



## On the identity of the Teyde dog-rose (Rosaceae): evidence for a new endemic taxon from Tenerife, Spain

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### Abstract

In view of the high diversity found in many groups of vascular plants on the Canary Islands, Spain, the genus *Rosa* (Rosaceae) is poorly represented comprising only two native taxa (*R. canina*, *R. rubiginosa*). For the first time, this study provides detailed data on distribution, morphology, chorology and status of the so-called ‘Teyde dog-rose’, a representative of the Section Caninae, which occurs exclusively in the subalpine zone of the Cañadas del Teide, Tenerife. A survey of both native stock and herbarium material yielded that this population, currently classified as common dog-rose (*Rosa canina* L.), is phenotypically close to continental representatives of the glaucous dog-rose (*Rosa dumalis* Bechst.), from which, however, it differs in several traits such as floral characters and leaf morphology. Consequently, the population is formally recognized as a distinct taxon, *Rosa dumalis* ssp. nov. *teydensis* Weller & H. Reichert. The new subspecies appears to be extremely rare in the wild, with a low number of individuals growing at scattered localities mainly at shady rocky walls and adjacent habitats in a restricted area of the southern Cañadas. Consequently, according to IUCN criteria the taxon must be regarded as Critically Endangered.

**Key words:** Canary Islands, Caninae, conservation, distribution, endemic, morphology, *Rosa canina*, *Rosa dumalis*, *Rosa dumalis* ssp. nov. *teydensis*, taxonomy

### Introduction

The Canary Islands (c. 7.450 km<sup>2</sup>) are the global top hotspot in terms of phytodiversity per area size, comprising > 700 endemic taxa (e.g., Humphries 1990, Reyes-Betancourt *et al.* 2008, and subsequent taxonomic studies), which is a remarkable portion given the total number of vascular plant species (c. 1.400; Arechavaleta *et al.* 2010) inhabiting these islands. Notably, many of them are local endemics, partly inhabiting extremely narrow distribution ranges (Bramwell & Bramwell 2001). The enormous variety of habitats at micro- and macro-scale based on oreographic and climatic effects as well as geological peculiarities, causing isolation and niching effects, have contributed to the high speciation and endemism rates especially observed in the western islands of this archipelago (Bramwell 1972, 1976; Reyes-Betancourt *et al.* 2008).

Within the family Rosaceae, two genera, *Bencomia* Webb & Berthel. (1842: 10; four species) and *Dendriopoterium* Svent. (1948: 255; two species, only on Gran Canaria) are exclusively found in the Canaries. However, the genus *Rosa* L. (1753: 491) is poorly represented across the islands and obviously understudied (Weller 2011, 2016). Traditionally only one species, the widespread Eurasian (and locally in northwest Africa distributed) common dog-rose (*R. canina* L., 1753: 492), was recognized for La Palma, Tenerife and Gran Canaria (e.g., Hansen & Sunding 1993, Santos 2001, Arechavaleta *et al.* 2010). Subsequent chorological studies yielded the presence of another genus member, the sweet briar-rose (*R. rubiginosa* L., 1771: 564) (La Palma, Weller 2011; Gran Canaria, Weller 2016). Hohenecker & Weiß (1993) indicated the existence of another taxon of the Section *Tomentellae* Christ, the round-leaved dog-rose (*R. balsamica* Bess., 1815: 18; syn. *R. tomentella* Léman, 1818: 94), doubtfully for La Palma. On Tenerife, *R. canina* has been recorded from the Cañadas del Teide (Hohenester & Weiß 1993). The area of high-elevation (c. 1.900–2.500 m a.s.l., 130 km<sup>2</sup>) at the southern slopes of Pico del Teide (3.718 m a.s.l.) is part of the only national park of the

island, Parque Nacional del Teide, and among the biodiversity hotspots of the Canary Islands with the highest rate of endemism in vascular plants (Wildpret & Martín-Osorio 2000, 2003; Bramwell & Bramwell 2001, Reyes-Betancort *et al.* 2008).

During several visits of the first author to the Canary Islands starting in the early 2000s, a survey of *Rosa* based on sporadic observations including photographic records yielded doubts about the identity of the taxon cited from Tenerife. Taking into account the few currently available data for the genus on this island, our study focused on different aspects: 1) systematic search for *Rosa* individuals, including collection of plant material, within Parque Nacional del Teide and adjacent areas aiming to uncover distribution, ecology, chorology and morphology; 2) study of herbarium specimens in botanical collections of Tenerife (see Acknowledgements); 3) comparison of collected material with specimens from Central Europe (Germany; herbarium of H. Reichert); 4) evaluation of literature data; 4) taxonomic conclusions. Here, we summarize field and herbarium data on *R. dumalis*, and provide evidence for the separate taxonomic status of the so-called ‘Teyde dog-rose’.

## Material and Methods

### Study site

The Parque Nacional (hereafter PN) del Teide, already protected by national law since 1954, is the oldest and largest (c. 19.000 ha) of its kind within the archipelago. The southern parts of the national park called “Las Cañadas” are formed by a giant, c. 17 km-long caldera of an ancient volcano with an average altitude of about 2.000 m a.s.l., delimited to the south by almost vertical ridges of up to c. 500 m height. Except for the steepest zones and vegetation-free lava fields, large portions of this landscape are dominated by subalpine shrubland mainly composed of *Spartocytisus supranubius* (L.fil.) Santos and *Adenocarpus viscosus* (Willd.) Webb & Berth. (Fabaceae). This almost tree-free vegetation zone offers numerous endemics adapted to the specific soil (i.e., volcanic origin) and climate conditions of the Cañadas (for details see Results, *Habitat and ecology*).

### Field observations, sampling and collecting

Field observations on Tenerife were made by the first author during a number of visits between 2000 and 2019. In the genus *Rosa*, sufficient taxonomic conclusions can be drawn only from fresh material of flowering or fruiting individuals, since flowers, ripe fruits (hips) and their stems are essential for a detailed morphological analysis and interspecific comparison, respectively. Since *Rosa* sp. flowers in PN del Teide from May on, survey and collecting of samples with flowers as well as fruits were performed between 16–20 June 2019 by the first author. Due to collecting restrictions issued by the national park authorities (see Acknowledgements), inspection of plants and sampling were restricted to areas with either unlimited or restricted access by walking on hiking trails or along roadsides. In addition, collecting was restricted to a limited size of individual samples per plant (< 50 cm / 250 g) and a limited number of overall samples (max. 20).

Since individuals of *Rosa* found in the Cañadas mountains usually grow solitary or in groups of two to three bushes (rarely more) of up to 2.5 m height (AAW pers. obs.), and exhibit a characteristic habitus (overhanging growth, blue-green overall appearance; cf. Table A2), they can be identified by an experienced observer even by distance. An additional survey was made by car, with regular stops along the main roads crossing the national park (TF-21, TF-24) in search of plants by means of a binocular (10x42). Altogether a total monitoring transect of c. 45 km was absolved by walking and driving, including parts of the national park adjacent to the Cañadas within the pine forest (*pinar*) zone, covering almost all putatively appropriate habitats and sites as far as they were accessible by collecting restrictions.

### Herbarium studies

Survey of herbarium material of *Rosa* from Tenerife included the botanical collections of the Departamento de Botánica, Ecología y Fisiología Vegetal (Herbario TFC), and of the Jardín de Aclimatación de La Orotava Puerto de la Cruz (ORT), both Tenerife, and specimens from Germany housed in the herbarium of H. Reichert (hereafter HR) and gathered between 1980–1996. The exclusive inclusion of the latter specimens is based on several reasons. First, all relevant characters of the HR samples have been summarized in a detailed data bank, which, to the best of our knowledge, is missing for all other collections of *R. dumalis*. Second, since specimens from this genus tend to change coloration under storing conditions, and are generally inappropriate for a detailed morphological analysis (i.e., many floral and vegetal characters cannot be examined unless to destroy the sample), we noted mainly collecting data from

TFC and ORT specimens, and photographed them for later comparison. For the same reasons, no attention was given to specimens from online herbaria (e.g., Naturalis/Leiden, Paris), also in view of the fact that some of those have been misidentified (HR pers. obs.).

### Morphological analysis

To analyse geographical variation in *Rosa dumalis*, for the first time we compared extensive samples and literature data, respectively, from three origins comprising Tenerife and continental Europe (Spain, Germany) (Henker 2000, Silvestre & Montserrat 2001, HR unpubl. data), in numerous quantitative and qualitative floral and vegetative characters (see Appendix). This data set presents for the first time a nearly complete survey of detailed information at hand on study-relevant populations. According to Henker (2000), in our analysis we follow a rather narrow species concept that includes leaf hairiness as distinguishing character. By contrast, a broader species concept merging *Rosa caesia* and *R. dumalis* has been, for example, proposed by Silvestre & Montserrat (2001), probably inspired by the studies of Graham & Primavesi (1993).

### Results

Inspection of the material collected within this study and of herbarium specimens yielded that *Rosa* individuals from the Cañadas del Teide belong to the subsection Caninae (Christ 1873: 219; cf. Klášterský 1968). According to determination keys of European flora all samples were close to *Rosa dumalis* (Bechstein 1810: 939; syn. *R. vosagiaca* auct., nom. illeg.) (for details, see Appendix). Within the *canina* group, which is characterized by non-pubescent leaflets, the latter taxon represents the so-called D-type (Reichert 1998) with the following characters: shrubs dense, flower stalks usually shorter than the receptaculum, petals of opening flowers usually deep pink, sepals after the anthesis persisting, narrow disc, and wide orifice (diameter > 1 mm).

To date, there is no taxonomically recognized geographic variation within *R. dumalis*, although historically several subspecies such as *subcanina* (H. Christ) Soó and *subcollina* (H. Christ) Schur had been merged in this taxon (for overviews see Bakker *et al.* 2019, WFO 2021), all of which, pending on the authority, are now considered either as separate species or as members of other *Rosa* taxa. In view of the ongoing confusion about priority in nomenclature, Reichert (2021) showed that the name *R. vosagiaca* (N.H.F. Desp.: 88) used for this species is illegitimate and that there are no valid reasons for the rejection of the name *R. dumalis* as maintained by Bakker *et al.* (2019).

TABLES 1A–14A summarize data from collected specimens (living, herbarium; this study), herbarium specimens from Germany (property of HR; see Appendix) and literature, providing support for the classification of the Teide plants as *R. dumalis*. However, according to the material inspected (herbarium specimens) the Tenerife population differs in several traits from all morphotypes of continental European representatives of *R. dumalis* (Henker 2000; herbarium specimens of HR) including those from mountains in Spain (Silvestre & Montserrat 2001). Although there are no hybridization barriers between closely related taxa of *Rosa*, due to the geographic isolation and phenotypic differentiation of the population, and the absence of other members of the genus on Tenerife except for *R. canina*, the Cañadas population should be best diagnosed as a new subspecies,

### *Rosa dumalis* ssp. *teydensis* Weller & H. Reichert

Holotype:—SPAIN. Canary Islands: Tenerife, Cañadas del Teide, Roque del Rosal, Cañada de la Mareta, 2.100 m a.s.l., 18 June 2019, leg. A.-A. Weller, det. H. Reichert, TFC 53.627 (FIGURE 1). Flowering branch (26 cm) of shrub (ca. 2.5 m), with a few, sickle-shaped prickles (removed for preparation purposes); leaves leathery, in living plant blue-green above, gray-green below, oval-shaped, 26–52 × to 50–86 mm; leaflets seven, almost sessile to very shortly stalked (c. 1 mm), partly overlapping, 6.5–29 × 4.5–20 mm, ovoid, towards inflorescence sometimes acute; margins crenate-serrate (uni- to multiserrate); teeth with sessile to shortly stalked glands; leaflets glandular below along midribs; rachis usually below lowest pair of leaflets with short hairs (0.1–0.2 mm long, occasionally several times longer), and straight to sickle-shaped prickles of 0.3–0.7 mm (1–10; mostly > 4, along rachis); stipules in upper parts of flowering branches 16–21 × 10–12.5 mm (lower stipules smaller), apically acute, with glandular margins; (one) flower pale pinkish, in living plant approx. 28 mm in diameter; petals obovoid, approx. 14 × 11 mm, terminally emarginate; orifice (one measured) 1.4 mm, pedicels c. 7.0–7.5 mm long, hairy; sepals up to 13 mm long, glandular along margins, tomentose-villous inside, partly outside, with glabrous, glandular appendages of up to two third of length of sepals; hips dark brown to black brown, 5.2–6.0 × 4.5–5.5 mm.

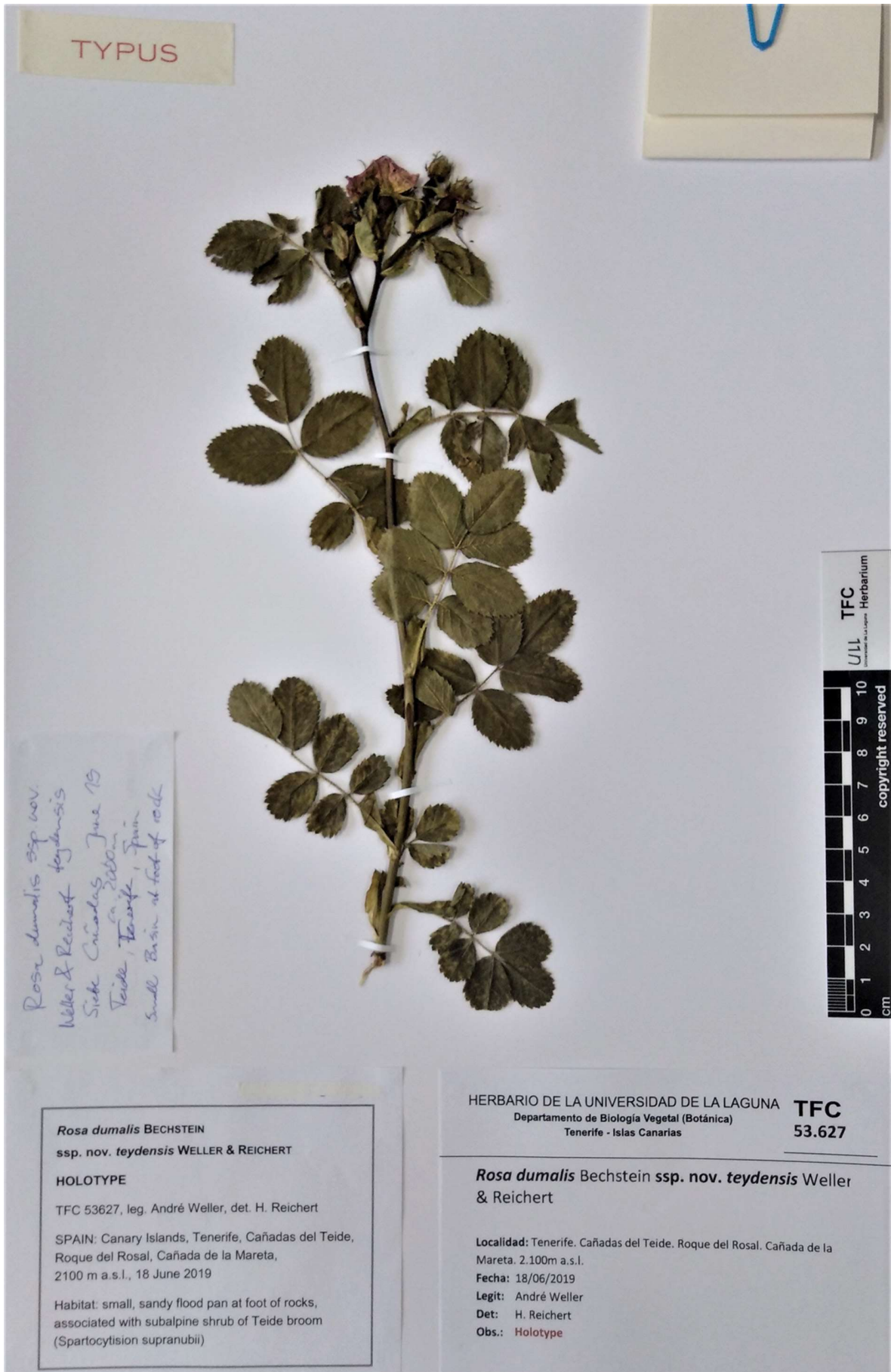


FIGURE 1. Holotype of *Rosa dumalis* ssp. *teydensis* Weller & H. Reichert (TFC 53.267) (photo: Herbario TFC)

Additional specimens:—SPAIN. Canary Islands: Tenerife, Cañadas del Teide:

Isotype: Roque del Rosal, Cañada de la Mareta, 2.100 m a.s.l., 18 June 2019, leg. A.-A. Weller, *WE-19618-Rd*; Las Cañadas, Montaña Diego Hernández, leg. E.R. Sventenius, 29 April 1944, *ORT 16209*; Las Cañadas, ad pedem montis Guajara, Hab. in rupibus apricis, 2.400 m, leg. E.R. Sventenius, 29 April 1944, *ORT 2681*; Topo de la Grieta, 21 May 1973, leg. W. Wildpret *et al.*, *TFC 3879*; Topo de la Grieta, presentado en la zona umbrosa, 31 May 1973, leg. W. Wildpret *et al.*, *TFC 21.912*; Roque del Agua, Cañada de la Grieta, 2.080 m, 20 June 2019, foot of rock, leg. A.-A. Weller (det. H. Reichert), *WE-19620-Rd*.

### Diagnosis

Matching *Rosa dumalis* Bechstein *sensu* Henker 2000 (*R. vosagiaca* auct., nom. ill.) in the following characters: foliage dense, leaflets close together, mostly touching each other or somewhat overlapping (FIGURE 2); leaves glabrous and primarily on the lower side glaucous; inflorescence clustered, usually with 2–4 flowers (FIGURE 3B); pedicels shorter than bracts and at least some of them shorter than the length of the hips (FIGURE 2); sepals after anthesis reflexed, later spreading to spreading-erect, persistent at least until fruit ripening; orifice (stylus channel) very short and wide, diameter more than 1 mm (FIGURE 4); stigmas forming a broadly cap-shaped, white-woolly head covering the orifice.

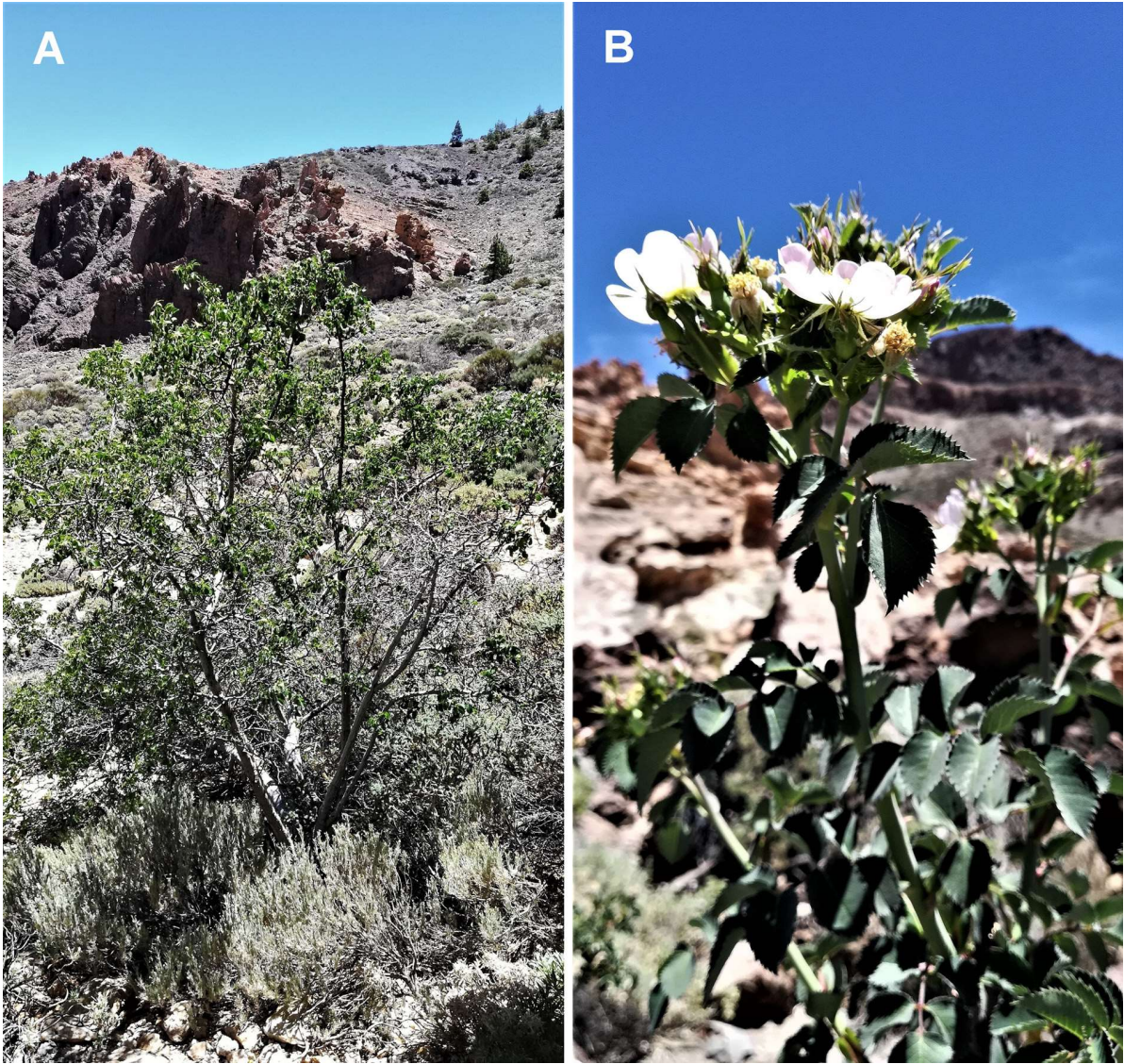


**FIGURE 2.** Leaflets and fruiting inflorescence of *Rosa dumalis* ssp. nov. *teydensis*. Pedicel length of the central flower only 3.2 mm (magnification: c. 2.5; photo: H. Reichert)

Differential characters of ssp. *teydensis* vs. continental *dumalis* are: shrubs usually more loosely branched (FIGURE 3A); spines of shoots rather heteracanth (FIGURE 5); leaflets at the end very broadly tapered to blunt and with the following xeromorphic characters: almost leathery (thickness approximately 0.2 mm), strikingly smooth on the upper side, veining often not visible due to narrowly sunken veins, margins of teeth brownish cartilaginous; sepals at the end often with a leaf-like appendix (FIGURE 3); petals already at beginning of anthesis usually whitish pink to pale pink (not deep pink) (FIGURE 6).

### Etymology

The taxon is named after its region of origin, the mountain range of Pico del Teide (Engl. Teyde).



**FIGURE 3.** Habitus of *Rosa dumalis* ssp. nov. *teydensis*. A: Shrub; B: flowering branch (photos: A.-A. Weller).



**FIGURE 4.** Longitudinal section through the upper part of the fruit of *Rosa dumalis* ssp. *teydensis* showing the extremely wide and short orifice (diameter: 1.6 mm) (photo: H. Reichert)



**FIGURE 5.** Variation of prickles in specimens of *Rosa dumalis* ssp. nov. *teydensis* showing slight heteracanthity (photo: H. Reichert)



**FIGURE 6.** Flower of *Rosa dumalis* ssp. nov. *teydensis* exhibiting a whitish-pink coloration (photo: A.-A. Weller)

### Habitat and ecology

*Rosa dumalis* ssp. nov. *teydensis* grows in semi-shady places, on steep, rocky slopes, at the foot of shady rocks (FIGURE 7), in crevices and rocky fissures with sparse vegetation cover, and in small wet, rather sandy pans. The habitat itself is associated with the endemic-rich, subalpine shrub of *Spartocytisium supranubium* (Esteve73), of the high mountains of both La Palma and Tenerife. On the latter island, it hosts characteristic elements such as *Spartocytisium supranubium* (L.f.) Christ & Kunk., *Adenocarpus viscosus* (Willd.) Webb & Berth. (Fabaceae), *Erysimum scoparium* Brouss. ex Willd. (Wettst.) (Brassicaceae), *Echium wildpretii* Pears. ex Hook.f. ssp. *wildpretii* (Boraginaceae), *Pterocephalus lasiospermus* Link ex Buch (Dipsacaceae), *Argyranthemum tenerifae* Humphr., *Andryala pinnatifida* Ait. var. *teydea* Webb and *Cheirolophus teydis* (Chr.Sm.) G.Lóp. (Asteraceae). In small pans with seasonal flooding, it is accompanied by *Arrhenatherum calderae* Hans. (Poaceae), *Nepeta teydea* Webb & Berth. and *Mentha longifolia* (L.) Huds. (Lamiaceae). Occasionally, xerothermic subalpine specialists including *Pimpinella cumbrae* Link (Apiaceae), *Micromeria lachnophylla* Webb & Berth., *Sideritis eriocephala* Marrero ex Negrín & Pér. (Lamiaceae) or the very rare *Helianthemum juliae* Wildpr. (Cistaceae) are found in the vicinity of *Rosa dumalis* ssp. nov. *teydensis*.

The climate conditions of the Cañadas are characterized by large temperature fluctuations (e.g., diurnal oscillations > 15°C) and can be described as cool during winter, with frost periods and occasional snow fall, and temperate to hot and dry weather in spring and summer, including an extreme high exposition to UV radiation. Based on altitude and the barrier effect of the surrounding mountains, such an environment favors a drought-resistant flora (Wildpret de la Torre & Martín-Osorio 2000) since rain is almost absent and humidity mostly results from either snowmelt (being restricted to early spring) or foggy periods.



**FIGURE 7.** Rocky habitat of *Rosa dumalis* ssp. nov. *teydensis* within subalpine teydeginster shrub of the Cañadas del Teide, Tenerife (photo: A.-A. Weller)

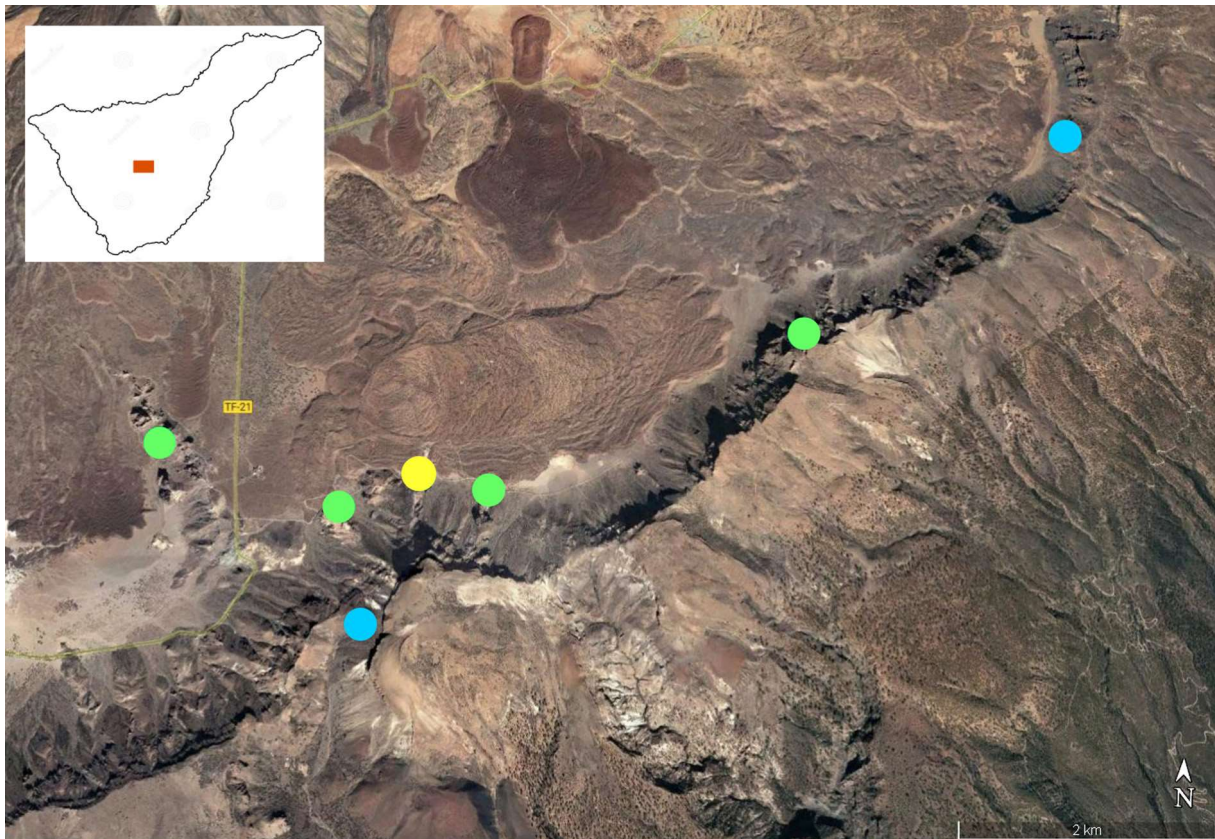
### **Distribution and population size**

*Rosa dumalis* ssp. *teydensis* is exclusively found at the northern edge of the half-ring-shaped mountains surrounding the caldera of Las Cañadas (FIGURE 8). The area of distribution covers a single quadrant (ordnance survey map: 27566), where the taxon is obviously restricted to a limited elevation area (c. 2.050–2.400 m a.s.l) across a range of c. 10 km in length in total. However, there are a low number of scattered localities (see *Additional specimens*) comprising at minimum one and at maximum > 10 individuals, and only a very small number of historical records, of which the earliest one refers to an exsiccate collected in 1955 by Sventenius.

Observations in the course of this study may indicate at least a slight loss in range since the begin of this century. Despite extensive search, an individual seen by the first author in August 2000 at the southwestern ridge of Roques de Garcia could not be relocated in June 2019. Moreover, we were unable to confirm another three historical sites (as evidenced by herbarium material), for which no access for the supposed zone of occurrence was permitted. However, the species could be located at three new localities without previous herbarium records (Piedras Amarillas, Roque del Rosal, Roque del Agua); see FIGURE 8).

The apparent rarity of *Rosa dumalis* ssp. *teydensis* is stressed by the 2019 survey yielding a population of less than 25 reproductive individuals and about the same number of immature bushes in the wild, all of which are considered as of natural origin. As indicated by two herbarium specimens (ORT, TFC), an additional but certainly minor number of plants may persist in remote areas that were not accessed during this study (i.e., due to collecting restrictions or incomplete locality data). Considering this uncertainty, overall population size is estimated < 50 plants in the wild. However, there are single bushes obviously planted for ornamental purposes along roadsides (e.g., TF 24, El Portillo) or hiking trails (Siete Cañadas). Finally, some specimens of minor height (< 1 m), partly seen flowering in June 2019, have been planted in the botanical garden of El Portillo Visitor Center of PN del Teide.





**FIGURE 8.** Distribution of *Rosa dumalis* ssp. nov. *teydensis* showing type locality (yellow), records since 2000 (green) and before 2000 (blue) (adapted from Google Earth Pro, © 2021 Maxar Technologies / Grafcan).

### Status and conservation

The population of *Rosa dumalis* ssp. *teydensis* is restricted to PN del Teide, one of the major national parks of Spain and the Canary Islands, respectively, providing extensive protection measures against man-made impacts to ensure the survival of its unique local fauna and flora. Due to the outstanding geological history and oreographic features, the volcano Teide is included in UNESCO's World Heritage List (UNESCO inscription of 28 June 2007; criteria vii, viii).

Despite the lack of reference data, the new taxon can be considered as one of the most threatened roses in Europe and may be among the rarest wild roses at global scale. Based on extremely small population size (number of mature individuals < 50), highly fragmented subpopulations (with  $n = 1$  to > 10 plants), extent of occurrence (< 100 km<sup>2</sup>) and area of occupancy (< 10 km<sup>2</sup>), respectively, the taxon must be classified as Critically Endangered (CR) under at least two IUCN criteria (B1, B2(a)(ii,iv); D). Moreover, we estimate that the criterion "Small population size and decline" (C1 and/or C2(a)(i)) may be also applicable to this taxon. It is proposed to include it in the Canarian catalogue of protected species in the category of "In danger of extinction" (LAW 4/2010, of June 4, from the Canary catalogue of protected species).

While *Rosa* individuals usually grow solitary or in small groups along rock walls, and occur in an instable environment, they are especially endangered by erosion and, potentially in the mid- and long-term, by volcanic activities. Other factors negatively impacting the vitality may include drought, flooding or even winter cold. In view of the low number of sites and individuals, the combination of risk factors makes the taxon highly vulnerable to local extinction (IUCN criterion E). On the other hand, inaccessibility, and remoteness of most sites of occurrence based both on natural conditions (such as steepness) and overall habitat protection make it less vulnerable to human activities. The general restrictions by the park authorities prohibit access by visitors to most growth sites. Moreover, grazing – a main threat to many endemic vascular plants of the Canaries – is negligible based both on the plant's habitat and habitus, though the introduced mufflon (*Ovis gmelini musimon*) persists as the only mammal herbivore in the Cañadas.

The few individuals planted for exhibition and/or ornamental purposes may provide a basic genetic reserve in terms of conservation. However, it is recommended to include seed material of *Rosa dumalis* ssp. *teydensis* to the germplasm reservoir of threatened Canarian vascular plants (Banco de Germoplasma de la Viceconsejería de Medio

Ambiente del Gobierno de Canarias). The initiation of a management plan to ensure of survival of reproductive plants, including replanting measures, may further enhance the survival probability for this unique member of Rosaceae.

## Conclusions

Evidence by literature, specimen labels and individuals planted for exhibition purposes reveals that the identity of the new taxon has surprisingly long been overlooked, for which several reasons may count for. *Rosa dumalis* belongs to the section Caninae, comprising phenotypical similar species which vary even at intraspecific level and may hybridize easily, thus blurring identification and taxonomic classification, especially in the light of molecular-biological methods (e.g., Nybom *et al.* 1997, Wissemann & Hellwig 1997, Ritz *et al.* 2005, De Cock *et al.* 2008, Herklotz & Ritz 2017). Since members of this group are not easily identified without comparative material at hand and detailed morphological analysis (for example, morphology of shoots, leaflets, fruits and spines, absence/existence of glands, requiring the consideration of feature combinations), we believe that historical misidentifications by botanists exploring earlier the Canarian flora have not been challenged by later reviewers non-specialized in the genus *Rosa*. Not least, herbarium material alone may be inappropriate for determination purposes as some relevant phenotypical features may be no longer visible or missing due to preparation or collecting (e.g., diameter of style channel, bribery at the basal half of plants). It is therefore highly recommended to include the new taxon in molecular studies to shed further light on its phylogenetic affinities and position within the Section Caninae.

*Rosa dumalis* has an ample distribution in the Palaearctic, with the main range extending from northern (western and southern Scandinavia) and western Europe (British Isles, Iberian Peninsula) across Central to eastern Europe (central Russia) (Kláštorský 1968). Moreover, single records exist from Island, Sardinia and the northern Caucasus. In central Europe, *R. dumalis* inhabits montane to subalpine shrub and is a characteristic element of xerothermic habitats of the Corylo-Rosetum vosagiaceae (Berberidion). On Tenerife, the taxon is associated with the high mountain flora, which is comparable to the environmental conditions in the central European populations.

The poor number of *Rosa* representatives on the Canary Islands is surprising, given the fact that other genera of Rosaceae (i.e., *Bencomia*, *Dendropoterium*, *Marcetella*) are exclusive members of the island flora and partially have been undergone remarkable radiations in this archipelago. However, our findings add another prominent member to the vascular flora of Tenerife, increasing the already high level of endemism (Wildpret de la Torre & Martín Osorio 2000, Bramwell & Bramwell 2001, Reyes-Betancort *et al.* 2008) in the unique region of Pico del Teide and stressing its role as major botanical hot-spot in that archipelago.

## Acknowledgements

Special thanks go to Juan Ramón Acebes Ginovés, Marcelino del Arco and Cristina Montelongo-Gonzales, Herbario de la Facultad de Ciencias (TFC), Sección Biológicas, Departamento de Botánica, Ecología y Fisiología Vegetal, Universidad de La Laguna and to Alfredo Reyes Betancourt, head of Jardín de Aclimatación de La Orotava (ORT), Puerto de la Cruz, for kindly preparing the visits and supporting the work of AAW at their herbarium collections. Field work and collection of specimens by AAW were permitted by Cabildo de Tenerife, Área de Sostenibilidad, Servicio Administrativo de Medio Ambiente, Unidad de Coordinación (Nº Sigma: 2019-01646) and El Director – Conservador Parque Nacional del Teide (Nº registro O00006501s1900022939).

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**APPENDIX 1.** Comparison of main diagnostic phenotypical and morphological characters between Tenerife and continental European *Rosa dumalis* populations based on this study and reference data. Abbreviations (bold): T—Tenerife specimens observed / collected by Weller and examined within this study; SM—data from Silvestre & Montserrat (2001); H—data from Henker (2000); HR—specimens from the Herbarium Hans Reichert, all collected in Germany, from Rhineland-Palatinate (29), Baden-Wuerttemberg (n = 2), Saarland (n = 1) and Thuringia (n = 1); C—conclusions. Morphological deviances of the Tenerife population are highlighted in bold.

**Table A1: General habitus**

<b>T</b>	Shrub, <b>often loosely branched</b> , usually with overhanging branches, (0.5) 1.5–2.5 m (cf. FIGURE 3A)
<b>SM</b>	Shrub (0.5) 1–2 m
<b>H</b>	Dense shrub (1) 1.5–2 (2.5) m high
<b>HR</b>	Noted for some specimens: dense, compact shrub
<b>C</b>	Tenerife individuals tend to be more loosely branched.

**Table A2: Color appearance of shrub based on foliage**

<b>T</b>	Blue-green (after field observations, AAW; cf. FIGURE 3)
<b>SM</b>	No data available
<b>H</b>	Blue-green
<b>HR</b>	Blue-green (after field observations)
<b>C</b>	As far as data are available, there are no clear differences in color appearance.

**Table A3: Bark color**

<b>T</b>	Young shoots olive green to brownish green, sometimes red tinged; older ones becoming dark brown
<b>SM</b>	Young shoots slightly glaucous and pruinose, older ones reddish
<b>H</b>	Shoots pruinose
<b>HR</b>	Young shoots mostly reddish brown, more rarely light brown to olive green; two-year-old shoots mostly red-brown. Color of herbarium specimens not ascertainable.
<b>C</b>	There are no clear differences in bark coloration.

**Table A4: Prickles of shoots**

<b>T</b>	<b>Straight, curved or crescent-shaped, of different length, indicating heteracanth</b> (see FIGURE 5, TFC herbarium specimens)
<b>SM</b>	Large, curved or slightly hook-shaped, either with a rounded cross-section at base or not
<b>H</b>	Prickles equal, exceptionally unequally prickly (heteracanth) to unarmed only in inflorescence. Prickles crowded, strong, fairly short, usually hooked, less often sickle-shaped; base broadly descending
<b>HR</b>	Prickles equal; curved in specimens from Hunsrück (mountain range in SW Germany) while rather hooked in other parts of Germany
<b>C</b>	Tenerife specimens are more heteracanth than continental ones.

**Table A5: Stipules (examined mainly on flower shoots from T, on regular shoots by HR)**

<b>T</b>	Significantly broader on shoots than petioles, margins sparsely hairy and densely glandular; usually glabrous on both sides, but in one specimen sparsely hairy and glandular below
<b>SM</b>	Glabrous or hairy below, margins glandular (reference with many other details about stipules, which are ignored in most floral plants).
<b>H</b>	Wide, glabrous, ciliate on the margin; on surface usually eglandular, rarely glandular
<b>HR</b>	Almost always significantly wider than petioles, hairless or slightly hairy on margins; mostly rich glandular, rarely loosely glandular
<b>C</b>	Specimens from Tenerife exhibit the typical characteristics of <i>Rosa dumalis</i> .

**Table A6: Petiole, rachis and midrib of leaflets**

<b>T</b>	Petiole partly glabrous, partly loosely hairy, throughout length rich glandular, mostly with more than four prickles on midrib of leaflets
<b>SM</b>	Petiole glabrous or hairy, with pedicel glands and small prickles extending to rachis and midrib
<b>H</b>	Petiole usually glabrous, rarely sparsely, exceptionally densely pubescent; often with varying numbers of glands and small, hooked prickles below
<b>HR</b>	Petiole usually glabrous, only slightly pubescent in one specimen; almost always with more than 30 stalked glands per segment; usually with more than four small prickles spreading to midrib of terminal leaflet
<b>C</b>	Tenerife specimens show characteristics in the range of variation of continental <i>Rosa dumalis</i> .

**Table A7: Leaves and leaflets**

<b>T</b>	Leaflets (5–)7, close together, mostly touching each other or somewhat overlapping, sessile to very shortly stalked, <b>ovoid to ovoid-shaped (length/width index 1.23–1.52)</b> , often small (local adaptation?), 12–31 × 8.0–24.5 mm, <b>at apex very broadly acute to obtuse</b> , at the base widely wedge-shaped to <b>rounded, coarse, almost leathery, approx. 0.2 mm thick (slightly xeromorphic); strikingly smooth on the upper side, dull, rather blue-green to dark green (only the latter in herbarium specimens), venation often invisible due to narrowly sunken veins</b> ; leaflets on both sides mostly completely glabrous, but <b>midrib occasionally pubescent</b> ; serration variable, usually uni- to multiserrate, in specimens with small leaflets often simple or in part with one posterior tooth, otherwise also with 2–3 posterior teeth; <b>teeth thickened, usually broadly serrate</b> (rarely narrow) (difference to <i>Rosa dumalis</i> in SM and H), at apex brownish-cartilaginous, glandular, in apical part of leaflet sometimes overlapping; secondary teeth often minute
<b>SM</b>	Leaflets (5–)7, dimensions (12) 18–36 (38) × (12) 16–24 (26) mm, ovoid to ovoid, somewhat narrow at the base, glabrous or pubescent on both sides, glandular on lower surface, at least midrib studded with glands, uni- to biserrate, with long and narrow teeth
<b>H</b>	Leaflets (5–)7, close together and touching, elliptical to broadly elliptical, rarely broadly ovoid to obovate, apically mostly broadly acute to acute, base cuneate, rarely rounded, weakly cordate or cuneate. Leaves consistently larger than in <i>Rosa canina</i> , usually bluish green, often lustrous. Leaflets deeply uniserrate to multiserrate, pointed, glandular or eglandular; glabrous on both sides; basal part of midrib frequently studded with glands that can also spread to entire midrib and lateral nerves
<b>HR</b>	Leaflets (5–)7, non-overlapping (75%) or touching to overlapping (25%); dimensions 20.5–36.5 × 13.5–35.7 mm, length-width index 1.32–2.38. Leaflets thin (around 120 µm) but taut, dull above, almost always glaucous; glabrous on both sides; glands only on basal third of midrib (80%) or absent (20%). Veins hyaline, appearing dark against light
<b>C</b>	Non-glaucous appearance of upper sites of leaflets, veining, shape, average length/width index and thickness of leaflets, and occasional pubescence of midribs are distinctive features for Tenerife plants.

**Table A8: Pedicels**

<b>T</b>	Mean length of terminal and some solitary pedicels 4–10 mm, shorter than bracts and rose hips (0.6–0.25 times shorter); <b>hairless, eglandular</b>
<b>SM</b>	(1) 2.3–10 (17) mm long, upright, sometimes hairy, smooth or with stalked glands
<b>H</b>	Short, only (0.2) 0.5–1 (–2) cm long, usually eglandular, sometimes sparsely to densely glandular
<b>HR</b>	Average values 2.6–10.4 mm; mean ratio of relative length to length of hip 0.18–0.85; shorter than bracts, glabrous (approx. 1/3) to slightly pubescent (approx. 2/3), always eglandular. For ambiguous length measurements due to the morphological differences between terminal and subterminal (lateral) flowers of inflorescences in <i>Rosa</i> see REICHERT (2011)
<b>C</b>	Although there is some variation in pedicels among continental <i>Rosa dumalis</i> , Tenerife individuals are in pedicel length close to other populations while pedicels are usually glabrous and eglandular.

**Table A9: Sepals**

<b>T</b>	Glands partly only on the <b>often leaf-like apical part</b> , partly on the entire margin, but never on back; inside (sometimes also outside) of sepals woolly. After anthesis partially reflexed, then <b>strongly upright</b> , less often straightened up and persistent for a long time
<b>SM</b>	Adaxially and at margins pubescent, abaxially glabrous or studded with stalked glands; protruding or upright on fruit
<b>H</b>	Mostly glabrous, with glandular or eglandular margins; if pedicels glandular, also abaxially glandular. At hip ripening rarely upright, falling off late
<b>HR</b>	Spreading erect during the fruiting season, persistent; glands only on margins, lacking on abaxial side; inside (in inner sepals also outside) woolly
<b>C</b>	In some characters the Tenerife clade tends to deviate from the Central European populations.

**Table A10: Flowers and petals**

<b>T</b>	Flowers usually in clusters of 2–4; petals 14–22 mm long, <b>whitish pink to pale pink</b> in life while darkening to pinkish in herbarium specimens (cf. FIGURES 1, 6)
<b>SM</b>	Petals (12) 14–25 (30) mm long, vivid to pale pink
<b>H</b>	Flowers usually solitary or in clusters (2–4), diameter (2.5–) 3–5 (–6.5) cm; petals mostly bright pink to rose red, rarely pale pink or white
<b>HR</b>	Petals 9–24 mm long, vividly pink when blooming and then gradually fading
<b>C</b>	Dimensions of floral characters of Tenerife plants are similar, but petals are usually paler and less bright colored than on average in continental representatives.

**Table A11: Styles and stigmas**

<b>T</b>	Stigmas forming a broadly cap-shaped head, styles white woolly
<b>SM</b>	Stigmas forming a conically shaped head, rarely bouquet-shaped
<b>H</b>	Stigmas forming a broad flat head, styles white woolly
<b>HR</b>	Stigmas forming a broadly cap-shaped head, styles white woolly
<b>C</b>	Most representatives (except those from Spain) including those from Tenerife are similar in this character.

**Table A12: Disc**

<b>T</b>	Diameter 3.7–4.4 mm; flat, occasionally with a low bulge around the orifice
<b>SM</b>	Diameter (4) 4.5–5 mm; almost flat or slightly conical
<b>H</b>	Disc index (disc diameter / orifice diameter) (2–) 2.5–3.5 (–4); flat to concave
<b>HR</b>	Diameter (3.0–) 4.0–4.88, index 3.0–4.73; about 30% flat, just as often with a low bulge around the orifice opening and just as often with flat-conical shape; less often concave (trough-shaped)
<b>C</b>	There are no significant differences towards continental <i>Rosa dumalis</i> .

**Table A13: Diameter of orifice (mm)**

<b>T</b>	1.4–1.75 (2.0)
<b>SM</b>	(1) 1.3–2.3 (2.5)
<b>H</b>	(1.1–) 1.5–2 (–3)
<b>HR</b>	0.79–1.6 (Hunsrück)
<b>C</b>	There are no significant differences towards continental <i>Rosa dumalis</i> .

**Table A14: Receptaculum (hip)**

<b>T</b>	Dimensions highly variable, 7.6–21.4 × 5.2–13.8 mm; elliptical, without neck (constriction below the disc), smooth; ripe bright red
<b>SM</b>	Length variable, (13) 17–30 (37) mm long; reverse pear-shaped to elliptical, smooth, rarely with stalked glands; ripe dark red
<b>H</b>	Dimensions variable, 20–30 mm × 10–20 mm (much larger than in <i>Rosa canina</i> ); ellipsoidal, spherical or ovoid, rarely oblong-ovate, also pear-shaped (especially the terminal hips); ripe strong cloudy dark red to orange-red
<b>HR</b>	Dimensions variable, 5.3–18.4 × 4.6–13.9 mm, terminal hips obovate, lateral hips ovoid, solitary hips elliptical; mostly (approx. 90%) without, rarely (approx. 10%) with neck; always smooth, without hairs or glands; ripe dark red
<b>C</b>	Hips exhibit no distinctive features, also because of their great variability.