



NEW DATA ON THE ALIEN VASCULAR FLORA OF CALABRIA (SOUTHERN ITALY)

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ABSTRACT – New data concerning the distribution of 21 non-native vascular species for Calabria (southern Italy) are presented. *Agave filifera* is reported for the first time in Europe (Canary Islands excluded), while *Leucaena leucocephala* subsp. *glabrata* and *Senna corymbosa* are founded for the first time in continental Italy. *Saccharum biflorum* is confirmed in Italian Peninsula, while *Physalis angulata* is a new exotic plant for southern Italy. Moreover sixteen other species are reported for the first time, confirmed or indicated with an updated naturalization status in Calabria.

KEYWORDS: BIODIVERSITY; EXOTIC PLANT; HERBARIUM SPECIMENTS; INVASIVENESS

INTRODUCTION

As the globalization has triggered a massive spread of plant species to areas outside their native distribution ranges (van Kleunen et al., 2015), the first step to counter their spread in new environments is a rapid eradication action. This action plan must include a rapid alert system based on field surveys to identify new species and their invasive trends. Invasive alien species can change the native biodiversity by competing for water and nutrients or inducing allelopathic interference. For this reason, they produce a considerable reduction of native species (Cano-Ortiz et al., 2015, 2018), as well as ecological and landscape modifications (Stinca et al., 2015). Many of these plants grow in sciaphilo-subnitrophilous annual communities of natural and semi-natural habitats, mostly belonging to the order *Geranio-Cardaminetalia* (Brullo et al., 2007). In the last twenty years in Calabria

(southern Italy) many botanic studies were performed (Brullo et al., 2001; Musarella & Tripodi, 2004; Crisafulli et al., 2010; Bernardo et al., 2011, 2012; Signorino et al., 2011; Spampinato, 2014; Cano et al., 2017; Galasso et al., 2016a, 2016b, 2017, 2018a, 2018b; Stinca et al., 2016a; Spampinato et al., 2017, 2018, 2019; Musarella et al., 2018, 2019a; Panuccio et al., 2018; Maruca et al., 2019). Recently, Galasso et al. (2018c) recorded for this region 247 non-native species and subspecies (3 undefined status, likely casual aliens; 110 casual; 105 naturalized; 29 invasive). These surprising data allow Calabria as the fourth region with the lowest presence of exotic plants. Similarly to the other regions of southern Italy, probably this is due to lack of knowledge of the vascular flora in the most anthropized areas where alien plants are frequently found in greater numbers

(e.g. Stinca & Motti, 2013; Stinca et al., 2016b), as well as in disturbed forest environments (Stinca & Motti, 2017; Bonanomi et al., 2018). Indeed, the number of alien species is steadily increasing in all southern regions, especially in environments with low level of naturalness (e.g. Motti et al., 2018; Stinca et al., 2018, 2019; Galasso et al., 2018b, 2019; Stinca, 2019; Stinca & Mei, 2019; Musarella, 2020; Rosati et al., 2020). Therefore, the aim of this paper is to report new data concerning the non-native flora of Calabria.

MATERIALS AND METHODS

This research was based on fieldwork carried out from 2010 to 2019, as well as on herbaria and literature surveys. The collected or examined plant material was stored in REGGIO, PORUN-Herb. Stinca, CLU and MS herbaria (acronyms according to Thiers, 2019).

In the floristic list, the species are arranged in alphabetical order. The nomenclature follows Galasso et al. (2018c). The collected specimens were identified by means of the standard literature (e.g. Tutin et al., 1964-1980, 1993; Pignatti, 1982; Pignatti et al., 2017-2019; Flora of North America Editorial Committee, 1993-2016).

For each species the following information are provided: 1) accepted name; 2) basionym and most relevant synonyms; 3) family; 4) life form according to Pignatti et al. (2017-2019) and verified by observations *in situ*; 5) native range; 6) period of introduction (archaeophyte or neophyte); 7) data report and current invasiveness status in Calabria, assessed by population monitoring over time according to the terminology of Pyšek et al. (2004); 8) discovery localities (*exsiccata* and *observata*) with details on the location (in Italian, according to the information on the specimen label data), growth environments, altitude, date, coordinates E and N (datum WGS84, UTM), *legit* and *determinavit*; 9) distribution and/or ecological notes.

RESULTS

***Acacia saligna* (Labill.) H.L.Wendl.** [= *Mimosa saligna* Labill.]

Fabaceae – P scap – Australia – Neophyte.

First geolocalized reports in Calabria (provinces of Catanzaro and Reggio Calabria). Invasive.

Exsiccatum. Cropani presso la foce del Fiume Trocchio (Catanzaro), shrubland, 3 m a.s.l., 24.07.2018, 657722-4308474, *leg. et det.* A. Stinca (PORUN-Herb. Stinca).

Observata. Squillace all’Oasi Scolacium (Catanzaro), sandy dunes, 4 m a.s.l., 28.06.2018, 638004-4294839, *obs. et det.* C.M. Musarella et G. Spampinato; Reggio Calabria lungo il Torrente Calopinace (Reggio Calabria), river bank, 47 m a.s.l., 09.01.2014, 557160-4217238, *obs. et det.* C.M. Musarella; Reggio Calabria lungo il Raccordo Autostradale 4 di Reggio Calabria in località Modena (Reggio Calabria), roadside, 77 m a.s.l., 09.12.2018, 557995-4215949, *obs. et det.* C.M. Musarella; Reggio Calabria lungo la SS 106 Jonica in corrispondenza di località San Gregorio (Reggio Calabria), roadside, 32 m a.s.l., 22.12.2018, 557997-4212553, *obs. et det.* C.M. Musarella.

Notes. *A. saligna* was reported for Calabria by Conti et al. (2005) and after by Bernardo et al. (2009) and Galasso et al. (2018c) as invasive. In the past, this neophyte has been widely used to stabilize coastal sandy dunes and as ornamental plant. Afterwards, its spread was mainly due to the abundant seeds production. This invasive species was included by the European Union in the “Union list” (Regulation EU No 1114/2014).

***Aeonium haworthii* Webb & Berthel.** [= *Sempervivum haworthii* (Webb & Berthel.) Salm-Dick ex Christ]

Crassulaceae – Ch suffr (succ) – Canary Islands – Neophyte. New distribution data for the province of Reggio Calabria. Change of status for Calabria: from casual to naturalized.

Exsiccatum. Melito di Porto Salvo a Pentedattilo (Reggio Calabria), ruins, 265 m a.s.l., 566936-4200919, 07.01.2001, *leg. et det.* C.M. Musarella (MS).

Observatum. Melito di Porto Salvo a Pentedattilo (Reggio Calabria), ruins, 265 m a.s.l., 566936-4200919, 03.05.2019, *obs. et det.* C.M. Musarella.

Notes. *A. haworthii* is a popular ornamental plant in Italy reported as casual in Toscana, Puglia, Calabria, Sicilia and Sardegna, and as naturalized in Liguria and Campania (Galasso et al., 2018c). In Calabria, only Musarella & Tripodi (2004) reported it on the walls of the ruined houses and into the rocks cracks (see *exsiccatum*) for the abandoned village of Pentedattilo (Melito di Porto Salvo). After several surveys in the same place since the first time it was observed, the species continues to be present and to produce new individuals. For this reason, we propose a change of its status from casual to naturalized in Calabria.

***Agave filifera* Salm-Dyck** [= *Agave filamentosa* Salm-Dyck ≡ *Bonapartea filamentosa* (Salm-Dyck) Boucen.]

Asparagaceae – H succ – North America (Mexico) – Neophyte. First report for Europe (Canary Islands excluded). Casual.

Exsiccatum. Reggio Calabria lungo Via Veglia salendo dallo svincolo di Via Lia (Reggio Calabria), roadside, 102 m a.s.l., 01.02.2019, 558097-4220132, *leg. et det.* C.M. Musarella (REGGIO).

Notes. *A. filifera* is an exotic plant native to central Mexico, from Querétaro to Mexico State. In the Euro-Mediterranean area, it was recorded for the first time in Algeria (Zeddami et al., 2018) and Canary Islands (Verloove et al., 2019). Therefore, our find is the first one for Europe (Canary Islands excluded) and it is referred to a little group of plants living with *Aloë vera* (see below) along the edge of a road, probably abandoned as garbage.

***Aloë vera* (L.) Burm.f.** [= *Aloë perfoliata* L. var. *vera* L. = *Aloe barbadensis* Mill. = *Aloe vulgaris* Lam.]

Asphodelaceae – NP – Arabian Peninsula and East Africa – Archeophyte.

New distribution data for the province of Reggio Calabria. Change of status for Calabria: from casual to naturalized.

Exsiccata. Motta San Giovanni lungo la SS 106 Jonica in corrispondenza di Capo dell'Armi (Reggio Calabria), rocks, 30 m a.s.l., 23.01.2019, 559709-4200916, *leg. et det.* C.M. Musarella (REGGIO); Melito di Porto Salvo a Pentadattilo (Reggio Calabria), rocks, 303 m a.s.l., 11.04.2017, 566940-4200991, *leg. et det.* C.M. Musarella (REGGIO); Reggio Calabria lungo Via Veglia salendo dallo svincolo di Via Lia (Reggio Calabria), roadside, 102 m a.s.l., 01.02.2019, 558097-4220132, *leg. et det.* C.M. Musarella (REGGIO).

Observatum. Melito di Porto Salvo a Pentadattilo (Reggio Calabria), rocks, 303 m a.s.l., 28.02.1998, 566940-4200991, *obs. et det.* C.M. Musarella.

Notes. For Calabria, Fiori (1923, sub *A. vera* "L."), Pignatti (1982, sub *Aloe barbadensis* Miller) and Pignatti et al. (2017-2019, sub *Aloe vera* (L.) Burm. fil.) reported *A. vera* as cultivated and "naturalized", while Bernardo et al. (2009, sub *Aloe vera* "L.") indicated generically it for the region. Bernardo et al. (2011, sub *Aloe vera* "L.") reported this species for the Crati Valley (northern Calabria), but this record is an erroneous interpretation of Passalacqua et al. (2007), which refers this plant only as cultivated for ethnobotanical purposes. After the first finding in Pentadattilo by Musarella in 1998 (see *observatum*), a lot of surveys in the same place confirmed its presence in several points of this abandoned village, living in the rocks cracks and producing new individuals.

***Anredera cordifolia* (Ten.) Steenis** [= *Boussingaultia cordifolia* Ten.]

Basellaceae – P lian – South America – Neophyte.

First geolocalized reports in Calabria (province of Reggio Calabria). Naturalized.

Exsiccata. Reggio Calabria al quartiere Santa Caterina (Reggio Calabria), roadside, 74 m a.s.l., 09.01.2019, 557814-4220147, *leg. et det.* C.M. Musarella (REGGIO); Reggio Calabria all'incrocio tra Via Borraccia Alla Caserma e Via del Torrione (Reggio Calabria), near a wall, 52 m a.s.l., 14.01.2019, 557829-4219349, *leg. et det.* C.M. Musarella (REGGIO);

Reggio Calabria al quartiere Santa Caterina (Reggio Calabria), ruin, 32 m a.s.l., 14.01.2019, 557552-4220010, *leg. et det.* C.M. Musarella (REGGIO); Reggio Calabria presso località Catona (Reggio Calabria), near a wall, 21 m a.s.l., 20.03.2019, 556642-4226899, *leg. et det.* C.M. Musarella, G. Spampinato et V.L.A. Laface (REGGIO).

Notes. Based on our literature research, *Anredera cordifolia* was recorded for the first time in Calabria by Bernardo et al. (2009) as casual alien. Recently, Pasta et al. (2016) states that this exotic taxon appears quite naturalized and rather generically widespread along the Tyrrhenian coast of Reggio Calabria and Cosenza. We confirm these data for the province of Reggio Calabria.

***Araujia sericifera* Brot.** [= *Araujia albens* (Mart.) G. Don]

Apocynaceae – P lian – South America – Neophyte.

Confirmation for Calabria (province of Reggio Calabria). Casual.

Exsiccatum. Reggio Calabria presso località Catona (Reggio Calabria), uncultivated field, 22.11.2014, unspecified coordinates, *leg. et det.* G. Arena (REGGIO).

Notes. In Calabria *A. sericifera* was indicated as "recently not confirmed" by Galasso et al. (2018c). Therefore, we can confirm its presence in this region as casual. In Italy this is an invasive exotic plant (Galasso et al., 2018c) and a secondary host for viruses harmful to crops (Parrella et al., 2013).

***Cardamine occulta* Hornem.** [= *Cardamine flexuosa* With. subsp. *debilis* O.E. Schulz ≡ *Cardamine hamiltonii* G. Don]

Brassicaceae – T scap – South-East Asia – Neophyte.

First reports for Calabria (province of Cosenza). Casual.

Exsiccata. Rossano presso l'Agriturismo Malena (Cosenza), flowerbed, 109 m a.s.l., 16.08.2018, 644030-4381590, *leg. et det.* A. Stinca (PORUN-Herb. Stinca); Santa Maria del Cedro a Marina di Santa Maria del Cedro (Cosenza), flowerbed, 4 m a.s.l., 18.08.2017, 568501-4401666, *leg.* A. Stinca et M. Ravo, *det.* A. Stinca (PORUN-Herb. Stinca).

Notes. In Italy this species was reported in Piemonte, Lombardia, Trentino-Alto Adige, Friuli-Venezia Giulia, Veneto, Emilia Romagna, Toscana, Marche, Umbria, Lazio, Campania and Sardegna (Galasso et al., 2018a, 2018b, 2018c). As observed in other populations in southern Italy (Stinca et al., 2017), also in Calabria *C. occulta* has been largely widespread by nurseries and soil transportation.

***Cenchrus setaceus* (Forssk.) Morrone** [= *Phalaris setacea* Forssk. ≡ *Pennisetum setaceum* (Forssk.) Chiov.]

Poaceae – H caesp – North-East Africa – Neophyte.

New distribution data for the province of Catanzaro, Cosenza and Reggio Calabria. Change of status for Calabria: from casual to naturalized.

Exsiccata. Gioia Tauro nel parcheggio della stazione ferroviaria (Reggio Calabria), sidewalk, 35 m s.l.m., 08.04.2018, 578442-

4253264, *leg.* S. Cannavò, *det.* S. Cannavò, C.M. Musarella *et* G. Spampinato (REGGIO); Reggio Calabria in località Armo (Reggio Calabria), scarp ex uncultivated olive grove, 321 m s.l.m., 19.11.2018, 562475-4214103, *leg.* V.L.A. Laface, *det.* C.M. Musarella, G. Spampinato *et* V.L.A. Laface (REGGIO); Bova Marina lungo la SP Bova Marina-Bova (Reggio Calabria), roadside and uncultivated field, 143 m s.l.m., 20.11.2018, 582549-4199250, *leg.* V.L.A. Laface, *det.* C.M. Musarella, G. Spampinato *et* V.L.A. Laface (REGGIO); Villa San Giovanni lungo l'Autostrada A2 del Mediterraneo all'area di servizio Villa San Giovanni est (Reggio Calabria), flowerbed, 100 m s.l.m., 08.01.2019, 556551-4231223, *leg. et det.* C.M. Musarella (REGGIO); Reggio Calabria lungo la SS 106 Jonica presso località Ravagnese (Reggio Calabria), roadside, 38 m s.l.m., 19.11.2018, 558138-4213357, *leg. et det.* C.M. Musarella (REGGIO); Reggio Calabria presso località Catona (Reggio Calabria), anthropized places, 2 m s.l.m., 09.02.2019, 556079-4226281, *leg. et det.* V.L.A. Laface (REGGIO); Reggio Calabria presso località Marinella di Catona (Reggio Calabria), roadside, 2 m s.l.m., 06.04.2019, 555559-4227374, *leg. et det.* G. Spampinato *et* V.L.A. Laface (REGGIO); Montebello Jonico tra località Saline e Pantano (Reggio Calabria), railway, 8 m s.l.m., 07.04.2019, 562790-4198976, *leg. et det.* G. Spampinato *et* V.L.A. Laface (REGGIO).

Observata. Reggio Calabria lungo il Raccordo Autostradale 4 di Reggio Calabria in località Modena (Reggio Calabria), roadside, 90 m s.l.m., 09.12.2018, 557874-4216191, *obs. et det.* C.M. Musarella; Reggio Calabria lungo Raccordo Autostradale 4 di Reggio Calabria prima della galleria Spirito Santo in direzione Sud (Reggio Calabria), roadside, 93 m s.l.m., 21.11.2018, 557933-4218164, *obs. et det.* V.L.A. Laface *et* C.M. Musarella; Gizzeria presso località C. Stocco al confine con Falerna (Catanzaro), sandy dunes, 3 m s.l.m., 24.11.2017, 599823-4313321, *obs. et det.* C. Gangale, D. Puntillo *et* D. Uzunov.

Notes. Castellano & Marino (2007) make the first find of *C. setaceus* (sub *Pennisetum setaceum*) in Calabria. They reported the presence of this species in the provinces of Reggio Calabria (along the A2 motorway between Rosarno and Gioia Tauro) and Catanzaro (along the highway SS 106 Jonica near Cropani Marina). Successively Bernardo *et al.* (2011) generically recorded it for “Medio Tirreno” on the basis of three *exsiccata* collected at Fiumefreddo Bruzio and Capo Suvero and stored in CLU [Fiumefreddo Bruzio lungo la SS 18 (Cosenza), 50 m a.s.l., 13.09.1998, WD 91.42, *leg. et det.* D. Puntillo; Fiumefreddo Bruzio lungo la SS 18 (Cosenza), 50 m a.s.l., 01.11.1999, WD 91.42, *leg. et det.* L. Bernardo; Capo Suvero (Cosenza), 5 m a.s.l., 10.10.2008, XD 00.11, *leg. et det.* L. Bernardo]. As a result, Galasso *et al.* (2018c) indicated this exotic species as casual for the flora of Calabria. *C. setaceus* probably came from Sicily, where it is very widespread (Pasta *et al.*, 2010). Our data highlights the active spreading process of this species via seeds along the

southern Italian coastal strip, favored by the road network and vehicular traffic. In all these sites *C. setaceus* seems to form populations capable of self-sustaining reproduction. We therefore propose the status change from casual to naturalized in Calabria. This species was included by the European Union in the “Union list” (Regulation EU No 1114/2014).

***Cyperus alternifolius* L. subsp. flabelliformis** Kük. [= *Cyperus involucratus* Rottb.]

Cyperaceae – H rhiz – East Africa – Neophyte.

First reports for Calabria (province of Reggio Calabria). Casual. *Exsiccata.* Villa San Giovanni in località Santa Trada, lungo la strada che porta dallo svincolo autostradale alla SS 18 (Reggio Calabria), water drainage channel, 50 m a.s.l., 09.01.2019, 559299-4232631, *leg. et det.* C.M. Musarella (REGGIO); Villa San Giovanni lungo la Fiumara Santa Trada, lungo il corso d'acqua (Reggio Calabria), in the bed of the river, 24 m a.s.l., 25.04.2019, 559025-4232687, *leg. et det.* C.M. Musarella (REGGIO).

Observatum. Reggio Calabria lungo l'Autostrada A2 in corrispondenza di località Baglio Giunta (Reggio Calabria), roadside, 62 m a.s.l., 09.03.2019, 558497-4223134, *obs. et det.* V.L.A. Laface.

Notes. In Italy it was reported for many regions, except Valle d'Aosta, Piemonte, Trentino-Alto Adige, Friuli-Venezia Giulia, Molise, Basilicata and Calabria (Galasso *et al.*, 2018c).

***Euphorbia hypericifolia* L.** [= *Anisophyllum hypericifolium* (L.) Haw. ≡ *Chamaesyce hypericifolia* (L.) Millsp.]

Euphorbiaceae – T scap – America – Neophyte.

First reports for Calabria (provinces of Catanzaro and Reggio Calabria). Casual.

Exsiccata. Motta San Giovanni in località Lazzaro Vecchio (Reggio Calabria), sandy dunes, 3 m a.s.l., 08.07.2011, 558090-4202970, *leg. et det.* C.M. Musarella (REGGIO); Reggio Calabria in via Fiumarella (Reggio Calabria), uncultivated field, 11 m a.s.l., 06.10.2018, 556516-4208229, *leg.* C.M. Musarella, *det.* C.M. Musarella *et* G. Spampinato (REGGIO); Girifalco presso località Curcio (Catanzaro), uncultivated field, 396 m a.s.l., 10.09.2018, 624611-4298764, *leg. et det.* R. Petrilli (REGGIO).

Notes. Sciandrello *et al.* (2016) recorded *E. hypericifolia* for the first time in Italy in two coastal areas close to the town of Taormina (eastern Sicily). Later, Lazzeri (2017) and Spadaro & Raimondo (2017) report this species for Toscana and other locations of western Sicily, respectively. Finally, Galasso *et al.* (2018b) states that a previous record by Buono *et al.* (2017) of *Euphorbia hyssopifolia* L. for Puglia should be referred to *E. hypericifolia*. Therefore, in Italy this species has been recorded only in Toscana, Puglia and Sicilia, whereas it was reported by mistake in Lombardia (Galasso *et al.*, 2018c). With these new records, *E. hypericifolia* can be considered as new for the vascular flora of Calabria.

***Ficus microcarpa* L.f.** [– *Ficus retusa* auct. p.p., non L.]

Moraceae – P scap – Asia and North Australia – Neophyte.
First reports for Calabria (provinces of Cosenza – and Reggio Calabria). Casual.

Exsiccata. Scalea in centro (Cosenza), wall, 7 m a.s.l., 20.08.2017, 567723-4407273, *leg. et det.* A. Stinca et M. Ravo, *det.* A. Stinca (PORUN-Herb. Stinca); Reggio Calabria lungo il Torrente Calopinace (Reggio Calabria), wall, 13 m a.s.l., 09.01.2019, 555796-4217193, *leg. et det.* C.M. Musarella (REGGIO); Reggio Calabria lungo il Torrente Calopinace, wall, 15 m a.s.l., 09.01.2019, 555894-4217194, *leg. et det.* C.M. Musarella (REGGIO); Reggio Calabria lungo il Torrente Calopinace, wall, 22 m a.s.l., 09.01.2019, 556210-4217227, *leg. et det.* C.M. Musarella (REGGIO).

Notes. Only recently this exotic plant was recorded in southern Italy for Campania (Stinca et al., 2017). In Calabria the observed individuals have been originated by the seeds of nearby cultivated plants.

***Leucaena leucocephala* (Lam.) de Wit subsp. *glabrata* (Rose) Zárate** [≡ *Leucaena glabrata* Rose]

Fabaceae – P scap – Tropical America – Neophyte.

First reports for Calabria (province of Reggio Calabria) and continental Italy. Casual.

Exsiccata. San Lorenzo in località Marina di S. Lorenzo (Reggio Calabria), uncultivated field, unspecified altitude, 15.12.2014, unspecified coordinates, *leg. et det.* F. Lugarà (REGGIO); Reggio Calabria lungo la SS 106 Jonica in corrispondenza di località San Leo (Reggio Calabria), roadside, 17 m a.s.l., 22.12.2018, 557564-4211119, *leg. et det.* C.M. Musarella (REGGIO); Reggio Calabria lungo la SS 106 Jonica in corrispondenza di località San Gregorio (Reggio Calabria), roadside, 32 m a.s.l., 22.12.2018, 557997-4212553, *leg. et det.* C.M. Musarella (REGGIO); Villa San Giovanni lungo l'Autostrada A2 del Mediterraneo allo svincolo di Villa San Giovanni (Reggio Calabria), roadside, 86 m a.s.l., 08.01.2019, 556678-4230515, *leg. et det.* C.M. Musarella (REGGIO); Reggio Calabria in località Pellaro nei pressi della stazione ferroviaria (Reggio Calabria), flowerbed, 8 m a.s.l., 11.01.2019, 557073-4208726, *leg. et det.* C.M. Musarella (REGGIO); Reggio Calabria lungo la strada per Gallina presso località C. delle Rose (Reggio Calabria), roadside, 173 m a.s.l., 19.02.2019, 558962-4215774, *leg. et det.* V.L.A. Laface (REGGIO); Melito di Porto Salvo lungo la SS 183 presso contrada Caderia, (Reggio Calabria), roadside, 91 m a.s.l., 16.02.2019, 569415-4200195, *leg. et det.* V.L.A. Laface (REGGIO); Villa San Giovanni lungo SS 18 tra località Porticello e il castello di Altafiumara (Reggio Calabria), roadside, 20 m a.s.l., 17.02.2019, 559128-4232894, *leg. et det.* V.L.A. Laface (REGGIO).

Observata. Condofuri presso località Straci (Reggio Calabria), roadside, 15 m a.s.l., 16.02.2019, 574187-4197656, *obs. et det.* V.L.A. Laface; Reggio Calabria lungo SS 106 Jonica in

località Occhio di Pellaro (Reggio Calabria), roadside, 15 m a.s.l., 16.02.2019, 557763-4209823, *obs. et det.* V.L.A. Laface.
Notes. In Italy *L. leucocephala* subsp. *glabrata* was recorded only in Sicily as naturalized alien near Agrigento, Campofelice di Roccella and Cefalù (Raimondo & Domina, 2007; Galasso et al., 2018c). Therefore, our finding is the first for continental Italy. Probably the individuals gathered in Calabria developed from seeds dispersed by plants nearby cultivated plants.

***Narcissus papyraceus* Ker Gawl.** [= *Narcissus barlae* Parl.

= *Narcissus niveus* Loisel. = *Narcissus polyanthos* Loisel.]
Amaryllidaceae – G bulb – West Mediterranean (Iberian Peninsula, France, Algeria, Morocco [?]) – Archeophyte.

First reports for Calabria (province of Reggio Calabria). Casual.

Exsiccata. Reggio Calabria presso località Cerasi (Reggio Calabria), uncultivated field, 660 m a.s.l., 23.11.2018, 565730-4223710, *leg. et det.* C.M. Musarella, G. Spampinato et V.L.A. Laface (REGGIO); Reggio Calabria presso località Cerasi (Reggio Calabria), uncultivated olive grove, 655 m a.s.l., 23.11.2018, 565877-4223618, *leg. et det.* V.L.A. Laface, *det.* C.M. Musarella, G. Spampinato et V.L.A. Laface (REGGIO); Reggio Calabria in località Orti Inferiore (Reggio Calabria), uncultivated field, 670 m a.s.l., 12.01.2018, 562400-4222398, *leg. et det.* V.L.A. Laface, *det.* C.M. Musarella, G. Spampinato et V.L.A. Laface (REGGIO); Calanna tra località Caria e Rocche (Reggio Calabria), uncultivated field, 568 m a.s.l., 12.01.2019, 563196-4227555, *leg. et det.* V.L.A. Laface, *det.* C.M. Musarella, G. Spampinato et V.L.A. Laface (REGGIO); Santo Stefano in Aspromonte lungo la SS 184 (Reggio Calabria), uncultivated field, 797 m a.s.l., 12.01.2018, 568352-4224570, *leg. et det.* V.L.A. Laface, *det.* C.M. Musarella, G. Spampinato et V.L.A. Laface (REGGIO).

Notes. In Italy this species was reported in Lombardia, Liguria, Toscana, Marche, Campania, Puglia, Sicilia, and Sardegna (Galasso et al., 2018c). Therefore, our findings are the first for Calabria.

***Petroselinum crispum* (Mill.) Fuss** [≡ *Apium crispum* Mill.]

Apiaceae – H bienn – Mediterranean (Europe and Asia) – Archeophyte.

First report for Calabria (province of Cosenza). Casual.

Exsiccatum. Scalea in centro (Cosenza), between floor cracks, 7 m a.s.l., 22.08.2016, 567636-4407438, *leg. et det.* A. Stinca (PORUN-Herb. Stinca).

Notes. *P. crispum* was recorded as casual in all Italian regions, except Valle d'Aosta, Friuli-Venezia Giulia, Calabria and Sicilia (Galasso et al., 2018c). The individuals observed in Calabria have spread by the seeds of nearby cultivated plants.

***Phoenix canariensis* H.Wildpret**

Arecaceae – P scap – Macaronesia – Neophyte.

First geolocalized report in Calabria (province of Catanzaro). Change of status for Calabria: from naturalized to casual.

Observatum. Staletti alle Vasche di Cassiodoro (Catanzaro), sea rocks, 5 m a.s.l., 28.06.2018, 636509-4291446, *obs. et det.* C.M. Musarella et G. Spampinato.

Notes. This species was reported generically for Calabria by Bernardo et al. (2009, 2011), and recently by Galasso et al. (2018c) as naturalized. However, *P. canariensis* in this region not form self-replacing populations, unlike other southern Italian regions (e.g. Campania: Stinca et al., 2012). It was observed during a monitoring action of habitats in the sea rocks of the SIC “Scogliere di Staletti” and it clearly came from some mature individuals in a villa overlooking the cliff below.

***Physalis angulata* L.** [= *Boberella angulata* (L.) E.H.L.Krause] Solanaceae – T scap – America – Neophyte.

First report for Calabria (province of Reggio Calabria) and southern Italy. Casual.

Exsiccatum. Laureana di Borrello al lago L’Aquila (Reggio Calabria), near the lake shore, 36 m a.s.l., 12.09.2013, 589615-4263017, *leg. et det.* S. Cannavò, C.M. Musarella et G. Spampinato (REGGIO).

Notes. Casual alien species with Italian distribution range including only in Lombardia, Veneto and Lazio (Galasso et al., 2018c).

***Prunus laurocerasus* L.**

Rosaceae – P scap – South-East Europe, West Asia and Caucasus – Neophyte.

Change of status for Calabria: from naturalized to casual.

Exsiccatum. Decollatura al SIC “Boschi di Decollatura” (Catanzaro), old chestnut grove, 911 m a.s.l., 22.06.2018, 615668-4323267, *leg.* C.M. Musarella, A. Morabito, G. Settineri et M. Prigoliti, *det.* C.M. Musarella (REGGIO).

Notes. This species was reported recently for Calabria by Musarella et al. (2019b) as naturalized at Decollatura. However, *P. laurocerasus* in this locality, as well as in all the region, not form self-replacing populations. It was reported in many Italian regions, except Friuli-Venezia Giulia, Molise, Basilicata, Calabria, Sicilia and Sardinia (Galasso et al., 2018c).

***Saccharum biflorum* Forssk.** [= *Saccharum aegyptiacum* Willd. – *Saccharum spontaneum* auct., non L.]

Poaceae – H caesp – Palaeotropical – Neophyte.

First reports for Calabria (province of Reggio Calabria) and confirmation for continental Italy. Naturalized.

Exsiccata. Reggio Calabria località Sopra Lume in corrispondenza dell’incrocio con via Pantano (Reggio Calabria), roadside, 40 m a.s.l., 23.12.2018, 557467-4208236, *leg. et det.* C.M. Musarella (REGGIO); Reggio Calabria presso località Bocale (Reggio Calabria), vineyard margins, 28 m a.s.l., 23.12.2018, 556506-4206133, *leg. et det.* C.M. Musarella (REGGIO); Reggio Calabria lungo la

SS 106 Jonica presso località Bocale (Reggio Calabria), roadside, 23 m a.s.l., 23.12.2018, 556483-4205948, *leg. et det.* C.M. Musarella (REGGIO); Reggio Calabria lungo la SS 106 Jonica presso località Pellaro (Reggio Calabria), roadside, 14 m a.s.l., 23.12.2018, 557486-4209007, *leg. et det.* C.M. Musarella (REGGIO).

Notes. Naturalized alien plant in Sicily, occurring with an undefined invasion status in Sardegna and no longer recorded in Puglia (Galasso et al., 2018c). Since about 10 years, this species grows in several uncultivated fields and along the roads of Reggio Calabria. Because of its ancient presence with fructifying mature clumps, we record here the new report for this species for continental Italy.

***Sedum palmeri* S.Watson** [= *Sedum compressum* Rose] Crassulaceae – Ch suffr (succ) – North America (Mexico) – Neophyte.

First report for Calabria (province of Crotona). Casual.

Exsiccatum. Casabona in località Zinga (Crotona), humid wall, 354 m a.s.l., 12.10.2018, 665270 -4347473, *leg. et det.* A. Stinca (PORUN-Herb. Stinca).

Notes. The Italian distribution range of this neophyte includes Lombardia, Veneto, Liguria, Emilia-Romagna, Lazio, Campania and Sardegna (Galasso et al., 2018c). As observed in other populations in southern Italy (Stinca et al., 2017), also the individuals recorded in Calabria have spread almost surely by seeds.

***Senna corymbosa* (Lam.) H.S.Irwin & Barneby** [= *Cassia corymbosa* Lam.]

Fabaceae – NP – South America – Neophyte.

First report for Calabria (province of Reggio Calabria) and continental Italy. Casual.

Exsiccata. Reggio Calabria presso località San Gregorio, in una traversa di Via Mortara di Ravagnese (Reggio Calabria), land with abandoned waste, 26 m a.s.l., 05.10.2018, 557287-4213012, *leg. et det.* C.M. Musarella (REGGIO); Reggio Calabria presso località San Gregorio, in una traversa di Via Mortara di Ravagnese (Reggio Calabria), land with abandoned waste, 26 m a.s.l., 03.12.2018, 557287-4213012, *leg. et det.* C.M. Musarella (REGGIO).

Notes. Only one individual was found in an abandoned area, among waste and nitrophilous vegetation. A first observation was made in October 2018 on the flowering plant, a second one in December on the same plant with fruits. In Italy, this species has been recorded only in Sardinia as casual alien in Camassi (Lazzeri et al., 2013; Galasso et al., 2018c). Therefore, our finding is the first for continental Italy.

***Tagetes erecta* L.** [= *Tagetes patula* L.]

Asteraceae – T scap – North America – Neophyte.

First report for Calabria (province of Crotona). Casual.

Observatum. Caccuri in località La Conicella (Crotone), road edge, 515 m a.s.l., 11.10.2018, 654331-4344348, *obs. et det.* A. Stinca.

Notes. Casual alien species with Italian distribution range including Piemonte, Lombardia, Trentino-Alto Adige, Friuli-Venezia Giulia, Veneto, Liguria, Emilia Romagna, Toscana, Lazio, Abruzzo, Molise, Campania, Sicilia and Sardegna (Galasso et al., 2018c).

DISCUSSION

In this work new data concerning the distribution of 21 non-native vascular species for Calabria are presented. *Agave filifera* is reported for the first time in Europe (Canary Islands excluded), while *Leucaena leucocephala* subsp. *glabrata* and *Senna corymbosa* are indicated for the first time in continental Italy. *Physalis angulata* is a new exotic taxon for southern Italy, while *Cardamine occulta*, *Cyperus alternifolius* subsp. *flabelliformis*, *Euphorbia hypericifolia*, *Ficus microcarpa*, *Narcissus papyraceus*, *Petroselinum crispum*, *Prunus laurocerasus*, *Sedum palmeri* and *Tagetes erecta* are reported for the first time in Calabria. In addition, *Saccharum biflorum* is collected for the first time for this region and it is a confirmation of its presence in Italian Peninsula. The presence of *Araujia sericifera* for the region is also confirmed. New distribution data regarding 14 species are first finds for some provinces of Calabria. Most of these new reports concern the province of Reggio Calabria (n. 10 taxa), while no alien plants were recorded in Vibo Valentia province (Tab. 1).

Moreover, the discovery of new sites and their population monitoring, along with a critical analysis of the literature, allowed us to update the alien status in Calabria for *Aeonium haworthii* (from casual to naturalized), *Aloë vera* (from casual to naturalized), *Cenchrus setaceus* (from casual to naturalized), *Phoenix canariensis* (from naturalized to casual) and *Prunus laurocerasus* (from naturalized to casual).

CONCLUSIONS

Due to the importance of managing alien species from a region scale up to level of each habitat, it is very important to know their presence and distribution. In addition, the monitoring of non-native plant populations is fundamental to outline needful measures according to the guidelines of the conservation biogeography (Richardson, 2012; Cano-Ortiz et al., 2016). The results obtained in this research confirm the importance of field investigations to detect the

presence of alien species in Calabria, as well as some aspect of their biology invasion. However, further researches aimed to increase the knowledge of the exotic flora of this region will be more necessary in the future.

Table 1. New reports of alien taxa for the provinces of Calabria (CS: Cosenza; CZ: Catanzaro; KR: Crotone; RC: Reggio Calabria; VV: Vibo Valentia).

| Taxon | Provinces | | | | |
|---|-----------|----|----|----|----|
| | CS | CZ | KR | RC | VV |
| <i>Agave filifera</i> | | | | • | |
| <i>Araujia sericifera</i> | | | | • | |
| <i>Cardamine occulta</i> | • | | | | |
| <i>Cyperus alternifolius</i> subsp. <i>flabelliformis</i> | | | | • | |
| <i>Euphorbia hypericifolia</i> | | • | | • | |
| <i>Ficus microcarpa</i> | • | | | • | |
| <i>Leucaena leucocephala</i> subsp. <i>glabrata</i> | | | | • | |
| <i>Narcissus papyraceus</i> | | | | • | |
| <i>Petroselinum crispum</i> | • | | | | |
| <i>Physalis angulata</i> | | | | • | |
| <i>Saccharum biflorum</i> | | | | • | |
| <i>Sedum palmeri</i> | | | • | | |
| <i>Senna corymbosa</i> | | | | • | |
| <i>Tagetes erecta</i> | | | • | | |
| Total reports | 3 | 1 | 2 | 10 | 0 |

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