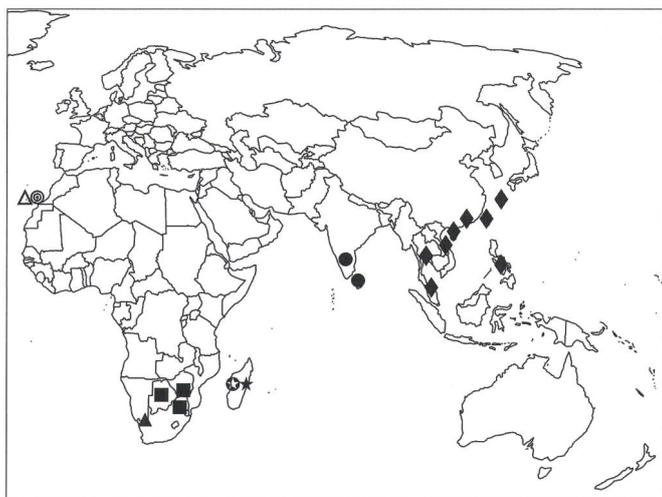
bioclimatic belt growing jointly with *Olea cerassiformis* Rivas-Mart. & del-Arco, *Phillyrea angustifolia* L., *Rhamnus crenulata* Ait., *Pistacia lentiscus* L., etc. It can grow also in the inframediterranean desertic arid bioclimatic belt but in this case is located in the most humid stands like those found on north facing cliffs or lava flows.

*Conservation status.* – *Gymnosporia cryptopetala* is extremely rare and is known from few localities. In Lanzarote it grows in three different areas: in Montaña Halcones (Timanfaya National Park), where only one individual was recorded; in Famara Massif we know around four or five individuals (the inaccessibility of this area makes counting it difficult), and in the Malpaís de La Corona where only three individuals have been located. On the other hand, only eight or nine plants are known on Fuerteventura, one or two individuals near La Matilla, one in Montaña Cardones, one on the north facing slopes of Pico de la Zarza, and five in the Esquinzo Valley (Stephan Scholz *pers. comm.*). For this reason we propose CR D status (Critically Endangered, criteria “D”) according to the IUCN (2001) Red List Categories. Although all populations are included within the nature reserve network of Lanzarote or Fuerteventura (Ley 4/2006 de modificación del Texto Refundido de las Leyes de Ordenación del Territorio de Canarias y de Espacios Naturales de Canarias), the low proportion of female individuals demands its urgent inclusion in a rescue programme to preserve the genetic diversity of this species.

*Relationships.* – Hitherto specimens of this species have been identified as “*Gymnosporia senegalensis*”, but it differs in having well-developed brachyblasts, inconspicuous petals, and a fleshy basal aril. In our opinion, *G. cryptopetala* is better placed in sect. *Tenuispinae* Jordaan which includes taxa with capsules usually longer than 5 mm and arils which are reduced to rims at the base of seeds. Sect. *Gymnosporia*, to which *G. senegalensis* belongs, includes taxa with globose to subglobose, dark purple or reddish, small (usually less than 5 mm) capsules and where the aril partially enveloped the seed.

From the morphological point of view this new species shows affinities with *G. tenuispina* (Sond.) Szyszyl., especially in the morphology of the fruit which is 3-gonous (or flattened if 2-locular), truncate, chartaceous and smooth (ROBSON, 1966). Nevertheless the Canarian plants have robust thorns (when present) longer than 1 cm long, always axillary (never terminating short branches); flowers are smaller (3-4 mm in diam not 5-7 mm); petals are less than 1 mm (2-2.5 mm long in *G. tenuispina*); capsule ovate to rounded (not obconic). Seeds 1-3, brown (purplish- or reddish-brown in *G. tenuispina*) and with a white aril (yellow in *G. tenuispina*).

*Gymnosporia cryptopetala* shows clear affinities with other taxa in sect. *Tenuispinae*, like *G. gariensis* Jordaan from the northern Cape of South Africa and southern parts of Namibia, *G. commiphoroides* H. Perrier and *G. leptopus* (Tul.) Baker from Madagascar, *G. emarginata* (Willd.) Thwaites from India



**Fig. 3.** – Distribution map of the species of *Gymnosporia* sect. *Tenuispinae* mentioned in the text. *Gymnosporia commiphoroides* H. Perrier (**white star**), *G. cryptopetala* Reyes-Bet. & A. Santos (**bull's-eye**), *G. leptopus* (Tul.) Baker (**black star**), *G. diversifolia* Maxim. (**black rhombuses**), *G. emarginata* (Willd.) Thwaites (**black dots**), *G. tenuispina* (Sond.) Szyszyl. (**black squares**), *G. gariepensis* Jordaan (**black triangles**), *G. cassinoides* (L'Hér.) Masf. (**white triangles**).

and Sri Lanka and *G. diversifolia* Maxim. from Asia, but differs in the small size of the petals (0.4–0.8 mm long) which are longer than 1 mm in the other species.

The sexuality and biotype of *G. cassinoides* (hermaphrodite, small tree), the presence of larger petioles and leaves, dichasial inflorescences, well-developed petals and obconic-trigonus fruits are characters which distinguish it from *G. cryptopetala*. Morphological differences between some species in this section are summarized in Table 1.

**Discussion.** – Plants studied from Fuerteventura show 3-valved fruits whilst plants from Lanzarote are 2-valved. Different colonisation events (including the founder effect) followed by isolation of populations of both islands provide a hypothetical explanation of the geographical distribution of this character. Despite this we consider this difference to be variability of the species itself, but it is important to keep in mind for conservation programs.

*Gymnosporia cryptopetala* has a well-defined distribution not shared with another species of sect. *Tenuispinae* (with the exception of the Canarian endemic *G. cassinoides*). This geographical disjunction between island species and the closest continental relatives is well-known in others endemic plants from the Canary Islands (Fig. 3; PERRIER, 1946; ROBSON, 1966; JORDAAN & VAN WYK, 2003; JORDAAN, 2005; HYDE & WURSTEN, 2009; QUANRU & FUNSTON, 2008), f.i. for *Helichrysum* Mill. (GALBANY-CASALS & al., 2009), *Dracaena* L. (MARRERO & al., 1998) and *Sideroxylon* L. (LOBIN & al., 2005).

*Gymnosporia cryptopetala* seems to be another species that supports the hypothesis of a huge but fragmented arid belt reaching from the Namib Desert to the Western Sahara (including arid parts of the Cape Verde and Canary Islands) via Eastern Africa (QUÉZEL, 1978; BRAMWELL, 1986; JÜRGENS, 1997).

**Additional material examined.** – **SPAIN. Canary Islands, Lanzarote:** Malpaís de La Corona, c. Peña del Artisco, 6.III. 2008, *J. A. Reyes-Betancort & A. Perdomo* 41123 (ORT). **Fuerteventura:** Montaña Aceitunal, 19.V.1979, *A. Santos & M. Fernández* 25305 (ORT); Valle de Esquinzo, 400 m, 24.VI.1980, *M. Fernández* 27219 (ORT); Valle de Esquinzo, 400 m, 20.II.2007, *S. Scholz* 39426 (ORT); Valle de Esquinzo, 350 m, 24.II.2006, *S. Scholz* 47903 (TFC); way up to Pico de la Zarza, 500 m, 25.IV.1979, *A. Santos & M. Fernández* 25304 (ORT); Montaña Cardones, 550 m, 13.V.2003, *S. Scholz* 46499 (TFC); *ex horto* Casa Sick (Esquinzo), 15.I.2009, *S. Scholz* 41096 (ORT).

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**Table 1.** – Some differential characteristics of the species of *Gymnosporia* (Wight & Arn.) Hook. f. mentioned in the text.

	<i>G. cryptopetala</i> Reyes-Bet. & A. Santos	<i>G. tenuispina</i> (Sond.) Szyszyl.	<i>G. gariensis</i> Jordaan	<i>G. commiphoroides</i> H. Perrier
Bark	greyish brown	greyish brown	greyish brown	blackish
Young branchlets	terete to slightly angular to the apex, not ribbed	slightly angular, flattened, not ribbed	terete	angular-ribbed
Brachyblast	well developed	short	short	short
Thorns	unarmed or axillary	axillary and lateral branch ending in a thorn	axillary and lateral branch ending in a thorn	axillary
Inflorescence	shorter than leaves (1-2)-flowered)	shorter than leaves (3-7(-10)-flowered)	shorter than leaves (1-2)-flowered)	shorter than leaves (1-flowered)
Petal length	0.4-0.8 mm	1.5-2 mm	2.5-4 mm	not known
Capsule	broadly conic-truncate to subglobose, compressed or trigonous if 3-locular	obconic- trigonous, truncate or compressed, semi-inflated	obconic-trigonous	obconic-subglobose
Locule	2 or 3	3(-2)	3	3(-2)
Seed	4.5 × 3-3.5 mm, brown	Not known, brown	5 mm, reddish brown	3-4 × 2-3 mm, red
Aril	Rim at base, white	Rim at base, yellow	Rim at base, yellow	Rim at base, white
Distribution	Eastern Canary Islands	E Botswana, S Zimbabwe and NE South Africa	S Namibia, NW South Africa	Madagascar

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<i>G. emarginata</i> (Willd.) Thwaites	<i>G. diversifolia</i> Maxim.	<i>G. cassinoides</i> (L'Hér.) Masf.	<i>G. senegalensis</i> (Lam.) Loes.
greyish brown	greyish brown	greyish brown	light grey
terete	terete	terete to slightly angular to the apex, not ribbed	terete
short	short	absent or short	absent or very reduced
axillary and lateral branch ending in a thorn	axillary and lateral branch ending in a thorn	unarmed (very rare axillary)	axillary and lateral branch ending in a thorn
shorter than leaves (few flowered)	shorter than leaves (1-few-flowered)	the same as or shorter than leaves (3-7-flowered)	shorter or longer than leaves (3-60-flowered)
2-3 mm	1-3 mm	3-4 mm	1.7-3.5 mm
obconic-trigonus	obcordate, compressed	obconic-trigonus	subglobose
3	2	3	2(-3)
2.5-3.5 × 2-2.5 mm, red	3 × 1.5 mm, brown	5 × 3-4.5 mm, brown	3-3.6 × 2.5-3 mm, brown
Rim at base, white	Rim at base, white	Rim at base, white	Partially covering the seed, white or pinkish
India and Sri Lanka	SE Asia	Canary Islands (except Lanzarote)	S Spain, Africa, W Asia, India and Indian Ocean Islands

