

A new subspecies, *Dracaena draco* (L.) L. subsp. *caboverdeana* Marrero Rodr. & R. Almeida (*Dracaenaceae*) from Cape Verde Islands

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Abstract

A study of qualitative and quantitative characters for 92 individuals of *Dracaena draco* in the three main areas of distribution: Canarias-Madeira, Anti-Atlas and Cape Verde Islands, is realized. Characters such as the shape of the plant, the color and width of leaves, the shape of the pedicels and the size of fruits and seeds allow us to differentiate the populations of the archipelago of Cape Verde. We describe here a new subspecies of dragon tree, *Dracaena draco* (L.) L. subsp. *caboverdeana* Marrero Rodr. & R. Almeida, to such Atlantic Islands. In this paper we also present data of habitat, ecology and phytogeography of this new subspecies.

Keywords: Cape Verde Islands, *Dracaena*, phytogeography, habitat, taxonomy

Introduction

Dracaena draco (L.) L. is a North Atlantic species, native to the archipelagos of Madeira (Madeira and extinct in Porto Santo), Canary Islands (Tenerife, extinct in Gran Canaria) and the Cape Verde Islands (Santo Antão, São Nicolau and Fogo, extinct in Santiago and São Vicente) (Marrero et al., 1998; Marrero, 2010). The presence of this species as native to the archipelago of the Azores, as well as on the islands of El Hierro, La Gomera, La Palma (Canary Islands), or in the island of Brava (Cape Verde) is discussed and is not documented (Almeida, 2010; Marrero, 2010). In the island of Santiago the only reference was the appointment of Chevalier (1935) for the Pico Antonia escarpments, but the species must have been especially frequent in the São Miguel parish, on the northern slope of Serra da Malagueta, given the existence of numerous place names alluding to this species in the area (Duarte & Moreira, 2002). Wild populations of this species also grow in the Anti-Atlas, in Morocco, in the escarpments and gorges of Asif Ou-Magouz in the upper basin of the Massa River. Finally, it is suspected that plants of dragon tree that grow in the foothills of Cádiz and Gibraltar could be, in part, originating in native populations of areas nearby but now extinct (Marrero, 2010).

When Benabid & Cuzin (1996) reported the existence of wild dragon tree in the Anti-Atlas, describe them as

Dracaena draco (L.) L. subsp. *ajgal* Benabid & Cuzin, noting some differences with the Atlantic Islands dragon tree, particularly by having shorter pedicels and yellow anthers. This led us again the suspicion that the Cape Verde Islands the dragon tree constituted a different taxon. Plants of these dragons tree grow in the Jardín Botánico Canario "Viera y Clavijo" – Unidad Asociada CSIC from Santo Antão and distinguished with the naked eye of the Canary Islands dragon tree especially for the color of its leaves. But a decision in this regard required a thorough study.

Material and method

In this work we are dealing with the metric study and qualitative characters of material fresh leaves, fruit's pedicels, fruits and seeds of *D. draco*. These characters are best suited for the timely diagnosis, after previous studies. The development of various projects in the Jardín Botánico Canario "Viera y Clavijo" – Unidad Asociada CSIC, such as BIOMABANC (03/MAC/4.1/C7), CAVEGEN (04/MAC/3.5/C34) or BIOCLIMAC (MAC/1/CO67), along with other personal initiatives has enabled us to carry out the material sampling enough for the study. Various expeditions to the Cape Verde Islands (Santo Antão, São Vicente, São Nicolau, Santiago, Fogo, and Brava), Morocco (foothills Asif Ou-Magouz) and Madeira (Ribeira Brava), are realized. Material of Gran

Canaria (ex horto) and Tenerife (of natural populations and ex horto) was also collected. Total 92 individuals of dragon tree samples were studied: 27 *D. draco* subsp. *draco*, 7 *D. draco* subsp. *ajgal* and 58 individuals from *D. draco* subsp. nov. (Table I).

<i>D. draco</i> (subspecies)	leaves	fruits pedicels	fruits	seed
<i>draco</i> Canary Is. Madeira Is.	26	9	9	9
<i>ajgal</i> Morocco	7	4	4	3
<i>caboverdeana</i> Cape Verde Is.	59	27	15	28

Table I.- Number of individuals analyzed for each sample and subspecies of *Dracaena draco*

Measures were taken with a millimeter tape of lacquered steel, with a digital electronic caliper Centigriff CF-7114 and with the support of field magnifying glass. The material collected in the locotypical localities, as in others one, are deposited in the LPA Herbarium (holotype and paratypes), with duplicates which will be sent to various herbaria.

Description

Dracaena draco (L.) L. subsp. *caboverdeana* Marrero Rodr. & R. Almeida subsp. nov.

Holotype: Cape Verde Islands, Santo Antão, Ribeira Grande, escarpes de Matinho, Ribeirinha, sobre Tarref d'Cima-Caibros, 1180 m s.m., NE; UTM: 26Q PD 993 926, en los escarpes por debajo de la meseta de cultivos (Planalto Leste); individuo viejo con 6-7 niveles de ramificación; leg.: Á.Marrero, R. Almeida & J. Caujapé, 09/03/2006; Campaña CAVEGEN-2006, LPA: 28878, with dupl. (Isotype). (Figure 1).

Paratypes: Cape Verde Islands, Santo Antão, Paul, Covadinha, sobre Santa Isabel, 1200 m s.m., NW; UTM 26Q QD 104 926; en riscos, taludes inaccesibles y entornos agrícolas, drago grande-A, con 8-9 ramifica-

caciones; leg.: Á.Marrero & R. Almeida 30/06/2006; Campaña CAVEGEN-2006, LPA: 28894-28895. Ibidem, drago grande-B, con 8-9 ramificaciones, Ibid. LPA: 28892-28893.

Habit arborescent-shrubby up to 4-6 (8) m high; cup dense, umbrelliform and wide; with a stout trunk in general proportionally short 1-2 (3) m tall, with erect-patent to patent external ramifications; leaves linear ensiform, $67.4 \pm 14.6 \times 3.6 \pm 0.48$ cm (up to 110 cm), with extreme subulate, glaucous o blue-grey in color; conical-globular very large floral scapes of up to 100 cm long, bipinnates; pinna with abundant floral glomerules with 2-5 (7) flowers; pedicels of the fruits 8.1 ± 0.91 mm, articulated, with the distal segment shorter 3.36 ± 0.73 mm; flowers generally white greenish or more rarely off-white-cream in color; stamens with anthers green or green-yellowish in color; fruit fleshy, spherical, somewhat flattened by the polar diameter of (13.2) 14.3-15.6 (17.6) mm; seeds spherical (6.0) 8.0-10.5 (11.5) mm, in general slightly flattened at the poles. (Iconography, Figure 2).

Taxonomic comments

Dracaena draco (L.) L subsp. *caboverdeana* Marrero Rodr. & R. Almeida, from *D. draco* subsp. *draco* and *D. draco* subsp. *ajgal* differs mainly due to the characteristic leaves glaucous o blue-grey in color, but also opposed by a number of trends in other notable features. These characters include general appearance of the plant with shorter trunks and large top, proportionally more wide leaves, pedicels of the fruits with the distal segment proportionally shorter (with a distal and proximal ratio of 3/4 and not 4/5 as in the other two subspecies), fruits and seeds of greater size average. (Tables II, III).

Habitat and Ecology

Currently *D. draco* (L.) L subsp. *caboverdeana* Marrero Rodr. & R. Almeida presents natural populations in the islands of Santo Antão, São Nicolau and Fogo, growing sub-spontaneous also in Santiago and Brava and cultivated on all islands.

<i>D. draco</i> (subspecies)	overall appearance in its natural environment			leave	
	aspect	external branching	top	colour	blade
<i>draco</i> Canary Is. Madeira Is.	high ± developed trunk	erect-patent	dense to slender	green to green- glaucous	flat, ± flexible slightly succulent
<i>ajgal</i> Morocco	high ± developed trunk	erect-patent	in general dense	green- glaucous	flat, hardly flexible slightly succulent
<i>caboverdeana</i> Cape Verde Is.	low ± short trunk	erect-patent to patent	dense	blue- glaucous	flat to slightly canaliculate hardly flexible ± succulent

Table II.- Qualitative data of size and leaves of the subspecies of *Dracaena draco*

<i>D. draco</i> (subspecies)	leaves			fruit pedicels			fruits Φ equatoria l (mm)	seeds Φ equatorial (mm)
	length (cm)	width (cm)	ratio length/width	total length (mm)	distal part (mm)	ratio distal/total		
<i>draco</i> Canary Is. Madeira Is.	79,7 \pm 13,02	3,3 \pm 0,40	20-30	8,8 \pm 1,17	3,95 \pm 0,87	3/7 (2/4,6)	13,59 \pm 0,85	8,79 \pm 0,95
<i>ajgal</i> Morocco	61,14 \pm 17,14	2,67 \pm 0,35	20-30	7,47 \pm 2,02	3,33 \pm 0,81	4/9 (2/4,5)	11,55 \pm 0,75	7,99 \pm 0,33
<i>caboverdeana</i> Cape Verde Is.	67,4 \pm 14,6	3,6 \pm 0,48	15-20 (25)	8,1 \pm 0,91	3,36 \pm 0,73	2/5	14,94 \pm 0,62	9,32 \pm 1,20

Table III.- Quantitative data of leaves, pedicels, fruits and seeds of the subspecies of *Dracaena draco*

Although the Macaronesia is well characterized geologically and geographically not true from the geobotanical point of view (Rivas Martínez, 2009). As this author points out the Cape Verde Islands are located in the Paleotropical Kingdom, Sahelo-Sudanic region, Saharo-Tropical subregion, with a Tropical bioclimate: tropical desert climate with extremely arid to arid ombroclimate (70% of the surface of the archipelago), tropical xeric of semiarid to dry (25%) and tropical pluviseasonal of sub-humid to humid low-humid (5%). In this context, *D. draco* subsp. *caboverdeana* would be restricted to the bioclimates tropical xeric and tropical pluviseasonal.

According to the ecological and vegetation patterns proposed by Brochmann & Rustan (1987) and Brochmann & al. (1997), it is a mesophile species of the humid and sub-humid areas of the Islands. Although it covers a wide altitudinal range from close to the level of the Sea (50 m s.m.) to summits (1400 m s.m.), it is restricted to the windward slopes of the Islands (Byström, 1960). These slopes are exposed to the NE, being influenced by the humidity of the trade winds, which constitute the main contribution of moisture in this archipelago (Chevalier, 1935). Within the archipelago constitutes a "western element" in the sense of Brochmann & Rustan (1987), where it shares habitat with the majority of endemism of Cape Verde islands, as *Artemisia gorgonum* Webb, *Echium stenosiphon* Webb subsp. *stenosiphon*, *Euphorbia tuckeyana* Webb, *Globularia amygdalifolia* Webb, *Lavandula rotundifolia* Benth., *Micromeria forbesii* (Benth.) Briq., *Sideroxylon marginata* (Decne.) Cout., *Sonchus daltonii* Webb or *Verbascum capitivirdis* Huber-Morath, among others.

Altogether these species of the Cape Verde Islands would be part of the vegetation of the potential sclerophyll forests, formed mainly by dragon tree and "marmulanes", *Sideroxylon marginata* (Santos 1999), recalling the vegetation of *Rhamno crenulatae-Oleetea cerasiformis* Santos ex Rivas Martínez 1987, of Canary Islands and Madeira. According to the proposal of Rivas Martínez et al. (in press) for the phytosociological communities of the Cape Verde Islands (Rivas Martínez, 2009), *D. draco* subsp. *caboverdeana* would be restricted to the communities of the *Asparago squarrosi-Sarcostemion daltonii* and especially to the *Globulario amygdalinae-Artemision gorgoni*, meso-shrublands or tree sized shrublands, infra-thermotropical, with semiarid, dry or subhumid ombroclimate. Being locally present also in

the thermotropical, desert-xérica, Savannah, to the arid-dry communities of *Sideroxylon marginatae-Acacion albidae*.

Phytogeography

Chevalier (1935) indicated for the endemic flora of the Cape Verde Islands up to 80% (4/5) as relatives of Mediterranean or Holarctic species and very related to the Macaronesian flora. Brochmann & al. (1997) in an exhaustive analysis found that only 64.6% of the endemic elements of these islands are Holarctic (2 Widdely Holarctic, 6 Mediterranean, 33 Canaro-Madeiran and 12 NW-Moroccan), against the Saharo-Arabian (17.1%) or Sudano-Zambesian-Sindian (14.6%). Rivas-Martínez (2009) supports the Mediterranean or afro-european origin of many genera of the endemic flora of Cape Verde: *Diplotaxis*, *Globularia*, *Helianthemum*, *Lotus*, *Micromeria* or *Phagnalon*, while for others on the contrary signals affinities afro-tropicals or Euroasiatic-Africans as *Periploca*, *Sonchus*, *Aeonium*, or *Echium*. Many of these genera are well represented in Macaronesia, especially in the Canary Islands (Macaronesian elements), and are considered as representatives or arising from old Pliocene-Pleistocene floras of the surrounding continent. But Rivas-Martínez (2009) notes that the current native and naturalised flora of the Cape Verde Islands, presents especially African tropical affinities, with 39% of the genera with this distribution.

Dracaena draco is considered as a typical example of the affinities floristic between Madeira, the Canary Islands and the Islands of Cape Verde, as it is the case with many of the endemic species of these last Islands (Brochmann & al., 1997), which include species of genera such as *Aeonium*, *Echium*, *Globularia*, *Micromeria* or *Sideroxylon* (Santos 1999). But recent studies of molecular phylogenies have shown that some macaronesian groups of plants are polyphyletic, making clear multiple colonization. This is the case, for example, of *Hedera* (Azores, Madeira and Canary Islands) or *Olea* (Madeira and Canary Islands) (Vargas & al., 1999; Hess & al. 2000).

Do not rule out that *Dracaena* can be a similar case, bearing in mind that the Canary Islands-Maderense dragon tree, *D. draco* subsp. *draco* and the dragon tree of the Anti-Atlas, *D. draco* subsp. *ajgal* have more affinities among themselves with the subspecies *caboverdeana*.

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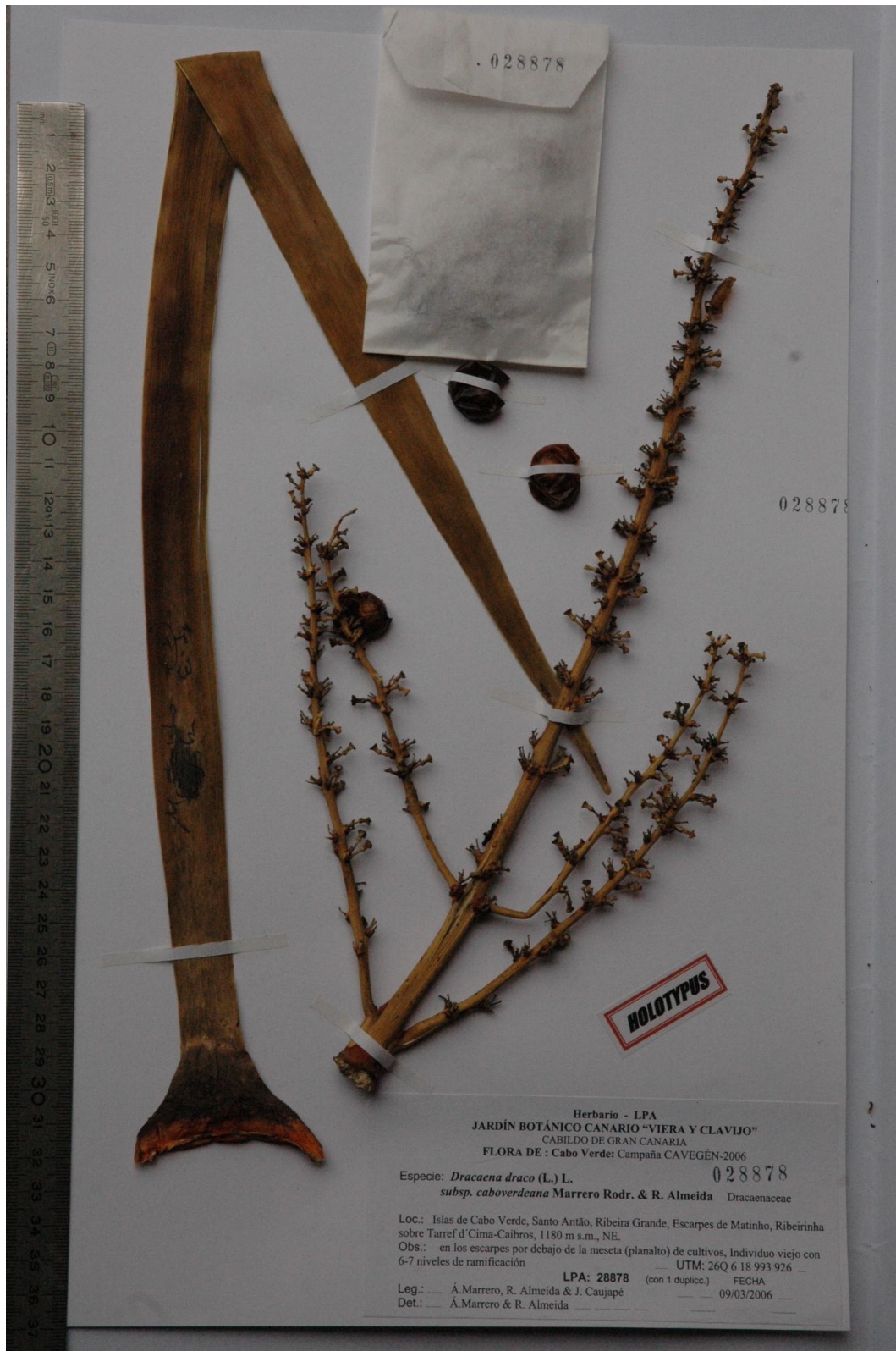


Figure 1.-Holotypus of *Dracaena draco* (L.) L subsp. *caboverdeana* Marrero Rodr. & R. Almeida, LPA: 28.878.

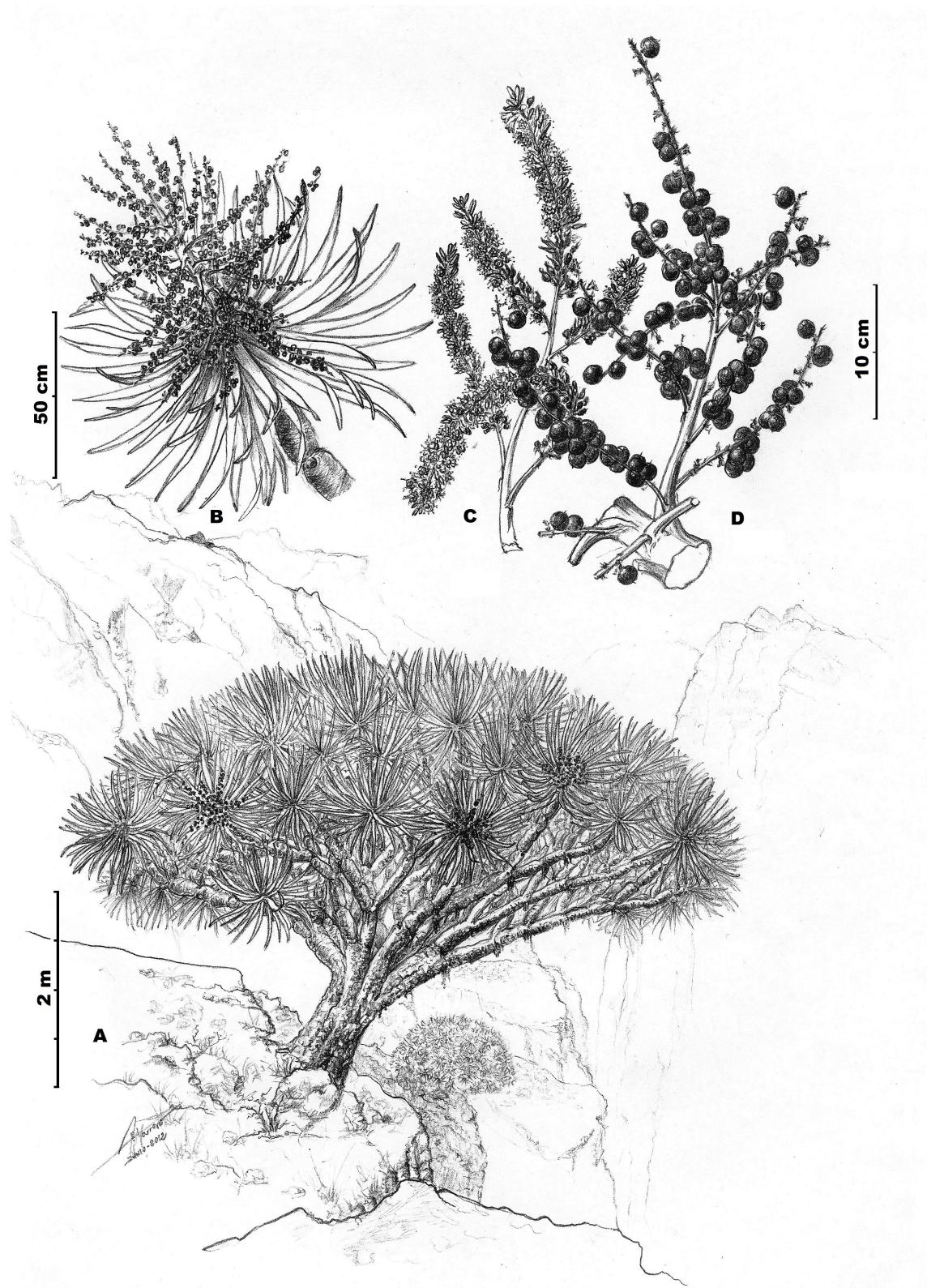


Figure 2.—Icon, A) general bearing of the plant in its natural habitat: Santo Antão, scarps of Matinho above Tarref d’Cima-Caibros. (B) infructescence branch; (C) inflorescence pinna; (D) infructescence pinna with fruits.