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A revision of *Teucrium heterophyllum* L'Hér. (*Lamiaceae*) with two new subspecies of the Canary Islands

Abstract

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Teucrium heterophyllum, a species originally described from Madeira and also distributed in the Canary Islands, is subdivided into three subspecies on the basis of differences in the calyx length, in the size of the branched, non-glandular trichomes on calyx and leaves, and in their distribution areas. From the Canary Islands *T. heterophyllum* subsp. *hierrense*, endemic to El Hierro, and subsp. *brevipilosum*, endemic to Gran Canaria, Tenerife, La Gomera (?) and La Palma, are described as new to science. A key to and a distribution map of the three subspecies are provided.

Introduction

Within the worldwide distributed genus *Teucrium* L., *T. heterophyllum* L'Hér. and the two Madeiran endemics *T. betonicum* L'Hér. and *T. abutiloides* L'Hér. form the section *Teucropsis* Benth., which is well defined by flower characters and the presence of bracts or leaves within the inflorescences (Kästner 1978). *T. heterophyllum* is confined to the Macaronesian region, where it occurs in the Madeira archipelago on Madeira and Desertas and in the Canary Islands on Gran Canaria, Tenerife, La Palma, El Hierro and, according to Santos (1975), also on La Gomera.

During the field work for his thesis about the flora and vegetation of the Inframediterranean bioclimatic belt of El Hierro (Del Arco & al. 1999), the author observed *T. heterophyllum* in the northeast of the island near the coast. Since he already knew the species from other islands, he noticed striking morphological differences, which led him to carry out further studies of this species.

Subdivision of *Teucrium heterophyllum*

On the basis of the calyx length and the size of the branched, non-glandular trichomes on the calyx and leaves three subpopulations of *Teucrium heterophyllum* with an allopatric distribution can be distinguished. The morphological differences observed are usually fairly clear but occasionally blurred by extreme forms. A taxonomic recognition of the subpopulations as subspecies appears the most appropriate solution. The morphological differences are summarized in Table 1 and illustrated in Fig. 1, the distribution areas are shown in Fig. 2.

Table 1. Morphological differences between the three subspecies of *Teucrium heterophyllum*. – All measurements in mm; calyx length measured from the calyx base to the tip of the lateral teeth; total number of individuals/calyces measured for the calyx length: subsp. *heterophyllum*: 7/50; subsp. *hierrense*: 10/50; subsp. *brevipilosum*: 30/100; total number of individuals/calyces/leaves measured for the trichome length: subsp. *heterophyllum*: 7/10/10; subsp. *hierrense*: 10/10/10; subsp. *brevipilosum*: 20/20/20 with 5 measured trichomes per calyx/leaf.

	subsp. <i>heterophyllum</i>	<i>T. heterophyllum</i> subsp. <i>hierrense</i>	subsp. <i>brevipilosum</i>
Length of the calyx			
Average	7.0	7.2	5.8
Min. and max.	6.0-8.4	6.2-8.8	4.0-7.1
Length of the branched trichomes (J-type) on the outer side of the calyx			
Average	0.12	0.57	0.06
Min. and max.	0.07-0.45	0.20-1.40	0.03-0.45
Length of the branched trichomes (J-type) on the adaxial surface of the terminal leaves at flowering			
Average	0.15	0.53	0.06
Min. and max.	0.05-0.25	0.25-1.25	0.03-0.15
Flowers per bract	(1)-2-3-(4)	(1)-2-4	(1)-2-3-(4)

The particular taxonomic value of calyx characters in *Teucrium* has already been known for a long time (see, e.g., Bentham 1835, Tutin & al. 1972, Kästner 1978). In more recent works, characters of the indumentum, such as the micromorphology and distribution of trichomes, have been used as additional characters (see, in particular, Manzanares & al. 1983 for the taxonomic value of the size and ramification of branched trichomes, and, e.g., Antunes & Sevinata-Pinto 1991, Bini Maleci & Servettaz 1991, Servettaz & al. 1992, Navarro & El Oualidi 1999). Differences in the length of the calyx and the trichomes have been employed previously in *T. marum* L. to separate taxa at the subspecific level (Mus & al. 1991).

Any possible dependence of the observed differences in the leaf indumentum of *Teucrium heterophyllum* on either the seasonal heterophylly or the different age of the plants or shoots has been excluded in comparing only flowering specimens and only equally developed material. A low variation within each subspecies among specimens from different years, altitudes and habitats also excludes modification caused by different site conditions as a possible reason for the observed differences. An additional indication is that the newly described subspecies from El Hierro shows greater similarity to subsp. *heterophyllum* of the Madeira archipelago than to subsp. *brevipilosum* of the other Canary Islands (Fig. 1).

Because of a slight variability within each subspecies, the measurements indicated for the indumentum at flowering (Table 1) are confined to branched, non-glandular trichomes of calyx and terminal leaves, although the obvious differences in the length of the trichomes can be recognized in other parts of the plants too. The typological classification of the trichomes is based on Cantino (1990) and was also used by Navarro & El Oualidi (1999). The branched, non-glandular J-type trichomes can be found in *T. heterophyllum* on the calyx, both leaf surfaces and on the lignified parts of the plant. C-type trichomes, which are not considered in Table 1, are branched, glandular hairs, which can be found on the upper edge of the calyx inside; other trichome types described by Antunes & al. (1997) are not considered here either.

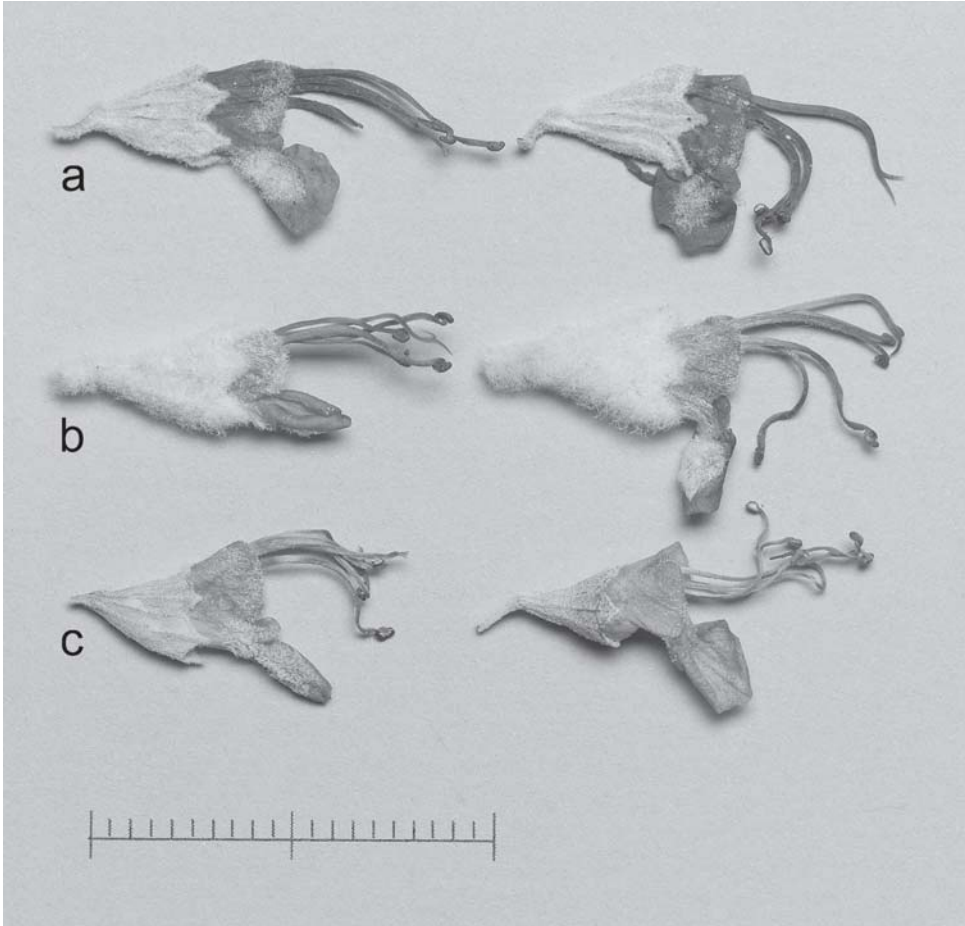


Fig. 1. Flowers of *Teucrium heterophyllum* – a: subsp. *heterophyllum* (left: from Moniz, BM, right: from Mandon 1999, BM); b: subsp. *hierrense* (left: from the holotype, right: from Gaisberg, Mña. de las Salinas, 120 m, 14.3.1999, herb. Gaisberg); c: subsp. *brevipilosum* (left: from Gaisberg, Tenerife, Punta del Sol, 150 m, 28.4.1998, herb. Gaisberg; right: from Schönfelder 94/114, herb. Schönfelder). – Scale: 2 cm; the different posture of lower lip and stamens results from the desiccation. Photograph: Wolfram Schmidt, Regensburg.

Key to the subspecies of *Teucrium heterophyllum*

- 1. Branched trichomes on the adaxial surface of the terminal leaves at flowering 0.25-1.25 mm long; calyx 6.2-8.8 mm long, with branched trichomes up to 1.4 mm long (Fig. 1b); verticillasters not rarely with four flowers; El Hierro only 1. *T. heterophyllum* subsp. *hierrense*
- Branched trichomes on the adaxial surface of the terminal leaves at flowering 0.03-0.25 mm long; calyx 4-8.4 mm long, with branched trichomes shorter than 0.5 mm; verticillasters only rarely with more than 2-3 flowers 2
- 2. Calyx 4-7.1 mm long (often shorter than 6 mm), with branched trichomes 0.03-0.45 mm but usually shorter than 0.1 mm (Fig. 1c); branched trichomes on the adaxial surface of the terminal leaves at flowering 0.03-0.15 mm but usually shorter than 0.1 mm; Tenerife, Gran Canaria, La Palma and La Gomera (?) 2. *T. heterophyllum* subsp. *brevipilosum*

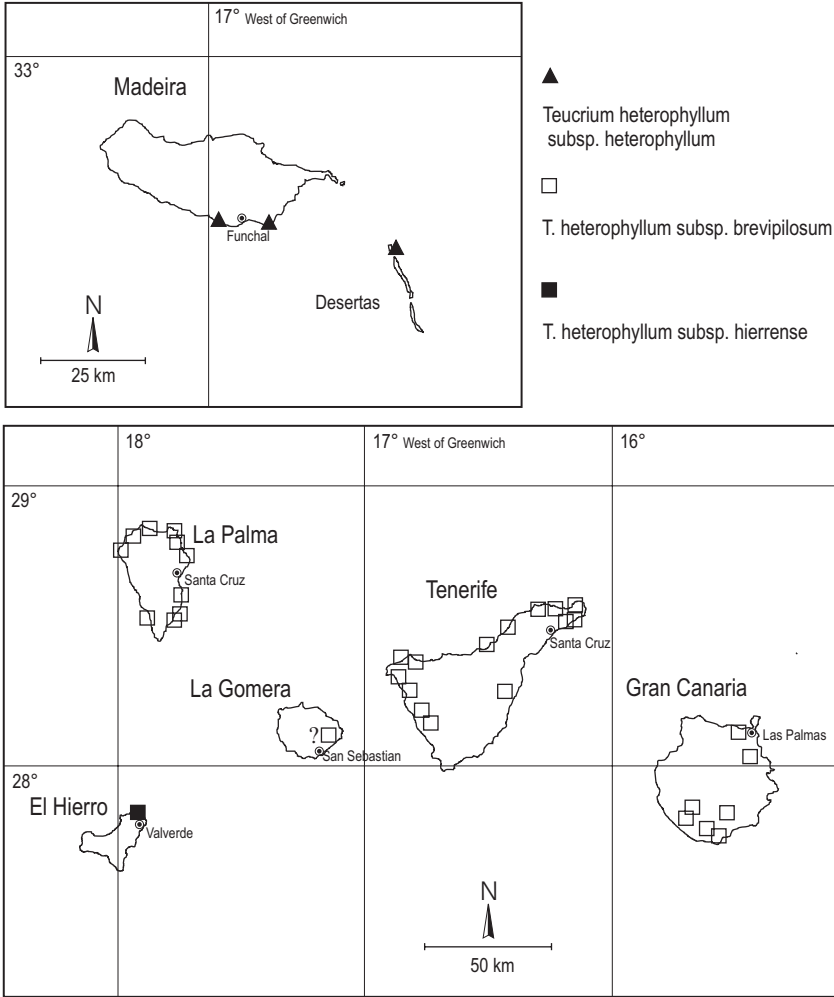


Fig. 2. Distribution of the subspecies of *Teucrium heterophyllum* L'Hér.

- Calyx 6-8.4 mm long, with branched trichomes 0.07-0.45 mm but usually longer than 0.1 mm (Fig. 1a); branched trichomes on the adaxial surface of the terminal leaves at flowering 0.05-0.25 mm but usually longer than 0.1 mm; Madeira archipelago
 3. *T. heterophyllum* subsp. *heterophyllum*

Teucrium heterophyllum

Teucrium heterophyllum L'Hér., Stirp. Nov.: 84, t. 49. 1787 ≡ *Poliodendron heterophyllum* (L'Hér.) Webb & Berth., Hist. Nat. Iles Canaries 2(3): 107, t. 173. 1845. – Holotype: Madeira, 1776, Masson (BM!).

Shrub up to 2-(3) m, short-hairy to densely tomentose. *Leaves* 2.5-5 × 0.7-2 cm, ovate-lanceolate, obtuse, margin entire to bluntly crenate in the upper part, greenish to greyish white-tomentose above, greyish white-tomentose beneath, the autumn leaves less hairy. *Verticillasters* usually with 2 or 3, rarely with 1 or 4 flowers, distant; bracts similar to leaves. *Calyx* (4)-6-7-(9) mm,

short-hairy to densely white-tomentose, infundibuliform to campanulate, the teeth equal, triangular. *Corolla* red to orange-red, densely hairy on the outside; lip with lateral lobes suborbicular, the middle lobe 4-5 mm long, stamens strongly exceeding the corolla. Flowering February to May.

***Teucrium heterophyllum* L'Hér. subsp. *heterophyllum* – Fig. 1a**

Distribution and ecology

Teucrium heterophyllum subsp. *heterophyllum* is confined to the Madeira archipelago, where it is a rare plant on rocky sea cliffs at Cabo Girão and Ponta do Garajau on Madeira, and on Ilhéu Chão in the Desertas (Press & Short 1994) (Fig. 2).

Additional specimens seen

MADEIRA: Ponta do Garajau, near the statue of Christ, 400 m, 11.8.1981, *R. J. Hampshire* 172 (BM); Cabo Girão, *G. Mandon* 199 (BM); s. loc., *Moniz* (BM); s. loc., 28.5.1875, *R. T. Lowe* 779, 779/2 (BM); s. loc., *Lemann* (BM).

Teucrium heterophyllum* subsp. *hierrense* v. Gaisberg, **subsp. nova*

Holotype: Canary Islands, El Hierro, above La Galera, 115 m, 14.3.1999, *M. v. Gaisberg* (B; isotypes M, TFC, herb. Gaisberg).

Differt a subsp. *brevipiloso* calyce generaliter 1-2 mm majore (6.2-8.8 mm), facies in parte ultima stirpis in tempore florente (ramosi pili 0.25-1.25 mm) et calyce (ramosi pili 0.2-1.4 mm) clare sed pilosioribus et generaliter numero majore florum per bractea. Differt a subsp. *heterophyllo* facies in parte ultima stirpis in tempore florente et calyce sed pilosioribus et generaliter numero majore florum per bractea (Fig. 1b, Table 1).

Distribution and ecology

Endemic to El Hierro. Today only one population in the northeast of the island seems extant (Fig. 2). According to Santos (1980), the species was collected by Sventenius also near Tamaduste and Sabinosa, while he himself observed it above Las Playas. At these localities the species was not found by the author during three years of field work on this island. A specimen collected by Perraudière in the middle of the 19th century indicates another population in the region of El Golfo, which apparently has disappeared too.

Teucrium heterophyllum subsp. *hierrense* is confined to relicts of a particular xerophytic scrub with *Euphorbia canariensis* or *E. balsamifera*, which constitutes a transition between the halotolerant, littoral Frankenio-Astydamietum and the succulent scrub proper (Table 2).

Additional specimens seen

EL HIERRO: El Golfo, at rocks, 15.5.[1855], *H. de la Perraudière* 173 (B); below Mña. de las Salinas, 120 m, 20.3.1998, *M. v. Gaisberg* (herb. Gaisberg); *ibid.*, 14.3.1999, *M. v. Gaisberg* (herb. Gaisberg); *ibid.*, 21.3.2000, *Ch. Stierstorfer* (TFC, herb. Gaisberg).

Teucrium heterophyllum* subsp. *brevipilosum* v. Gaisberg, **subsp. nova*

Holotype: Canary Islands, Tenerife, Ladera de Tamaimo, 2.4.1980, *W. Wildpret de la Torre, J. R. Acebes, M. J. del Arco, M. C. León, M. A. Viera, M. L. Negrín* (TFC 10 009!).

=? *Teucrium canariense* Lam., *Encycl.* 2: 692. 1786. – Holotype: Cultivated in the Jardin du Roi, Paris, “nous croyons cet arbrisseau originaire des Canaries ...”, (P-Lam [IDC microfiche 6207!]).

Differt a subsp. *heterophyllo* calyce generaliter 1-2 mm minore (4-7.1 mm), facies in parte ultima stirpis in tempore florente (ramosi pili 0.03-0.15 mm) et calyce (ramosi pili 0.03-0.45 mm) debiliter pilosis. Differt a subsp. *hierrensi* calyce generaliter 1-2 mm minore, facie in parte ultima stirpis in tempore florente et calyce clare debiliter pilosis et generaliter numero minore florum per bractea (Fig. 1c, Table 1).

Table 2. Succulent scrub with *Teucrium heterophyllum* subsp. *hierrense* on El Hierro.

Aspect	NNE	NNE	NW	N
Slope (°)	12	15	5	10
Area (m ²)	100	100	50	100
Outcrop of rock (%)	70	60	85	30
Cover of shrub layer (%)	50	50	20	65
Cover of herbaceous layer (%)	2	6	3	3
Height of shrub layer (dm)	20	18	6	15
Altitude (m. a.s.l.)	120	115	140	155
Month of relevé	5	5	5	5
Running number	1	2	3	4
Shrub layer				
<i>Euphorbia canariensis</i>	3	3	.	.
<i>Euphorbia canariensis</i> juv.	1	+	.	.
<i>Euphorbia balsamifera</i>	.	.	2a	4
<i>Euphorbia balsamifera</i> juv.	.	.	+	+
<i>Schizogyne sericea</i>	2a	2b	2a	2a
<i>Schizogyne sericea</i> juv.	1	1	1	+
<i>Teucrium heterophyllum</i> subsp. <i>hierrense</i>	1	+	+	+
<i>Teucrium heterophyllum</i> subsp. <i>hierrense</i> juv.	+	+	.	+
<i>Kleinia neriifolia</i>	+	1	.	+
<i>Kleinia neriifolia</i> juv.	+	+	+	+
<i>Periploca laevigata</i>	+	+	+	+
<i>Periploca laevigata</i> juv.	+	+	+	+
<i>Euphorbia obtusifolia</i> var. <i>wildpretii</i>	+	+	+	.
<i>Euphorbia obtusifolia</i> var. <i>wildpretii</i> juv.	+	+	+	.
<i>Rubia fruticosa</i> subsp. <i>fruticosa</i>	+	+	.	+
<i>Rubia fruticosa</i> subsp. <i>fruticosa</i> juv.	+	.	.	.
Herbaceous layer (from Frankenio-Astydamietum)				
<i>Astydamia latifolia</i>	+	2a	1	.
<i>Limonium pectinatum</i>	.	+	1	1
<i>Frankenia laevis</i>	.	+	+	.
Herbaceous layer (endemic to the Canary Islands)				
<i>Micromeria hyssopifolia</i>	1	+	+	1
<i>Plantago aschersonii</i>	+	+	1	1
<i>Polycarpha divaricata</i>	.	+	1	1
<i>Lotus sessilifolius</i>	.	.	+	.
<i>Reichardia ligulata</i>	.	.	+	.
Accompanying species				
<i>Trachynia distachya</i>	1	1	1	2m
<i>Ononis dentata</i>	1	1	1	2m
<i>Cuscuta planiflora</i>	.	+	+	1
<i>Trifolium glomeratum</i>	.	+	.	1
<i>Wahlenbergia lobelioides</i> subsp. <i>lobelioides</i>	+	+	.	.
<i>Stipa capensis</i>	+	.	.	+
<i>Biserrula pelecinus</i>	.	+	.	+
<i>Silene gallica</i>	.	.	+	+

Other taxa: R1: *Lamarckia aurea* +, *Arenaria leptoclados* +, *Spergularia fallax* +; R3: *Senecio incrassatus* +; R4: *Anagallis arvensis* 1, *Lophochloa pumila* 1, *Galium parisiense* +, *Trifolium campestre* +, *Trifolium arvense* +, *Trifolium scabrum* +, *Misopates orontium* +, *Lobularia libyca* +.

Notes

Since the holotype of the binomial *Teucrium canariense* Lam. is a specimen without flowers taken from a plant cultivated in the Jardin du Roi, Paris, whose wild source is said to have come from the Canary Islands without further details, its synonymy with subsp. *brevipilosum* is not free from doubt.

As a rare exception, plants with a yellow instead of the usual red to orange-red corolla have been documented from near Ayagaures on Gran Canaria by Marrero Rodríguez (1992: 60, colour photograph). Apart from the flower colour the plants perfectly match subsp. *brevipilosum* as far as can be judged from the photograph and they may merely have lost the red colour component; herbarium material of these individuals is apparently not preserved.

Ic.: Schönfelder 1997: 184; Marrero Rodríguez 1992: 60 (exceptionally yellow-flowered plant).

Distribution and ecology

Endemic to the islands of Gran Canaria, Tenerife and La Palma. Since no specimen could be traced from La Gomera, the report for this island (Santos 1975) and its taxonomic classification need confirmation (Fig. 2). *Teucrium heterophyllum* subsp. *brevipilosum* is quite rare on all islands and grows in natural communities together with *Euphorbia canariensis* and *E. balsamifera* in the Inframediterranean bioclimatic belt. Sometimes it could also be observed up to the Thermomediterranean bioclimatic belt (Fig. 2). Tenerife: in the northwest of the island primarily in the region of Teno and Tamaimo southwards to the area around Arona; in the northeast at Bajamar, Punta del Sol, Tacoronte, Punta Hidalgo and at the southern and northern coasts of Anaga, particularly above the Barranco de Jagua (e.g. Burchard 1929, La Serna Ramos & Wildpret de la Torre 1978, La Serna Ramos & León Arenciba 1980, Bramwell & Bramwell 1990). Gran Canaria: primarily in the southwest of the island; at the Risco Blanco in the Caldera de Tirajana, also at Roque Aguayro, Bco. de Arguineguín, Degollada de la Manzanilla, Bco. de Ayagaures, Bco. de La Palma, etc. (e.g. Burchard 1929, Bramwell & Bramwell 1990). La Palma: in the north and along the northeastern coast southwards to the region below Mazo; also at Bco. de La Galga, Bco. Herradura, Mña. Centinela, Punta Salvajes, Tigalate, Bco. Don Pedro, Bco. San Juan, Bco. Seco, the cliffs near Puntagorda, Bco. de Izcagua, Cardonales de Las Salemeras (e.g. Pitard & Proust 1908, Santos 1983). La Gomera: in the east of the island at Pico de Haragán (Santos 1975).

Specimens seen

TENERIFE: La Matanza (Playa del Caletón), 10.4.1988, *P. L. Pérez de Paz & M. Morales* (TFC 25 267, 25 220-25 223); Cuchillo del Saltadero (San Andrés), 19.3.1989, *M. Morales* (TFC 25 269); Lomo de Vasta, 220 m, 6.3.1985, *Francisco Ardévol* (TFC 19 158); Casas del Caletón (La Matanza), 15.4.1994, *F. R. Rodríguez* (TFC 37 291); Carretera de Boca Tauce, 2.7.1977, *W. Wildpret de la Torre & al.* (TFC 32 649); Afur (Anaga), 15.5.1989, *M. Marrero Gómez* (TFC 35 327); Bco. de las Gambuesas (Fasnia), 650 m, 7.7.1989, *M. M. Gómez* (TFC 29 845); Bco. de Herques (Fasnia), 7.6.1998, *A. Díaz Hernández* (TFC 41 471); Icod de los Vinos (Punta de los Morenos), 3.3.1977, *H. Metlesics* (TFC 6536); Roque de las Animas, 19.5.1971, *A. Santos* (TFC 620); Malpaís de Tamaimo (Valle de Santiago del Teide), 400 m, 23.2.1969, *D. Bramwell* (TFC 448); Ladera de Tamaimo, 2.4.1980, *W. Wildpret de la Torre & al.* (10 010); Ladera Izq. del Bco. de Masca, 300 m, 3.5.1976, *M. del Arco Aguilar & al.* (TFC 6551); Bco. de Herques (El Escobonal), 6.3.1981, *O. Rodriguez & P. G. Cabrera* (TFC 12 700); Pta. de Garajau (Costa de Icod), 30.3.1985, *P. L. Pérez de Paz* (TFC 24 216); Buenavista, 10.5.1980, *W. Wildpret de la Torre & al.* (TFC 10 011); Roque de las Animas (Taganana), 9.2.1980, *L. Negrín Sosa* (TFC 10 001); El Cuchillo del Saltadero sobre San Andrés, 12.3.1972, *E. Beltrán & al.* (TFC 813); Sobre Las Carvas, 8.8.1991, *V. L. Sauquillo* (TFC 38 138); Roque de las Animas (Anaga), 250 m, 15.4.1981, *M. del Arco Aguilar & Ricardo Haroun* (TFC 32 651); Icod de los Vinos, 3.1905, *O. Burchard* (M); Bco. de la Goleta, 28.3.1972, *P. Schönfelder 72/177* (herb. Schönfelder); Punta del Sol, 150 m, 11.4.1999, *R. Otto* (herb. Gaisberg); *ibid.*, 28.4.1998, *M. v. Gaisberg* (herb. Gaisberg); Punta Hidalgo, 300 m, 2.5.1999, *R. Otto* (herb. Gaisberg); s. loc., 20.4.1972, *O. H. Volk* (MSB 61 676); s. loc., *C. Correns* (M).

GRAN CANARIA: Bco. de Ayagames, 400-500 m, 2.5.1979, *P. L. Pérez de Paz* (TFC 32 085); Soria, sur de las Palmas de Gran Canaria, 21.4.1975, *A. Santos & P. L. Pérez de Paz* (TFC 32 128); Mña de las Brujas, 8.1982, *M. Nogales* (TFC 20 223); Bco. de Mogan, 340 m, 2.3.1994, *Royl 560* (B); Mña. de Horno, 430 m, 15.3.1969, *G. Kunkel 12666* (M); Bco. de Ayagaures, 470 m, 24.4.1994, *P. Schönfelder 94/114* (herb. Schönfelder); Bco. de La Palma, 23.3.1976, *P. Schönfelder 76/75* (herb. Schönfelder).
 LA PALMA: Mazo (Hoyo), 10.12.1971, *P. L. Pérez de Paz* (TFC 773); Mña de la Centinela, 26.3.1997, *P. L. Pérez de Paz* (TFC 40 495); Mña. de la Centinela, 3.1989, *J. A. Pérez de Paz* (TFC 25 270, 25 764); s. loc., *Bourgeau 132* (B).

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