

Gymnosporia Cryptopetala Reyes-Bet. & A. Santos (Celastraceae), a New Species from the Canary Islands

Authors: Reyes-Betancort, Jorge Alfredo, and Guerra, Arnaldo Santos

Source: Candollea, 65(2) : 189-195

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

URL: <https://doi.org/10.15553/c2010v652a2>

BioOne Complete (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.

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.

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 affiné avec des espèces géographiquement éloignées telles que *Gymnosporia tenuispina* (Sond.) Szyszyl. et *Gymnosporia emarginata* (Willd.) Thwaites, entre autres espèces.

Address of the authors: Unidad de Botánica Aplicada, ICIA. Jardín de Aclimatación de La Orotava, C/ Retama 2, 38400 Puerto de La Cruz, Tenerife. Canary Islands, Spain.
Email (JARB): areyes@icia.es

Submitted on April 30, 2009. Accepted on August 24, 2010.

Edited by P. Bungener

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 infraspecific 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 cinereus 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, subpentagonal, 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

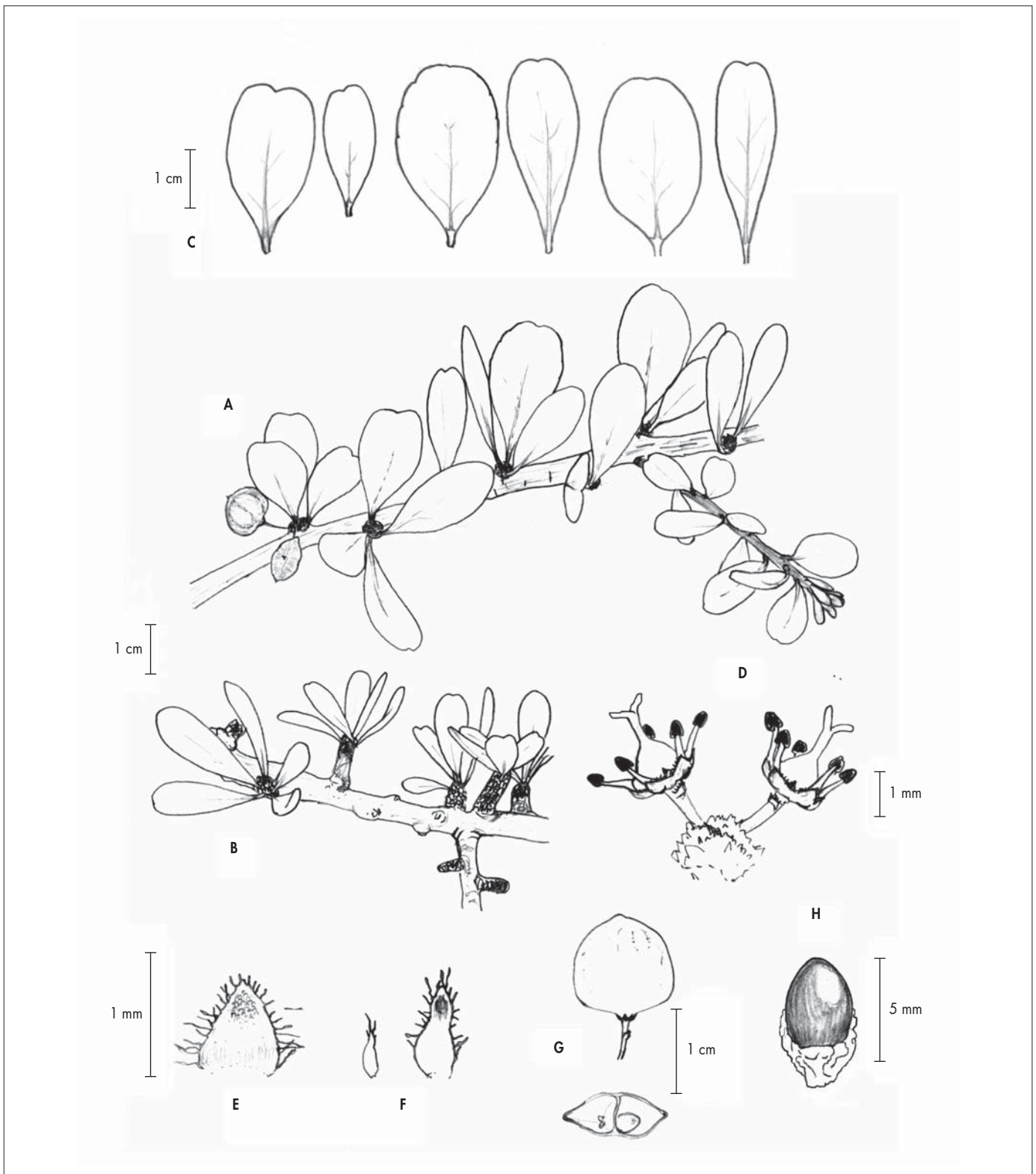


Fig. 1. – *Gymnosporia cryptopetala* Reyes-Bet. & A. Santos. **A.** Branch showing leaves, a young branch (on the right) and fruits (on the left); **B.** Branch showing well developed brachyblasts; **C.** Leaves; **D.** Female flowers; **E.** Sepal; **F.** Two petals; **G.** Lateral and cross section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

[Drawings by J. A. Reyes-Betancort]

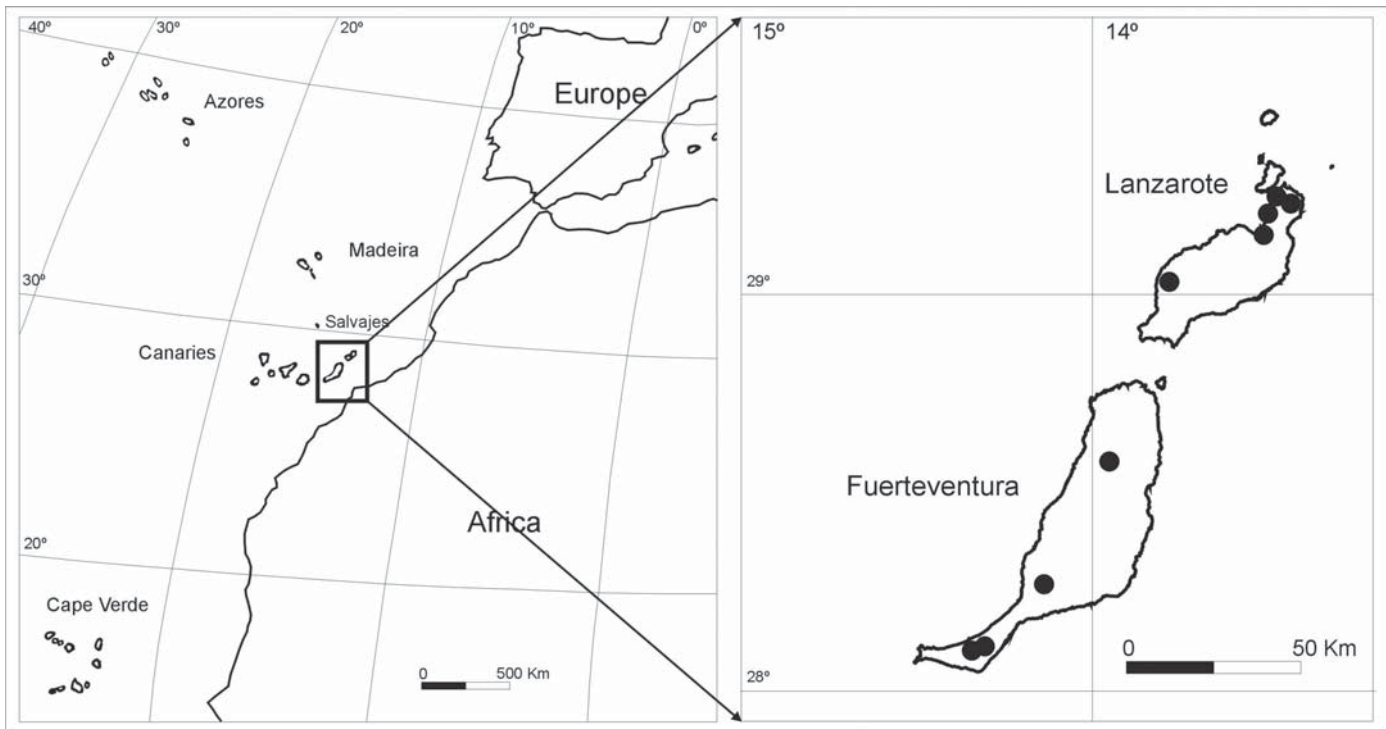


Fig. 2. – Present day distribution of *Gymnosporia cryptopetala* Reyes-Bet. & A. Santos (black dots) in the eastern Canary Islands.

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-trigonous 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:** Malpais 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).

Acknowledgements

We would like to express our gratitude to Stephan Scholz who provided us with useful information on Fuerteventura populations of this new species. We are also indebted to the anonymous reviewer for their valuable comments and suggestions to the manuscript.

References

- BRAMWELL, D. (1986). Contribución a la biogeografía de las islas Canarias. *Bot. Macaronésica* 14: 3–34.
- GALBANY-CASALS, M., N. GARCÍA-JACAS, LL. SÁEZ, C. BENEDÍ & A. SUSANNA (2009). Phylogeny, Biogeography, and Character Evolution in Mediterranean, Asiatic, and Macaronesian *Helichrysum* (Asteraceae, Gnaphalieae) Inferred from Nuclear Phylogenetic Analyses. *Int. J. Pl. Sci.* 170: 365–380.
- HYDE, M. A. & B. WURSTEN (2009). *Flora of Zimbabwe: Checklist: Celastraceae*. [http://www.zimbabweflora.co.zw/speciesdata/utilities/utility-display-checklist.php?family_id=53, retrieved 1 April 2009].
- IUCN (2001). *IUCN Red List categories and criteria, version 3.1*. IUCN.
- JORDAAN, M. (2005). A new species of *Gymnosporia* (Celastraceae) from Southern Africa. *Novon* 15: 301–304.
- JORDAAN, M. & A. E. VAN WYK (1999). Systematic studies in subfamily Celastroideae (Celastraceae) in southern Africa: reinstatement of the genus *Gymnosporia*. *S. Afr. J. Bot.* 65: 177–181.
- JORDAAN, M. & A. E. VAN WYK (2003). Reinstatement of *Gymnosporia* (Celastraceae): implications for the Flora Malesiana region. *Telopea* 10: 155–167.
- JORDAAN, M. & A. E. VAN WYK (2006). Sectional classification of *Gymnosporia* (Celastraceae), with notes on the nomenclatural and taxonomic history of the genus. *Taxon* 55: 515–525.
- JÜRGENS, N. (1997). Floristic biodiversity and history of African arid regions. *Biodivers. & Conservation* 6: 495–514.
- KUNKEL, G. (1973). Nuevas adiciones para la flora de las Islas Orientales. *Cuad. Bot. Canaria* 18–19: 25–31.

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. gariepensis</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

KUNKEL, G. (1974). Resultados de dos viajes a Fuerteventura y Lanzarote. *Cuad. Bot. Canaria* 20: 17-23.

KUNKEL, G. (1975). *Inventario de los Recursos Naturales Renovables de la Provincia de Las Palmas (Islas Canarias, España)*. Cabildo Insular de Gran Canaria y Excm. Mancomunidad Interinsular de las Palmas.

KUNKEL, G. (1976). Enumeración de las plantas vasculares del Parque Nacional de Timanfaya (Lanzarote) con notas adicionales. *Cuad. Bot. Canaria* 26-27: 41-58.

KUNKEL, G. (1977). *Endemismos Canarios. Inventario de las Plantas Vasculares Endémicas en la Provincia de Las Palmas*. Ministerio de Agricultura.

LOBIN, W., T. LEYENS, A. SANTOS GUERRA, H. COSTA NEVES & I. GOMES (2005). The genus *Sideroxylon* (Sapotaceae) on the Madeira, Canary Islands and Cape Verde archipelagoes. *Vieraea* 33: 119-144.

MARRERO, A., R. S. ALMEIDA & M. GONZÁLEZ-MARTÍN (1998). A new species of wild dragon tree, *Dracaena* (Dracaenaceae) from Gran Canaria and its taxonomic and biogeographic implications. *Bot. J. Linn. Soc.* 128: 291-314.

PERRIER, H. (1946). *Gymnosporia*. In: HUMBERT, H., *Fl. Madagascar & Comores* 116: 17-29. Tananarive Imprimerie Officielle.

QUANRU, L. & M. FUNSTON (2008). *Gymnosporia*. In: WU, Z. Y., P. H. RAVEN & D. Y. HONG (ed.), *Fl. China* 11: 474-477. Science Press.

QUÉZEL, P. (1978). Analysis of the Flora of mediterranean and Saharan Africa. *Ann. Missouri Bot. Gard.* 65: 501-535.

ROBSON, N. K. B. (1966). Celastraceae. In: EXELL, A. W. & H. WILD (ed.), *Fl. Zambes.* 2: 355-418. Crown Agents.

SANTOS, A. & M. FERNÁNDEZ (1984). Notas florísticas de las islas de Lanzarote y Fuerteventura (I. Canarias). *Anales Jard. Bot. Madrid* 41: 167-174.

SCHOLZ, S. (2005). Las plantas vasculares. Catálogo florístico. In: RODRÍGUEZ DELGADO, O. (ed.), *Patrimonio Natural de la Isla de Fuerteventura*: 241-280. Excmo. Cabildo de Fuerteventura, Gobierno de Canarias y Centro de la Cultura Popular Canaria.

SIMMONS, M. P. (2004). Celastraceae. In: KUBITZKI, K. (ed.), *The Families and Genera of Flowering Plants* 6: 29-64. Springer.

SIMMONS, M. P., J. J. CAPP, R. H. ARCHER, A. J. FORD, D. EICHSTEDT & C. C. CLEVINGER (2008). Phylogeny of the Celastraceae (Celastraceae) and the relationships of *Catha edulis* (qat) inferred from morphological characters and nuclear and plastid genes. *Molec. Phylogen. Evol.* 48: 745-757.

SIMMONS, M. P., C. C. CLEVINGER, V. SAVOLAINEN, R. H. ARCHER, S. MATHEWS & J. J. DOYLE (2001a). Phylogeny of the Celastraceae inferred from phytochrome B and morphology. *Amer. J. Bot.* 88: 313-325.

SIMMONS, M. P., V. SAVOLAINEN, C. C. CLEVINGER, R. H. ARCHER & J. I. DAVIS (2001b). Phylogeny of the Celastraceae inferred from 26S nrDNA, phytochrome B, atpB, rbcL, and morphology. *Molec. Phylogen. Evol.* 19: 353-366.

<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