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New xenophytes from La Palma (Canary Islands, Spain), with emphasis on naturalized and (potentially) invasive species – Part 2

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Abstract
New xenophytes from La Palma (Canary Islands, Spain), with emphasis on naturalized and (potentially) invasive species. Part 2.— Several months of field work in La Palma (western Canary Islands) yielded a number of interesting new records of non-native vascular plants. *Abutilon theophrasti*, *Agrostis ×fouilladeana*, *Alternanthera brasiliana*, *Bupleurum salicifolium* subsp. *salicifolium*, *Callisia fragrans*, *Emilia coccinea*, *Hyparrhenia sinaica*, *Ipomoea purpurea, Jasminum polyanthum*, *Macfadyena unguis-cati*, *Malvastrum coromandelianum* subsp. *coromandelianum*, *Misopates calycinum*, *Nephrolepis cordifolia*, *Opuntia microdasys*, *Passiflora subpeltata*, *Plantago lanceolata*, *Polygonum aviculare* subsp. *rurivagum*, *Pseudogynoxys chenopodioides*, *Psidium littorale*, *Robinia pseudoacacia*, *Rosa micrantha*, *Rumex bucephalophorus* subsp. *gallicus*, *Sorghum bicolor* subsp. *verticilliflorum*, *Sphagneticola trilobata*, *Syzygium jambos*, *Thunbergia alata* and *Youngia japonica* subsp. *japonica* are naturalized or (potentially) invasive xenophytes, reported for the first time from either the Canary Islands or La Palma. Fourteen additional, presumably ephemeral taxa are reported for the first time from the Canary Islands, whereas 15 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 2.— Varios meses de trabajos de campo en La Palma (Islas Canarias occidentales) han posibilitado el descubrimiento de nuevas plantas vasculares no nativas. *Abutilon theophrasti*, *Agrostis ×fouilladeana*, *Alternanthera brasiliana*, *Bupleurum salicifolium* subsp. *salicifolium*, *Callisia fragrans*, *Emilia coccinea*, *Hyparrhenia sinaica*, *Ipomoea purpurea, Jasminum polyanthum*, *Macfadyena unguis-cati*, *Malvastrum coromandelianum* subsp. *coromandelianum*, *Misopates calycinum*, *Nephrolepis cordifolia*, *Opuntia microdasys*, *Passiflora subpeltata*, *Plantago lanceolata*, *Polygonum aviculare* subsp. *rurivagum*, *Pseudogynoxys chenopodioides*, *Psidium littorale*, *Robinia pseudoacacia*, *Rosa micrantha*, *Rumex bucephalophorus* subsp. *gallicus*, *Sorghum bicolor* subsp. *verticilliflorum*, *Sphagneticola trilobata*, *Syzygium jambos*, *Thunbergia alata* y *Youngia japonica* subsp. *japonica* son xenófitos naturalizados o (potencialmente) invasores, se citan por primera vez para las Islas Canarias o para La Palma. Se dan a conocer por primera vez 14 táxones adicionales, probablemente casuales, de las Islas Canarias y 15 táxones de la isla de La Palma.

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

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INTRODUCTION

Despite being well-documented (e.g. Hohenester & Welss, 1993; Acebes Ginovés *et al.*, 2009), the flora of the Canary Islands (Spain) requires permanent updates. An increase of taxonomic knowledge allows the recognition of poorly known or neglected native species or even the description of new taxa. Also, in our globalized world geographical boundaries have become obsolete, enhancing the almost unlimited exchange of goods and their stowaways (diaspores, etc.). In addition to these inadvertently introduced alien species, humans are also responsible for the introduction to new areas of economically or otherwise important species, for instance garden ornamentals. In the past centuries the Canary Islands, with their subtropical climate, have become home for hundreds of ornamental, subtropical plant species. An increasing number of these are not only well-adapted to the local climate but started to reproduce locally, in some cases eventually naturalizing, spreading or even becoming invasive. This is a well-known phenomenon that has widely been studied in recent times (Foxcroft *et al.*, 2008). Moreover, islands are particularly vulnerable, invasive alien species being among the primary threats to biodiversity on islands (Vitousek, 2002). The early taxonomic recognition of newly detected aliens is of the utmost importance, enabling, if appropriate, the immediate implementation of management practices. Even the first, seemingly anecdotic, reproduction of an ornamental is worth reporting, since it may constitute the first (but essential) step in a future naturalization process (Böcker *et al.*, 1995).

This paper is a sequel to Otto & Verloove (2016). 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 field work in La Palma conducted by the first author, mainly between 2013 and 2016. 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 of Meise, Belgium (BR) (acronym according to Thiers, 2017).

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.* (2009), the Euro+Med PlantBase (Euro+Med, 2006–) and the Banco de Datos de Biodiversidad de Canarias (2017). 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 probably and/or locally naturalized or (potentially) invasive species. 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 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 Agavaceae are included in Asparagaceae and Sterculiaceae in Malvaceae. 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 ("nativa seguro") by Acebes Ginovés *et al.* (2009) were considered non-native in this paper. The only exception is *Bupleurum salicifolium* R. Br. subsp. *salicifolium,* a taxon that is native in at least part of Macaronesia but with uncertain status in La Palma (see below).

RESULTS

Naturalized and/or potentially invasive taxa

Abutilon theophrasti Medik., Malvenfam. 28 (1787) (Malvaceae).

New to the Flora of the Canary Islands.

Spain, La Palma: Barlovento, next to LP-1 below the village, potato field, numerous individuals, 28.827877º N, 17.791784º W, 20.09.1999, *R. Otto 4699* (priv. herb. RO).

Origin: Tropical Asia. Introduced and naturalized in southeastern and Western Europe, the Mediterranean region and North America.

Degree of naturalization: ephemeral but potentially weedy.

Abutilon theophrasti is considered a noxious weed in agricultural fields (e.g. Warwick & Black, 1988). Therefore, it is astonishing that the species was not found again after the first discovery in 1999, despite repeated searches (perhaps a consequence of herbicide use).

In contrast to the widely naturalized *Abutilon grandifolium* (Willd.) Sweet, this species is an annual herb, softly tomentose when young. The dark yellow petals are only 7–13 mm long and the mericarps are longer than the calyx and have a 2–3 mm long slender awn.

Agrostis ×***fouilladeana*** Lambinon & Verloove in Bull. Soc. Échange Pl. Vasc. Eur. Occid. Bassin Médit. 29: 105 (2004) (Poaceae).
≡ *Agrostis* ×*fouilladei* P. Fourn., nom. nudum
= *Agrostis capillaris* L. × *Agrostis castellana* Boiss. & Reut. var. *castellana*

New to the flora of the Canary Islands.

Spain, La Palma: Breña Alta, San Pedro, Camino Barranco de Aguacencio, large population in wayside and on the edge of a private garden, several groups also in nearby area, 25.06.2015, *R. Otto 21523* (priv. herb. RO, dupl. BR); ibid., 01.10.2016, *R. Otto* (pers. obs.).

Origin: known from Europe and New Zealand, possibly introduced as a contaminant in amenity turf grass seed.

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

This hybrid is not easily recognized and may be overlooked because of its similarity with other species of the genus, especially its putative parent species.

Alternanthera brasiliana (L.) Kuntze, Revis. Gen. Pl. 2: 537 (1891) (Amaranthaceae).
≡ *Gomphrena brasiliana* L.
= *Alternanthera dentata* (Moench) Stuchlik ex R. E. Fr., *Alternanthera brasiliana* var. *villosa* (Moq.) Kuntze, *Gomphrena dentata* Moench

New to the flora of the Canary Islands.

Spain, La Palma: Tazacorte, Pueblo de Tazacorte, Calle Miguel de Unamuno, several specimens in ruderal vegetation on the edge of an unpaved parking area and also by nearby roadside, 11.08.2014, *R. Otto* (pers. obs.); ibid., several seedlings and some fruiting specimens by roadside and between cobbles, some specimens also seen in a nearby garden, 07.04.2016, *R. Otto 22093* (pers. herb. RO, dupl. BR).

Origin: native to South and Central America and southern Mexico. Introduced and naturalized in Australia, Florida, some Pacific Islands and South Africa.

Degree of naturalization: ephemeral, potentially weedy and invasive.

Several cultivars of this species are available in the horticultural trade. The above cited plants have reddish-purple colored leaves and probably belong to the most common cultivar 'Rubiginosa' (Sánchez de Lorenzo Cáceres, 2000). This cultivar is recently planted more frequently in the Canary Islands, also in Tenerife.

Alternanthera brasiliana is reported as invasive from the *Kruger National Park* in South Africa and

as "sleeper weed" from Northern Australia (Weeds of Australia, 2015). The propagation of *Alternanthera brasiliana* is by seed (probably with long dormancy) and by shoot fragments (US Forest Service, 2017).

Bupleurum salicifolium R. Br., Phys. Beschr. Canar. Ins.: 195 (1828) subsp***. salicifolium*** (Apiaceae).

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 between planted ornamental bushes and palms (*Melia azedarach* L., *Phoenix canariensis* Chabaud and *Schinus molle* L.), 28.674255º N, 17.770005º W, 06.07.2015, *R. Otto 21610* (pers. herb. RO, dupl. BR).

Origin: Macaronesia (Canary Islands and Madeira Islands)

Known distribution in the Canary Islands: G, C (Acebes Ginovés *et al.*, 2009).

Degree of naturalization: naturalized (?).

Bupleurum salicifolium subsp. *salcifolium* is so far only listed for La Gomera and El Hierro (as "nativa seguro"; Acebes Ginovés *et al.*, 2009) and from Madeira and Porto Santo (Borges *et al*., 2008). In La Palma only the Canarian endemic subsp. *aciphyllum* (Webb & Berthel.) Sunding & Kunkel had been recorded so far. It is unclear whether on La Palma *B. s.* subsp. *salicifolium* is a recent introduction or a native but overlooked taxon. The occurrence in the middle of ornamentals, on the one hand, points at a recent introduction. On the other hand, a previously unknown natural occurrence appears to be possible on the steep and very difficult-to-access crater walls of the Risco de la Concepción. This natural monument rises from sea level up to 380 m and houses a whole series of endemic species. Further investigations are necessary.

Both subspecies can be distinguished as follows:

1. Leaves approximately 8–15 mm wide [20 mm in var. *robustum* (Burch.) Kunk.], with 7–9 parallel nerves, the leaf margin smooth .... **subsp. *salicifolium***

-. Leaves approximately 3–5 mm wide, with 5–6 parallel nerves, the leaf margin weakly crenate ..... **subsp. *aciphyllum***

Callisia fragrans (Lindl.) Woodson in Ann. Missouri Bot. Gard. 29: 154 (1942) (Fig. 1) (Commelinaceae).

Figure 1. *Callisia fragrans*, Breña Alta, Barranco de Aguacencio, location (right), October 2015; inflorescences (left), June 2015 (Photographs: R. Otto).

New to the flora of the Canary Islands.

Spain, La Palma: Breña Alta, San Pedro, Camino Barranco de Aguacencio, dense ruderal vegetation in dry riverbed, a lot of established and vigorous colonies of several square meters, partially shaded, 28.6604º N, 17.788552º W, 30.10.2014, *R. Otto 21354* (pers. herb. RO, dupl. BR); ibid., plants with many inflorescences up to more than 1 m and abundantly flowering, 25.06.2015, *R. Otto 21524* (pers. herb. RO); ibid., 01.10.2016, *R. Otto* (pers. obs.); Breña Baja, Los Cancajos, Calle El Cardón, next to a sidewalk, former throw-out, some individuals under very dry conditions, 30.10.2014, *R. Otto 21361* (pers. herb. RO); ibid., a small population of about one square meter, 29.09.2016, *R. Otto* (pers. obs.); San Andrés y Sauces, open water channel alongside LP-104, some individuals rooted in cracks of concrete, cultivated specimens nearby, 03.11.2014, *R. Otto* (pers. obs.); Sta. Cruz de La Palma, Las Nieves above the presbytery, steep slope of wayside, former dump (?), several individuals together with *Crassula multicava* Lem. and *Crassula ovata* (Mill.) Druce, 03.11.2014, *R. Otto* (pers. obs.); ibid., 03.10.2016, *R. Otto* (pers. obs.).

Origin: Southern Mexico. Introduced and naturalized in Australia, Morocco, Florida and Hawaii.

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

This species is not rare as an ornamental in the Canary Islands, often as a hanging-basket plant. It prefers moist and slightly shady conditions, but can survive periods of drought. Invasive occurrences are known from Florida, Hawaii and Queensland (US Forest Service, 2017).

Emilia coccinea (Sims) G. Don., Hort. Brit., ed. 3: 382 (1839) (Fig. 2) (Asteraceae).

Figure 2. *Emilia coccinea*, Breña Baja, Los Cancajos, April 2016 (Photographs: R. Otto).

New to the flora of the Canary Islands.

Spain, La Palma: Breña Baja, Los Cancajos, Travesía de los Cancajos, as a weed in an ornamental planting of succulents, 13.10.2015 and 13.04.2016, *R. Otto 21886* (pers. herb. RO, dupl. BR).

Origin: Africa and perhaps Madagascar. Introduced and naturalized for instance in Central America, Colombia, Hawaii, Mauritius, Mexico and New Caledonia.

Degree of naturalization: ephemeral but potentially invasive.

This species is probably very rarely cultivated as an ornamental in the Canary Islands. It is unclear whether in La Palma it escaped from cultivation or was unintentionally introduced as a weed. In favorable climatic circumstances it behaves like an aggressive environmental weed. It is invasive for instance in Colombia, Costa Rica, El Salvador, the Hawaiian Islands and the Mauritius Islands (US Forest Service, 2017).

Hyparrhenia sinaica (Delile) Llauradó ex G. López in Anales Jard. Bot. Madrid 51(2): 313 (1993) (Poaceae).

New to the flora of La Palma.

Spain, La Palma: Breña Alta, Buenavista de Abajo, waste place, 19.08.2006, *R. Otto 12116* (pers. herb. RO, dupl. BR); Los Llanos de Aridane, El Charco Verde, rocky slope, 10.08.2007, *R. Otto 13099* (pers. herb. RO, dupl. BR).

Origin: probably North Africa and southwestern Asia but widely naturalized in warm-temperate regions of the world.

Known distribution in the Canary Islands: G, C, L (Acebes Ginovés *et al.*, 2009).

Degree of naturalization: naturalized.

Hyparrhenia sinaica is a very common species in La Palma. All plants seen of this genus belong to this species, whereas *H. hirta* (L.) Stapf seems to be absent or at least very rare.

Ipomoea purpurea (L.) Roth, Bot. Abh. Beobacht.: 27 (1787) (Convolvulaceae).

New to the flora of La Palma.

Spain, La Palma: Barlovento, Barranco de Abreu, Carretera del Faro, creeping over stone wall of a banana plantation, 05.08.2014, *R. Otto 21184* (priv. herb. RO); ibid., rocky slope and roadside, several individuals in ruderal vegetation, 62 m, 28.827963º N, 17.776458º W, 25.06.2015, *R. Otto 21594* (priv. herb. RO); Sta. Cruz de La Palma, near T-junction LP-401 and LP-101, earth parking area, several young specimens, 28.696009º N, 17.775918º W, 07.10.2015, *R. Otto* (pers. obs.); ibid., Llano Grande, wayside and as agricultural weed, several specimens, *ca.* 300 m, 11.10.2016, *R. Otto* (pers. obs.).

Origin: Mexico. Introduced and naturalized throughout the tropics; also in Madeira and the Iberian Peninsula.

Known distribution in the Canary Islands: C (Acebes Ginovés *et al.*, 2009), T (Verloove & Reyes-Betancort, 2011).

Degree of naturalization: naturalized (?), potentially weedy and perhaps invasive.

Ipomoea purpurea is here reported from several different localities in La Palma. Since its discovery in Tenerife in 2010 (Verloove & Reyes-Betancort, 2011) it has been confirmed there and was also

found in several other places. It is obviously well-established and expanding locally.

From the Iberian Peninsula, the plant is reported as an invasive xenophyte (Sanz-Elorza *et al.*, 2004).

Jasminum polyanthum Franch. in Rev. Hort. 1891: 270 (1891) (Fig. 3) (Oleaceae).

New to the flora of the Canary Islands.

Spain, La Palma: Puntallana, LP-1 at km 12, steep rocky escarpment of roadside, intensely sprawling by layering over *ca.* 100 square meters, with *Setaria sulcata* Raddi [syn.: *S. megaphylla* (Steud.) T. Durand & Schinz], 450 m, 28.751211º N, 17.752359º W, 09.03.2014, *R. Otto* (pers. herb. RO, dupl. BR).

Origin: China. Indroduced and naturalized elsewhere.

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

Reported as invasive, e.g. in Australia, Chile (offshore islands), Hawaii and New Zealand. In this species, stems may become very long and climb in the vegetation or lie on the substrate. Where they find favorable conditions on the ground, they form at their nodes roots and new shoots (US Forest Service, 2017). In La Palma, *Jasminum polyanthum* forms an impressive and spectacular stand when seen in flower in spring, while in summer it is hardly visible.

Macfadyena unguis-cati (L.) A.H. Gentry in Brittonia 25 (3): 236 (1973) (Fig. 4) (Bignoniaceae).
≡ *Dolichandra unguis-cati* (L.) L. G. Lohmann

Figure 4. *Macfadyena unguis-cati,* Sta. Cruz de La Palma, April 2016 (Photograph: R. Otto).

Figure 3. *Jasminum polyanthum*, Puntallana, location with *Setaria sulcata* (left), flowers (bottom right), formation of new shoots (top right), March 2014 (Photographs: R. Otto).

Spain, La Palma: Sta. Cruz de La Palma, Lomo Machado, close to Carretera las Nieves (LP-101), small young plant hardly 1 m tall, growing out of the foot of a stone wall and climbing upwards, 03.07.2015, *R. Otto 21578* (pers. herb. RO); ibid., between Lomo Machado and the former hospital alongside LP-101, several procumbent individuals on the roadside and on the bank, some damaged, 01.10.2015, *R. Otto 21909* (pers. herb. RO, dupl. BR); ibid., a large-area occurrence on a rocky slope alongside the LP-101 above the former hospital, the richly fruiting vine forms thick mats on the ground and covers bushes like *Opuntia* spec., *Kleinia neriifolia* Haw., *Rumex lunaria* L. and *Periploca laevigata* Aiton, 16.04.2016, *R. Otto* (pers. obs.).

Origin: Central America and Mexico. Introduced as an ornamental and naturalized e.g. in Australia, Hawaii, New Caledonia, New Zealand, Micronesia and the United States.

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

Macfadyena unguis-cati produces abundant seeds that are easily wind-dispersed. Also, it forms root tubers and long stolons on the leaf nodes of shoots lying on the soil which enables an intensive and rapid clonal reproduction. It is reported to be invasive e.g. from Florida, La Réunion and New Zealand (US Forest Service, 2017). In the subtropical northeastern part of New South Wales and in Southeast Queensland in Australia it is a serious weed and even considered a "transformer species" (Global Invasive Species Database, 2017).

Malvastrum coromandelianum (L.) Garcke in Bonplandia 5 (18): 295 (1857) subsp. ***coromandelianum*** (Malvaceae).

New subspecies to the flora of La Palma.

Spain, La Palma: Sta. Cruz de Palma: Barranco de Las Nieves parallel to Calle Belmaco, dry gravelly riverbed with *Waltheria indica* L., several individuals, 40 m, 28.689374º N, 17.765365º W, 05.03.2014, *R. Otto 20886* (pers. herb. RO, dupl. BR).

Origin: from Texas and Florida south through the Caribbean region and Central America to coastal regions in South America. Widely naturalized as a weed in other parts of the pantropics.

Known distribution in the Canary Islands: C (Santos-Guerra *et al.* 2013).

Degree of naturalization: naturalized.

Acebes Ginovés *et al.* (2009) report *M. coromandelianum* for P, G, C but these claims may be partially in error for *M. corchorifolium* (Desr.) Britton ex Small and *M. coromandelianum* subsp. *capitatospicatum* (Kuntze) S.R. Hill. *Malvastrum coromandelianum* subsp. *coromandelianum* is here confirmed for the first time from La Palma. It was only explicitly cited from Gran Canaria up to now (Santos-Guerra *et al.*, 2013).

Misopates calycinum (Lam.) Rothm**.** in Repert. Spec. Nov. Regni Veg. Beih. 136: 112 (1956) (Fig. 5) (Plantaginaceae).

New to the flora of La Palma.

Figure 5. *Misopates calycinum*, Sta. Cruz de La Palma, La Cuesta, March 2014 (Photographs: R. Otto).

Spain, La Palma: Sta. Cruz de La Palma, Calle Dornajos, between cobbles, 03.05.2012, *R. Otto 19043* (pers. herb. RO, dupl. BR); Breña Alta, above San Isidro, close to the crossing of LP-301 and Canal de Fuencaliente, several individuals on fallow land, 680 m, 05.05.2012, *R. Otto 19270* (pers. herb. RO); Sta. Cruz de La Palma, Las Nieves, grassy path near earth parking area above Santuario de Las Nieves, several individuals, 270 m, 11.03.2014, *R. Otto 20985* (pers. herb. RO, dupl. BR, conf. *E. Clement* 03.2015); Sta. Cruz de La Palma, La Cuesta, roadside and between cobbles, numerous individuals, 230 m, 11.03.2014, *R. Otto 20989* (pers. herb.

RO, dupl. BR); Breña Alta, Barranco de la Zarcita, Camino la Muralla, riverbed, 08.10.2015, *R. Otto* (pers. obs.); Sta. Cruz de La Palma, Barranco de las Nieves parallel to Calle Leocrizia Pestana, gravelly riverbed, 08.04.2016, *R. Otto* (pers. obs.); Puntallana, LP-1 at km 12, numerous individuals by roadside and on embankments, *ca.* 450 m, 28.750959º N, 17.752276º W, 10.04.2016, *R. Otto 22012* (pers. herb. RO); Breña Alta, Barranco de Aduares parallel to Camino El Manchón, wayside, 16.04.2016, *R. Otto 22072* (pers. herb. RO).

Origin: western Mediterranean region and Madeira, possibly also native in the Canary Islands.

Known distribution in the Canary Islands: L (Acebes Ginovés *et al.*, 2009).

Degree of naturalization: naturalized.

In contrast with *M. orontium* (L.) Raf., in this species the flowers are conspicuously crowded at anthesis at the end of the upright and often unbranched stems (internodes shorter than corolla length). The corolla is 18–27 mm long, slightly longer than the calyx and in all specimens seen on La Palma pale pink colored. In Lanzarote, conversely, flowers are paler, often white. However, flower color is not reliable as a character in *Misopates*; *M. orontium* also occurs in pink and white flowered variants.

Nephrolepis cordifolia (L.) C. Presl, Tent. Pterid.: 79 (1836) (Fig. 6) (Davalliaceae).

New to the flora of La Palma.

Spain, La Palma: Breña Baja, Carretera Aeropuerto (LP-5) above Los Cancajos, palm plantation by roadside, epiphytic on trunk of *Phoenix canariensis* Chabaud, 19.08.2010, *R. Otto 17216* (pers. herb. RO); Villa de Mazo, El Pueblo, natural stone wall, 24.05.2013, *R. Otto 20198* (priv. herb. RO); San Andrés y Sauces, Los Sauces, Calle 1a, wet rock face, plant bearing tubers, 02.06.2013, *R. Otto 20363* (priv. herb. RO); Sta. Cruz de La Palma, Barranco Las Nieves parallel to Avenida Manuel González Méndez, cracks in concrete wall, *ca.* 65 m, 05.03.2014,

Figure 6. *Nephrolepis cordifolia*, San Andrés y Sauces next to Charco Azul, April 2016 (Photographs: R. Otto).

R. Otto 20885 (priv. herb. RO); San Andrés y Sauces, close to Charco Azul, at crossing LP-1402 and Camino Puerto Espíndola, several individuals growing out of a natural stone wall of the embankment, plant bearing tubers, 28.807502º N, 17.763675º W, 10.04.2016, *R. Otto 22021* (priv. herb. RO, dupl. BR); ibid., Los Sauces, 150 m before crossing LP-1 and General Bajamar, roadside, numerous individuals growing out of a natural stone wall, plant bearing many tubers just above ground, *ca.* 200 m, 28.811179º N, 17.771983º W, 13.04.2016, *R. Otto 22044* (priv. herb. RO, dupl. BR); ibid., *ca.* 350 m in direction Barlovento after the roundabout LP-1 and Calle Vera, steep walls of a building pit, some large rosettes without tubers, *ca.* 250 m, 13.04.2016, *R. Otto 22046* (priv. herb. RO, dupl. BR); Sta. Cruz de La Palma, Las Nieves, retaining wall at LP-101, *ca.* 300 m north of the road tunnel, many rosettes growing out of the natural stone wall, without tubers, 28.695477º N, 17.777385º W, 13.04.2016, *R. Otto 22056* (priv. herb. RO); ibid., close to the crossing LP-101 and La Vereda, retaining wall of a banana plantation, many rosettes at the foot of the wall, plant bearing tubers, 16.04.2016, *ca.* 250 m, 28.696975º N, 17.774650º W, *R. Otto 22070* (priv. herb. RO).

Origin: Neotropics. Often escaped from cultivation and naturalized in many parts of the tropics and subtropics worldwide, for instance in continental Spain (Pyke, 2008).

Known distribution in the Canary Islands: T (Verloove, 2017).

Degree of naturalization: naturalized.

Surprisingly, most of the populations of *Nephrolepis* seen on La Palma (cultivated as well as wild) belong to *N. cordifolia* not to *N. exaltata* (L.) Schott. The inverse is true for Tenerife where, by far, the latter is the most widely spread species (Verloove, 2017).

N. cordifolia is found in nearly all parts of the island at lower and middle elevations, preferably in places with alternately wet-dry or permanently humid conditions, usually near settlements. There, it very often inhabits stone walls, gaps and cracks in concrete walls and masonry, rocks and roadsides, but probably always in contact with leakage of moisture, e.g. from irrigation systems, water pipes, ducts and channels. Not infrequently it is seen epiphytic, mostly on trunks of *Phoenix canariensis* Chabaud. The habit of the plants is quite variable, probably depending partly on the cultivars involved.

In some populations plants have hanging fronds up to 2 m long while others have short and tautly upright standing fronds.

The species can occur with or without scaly tubers. The presence of such tubers appears to be erratic and not correlated with other features (Hovenkamp & Miyamoto, 2005). The tubers are often developed, sometimes even very strongly so, and up to 4 cm in diameter. In many cases however, tubers are difficult to find in the stony substrate and under very dry conditions they are practically not visible, since they are completely shrunken and dried. The possession of tubers probably also allows for the survival of long periods of drought. The occasional absence of such tubers may account for the possible confusion in the Canary Islands with *N. exaltata*, a species that never develops tubers.

Both species are distinguished in the following couplet, also when sterile (modified from Nauman, 1993 and Langeland, 2001):

1. Pinnae sword-shaped with acute or attenuate tips; plants never bearing tubers; adaxial rachis scales concolored or obscurely bicolored .... ***N. exaltata***

-. Pinnae mostly straight or slightly sword-shaped with blunt tips; plants often bearing tubers; adaxial rachis scales pale with a distinct dark point of attachment ..... ***N. cordifolia***

Opuntia microdasys (Lehm.) Pfeiff., Enum. Diagn. Cact.: 154 (1837) (Fig. 7) (Cactaceae).

New to the flora of La Palma.

Figure 7. *Opuntia microdasys,* Los Llanos de Aridane, August 2014 (Photographs: R. Otto).

Spain, La Palma: Los Llanos de Aridane, wasteland beside LP-1 about 1,4 km below Argual, one meter high bush, 11.08.2014, *R. Otto 21241* (pers. herb. RO); Tijarafe, steep and difficult-to-access slopes below LP-1 and Mirador El Time, numerous old and young bushes, *ca.* 490 m, 19.10.2016, *R. Otto* (pers. obs.).

Origin: Mexico. Widely cultivated as an ornamental in subtropical and warm-temperate regions.

Known distribution in the Canary Islands: L, T (Verloove & Guiggi, 2013; Verloove *et al*., 2017).

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

Opuntia microdasys is widely planted in dry and warm regions of the world, also in the Canary Islands. It usually is less weedy than e.g. *O. dillenii* Haw. and *O. ficus-indica* (L.) Mill. Local incipient invasion events, however, have been observed lately in the Canary Islands in Lanzarote and Tenerife (Verloove & Guiggi, 2013; Verloove *et al.*, 2017).

In Tijarafe, *O. microdasys* was already observed in 2010 by Salas Pascual (2010). There were, however, some doubts about its identity which is here confirmed. The La Palma plants have yellowish glochids, a typical feature of *O. m.* subsp. *microdasys*, although the recognition of infraspecific taxa is probably of limited value in this species.

Passiflora subpeltata Ortega, Nov. Pl. Descr. Dec. 6: 78 (1798) (Figs. 8, 9) (Passifloraceae).
= *Passiflora alba* Link & Otto

Figure 8. *Passiflora subpeltata***,** Sta. Cruz de La Palma, August 2014 (Photograph: R. Otto).

Figure 9. *Passiflora subpeltata***,** Sta. Cruz de La Palma, August 2014 (Photographs: R. Otto).

New to the flora of the Canary Islands.

Spain, La Palma: Sta. Cruz de La Palma, Barranco de Juan Mayor, running wild in a banana plantation and on the adjacent rocky slopes alongside the footpath (lengthening of Av. el Puente) to Las Tierritas, numerous individuals, *ca.* 160 m., 28.688421º N, 17.777008º W, 14.08.2014, *R. Otto 21264* (pers. herb. RO, dupl. BR); ibid., many seedlings, 26.06.2015, *R. Otto 21530* (pers. herb. RO); ibid., 11.10.2016, *R. Otto* (pers. obs.).

Origin: Mexico, Central America, Colombia, Venezuela and Brazil. Introduced and naturalized in South and East Africa, Australia, India, the Philippines and Hawaii.

Degree of naturalization: probably locally naturalizing, weedy.

P. subpeltata was found plentiful in a single locality in Santa Cruz de La Palma. Plants are abundantly fruiting and overgrow the bushy vegetation with e.g. *Agave* spec., *Euphorbia lamarckii* Sweet, *Foeniculum vulgare* Mill., *Kleinia neriifolia* Haw., *Pennisetum setaceum* (Forssk.) Chiov., *Periploca laevigata* Aiton, *Rhamnus crenulata* Aiton and *Rumex lunaria* L.

It is reported as invasive from Queensland and several Hawaiian Islands (US Forest Service, 2017).

Plantago lanceolata L., Sp. Pl. 1: 113 (1753) (Plantaginaceae).

New to the flora of La Palma.

Spain, La Palma: Breña Alta, roadside and pasture land close to junction of Carretera de San Isidro and Camino 1a, numerous individuals, 590 m, 28.639268º N, 17.798415º W, 10.08.2014, *R. Otto 21228* (pers. herb. RO, dupl. BR); ibid., Camino el Manchón, Barranco de Aduares, pasture land and wayside, several individuals, 16.04.2016, *R. Otto* (pers. obs.); ibid., Avenida los Indianos, public green, in lawn, 6 m, 28.675852º N, 17.770210º W, 03.11.2014, *R. Otto 21395* (pers. herb. RO); ibid., 11.07.2015, *R. Otto* (pers. obs.); Garafia, La Mata, roadside LP-1, 30.09.2016, *R. Otto* (pers. obs.).

Origin: Europe.
Known distribution in the Canary Islands: H, T, C (Acebes Ginovés *et al.*, 2009).
Degree of naturalization: naturalized.

This species is spreading on La Palma for several years. In addition to those cited above, further occurrences in and near to pastures, by roadsides and in public lawns have been noted, also in other parts of the island (mainly in the north and northeast), e.g. in Puntallana, San Andrés y Sauces and Barlovento. It is often accompanied by *Trifolium repens* L.

Plantago lanceolata could have been overlooked in the past, possibly resulting from confusion with *P. amplexicaulis* Cav.

Polygonum aviculare L., Sp. Pl. 1: 362 (1753) subsp. ***rurivagum*** (Jord. ex Boreau) Berher, Fl. Vosges, ed. 2: 195 (1887) (Polygonaceae).
≡ *Polygonum rurivagum* Jord. ex Boreau
= *Polygonum aviculare* subsp. *rectum* Chrtek

New to the flora of the Canary Islands.

Spain, La Palma: Puntallana, unpaved parking area on LP-1, several specimens on bare ground, 412 m, 28.756081º N, 17.764432º W, 10.05.2012, *R. Otto 19178* (pers. herb. RO, det. *R. Wißkirchen*); ibid., 02.10.2012, *R. Otto 19828* (pers. herb. RO, dupl. BR, conf. *R. Wißkirchen*); Sta. Cruz de La Palma, Velhoco, roadside LP-101,15.05.2012, *R. Otto* (pers. obs.); Garafia, San Antonio del Monte, church square, bare ground, numerous individuals, 27.05.2013, *R. Otto 20288* (pers. herb. RO, conf. *R. Wißkirchen*); Breña Alta, Barranco de la Zarcita, roadside and wasteland at Camino la Muralla, numerous individuals, 408 m, 28.653029º N, 17.794998º W, 03.06.2013, *R. Otto 20096* (pers. herb. RO, conf. *R. Wißkirchen*); Puntallana, La Galga, Calle Lomo Estrello close to LP-1, wayside and storage area, 02.08.2014, *R. Otto 21171* (priv. herb. RO, dupl. BR).

Also seen on several occasions in other parts of the island, e.g. San Andrés y Sauces, Los Llanos de Aridane, Villa de Mazo, Puerto de Tazacorte and Fuencaliente, 04.2016, *R. Otto* (pers. obs.).

Origin: Southern and western Europe.
Degree of naturalization: naturalized.

This subspecies is not rare in La Palma and probably widely overlooked. It is distinguished from *P. aviculare* subsp. *aviculare*, among others, by its narrowly lanceolate to linear, pointed leaves, its nuts only 2–2.5 mm long that are not fully enclosed by the short perianth, its fewer-flowered glomerules with 1–3 flowers and its often squarrose growth (Wißkirchen, 2011).

Pseudogynoxys chenopodioides (Kunth) Cabrera in Brittonia 7(1): 56 (1950) (Fig. 10) (Asteraceae).
≡ *Senecio chenopodioides* Kunth

New to the flora of the Canary Islands.

Spain, La Palma: Breña Alta, San Pedro, Camino Barranco de Aguacencio, foot of wall, a single flowering and fruiting plant, also seen cultivated in a garden nearby, 06.08.2014, *R. Otto 21206* (pers. herb RO, dupl. BR).

Figure 10. *Pseudogynoxis chenopodioides,* Breña Alta, August 2014 (Photographs: R. Otto).

Origin: Mexico, Central America to northern South America. Introduced and naturalized for instance in Hawaii.

Degree of naturalization: ephemeral but potentially invasive.

This species is probably very rarely cultivated in the Canary Islands, as a climbing or hanging ornamental. In favorable climatic circumstances it behaves like an aggressive environmental weed. As such, it is considered invasive species in Hawaii Island and Maui Island and it is reported as possibly an invasive plant in the Galápagos Islands as well (US Forest Service, 2017).

Psidium littorale Raddi, Opusc. Sci. 4: 254, pl. 7, f. 2 (1820) (Fig. 11) (Myrtaceae).
= *Psidium cattleyanum* Sabine, *Psidium littorale* Raddi var. *longipes* (O. Berg ex Mart.) Fosberg

New to flora of the Canary Islands.

Spain, La Palma: Barlovento, Carretera del Faro, Barranco de Abreu, between asphalt surface and retaining wall of a banana plantation, several small bushes, 05.08.2014, *R. Otto 21195* (pers. herb. RO, dupl. BR); Sta. Cruz de La Palma, Lomo Machado, several young bushes as weed in vegetables plantation (planted tree nearby), 03.07.2015, *R. Otto 21582* (pers. herb. RO, dupl. BR); San Andrés y Sauces, LP-1 between Llano el Pino and San Andrés, roadside, 10.04.2016, *R. Otto 22015* (pers. herb. RO).

Origin: Brazil and Uruguay. Introduced and naturalized for instance in Australia, Chile, Cook Islands, Hawaii, Japan, Polynesia, La Réunion and New Zealand.

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

Figure 11. *Psidium littorale*, flowers, Sta. Cruz de La Palma, July 2015 (top right); habit and fruits, Barlovento, August 2014 (Photographs: R. Otto).

Like *Psidium guajava* L. this is a cultivated fruit tree in house gardens and easily reproduces from seed. It might be a widely overlooked or neglected element of the subspontaneous flora in the Canary Islands. It is reported as invasive from many parts of the world, e.g. Indian Ocean Islands, New Zealand, Queensland and Tahiti Islands. In forests of Hawaii, Tahiti, La Réunion and Mauritius it is one of the worst invasive species (US Forest Service, 2017; sub '*P. cattleianum*').

Robinia pseudoacacia L., Sp. Pl. 2: 722. 1753 (Fig. 12) (Fabaceae).

Figure 12. *Robinia pseudoacacia,* root sprout, Breña Alta, August 2014 (Photograph: R. Otto).

New to the flora of La Palma.

Spain, La Palma: Breña Alta, San Isidro, roadside *ca.* 100 m uphill after crossing LP-301 and Canal de Fuencaliente, some individuals (root suckers), some of them damaged by traffic, planted trees nearby, 10.08.2014, *R. Otto 21236* (pers. herb. RO).

Origin: United States. Planted worldwide in several cultivars and naturalized in many parts of the world, e.g. in Australia, China, Europe, New Zealand and South Africa.

Known distribution in the Canary Islands: C (Acebes Ginovés *et al.*, 2009).

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

Robinia pseudoacacia belongs to the "100 of the most invasive alien species in Europe" (Basnou, 2009). Invasive occurrences are reported e.g. from Australia, Chile (offshore islands), La Réunion and New Zealand. Propagation takes place through seeds but is even more effective through root suckers. In a short time extensive and hard-to-eradicate stocks with common roots are formed (US Forest Service, 2017).

Rosa micrantha Borrer, Engl. Botany 35: pl. 2490 (1813) (Fig. 13) (Rosaceae).

Figure 13. *Rosa micrantha*, Breña Alta, July 2015; fruits, August 2014 (Photographs: R. Otto).

New to the Flora of the Canary Islands.

Spain, La Palma: Breña Alta, above San Isidro, at crossing of LP-301 and Canal de Fuencaliente, large bush in hedge of roadside, 695 m, 28.628994º N, 17.802159º W, 10.08.2014, *R. Otto 21232* (pers. herb. RO, dupl. BR, conf. *H. Reichert* 01.2017); ibid., several feral young bushes alongside the street, growing out of foot of wall, 10.08.2014, *R. Otto 21233* (pers. herb. RO, conf. *H. Reichert* 01.2017); ibid., numerous bushes in a small *barranco* alongside the street, 05.07.2015 and 01.10.2016, *R. Otto 21601* (pers. herb. RO, conf. *H. Reichert* 01.2017); Villa de Mazo, Camino Las Toscas, 700 m, 28.607907º N, 17.788051º W, 10.10.2016, *R. Otto 22432* (priv. herb. RO).

Also seen in other populations in the vicinity of those cited above.

Origin: Europe, North Africa (Algeria, Morocco, Tunisia).

Degree of naturalization: naturalized (locally spreading).

While *R. micrantha* can have pink or white petals, on La Palma only plants with white petals have

been noticed so far. Key characters for its determination are: leaflets with glands and without hairs on lower surface; flower stalks as long as the fruit, glandular bristly; stylar orifice very narrow, *ca.* 0.5 mm wide on average (H. Reichert, pers. comm., 2017). Special features (probably because of horticultural selection) are the large leaves, the almost unarmed stems and the fruit stalks that are usually only sparsely covered with glandular bristles (sometimes even completely smooth).

The unknown species of *Rosa* mentioned by Kunkel (1991: 104) "… una especie con flores blancas (no identificada) se han establecido en algunos riscos y matorrales de zonas elevadas en C, T, G, H? y P." may well refer to *R. micrantha*.

Rumex bucephalophorus L., Sp. Pl. 1: 336 (1753) subsp. ***gallicus*** (Steinh.) Rchb. f. in Bot. Not. 1939: 497 (1939) var. ***stenocarpus*** (G. Beck) J. R. Press in Bot. J. Linn. Soc. 97 (4): 352 (1988) (Polygonaceae).

New subspecies to the flora of La Palma.

Spain, La Palma: Garafia, Llano Negro, close to Casa de los Sables, heaps of excavation material of road construction, abundant, 27.05.2013, *R. Otto 20294* (pers. herb. RO, dupl. BR); ibid., waste ground and roadside LP-1, numerous individuals, 27.05.2013, *R. Otto* (pers. obs.).

Origin: western Mediterranean area, Macaronesia.

Known distribution in the Canary Islands: *R. bucephalophorus* subsp. *gallicus* is known from T, C, F, L (Acebes Ginovés *et al.*, 2009).

Degree of naturalization: naturalized, or possibly an overlooked native taxon.

Sorghum bicolor (L.) Moench, Methodus 207 (1794) subsp. ***verticilliflorum*** (Steud.) de Wet ex Wiersema & J. Dahlb. in Taxon 56 (3): 944 (2007) (Figs. 14–17) (Poaceae).
≡ *Sorghum verticilliflorum* (Steud.) Stapf
= *Sorghum bicolor* subsp. *arundinaceum* (Desv.) de Wet & J. R. Harlan ex Davidse, *Sorghum arundinaceum* (Desv.) Stapf

New to the flora of the Canary Islands.

Spain, La Palma: Barlovento, Calle la Hoya, 3.4 km before La Fajana, foot of water reservoir and wayside, several individuals, 125 m, 28.836080º N, 17.785918º W, 05.08.2014, *R. Otto 21215* (pers. herb. RO); ibid., 29.06.2015, *R. Otto 21554* (pers. herb. RO, dupl. BR); ibid., Carretera del Faro, banana plantation, foot of wall, several individuals along the road, 35 m, 28.839322º N, 17.78230º W, 29.06.2015, *R. Otto 21552* (pers. herb. RO, dupl. BR); ibid., 02.10.2015, *R. Otto* (pers. obs.); ibid., between La Cuesta and Barlovento close to the T-junction Calle la Hoya, embankment and road shoulder of LP-1, several individuals, 280 m, 28.831104º N, 17.789393º W, 02.10.2014, *R. Otto 21935* (pers. herb. RO); San Andrés y Sauces, LP-1 *ca.* 400 m after Mirador Jardín de las Hespérides in the direction of Los Sauces, numerous individuals beside the guardrail, 234 m, 28.775499º N, 17.765091º W, 09.10.2015, *R. Otto 21940* (pers. herb. RO, dupl. BR); ibid., 11.10.2016, *R. Otto* (pers. obs.); Barlovento, LP-1 close to bridge over Barranco de la Herradura, embankment and road

Figure 14. Herbarium specimen of *Sorghum bicolor* subsp. *verticilliflorum,* Nr. 21554 priv. herb. RO, Barlovento, coll. 29.06.2015 (left) and *S. halepense* Nr. 6822 priv. herb. RO, Breña Alta, coll. 15.08.2001 (right) (Photograph: R. Otto).

Figure 15. *Sorghum bicolor* subsp. *verticilliflorum* without rhizomes (top) and *S. halepense* with thick creeping rhizomes (bottom), different rooting after 10 days of culture in wet substrate, La Palma, October 2016 (Photographs: R. Otto).

Figure 17. *Sorghum bicolor* subsp. *verticilliflorum*, Barlovento, October 2015 (Photographs: R. Otto).

shoulder, several individuals, *ca.* 135 m, 28.811226º N, 17.779902º W, 09.10.2015, *R. Otto* (pers. obs.); ibid., 05.10.2016, *R. Otto 22404* (pers. herb. RO).

Origin: throughout Africa (mainly western Africa). Introduced, cultivated as a forage grass and naturalized in Australia, India, Pakistan, on many Pacific Islands and in South America.

Degree of naturalization: naturalizing, potentially invasive.

It is uncertain whether *S. bicolor* subsp. *verticilliflorum* long remained overlooked on La Palma or

Figure 16. *Sorghum bicolor* subsp. *verticilliflorum*, spreading and overhanging panicle at anthesis (left) and rod-shaped appearance of the dried up panicles after falling off of the spikelets (right), Barlovento, October 2016 (Photographs: R. Otto).

is a recent introduction with subsequent fast propagation. There is, however, some evidence for the latter assumption. The area was prospected by the first author for many years without having noticed it before 2014. Also, its presence seems to be restricted to the northeastern part of La Palma where, in the last decade, extensive road works were carried out. Since all records are from roadsides, a connection with these recent road construction works seems most plausible. Although often considered weedy, it was not seen so far in agricultural fields. It could have been initially introduced with birdseed in La Palma. This kind of introduction is also known for the closely related species *Sorghum halepense* (L.) Pers. and *S. bicolor* (L.) Moench.

Invasive occurrences of *S. bicolor* subsp. *verticilliflorum* are reported from the Fiji Islands, Hawaii, the Norfolk-Islands, Papua New Guinea and some Polynesian Islands (US Forest Service, 2017).

The classification of the highly variable domesticated *Sorghum* and its wild and/or weedy relatives has always been problematic, leading to a confusing nomenclature. We here follow the taxonomy and nomenclature as proposed by Wiersema & Dahlberg (2007). Although subsumed by these authors under *S. bicolor*, this taxon is much more reminiscent of *S. halepense* and, especially in the absence of underground parts, both can be intermixed (Setshogo, 2002). Typical specimens have culms up to 2.5 m tall (or even more) with a loose pyramidal, pendent panicle up to 50 cm long. The long panicle branches are often widely spreading. The panicle branches are usually devoid of spikelets in their lower 5–10 cm. Once all spikelets have fallen, the dried up panicle contracts, the branches becoming tightly clustered next to each other. All these traits make it a very striking grass species, even from a distance. However, the most important difference is the absence of a thick creeping rhizome which is typical for *S. halepense*. The absence of a rhizome may account for its lesser drought resistance and its limited ability for vegetative propagation and spread. For further differences in spikelet morphology see Clayton & Renvoize (1982) and Setshogo (2002).

The three taxa of *Sorghum* known to occur in the Canary Islands, are distinguished as follows (modified from Clayton & Renvoize, 1982 and Setshogo, 2002):

1. Perennial with thick creeping rhizomes, racemes fragile, plants wild ..... ***S. halepense***

-. Annual or short-lived perennial but always without rhizomes **2**

2. Racemes tough or tardily disarticulating, sessile spikelets persistent, annual, cultivated .... ***S. bicolor* subsp. *bicolor***

-. Racemes fragile, sessile spikelets deciduous at maturity, annual or short-lived tufted perennial, wild ..... ***S. bicolor* subsp. *verticilliflorum***

Sphagneticola trilobata (L.) Pruski in Mem. New York Bot. Gard. 78: 114 (1996) (Fig. 18) (Asteraceae). ≡ *Wedelia trilobata* (L.) Hitchc.

Figure 18. *Sphagneticola trilobata***,** Puntallana, October 2015 (Photographs: R. Otto).

Spain, La Palma: Breña Alta, Calle Adelfas, several small individuals between cobbles, escaped from cultivation nearby, 16.08.2014, *R. Otto 21279* (priv. herb. RO); Puntallana, LP-102 at the junction for Puerto Trigo, originally escaped from cultivation nearby, now forming a several square meters large carpet on the road embankment, the verge under the crash barrier and also crawling on the asphalt, *ca.* 75 m, 28.734770º N, 17.731311º W, 02.10.2015, *R. Otto 21899* (priv. herb. RO, dupl. BR).

Origin: Central and South America. Widely introduced in the tropics and subtropics in Asia, Australia, Indian Ocean Islands and Pacific Islands.

Known distribution in the Canary Islands: C (Verloove, 2017).

Degree of naturalization: ephemeral, potentially invasive.

Sphagneticola trilobata belongs to the "100 of the World's Worst Invasive Alien Species" (Global Invasive Species Database, 2017). On La Palma it

is sometimes cultivated for ornamental soil covering or because of its long down hanging stolons (to several meters), like a living curtain. The propagation appears to be exclusively vegetative; viable seed has not been observed so far on La Palma.

Syzygium jambos (L.) Alston, Handb. Fl. Ceylon Flora of Ceylon 6: 115 (1931) (Myrtaceae).

New to the flora of the Canary Islands.

Spain, La Palma: Sta. Cruz de La Palma, Llano Grande, weedy in mango plantation, 01.07.2015, *R. Otto* (pers. obs.); Breña Baja, Los Cancajos, hotel garden, several small shrubs as weed between ornamentals, not planted, 12.07.2015, *R. Otto 21629* (priv. herb. RO).

Origin: Southeastern Asia. Widely introduced and naturalized in the tropics and subtropics in Asia, Australia, Indian Ocean Islands and Pacific Islands.

Degree of naturalization: ephemeral, potentially invasive.

This ornamental tree ("Pomarosa") is cultivated on La Palma in home gardens, mainly for its decorative flowers and aromatic berries. Young saplings might easily be confused with similar-leaved ornamental shrubs and trees like *Nerium oleander* L. *Syzygium jambos* is reported as invasive, e.g. in Australia, China and many Pacific and Indian Ocean Islands (US Forest Service, 2017).

Thunbergia alata Bojer ex Sims in Bot. Mag. 52: pl. 2591 (1825) (Fig. 19) (Acanthaceae).

Figure 19. *Thunbergia alata*, Sta. Cruz de La Palma, Barranco de las Nieves, April 2016 (Photographs: R. Otto).

New to the flora of the Canary Islands.

Spain, La Palma: San Andrés y Sauces, Charco Azul, roadside, escape from nearby culture, 26.06.2015, *R. Otto 21533* (pers. herb. RO); Sta. Cruz de La Palma, Barranco de las Nieves parallel to Calle Leocrizia Pestana, gravelly riverbed, 85 m, 08.04.2016, *R. Otto 22000* (pers. herb. RO, dupl. BR); Breña Baja, San Antonio, roadside LP-2, 29.09.2016, *R. Otto 22362* (pers. herb. RO).

Origin: Eastern Africa. Introduced and naturalized for instance in Australia, China, Hawaii, Japan, Samoa, Papua New Guinea, Philippines and Singapore.

Degree of naturalization: ephemeral, potentially invasive.

This species is very frequently cultivated as an ornamental in the Canary Islands and easily self-seeds. Surprisingly, it had not been reported so far as an escape. It is considered invasive for instance in Fiji Islands, Hawaii, Hong Kong, Queensland and Singapore (US Forest Service, 2017).

This species and the similar *T. gregorii* S. Moore are often confused. The latter is distinguished by its corollas that are uniformly yellow or orange, without a blackish throat (Vollesen, 2008). It has also been recorded in La Palma but possibly as an ephemeral (see below).

Youngia japonica (L.) DC., Prodr. 7(1): 194 (1838) subsp. ***japonica*** (Figs. 20, 21) (Asteraceae).
≡ *Crepis japonica* (L.) Benth.

Figure 20. *Youngia japonica*, mass occurrence in Sta. Cruz de La Palma, Parque Infantil del Llano de Las Monjas, April 2016 (Photographs: R. Otto).

Figure 21. *Youngia japonica,* Sta. Cruz de La Palma, Parque Infantil del Llano de Las Monjas, April 2016 (Photographs: R. Otto).

Spain, La Palma: Sta. Cruz de La Palma, Calle San Vicente de Paul, Parque Infantil del Llano de Las Monjas, mass occurrence on bare soil in plantation plot, at least one thousand individuals, 15.04.2016, *R. Otto 21981* (pers. herb. RO, dupl. BR).

Origin: Southeast Asia.

Known distribution in the Canary Islands: C (Verloove, 2013), T (Siverio Núñez *et al*., 2013).

Degree of naturalization: ephemeral (?), weedy.

This aggressive weed was already observed in La Palma in 2013 in plant containers in a greenhouse of a garden center. In identical circumstances it has also been recorded in Germany and several other European countries (e.g. Pyke, 2017) where it is a typical weed in bonsai shells and palm containers [e.g. *Phoenix roebelenii* O'Brien and *Trachycarpus fortunei* (Hook.) H. Wendl.]. In 2016, *Y. japonica* was recorded for the first time out-of-doors in La Palma. A future, wider naturalization like in Tenerife and Gran Canaria (Siverio Núñez *et al*., 2013; Verloove, 2013) is predictable.

It is reported as an invasive species e.g. from Costa Rica, Hawaii, Mexico, Mauritius Island Tahiti and Papua New Guinea (US Forest Service, 2017).

Ephemeral taxa

New to the flora of the Canary Islands

Agave macroacantha Zucc. (Fig. 22) (Asparagaceae).

Figure 22. *Agave macroacantha*, Sta. Cruz de La Palma, July 2015 (Photograph: R. Otto).

Spain, La Palma: Villa de Mazo, La Salemera, some individuals, wayside close to the sea, escape from cultivation, 29.09.2013, *R. Otto* (pers. obs., photo det. *D. Guillot Ortiz*); Sta. Cruz de La Palma, La Dehesa, Barranco del Carmen, steep rocky slope above LP-401, one specimen, 01.07.2015, *R. Otto* (pers. obs., photo det. *D. Guillot Ortiz* 03.2017).

Astrophytum ornatum (DC.) Britton & Rose (Fig. 23) (Cactaceae).

Figure 23. *Astrophytum ornatum,* Los Llanos de Aridane, April 2016 (Photographs: R. Otto).

Spain, La Palma: Los Llanos de Aridane, Argual, roadside LP-2, road embankment with rubble, 12.04.2016, *R. Otto* (pers. obs., photo det. *A. Guiggi* 03.2017).

Bauhinia variegata L. (Fabaceae).

Spain, La Palma: Breña Baja, Los Cancajos, hotel garden, seedlings and young flowering tree in a

light shaft and at foot of wall near planted specimens, 09.03.2014, *R. Otto 20931* (priv. herb. RO); Sta. Cruz de La Palma, Calle Blas Simón, stairs to Calle Virgen de la Luz, several seedlings (adult tree nearby) in a water channel, 01.10.2016, *R. Otto 22375* (priv. herb. RO).

Beta vulgaris L. var. ***cicla*** L. (Amaranthaceae).

Spain, La Palma: Barlovento, close to crossing LP-109 and Calle Lomo Machín Alto, landfill for soil (excavation) and rubble, several individuals, 06.10.2015, *R. Otto 21914* (pers. herb. RO).

Dahlia pinnata Cav. (incl. hybrids) (Asteraceae).

Spain, La Palma: Breña Alta, San Pedro, Camino Barranco de Aguacencio, riverbed, some individuals in dense ruderal vegetation, former garden throw-out, 07.03.2014, *R. Otto 20905* (priv. herb. RO).

Dimorphotheca jucunda E. Phillips (Fig. 24) (Asteraceae).

≡ *Osteospermum jucundum* (E. Phillips) Norl.

Figure 24. *Dimorphotheca jucunda*, Villa de Mazo, March 2014 (Photographs R. Otto).

Spain, La Palma: Barlovento, Laguna de Barlovento, wasteland and storage area for earth, 25.09.2013, *R. Otto 20690* (pers. herb. RO); Villa de Mazo, close to crossing of LP-206 and LP-2022, roadside, several individuals together with one specimen of *Dimorphotheca ecklonis* DC., 11.03.2014, *R. Otto 20998* (pers. herb. RO, dupl. BR, conf. *E. Clement* 03.2015); ibid., between La Sabina and Malpaíses, roadside LP-206, several individuals, *R. Otto* (pers. obs.); Sta. Cruz de La Palma, La Cuesta, several individuals, roadside LP-202, 11.03.2014, *R. Otto 20992* (pers. herb. RO); ibid., Carretera Las Nieves (LP-101) close to Lomo Machado, roadside, several individuals together with D. *ecklonis* DC., 16.04.2016, *R. Otto 22084* (pers. herb. RO).

Euphorbia lactea Haw. (Fig. 25) (Euphorbiaceae).

Figure 25. *Euphorbia lactea,* Puerto de Tazacorte, March 2014 (Photograph: R. Otto).

Spain, La Palma: Tazacorte, Puerto, Avenida Taburiente, rocky slope of Barranco de las Angustias with construction waste nearby, one bush *ca.* 60 cm tall, established throw-out with *Austrocylindropuntia subulata* (Muehlenpf.) Backeb., 16 m, 28.652859º N, 17.94241º W, 06.03.2014, *R. Otto 20895* (pers. herb. RO); ibid., 07.04.2016, *R. Otto* (pers. obs.).

Lonicera periclymenum L. subsp. ***hispanica*** (Boiss. & Reut.) Nyman (Caprifoliaceae).

Spain, La Palma: Villa de Mazo, Camino el Poleal, a single plant overgrowing rocky escarpment on wayside, 01.11.2014, *R. Otto 21372* (pers. herb. RO).

Lycianthes rantonnetii (Carrière) Bitter (Fig. 26) (Solanaceae).

≡ *Solanum rantonnetii* Carrière

Spain, La Palma: Sta. Cruz de La Palma, Pinar between Llano Grande and El Dorador, slope with rubble and earth deposits at the edge of an earth parking area next to the bridge over the valley bottom of Barranco del Carmen, a single vigorous bush *ca.* 2.5 m tall in ruderal vegetation, 31.10.2014,

Figure 26. *Lycianthes rantonnetii*, Sta. Cruz de La Palma, October 2015 (Photograph: R. Otto).

R. Otto 21368 (pers. herb. RO, dupl. BR); ibid., 07.10.2015 and 17.04.2016, *R. Otto* (pers. obs.).

Ochlopoa maroccana (Nannf.) H. Scholz (Poaceae).
≡ *Poa maroccana* Nannf.

Spain, La Palma: Los Llanos de Aridane, Argual, Camino El Alamo close to crossing of LP 1 and LP 2, roadside, 283 m, 28.656206º N, 17.927075º W, 15.08.2004, *R. Otto 2128* (priv. herb. RO, conf. *H. Scholz* 12.2008).

This species is more or less intermediate between *O. annua* (L.) H. Scholz and *O. infirma* (Kunth) H. Scholz (Scholz, 1995) and may have been widely overlooked. In some areas in the Mediterranean it has proven to be not rare at all.

Portulacaria afra Jacq. (Didiereaceae).

Spain, La Palma: Breña Baja, alongside Calle los Cancajos, several individuals on escarpments and rocky slopes, 05.03.2014, *R. Otto* (pers. obs.); Los Llanos, Puerto de Naos, coastal rocks below Calle los Lajones, 29.05.2013, *R. Otto* (pers. obs.); Villa de Mazo, Camino la Bajita, wayside, several small individuals, 31.07.2014, *R. Otto 21148* (pers. herb. RO, dupl. BR).

All these occurrences probably result from discarded garden debris.

Thunbergia gregorii S. Moore (Fig. 27) (Acanthaceae).

Spain, La Palma: San Andrés y Sauces, Charco Azul, roadside, 11.10.2015, *R. Otto* (pers. obs.); ibid., 10.04.2016, *R. Otto 22022* (pers. herb. RO, dupl. BR); ibid., ruderalized rocky slope above coast (former banana plantation?), with e.g. *Cardiospermum grandiflorum* Sw., *Nicotiana glauca* Graham, *Ricinus communis* L., *Thunbergia alata* Bojer ex Sims, 11.10.2016, *R. Otto* (pers. obs.).

Figure 27. *Thunbergia gregorii*, San Andrés y Sauces, October 2015 (Photograph: R. Otto).

Yucca gloriosa L. (Asparagaceae).

Spain, La Palma: Breña Alta, close to crossing of Camino del Aeropuerto and LP-101, embankment of former airfield, ruderal site with *Arundo donax* L., a single individual, 02.10.2015, *R. Otto 21908* (pers. herb. RO, dupl. BR).

Yucca guatemalensis Baker (Asparagaceae).

Spain, La Palma: Breña Baja, Los Cancajos, Calle El Cardón, next to sidewalk, former throw-out, two individuals, 04.08.2014, *R. Otto 20645* (pers. herb. RO, dupl. BR).

New to the flora of La Palma

Ageratum houstonianum Mill. (Asteraceae).

Spain, La Palma: Breña Alta, Calle Cassiopea, roadside, several seedlings, 06.04.2016, *R. Otto 21974* (pers. herb. RO).

Bougainvillea spectabilis Willd. (Nyctaginaceae).

Spain, La Palma: Sta. Cruz de La Palma, Carretera del Galión, hardly accessibly sea side cliff, several bushes, maybe relic of former plantation, 16.08.2014, *R. Otto 21270* (pers. herb. RO, dupl. BR).

Brugmansia suaveolens (Humb. & Bonpl. ex Willd.) Bercht. & J. Presl (incl. hybrids) (Solanaceae).

Spain, La Palma: Breña Alta, Buenavista, old airfield close to cemetery, storage area for earth and rubble overgrown with ruderal vegetation, one vigorous and flowering individual, garden throw-out, 07.08.2014, *R. Otto 21210* (pers. herb. RO).

Carthamus tinctorius L. (Asteraceae).

Spain, La Palma: Breña Alta, Buenavista, old airfield, storage area for earth and rubble, few individuals, 07.08.2014, *R. Otto 21212* (pers. herb. RO).

Ficus rubiginosa Desf. ex Vent. (Moraceae).

Spain, La Palma: Breña Alta, San Pedro, Camino Barranco de Aguacencio, young trees on slope next to riverbed, self-sown under planted individuals, 30.10.2014, *R. Otto 21352* (pers. herb. RO, dupl. BR).

Frankenia pulverulenta L. (Frankeniaceae).

Spain, La Palma: Breña Alta, Avenida Bajamar, roadside plantations close to the sea, under *Nerium oleander* L. bushes, few individuals, 10.03.2014, *R. Otto 20969* (priv. herb. RO, dupl. BR); ibid., beach opposite Central Térmica Los Guinchos, about 20 individuals, 06.07.2015, *R. Otto 21612* (priv. herb. RO, dupl. BR).

Lonicera japonica Thunb. subsp. ***japonica*** (Caprifoliaceae).

Spain, La Palma: Sta. Cruz de La Palma, Carretera del Galión, rocky slope, climbing in dense ruderal vegetation on roadside, 16.08.2014, *R. Otto 21277* (pers. herb. RO).

Malephora crocea (Jacq.) Schwantes var. ***crocea*** (Aizoaceae).

Spain, La Palma: Villa de Mazo, Las Salemera, wayside close to the sea, some individuals escaped from cultivation, 29.09.2013, *R. Otto* (pers. obs., photo det. *D. Guillot Ortiz*).

Pisum sativum L. (Fabaceae).

Spain, La Palma: Breña Alta, San Pedro, Barranco de la Zarcita, wayside, several individuals, 07.03.2014, *R. Otto 20910* (pers. herb. RO).

Pteris tremula R. Br. (Pteridaceae).

Spain, La Palma: San Andrés y Sauces, Los Sauces, Calle Ciro González, young specimen with fertile fronds growing on wall of small water channel, 30.09.2016, *R. Otto 22047* (pers. herb. RO).

In La Palma this species was also repeatedly seen as a weed in garden centers. This may explain its vector of introduction and spread.

Setaria viridis (L.) P. Beauv. (Poaceae).

Spain, La Palma: Villa de Mazo, Pueblo, Calle Caridad Salazar, wayside close to the church, probably from bird seed waste, 10.08.2014, *R. Otto 21238* (pers. herb. RO).

Schefflera actinophylla (Endl.) Harms (Fig. 28) (Araliaceae).

Figure 28. *Schefflera actinophylla,* Breña Baja, October 2014 (Photograph: R. Otto).

Spain, La Palma: Breña Baja, Los Cancajos, Calle Salinas, hotel garden and surroundings, several seedlings in cracks of pavement, close to and under planted specimens, also epiphytic on trunk of *Phoenix canariensis* Chabaud, 09.03.2014, *R.*

Otto 20932 (pers. herb. RO); ibid., Calle Tabaiba Dulce, garden, several specimens epiphytic on trunk of *P. canariensis* Chabaud close to planted trees, 29.10.2014, *R. Otto 21348* (pers. herb. RO).

Seedlings are regularly found as epiphyte on *P. canariensis* Chabaud, always close to planted individuals. The species is obviously spread by birds.

Solanum tuberosum L. (Solanaceae).

Spain, La Palma: Barlovento, Laguna de Barlovento, soil depot, several individuals, 05.08.2014, *R. Otto 21193* (pers. herb. RO); ibid., industrial area close to LP-109, roadside in ruderal vegetation, 05.08.2014, *R. Otto 21202* (priv. herb. RO).

Vicia faba L. (Fabaceae).

Spain, La Palma: Breña Alta, San Isidro, Barranco de Aduares, wayside with *Trifolium repens* L., 10.03.2014, *R. Otto 20961* (pers. herb. RO).

Xerochrysum bracteatum (Vent.) Tzvelev (Asteraceae).

Spain, La Palma: Breña Alta, above Buenavista de Abajo, fallow land on the former airfield close to the cemetery, several specimens in dense ruderal vegetation, 17.04.2016, *R. Otto 22085* (pers. herb. RO).

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