

# New xenophytes from La Palma (Canary Islands, Spain), with emphasis on naturalized and (potentially) invasive species – Part 3

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Editor: N. Ibáñez

Received 22 February 2019; accepted 12 September 2019; published on line 14 April 2020

## Abstract

NEW XENOPHYTES FROM LA PALMA (CANARY ISLANDS, SPAIN), WITH EMPHASIS ON NATURALIZED AND (POTENTIALLY) INVASIVE SPECIES. PART 3.— Several months of field work in La Palma (western Canary Islands) yielded a number of interesting new records of non-native vascular plants. *Alstroemeria aurea*, *A. ligtu*, *Anacyclus radiatus* subsp. *radiatus*, *Chenopodium album* subsp. *borbasii*, *Cotyledon orbiculata*, *Cucurbita ficifolia*, *Cynodon nlemfuensis*, *Datura stramonium* subsp. *tatula*, *Digitaria ciliaris* var. *rhachiseta*, *D. ischaemum*, *Diplotaxis tenuifolia*, *Egeria densa*, *Eugenia uniflora*, *Galinsoga quadriradiata*, *Glebionis segetum*, *Kalanchoe laetivirens*, *Lemna minuta*, *Ligustrum lucidum*, *Lotus broussonetii*, *Oenothera fallax*, *Paspalum notatum*, *Passiflora caerulea*, *P. manicata* × *tarminiana*, *P. tarminiana*, *Pelargonium capitatum*, *Phaseolus lunatus*, *Portulaca trituberculata*, *Pyracantha angustifolia*, *Sedum mexicanum*, *Trifolium lappaceum*, *Urochloa mutica*, *U. subquadripara* and *Volutaria tubuliflora* are naturalized or (potentially) invasive xenophytes or of special floristic interest, reported for the first time from either the Canary Islands or La Palma. Three additional, presumably ephemeral taxa are reported for the first time from the Canary Islands, whereas seven ephemeral taxa are new for La Palma.

Key words: Canary Islands; chorology; La Palma; new records; vascular plants; xenophytes.

## Resumen

NUEVOS XENÓFITOS DE LA PALMA (ISLAS CANARIAS, ESPAÑA), CON ÉNFASIS EN LAS ESPECIES NATURALIZADAS Y (POTENCIALMENTE) INVASORAS. PARTE 3.— Varios meses de trabajos de campo en La Palma (Islas Canarias occidentales) han posibilitado el descubrimiento de nuevas plantas vasculares no nativas. *Alstroemeria aurea*, *A. ligtu*, *Anacyclus radiatus* subsp. *radiatus*, *Chenopodium album* subsp. *borbasii*, *Cotyledon orbiculata*, *Cucurbita ficifolia*, *Cynodon nlemfuensis*, *Datura stramonium* subsp. *tatula*, *Digitaria ciliaris* var. *rhachiseta*, *D. ischaemum*, *Diplotaxis tenuifolia*, *Egeria densa*, *Eugenia uniflora*, *Galinsoga quadriradiata*, *Glebionis segetum*, *Kalanchoe laetivirens*, *Lemna minuta*, *Ligustrum lucidum*, *Lotus broussonetii*, *Oenothera fallax*, *Paspalum notatum*, *Passiflora caerulea*, *P. manicata* × *tarminiana*, *P. tarminiana*, *Pelargonium capitatum*, *Phaseolus lunatus*, *Portulaca trituberculata*, *Pyracantha angustifolia*, *Sedum mexicanum*, *Trifolium lappaceum*, *Urochloa mutica*, *U. subquadripara* y *Volutaria tubuliflora* son xenófitos naturalizados o (potencialmente) invasores o de especial interés florístico, que se citan por primera vez para las Islas Canarias o para la isla de La Palma. Tres táxones adicionales, probablemente casuales, se dan a conocer por primera vez de las Islas Canarias, y siete táxones de la isla de La Palma.

Palabras clave: corología; Islas Canarias; La Palma; nuevas citas; plantas vasculares; xenófitos.

## Cómo citar este artículo / Citation

Otto, R. & Verloove, F. 2020. New xenophytes from La Palma (Canary Islands, Spain), with emphasis on naturalized and (potentially) invasive species – Part 3. *Collectanea Botanica* 39: e002. <https://doi.org/10.3989/collectbot.2020.v39.002>

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## INTRODUCTION

This paper is a sequel to Otto & Verloove (2016 and 2018). We present new records for species that are either new to the Canary Islands (and even Macaronesia as a whole) or new to the island of La Palma. The emphasis is on species that are naturalized or on their way to future naturalization, (potentially) invasive or that are otherwise of interest. Records of (mostly) occasional garden escapes or (presumably) ephemeral introductions (“casual alien plants” *sensu* Richardson *et al.*, 2000) are only briefly commented.

## MATERIALS AND METHODS

Records here presented are the result of several months of fieldwork in La Palma conducted by the first author, mainly between 2014 and 2018. In addition, specimens collected by the first author during the last decades have been re-examined. Voucher specimens of most taxa are preserved in the private herbarium of the first author (hereafter as “pers. herb. RO”). Duplicates were often deposited in the herbarium of the Botanic Garden Meise, Belgium (BR) (acronym according to Thiers, 2019).

The actual presence or absence on the island of La Palma of the non-native taxa here presented was each time compared with data provided by Hohenester & Welss (1993), Acebes Ginovés *et al.* (2010), the Euro+Med PlantBase (Euro+Med, 2006–2019) and the Banco de Datos de Biodiversidad de Canarias (2019). For some recently introduced species several additional papers were checked as well.

The paper is divided in three parts. The first and major part deals with either probably and/or locally naturalized or (potentially) invasive species or species that are otherwise of particular interest. Each entry includes the scientific name of the taxon (if useful accompanied by one or more homo- or heterotypic synonyms), the family to which the taxon belongs (see below), kind of chorological novelty, enumeration of selected herbarium collections and/or personal observations (often also with exact locality indication, using Google Maps coordinates, given in decimal degrees), origin (primary as well as secondary distribution range), known distribution in the Canary Islands (abbreviated as follows: H = El Hierro, P = La Palma, G = La Gomera, T =

Tenerife, C = Gran Canaria, F = Fuerteventura, L = Lanzarote) and its estimated degree of naturalization in La Palma (*sensu* Richardson *et al.*, 2000). If relevant, some additional information is also provided (nomenclatural or taxonomic comments, identification keys, etc.). In the second and third part records of (presumably) ephemeral aliens are presented. These may be either new to the Canary Islands or new to the island of La Palma. For these records only herbarium data and personal observations are referred to. For convenience, within each of these parts, all taxa are presented in alphabetical order.

Familial and generic classifications are in accordance with APG IV (2016). For the taxa treated herein this means, for instance, that Chenopodiaceae are included in Amaranthaceae and Lemnaceae in Araceae. Assessing the exact residence status in the Canary Islands in general, or the island of La Palma in particular for each individual species, is not straightforward. All taxa except those that are quoted as surely native for La Palma (“nativa seguro”) by Acebes Ginovés *et al.* (2010) were considered non-native in this paper.

## RESULTS

### Naturalized, potentially invasive and/or taxa of particular interest

*Alstroemeria aurea* Graham in Edinb. Philos. J. 15: 181 (1833) (incl. hybrids) (Fig. 1) (Alstroemeriaceae).

Syn.: *Alstroemeria aurantiaca* D. Don

New to the flora of the Canary Islands.

Spain, La Palma: Puntallana, Barranco Hondo de Nogales, Calle El Corcho, embankment with deposited soil and rubble, numerous specimens in dense ruderal vegetation, ca. 400 m, 28.756744° N, 17.758838° W, 26.VI.2015, *R. Otto* 21538 (pers. herb. RO); *ibid.*, 05.X.2016, *R. Otto* (pers. obs.).

*Origin*: native to southern South America (Chile, Argentina), cultivated worldwide in many cultivars and hybrid forms, naturalized in Australia, New Zealand and the UK (Weber, 2017).

*Degree of naturalization*: ephemeral but potentially invasive.





**Figure 1.** *Alstroemeria ligtu* (left half) and *Alstroemeria aurea* (right half), Puntallana, June 2015 (photographs: R. Otto).

The species is reported as an environmental weed and invasive from Australia (Queensland Government, 2019) and New Zealand (T.E.R:R.A.I.N., 2019).

*Alstroemeria ligtu* L., Sp. Pl. 2: 462 (1762) (incl. hybrids) (Figs. 1 and 2) (Alstroemeriaceae).

New to the flora of La Palma.

Spain, La Palma: Barlovento, Laguna de Barlovento, landfill for soil (excavation) and rubble, small colony in open ruderal vegetation, 07.X.2011,

*R. Otto 18766* (pers. herb. RO); *ibid.*, 23.X.2018, *R. Otto* (pers. obs.); Puntallana, Barranco Hondo de Nogales, Calle El Corcho, embankment of a former section of the LP-1 with deposited soil and rubble, numerous individuals in dense ruderal vegetation, *ca.* 400 m, 28.756744° N, 17.758838° W, 02.VI.2013, *R. Otto 20366* (pers. herb. RO); *ibid.*, more numerous and partially overgrown by *Ipomoea indica* (Burm.) Merr., 26.VI.2015; San Andrés y Saucos, San Andrés, banana plantation, 26.V.2013, 10.X.2017 and 08.IV.2018, *R. Otto* (pers. obs.).





**Figure 2.** *Alstroemeria ligtu* in banana plantation (left half) and ligtu-tepals as component part of a flower carpet (right half), Los Sauces, June 2013 (Photographs: R. Otto).

*Origin:* native to southern South America (Chile, Argentina), cultivated worldwide in countless cultivars and hybrid forms.

*Known distribution in the Canary Islands:* C (Verloove *et al.*, 2018).

*Degree of naturalization:* locally naturalized (?).

*Alstroemeria ligtu* is here accepted in a broad sense. The true *A. ligtu* (incl. several subspecies) is barely cultivated on La Palma. However, there are an immense number of garden forms and intra- and interspecific hybrids that are commonly grouped under ‘Ligtu hybrids’ or *Alstroemeria* × *hybrida* hort. These cultigens show a broad variation in all features, especially regarding the color and pattern of the perigone and are often ornamental elements of house gardens.

The most often cultivated and also escaped form on La Palma looks very similar to a plant from the Jardín Botánico Orotava called “*A. aurantiaca* × *A. ligtu*” (Regina en Mayo) and cultivated in the Jardín Botánico Mundani (<http://jardin-mundani.com/amaryllidaceae/alstroemeria2.jpg>). In some places, for example in the area around Los Sauces, the plant grows in banana plantations (mostly without ornamental value), sometimes weedy but also cultivated or at least tolerated in a “semi-wild” state. Around Corpus Christi the eye-catching tepals are used in the production of flower carpets (which may require considerable amounts).

*Anacyclus radiatus* Loisel., Fl. Gall. 2: 583 (1807) subsp. *radiatus* (Asteraceae).

New to the flora of La Palma.

Spain, La Palma: Puntallana, Calle Los Rodeos (LP-102), fallow land on the edge of the road, 04.IV.2017, *R. Otto* 22558 (pers. herb. RO, dupl. BR); Breña Alta, San Isidro, near the crossing of LP-301 and Canal de Fuencaliente, fallow land, 05.IV.2017, *R. Otto* (pers. obs.).

*Origin:* native to the western Mediterranean region, North Africa and the Canary Islands, known as casual alien from Madeira, naturalized in the Azores.

*Known distribution in the Canary Islands:* H, G, T, F, L (Acebes Ginovés *et al.*, 2010).

*Degree of naturalization:* naturalized.

***Chenopodium album*** L., Sp. Pl. 1: 219 (1753) subsp. ***borbasii*** (Murr) Soó in Acta Bot. Acad. Sci. Hung. 10: 376 (1964) (Amaranthaceae).

Syn.: *Chenopodium borbasii* Murr, *C. zobellii* Murr ex Asch. & Graebn., *C. borbasoides* A. Ludwig ex Asch. & Graebn.

New subspecies to the flora of the Canary Islands.

Spain, La Palma: Breña Alta, San Isidro, Cruz de La Pavona, several specimens, roadside along LP-301, ca. 615 m, 25.VIII.2005, *R. Otto* 11262 (pers. herb. RO, conf. *J. Walter* I.2019); *ibid.*, below Montaña La Pavona, roadside and fallow cereal field, ca. 645 m, numerous specimens, 27.IX.2012, *R. Otto* 19785 (pers. herb. RO); *ibid.*, near the crossing of LP-301 and Canal de Fuencaliente, fallow land, ca. 700 m, numerous specimens, 27.IX.2012, *R. Otto* 19787 (pers. herb. RO); *ibid.*, wayside in small *barranco* alongside LP-301, several specimens, 30.X.2014, *R. Otto* 21357 (pers. herb. RO, conf. *J. Walter* I.2019); *ibid.*, roadside LP-301, 03.IV.2017, *R. Otto* 22562 (pers. herb. RO); *ibid.*, San Pedro, Camino Bco. de Aguacencio, ca. 100 m above underpass of the LP-202, roadside, several adult specimens and many young plants, 01.X.2015, *R. Otto* 21880 (pers. herb. RO, conf. *J. Walter* I.2019); Barlovento, Laguna de Barlovento, landfill of excavated soil, many specimens, 735 m, 02.X.2015, *R. Otto* 21894 (pers. herb. RO, conf. *J. Walter* 01.2019); Puntallana, Barranco Hondo de Nogales near junction of Calle El Corcho with LP-1, deposited soil and rubble, numerous specimens, 400 m, 28.756744° N, 17.758838° W, 02.X.2015, *R. Otto* 21903 (pers. herb. RO, conf. *J. Walter* I.2019).

*Origin:* native to Italy and Romania (Euro+Med, 2006–2019). Little is known about its exact origin, but it can be assumed that it comes from the southern parts of Europe or the Mediterranean region. It is introduced as a rare casual in the western and northern parts of Europe, but “usually not flowering and never setting seed in Norden” (Uotila, 2001).

*Degree of naturalization:* naturalized.

This subspecies seems to be not rare on La Palma. It was also seen in disturbed places in or near Breña Baja, El Paso, Los Llanos, San Andrés y Sauces and Sta. Cruz de La Palma, mostly between 200 and 700 m, sometimes together with *Ch. album* subsp. *album* and *Ch. probstii* Aellen, both with similar ecological requirements. It was surely overlooked on La Palma in the past or confused with the similar type subspecies, and this may be true for the other islands as well.

Both subspecies are distinguished in the following couplet, modified from Wißkirchen & Walter (2014). The lower and middle leaves on the main stem are important for the determination.

1. Leaves about as long as broad, ± ovate, 4–6 cm long, with short but clear basal side lobes (“trilobate”) or at least basally stepped lobed-toothed, the middle lobes often with somewhat parallel margins, up to tip with large and often sharp teeth, tip rounded or only pointed briefly ..... **1a. subsp. borbasii**

-. Leaves mostly clearly longer than broad, (broad) triangular-rhombic to ovate-lanceolate, up to 12 cm long, not or only in hints trilobate, mostly clearly and densely toothed with below mostly two larger teeth, tapered to the tip ..... **1b. subsp. album**

A number of very instructive photos of herbarium specimens and of living plants of *Ch. a.* subsp. *borbasii* (and many other *Chenopodium* species) are provided online by Wißkirchen & Walter (2014).

***Cotyledon orbiculata*** L., Sp. Pl. 1: 429 (1753), incl. var. *dactyloopsis* Toelken, var. *flanaganii* (Schönland & Baker f.), var. *oblonga* (Haw.) DC., var. *spuria* (L.) Toelken (Fig. 3) (Crassulaceae).

New to the flora of La Palma.





**Figure 3.** *Cotyledon orbiculata* as epiphyte on *Phoenix canariensis* (left) and in stock of *Arundo donax* (right), Breña Alta, April 2018 (photographs: R. Otto).

Spain, La Palma: Villa de Mazo, Camino el Poleal, wayside, embankment with deposited earth and garden debris, 18.VIII.2014, R. Otto (pers. obs.); *ibid.*, La Rosa, embankment road side LP-206, some individuals up to almost one meter tall between *Geranium* shrubs, 18.VIII.2014, R. Otto (pers. obs.); Breña Alta, road embankment near crossing LP-204 and LP-3, numerous specimens in a stock of *Arundo donax* L., probably planted nearby many years ago in a small road accompanying palm area and escaped (or became overgrown), also seen nearby several specimens as epiphytes on trunks of *Phoenix canariensis* Chabaud, 09.IV.2018, R. Otto (pers. obs.); *ibid.*, 25.X.2018, R. Otto 23421 (pers. herb. RO, photo conf. Jordi López Pujol and Carlos Gómez-Bellver XII.2018).

*Origin:* *Cotyledon orbiculata* is native to southern Africa and introduced worldwide in warm climates as a garden ornamental plant, naturalized in southern Australia, California, New Zealand (Weber, 2017) and Italy (Gallo, 2017); present in France, India (CABI, 2019) and Spain (CABI, 2019; *sub C. macrantha*).

*Known distribution in the Canary Islands:* C (Verloove *et al.*, 2018).

*Degree of naturalization:* ephemeral, potentially invasive.

*Cotyledon orbiculata* is an extraordinarily variable species, divided into five varieties and a great number of poorly distinguishable cultivars (Jaarsveld, 2003). According to Tölken (1979) our plant is similar to both var. *spuria* and var. *oblonga*. For Tenerife the occurrence of *Cotyledon macrantha* is indicated (Acebes Ginovés *et al.*, 2010). This is an unresolved name but probably belongs in the synonymy of *C. orbiculata* L. var. *orbiculata* (Jaarsveld, 2003).

According to Weber (2017) *C. orbiculata* is invasive in southern Australia and New Zealand, mostly in coastal scrub and rock outcrops.

The frequency with which this species is used in gardens is astonishing in view of the strong toxicity of all plant parts, especially for goats and sheep, but also for dogs, horses, cattle and poultry (Fuller & McClintock, 1986). The contained “cotyledon toxin” is a highly potent neurotoxin and people who



have eaten meat from animals with cotyledonosis can also get sick.

This species could be confused in the vegetative state with similar-looking species of *Crassula* or *Kalanchoe*, e.g. *Kalanchoe luciae* Raym.-Hamet.

***Cucurbita ficifolia*** Bouché in Verh. Vereins. Beförd. Gartenbaues Königl. Preuss. Staaten 12: 205–206 (1837) (Figs. 4–6) (Cucurbitaceae).  
Syn.: *C. melanosperma* A. Br., nom. nud.

New to the flora of the Canary Islands.

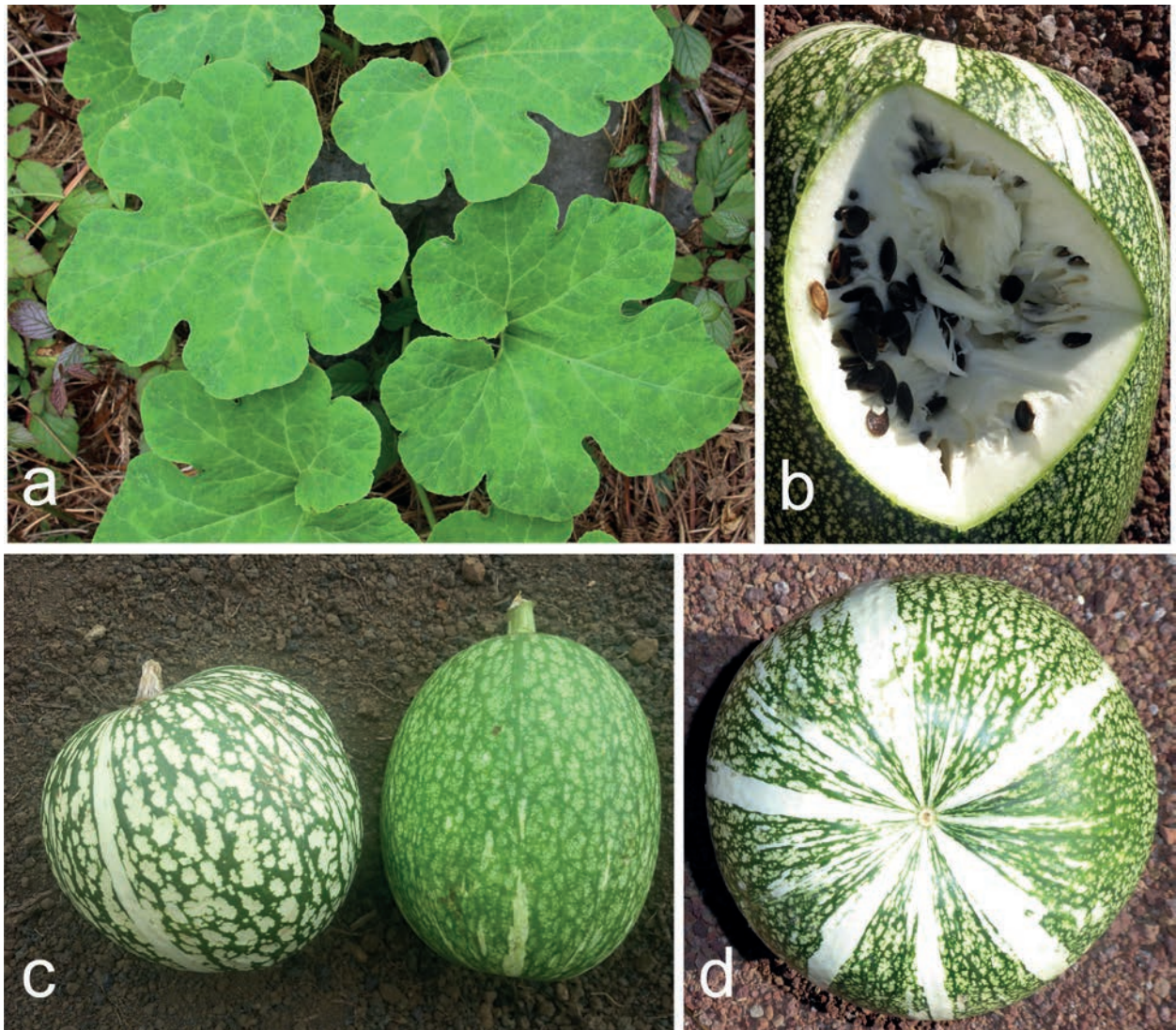
Spain, La Palma: Breña Alta, near San Pedro, Barranco de la Zarcita, near the intersection of Canal de Breña and Camino La Muralla, rocky slope wayside, one (?) individual is creeping several square meters over the dense bushy vegetation, 28.IX.2012, *R. Otto* (pers. obs.); *ibid.*, 07.III.2014, *R. Otto* 20908

(pers. herb. RO); *ibid.*, 05.VII.2015, *R. Otto* (pers. obs.); Los Llanos de Aridane, Argual, embankment on LP-2, 11.VIII.2014, *R. Otto* (pers. obs.); Breña Alta, San Isidro, roadside near the intersection with Camino 1a, 05.VII.2015, *R. Otto* 21604 (pers. herb. RO); Barlovento, Laguna de Barlovento, levelled earth heap near Zona Recreativa, ruderal site, several fruiting individuals, 10.X.2017, *R. Otto* 23017 (pers. herb. RO, dupl. BR); *ibid.*, 02.IV.2018, *R. Otto* (pers. obs.); Garafia, Calle Don Pedro, several individuals in impressive stock at the roadside, the plants climb partly over 5 m high in the bushes and cover many square meters of the vegetation and partly also the asphalt surface of the road, several ripe and overripe fruits, 18.X.2017, *R. Otto* 23054 (pers. herb. RO); *ibid.*, 02.IV.2018, *R. Otto* (pers. obs.); Sta. Cruz de La Palma, Calle el Pilar, small green area, between ornamentals, 09.IV.2018, *R. Otto* (pers. obs.).



**Figure 4.** Some individuals of *Cucurbita ficifolia* climb many meters high in bushes and trees (red arrows) and cover many square meters of the vegetation along the road edge and partly also the asphalt surface of the road. Garafia, October 2017 (photograph: R. Otto).





**Figure 5.** Characteristic features of *Cucurbita ficifolia*: (A), typical shape of leaves; (B), the typical black seeds; (C), typical color and pattern of ripe and immature fruits in side view; (D), and from below. Barlovento, October 2017 (photographs: R. Otto).

*Origin:* native in the highlands of Central America and Mexico, cultivated in North and South America, Europe and Asia.

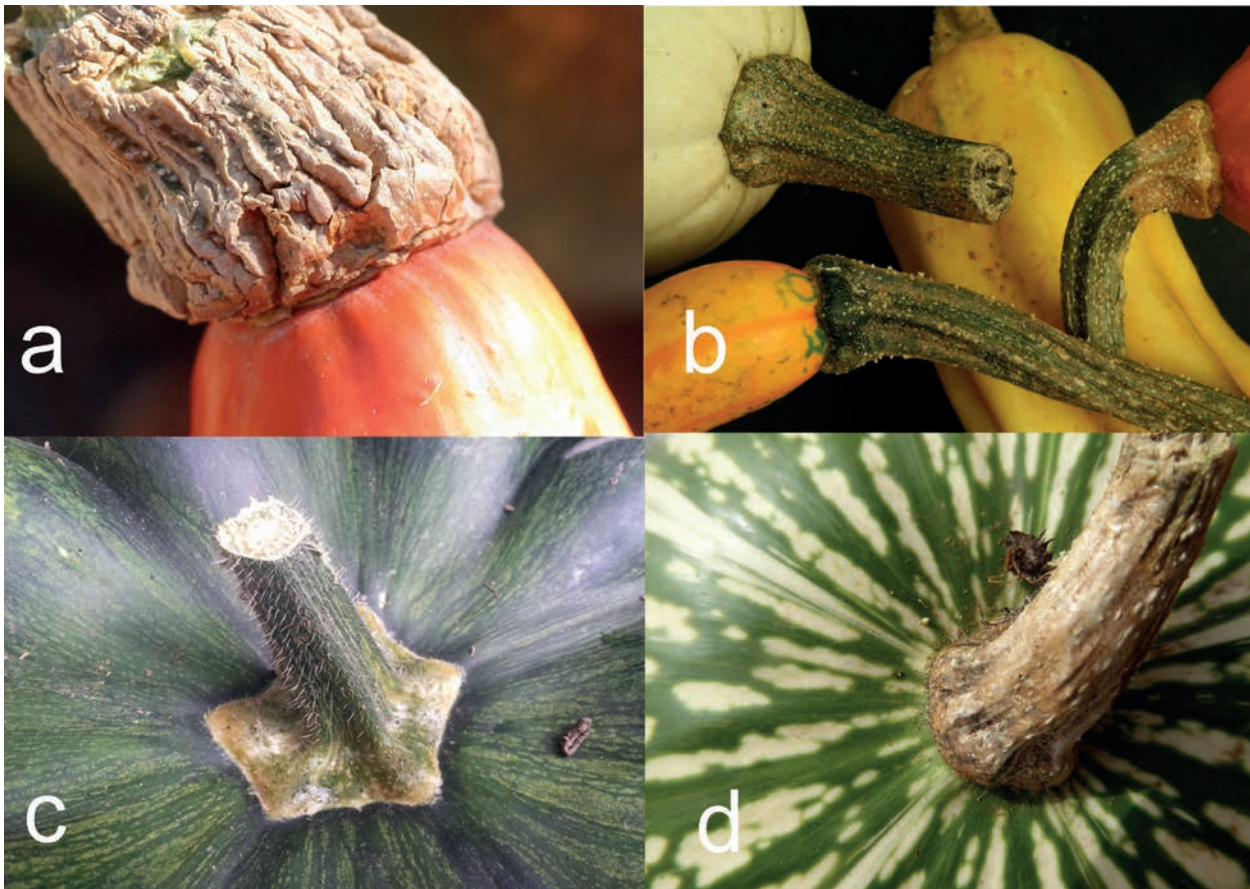
*Degree of naturalization:* ephemeral, but some occurrences persistent for several years.

The fig-leaf gourd is a perennial, very vigorous and widely creeping or climbing plant. In contrast to its one-year cultivated relatives *C. maxima* (Duchesne) Duchesne ex Poir., *C. moschata* Duchesne and *C. pepo* L. the plant is more cold tolerant and shows a higher resistance to various diseases (e.g. fusariosis of cucumbers) and is therefore (e.g. in Central Europe) used as a grafting stock for cucumbers. On La Palma, the plant is quite often

cultivated in house gardens, probably especially for the production of desserts (*cabello de ángel*, *dulce de calabaza*), even the roasted seeds are eaten. For more information about the use and culture of this exceptional pumpkin see e.g. <http://www.joseanalija.com/la-calabaza-cabello-de-angel/>. The occurrences in the wild are the result of distribution by seeds (for example from bird seed mixtures) or by outgrowing of cultivated specimens into the nearer environment. At suitable locations plants can outlast for a few years. It is probably overlooked or misunderstood.

The separation of the four mentioned *Cucurbita* species is most secure on the basis of fruiting plants. It can be done according to the key below





**Figure 6.** Fruit stalks of the different *Cucurbita* species: (A), *C. maxima*; (B), *C. pepo*; Germany, October 2010; (C), *C. moschata*; and (D) *C. ficifolia*; Barlovento, October 2017 (photographs: R. Otto).

(modified from Hamer & Hanelt, 2008; Scholz, 2008; Nesom, 2015). It should be noted that also interspecific hybrids are in culture as vegetables (e.g. *C. moschata* × *C. pepo*) or for use as the preferred rootstock (*C. maxima* × *C. moschata*) for watermelons, melons and cucumber (Karaağaç & Balkayab, 2013).

1. Seeds black, brown-black or dirty white (very rarely white); leaves similar to fig leaf, roundish to kidney-shaped, 5-lobed with rounded sinuses between the lobes, basis heart-shaped and their basal edge ± serrate, ± hirsute, blade often mottled with silvery green; stems angular and mostly sparsely stiff-haired, without markedly papillose based hairs, creeping to 25 m and more; fruit ± round or obovate, up to 30 cm long, green, mostly with longitudinal white lines or stripes distally, irregularly linearly spotted; fruit stem rounded 5-ribbed and not or only slightly broadened at the point of fruit attachment, hardened; perennial ..... **1. *C. ficifolia***

-. Seeds brownish, greenish, yellowish or whitish, rarely ± blackish (*C. pepo*); fruit and fruit stems not as above; when adult leaves are deeply divided then mostly with pointed sinuses between the lobes (*C. pepo*); annuals ..... **2**

2. Fruit stalks in cross-section roundish, with a soft, corky surface, the leaves pubescent and usually only sinuate or laxly lobed; plant usually without pustulate based hairs; basal edge of the leaves not serrate, fruits round or cylindrical, usually reddish or orange, rarely green, probably rarely cultivated on La Palma ..... **2. *C. maxima***

-. Fruit stalks in cross-section 5-edged, ± woody and hard; basis of the blade heart-shaped and their basal edge serrate ..... **3**

3. Fruit stalks usually distinctly and abruptly widened; hairiness of stems and leaves soft, almost felt-like by a mixture of longer, thick, vitreous hairs with

conspicuous cross-walls and much shorter and finer hairs, without pustulate based hairs; stems lying down,  $\pm$  roundish, not sharp-edged; leaves of mostly soft consistency, often marbled in green-white, plant without markedly papillose based hairs, leaf-blade 5 or 6 lobed, fruit mostly oblate or somewhat clavate, pruinose; calyx lobes often widened on their tips or even foliaceous ..... **3. *C. moschata***

-. Fruit stalks 5 angularly ribbed and not much expanded; hairiness of stem and leaves rough to coarse bristly by persistent pustulate based hairs and a  $\pm$  hispidulous understory; stems lying or with tendrils climbing; leaves variable, of  $\pm$  hard consistency, mostly markedly 5-lobed and divided, blade sometimes white spotted at vein junction; fruits very variable in all respect ..... **4. *C. pepo***

***Cynodon nlemfuensis*** Vanderyst in Bull. Agric. Congo Belge 13: 342 (1922) (Figs. 7–10) (Poaceae).

New to the flora of the Canary Islands.

Spain, La Palma: Villa de Mazo, Belmaco, next to Archeological Park Belmaco; from the parking lot on approx. 70 m length along the right side of the LP-2 in the direction of Sta. Cruz a large occurrence at the roadside, at the unpaved parking strip, at the road embankment and partly reaching far down into the terraced slope (formerly cultivated land); the strong lawn grows on the open and sun-exposed areas between higher bushes almost in pure stands, spreads over the asphalt and overgrows walls and lower bushes; perhaps intentionally or unintentionally applied for attachment of the embankment, 360 m, ca. 28.578338° N, 17.776081° W, 13.X.2017, *R. Otto 23031* (pers. herb. RO, dupl. BR); *ibid.*, much more flowering culms, striking fresh-green color of the juicy lawn, 01.IV.2018, *R. Otto 23115* (pers. herb. RO, dupl. BR).

*Origin*: native to Africa, introduced as good pasture grass and for the production of valuable hay (Wouw *et al.*, 2009) as well as for soil stabilization in many parts of the tropics and subtropics worldwide and naturalized.

*Degree of naturalization*: locally naturalized and potentially invasive.

The grass is reported as invasive for instance from the Hawaiian Islands (US Forest Service,



**Figure 7.** Strong occurrence of the grass species *Cynodon nlemfuensis* at road embankment and road edge next to the Archeological Park Belmaco. Only the climbing *Bryonia verrucosa* Dryand., recognizable at the lower picture edge, can more or less resist the competition of *Cynodon nlemfuensis*. Villa de Mazo, April 2018 (photograph: R. Otto).

2019), from Costa Rica, Cuba, Mexico and Puerto Rico (CABI, 2019). In Galápagos it has only been observed in a couple of places, but it is feared that it may in future become the most severely invasive of all grass species (Laegaard & Pozo García, 2004). Already in 2008 it was reported as invasive from there (US Forest Service, 2019).

In contrast to *Cynodon dactylon* L. (Pers.) [except var. *afghanicus* Harlan & de Wet and var. *coursii* (Camus) Harlan & de Wet] this species has no underground rhizomes but forms vigorous, long, somewhat woody stolons. The roots of the drought resistant grass are vigorous and deep reaching and form a very dense root network (see Fig. 10), the stems are up to 60 cm (and more) high and 1–2(3) mm thick at the bottom. Each inflorescence consists of usually only a single whorl of 3–13 spikes, that are 4–11 cm long. The propagation of the species is possible by seed but is mainly vegetative by its





**Figure 8.** Herbarium specimen of *Cynodon nlemfuensis*, Nr. 23032 pers. herb. RO, Villa de Mazo next to Archeological Park Belmaco, coll. 01.IV.2018 (photograph: R. Otto).



**Figure 9.** Dense lawn of *Cynodon nlemfuensis* along the asphalt surface of the LP-2 next to Archaeological Park Belmaco. Villa de Mazo, November 2018 (photograph: R. Otto).

creeping stolons or by parts of their above-ground stems because the plants are rarely flowering, and their seed set is low (CABI, 2019). So, it is possible that sterile *Cynodon* turfs in the Canaries also belong to *C. nlemfuensis*.

This species is able to overgrow large areas in a short time. A plant excavated in La Palma at the beginning of April 2018 developed stolons of over 4 m in length in pot culture in the garden of the first author in Germany until the beginning of August 2018 (under probably not optimal conditions)! The very competitive species has obviously transformer qualities. The strong, many meters long and highly branched stolons lie on the ground and on top of each other as  $\pm$  dense “multi-storey”, sometimes nearly knee-high mats. The stolons cover shrubs such as *Kleinia neriifolia* Haw., *Rumex lunaria* L. or *Opuntia* sp. and eventually lead to a very species-poor plant community, e.g. with the climbing

*Bryonia verrucosa* Dryand. as a stubborn and striking companion plant.

Two varieties are described, *C. n.* var. *nlemfuensis* and var. *robustus* Clayton & J. R. Harlan. Both can be separated as follows (modified from Harlan *et al.*, 1970; Barkworth, 2003; Cook *et al.*, 2005).

**1.** Racemes 3–9, slender and often somewhat flexuous, (2)4–7(10) cm long; lemma hairy on keel; leaf blades 2–5 mm wide, sometimes with scattered hairs; stout stolons and rather slender culms of 1–1.5 mm diameter, forms loose mats up to 40(60) cm thick ..... **1a. var. *nlemfuensis***

-. Racemes 5–13, spreading, often rather flexuous, 6–11 cm long; lemma sparsely hairy on keel; leaf blades 5–6 mm wide, glabrous or nearly so; coarse plant with culms about 90 cm tall and 2–5 mm





**Figure 10.** *Cynodon nlemfuensis* has strong, deep reaching roots and a very dense root system and lacks rhizomes (left) but has numerous stolons that often lie close to the substrate and form roots at their nodes (right). Villa de Mazo, roadside near Archeological Park Belmaco, April 2018 (photographs: R. Otto).

diameter, with stiff foliage, spreading vigorously by stolons ..... **1b. var. robustus**

Most likely our plant belongs to var. *nlemfuensis*, but the characteristics overlap and hybrids and several cultivars exist. One of them, ‘*Okeechobee*’ for instance, is known as a contaminant in the stands of *C. dactylon* cv. ‘*Callie*’ (Cook *et al.*, 2005), so a contamination of lawn seed (e.g. for soil stabilisation) could also explain the occurrence of the grass in La Palma.

The taxonomic value of these varieties is questionable. Stolons of the La Palma plants were cultivated in Germany (April–September 2018). The obtained plants look significantly different: leaf laminae are practically hairless (vs. ± numerous hairs on tiny nodules), are up to 5–7(8) mm wide (vs. 2–5 mm) and culms are 2–2.5 mm wide at base (vs. 1–1.5 mm). The plants developed numerous strong stolons 3–3.5 mm wide and up to 4 m long in four months. Unfortunately, no racemes were developed. One could say that, under cultivation *ex situ*, some characteristics shifted towards var. *robustus*.

Small forms of *Cynodon nlemfuensis* and vigorous forms of *C. dactylon* (e.g. var. *aridus* J. R. Harlan & de Wet) can be separated by the lack of underground rhizomes, longer stolons and longer racemes in *C. nlemfuensis*. Another closely related giant *Cynodon* species is *C. aethiopicus* Clayton & J. R. Harlan. This species also lacks rhizomes but has woody culms and inflorescences that are composed of up to five whorls. For more differences between the “giant *Cynodon*” species see for instance Cook *et al.* (2005).

***Datura stramonium* L.**, Sp. Pl. 1: 179 (1753)  
subsp. ***tatula*** (L.) Nyman, Consp. Fl. Eur.: 523  
(1881) (Solanaceae).  
Syn.: *Datura tatula* L.

New to the flora of the Canary Islands.

Spain, La Palma: Barlovento, Zona Industrial, abundantly on a fallow potato field, 05.VIII.2014, R. Otto 21192 (pers. herb. RO); *ibid.*, between 2015 and 2018 several times (pers. obs. RO); Breña Alta, San Isidro, storage place for soil and manure, numerous individuals 13.VIII.2014, R. Otto 21258

(pers. herb. RO); *ibid.*, seen several times between 2015 and 2018 (pers. obs. RO); *ibid.*, old airfield above Buenavista de Abajo, Camino del Aeropuerto, heap of earth, 04.X.2014, *R. Otto* (pers. obs.).

*Origin:* according Euro+Med (2006–2019) known from northern Algeria and Sicily but in reality spread throughout Western Europe.

*Known distribution in the Canary Islands:* not listed by Acebes Ginovés *et al.* (2010) and not in the Banco de Datos de Biodiversidad de Canarias (2019), but the photo in the database shows this subspecies ([https://www.biodiversidadcanarias.es/biota/especie/F01100/imagen?filename=datura\\_stramonium\\_107085935\\_10186\\_0479\\_8261.jpg](https://www.biodiversidadcanarias.es/biota/especie/F01100/imagen?filename=datura_stramonium_107085935_10186_0479_8261.jpg)).

*Degree of naturalization:* naturalized.

***Digitaria ciliaris*** (Retz.) Koeler var. ***rhachiseta*** (Henrard) A. S. Vega & Rúgolo, *Cat. New World Grasses* 3: 198 (2003) (Fig. 11) (Poaceae).

Syn.: *D. adscendens* (Kunth) Henrard var. *rhachiseta* Henrard

New to the flora of the Canary Islands.

Spain, La Palma: Breña Alta, San Pedro, Calle la Constitución, public green, irrigated flower bed, numerous, 28.660935° N, 17.782092° W, 08.X.2017, *R. Otto* 23000 (pers. herb. RO, dupl. BR); *ibid.*, only a few specimens, 25.X.2018, *R. Otto* (pers. obs.).

*Origin:* South America, known from Colombia (Henrard, 1950), Brazil and Ecuador (Vega & Rúgolo de Agrasar, 2003) and Venezuela (rare, according to Nozawa *et al.*, 2017).

*Degree of naturalization:* locally naturalized (?).

This extraordinary variety of the highly polymorphic and widespread weedy *Digitaria ciliaris* seems to be restricted so far to South America (Vega & Rúgolo de Agrasar, 2003).

It is characterized by the presence of scattered, papillose based, long glassy hairs on the raceme rachis and/or pedicels. On the specimens of La Palma, these hairs were (3)4–7(8) mm long and concentrated on the lower third of the racemes and varying in numbers.

In his monograph Henrard (1950) characterizes this taxon as follows: “It has combined characters



**Figure 11.** Herbarium specimen of *Digitaria ciliaris* var. *rhachiseta* with scattered, papillose based, long glassy hairs on the raceme rachis, Nr. 23000 pers. herb. RO, Breña Alta, coll. 08.X.2017 (photographs: R. Otto).



of two different species, belonging to different sections, viz: *D. adscendens* and *D. horizontalis*.” and he sums up after the description of the individual characteristics: “Hitherto only known from Colombia, a region from which both species are known. The plant may represent a crossing between the two species.”

This variety is reported here because there is a risk of confusion with two other similar, weedy representatives of *D.* subg. *Digitaria* sect. *Digitaria*, which also can bear such papillose based long hairs on their raceme rachis, namely *Digitaria nuda* Schumacher (p.p.) and *D. horizontalis* Willd. These three taxa can be distinguished as follows (modified from Pohl, 1980; Nozawa *et al.*, 2017).

1. Spikelet length 2.8–3.5 mm [according to Henrard (1950) “only 2.5 mm”] and spikelet *ca.* 3 times as long as broad; lower glume a triangular scale of 0.2–0.3 (0.8) mm length, upper glume *ca.* 2/3× as long as the spikelet; vegetative parts densely pubescent ..... 1. *D. ciliaris* var. *rhachiseta*

-. Spikelet up to 2.5 mm long ..... 2

2. Spikelet 1.7–2.5 mm long; upper glume 1/2 to 2/3× as long as the spikelet (including pubescence), lower glume absent or scale like with truncate to rounded apex, shorter than 0.2 mm; leaf blades with abaxial surface glabrous, adaxial surface essentially glabrous with some scattered long hairs near the base ..... 2. *D. nuda* (p.p.)

-. Spikelet 2.1–2.4 mm long, 0.5–0.6(0.65) mm wide, *ca.* 4 times longer as wide; lower glume 0.1–0.2 mm long, triangular or with ± rounded apex, upper glume *ca.* 1/2× as long as the spikelet (including pubescence); leaf blades finely pubescent on both surfaces ..... 3. *D. horizontalis*

*Digitaria ischaemum* (Schreb.) Muhl., Descr. Gram.: 131 (1817) (Poaceae).

New to the flora of Canary Islands.

Spain, La Palma: Sta. Cruz de La Palma, Avenida de Los Indianos, traffic island opposite the junction of Calle Álvarez de Abreu, earthy open spots in the *Stenotaphrum*-lawn by trample damage, several individuals, 02.X.2016, *R. Otto* 22386 (pers. herb. RO, dupl. BR); *ibid.*, weed between freshly planted

rosemary bushes, sparse, 04.X.2017, *R. Otto* 22967 (pers. herb. RO, dupl. BR); *ibid.*, several specimens, 17.X.2018, *R. Otto* 23390 (pers. herb. RO); Barlovento, Laguna de Barlovento, flattened earth heap near recreation area, bare ground, several large prostrate specimens, 10.X.2017, *R. Otto* 23013 (pers. herb. RO, dupl. BR).

*Origin*: native in the warm-temperate regions of Eurasia, now naturalized in such regions worldwide.

*Degree of naturalization*: naturalized (?), possibly overlooked and/or confused with *D. violascens* Link.

*Diplotaxis tenuifolia* (L.) DC., Syst. Nat. 2: 632–633 (1821) (Brassicaceae).

New to the flora of La Palma.

Spain, La Palma: Garafía, Calle Don Pedro, between LP-1 and Don Pedro, several individuals at the roadside, 18.X.2017, *R. Otto* 23056 (pers. herb. RO, dupl. BR); Tazacorte, Puerto de Tazacorte, marina, green area, palm tree foot, several specimens, 29.X.2018, *R. Otto* 23438 (pers. herb. RO).

*Origin*: southern Europe and western Asia, naturalized in many temperate regions worldwide.

*Known distribution in the Canary Islands*: T (Verloove, 2017), C (Verloove, 2013), L (Gil González *et al.*, 2014).

*Degree of naturalization*: ephemeral but possibly invasive.

The species is reported as invasive from the southwestern region of the United States (White, 2013), from California (EDDMapS, 2019), and from Argentina (Busso *et al.*, 2013).

The observations of *Diplotaxis tenuifolia* in the Canary Islands have been increasing in recent years (see above). This is due (as in mainland Europe or North America) to increased commercial and private cultivation (sale of potted plants and seeds) in recent decades. This perennial *Diplotaxis* species is used as a salad and spice plant (product name often “Italian arucula”) and increasingly replaces the annual *Eruca sativa* L. (“arucula”) due to the higher drought-resistance and its easier cultivation.

*Egeria densa* Planch. in Ann. Sci. Nat., Bot., sér. 3, 11: 80 (1849) (Hydrocharitaceae).

New to the flora of the Canary Islands.

Spain, La Palma: Puntallana, Fuente de San Juan, somewhat shaded brick basin, strong stock of flowering male plants, with sparse *Landoltia punctata* (G. Mey.) Les & D. J. Crawford and *Lemna minuta* Kunth, 22.X.2018, *R. Otto 23408* (pers. herb. RO, dupl. BR).

*Origin*: South America, commonly cultivated as aquarium plant worldwide and naturalized as an aquatic weed in stagnant or slow-flowing water in temperate to tropical regions.

*Degree of naturalization*: ephemeral (?), potentially weedy and invasive.

*Egeria densa* is reported as invasive from Australia, Central America, Mexico, New Zealand and the United States (US Forest Service, 2019).

The above occurrence may also refer to a deliberate introduction (since in the neighboring basin also several specimens of *Pistia stratiotes* L. were observed) but should be mentioned here for several reasons.

According to information from local residents, the species forms mass populations in water tanks etc., which unfortunately could not be verified because of difficulties of access to such facilities. *Egeria densa* could be more widespread in any case and it should therefore be paid special attention to this taxon on the islands. There is a high risk of confusion with similar Hydrocharitaceae species, especially with *Hydrilla verticillata* (L.) Royle. The first author has seen several mass occurrences of this species in water tanks in the vicinity of Sta. Cruz de La Palma (Otto & Verloove, 2016). The most important differences of some easy-to-confuse species are presented in the following key (modified from Weyer & Schmidt, 2010; Nelson, 2011; and Scannell, 2011).

1. Leaves spirally arranged (so far not known from the Canaries) ..... **1. *Lagarosiphon major*** (Ridley) Moss

-. Leaves whorled ..... **2**

2. Leaves with prickly toothed margins, in whorls of 3–8, with two *ca.* 0.5 mm long, brownish, fringed nodal scales in each axil; flowers minute, borne at the water surface, without nectaries ..... **2. *Hydrilla verticillata*** (L. f.) Royle

-. Leaves not toothed but very finely serrate at margins, with or without nodal scales ..... **3**

**3.** Leaves mostly in whorls of (2–)4–5(–8), mostly 20–40 mm long and over 2 mm wide, without nodal scales; flowers conspicuous, held above the water surface, with nectaries ..... **3. *Egeria densa*** Planch.

-. Leaves mostly in whorls of 3(4), *ca.* 15 mm long and *ca.* 2 mm wide, with inconspicuous and unfringed nodal scales, flowers minute, submerged or borne at the water surface, without nectaries. .... **4. *Elodea canadensis*** Planch. [and see also *E. nuttallii* (Planch.) H. St. John and *E. callitrichoides* (Rich.) Casp., both so far not known from the Canaries].

***Eugenia uniflora*** L., Sp. Pl. 1: 470–471 (1753) (Fig. 12) (Myrtaceae).

New to the flora of the Canary Islands.

Spain, La Palma: San Andrés y Sauces, San Andrés, Calle Iglesia, some seedlings and small individuals of about *ca.* 30 cm in small water channel at the roadside, 22.X.2018, *R. Otto 23404* (pers. herb. RO); *ibid.*, banana plantation between San Andrés and Charco Azul, drainage channel, some young bushes, cultivated nearby, 31.X.2018, *R. Otto 23447* (pers. herb. RO); *ibid.*, next to Charco Azul, small *barranco* alongside Camino Quinta Zoca, several specimens, 31.X.2018, *R. Otto* (pers. obs.); Sta. Cruz de La Palma, Barranco de la Madera, approx. 200 m before the driveway into LP-20, shady foot of a natural stone wall at the roadside, small flowering bush, 10.XI.2018, *R. Otto 23470* (pers. herb. RO).

*Origin*: South America, cultivated in many cultivars for its edible fruits and naturalized in many tropical and subtropical regions worldwide.

*Degree of naturalization*: ephemeral but possibly invasive.

*Eugenia uniflora* is reported as invasive from Australia, Cook Islands, French Polynesia, Hawaiian Islands, Mauritius, La Réunion (US Forest Service, 2019) and is probably a hitherto overlooked element of the Canary Islands xenophyte flora. It is possibly dispersed by birds.





**Figure 12.** *Eugenia uniflora*, Sta. Cruz de La Palma, November 2018 (left and top right); July 2015 (right below; photographs: R. Otto).

***Galinsoga quadriradiata*** Ruiz & Pav., Syst. Veg. Fl. Peruv. Chil. 1: 198–199 (1798) (Asteraceae).  
Syn.: *Galinsoga ciliata* (Raf.) S. F. Blake.

New to the flora of La Palma.

Spain, La Palma: San Andrés y Sauces, Los Sauces, weed in house garden, 20.VIII.2002, *R. Otto* 6897 (pers. herb. RO); *ibid.*, Puerto Espíndola, moist ditch alongside LP-104, many individuals, 26.VIII.2007, *R. Otto* 13252 (pers. herb. RO); Breña Alta, Avenida Bajamar, newly arranged border, 25.VIII.2007, *R. Otto* 13293 (pers. herb. RO); Sta. Cruz de La Palma, Avenida Marítima, around the Castillo de Santa Catalina, numerous, 06.IV.2018, *R. Otto* 23190 (pers. herb. RO).

*Origin:* native to Central Mexico, now a cosmopolitan weed of disturbed areas in temperate and subtropical regions.

*Known distribution in the Canary Islands:* G, T (Acebes Ginovés *et al.*, 2010) C (Verloove *et al.*, 2018). *Galinsoga quadriradiata* was first reported from La Palma by Brandes (2005). However, this information was not included in the list of Acebes Ginovés *et al.* (2010).

*Degree of naturalization:* naturalized and invasive.

Seen very frequently throughout the island in gardens, cultures of vegetables and by roadsides, sometimes in abundance, at times together with



*Galinsoga parviflora* Cav. Between 2002 and 2018, the species has increased considerably (R. Otto, pers. obs.).

***Glebionis segetum*** (L.) Fourr. in Ann. Soc. Linn. Lyon, sér. 2, 17: 90 (1869) (Asteraceae).

New to the flora of La Palma.

Spain, La Palma: Breña Alta, San Isidro, Camino la Piedad, abundant as weed in crop fields, 28.644525° N, 17.800445° W, 30.V.2013, R. Otto (pers. obs.); *ibid.*, near the crossing of LP-301 and Canal de Fuencaliente, fallow land, numerous, 03.IV.2017, R. Otto (pers. obs.); Municipio Tijarafe, Camino Bellido, fallow land and wayside, ca. 1120 m, 28.734699° N, 17.953128° W, 08.IV.2017, R. Otto 22587 (pers. herb. RO, dupl. BR).

*Origin*: Mediterranean region, naturalized in the Canary Islands, Azores, Madeira, Western Europe and in parts of Northern Europe.

*Known distribution in the Canary Islands*: G, T, C (Acebes Ginovés *et al.*, 2010).

*Degree of naturalization*: naturalized.

***Kalanchoe laetivirens*** Desc. in J. Bot. Soc. Bot. France 4: 85 (1997) (Fig. 13) (Crassulaceae).

New to flora of the Canary Islands.

Spain, La Palma: Tazacorte, Puerto de Tazacorte, marina, neglected palm border with *Lampranthus cf. spectabilis* (Haw.) N. E. Br. as ground cover plant, utilized as location of waste containers and ruderalized; several adult specimens and numerous plantlets grow together with *Amaranthus viridis* L., *Cynodon dactylon* L. (Pers.), *Eragrostis barrelieri* Daveau, many old and young specimens of *Kalanchoe ×houghtonii* D. B. Ward, *Portulaca nicaraguensis* (Danin & H. G. Baker) Danin, *Setaria adhaerens* (Forssk.) Chiov., *Sonchus oleraceus* L. and others, 3 m, 29.X.2018, R. Otto 23435 (pers. herb. RO, photo det. Jordi López-Pujol XII.2018).



**Figure 13.** *Kalanchoe laetivirens*, Tazacorte, November 2018 (photograph: R. Otto).



*Kalanchoe laetivirens*, a species close to *K. daigremontiana* Raym.-Hamet & H. Perrier, has rarely been seen on La Palma in culture so far. Like other *Kalanchoe* species with the ability to produce plantlets at the edges of leaves, e.g. *K. daigremontiana*, *K. delagoensis* Eckl. & Zeyh. and *K. ×houghtonii*, *K. laetivirens* also has the ability to develop into a weed (or an invasive species) in a near future.

***Lemna minuta*** Kunth, Nov. Gen. Sp., ed. 4, 1: 372 (1815) (Araceae).

New to the flora of La Palma.

Spain, La Palma: Puntallana, La Fuenteña, bricked basin of springs, covers with *Landoltia punctata* (G. Mey.) Les & D. J. Crawford the entire water surface, 22.X.2018, R. Otto 23399 (pers. herb. RO, dupl. BR); *ibid.*, Fuente de San Juan, sparse with just as sparse *Landoltia punctata*, 22.X.2018, R. Otto (pers. obs.).

*Origin*: temperate to tropical America, introduced as an aquatic weed and now established in many parts of Europe (see DAISIE, 2019).

*Known distribution in the Canary Islands*: C (Verloove, 2013).

*Degree of naturalization*: probably in the process of naturalization.

*Lemna minuta* could have been present on La Palma for quite some time, but it is certainly not a very common species. It was first observed on La Palma by the first author in October 2013 [Villa de Mazo, water basin in a foil greenhouse, together with *Eichhornia crassipes* (Mart.) Solms, *Salvinia molesta* D. S. Mitchell and *Azolla filiculoides* Lam.]. Since then the species was searched for but with limited success. This is somewhat surprising in view of its rapid spread on the European continent. Since many of its potential habitats on La Palma (mainly water tanks) are inaccessible, it may be more widespread.

However, the duckweed flora on La Palma is clearly dominated by the highly invasive species *Landoltia punctata* (Otto & Verloove, 2016). The first author is not aware of any current occurrence of *Lemna gibba* L. and only a few occurrences of *Lemna minor* L. Perhaps the delicate and thin *L. minuta* (and also *L. minor*) is less competitive under the Canarian environmental conditions against the robust and thermophilous *Landoltia punctata*.

***Ligustrum lucidum*** W. T. Aiton, Hort. Kew., ed. 2, 1: 19 (1810) (Fig. 14) (Oleaceae).

New to the flora of La Palma.

Spain, La Palma: Breña Alta, San Isidro, on LP-301 at km 16.25, about 100 m uphill to junction LP-301 and Canal de Fuencaliente, roadside, some abundantly fruiting trees up to 8 m tall and several small individuals next to some trees of *Robinia pseudoacacia* L., ca. 700 m, 28.629639° N, 17.802690° W, 19.X.2017, R. Otto 23067 (pers. herb. RO, dupl. BR); *ibid.*, 31.III.2018, R. Otto 23110 (pers. herb. RO).

*Origin*: native to China, introduced and naturalized in southern Africa, Central and South America, Australia, Japan, New Zealand, Spain and the southern United States.

*Known distribution in the Canary Islands*: T, C (Acebes Ginovés *et al.*, 2010).

*Degree of naturalization*: locally naturalized (?), potentially invasive.

This semi-evergreen large ornamental shrub or small tree is reported as invasive for instance from Argentina (Busso *et al.*, 2013), from Australia, Florida and New Zealand (US Forest Service, 2019) and it is on the list of “Hawaii’s most invasive horticultural plants” (DLNR, 2001). According to this “it is urged that species on this list not be grown anywhere in the state of Hawaii”.

It is classified as a Category 1 invasive exotic species in Florida: “when they are altering native plant communities by displacing native species, changing community structures or ecological functions, or hybridizing with natives” (FLEPPC, 2017).

This species shows tolerance to moderate frost, high temperatures, shading, grazing, damage, moisture, drought, salt and wind. It is fast-growing and long-lasting, forms root shoots and can form high and dense stocks; once established the species is difficult to eliminate. It produces a high number of highly-viable seed, the berries can be widely spread by birds. For this reason, in New Zealand it is listed on the National Pest Plant Accord list (NPPA, 2018). This contains plants which are banned from sale, distribution, display and propagation (see <http://www.mpi.govt.nz/protection-and-response/long-term-pest-management/national-pest-plant-accord/>



**Figure 14.** *Ligustrum lucidum*, abundantly fruiting tree, Breña Alta, October 2017 (left and middle); young growth (right), April 2018 (photographs: R. Otto).

and <http://www.weedbusters.org.nz/weed-information/ligustrum-lucidum/59/>).

When planning invasive weed management on Rangitoto Island (New Zealand) *Ligustrum lucidum* was classified also a “class 1” weed (Wotherspoon & Wotherspoon, 2002).

The presence of both *Ligustrum lucidum* and *Robinia pseudoacacia* in this locality suggests a possible planting as bee pasture. *Robinia pseudoacacia* is a well-known and widespread honey plant and also the “Chinese privet” *Ligustrum lucidum* (like other *Ligustrum* species) is known as a good bee-tree (see for instance: <https://www.urbanbees.co.uk/trees/trees.htm>).

***Lotus broussonetii*** Choisy ex Ser. in DC., Prodr. 2: 211 (1825) (Fabaceae).

Syn.: *Dorycnium broussonetii* (Choisy ex Ser.) Webb

New to the flora of La Palma.

Spain, La Palma: Breña Alta, Avenida Bajamar at the foot of the Risco de la Concepción, several individuals in a plantation of ornamental bushes and palms (e.g. *Melia azedarach* L., *Phoenix*

*canariensis* Chabaud and *Schinus molle* L.) interspersed with spontaneous species like *Pennisetum setaceum* (Forssk.) Chiov. and *Rumex lunaria* L. and adjacent to *Bupleurum salicifolium* R. Br. subsp. *salicifolium*, 10 m, 28.674255° N, 17.770005° W, 11.IV.2017, R. Otto 22605 (pers. herb. RO, dupl. BR); *ibid.*, 11.IV.2018 (pers. obs.).

*Origin:* Canary Islands, endemic in T and C.

*Known distribution in the Canary Islands:* T, C (Acebes Ginovés *et al.*, 2010).

*Degree of naturalization:* locally naturalized (?).

This richly flowering plant has high ornamental value. At various times, planted specimens of this species were seen on La Palma, e.g. in San Andrés y Sauces (Chargo Azul, wayside of Camino el Cardal) or in Breña Alta (near Urbanisation La Grama, borders before supermarket). The occurrence at the foot of the Risco de Concepción does not give the impression of intentional planting. The plants are also not visible from the passing sidewalk and, unlike the clearly planted ornamental shrubs and palm trees, they are not cared for by green services. In 2005, the first author found a young, non-flowering



plant (back then named *cf. Dorycnium* sp.) as epiphyte on *Phoenix canariensis*. This may be an indication of an unintentional introduction during the planting of the area. Because of the danger of falling boulders from the steeply towering rock face, the terrain was later fenced.

This record throws some new light on a previous finding of *Bupleurum salicifolium* R. Br. subsp. *salicifolium* in the same locality in 2014 (Otto & Verloove, 2018). It was also unintentionally introduced and most probably on the same occasion.

***Oenothera fallax*** Renner in Z. Indukt. Abstammungs-Vererbungsbl. 18: 176 (1917) *sensu lato* (Onagraceae).

Syn.: *Oenothera* × *fallax* Renner, *O. glazioviana* Micheli × *O. biennis* L. *sensu lato*

The specific epithet is used here in a broad sense and includes all hybrids, regardless of the direction of crossing between the two parent species and includes also back crossings.

New to the flora of the Canary Islands.

Spain, La Palma: Garafia, Calle Don Pedro, between LP-1 and Don Pedro, roadside, several individuals, 18.X.2017, R. Otto 23055 (pers. herb. RO); *ibid.*, 02.IV.2018, R. Otto 23180 (pers. herb. RO, dupl. BR).

*Origin*: originated in Europe from *O. glazioviana* and *O. biennis*. The hybrid and its parent species are today known from nearly all over Europe with the striking exception that Rostański *et al.* (2010) and Euro+Med (2006–2019) do not specify the hybrid for large parts of Southern Europe.

*Degree of naturalization*: ephemeral but potentially invasive.

The above-mentioned occurrence of *Oenothera fallax* is an example of a misguided “garden culture”, namely the use of mostly foreign floral mixtures in the wild, e.g. on the roadside and in other places that supposedly need to be embellished. Next to the site of the *Oenothera*, on a several meter long strip of the unpaved edge of the road, locally common roadside species such as e.g. *Echium plantagineum* L., *Bidens pilosa* L. and *Bromus madritensis* L. but intermixed with *Eschscholzia californica* Cham., *Linum usitatissimum* L., another non-flowering *Linum* species, *Lobularia maritima* (L.) Desv.,

rosettes with crinkly leaves of *Oenothera* sp. (most likely the same taxon as above), *Rudbeckia hirta* L. and *Salvia viridis* L. are growing. These “exotics” are typical elements of many so-called flower mixtures (fragrance mixtures, butterfly meadows, etc.), applied with good intention but with the inhering danger of an expansionary spread, in this case especially of the *Oenothera* taxa.

One of several *Oenothera* rosettes was taken from the site and further cultivated in 2018 in Germany. It was identified as a very likely product of a cross of female *O. biennis* and male *O. glazioviana* by using the key in Murphy (2016). In contrast with the “true” *O. fallax* (female *O. glazioviana* × male *O. biennis*) this type has petals of about 35 mm length and the style is always longer than the filament of the stamens (vs. petals about 30 mm and stigma lobes at the same level as the anthers or shorter). Both types have crinkly leaves and red bases of the pustulate hairs, legacies of the *O. glazioviana* parent and clearly distinguish it from *O. biennis*.

***Paspalum notatum*** Flüggé, Gram. Monogr. Paspalum: 106–108 (1810) var. *saurae* Parodi in Revista Argent. Agron. 15: 55 (1948) (Poaceae).

New to the flora of La Palma.

Spain, La Palma: Breña Baja, Los Cancajos, ruderalized *Cynodon dactylon* lawn near the Tourism Information Office and the Paseo del Litoral, partially shaded by young specimen of *Phoenix canariensis* Chabaud, 15 m, 28.651265° N, 17.759152° W, 04.X.2017, R. Otto 22966 (pers. herb. RO, dupl. BR); *ibid.*, 17.X.2018, R. Otto (pers. obs.).

*Origin*: native of Tropical America, introduced in Australia, Fiji Islands, Guam Islands, Hawaiian Islands, Japan and the southern United States.

*Known distribution in the Canary Islands*: T (Verloove & Reyes-Betancort, 2011; Siverio Núñez *et al.*, 2013), C (Verloove, 2017).

*Degree of naturalization*: ephemeral but potentially weedy and invasive.

Reported as invasive from Australia, the Fiji Islands and the Hawaiian Islands (US Forest Service, 2019) and from Georgia and South Carolina (Swearingen & Barger, 2016).

In its natural distribution area *P. notatum* comprises several forms (Gates *et al.*, 2004), mostly

considered at the rank of botanical varieties, with different ploidy levels and sexual ( $2n$ ) or apomictic ( $4n$ ) reproduction. Many cultivars (see e.g. <https://www.invasive.org/gist/moredocs/pasnot01.pdf>) have been developed and it is an important pasture grass and also used as lawn grass and for soil stabilization. Also, infra- and interspecific hybrids are known.

The relatively small spikelets of the La Palma plants of only 2.8–3.0 mm length (vs. 3.0–3.5 mm in var. *notatum*) are typical for var. *saurae* Parodi (Hitchcock, 1950; Gates *et al.*, 2004), a variety, also recently found in Gran Canaria (Verloove, 2017). On the other hand, many authors (e.g. Allen & Hall, 2003) do not differentiate between the two varieties.

***Passiflora caerulea* L.**, Sp. Pl. 2: 959–960 (1753) (Passifloraceae).

New to the flora of the Canary Islands.

Spain, La Palma: Villa de Mazo, El Pueblo, potato field, escaped from cultivation nearby, 10.VIII.2014, *R. Otto 21239* (pers. herb. RO, dupl. BR); *ibid.*, Malpaises, Camino de Eusebio below LP-206, numerous at the wayside and in neighboring overgrown former gardens, 615 m, ca. 28.575229° N, 17.787192° W, 14.X.2017, *R. Otto 23042* (pers. herb. RO); *ibid.*, in full flower, 01.IV.2018, *R. Otto 23114* (pers. herb. RO, dupl. BR).

*Origin*: southern Brazil, Argentina, Paraguay and Uruguay; introduced to many parts of the world for instance the Azores, Madeira, Italy, Croatia, Libya and parts of the eastern Mediterranean area.

*Degree of naturalization*: locally naturalized (?), potentially invasive.

*Passiflora caerulea* is used (like *P. tarminiana* Coppens & V. E. Barney, see below) as ornamental and as rootstock for other passifloras to increase hardiness. It is reported as invasive from the Hawaiian Islands, New Zealand and Robinson Crusoe Island (US Forest Service, 2019).

The species is dispersed by birds but also through the formation of daughter plants where the long shoots come to rest on the ground. Even cut off parts of plants (garden waste) can sprout in suitable places. In New Zealand *Passiflora caerulea*

belongs to the “banned plants”. It is illegal to buy, sell and propagate such “unwanted organisms” (NPPA, 2018).

***Passiflora manicata* (Juss.) Pers.**, Syn. Pl. 2(1): 221 (1806) [1807] × *tarminiana* Coppens & V. E. Barney in Novon 11(1): 9 (8–15; figs. 1–3; tab. 1) (2001) (Figs. 15 and 16) (Passifloraceae).

New to the flora of the Canary Islands.

Spain, La Palma: Villa de Mazo, Malpaises, below a parking on LP-206 near Camino de Eusebio, neglected, no longer irrigated garden, the richly flowering (not fruiting) liana overgrows a considerable part of the large garden, covering bushes and trees, ca. 615 m, 28.575536° N, 17.786936° W, 02.IV.2017, *R. Otto 22529* (pers. herb. RO, dupl. BR, det. G. Coppens d’Eeckenbrugge I.2018); *ibid.*, without flowers, fruits not seen, 14.X.2017, *R. Otto* (pers. obs.); *ibid.*, 01.IV.2018, *R. Otto 23113* (pers. herb. RO).

*Origin*: cultigen, probably introduced as an ornamental plant.

*Degree of naturalization*: long persisting after cultivation and apparently becoming strongly weedy.

Both parent species belong to *Passiflora* super-section *Tacsonia* (Juss.) Feuillet & J. M. MacDougal and are native to the Andean region of northwestern South America.

The cultigen *Passiflora tarminiana* is cultivated on La Palma for its edible fruit and as an ornamental (for more details see below).

*Passiflora manicata* is a wild species from intermediate elevations of the Andean region from Venezuela to Peru (1500–3000 m) with somewhat other ecological requirements than *P. tarminiana*: it grows there under drier conditions and in more open vegetation (G. Coppens d’Eeckenbrugge, pers. comm. 2018).

The fruits are hardly edible (toxic and psychotropic effects), but the plant is interesting because of its adaptation to warmer and drier environments, its resistance to some pests and it is used as rootstock for *Passiflora tripartita* (Juss.) Poir var. *mollissima* (Kunth) Holm-Niels. & P. Jørg (Ocampo *et al.*, 2017).

About several spontaneous and artificial hybrids of wild and cultivated forms of the *Tacsonia* group





**Figure 15.** *Passiflora manicata* × *tarminiana*, Villa de Mazo, April 2017 (left and middle) and *Passiflora tarminiana*, Puntallana, August 2008 (right). Visible are the differences in the flower color and in the ratio of the lengths of hypanthium and sepals, as well as the different shape of the corona. *P. tarminiana* has only a single set of filaments, the corona is reduced to a single white tubercle ring. In the hybrid with *P. manicata* the corona filaments are inserted in three different series (photographs: R. Otto).



**Figure 16.** *Passiflora manicata* × *tarminiana*, Villa de Mazo, April 2017 (photographs: R. Otto).



has been reported by producers and several authors (Ocampo *et al.*, 2017). Experimentally produced hybrids are also known from *P. manicata* and *P. tarminiana* (Coppens d'Eeckenbrugge, pers. comm., 2018).

It can be assumed that it is an artificial hybrid, most likely sterile or with only a slight set of fruit and introduced as a richly flowering ornamental plant. The exceptionally strong growth under dry and warm conditions is likely the visible legacy of *P. manicata*.

The hybrid character becomes clearly visible on the morphological features. Vegetatively, the plant resembles *P. manicata*, while the floral features are similar to those of *P. tarminiana*, except for the intermediate corona and floral tube length (Coppens d'Eeckenbrugge, pers. comm., 2018). These features are shown in Fig. 15.

This hybrid is probably identical with *Passiflora* 'Coral Sea'. The latter is a hybrid cultivar of *P. manicata* and an unknown parent, known from California, where it is often cultivated along the coast (Rejmánek, 2009). Its description strongly recalls the hybrid of La Palma: "Extensively branching individuals can cover large trees. Plants are sterile, but persisting for a long time after cultivation" (see: [http://bomi.ou.edu/ben/406/passiflora\\_figures.pdf](http://bomi.ou.edu/ben/406/passiflora_figures.pdf)). Particularly striking is the correspondence in the flower structure: "Hypanthium about the same length as sepals; corona filaments in three series, outer 0.6–1.0 cm, of filiform, violet elements, second series 0.1–0.3 cm, membranous, upper 1/2 split into filiform segments, white, third series 0.1 cm, membranous, white; corolla dark pink" (see: <https://www.ou.edu/cas/botany-micro/ben/ben406.html>). This is perfectly in line with the characteristic features of the La Palma specimen as shown in Fig. 15.

***Passiflora tarminiana*** Coppens & V. E. Barney in Novon 11(1): 9 (8–15; figs. 1–3; tab. 1) (2001) (Figs. 15 and 17) (Passifloraceae).

Syn.: *Passiflora mollissima* (Kunth) L. H. Bailey cv. 'Banana Poka' Anon., *P. mollissima* auct. non (Kunth) L. H. Bailey

New to the flora of the Canary Islands.

Spain, La Palma: Puntallana, Barranco de la Galga, trail to Cubo de la Galga, ca. 1.5 km uphill parking, edge of the riverbed, one (?) vigorous plant

climbing in *Rubus* scrub, 23.VIII.2008, *R. Otto* 14318 (pers. herb. RO, dupl. BR, rev. *G. Coppens d'Eeckenbrugge*, 2017); Breña Alta, San Isidro, ca. 350 m before LP-301 crosses Canal de Fuencaliente, climbing in shrubs of *Erica arborea* L. along the roadside, probably generated and escaped from former cultivation in the adjoining fenced terrain, 670 m, 10.VIII.2014, *R. Otto* 21231 (pers. herb. RO, conf. *G. Coppens d'Eeckenbrugge* I.2018); *ibid.*, 19.X.2017, *R. Otto* (pers. obs.).

*Origin*: cultigen, Andean highlands of tropical northwestern South America, widely cultivated at high elevations up to more than 3000 m (Coppens *et al.*, 2001) throughout the Andean countries for a long time, introduced in many parts of the tropics worldwide and naturalized, e.g. in Australia, New Zealand and Hawaii.

*Degree of naturalization*: ephemeral but potentially invasive.

*Passiflora tarminiana* is regarded as invasive from Hawaii and New Zealand (US Forest Service, 2019), and from Australia (Victoria) and California (CABI, 2019). Like *P. caerulea* and *P. tripartita* it belongs in New Zealand to the "banned plants" (NPPA, 2018).

One of the most commonly grown *Passiflora* species from the supersection *Tacsonia* was formerly known as *P. mollissima* (Kunth) L. H. Bailey. Due to morphological and genetic studies the currently accepted name for this taxon is *P. tripartita* var. *mollissima*. In 2001, the cultivar 'Banana Poka' of *P. mollissima* (Kunth) L. H. Bailey was recognized as an independent taxon and described as *P. tarminiana* (Coppens *et al.*, 2001). This species is different from *P. tripartita* var. *mollissima* (and the other varieties of this species) by, e.g. smaller and readily deciduous stipules, a shorter hypanthium and a larger nectar chamber. To distinguish *P. tarminiana*, *P. tripartita* and the closely related *P. mixta* L. f. see the table in Coppens *et al.* (2001) and the key in Rejmánek (2009). The latter contains also *P. caerulea* L., *P. edulis* Sims, *P. mixta* L. and *Passiflora* 'Coral Sea'.

In recent years, it has been found that many *Passiflora mollissima* occurrences worldwide in fact belong to *P. tarminiana*, e.g. the well-known and very problematic occurrence on Hawaii (Global Invasive Species Database, 2019). Also the indication





**Figure 17.** *Passiflora tarminiana* climbing in *Erica arborea* bushes at the roadside, Breña Alta, August 2014 (photographs: R. Otto).

of *P. mollissima* for La Palma (Otto & Verloove, 2016) is to be corrected to *P. tarminiana* (collection Nr. 14318, coll. 23.VIII.2008).

It is probably also listed for laurel forests on Madeira sub '*Passiflora tripartita* (Juss.) Poir. var. *mollissima* (Kunth) Holm-Niels. & P. Jørg. [*Passiflora mollissima* (Kunth) L. H. Bailey]' as one of the TOP 100 of the "Invasive Terrestrial Flora & Fauna of Macaronesia" (Silva *et al.*, 2008).

The flower color of *P. tarminiana* is usually lilac, very rarely also white (Coppens *et al.*, 2001). Such white forms have also been observed in culture on La Palma.

***Pelargonium capitatum*** (L.) L'Hér., Hort. Kew. 2: 425 (1789) (Geraniaceae).

New to the flora of La Palma.

Spain, La Palma: San Andrés y Sauces, little bush in roadside LP-104, 08.IV.2018, R. Otto (pers. obs.); Breña Baja, Las Ledas, Barranco Amargavinos, several square metres large population in the dry riverbed, probably originating from garden debris, ca. 450 m, 01.XI.2018, R. Otto 23452 (pers. herb. RO, dupl. BR).

*Origin:* native of South Africa, cultivated in temperate areas worldwide as an ornamental and for the production of geranium oil, naturalized in Australia (Queensland Government, 2019) California, the Canary Islands, the Hawaiian Islands and New Zealand (US Forest Service, 2019).

*Known distribution in the Canary Islands:* L (Acebes Ginovés *et al.*, 2010).

*Degree of naturalization:* ephemeral but potentially invasive.

Invasive occurrences of the species are known from the Hawaiian Islands and New Zealand (US Forest Service, 2019). The occurrence of the species on Lanzarote is reported by Sanz-Elorza *et al.* (2004). *Pelargonium capitatum* is also a common ornamental plant in gardens and public green areas on La Palma. In some cases, e.g. occurrences on natural stone walls of banana plantations or on rocks near settlements, plantations and semi-wild (and tolerated) occurrences can hardly be distinguished.

***Phaseolus lunatus*** L., Sp. Pl. 2: 724 (1753) var. *lunatus* (Figs. 18 and 19) (Fabaceae).





**Figure 18.** *Phaseolus lunatus* in the dry riverbed of the Barranco Las Nieves with prostrate growth, abundantly flowering and fruiting. Under the plant numerous well-formed seeds. Sta. Cruz de La Palma, October 2017 (photographs: R. Otto).

New to the flora of the Canary Islands.

Spain, La Palma: Breña Alta, Camino Miranda, wall base on the roadside, 05.V.2012, *R. Otto 19074* (pers. herb. RO); Sta. Cruz de La Palma, intra-urban part of the Barranco de las Nieves, dry gravelly riverbed, ruderal site, the occurrence probably originates from garden debris with ripe pods, young plant covers about one square meter of soil, 05.X.2017, *R. Otto 22970* (pers. herb. RO); *ibid.*, the occurrence has grown to a few square meters, plants overgrow partially young specimens of *Abutilon grandifolium* (Willd.) Sw. and *Ricinus communis* L., but mostly the plants grow close to the ground, with abundant dried fruits with germinable beans *ca.* 25 mm long and either white with irregular brownish to purple spots or vice versa, 29.III.2018, *R. Otto 23100* (pers. herb. RO); *ibid.*, abundant in fruit, 19.X.2018, *R. Otto* (pers. obs.); San Andrés y Sauces, San Andrés, Calle Iglesia, on the roadside between LP-104 and sports field, plants grow in a strong stock of *Urochloa mutica* (Forssk.) T. Q. Nguyen, with still unripe pods

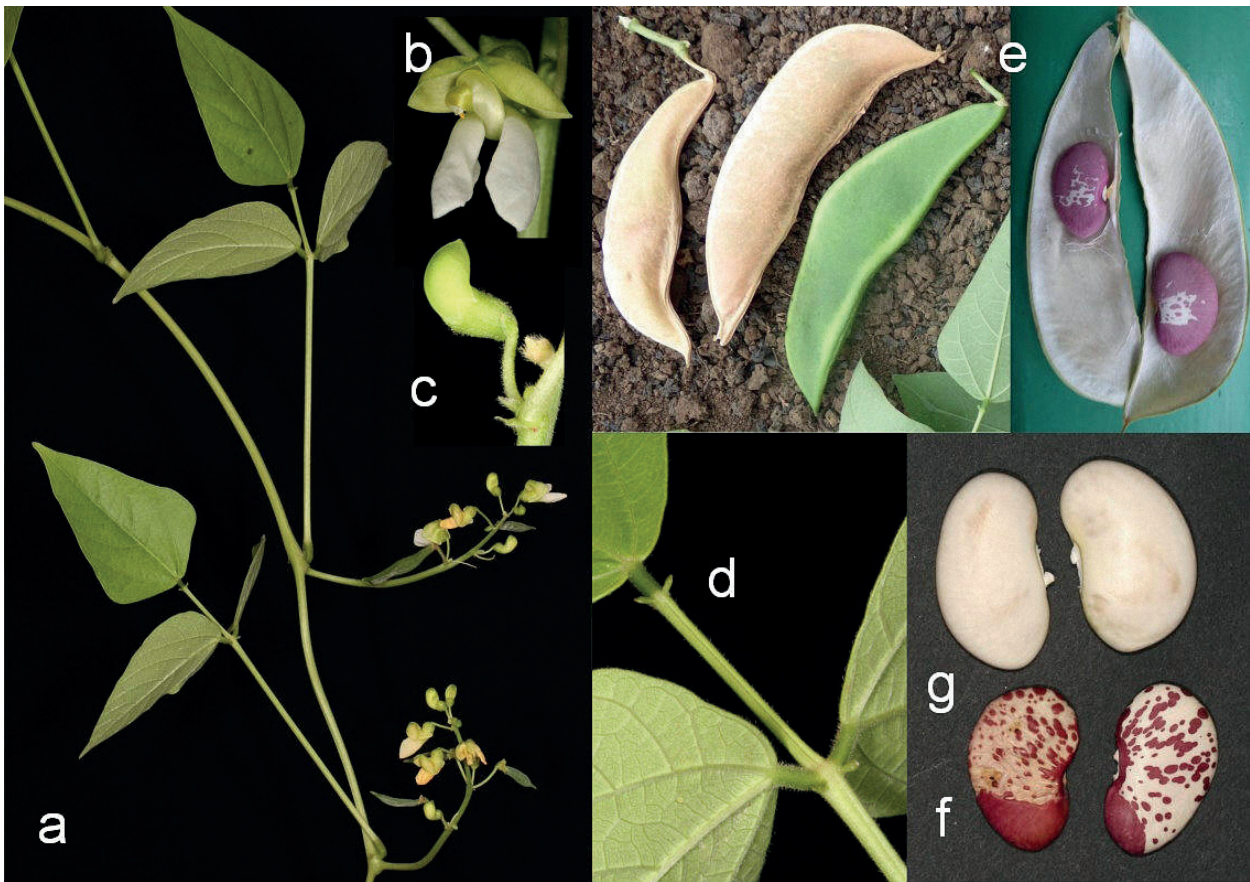
and pure white seeds *ca.* 30 mm long, *ca.* 75 m, 28.799374° N, 17.761908° W, 08.IV.2018, *R. Otto 23173* (pers. herb. RO); *ibid.*, above sports field, several specimens along the way, 22.X.2018, *R. Otto* (pers. obs.); *ibid.*, Calle el Medio, small water gutter, seedlings, 31.X.2018, *R. Otto 23445* (pers. herb. RO).

*Origin:* the wild form (var. *silvester* Baudet) is native to the Andean region and Central America. Widely cultivated as var. *lunatus* in many types as a vegetable in warm temperate to tropical regions of the world.

*Degree of naturalization:* casual but possibly overlooked, wild occurrences of the short living perennial (mostly annual in cultivation) seem to persist for several years, possibly invasive.

Reported as invasive from Australia, New Zealand and Philippine Islands (US Forest Service, 2019), also from Cuba and Puerto Rico (CABI, 2019) and as established alien from Spain (DAISIE, 2019).





**Figure 19.** Characteristic features of *Phaseolus lunatus*: (A), Inflorescences shorter than, to as long as, their bracts and with few flowers; (B), corollas usually yellowish or whitish; (C), bracteoles inconspicuous, shorter than calyx tube; (D), stipels 1.5–2 mm long; (E), pods smooth, crescent-moon-shaped bent, strongly flattened, up to 10 cm long, only 2–4 times longer than broad with only 2–4 seeds; (F), seeds 15–20 mm long, with purple spots; (G), or white throughout and up to 30 mm. Pictures A–F from specimen collected in Sta. Cruz de La Palma and picture G from specimen collected in San Andrés y Sauces, October 2018 (photographs: R. Otto).

*Phaseolus lunatus* cultivars are often cultivated in home gardens (especially on fences) and on walls of banana plantations of the lower zones in La Palma and the green pods and the seeds are used like those of *Phaseolus vulgaris* L.

*P. lunatus* may be sometimes confused (especially young or dwarf specimens and if without pods) with very similar forms of the variable *P. vulgaris* and perhaps also with non-flowering specimens of *P. coccineus* L. Another similar species is *P. acutifolius* A. Gray (Tepary bean), reported as naturalized from Gran Canaria in the cultivated, broad-leaved race var. *latifolius* Freeman (Verloove, 2013).

Four important beans of American origin exist in a huge number of cultivars and can be distinguished in the following key (modified from Hegi, 1924; Webb *et al.*, 1988; Wu & Thulin, 2010).

1. Small slender annual herb, generally up to approx. 40 cm tall, inflorescence 2–5 flowered, pedicels *ca.* 5 mm, bracteoles very small and triangular, flower buds hairy, corollas purple or white; pods silky hairy, up to 5–8(15) cm long, linear, compressed and about 10 mm thick, with 3–5(7) rounded and not more than *ca.* 10 mm long seeds; cotyledons well above ground (germination epigeal) ..... **1. *P. acutifolius***

–. Vigorous annuals, biennials or perennial herbs, climbers with stems up to several meters long, inflorescences with more flowers, pedicels longer ..... **2**

2. Inflorescences shorter as to as long as their bracts; corollas usually yellowish or whitish to pale-purple in color; ripe pods smooth; cotyledons well above ground (germination epigeal) ..... **3**

-. Inflorescences usually longer than their bracts, mostly many-flowered; corollas 15–30 mm scarlet or white or bicolored; bracteoles conspicuous, longer than calyx tube; pods rough, 10–30 cm long, seeds mostly over 20 mm long; cotyledons non-photosynthetic, remain in soil (hypogeal germination) ..... **2. *Phaseolus coccineus***

**3.** Stipeles 3–6 mm; bracteoles conspicuous, longer than calyx tube; pods up to more than 20 cm, much longer than wide and around the 2–8 seeds slightly nodular; seeds commonly under 20 mm long ..... **3. *Phaseolus vulgaris* subsp. *vulgaris***

-. Stipeles 1.5–2 mm long; bracteoles inconspicuous, shorter than calyx tube; pods crescent-moon-shaped bent, strongly flattened, up to 10 cm long, only 2–4 times longer than broad, with only 2–4 seeds; seeds 15–30 mm long (several small-seeded and large-seeded cultivars exist) ..... **4. *Phaseolus lunatus***

***Portulaca trituberculata*** Danin, Domina & Raimondo in Fl. Medit. 18: 91 (2009) (Portulacaceae).

New to the flora of La Palma.

Spain, La Palma: Puntallana, Calle el Posito (LP-1), roadside, many specimens, 20.IX.2013, *R. Otto 20349* (pers. herb. RO); *ibid.*, margins of a potato field, 03.XI.2014, *R. Otto 21391* (pers. herb. RO, dupl. BR); Los Llanos de Aridane, Avenida Tanau-sú, tree pit, 01.VIII.2014, *R. Otto 21156* (pers. herb. RO).

*Origin:* Old World.

*Known distribution in the Canary Islands:* T (Danin & Reyes-Betancort, 2006, as *Portulaca oleracea* L., named *Portulaca oleracea* L. subsp. *oleracea* by Danin *et al.*, 1978).

*Degree of naturalization:* perhaps locally naturalized.

It most probably is a relatively rare and ephemeral weedy species in the Canary Islands, but it could also be overlooked sometimes or confused with one of the very similar other *Portulaca* taxa.

***Pyracantha angustifolia*** C. K. Schneid., Ill. Handb. Laubholz. 1(5): 761 (1906) (Fig. 20) (Rosaceae).

New to the flora of the Canary Islands.

Spain, La Palma: Breña Alta, above San Isidro, *ca.* 250 m before crossing LP-301 over Canal de Fuencaliente, roadside, two approximately one meter high bushes with numerous fruits, 665 m, 28.630620° N, 17.799618° W, 30.X.2018, *R. Otto 23442* (pers. herb. RO, dupl. BR).

*Origin:* native to Southwestern China, cultivated as garden ornamental in temperate and subtropical regions worldwide and naturalized elsewhere, e.g. established in Madeira and Spain (DAISIE, 2019).

*Degree of naturalization:* ephemeral, potentially invasive.

*Pyracantha angustifolia* is reported as invasive from Australia, French Polynesia, the Hawaiian Islands, New Zealand and South Africa (US Forest Service, 2019).

This up to four meter tall and wide, thorny evergreen bush has striking white flowers (up to 12 mm diameter) in downy corymbs and attractive brilliant yellow or orange colored fruits which are spread by birds. The leaves are ± narrowly oblong with rounded apex, the under surface is grey felted, the upper surface dark green and hairless. According to Webb *et al.* (1988) *P. angustifolia* can “be easily distinguished from all other *Pyracantha* sp. by the persistently tomentose petioles and leaf undersides”.

***Sedum mexicanum*** Britton in Bull. New York Bot. Gard. 1(4): 257 (1899) (Crassulaceae).

New to the flora of La Palma.

Spain, La Palma: San Andrés y Sauces, Barranco de San Juan, way to Cuevas de Tendal, embankment of dry riverbed with excavation and rubble, small not flowering population, originating from garden waste, 09.X.2015, *R. Otto 21939* (pers. herb. RO).

*Origin:* described from Mexico, known also from Central America and Colombia, introduced as perennial ornamental in many parts of the world and also used for creation of “green roofs”.

*Known distribution in the Canary Islands:* T (Acebes Ginovés *et al.*, 2010).

*Degree of naturalization:* ephemeral but potentially invasive.





**Figure 20.** *Pyracantha angustifolia*: spreading meter-high bush at the roadside, Breña Alta, November 2018 (left); underside of leaf, flowers and ripe fruits, Los Llanos de Aridane, August 2014 (right) (photographs: R. Otto).

Feral occurrences of this species are known from several parts of the world (Roselló Gimeno *et al.*, 2012), e.g. also from France and the Iberian Peninsula. It is reported as invasive from Japan (Mito & Uesugi, 2004).

For a description of the plant and the differences with the closely related *Sedum lineare* Thunb., see Roselló Gimeno *et al.* (2012).

***Trifolium lappaceum* L.**, Sp. Pl. 2: 768–769 (1753) (Fabaceae).

New to the flora of La Palma.

Spain, La Palma: Barlovento, surroundings of La Fajana and wayside Calle La Fajana, numerous individuals, ca. 20 m, 01.IV.2017, R. Otto 22516 (pers. herb. RO).

*Origin*: South Europe.

*Known distribution in the Canary Islands*: G, T, L (Acebes Ginovés *et al.*, 2010).

*Degree of naturalization*: (only locally?) naturalized.

***Urochloa mutica* (Forssk.) T. Q. Nguyen** in Novosti Sist. Vyssh. Rast. 1966: 13 (1966) (Figs. 21 and 22) (Poaceae).

Syn.: *Brachiaria mutica* (Forssk.) Stapf

New to the flora of La Palma.

Spain, La Palma (selected occurrences): San Andrés y Sauces, between San Andrés and Charco Azul, coastal rocks along Camino el Cardal and wayside, not flowering, ca. 16 m, 28.805067° N, 17.761465° W, 08.V.2012, R. Otto 19154 (pers. herb. RO); *ibid.*, San Andrés, a large established and fertile occurrence on the roadside of Calle Iglesia between LP-104 and sports field and partially in monospecific stand in the wasteland nearby, with old fruit stands, ca. 75 m, 28.799374° N, 17.761908° W, 08.IV.2018, R. Otto 23174 (pers. herb. RO, dupl. BR); *ibid.*, beginning of flowering, 22.X.2018, R. Otto (pers. obs.); *ibid.*, damp rock face and water channel along LP-1401 shortly before Puerto Espíndola, not flowering, 30 m, 28.809392° N, 17.763895° W, 22.X.2018, R. Otto





**Figure 21.** Dense upright meter-high stock of the invasive grass species *Urochloa mutica*, Sta. Cruz de La Palma, April 2018 (right); mass stock with widely creeping stolons of the same grass species, San Andrés, October 2018 (left; photographs: R. Otto).

23405 (pers. herb. RO); *ibid.*, embankment at LP-104 and roadside, not flowering, *ca.* 78 m, 28.803909° N, 17.764115° W, 23.X.2018, *R. Otto* 23410 (pers. herb. RO); Sta. Cruz de La Palma, *pinar* between Llano Grande and El Dorador, slope with rubble and earth deposits at the edge of a ground-based parking next to the bridge (LP-401) over the valley bottom of the Barranco del Carmen, an occurrence of about 100 m<sup>2</sup>, known since 2010, the stock took on slowly but continuously, never seen in flowering state, probably originating from formerly deposited green waste, 265 m, 28.703311° N, 17.778947° W, 05.IV.2018, *R. Otto* 23151 (pers. herb. RO); *ibid.*, below the bridge and at the edge of the path leading downhill, non-flowering, 05.IV.2018, *R. Otto* (pers. obs.); *ibid.*, Mirca, embankment at LP-4 near junction Caserio los Álamos, not flowering, *ca.* 235 m, 28.707822° N, 17.765531° W, 20.X.2018, *R. Otto* 23394 (pers. herb. RO); *ibid.*, near branch of LP-4 of LP-1, strong stand in a depression along Caserio la Portada, not flowering, 140 m, 28.701201° N, 17.759345° W, 20.X.2018, *R. Otto*

23395 (pers. herb. RO); *ibid.*, Lomo Machado, on the embankment and roadside along LP-101, several flowering culms, 117 m, 28.691889° N, 17.764020° W, 24.X.2018, *R. Otto* 23472 (pers. herb. RO, dupl. BR); *ibid.*, road to Las Nieves in the Barranco de la Madera, *ca.* 200 m before drive on LP-20, roadside, not flowering, *ca.* 130 m, 28.692095° N, 17.773427° W, 10.XI.2018, *R. Otto* 23471 (pers. herb. RO); *ibid.*, San Telmo, roadside LP-202 (Ctra. Timibúcar), not flowering, 75 m, 28.683413° N, 17.768241° W, 10.XI.2018, *R. Otto* (pers. obs.); Barlovento, La Fajana, on the slopes above the settlement some large stands in the fallow land and at the edge of sugar cane plantations, *ca.* 50 m, 23.X.2018, *R. Otto* (pers. obs.).

*Origin:* native to Africa. Cultivated as forage grass in the tropics worldwide and naturalized in warm temperate, subtropical and tropical regions. In Macaronesia known also from Madeira (Borges *et al.*, 2008).

*Known distribution in the Canary Islands:* C (Verloove, 2013).





**Figure 22.** Important details of *Urochloa mutica*: flowering panicle (right); spike-like panicle branches with short-stalked, mostly paired glabrous spikelets ca. 3 mm long in 2–4 rows (middle); culm nodes, leaf sheaths and nodes densely covered with fine spreading hairs up to 3 mm (top left); ligule of hairs 1–1.5 mm, the basal membranous portion inconspicuous (bottom left); Sta. Cruz de La Palma (photographs: R. Otto).

*Degree of naturalization:* naturalized and highly invasive.

Worldwide the species is reported as invasive from many areas, e.g. from Australia, Central America, the Hawaiian Islands, Indonesia, Mauritius, New Zealand, the Philippines, South America (Colombia, Ecuador, Peru), Thailand and Vietnam (US Forest Service, 2019).

One can assume that the fast growing and largely creeping perennial grass was presumably introduced as a forage grass and is naturalized there for decades. As a consequence of its low tendency to bloom it was probably overlooked or confused with morphologically similar grasses like *Pennisetum purpureum* Schumach.

According to the first author's observations so far, the species occurs mainly in the humid northeast of the island. There are three obvious distribution centres, namely the communes of Sta. Cruz de La Palma, San Andrés y Sauces and Barlovento.

Here, the species occurs on disturbed sites practically from sea level to about 265 m, mainly at roadsides and their embankments and from there spreads to managed (e.g. banana plantations) and unmanaged cultivated land. Typical but mostly inaccessible are also occurrences on damp rock walls (e.g. coastal rocks), here often with several meters long far down hanging stolons, or occurrences in damp places in *barrancos* and ditches or in contact with (leaky?) water channels or water tanks.

The known populations are, at least in part, already large and dominant, nearly monospecific stands of some hundred, rarely up to more than thousand square meters. But many of them are only some square meters large, often easily overlooked populations in association and competition with other perennial, strong and tall grass species such as *Arundo donax* L., *Pennisetum purpureum*, *Pennisetum setaceum* (Forsk.) Chiov. and *Paspalum urvillei* Steud., once also with *Urochloa maxima* (Jacq.) R. D. Webster. As frequent accompanying



dicots were seen e.g. *Cardiospermum grandiflorum* Sw., *Foeniculum vulgare* Mill., *Kleinia neriifolia* Haw., *Opuntia* sp., *Ricinus communis* L. and *Rumex lunaria* L. These higher-growing species compete best with the aggressive *U. mutica*.

The presence of non-flowering stands (flowering time on La Palma is November, December, January) and mowing alongside the streets make it sometimes difficult to see and/or identify the species. Confusion is possible especially with lean forms of *Pennisetum purpureum*, but this species has a much larger to 5 mm long ligule. *P. clandestinum* Hochst. ex Chiov. often has similarly hairy sheaths, but always hairless leaf nodes, a ligule about 2.2 mm long and leaves only up to 6 mm wide (vs. 10–15 mm). Somewhat similar in inflorescence is the caespitose *Paspalum urvillei*, but the spikelets of this species are clearly hairy, the ligule is membranous and up to 7 mm long and at the base of the adaxial leaf side there are striking, long hairs. Fig. 22 shows the essential

characteristics of *Urochloa mutica* to distinguish the species from the other mentioned grasses, also in the vegetative stage.

*Urochloa subquadripara* (Trin.) R. D. Webster, Austral. Paniceae (Poaceae): 252 (1987) (Figs. 23 and 24) (Poaceae).

Syn.: *Brachiaria subquadripara* (Trin.) Hitchc.

New to the flora of the Canary Islands.

Spain, La Palma: Breña Baja, Los Cancajos, Calle Amargavinos, crawling somewhat rigid weed in a permanently mowed and irrigated lawn, with some interspersed dicots like *Cerastium fontanum* Baumg. subsp. *vulgare* (Hartm.) Greuter & Burdet, *Taraxacum* sp., *Symphyotrichum squamatum* (Spreng.) G. L. Nesom and abundant *Trifolium repens* L., 10 m, 28.651809° N, 17.759839° W, 06.X.2017, R. Otto 22977 (pers. herb. RO, dupl. BR); *ibid.*, the lawn is very strongly overgrown by



**Figure 23.** *Urochloa subquadripara*, mass occurrence in a lawn, aspect after mowing (right), detail (left), Breña Baja, April 2018 (photographs: R. Otto).





**Figure 24.** *Urochloa subquadripara*, panicles with spike-like primary branches in two ranks (left); spikelets with view of upper glumes (middle), pubescent sheath (right) (photographs: R. Otto).

the prostrate and long creeping and rooting stems of *Urochloa*, the originally (?) applied perennial grass species (e.g. *Digitaria ciliaris* (Retz.) Koeler, *Digitaria radicata* (C. Presl.) Miq., *Festuca* sp. sect. *Schedonorus*, *Paspalum* sp.) are significantly reduced, 07.XI.2018, R. Otto (pers. obs.).

*Origin*: probable native to Tropical Asia and Australia. Introduced into the tropics worldwide and naturalized in many parts of them.

*Degree of naturalization*: ephemeral but potentially invasive.

*Urochloa subquadripara* is a perennial, creeping species and willingly rooting at the nodes. It is reported as a troublesome weed and is also cultivated in some parts of the tropics as forage because of its drought tolerance. According to Teuton *et al.* (2004) it is “one of the most serious weed problems in the St. Augustine grass sod production in Florida and its presence increases production costs and lowers turfgrass quality”.

The grass is reported as invasive for instance from the Fiji Islands, the Hawaiian Islands and

New Caledonia Archipelago (US Forest Service, 2019) and from Texas (Hatch, 2010).

Our plant fits very well with the description given by Wipff & Thompson (2003). The lower palea is normally present in our collection, but we have also observed some spikelets with and without a lower palea in the same panicle.

According to Chen & Phillips (2006) our plant belongs to var. *subquadripara*. In dense lawns the prostrate grass is initially facile to overlook; later the flat lying leaves, partially mangled during mowing and then dried up, give the lawn a typical unattractive blotchy appearance due to its partial straw color (Fig. 23).

*Urochloa subquadripara* is sometimes included in *U. distachya* (L.) T. Q. Nguyen (see the discussion in CABI, 2019). Further occurrences in the Canaries are to be expected.

*Voluntaria tubuliflora* (Murb.) Sennen, Campagn. Bot. Maroc Or.: 148 (1936) (Asteraceae).  
Syn.: *Voluntaria lippii* (L.) Cass. ex Maire subsp. *tubuliflora* (Murb.) Maire.

New to the flora of La Palma.

Spain, La Palma: Breña Alta, Las Ledas, small storage area and road-edge on Carretera San Isidro (LP-301), ca. 385 m, 28.648734° N, 17.788575° W, 03.IV.2017, *R. Otto* 22563 (pers. herb. RO); *ibid.*, several specimens alongside the street, 31.III.2018, *R. Otto* 23185 (pers. herb. RO, dupl. BR); Sta. Cruz de la Palma, Calle del Caserío Miranda, wasteland, numerous specimens, 05.IV.2018, *R. Otto* (pers. obs.).

*Origin*: southern Mediterranean region.

*Known distribution in the Canary Islands*: H, T, L (Acebes Ginovés *et al.*, 2010).

*Degree of naturalization*: ephemeral but potentially invasive.

*Volutaria tubuliflora* is recently reported as invasive from the California desert and from the Chilean Atacama Desert (Harris *et al.*, 2015; McDonald, 2017). These authors report on the discovery of the species, its amazing expansion history in California and control measures. In contrast to the Canarian plants (all?) the American specimens have white flowers.

Recent molecular genetic studies (Calleja *et al.*, 2016) have shown that the two Macaronesian endemic species *V. bollei* (Sch. Bip. ex Bolle) A. Hansen & G. Kunkel and *V. canariensis* Wagenitz, the African *V. lippii* (L.) Cass. and also *V. tubuliflora* are all well-separated species, despite some morphological similarities and in contrast with former presumptions (see e.g. synonyms).

### Ephemeral taxa

*New to the flora of the Canary Islands*

*Euphorbia cotinifolia* L. subsp. *cotinoides* (Miq.) Christenh. (Euphorbiaceae).

Spain, La Palma: Breña Alta, Miranda, Calle Rosal, fallow terrain for future residential development, several flowering specimens of different heights in dense ruderal vegetation, escape from cultivation, 18.X.2018, *R. Otto* 23392 (pers. herb. RO, dupl. BR).

According to Ma & Gilbert (2008) our plant belongs to the throughout the tropics cultivated *E. c.* subsp. *cotinoides* (syn.: *E. cotinoides* Miq.) with attractive leaves of conspicuous reddish brown color and with ovate-rounded leaf blade and subtruncate leaf base. The green-leaved subspecies *cotinifolia*

in contrast has orbiculate and apically rounded leaf blades.

*Pelargonium cucullatum* (L.) L'Hér. (Geraniaceae).

Spain, La Palma: San Andrés y Sauces, Los Sauces, Mirador de Llano Clara, under and near a high voltage mast on the slope, several vigorous plants, perhaps persistent from an earlier culture, growing together with *Pennisetum thunbergii* Kunth, 467 m, 28.800282° N, 17.786674° W, 09.IV.2017, *R. Otto* 22601 (pers. herb. RO, dupl. BR).

*Urtica dioica* L. subsp. *dioica* var. *dioica* (Urticaceae).

Spain, La Palma: Breña Alta, San Pedro, Camino Bco. de Aguacencio, one specimen between bushes and ruderal plants at the roadside near to a nursery, 03.IX.2010, *R. Otto* 17335 (pers. herb. RO; conf. *M. Weigend* XII.2018).

The presence of this species could not be confirmed subsequently, despite repeated searches. The occurrence of *Urtica dioica* is not surprising. Several times the first author saw potted individuals offered as medicinal plants on different markets of the island.

*New to the flora of La Palma*

*Aloe arborescens* Mill. (Xanthorrhoeaceae).

Spain, La Palma: Villa de Mazo, waste land along LP-205, small bush originating from garden waste, 31.VII.2014, *R. Otto* 21164 (pers. herb. RO); *ibid.*, between El Pueblo and La Rosa, several individuals on rocky road embankments, 06.IV.2018, *R. Otto* (pers. obs.); Sta. Cruz de La Palma, Barranco de las Nieves below Plaza de San Fernando, embankment at the entrance to the riverbed, small plant with a few rosettes, probably originating from cut back of some bushes in the near public green, 17.X.2018, *R. Otto* (pers. obs., photo det. Carlos Gómez-Bellver XII.2018).

This species is frequently seen near settlements, on roadsides, embankments, garden waste dumps and similar disturbed places, often individuals of considerable size.

*Coriandrum sativum* L. (Apiaceae).

Spain, La Palma: Sta. Cruz de La Palma, La Dhesa, roadside LP-401 next to Ciudad Deportiva



Miraflores, 06.IV.2018, *R. Otto* 23168 (pers. herb. RO).

***Cucurbita pepo*** L. (Fig. 6B) (Cucurbitaceae).

Spain, La Palma: Sta. Cruz de La Palma, Calle Abenguareme, storage area close to the sea, small rubbish heap (purification of bin lorries), several young individuals, 30.V.2013, *R. Otto* (pers. obs.); *ibid.*, Barranco de Las Nieves parallel Avenida las Nieves, gravelly riverbed, small plant, presumably birdseed origin, 23.IX.2013, *R. Otto* (pers. obs.); Breña Baja, Los Cancajos, dry wasteland near former sewage station, several young individuals, 25.V.2013, *R. Otto* (pers. obs.); Barlovento, next to Laguna de Barlovento, landfill for excavation earth, several flowering individuals overgrow the dense ruderal vegetation, 05.VIII.2014, *R. Otto* 21196 (pers. herb. RO).

There is a risk of confusion with *C. ficifolia* and *C. moschata* in the case of dwarfish specimens as a result of dryness. For the differentiation of the *Cucurbita* species see the key under *C. ficifolia*.

***Cupressus sempervirens*** L. var. *sempervirens* (Cupressaceae).

Spain, La Palma: Breña Alta, Buenavista de Abajo, in the middle of the former runway of the old airfield, 404 m, 09.IV.2018, *R. Otto* 23177 (pers. herb. RO, dupl. BR).

***Montanoa bipinnatifida*** (Kunth) K. Koch (Asteraceae).

Spain, La Palma: Villa de Mazo, Hoyo de Mazo, below Ermita de los Dolores and near crossing LP-205 (Calle Molinos de Viento) and Camino Fierro, roadside, 21.X.2017, *R. Otto* 23074 (pers. herb. RO, dupl. BR).

***Polypogon maritimus*** L. var. *maritimus* (Poaceae).

Spain, La Palma: Los Llanos de Aridane, roadside on LP-211 (Carretera El Hoyo Todoque) near Cueva de Las Palomas, numerous individuals along with *Castellia tuberculosa* (Moris) Bor, 470 m, 28.601060° N, 17.893620° W, 28.X.2018, *R. Otto* 23439 (pers. herb. RO, dupl. BR).

***Roldana petasitis*** (Sims) H. Rob. & Brettell (Asteraceae).

Spain, La Palma: Breña Baja, San Jose, near Entrada Sur, crossing LP-206 and Calle Gumersindo

Galvan de las Casas, ruderalized embankment, some individuals, perhaps former garden throw-out, 13.X.2017, *R. Otto* 23029 (pers. herb. RO).

## ACKNOWLEDGEMENTS

G. Coppens d'Eeckenbrugge (Montpellier, France) is acknowledged for the identification of the *Passiflora* taxa and for providing references for the problematic *Tacsonia* group. J. López-Pujol (Barcelona, Spain) and C. Gómez-Bellver (Barcelona, Spain) helped with the identification of several ornamental species. J. Walter (Vienna, Austria) is thanked for his help with identifying species of *Chenopodium* and M. Weigend (Bonn, Germany) for his support with *Urtica*.

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