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Natural hybrids in endemic Canarian dendroid spurges *(Euphorbia* subsect. *Pachycladae)*

Abstract

Molero, J. & Rovira, A. M.: Natural hybrids in endemic Canarian dendroid spurges *(Euphorbia* subsect. *Pachycladae).* – Willdenowia 35: 271-280. – ISSN 0511-9618; © 2005 BGBM Berlin-Dahlem. doi:10.3372/wi.35.35207 (available via http://dx.doi.org/)

The hybridization in Canarian dendroid spurges belonging to *Euphorbia* subsect. *Pachycladae* is discussed. Natural hybrids accepted to date are nomenclaturally typified, two new hybrids, *E.* ×*marreroi (E. regis-jubae* × *E. aphylla)* in Gran Canaria and *E.* ×*fernandez-lopezii (E. bourgeana* × *E. berthelotii)* in La Gomera, are described, and all hybrids and their parents are morphologically characterised and compared.

Introduction

Natural hybridization is infrequent in *Euphorbia*. With more than 2100 published species (Oudejans 1990) reduced to 1836 accepted species (Govaerts & al. 2000) just over a hundred hybrids have been described. Some are between highly plastic species (e.g. in *E.* subg. *Esula* sect. *Esula*) and often actually correspond to simple forms of non-hybridogenous nature. Several mechanisms in *Euphorbia* ensure the genetic stability of the species and contribute to make interspecific crossing difficult. The most frequent ones are the allopatric distribution of related taxa as a result of radiation, ecological specialization (clinal segregation and habitat specialization) and mechanisms of temporal separation (differences in phenology, protandry, pollen-stigma incompatibility, etc). These regulate the highly non-specific cross-pollination that occurs in the genus and the low rates of self-pollination (Simón & Vicens 1999, Molero & Rovira obs.). However, hybridization is not uncommon in closely related and recently differentiated groups of species with overlapping contact areas, such as *E.* subsect. *Pachycladae* Boiss. in the Canary Islands (Molero & al. 2000), revealing the weakness of reproductive barriers. The similarity of the karyotype can be highly conducive to meiotic segregation and the viability of hybrids. We cannot agree with Hobohm (2000) that the adaptative radiation process in this group of endemic Canarian *Euphorbia* is complete, not, at least, on Tenerife and La Gomera, where the greatest (vertical and horizontal) radiation has taken place. On Tenerife, active hybridization is occurring in the Teno region and especially on La Gomera in the Erques gully, where we have observed a very clear example of active hybridization and backcrossing between *E. bourgeana* Boiss. and *E. berthelotii* Boiss.

An example that shows the weakness of reproductive barriers between Canarian dendroid spurges provides the *Euphorbia lamarckii (obtusifolia)* complex in the Botanical Garden Viera y Clavijo (Las Palmas, Gran Canaria). The excellent collection of representatives of this complex has been grown in relative closeness for several decades, without physical barriers to prevent cross-pollination. During a visit to the Botanical Garden in 1995, not only could we observe some hybrids already present in the wild, but we were able to collect some spontaneous hybrid samples (material deposited in the herbarium of the University of Barcelona, BCN) between species that occur far apart in their natural habitat (*E. regis-jubae* Webb & Berthel. × *E. atropurpurea* f. *lutea* A. Santos, *E. regis-jubae* × *E. bourgeana* and so on).

The present contribution treats the natural hybrids of Canarian *Euphorbia* subsect. *Pachycladae*. Herbarium material of the previously described hybrids preserved in the herbarium of the Jardin de Aclimatación de la Orotava, Tenerife (ORT) was studied and samples of wild populations were surveyed, collected and studied, together with their parental species, in Gran Canaria, Tenerife and La Gomera. As a result, strong morphological evidence and spatial distribution (situation of the hybrids "inter parentes") allow safe identification of five natural hybrids.

Results and discussion

So far three natural hybrids of *Euphorbia* subsect. *Pachycladae* have been described from the Canary Islands: *E.* ×*jubaephylla, E.* ×*navae* and *E.* ×*pettersonii*. In addition, the hybrid *E. atropurpurea* × *E. bourgeana* has been reported from the foot of the slope of Guimar (Santos 1998), but this taxon has not yet been formally described and we could not find it.

Descriptions are provided of the five hybrids that are finally recognized in this group, including two new hybrids, *E.* ×*marreroi* from Gran Canaria and *E.* ×*fernandez-lopezii* from La Gomera. Table 1 compares relevant morphological diagnostic characters of these hybrids and their progenitors.

Euphorbia* ×*jubaephylla Svent., Addit. Fl. Canar. 1: 29. 1960
Type citation in the protologue: "Nivaria (Tenerife): regione occidentali in planities infra appidulum Buenavista, ubi es valde rara. Legit cum fructu mense Augusto 1954 et cum flore die 30.5. 1956".
Lectotype (designated here): "*Euphorbia* / × *jubaephylla*/ Svent. hybr. nat./ Tenerife: Buenavista/ reg. *marítima/rarísima,* muy escasa/ 30.5.1956/ Sventenius" [in Sventenius handwriting] (ORT 2027; isolectotype: ORT 2027bis).

Ic. – Sventenius (1960: 30, t. XI).

Note. – Originally described as the hybrid *Euphorbia regis-jubae* × *E. aphylla* Willd., *E.* ×*jubaephylla* is actually the hybrid *E. lamarckii* var. *broussonetii* (Link) Molero & Rovira (see Molero & Rovira 2004) × *E. aphylla.*

Diagnosis. – Habit most similar to *Euphorbia aphylla*. It differs from *E. lamarckii* var. *broussonetii* by being a more succulent, smaller shrub with denser, more intricate ramification; also by its very fleshy apical branches, with fewer, smaller, linear or linear-spathulate, soon deciduous leaves of 10-30 × 2-4 mm; by its smaller number (3-6) of pleiochasial rays, which are shorter (5-20 mm) and fleshy; its smaller subsessile cyathia (pedicellate in *E. lamarckii*) and its smaller capsules, seeds and caruncles. It differs from *E. aphylla* by having leafy apical branches and a more developed synflorescence; also by its pleiochasial elliptical or obovate bracts 5-10 × 3-6 mm (not present in *E. aphylla*); its ovate or obovate-oblong infracyathial bracts (elliptical to oblong in *E. aphylla*) being persistent until the fruit ripens; its larger capsules and its larger seeds with a larger caruncle.

Fleshy shrub, 80-170 cm high, densely branched from the base. *Ramification* intricate, erecto-patent with branches generally grouped in pseudoverticils of 3-11; apical branches slightly clavi-

Table 1. Comparative list of diagnostic characters of the hybrids and progenitors of the Canarian *Euphorbia* subsect *Pachycladae*. – Abbreviations: L = length, W = width. **Hab** (habit): VI = very intricate branch structure, apical stems fleshy, up to 0.6 cm in diameter, green or greyish green, with no brown or reddish parchment-like bark (rhytidome), and no or only a few leaf scars; IN = intricate branch structure, apical stems fleshy/subfleshy, greyish green, up to 0.6(-0.8) cm in diameter, with numerous leaf scars; SI = non-intricate branch structure, subfleshy apical stems 0.8-1.3 cm in diameter with a brown or reddish parchment-like rhytidome and numerous leaf scars. **C** (colour of leaves and synflorescences): g = green; pr = pale purplish-red; r = purplish red. **Pleiochasial rays** (pseudo-umbel): n° = number of primary rays; SR = secondary rays (number per primary ray). **Infracyathial bracts** (bracteoles): P = persistence during fruiting (p = persistent, d = deciduous); C = concrescence; f = free to the base; c = connate, lower half joined. **Horns** = cyathial glands with two horns on the outer edge (+), or without horns (–). **Seed:** form = longitudinal section, ventral view. **Caruncle:** form = form of longitudinal section of seed, lateral view. – All measurements in mm.

	Hab	Leaves (L × W)	C	Pleiochasial rays n°	L	SR	Infracyathial L × W	bracts P	C	Horns	Capsules L × W	Seed L	form	Caruncle L × W	form
E. regis-jubae	IN	15-100 × 3-10	g	4-10	20-50	2	5-10 × 7-15	p	f	+	4-5.2 × 5.2-7.3	2.5-3.5	oblong	0.4-1 × 0.7-1.2	obnavicular-truncate
E. ×marreroi	VI	4-14 × 1-4	g	3-5	8-20	2	3-4.5 × 2.8-4	p	f	+	4-5 × 4.5-5.7	2.5-3	ovoid-oblong	0.4-0.7 × 0.9-1.2	widely conical
E. aphylla	VI	–	g	1-3	0.2-0.5	–	1.5-2.5 × 2-2.5	d	f	–	3-3.5 × 4-4.5	1.8-2.3	ovoid	0.5-0.7 × 0.5-0.7	conical
E. ×jubaephylla	VI	10-30 × 2-4	g	3-6	0.5-2	2	2-3 × 2-3	d	f	–	3-4 × 5-7	2.2-2.6	ovoid	0.4-0.6 × 0.9-1.2	obnavicular-truncate
E. lamarckii var. ***broussoneti***	IN	30-80 × 3-7	g	3-7	10-30	2	2.5-5 × 1.3-3.8	d	f	–	3.8-6 × 5.5-8.2	2.4-3.3	ovoid	0.7-1.5 × 0.6-1.2	obnavicular-truncate
E. ×navae	SI	30-90 × 3-8	pr	5-10	15-40	2	4.5-7.5 × 4.0-7	p	f	–	5.4-6.6 × 5.6-6.8	2.4-6.4	oblong	1-1.4 × 1-1.2	Conical-mitre-shaped
E. atropurpurea	SI	50-120 × 10-20	r	5-15	20-60	3-4	3-10 × 7-15	p	c	–	5.5-7 × 5-6.5	3-4.2	oblong	0.8-1.4 × 0.5-1.3	Conical-mitre-shaped
E. ×peterssonii	SI	10-20 × 2-4	g	2-5	0.8-2	2	–	p	f	–	–	–	–	–	–
E. berthelotii	IN	30-70 × 3-8	g	3-10	10-50	2	5-8 × 3-7	p	f	–	5-6 × 5-6	2.3-3.2	ovoid-oblong	0.4-0.9 × 0.5-1	conical-hemispherical
E. ×fernandez-lopezii	SI	40-100 × 8-15	pr	5-8	30-60	2	7-12 × 7-13	p	f	–	6-8 × 8-10	3.2-3.8	ovoid-oblong	0.8-1 × 1.5-1.7	conical-hemispherical
E. bourgeana	SI	30-170 × 7-20	g/r	4-9	30-70	3	12-19 × 14-22	p	c	–	6-8.6 × 7.2-9.8	3.6-5.4	ovoid-oblong	0.8-1.4 × 0.9-1.7	conical

form, densely pruinose, with leaf scars closely gathered towards the apex. *Leaves* 10-30 × 2-4 mm, linear, narrowly linear-obovate or linear-spathulate, obtuse, abruptly narrowed at the base, glaucescent and soon deciduous; small leaves of annual shoots 2-4 × 2-3.5 mm, broadly linear, obtuse or rounded, fleshy, soon deciduous. *Terminal pleiochasium* (pseudo-umbel) at the apices of the non-flowering branches or annual shoots if present; *pleiochasial bracts* broadly linear or elliptical, apex truncate, yellowish, deciduous. *Pleiochasial rays* 3-6, 5-20 mm, (0-)1-bifurcate; *infracyathial bracts* 2-3 × 2-3 mm, equal to the cyathium or somewhat shorter, elliptical or suborbicular, apex truncate or emarginate, mucronulate, persistent until the beginning of fruiting. *Cyathia* sessile or subsessile, 2.5-3 × 2-2.5 mm; *glands* 4, 1.5-2.5 × 1-1.5 mm, transversally elliptical or elliptical-oblong, without horns; *cyathial lobes* broadly triangular, ciliate-pubescent adaxially. *Male flowers* 15-20; stamens with filaments up to 1 mm and ovoid anthers of 0.5 mm; *peduncles* up to 1 mm; *intracyathial laciniae* (male bracts) linear, simple or divaricate, ciliate-pubescent in upper half. *Female flower* pedicellate; ovary 1 mm, smooth, glabrous; styles 1.5-2.2 mm, trifurcate at 0.5-0.8 mm from the base, erecto-patent; stigma bifid, stigmatic lobes 0.3-0.5 mm. *Capsule* 3-4 × 5-7 mm, subspherically compressed, pedicellate; coccae rounded, smooth, light brownish or reddish. *Seeds* 2.2-2.6 × 1.6-1.9 × 1.8-2.1 mm, slightly ovoid, rugulose, dark brownish or greyish-blackish; *caruncle* 0.4-0.6 × 0.8-0.1 × 0.8-1.1 mm, obnavicular-truncate, sessile, whitish, insertion subapical.

Distribution and habitat. – The hybrid is only known from the Buenavista coastal region on Tenerife (Fig. 1), whereas reports from Gran Canaria (Kunkel & Kunkel 1978) actually refer to *Euphorbia* ×*marreroi* Molero & Rovira. *E.* ×*jubaephylla* occurs inter parentes in the "tabaibal" of the coastal "malpais" in the NW part of Tenerife, at altitudes of 100-200 m, in the infra-Canarian semiarid bioclimatic belt (Rivas-Martinez & al. 1993), on stony soils, in impoverished communities of the Ceropegio dichotomae-Euphorbietum aphyllae, in transition to the "tabaibal" of *E. balsamifera.*

Additional material examined. – Canary Islands, Tenerife: Buenavista, Montaña del Taco, 180 m, exp. S, 28RCS 2139, 11.6.1990, *J. Molero & P. L. Pérez de Paz* (BCF 37846); Buenavista, over the neighbourhood of San Bernardo, Las Canteras, 150 m, 30.9.1990, *J. Molero & A. Rovira* (BCF 37845).

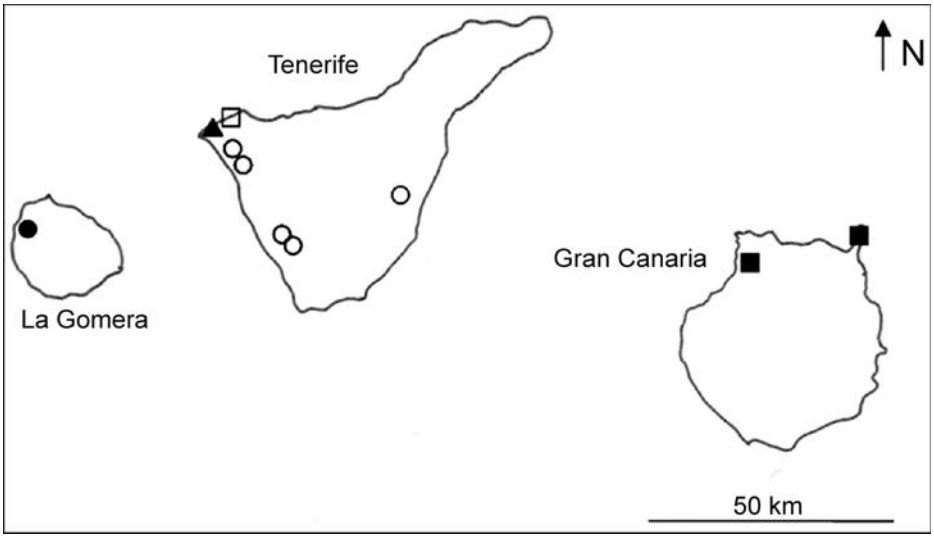

Fig. 1. Geographical distribution of the natural hybrids of *Euphorbia* subsect. *Pachycladae* in the Canary islands – □ = *E.* ×*jubaephylla;* ■ = *E.* ×*marreroi;* ○ = *E.* ×*navae;* ● = *E.* ×*fernandez-lopezii;* ▲ = *E.* ×*pettersonii.*

Euphorbia ×navae Svent. in Bol. Inst. Nac. Invest. Agron. Madrid 18(96): 4. 1948
Type citation in the protologue: "... la cogimos en Masca (vertiente sur del Guelgue, 900 m), el día 13 de mayo de 1947 ...".
Lectotype (designated here): Tenerife, "Nivaria, Masca, in clivo austr. montis Guelgue, 900 m, super mare/ in lapidosis torridis/ rarissima!/ 13.5.1947/ Archetypum! *E. R. Sventenius*/" (ORT 20030; isolectotypes: ORT 2030bis, ORT 14098).

Ic. – Sventenius (1948: 5).

Note. – Originally described as a hybrid of *Euphorbia regis-jubae* × *E. atropurpurea,* the first parental species is actually *E. lamarckii* var. *broussonetii.*

Diagnosis. – Habit and ramification most similar to *Euphorbia lamarckii* var. *broussonetii,* differing by its apical stems thickened, fleshy and more densely leafy; by its slightly red-purplish synflorescence; by its larger infracyathial bracts (4.5-7.5 mm compared to 2.5-5 mm in *E. lamarckii*); by its subsessile cyathia (pedicellate in *E. lamarckii*); by its somewhat bigger and narrower capsule; by its oblong seeds (in longitudinal section) with conical-mitriform caruncle (oval or oval-oblong with obnavicular truncate caruncle in *E. lamarckii*), etc. Differs from *E. atropurpurea* by being a stronger branched and delicate plant, by its apical stems less thickened, slightly purplish or greenish, more pruinose and less densely leafy; by its shorter and narrower leaves very similar to *E. lamarckii;* by its slightly purplish or greenish synflorescence with bifurcate pleiochasial rays (trifurcate or 4-furcate in *E. atropurpurea*); by its ovate or elliptical, not joined infracyathial bracts (from obovate to subreniformes and joined in the lower third in *E. atropurpurea*); by the longer pedicels of its capsules (2-4 mm, but 1-2 mm in *E. atropurpurea*), the mitre-shaped, caruncle, etc.

Shrub 1-2 m high, habit and ramification most similar to *E. lamarckii* var. *broussonetii. Apical branches* thickened, subfleshy, greenish pruinose or more often reddish pruinose, with somewhat purple leaf scars, densely leafy at the apex. *Leaves* as in *E. lamarckii*, 30-90 × 3-8 mm, linear-lanceolate, apex acute or subacute, mucronate, gradually narrowed at the base, dark greenish, rarely purplish. *Synflorescence* as in *E. lamarckii,* but ± intensely red-purple coloured. *Pleiochasial rays* 5-10, 15-40 mm; rays bifurcate; *infracyathial bracts* 4.5-7.5 × 4-7 mm, ovate, elliptical or suborbicular, apiculate, reddish. *Cyathium* 3-4 × 2.2-2.6 mm, subsessile, glabrous or pubescent, reddish; *cyathial lobes* obtuse, 0.4-0.5 × 0.4-0.6 mm, bifid up to the middle; *glands* 4, 12-24 × 9-14 mm, without horns, transversely oblong or suborbicular, reddish. *Male flowers* 16-24; stamens 2-3 mm with subglobose anthers 0.4 × 0.5 mm and filaments up to 1.2 mm; *septal laciniae* (bracteoles) 2-3 mm, filiform, ciliate-pubescent except at the basal third. *Female flower* pedicellate; ovary c. 1.4 mm, smooth, glabrous; styles 1.5-2.5 mm, erecto-patent, trifurcate for 0.5-1 mm from the base; stigma bifid, lobes 0.2-0.5 mm long. *Capsule* 5.4-6.6 × 5.6-6.8 mm with a pedicel 2-4 mm, globose-compressed, transversely oblong in cross section; coccae rounded, smooth or punctulate, glabrous, light brownish or reddish. *Seeds* 2.4-3.4 × 1.6-2.2 × 1.4-2 mm, very similar to *E. atropurpurea* but smaller, oblong-subtetragonal, base truncate with obvious dorsal and lateral projections; *caruncle* 1-1.4 × 0.9-1.4 × 1-1.2 mm, conical, mitre-shaped, truncate and ventrally markedly emarginate; subsessile or with a stipe of up to 0.3 mm, erect.

Distribution and habitat. – Known in Tenerife (Fig. 1). In the NW part of the island, in the Masca and Teno region, at medium altitudes (700-1200 m) in the xeric semiarid bioclimatic belt, it is relatively common between the parents. More rarely it occurs on stony slopes at medium altitudes of the south and west of the island, from Santiago del Teide to Guia de Isora (Santos 1998; own obs.) in the warmer environments of the Euphorbietum atropurpureae (Rivas-Martinez & al. 1993) .

Additional material examined. – TENERIFE: Santiago del Teide, camino de Chierfe, 16.6.1966, *Sventenius* (ORT 14097); Santiago del Teide, to 1 km towards Masca, 950 m, 11.6.1990, *J. Molero* (BCF 37851); (Degollada de Masca, 28RBS2134), 1000 m, 13.3.1989, *J. Molero & P. L.*

Pérez de Paz (BCF 37850); Tijoco de Arriba, 1000 m, on stony fissures, 11.6.1990, *J. Molero* (BCF 37852).

Euphorbia ×petterssonii Svent. in Bol. Inst. Nac. Invest. Agron. Madrid 9(20): 199. 1949
Type citation in the protologue: "Buenavista, laderas rocoso pedregosas del promontorio denominado Roque del Fraile, a 70 m sobre el nivel del mare, donde fué observada en sólo tres ejemplares. Cogida en flor el día 12 de febrero de 1949".
Holotype: "Buenavista, Roque/ del Fraile/ 12.2.49/ escasísima/ *Sventenius*" (ORT s.n.)

Ic. – Sventenius (1949: 198).

Note. – The hybrid was originally attributed to the cross of *Euphorbia bourgeana* and *E. aphylla,* but the first parent is actually *E. atropurpurea* f. *lutea* (Santos 1998).

Diagnosis. – Habit most similar to *Euphorbia atropurpurea* but being a smaller plant, branched from the base, with greyish subclaviform, densely pruinose stems; leaves 10-20 × 2-4 mm (50-120 × 10-20 mm in *E. atropurpurea*), sparse in a terminal pseudo-rosette; pleiochasial rays 2-5, much shorter and sparse (5-10 rays of 20-60 mm in *E. atropurpurea*), simply bifurcate (always with 3 rays in *E. atropurpurea*); dichasial bracts 2-3 mm, not joined at the base (3-10 mm and joined at the base in *E. atropurpurea*). Essentially differs from *E. aphylla* by its subclaviform stems with numerous leaf scars and by its leaves in a terminal pseudo-rosette on its annual shoots (stems with neither scars nor leaves in *E. aphylla*); by its pleiochasial rays longer, bifurcate, etc.

Fleshy shrub 40-50 cm high, branched from the base, habit similar to *E. atropurpurea*. *Ramification* with pseudoverticils of 3-12 fleshy branches; branches arcuato-erect, flexuose, linear-subclaviform, greenish-greyish, intensely pruinose, with marked leaf scars and sparse leaves at the apex in a pseudo-rosette on short, soft annual shoots. *Leaves* 10-20 × 2-4 mm, linear-spathulate, apex strongly obtuse, rounded or retuse, mucronulate; lamina somewhat concave, glabrous. *Synflorescense* a terminal pleiochasium with 2-5 rays up to 20 mm; rays 1-bifurcate; *infracyathial bracts* 2-3 mm, obovate-spathulate, not joined, somewhat concave, greenish-yellowish, shortly ciliate at the apex. *Central cyathium* sterile, lateral cyathia shortly pedunculate, globose; *glands* 1.4-1.8 × 0,4-0.7 mm, elliptical, yellowish. *Capsule* and *seed* unknown.

Note. – Incompletely described from the Teno cliffs (near Buenavista, Tenerife). The holotype containing three fragments of a young specimen lacking the synflorescenses and fruits is the only material available. The sheet comprises only two very young and very dry cyathia, which are susceptible to break at handling. The description of the floral characters offered here is mainly based on the characters indicated in the protologue. Nobody else has ever found the hybrid despite searching repeatedly, so it must be very rare. Santos (pers. com.) reports that in some particularly rainy years he has observed non-flowering plants that may be attributed to this taxon but they dried up before flowering. Probably a highly unstable hybrid, which rarely develops the first progeny.

Euphorbia ×marreroi Molero & Rovira, **nothosp. nov.** [*E. regis-jubae* × *E. aphylla*]
Holotype: Gran Canaria, between Las Rosas and Agaete, near the gully of Los Llanos, 120 m, somewhat degraded tabaibal on stony, south facing slope with *Opuntia* sp., inter parentes, 21.4.1994, *A. Marrero & J. Molero* (BCN 39343).

Habitu *Euphorbiae aphyllae* similior, sed ab ea differens caulibus postremis foliosis, inflorescentia complexiore radiisque pleiochasialibus longioribus, bracteis pleiochasialibus 5-10 × 3-6 mm, ellipticis aut obovatis, infra-cyathialibus autem 3-4.5 × 2.8-4 mm, late ellipticis, ovatis aut obovato-oblongis, capsulis maioribus (4-5 × 4.5-5.7 mm), seminibus denique maioribus (2.5-3 × 1.9-2.2 × 1.8-2.1 mm), basi tridenticulatis, caruncula praeditis maiore (0.4-0.7 × 0.9-1.2 mm); differt quidem ab *E. regis-jubae* cum sit nostra crassior atque humilior, magis dense atque intricate ramosa, caulibus apicalibus carnosis maxime, subclaviformibus, foliisque paucioribus atque

minoribus (4-12 × 1-3 mm), linearibus, obovatis aut subspathulatis, cito cadentibus, radiis pleiochasialibus paucioribus (3-5), brevioribus (8-20 mm) carnosioribusque, cyathiis minoribus atque subsessilibus, nectariis truncatis et parvis cornibus (0.2-0.3 mm) praeditis, capsulis denique atque seminibus minoribus.

Habit most similar to *Euphorbia aphylla*. It differs from *E. regis-jubae* by being a more succulent, smaller shrub with denser, more intricate ramification; also by its very fleshy subclaviform apical branches, with fewer, smaller, linear to subspathulate or obovate, soon deciduous leaves of 4-14 × 1-4 mm; by its smaller number (3-5) of pleiochasial rays, which are shorter (8-20 mm) and fleshy; its smaller subsessile cyathia and truncate glands with small horns of 0.2-0.3 mm; also by its smaller capsules and seeds. It differs from *E. aphylla* by having leafy apical branches and a more developed synflorescence; also by its pleiochasial elliptical or obovate bracts of 5-10 × 3-6 mm, its longer pleiochasial rays and its 3 mm, ovate, broadly elliptical or obovate-oblong, infracyathial bracts of 4.5 × 2.8-4, which are persistent until fruiting; by its larger capsules of 4-5 × 4.5-5.7 mm, and its larger seeds, tridenticulate at the base, with a larger caruncle.

Eponymy. – Dedicated to Águedo Marrero, Curator of the Herbarium of the Jardín Botánico Canario (JVC) and Researcher at the Jardín Botánico Canario, an authority on Canarian flora, with whom we collected the hybrid.

Fleshy shrub 0.4-0.8(-1.2) m high; habit intermediate between the parents, though more similar to *Euphorbia aphylla. Ramification* intricate from the base, basal stem with reddish wrinkling bark (rythidome), last-order branches greyish with a waxy bloom; annual shoots in pseudoverticils of 4-9, thickened, fleshy, subclaviform, 30-100 × 3-5 mm, with leaf scars and leaves more dense towards the apex. *Leaves* 1.2(-1.4) × 1-3(-4) mm, linear, linear-spathulate or linear-obovate, somewhat fleshy, subobtuse, rounded or truncate, narrowed at the base, soon deciduous; leaves of annual shoots smaller, 3-6 × 3-4 mm, broadly linear or obovate. *Pleiochasial bracts* (pseudo-umbels) 5-12 × 3-6 mm, elliptical, obovate or obovate-spathulate; *pleiochasial rays* 3-5(-6), unequal, born directly from previous-year branches or from annual shoots, fleshy, 8-20 mm, 0(-1)-bifurcate. *Cyathial bracts* 3-4.5 × 2.8-4 mm, broadly elliptical, ovate or obovate, ciliate when young, persistent until fruiting. *Cyathia* 2.5-3.5 × 1.8-2.6 mm, subsessile or with peduncles up to 1 mm, pubescent at the base when young; cyathial lobes 0.5-0.8 × 0.5-0.6 mm, triangular, bifid apically, ciliate-pubescent on the margin and the inner side; *glands* 0.4-1 × 1.2-2 mm, transversely elliptical-oblong or semicircular, outer edge truncate or slightly emarginate, with 2 small horns of 0.3 mm. *Male flowers* 12-16; *stamens* with filaments up to 0.7 mm and ovoid anthers 0.3-0.4 mm, pedicels c.1 mm; *intracyatial laciniae* (male bracts) 1-1.3 mm, linear, simple or divaricate, ciliate-pubescent in its upper half. *Female flower* pedicellate; ovary c. 1 mm, smooth, glabrous; styles 1.5-2.2 mm, trifurcate 0.5-0.8 mm from the base, erecto-patent; stigma bifid, with stigmatic lobes, 0.3-0.5 mm. *Capsules* 4-5 × 4.5-5.7 mm, polarily compressed, with deep furrows (130°-145°), pedicellate; coccae rounded, smooth or punctulate, yellowish or reddish. *Seeds* 2.5-3 × 1.9-2.2 × 1.8-2.1 mm, ovoid-oblong, obscurely tridenticulate at the base, smooth or rugulose, blackish brown or greyish; *caruncle* 0.4-0.7 × 0.4-0.6 × 0.9-1.2 mm, subsessile, broadly conical or obnavicular, truncate or ventrally emarginate, whitish.

Distribution and habitat. – Known from the northern part of the island of Gran Canaria (Fig. 1). Currently restricted to "Los llanos de los moriscos", near Agaete, on stony volcanic slopes ("malpais") facing south, in degraded tabaibal communities, at 130-180 m, with *Euphorbia aphylla, E. regis-jubae, E. balsamifera, Opuntia dillenii, Kleinia neriifolia, Launaea arborescens* and *Periploca laevigata* as dominant species. Some years ago it was also observed in Santa Maria de Guia (Cuesta de Silva, 200-250 m: Marrero, pers. comm.), but it seems to have disappeared there. Kunkel & Kunkel (1978) report it (sub *E.* ×*jubaephylla*) from La Isleta and the slopes of the Confital, near Las Palmas. In the Canarian Botanical Garden herbarium a sheet with the following quotation is extant: "Gran Canaria, Confital, km 3, entre rocas y los parentales, 26.2.1967, *G. Kunkel* (JVC 10407)". A. Marrero (in litt.) reported to us that no hybrid specimens have been lately observed in this area and that even the parent *E. regis-jubae* is missing.

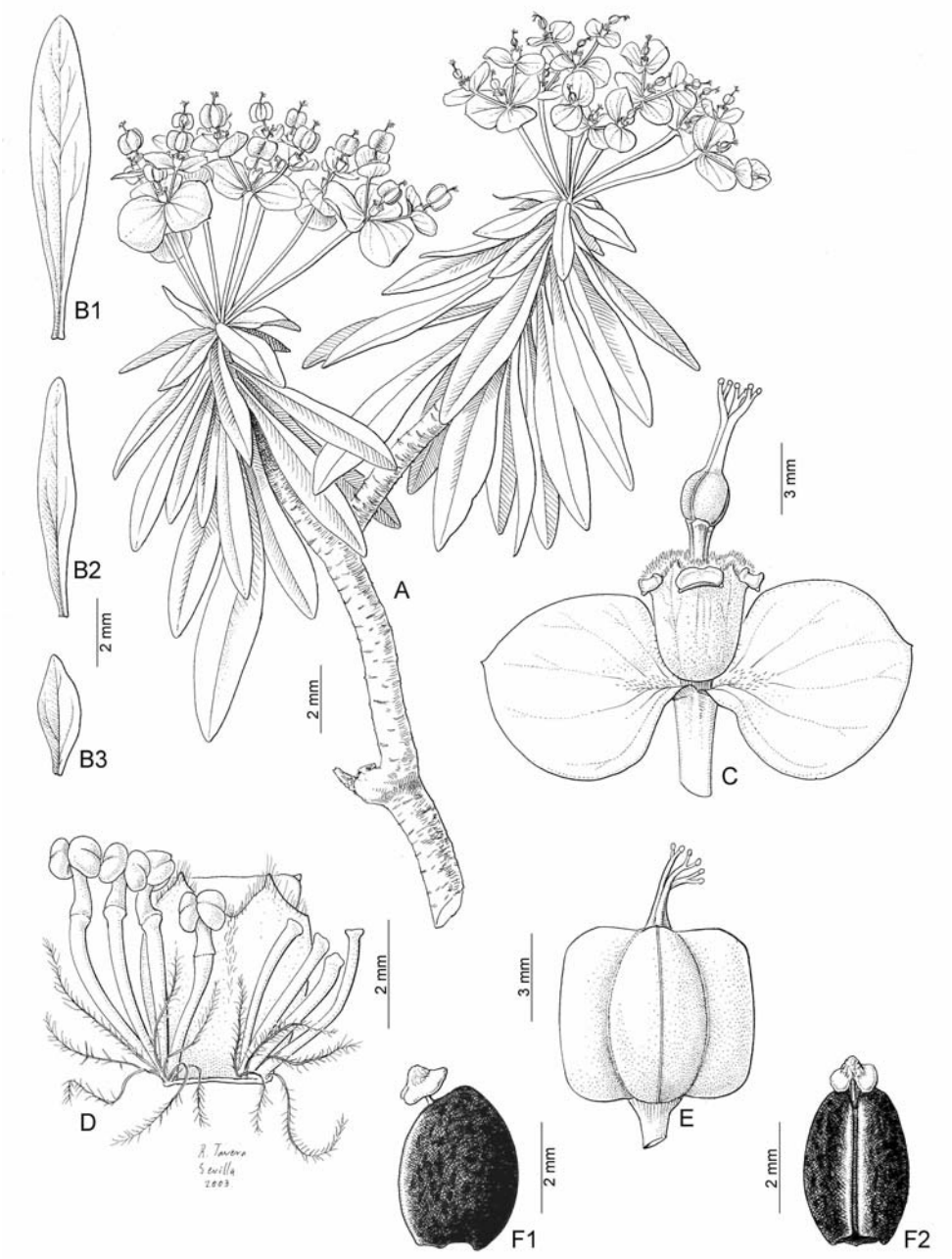

Fig. 2. *Euphorbia* ×*fernandez-lopezii* – A: flowering stem; B1, B2, B3: leaves; C: cyathium; D: stamens and male bracts (intracyathial laciniae); E: capsule; F1: seed in lateral view; F2: seed in ventral view. – Drawn from the holotype by R. Tavera.

Note. – Habitually this hybrid greatly resembles *Euphorbia* ×*jubaephylla* from Tenerife. *E.* ×*marreroi* is distinguished from *E.* ×*jubaephylla* by its larger bracts, which are persistent until fruiting, and by its cyathial glands, which are clearly truncate and have two short horns. The capsules and seeds are also somewhat larger. Moreover, it is located exclusively in Gran Canaria.

Euphorbia* ×*fernandez-lopezii Molero & Rovira, **nothosp. nov.** [*E. bourgeana* × *E. berthelotii*] Holotype: La Gomera, E of Chipude, head of the gully of Erques, 960 m, 7.6.1997, *A. Fernández, J. Molero 7.4/96 & A. Rovira.* – Fig. 2.

Ab *Euphorbia berthelotii* differt foliis longioribus latioribusque (40-100 × 8-15 mm), bracteis maioribus quidem, basalibus autem saepe 3-verticillatis, nunquam late lineari-oblongis, atque subcyathialibus paulo maioribus nunquamque lineari-oblongis, capsulis paulo maioribus et stylis item longioribus -(2.8)3-4 mm, seminibus maioribus etiam atque basi clare tridenticulatis, ubique scrobiculatis, caruncula maiore longeque stipitata; differt ab *Euphorbia bourgeana* inflorescentia magis reducta, bracteis infra-cyathialibus 2-3-verticillatis, minoribus (10-16 × 8-16 mm), bracteis subcyathialibus ovatis, obovatis aut suborbicularibus, 7-12 × 7-13 mm, etiam basi liberis, capsulis minoribus (6-8 × 8-10 mm), seminibus minoribus (3.2-3.8 × 2.4-2.8 × 2.5-2.9 mm), non ita clare scrobiculatis, caruncula hemisphaerica vel conico-hemisphaerica, maiore (0.8-1 × 1.5-1.7 mm), stipitata, erecta.

Differs from *Euphorbia bourgeana* by its smaller synflorescence, its smaller basal bracts of 10-16 × 8-16 mm, grouped in twos or threes; by infracyathial bracts of 7-12 × 7-13 mm, free to the base, ovate, suborbicular or broadly ovate; smaller capsules 6-8 × 8-10 mm; smaller seeds 3.2-3.8 × 2.4-2.8 × 2.5-2.9 mm, with less marked scrobiculate ornamentation and larger stipitate, erect, hemispherical or conical-hemispherical caruncle of 0.8-1 × 1.5-1.7 mm. Differs from *E. berthelotii* by its broader and longer leaves of 40-100 × 8-15 mm; larger bracts, the basal bracts sometimes grouped in whorls of three, never broadly oblong; by slightly larger, never oblong cyathial bracts; slightly larger capsules, with longer styles (2.8-)3-4 mm; larger, scrobiculate seeds, clearly tridenticulate at the base; and by the larger, more broadly stipitate caruncle.

Eponymy. – Dedicated to the forestry engineer Ángel Fernández López, Head of the Services of ICONA on La Gomera and Director of the Garajonay National Park, an authority on the flora of this island and discoverer of the hybrid.

Shrub 1.2-2 m, habit intermediate between *Euphorbia bourgeana* and *E. berthelotii,* with apical branches greenish or reddish, densely leafy. *Leaves* 40-100 × 8-15 mm, lanceolate or elliptical-lanceolate, deflexed, more similar to *E. bourgeana*. *Synflorescence* more densely bracted than *E. berthelotii,* but smaller and less colourful than of *E. bourgeana*. *Pleichasial bracts* 20-35 × 8-11 mm, lanceolate or elliptical; pleiochasial rays 5-8(-9), up to 6 cm long, once dichotomous or trichotomous; basal bracts opposite or in pseudoverticils of three, 10-16(-20) × 8-16(-20) mm, ovate, subrhomboidal or suborbicular, free to the base, caducous later at fruiting; *infracyathial bracts* 7-12 × 7-13 mm, free to the base, obtrullate, obovate or suborbicular, rarely ovate. *Cyathium* 4 mm long; pedunculate; *glands* 1-2 × 0.6-1.2 mm, transversely oblong or subtrapezoid, with 2 little horns up to 0.3 mm; lobes 0.6-1 × 0.3-0.7 mm, triangulate, obtuse or apically bifid, adaxially densely ciliate-pubescent at the margin. *Male flowers* 12-18; anthers 0.4-0.5 mm, filament c. 1 mm; pedicels up to 4 mm. *Female flower* pedicellate; ovary c. 2 mm, smooth, glabrous; style (2.8-)3-3.8 mm, trifurcate to half way. *Capsules* 6-8 × 8-10 mm, pedicellate, subspherically depressed, with deep furrows, green or reddish, rugulose. *Seeds* 3.2-3.8 × 2.4-2.8 × 2.5-2.9 mm, oblong, quadrangular in cross-section, black, slightly scrobiculate, with clearly tridenticulate base; *caruncle* 0.8-1 × 1.5-1.7 mm, hemispherical or conical-hemispherical, with a stipe of up to 0.5 mm, erect, broadly ventrally emarginate.

Distribution and habitat. – *Euphorbia* ×*fernandez-lopezii* is restricted to Gomera (Fig. 1) and appears in the contact area between two large populations of the parental stocks along the head of the gully of Erques, though it is best characterized at the bottom of the gully and on the northern slope where it is rare, together with *E. bourgeana.* Introgressants and other classes of late generation hybrids are observed among the much more widespread population of *E. berthelotii;* it is not difficult to detect intermediate hybridogenous forms, which are more akin to the latter species and are characterized by their robustness, broader leaves, dense synflorescence and larger broadly ovate or suborbicular apical bracts.

Acknowledgements

We wish to express our gratitude to Father Laínz S. J., who translated the diagnoses of the new taxa into Latin, to Aguedo Marrero, Ángel Fernández and Arnoldo Santos, who helped us with the collections and loans of material. This study was supported by Project PB87-1008 of the Spanish Ministry of Education and Science.

References

Govaerts, R., Frodin, D. G. & Radcliffe-Smith, A. 2000: World checklist and bibliography of *Euphorbiaceae* **2.** – Kew.

Hobohm, C. 2000: Plant species diversity and endemism on islands and archipelagos with special reference to the Macaronesian islands. – Flora **195:** 209-224.

Kunkel, M. A. & Kunkel, G. 1978: Flora de Gran Canaria 3. Las plantas suculentas. – Las Palmas.

Molero, J., Garnatje, T., Rovira, A., García-Jacas, N. & Susanna, A. 2000: Karyological evolution and molecular phylogeny in Macaronesian dendroid spurges *(Euphorbia* subsect. *Pachycladae).* – Pl. Syst. Evol. **231:** 109-132. [CrossRef]

— & Rovira, A. 2004: *Euphorbia lamarckii* Sweet, correct name for *E. obtusifolia* Poir. non Lam. – Vierea **32:** 117-122.

Oudejans, C. H. M. 1990: World catalogue of species names published in the tribe *Euphorbieae (Euphorbiaceae)* with their geographical distribution. – Utrecht.

Simon, J. & Vicens, J. 1999: Estudis biosistemátics en *Euphorbia* L. a la Mediterránia occidental. – Inst. Estud. Catalans, Arx Secc. Ci. **122.**

Rivas-Martínez, S., Wildpret, W., Del Arco, M., Rodríguez, O., Pérez de Paz, P. L., Garcia Gallo, A., Acebes, J. R., Díaz, T. E. & Fernández González, F. 1993: Las comunidades vegetales de la Isla de Tenerife (Islas Canarias). – Itinera Geobot. **7:** 69-374.

Santos, A. 1998: Notas sobre *Euphorbia* Gay ex Boiss. in DC. y especies afines. – Bot. Macaronés. **16:** 29-36.

Sventenius, E. S. 1948, 1949: Plantas nuevas o poco conocidas de Tenerife. – Bol. Inst. Nac. Invest. Agron. Madrid **18(96):** 4-6, **20(111):** 197-209.

— 1960: Additamentum ad floram canariensem I. – Madrid.

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