Article

Fl. Medit. 32: 403-420
https://doi.org/10.7320/FlMedit32.403
Version of Record published online on 28 December 2022

Salvatore Pasta

Never underestimate Sicilians: some case histories dealing with narrow native ranges, deliberate introduction, claimed extinction and predictable plant invasion worldwide

Abstract

Pasta, S.: Never underestimate Sicilians: some case histories dealing with narrow native ranges, deliberate introduction, claimed extinction and predictable plant invasion worldwide. — Fl. Medit. 32: 403-420. 2022. — ISSN: 1120-4052 printed, 2240-4538 online.

First described from Sicily or originally occurring only on this island, after being introduced worldwide, several vascular plants proved to be able to adapt to the enviromental conditions encountered in different biomes, and in some cases became a threat for the biodiversity of the newly invaded habitats.
These paradigmatic and somewhat paradoxical cases shed light on the complexity of invasion forecasting procedures. They provide insightful examples on the global effect of voluntary or involuntary introductions of potentially invasive species and the importance of better studying the ecology and demography of rare plants within their native home range.

Key words: horticulture, international plant trade, invasion biology, Mediterranean-type biomes, niche shift, population genetics, risk assessment.

Introduction

Since 16th-17th centuries AD not only exotic plants from Americas, Asia and Africa reached Europe, but also Mediterranean countries became the target of extensive plant gathering and trade for medicinal and ornamental purposes (Tongiorgi Tomasi 1984; Lack 1996). On this purpose, Sicily played a key role long before the colonisation of Americas not only as connection hub for the trade of many vascular plants coming from the eastern and southern Mediterranean countries, but also as homeland of other plants which have been spread across temperate and Mediterranean Europe and beyond. For instance, the cosmopolitan *Verbascum thapsus* L., apparently corresponding to the medicinal (but toxic) plant called 'thapsos' by Theophrastus, probably takes its name from an ancient Helladic colony where the common mullein was gathered during Antiquity located on the islet of Thapsos in southeastern Sicily (Muenscher 1935), while the edible spiny "kaktos" that Theophrastus claimed to be growing only in Sicily (Hist. Pl. 6.4.10) probably corresponds to the wild artichoke, *Cynara scolymus* L. (Rottenberg & Zohary 1996).

Moreover, many scholars have mentioned Sicily as the first European site of introduction of many palaeotropical Asian and African plant species of high economic importance (e.g., citrus trees, mulberry trees, sumac, sugar cane, etc.) during the Middle Ages (e.g., Metcalfe 2017).

During the 16th and 17th centuries, the curators of the botanical gardens created by the universities and mecenates of the island actively participated in the dense network of seed exchanges between the institutions and private collectors and passionates that were beginning to populate the whole of Europe. For instance, Francesco Cupani was in contact with many of his Italian and European colleagues (Pulvirenti & al. 2015). Similarly, Boccone (1674) reported to have communicated the seeds of several good-looking hardy Mediterranean plants to several botanical gardens such as those of Paris, Amsterdam, Padua and London and to have recommended to their curators to cultivate them for ornamental purposes. Indeed, some of them have been successful, as testified by the use of *Convolvulus cneorum* L. and *Iberis semperflorens* L. - two of Boccone's beloved plants - in the front garden of many private houses in today's London (S. Pasta, *pers. obs*.).

During the 19th century, the straw used as fodder for the horses of the French Army came not only from Algeria but also from Italian and Sicilian hay fields (Gaudefroy & Mouillefarine 1871). The seeds germinated in the military camps of Paris gave rise to the ephemeral occurrence of several dozens of Mediterranean species, like *Vicia sicula* (Raf.) Guss. This wild vetch, endemic to Maghreb, Sicily and Tyrrhenian Italy (Roskov & al. 2014), has been reported as a casual alien also for Belgium, where it was recorded only once in 1920 (Verloove 2006), as testified by a single herbarium specimen (BR0000012011728) (F. Verloove *pers. comm*.).

Deliberate or accidental introductions have probably happened much more frequently than expected, and most of them may have passed unnoticed just because they experienced only local success. This seems to have happened to several other Sicilian plant taxa introduced abroad. For instance, the occurrence of *Centaurea solstitialis* L. in California was reported by the end of the 1870s, and this plant was already considered a noxious weed in the 1890s (Robbins 1940). More recent investigations (Widmer & al. 2007) pointed out that the Californian populations of yellow star thistle belong not only to subsp. *solstitialis* but also to subsp. *schouwii* (DC.) Gugler, described from the Madonie Mountains (Peruzzi & al. 2019) and currently living in NW-Africa, Sardinia, Sicily and southern Italy (Greuter 2006).

Thellung (1919) coniated the term "Sicilian colony" to emphasize the sudden arrival of as many as 42 species new to the Canton of Zurich (19 of them being new to the entire Swiss territory) as a direct consequence of the steep increase of fruit import at the beginning of the First World War. In fact, most of those newcomers were weeds typical to southern European orchards and colonized the commercial railway station of Zurich when Switzerland became the main buyer of the Italian citrus products.

As for *Desmazeria sicula* (Jacq.) Dum., this rare plant living along the rocky shores of N Africa, Malta, Sicily, Calabria, Sardinia and Southern Spain (Lansdown & Véla 2019) may have been introduced in Belgium (Auquier 1978) by the mine workers migrated from southern Sicily after the World War II (Cumoli 2009).

This paper aims at presenting several emblematic cases of plants described from Sicily and thought to be rare or even extinct, which instead have been traded far away and became invasive elsewhere on the planet. These paradigmatic and somewhat paradoxical examples shed light on the complexity of invasion mechanisms and the need of improving our understanding about plant invasions to prevent and forecast them.

An amazing case of global success: the "Sicilian" sweet pea

The sweet pea *Lathyrus odoratus* L. was once probably endemic to central and east Mediterranean (Sicily, S-Italy, Crete, Cyprus and several Aegean islands). Due to its enormous success as an ornamental plant, it has been introduced worldwide and became naturalized in 32 countries across all continents, and currently occurs even on very distant islands like Galapagos archipelago, Juan Fernández (c. 700 km west off Chile), Chatham Islands (c. 800 km east off New Zealand) and Hawai'i (GBIF Secretariat 2021; KBD 2022).

The sweet pea variety called "Cupani" is thought to be the closest to the wild ancestor of all present-day breeds (Inoue & al. 2000). Francesco Cupani was the curator of the botanical garden of Misilmeri, a town some 15 km southeast of Palermo. The sweet pea was mentioned for the first time by Cupani (1694) among the plants newly discovered in Sicily; two years later Cupani (1696) described it as "Lathyrus distoplatyphyllus, hirsutus, mollis, magno, & peramæno flore odoro". In 1699, Cupani sent the seeds of the wild sweet pea to several correspondents all over Europe. One of them, Caspar Commelijn, director of the botanical garden of Leiden, provided the earliest botanical illustration of the plant, named "Lathyrus distoplatyphyllus hirsutus mollis et odorus" in his catalogue (Commelijn 1701).

In the following decades an authentic "sweet pea mania" gripped English and Dutch botanists, plant collectors and gardeners, who shared the seeds sent from Sicily with many private passionates, who started to breed the plant to modify the flower traits for ornamental purposes, so that the species experienced a very fast spread and success and was already released commercially in the 1720s. The economic success of this plant lasted for centuries: for instance, a National Sweet Pea Society was founded in England in 1901, and in the following decades regular competitions among amateur gardeners were organized to promote the selection of countless varieties (Unwin 1952). Not surprisingly, the huge bulk of knowledge on *L. odoratus* breeding has stimulated several basic studies on inheritance mechanisms worldwide (e.g., Punnett 1923). During last century the main centres of production and experimentation moved first to Japan and then to New Zealand, which still leads the world production (Rice 2002).

Born to go wild? *Genista etnensis* from Sardinia to Sicily and beyond

The giant Etna broom *Genista etnensis* (Raf.) DC. is considered to be native to Sicily (Mt. Etna), Eastern and Southern Sardinia and Corsica. Based on several morphological traits, some authors (e.g., Bacchetta & al. 2016; Fridlender 2018) have recently suggested to refer the plants growing on these islands to three different taxa.

Sardinia represents the main pool of the species in terms of extent of occurrence, although local populations show low values both in terms of genetic variability and number of haplotypes (De Castro & al. *submitted*). Here *G. etnensis* mostly occurs in the gaps of the evergreen woodlands and is common in the shrubland communities of the hill and mountain belts. In Corsica as well the species prefers the natural gaps within *Q. ilex*- and/or *Pinus pinaster*-dominated forest communities and disappears once forest cover becomes too dense (Delage & Hugot 2020). Disputed for long time, the native status of *G. etnensis* in Corsica has been reported in the most recent and influential monograph on local vascular flora (Jeanmonod & Gamisans 2013). Indeed, according to the most recent genetic investigations, the populations of Corsica are represented by an exclusive haplotype and they may even represent the "core" population of the species (De Castro & al. *submitted*).

In Sicily, *Genista etnensis* behaves as a pioneer colonizer of recent lava flows and volcanic ashes on the slopes of Mt. Etna, where it occurs in the gaps of wood communities between 1200 and 1900(2000) m a.s.l., as a pioneer species on volcanic debris and even above the timberline (Sciandrello & al. 2020). The giant broom plays an important role in creating nitrogen-rich islands (Fernández Sanjurjo & al. 2003). Since the beginning of the 19th century, and even more intensively after the World War II, *G. etnensis* has been introduced out of its original range for nature restoration purposes; due to these massive plantation efforts, on Mt. Etna the giant broom also occurs from sea level up to 1200 m a.s.l. (Sciandrello & al. 2020). *G. etnensis* was also planted in the Peloritani Mts. and Nebrodi Mts. (NE-Sicily) but it did not spread there (A. Crisafulli, *pers. comm.*). The extremely low genetic diversity of the populations of Mt. Etna (De Castro & al. *submitted*) induces to suspect that *G. etnensis* might have been introduced in Sicily from Sardinia, where the giant broom occurs in much less disturbed habitats.

Soon after its discovery on Mt. Etna, seeds of *G. etnensis* were sent by the Sicilian botanists to the British gardeners. This species is still a popular ornamental plant in England, where it was first recorded as escaped in the wild in 1977 (Surrey: OABIF 2022a) started to spread in the 1980s (NBN Atlas 2022) and it currently occurs not only in southern England but also in North Wales and near Sheffield (BSBI 2022a).

As for Campania, individuals from Mt. Etna were introduced on the slopes of Mt. Vesuvius at the beginnings of 20th century (Agostini 1959). After 60-70 years of apparently harmless acclimatisation, during last 40 years local population was able to modify local soil properties and to perform a very fast spread, turning so invasive to pose a serious threat to local flora and vegetation (Stinca & al. 2015).

No precise information is available on the regional origin and the date of introduction of *G. etnensis* in many other Italian and Mediterranean localities, but most of (if not all) the propagation material (seeds or plugs) probably comes from Mt. Etna. The species behaves as casual in Molise (Bartolucci & al. 2016), while it has escaped and is spreading in Emilia-Romagna (Alessandrini & al. 2012), Tuscany (Bartolucci & al. 2020), Greece (Polymenakos & Tan 2012), south-western France (Leblond & al. 2020) and Anatolia (O. Şentürk, *pers. comm.*). *G. etnensis* has been introduced for ornamental purposes in all continents. In California, where it grows in many private and public gardens since more than one century (Hrusa & al. 2002), it did not turn invasive so far (Grotkopp & Rejmánek 2007). No data are available about its behaviour in Argentina (Burkart 1952), south-eastern India (Sharma & al. 1977), South Africa (Glen 2002), south-eastern Australia (Spencer 2002) and Zimbabwe (Maroyi 2006).

Plant trade in the web age

The voluntary spread of useful plants is old as mankind. For this reason, it is just impossible to assess the original home range of many archaeophytes, as their introduction worldwide started by early seafarers (Fuller & al. 2011). Since the early 1500s, European merchants and scientists increased their collecting, cultivating and breeding activities across the globe, mostly focusing on ornamental and medicinal plants, and begun to transfer many alien plants across continents. As a consequence of this imperial-colonial phase of botanical collections, the description of many plants native to the Americas, Asia and Africa is based on plants cultivated in the European botanical gardens (e.g., Kew, Paris, Madrid, St. Petersbourg, Palermo) and their original home range is unknown. This process did not slow down in the following centuries, and today both species introduction and establishment appear relentless and unstoppable (Seebens & al. 2017). If compared with past times, the international e-commerce of potentially dangerous weeds has dramatically increased in terms of speed, intensity and species number. Hence, internet plant market appears one of the most effective allies for invasive plants (Humair & al. 2015).

A formidable example of the potential of internet trade in 'reviving' even very rare plants is provided by *Cistus* ×*skanbergi* Lojac.. Despite having completely disappeared in its *locus classicus*, Lampedusa Island (Strait of Sicily), and its extreme rarity throughout the whole Mediterranean Basin, the so-called dwarf pink rock rose is far from being extinct worldwide. On the contrary, a quick automatic query made on the internet using the words "*Cistus*" or "rockrose" + "*skanbergi*" (or "*skanbergii*") gave c. 9200 pages referring to this handsome plant, currently produced by dozens of nurseries and used for private greening purposes in Europe and abroad (e.g., USA, Australia and New Zealand); more recently, *C.* ×*skanbergi* started to escape from cultivation in southern Europe and California (Pasta *submitted*-a).

The Hyblaean sea lavender, a narrow endemic turned subcosmopolitan

Limonium hyblaeum Brullo is a salt-tolerant hemicryptophyte considered strictly endemic to SE-Sicily (Brullo & Brullo 2021). It dominates a species-poor plant community adapted to grow on the salt-sprayed calcareous rocky shores. Within its native range, *L. hyblaeum* is currently threatened with urban sprawl along the coast, so that during last decades its populations experienced increasing fragmentation and even local extinction (Pasta *submitted*-b).

Erben (1986) identified several specimens of *Limonium hyblaeum* collected in three countries very far from Sicily, i.e., in England, in Chile and in Australia (Fig. 1). As for UK, the species was first observed in 1979 (i.e. even before being described by Brullo 1980) growing as a garden escape on the sea cliffs of East Sussex (Ingrouille 1981). An updated map (BSBI 2022b) points out the remarkable spread of *L. hyblaeum* along the coasts of southern England during the last 30 years, probably due to seagull dispersal (OABIF 2022b). As for Chile, the plants observed in the 1970s in a private green area near Pichidangui were unable to escape from cultivation, and the species does not feature among the casual and naturalized vascular plants of Chile (Fuentes & al. 2020).

The fast spread of *Limonium hyblaeum* in Australia between 1970s and 2000s is well documented. The so-called "Sicilian sea-lavender" currently occurs in South Australia, Western Australia, Victoria and New South Wales, and its invasive behaviour is a major concern for local conservation biologists and managers (Walsh 1996, Parsons 2013).

***Senecio squalidus* L. & "Sons": when colonization and hybridization trigger evolution**

The history of the establishment of *Senecio squalidus* L., once probably strictly endemic to Sicily and introduced in England at the end of the 17th century (Harris 2002), is just extraordinary.Very soon after its introduction, it had already escaped from cultivation and started to grow on the walls of Oxford college. During 18^{th} the so-called "Oxford Ragwort" exploited the railway lines to disperse across the country; this species is currently the most frequent neophyte in urban and suburban habitats of central Britain (Hill & al. 2002), being fairly ubiquitous in most urban areas of UK and still spreading (Botham & al. 2009). During its establishment, and along with its spread across Europe (IUCN/SSC-

Fig. 1. *Limonium hyblaeum*: native distribution range in Sicily (a) and secondary range in UK (b), Chile (c) and Australia (d), from Parsons (2013) modified.

ISSG 2010), the original niche of *S. squalidus* apparently expanded and shifted, as testified by the different assessment of its Ecological Indicator Values given in several parts of its native and secondary distribution range (Table 1). During its spread across Great Britain, *S. squalidus* encountered several native congeneric species, giving rise to several new hybrid species, reproductively isolated from their parents (Abbott & Lowe 2004).

Senecio squalidus shows such an invasive attitude to require *ad hoc* measures for its management and control (Heywood & Brunel 2008); during the last decades it was able to colonize even the Falkland/Malvinas Islands (Upson & Lewis 2014), USA and Canada (USDA-ARS 2010, USDA-NRCS 2010).

Senecio squalidus grows together with its two parent species *S. aethnensis* and *S. siculus* All. (= *S. chrysanthemifolius* Poir.), on the slopes of a highly dynamic and active volcano, Mount Etna (Sicily), forming a hybrid zone at intermediate altitudes between 2000 and 2400 m a.s.l. (James & Abbott 2005). The exceptional morphogical plasticity of the aforementioned *Senecio* species has been noticed since the 17th century (Cupani 1696) and has been studied by generations of botanists, who gave plenty of different names to different ecomorphotypes (Barone & al. 2022), measured their traits and tried to interpret their clinal variation as a response to temperature and altitude gradients (Pasta *submitted*-c). Such plasticity remained unexplained until quite recently, when a survey of randomly amplified polymorphic DNA marker variation confirmed that *S. squalidus* is a diploid hybrid derivative of *S. aethnensis* and *S. siculus* All. (Abbott & al. 2002).

After 30 years of dedicated research and dozens of publications focused on *S. squalidus* (Pasta *submitted*-c), this species has become a target model to study many aspects of the ecology, genetics, and evolution of invasive diploid plants (Abbott 1992, Lowe & Abbott 2003, Abbott & al. 2009, Brennan & al. 2014, Chapman & al. 2016, Nevado & al. 2020).

Table 1. Ellenberg Indicator Values (EIVs) assigned to *Senecio aethnensis* and *S. chrysanthemifolius* within their native range and to *S. squalidus* throughout its native and European secondary range according to different sources. Standard abbreviations of EIVs: L (= Light), F (= Soil moisture), R (= Soil reaction, pH), N (= Nitrogen soil content), T (= Temperature), K (= Continentality) and S (= Salinity); n.a. = not assessed.

Taxon, geographical area and source	**L**	**F**	**R**	**N**	**T**	**K**	**S**
S. chrysanthemifolius							
Italy (Pignatti & al. 2017-2019)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
S. aethnensis							
Italy (Pignatti & al. 2017-2019)	11	2	1	1	n.a.	2	0
S. squalidus							
Italy (Pignatti & al. 2017-2019)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Central Europe (Ellenberg & al. 1991)	8	5	7	8	n.a.	n.a.	n.a.
England (Hill & al. 1999)	8	4	7	7	n.a.	n.a.	n.a.
S-Aegaean islands, Greece (Böhling & al. 2002)	6	4	8	6	7	5	0
Sweden (Torbjörn & al. 2021)	7	4	6	7	n.a.	5	2

Discussion

And the winner is? Looking for general proxies to predict biological invasions

Taking in mind the intrinsic stochastic nature of invasions, invasion biologists are still looking for general patterns and reliable predictors (e.g., Hayes & Barry 2008, Pyšek & al. 2020) to improve our ability to forecast biological invasions. On this purpose, three hypotheses have been invoked, i.e. the Enemy Release (Keane & Crawley 2002, Colautti & al. 2004), the Evolution of Increased Competitive Ability (Blossey & Notzold 1995), and the Novel Weapons (Callaway & Aschehoug 2000). Indeed, these hypotheses do not conflict, as two or more of these favouring factors may synergically allow a species to expand into a broader or somehow different ecological niche (Lau & Schultheis 2015). Moreover, the strong selection forces encountered by potential invaders might speed up their evolution and induce major niche shifts (Lee 2002; Parker & al. 2003; Colautti & Barrett 2013; Early & Sax 2014, Bock & al. 2015; Dlugosch & al. 2015; Braasch & al. 2019).

With no doubt, invasion biologists and plant conservation practitioners should investigate the ecology of potentially invasive plants starting from studying their behaviour within their native range (Hierro & al. 2005); moreover, they should focus on the traits which may favour the establishment and the fast spread of alien organisms. For instance, comparing the seedling performance of 30 woody species, Grotkopp & Rejmánek (2007) pointed out that *G. etnensis* shows the highest percentage of root biomass 30 days after seed germination, testifying the high investment of the giant broom to ensure establishment after emergence.

Plant invasions performed by naturally rare organisms

Narrow-ranged does not mean harmless. The case of *Limonium hyblaeum* provides a new striking example of a still poorly understood phenomenon, concerning originally narrow-ranged plants which were rare or even at the brink of extinction within their native range but turned invasive once they colonized new habitats and biomes (Rocha & Bergallo 2012; Colautti & al. 2017). To our knowledge, just a handful similar cases concerning vascular plants have been reported and investigated worldwide so far, i. e. *Pinus radiata* D. Don, *Rhododendron ponticum* subsp. *baeticum* (Boiss. & Reut.) Hand.-Mazz., *Hypericum canariense* L. and *Lotus maculatus* Breitf. (Pasta *submitted*-b).

Natura facit saltus*: Genetics, niche-shifts and invasions*

Although many introduced species have to face the consequences of bottlenecks in population size, like the reduction of fitness and evolutionary potential, many of them succeed to become invasive. This apparent paradox may often be explained by rapid evolution along with establishment (Colautti & Lau 2015), while in other cases the newcomers maintain high genetic variation in ecologically relevant traits (Estoup & al. 2016).

In this context, polyploidy and hybridization represent favourable traits for many invasive plants, as already pointed out by Stebbins (1985) and recently confirmed for many evolutionarily distant plants (Pandit & al. 2011; te Beest & al. 2012; Yakimowski & Rieseberg 2014; Rosche & al. 2017).

Recent investigations pointed out the importance of hybridisation in plant invasions. It has been suggested that hybridisation may promote the evolution of invasiveness by increasing genetic variability or introducing novel genes that allow invasion of new habitats (Abbott & al. 2003). Many invasive species are the result of hybridisation events (Schierenbeck & Ellstrand 2009), and hybridisation has also been shown to allow range expansion in native species (Rieseberg & al. 2007). On this purpose, the hybrid nature of *S. squalidus* probably provided enough genetic variation to expand its range in Britain. In fact, several experiments have shown that the British populations of *S. squalidus* managed to adapt to the different climatic patterns encountered whilst spreading across their new range, so that the northern populations can survive under cooler and wetter conditions, whilst the southern ones are better able to cope with drought stress (Allan & Pannell 2009).

Repetita non juvant*: the dangerous effects of propagule pressure and admixture*

Until the end of 18th century *Ailanthus altissima* (Mill.) Swingle grew only in China and Taiwan before being introduced in Europe and north America, where it had disappeared during the last glacial events. Nowadays the tree-of-Heaven, favoured by massive introduction of material coming from different populations, is an almost ubiquitous and “iconic” invasive plant worldwide, especially in forest fringes, urban and suburban areas and in archaeological sites (Kowarik & Säumel 2007; Raimondo 2012; Badalamenti & al. 2012; Campagnaro & al. 2018).

Increasing experimental evidence (e.g., Dlugosch & Parker 2008; Albright & al. 2010; Smith & al. 2020) shows how repeated introductions from different interfertile provenances may benefit the genetic diversity of alien species and enhance their ecological plasticity and fitness (Ferrero & al. 2015). In other cases, admixture may lead to reproductive incompatibility between populations originating from different introduction events, and this in turn may cause the rapid differentiation of new species in the invaded areas (Irimia & al. 2021).

Similarly, the recent success of the population of *Genista etnensis* on Mt. Vesuvius may issue from the admixture of living material from different populations of Mt. Etna (De Castro & al. *submitted*), and this mechanism could also explain the fast spread recently experienced by the giant Etna broom across the European and Mediterranean countries.

Conclusions

Take-home messages…

IUCN specialist groups should better communicate with each other. On this purpose, *L. hyblaeum* provides a paradoxical example of 'double-blind' listing. In fact, on the one hand this species was subjected to risk assessment and considered "LR" (Low Risk) on the regional level by Conti & al. (1997), while Orsenigo & al. (2018) assigned to it the IUCN category "LC" (Least Concern) on the national level. On the other hand, this sea lavender is featured among the invasive plants of Europe listed by the DAISIE working group (Roy & al. 2020). Similarly, due to the ongoing shrinkage of its small coastal populations (Piazza & Paradis 2000), *G. etnensis* features among the Critically Endangered vascular plants of Corsica (Delage & Hugot 2020), while it has been indicated as "LC" on the global level (Rivers & Beech 2017).

The increasing amount of information provided by blacklists available worldwide must be adequately consulted to avoid the introduction of plants that have already shown a clearly invasive behaviour under similar climatic conditions and/or in geographically close countries.

… and "lessons" to unlearn

Being among the earliest and most active actors and "teachers" of plant breeding and introduction worldwide, the British gardeners have had a very important role (and responsibility) in favouring the invasion of tens of vascular plant species in the Mediterranean-type and temperate biomes worldwide (Hulme 2011).

Indeed, the worlds' scientific community of alien plant specialists should go far beyond the simple academic 'sport' of recording new occurrences, trying instead to get more engaged, for instance supporting the adoption of sustainable greening options, the exclusive use of certified native plants, publicly speaking out against the use of aliens known to be adapted to invade new suitable biomes. In fact, in my opinion it is time to change direction and to fight against insane projects which foresee the deliberate introduction of plenty of exotic woody plants in the Mediterranean Basin, a territory with a long story and a recent worrying increase of naturalisation and invasion cases performed by species coming from other Mediterranean-type or subtropical regions (Lambdon & al. 2008; Arianoutsou & al. 2013). Finally conscious of their past and recent responsabilities and their current duties (Hulme & al. 2008, Dehnen-Schmutz 2011), the European horticultural societies and the botanic gardens are working together to reduce and stop the use of invasive alien ornamental plants (Heywood & Brunel 2011).

Moreover, botanists should support local and national decision-makers by sharing continuously updated black-lists to be used outside the academic congresses as guidelines for all activities dealing with plant use (e.g., forestry, habitat restoration, landscaping, gardening) and by providing first-hand information about any sudden shift of casual and fully-naturalized alien plants towards invasiveness in order to promptly detect and eradicate the most dangerous and dynamic newcomers (Stasny & Sargent 2017; Stasny & al. 2020).

Acknowledgements

I thank Bertrand de Montmollin (Neuchâtel, Switzerland), chair of the IUCN Mediterranean Plants Conservation Group, and all the members of the organising committee of the 3rd Mediterranean Plant Conservation Week for inviting me to submit this paper. I am grateful to Filip Verloove (Botanic Garden of Meise, Belgium) for sharing some information on the occurrence of *Vicia sicula* in Belgium, to Gianluigi Bacchetta (Dept. of Life and Environmental Sciences, University of Cagliari, Italy), to Alessandro Crisafulli (Dept. ChiBioFarAm, University of Messina, Italy), to Riccardo Guarino (Dept. STeBiCeF, University of Palermo, Italy) and to Ozan Şentürk (Botanic Garden and Applied Research Center of Ege University, Turkey) for sharing information concerning the topic. I am also grateful to F. M. Raimondo and to the editorial board of Flora Mediterranea for revising and improving the manuscript.

References

Abbott, R. J. 1992: Plant invasions, interspecific hybridization and the evolution of new plant taxa. – Trends Ecol. Evol. **7(12):** 401-405. https://doi.org/10.1016/0169-5347(92)90020-c

—, Brennan, A. C., James, J. K., Forbes, D. G., Hegarty, M. J. & Hiscock, S. J. 2009: Recent hybrid origin and invasion of the British Isles by a self-incompatible species, Oxford ragwort (*Senecio squalidus* L., *Asteraceae*). – Biol. Inv. **11(5):** 1145-1158. https://doi.org/10.1007/s10530-008-9382-3

—, James, J. K., Forbes, D. G. & Comes H. P. 2002: Hybrid origin of the Oxford Ragwort, *Senecio squalidus* L.: morphological and allozyme differences between *S. squalidus* and *S. rupestris* Waldst. and Kit. – Watsonia **24:** 17-29.

—, Lowe, A. J. 2004: Origins, establishment and evolution of new polyploid species: *Senecio cambrensis* and *S. eboracensis* in the British isles. – Biol. J. Linn. Soc. **82(4):** 467-474. https://doi.org/10.1111/j.1095-8312.2004.00333.x

—, —, Milne, R. I. & Gillies, A. C. M. 2003: Plant introductions, hybridization and gene flow. – Philos. Trans. Roy. Soc. London, ser. B. (Biol. Sci.), **358 (1434):** 1123-1132. https://doi.org/10.1098/rstb.2003.1289

Agostini, R. 1959: Alcuni reperti interessanti della flora della Campania. – Delpinoa **1:** 42-68.

Albright, T. P., Chen, H., Chen, L. & Guo, Q. 2010: The ecological niche and reciprocal prediction of the disjunct distribution of an invasive species: the example of *Ailanthus altissima*. – Biol. Invas. **12:** 2413-2427. https://doi.org/10.1007/s10530-009-9652-8

Alessandrini, A., Fontanesi, G., Galasso, G., Morelli, V. & Sturloni, S. 2012: Integrazioni alla flora del Reggiano con alcune novità per la flora dell'Emilia-Romagna. – Inform. Bot., Ital. **44(suppl. 1):** 7-12.

Allan, E. & Pannell, J. R., 2009: Rapid divergence in physiological and life-history traits between northern and southern populations of the British introduced neo-species, *Senecio squalidus*. – Oikos **118(7):** 1053-1061. https://doi.org/10.1111/j.1600-0706.2009.17135.x

Arianoutsou, M., Delipetrou, P., Vilà, M., Dimitrakopoulos, P. G., Celesti-Grapow, L., Wardell-Johnson, G., Henderson, L., Fuentes, N., Ugarte-Mendes, E. & Rundel, P. W. 2013: Comparative Patterns of Plant Invasions in the Mediterranean Biome. – PLoS ONE **8(11):** e79174. https://doi.org/10.1371/journal.pone.0079174

Auquier, P. 1978: *Desmazeria sicula* (Jacq.) Dum. (*Poaceae*): adventice nouvelle pour la flore Belge. – Dumortiera **9:** 17-18.

Bacchetta, G., Brullo, S., Caputo, P., De Castro, O., Del Guacchio, E., Dettori, C. A., Giusso del Galdo, G., Grillo, O. & Piazza, C. 2016: Morphological and micro-morphological comparative study of *Genista etnensis* populations. – Notiz. Soc. Bot. Ital. **0:** 3-4.

Badalamenti, E., Barone, E., Pasta, S., Sala, G. & La Mantia, T. 2012. *Ailanthus altissima* (Mill.) Swingle (fam. *Simaroubaceae*) in Sicilia e cenni storici sulla sua introduzione in Italia. – Naturalista sicil., ser. 4, **36(1):** 117-164.

Barone, G., Domina, G., Bartolucci, F., Galasso, G. & Peruzzi, L. 2022. A nomenclatural and taxonomic revision of the *Senecio squalidus* group (*Asteraceae*). – Plants **11**: 2597. https://doi.org/10.3390/plants11192597

Bartolucci, F., Domina, G., Adorni, M., Argenti, C., Astuti, G., Bangoni, S., Buldrini, F., Campochiaro, M. B., Carruggio, F., Cecchi, L., Conti, F., Cristaudo, A., D'Amico, F. S., D'Auria, G., Di Gristina, E., Dunkel, F. G., Forte, L., Gangale, C., Ghillani, L., Gottschlich, G., Mantino, F., Mariotti, M., Novaro, C., Olivieri, N., Palladino, G., Pascale, M., Pepe, A., Perrino, E. V., Peruzzi, L., Picollo, S., Puntillo, D., Roma-Marzio, F., Rosiello, A., Russo, G., Santini, C., Selvi, F., Scafidi, F., Scoppola, A., Stinca, A., Villa, M. & Nepi, C., 2016: Notulae to the Italian native vascular flora: 2. – Ital. Bot. **2:** 73-92. https://doi.org/10.3897/italianbotanist.2.11060

—, —, Bagella, S., Barberis, G., Briozzo, I., Calbi, M., Caria, M. C., Cavallaro, V., Chianese, G., Cibei, C., Conti, F., Dagnino, D., Esposito, A., Galasso, G., Giacanelli, V., Forte, L., Gottschlich, G., Lattanzi, E., Longo, D., Mei, G., Merli, M., Orsenigo, S., Pau, G. B., Pazienza, G., Peccenini, S., Pisanu, S., Rivieccio, G., Roma-Marzio, F., Scafidi, F., Selvi, F., Stinca, A., Turcato, C. & Nepi, C. 2020: Notulae to the Italian native vascular flora: 10. – Ital. Bot. **10:** 47-55. https://doi.org/10.3897/italianbotanist.10.60743

Blossey, B. & Notzold, R. 1995: Evolution of increased competitive ability in invasive non-indigenous plants: a hypothesis. – J. Ecol. **83:** 887-889. https://doi.org/10.2307/2261425

Boccone, S. 1674: Icones et descriptiones rariorum plantarum Siciliae, Melitae, Galliae et Italiae quarum unaquaequae proprio charactere signata, ab aliis ejusdem classis facile distinguitur. Auctore Paulo Boccone Panormitano Siculo Serenissimi Magni Etruriae Dulcis olim Botanico. – Oxoniae.

Bock, D. G., Caseys, C., Cousens, R. D., Hahn, M. A., Heredia, S. M., Hübner, S., Turner, K. G., Whitney, K. D. & Rieseberg, L. H. 2015: What we still don't know about invasion genetics. – Mol. Ecol. **24(9):** 2277-2297. https://doi.org/10.1111/mec.13032.

Böhling, N., Greuter, W. & Raus, Th. 2002: Zeigerwerte der Gefäßpflanzen der Südägäis (Griechenland) - Indicator values of the vascular plants in the Southern Aegean (Greece). – Braun-Blanquetia **32:** 1-108.

Botham, M. S., Rothery, P., Hulme, P. E., Hill, M. O., Preston, C. D. & Roy, D. B. 2009: Do urban areas act as foci for the spread of alien plant species? An assessment of temporal trends in the UK. – Diversity Distrib. **15(2):** 338-345. https://doi.org/10.1111/j.1472-4642.2008.00539.x

Braasch, J., Barker, B. S. & Dlugosch, K. M. 2019: Expansion history and environmental suitability shape effective population size in a plant invasion. – Mol. Ecol. **28(10)**: 2546-2558. https://doi.org/10.1111/mec.15104.

Brennan, A. C., Hiscock, S. J. & Abbott, R. J. 2014: Interspecific crossing and genetic mapping reveal intrinsic genomic incompatibility between two *Senecio* species that form a hybrid zone on Mount Etna, Sicily. – Heredity **113:** 1-10. https://doi.org/10.1038/hdy.2014.14

Brullo, C. & Brullo, S. 2021: Flora endemica illustrata della Sicilia. – Reggio Calabria.

Brullo, S. 1980: Taxonomic and nomenclatural notes on the genus *Limonium* in Sicily. – Bot. Not. **133:** 281-293.

BSBI (= Botanical Society of Britain & Ireland) 2022a: *Genista aetnensis* distribution map. – https://bsbi.org/maps?taxonid=2cd4p9h.3v9 [Last accessed 8.3.2022]

— 2022b: *Limonium hyblaeum* distribution map. – https://bsbi.org/maps?taxonid=2cd4p9h.b73 [Last accessed 8.3.2022]

Burkart, A. 1952: Las Leguminosas Argentinas. – Buenos Aires.

Callaway, R. M. & Aschehoug, E. T. 2000: Invasive plants versus their new and old neighbors: a mechanism for exotic invasion. – Science **290:** 521-523. https://doi.org/10.1126/science.290.5491.521

Campagnaro, T., Brundu, G. & Sitzia, T. 2018: Five major invasive alien tree species in European Union forest habitat types of the Alpine and Continental biogeographical regions. – J. Nat. Cons. **43:** 227-238. https://doi.org/10.1016/j.jnc.2017.07.007.
Chapman, M. A., Hiscock, S. J. & Filatov, D. A. 2016: The genomic bases of morphological divergence and reproductive isolation driven by ecological speciation in *Senecio* (*Asteraceae*). – J. Evol. Biol. **29:** 98-113. https://doi.org/10.1111/jeb.12765
Colautti, R. I., Alexander, J. M., Dlugosch, K. M., Keller, S. R. & Sultan, S. E. 2017: Invasions and extinctions through the looking glass of evolutionary ecology. – Phil. Trans. R. Soc., ser. B, **372:** 20160031. https://doi.org/10.1098/rstb.2016.0031
— & Barrett, S. C. H. 2013: Rapid adaptation to climate facilitates range expansion of an invasive plant. – Science **342:** 364-366. https://doi.org/10.1126/science.1242121
— & Lau, J. A. 2015: Contemporary evolution during invasion: evidence for differentiation, natural selection, and local adaptation. – Mol. Ecol. **24(9):** 1999-2017. https://doi.org/10.1111/mec.13162.
—, Ricciardi, A., Grigorovich, I. A. & MacIsaac, H. J. 2004. Is invasion success explained by the enemy release hypothesis? – Ecol. Lett. **7:** 721-733. https://doi.org/10.1111/j.1461-0248.2004.00616.x
Commelijn, C. 1701: Horti Medici Amstelodamænsis Rariorum Tam Africanarum, quam Utriusque Indiæ, aliarum Peregrinarum, Plantarum Magno studio et labore, sumptibus Civitatis Amsteledæmensis longa annorum Serie collectarum, Descriptio & Icones Ad vivum æri incisæ. Pars Altera. – Amsteledæmi.
Conti, F., Manzi, A. & Pedrotti F. (eds) 1997: Liste Rosse Regionali delle Piante d'Italia. –Camerino.
Cowan, R., Ingrouille, M. J. & Lledò, M. D. 1998: The taxonomic treatment of agamosperms in the genus *Limonium* Mill. (*Plumbaginaceae*). – Folia Geobot. **33:** 353-366.
Cumoli, F. 2009: Dai campi al sottosuolo. Reclutamento e strategie di adattamento al lavoro dei minatori italiani in Belgio. – Storicamente **5:** Art. no. 6, 24 pp. https://doi.org/10.1473/stor290
Cupani, F. 1694: Syllabus Plantarum Siciliae nuper detectarum. – Panormi.
— 1696: Hortus Catholicus seu Illustrissimi et Excellentissimi Principis Catholicae Ducis Misilmeris […]. – Neapoli.
De Castro, O., Bacchetta, G., Brullo, S., Del Guacchio, E., Di Iorio, E., Piazza, C. & Caputo, P. *submitted*: Variability and nativeness in the Mediterranean taxa: divergence and phylogeography of *Genista etnensis* (Raf.) DC. (*Fabaceae*) inferred from nuclear and plastid data. – Flora
Dehnen-Schmutz, K. 2011: Determining non-invasiveness in ornamental plants to build green lists. – J. Appl. Ecol. **48:** 1374-1380. https://doi.org/10.1111/j.1365-2664.2011.02061.x
Delage, A. & Hugot, L. (eds) 2020: Atlas biogéographique de la flore de Corse. – Albiana.
Dlugosch, K. M., Cang, F. A., Barker, B. S., Andonian, K., Swope, S. M. & Rieseberg, L. H. 2015: Evolution of invasiveness through increased resource use in a vacant niche. – Nat. Pl. **1:** 15066. https://doi.org/10.1038/nplants.2015.66.
— & Parker, I. M. 2008: Founding events in species invasions: genetic variation, adaptive evolution, and the role of multiple introductions. – Mol. Ecol. **17(1):** 431-449. https://doi.org/10.1111/j.1365-294X.2007.03538.x.
Early, R. & Sax, D. F. 2014: Climatic niche shifts between species' native and naturalized ranges raise concern for ecological forecasts during invasions and climate change. – Glob. Ecol. Biogeogr. **23:** 1356-1365. https://doi.org/10.1111/geb.12208
Ellenberg, H., Weber, H. E., Düll, R., Wirth, V., Werne, W. & Paulissen, D. 1991: Zeigerwerte von Pflanzen in Mitteleuropa. – Scripta Geobot. **18(1):** 1-248.
Erben, M. 1986: Bemerkungen zur taxonomie der Gattung *Limonium*. 3. – Mitteil. Bot. Staatsamml. München **22:** 203-220.

Estoup, A., Ravigné, V., Hufbauer, R., Vitalis, R., Gautier, M. & Facon, B. 2016: Is there a genetic paradox of biological invasion? – Annu. Rev. Ecol. Evol. Syst. **47:** 51-72. https://doi.org/10.1146/annurev-ecolsys-121415–032116

Ferrero, V., Barrett, S. C. H., Castro, S., Caldeirihna, P., Navarro, L., Loureiro, J. & Rodríguez-Echeverría, S. 2015: Invasion genetics of the Bermuda buttercup (*Oxalis pes-caprae*): complex intercontinental patterns of genetic diversity, polyploidy and heterostyly characterize both native and introduced populations. – Mol. Ecol. **24(9):** 2143-2155. https://doi.org/10.1111/mec.13056

Fridlender, A. 2018: Observations sur le genêt d l'Etna en Corse: *Genista aetnensis* (Biv.) DC. subsp. *fraisseorum subsp. nova*. Bull. Mens. – Soc. Linn. Lyon **87(3-4):** 73-95.

Fuentes, N., Marticorena, A., Saldaña, A., Jerez, V., Ortiz, J. C., Victoriano, P., Moreno, R. A., Larraín, J., Villaseñor-Parada, C., Palfner, G., Sánchez, P., Pauchard, A. 2020: Multi-taxa inventory of naturalized species in Chile. – NeoBiota **60:** 25-41. https://doi.org/10.3897/neobiota.60.55366

Fuller, D. Q., Boivin, N., Hoogervorst, T. & Allaby, R. 2011: Across the Indian Ocean: the prehistoric movement of plants and animals. – Antiquity **85:** 544-558. http://antiquity.ac.uk/ant/085/ant0850544.htm

Gaudefroy, E. & Mouillefarine, E. 1871: Note sur des plantes méridionales observées aux environs de Paris ("Florula obsidionalis"). – Bull. Soc. Bot. France **18:** 246-252.

GBIF Secretariat 2021: *Lathyrus odoratus* L. GBIF Backbone Taxonomy. Checklist dataset. https://www.gbif.org/species/5356514 [Last accessed 8.3.2022]

Glen, H. F. 2002: Cultivated Plants of Southern Africa: Botanical Names, Common Names, Origins, literature. – Johannesburg.

Greuter, W. 2006: *Senecio squalidus*. In: W. Greuter, E. von Raab-Straube (eds), Euro+Med Plantbase - the information resource for Euro-Mediterranean plant diversity. http://ww2.bgbm.org/EuroPlusMed/PTaxonDetail.asp?NameCache=Senecio%20squalidus [Last accessed 8.3.2022]

Grotkopp, E. & Rejmánek, M. 2007: High seedling relative growth rate and specific leaf area are traits of invasive species: Phylogenetically independent contrasts of woody Angiosperms. – Amer. J. Bot. **94(4):** 526-532. https://doi.org/10.3732/ajb.94.4.526

Harris, S. A. 2002: Introduction of Oxford Ragwort, *Senecio squalidus* L. (*Asteraceae*), to the United Kingdom. – Watsonia **24(1):** 31-43.

Hayes, K. R. & Barry, S. C. 2008: Are there any consistent predictors of invasion success? – Biol. Invas. **10:** 483-506. https://doi.org/10.1007/s10530-007-9146-5

Heywood, V. & Brunel, S. 2008: Code of conduct on horticulture and invasive alien plants. Convention on the Conservation of European Wildlife and Natural Habitats. Standing Committee 28th meeting (Strasbourg, 24-27 November 2008) (http://www.plantnetwork.org/aliens/code_of_conduct_aliens_eu.pdf)

— & — 2011: Code of Conduct on Horticolture and Invasive Alien Plants. Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention). – Strasbourg.

Hierro, J. L., Maron, J. L. & Callaway, R. M. 2005. A biogeographical approach to plant invasions: the importance of studying exotics in their introduced *and* native range. – J. Ecol. **93:** 5-15. https://doi.org/10.1111/j.0022-0477.2004.00953.x

Hill, M. O., Mountford, J. O., Roy, D. B. & Bunce, R. G. H. (eds.), 1999: Ellenberg's indicator values for British plants. ECOFACT research Series, 2 Technical Annex. – Monks Wood.

—, Roy, D. B. & Thompson, K. 2002: Hemeroby, Urbanity and Ruderality: bioindicators of disturbance and human impact. – J. Appl. Ecol. **39(5):** 708-720.

Hrusa, F., Ertter, B., Sanders, A., Leppig, G. & Dean, E., 2002: Catalogue of non-native vascular plants occurring spontaneously in California beyond those addressed in The Jepson Manual. Part I. – Madroño **49:** 61-98.

Hulme, P. E., 2003. Biological invasions: winning the science battles but losing the conservation war? – Oryx **37:** 178-193. https://doi.org/10.1017/s003060530300036x

— 2011: Addressing the threat to biodiversity from botanic gardens. – Trends Ecol. Evol. **26:** 168-174. https://doi.org/10.1016/j.tree.2011.01.005

—, Bacher, S., Kenis, M., Klotz, S., Kuhn, I., Minchin, D., Nentwig, W., Olenin, S., Panov, V., Pergl, J., Pyšek, P., Roques, A., Sol, D., Solarz, W. & Vilà, M. 2008: Grasping at the routes of biological invasions: a framework to better integrate pathways into policy. – J. Appl. Ecol. **45:** 403-414.

Humair, F., Humair, L., Kuhn, F. & Kueffer, C. 2015: E-commerce trade in invasive plants. – Conserv. Biol. **29:** 1658-1665. https://doi.org/10.1111/cobi.12579

Ingrouille, M. J. 1981. A newly discovered *Limonium* in East Sussex. – Watsonia **13:** 181-184.

Inoue, T., Koike, Y., Miura, Y., Higuchi, H. & Sasaki, H. 2000: Growth behavior of sweet pea (*Lathyrus odoratus*) in Sicily Island (the place of origin) and history of differentiation of the flowering lines and varieties. – Jap. J. Agricult. Educ. **31:** 67-74.

Irimia, R. E., Hierro, J. L., Branco, S., Sotes, G., Cavieres, L. A., Eren, Ö., Lortie, C. J., French, K., Callaway, R. M. & Montesinos, D. 2021: Experimental admixture among geographically disjunct populations of an invasive plant yields a global mosaic of reproductive incompatibility and heterosis. – J. Ecol. **109:** 2152-2162. https://doi.org/10.1111/1365-2745.13628

IUCN/SSC-ISSG (Invasive Species Specialist Group) 2010: *Senecio squalidus*. – http://issg.org/database/species/ecology.asp?si=1653&fr=1&sts=&lang=EN [Last accessed 8.3.2022]

James, J. K. & Abbott R. J., 2005: Recent, allopatric, homoploid hybrid speciation: The origin of *Senecio squalidus* (*Asteraceae*) in the British Isles from a hybrid zone on Mount Etna, Sicily. – Evolution **59(12):** 2533-2547.

Jeanmonod, D. & Gamisans, J. 2013: Flora Corsica. 2nd Ed. – Koenigstein, Koeltz.

KBD (= Kew Backbone Distributions), The International Plant Names Index and World Checklist of Selected Plant Families 2022. *Lathyrus odoratus* L. The International Plant Names Index and World Checklist of Selected Plant Families 2022. http://powo.science.kew.org/taxon/urn:lsid:ipni.org:names:501909-1#source-KBD [Last accessed 8.3.2022]

Keane, R. M. & Crawley, M. J. 2002: Exotic plant invasions and the enemy release hypothesis. – Trends Ecol. Evol. **17:** 164-170.

Kowarik, I. & Säumel, I. 2007: Biological flora of Central Europe: *Ailanthus altissima* (Mill.) Swingle. – Persp. Pl. Ecol. Evol. Syst. **8(4):** 207-237. https://doi.org/10.1016/j.ppees.2007.03.002

Lack, H. W. 1996: Die frühe botanische Erforschung der Insel Kreta. – Ann. Naturhist. Mus. Wien **98B(Suppl.):** 183-236.

Lambdon, P. W., Lloret, F. & Hulme, P. E. 2008: How do introduction characteristics influence the invasion success of Mediterranean alien plants? – Persp. Pl. Ecol. Evol. Syst. **10(3):** 143-159. https://doi.org/10.1016/j.ppees.2007.12.004.

Lansdown, R. V. & Véla, E. 2019. *Desmazeria sicula*. The IUCN Red List of Threatened Species 2019: e.T13165092A18610018. http://dx.doi.org/10.2305/IUCN.UK.2019-3.RLTS.T13165092A18610018.en

Lau, J. A. & Schultheis, E. H. 2015: When two invasion hypotheses are better than one. – New Phytol. **205:** 958-960.

Leblond, N., Coulot, P. & Rabaute, Ph. 2020: *Genista aetnensis* (Biv.) DC. subsp. *aetnensis* en cours de naturalisation dans le Tarn-et-Garonne? – Carnets bot. Soc. Bot. Occitanie **16**. https://doi.org/10.34971/qc9k-1x58

Lee, C. E. 2002: Evolutionary genetics of invasive species. – Trends Ecol. Evol. **17:** 386-391.

Lowe, A. J. & Abbott, R. J., 2003: A new British species, *Senecio eboracensis* (Asteraceae), another hybrid derivative of *S. vulgaris* L. and *S. squalidus* L. – Watsonia **24:** 375-388.

Maroyi, A. 2006: Preliminary checklist of introduced and naturalized plants in Zimbabwe. – Kirkia **18(2):** 177-247.

Metcalfe, A. 2017: Dynamic Landscapes and Dominant Kin Groups: Hydronymy and Water-Management in Arab-Norman Western Sicily. Pp. 127-167 in: Jäckh, T. & Kirsch, M. (eds), 'Urban dynamics and transcultural communication in Medieval Sicily' (Mittelmeerstudien 17), Paderborn.

Muenscher, W. C. 1935: Weeds. – New York.

NBN Atlas 2022: *Genista aetnensis* (Raf. ex Biv.) DC. - Mount Etna Broom. https://species.nbnatlas.org/species/NBNSYS0000013930 [Last accessed 8.3.2022]

Nevado, B., Harris, S. A., Beaumont, M. A. & Hiscock, S. J. 2020: Rapid homoploid hybrid speciation in British gardens: The origin of Oxford ragwort (*Senecio squalidus*). – Mol. Ecol. **29(21):** 4221-4233. https://doi.org/10.1111/mec.15630

OABIF (= Online Atlas of the British & Irish Flora) 2022a: https://www.brc.ac.uk/plantatlas/plant/genista-aetnensis) [Last accessed 17.3.2022]

— 2022b: http://www.brc. ac.uk/plantatlas/index.php?q=plant/limonium hyblaeum [Last accessed 20.2.2022]

Orsenigo, S., Montagnani, C., Fenu, G., Gargano, D., Peruzzi, L., Abeli, T., Alessandrini, A., Bacchetta, G., Bartolucci, F., Bovio, M., Brullo, C., Brullo, S., Carta, A., Castello, M., Cogoni, D., Conti, F., Domina, G., Foggi, B., Gennai, M., Gigante, D., Iberite, M., Lasen, C., Magrini, S., Perrino, E. V., Prosser, F., Santangelo, A., Selvaggi, A., Stinca, A., Vagge, I., Villani, M., Wagensommer, R. P., Wilhalm, T., Tartaglini, N., Duprè, E., Blasi, C. & Rossi, G. 2018. Red Listing plants under full national responsibility: Extinction risk and threats in the vascular flora endemic to Italy. – Biol. Conserv. **224:** 213-222. https://doi.org/10.1016/j.biocon.2018.05.030

Pandit, M. K., Pocock, M. J. O. & Kunin, W. E. 2011: Ploidy influences rarity and invasiveness in plants. – J. Ecol. **99:** 1108-1115. https://doi.org/10.1111/j.1365-2745.2011.01838.x

Parker, I. M., Rodriguez, J. & Loik, M. E. 2003: An evolutionary approach to understanding the biology of invasions: local adaptation and general-purpose genotypes in the weed *Verbascum thapsus*. – Conserv. Biol. **17:** 59-72. https://doi.org/10.1046/j.1523-1739.2003.02019.x

Parsons, R. F. 2013: *Limonium hyblaeum* (Plumbaginaceae), a cushion plant invading coastal southern Australia. – Cunninghamia **13:** 267-274. https://doi.org/10.7751/cunninghamia.2013.004

Pasta, S. *submitted*-a: *Cistus ×skanbergi* Lojac., the 'phoenix' hybrid that became extinct in its locus classicus to revive in the web. – Nat. Hist. Sci.

– – *submitted*-b: *Limonium hyblaeum* Brullo (*Plumbaginaceae*) and the "Mr. Hyde syndrome" of narrow endemic plants turning invasive abroad. – In: Galanidis, A. & Dimitrakopoulos, P. (eds.), "Recent Studies of Invasion Ecology in the Mediterranean Basin". Diversity (Special Issue)

– – *submitted*-c: From Mount Etna to Oxford and beyond: the wonderful story of recent evolution and spread of some ragwort species (genus *Senecio* L., *Asteraceae*). – Biodiv. J.

Peruzzi, L., Galasso, G., Domina, G., Bartolucci, F., Santangelo, A., Alessandrini, A., Astuti, G., D'antraccoli, M., Roma-Marzio, F., Ardenghi, N. M. G., Barberis, G., Conti, F., Bernardo, L., Peccenini, S., Stinca, A., Wagensommer, R. P., Bonari, G., Iamonico, D., Iberite, M., Viciani, D., Del Guacchio, E., Del Galdo, G. G., Lastrucci, L., Villani, M., Brunu, A., Magrini, S., Pistarino, A., Brullo, S., Salmeri, C., Brundu, G., Clementi, M., Carli, E., Vacca, G., Marcucci, R., Banfi, E., Longo, D., Di Pietro, R. & Passalacqua, N. G. 2019: An inventory of the names of native, non-endemic vascular plants described from Italy, their loci classici and types. – Phytotaxa **410(1):** 1-215. https://doi.org/10.11646/phytotaxa.410.1.1

Piazza, C. & Paradis, G. 2000: Description phytosociologiques et cartographique de la vegetation du cordon littoral de Palo (côte orientale de la Corse). – Bull. Soc. Bot. Centre-Ouest **31:** 115-170.

Pignatti, S., Guarino, R. & La Rosa, M. (eds) 2017-2019: Flora d'Italia. 2a Ed & Flora Digitale. – Bologna - Milano, Edagricole-New Business Media.

Polymenakos, K. & Tan, K. 2012: Reports 106-113. In: Vladimirov, V., Dane, F., Matevski, V. & Kit, T. (eds), New floristic records in the Balkans: 18. – Phytol. Balc. **18(1):** 69-92.

Prentis, P. J., Wilson, J. R., Dormontt, E. E, Richardson, D. M. & Lowe, A. J., 2008. Adaptive evolution in invasive species. – Trends Pl. Sci. **13(6)**: 288-294. https://doi.org/10.1016/j.tplants.2008.03.004.

Pulvirenti, S., Costa, R. M. S. & Pavone, P. 2015: Francesco Cupani: "the scientific network" of his time and the making of the Linnaean "system". – Acta Bot. Gallica **162(3):** 215-223. https://doi.org/10.1080/12538078.2015.1039580.

Punnett, R.C. 1923: Linkage in the sweet pea (*Lathyrus odoratus*). – J. of Genetics **13:** 101-123.

Pyšek, P., Bacher, S., Kuhn, I., Novoa, A., Catford, J. A., Hulme, P. E., Pergl, J., Richardson, D. M., Wilson, J. R. U. & Blackburn, T. M. 2020: MAcroecological Framework for Invasive Aliens (MAFIA): disentangling large-scale context dependence in biological invasions. In: Wilson, J.R., Bacher, S., Daehler, C.C., Groom, Q.J., Kumschick, S., Lockwood, J. L., Robinson, T. B., Zengeya, T. A. & Richardson, D. M. (eds.), Frameworks used in Invasion Science. – NeoBiota **62:** 407-461. https://doi.org/10.3897/neobiota.62.52787

Raimondo, F. M. 2012: Piante invasive e ripercussioni su paesaggio e beni architettonici: il caso di *Ailanthus altissima* (*Simaroubaceae*). Pp. 113-123 in: Atti del Convegno nazionale AIAR "Sistemi biologici e Beni culturali." (Palermo 6-7 Ottobre 2009). – Palermo.

Rice, G., 2002: From the wild to our gardens. – London.

Rieseberg, L. H., Kim, S. C., Randell, R. A., Whitney, K. D., Gross, B. L., Lexer, C. & Clay, K. 2007: Hybridization and the colonization of novel habitats by annual sunflowers. – Genetica **129(2):** 149-165. https://doi.org/10.1007/s10709-006-9011-y

Rivers, M. C. & Beech, E. 2017: *Genista aetnensis*. The IUCN Red List of Threatened Species 2017: e.T79727282A79727286. https://dx.doi.org/10.2305/IUCN.UK.2017-3.RLTS.T79727282A79727286.en. [Last accessed 16.3.2022]

Robbins, W. W. 1940: Alien plants growing without cultivation in California. – Bull. Coll. Agric., Agric. Exp. Sta., Berkeley, California **637:** 1-128.

Rocha, C. F. D. & Bergallo, H. G. 2012: When invasive exotic populations are threatened with extinction. – Biodiv. Conserv. **21:** 3729-3730. https://doi.org/10.1007/s10531-012-0392-1

Rosche, C., Mráz Durka, W. & Lachmuth, S. 2017: Invasion success in polyploids: the role of inbreeding in the contrasting colonization abilities of diploid versus tetraploid populations of *Centaurea stoebe s.l.* – J. Ecol. **105(2):** 425-435. https://doi.org/10.1111/1365-2745.12670

Roskov, Y. R., Bisby, F. A., Zarucchi, J. & Novoselova, M. 2014: World Database of Legumes. In: Bánki, O., Roskov, Y., Döring, M., Ower, G., Vandepitte, L., Hobern, D., Remsen, D., Schalk, P., DeWalt, R. E., Keping, M., Miller, J., Orrell, T., Aalbu, R., Adlard, R., Adriaenssens, E., Aedo, C., Aescht, E., Akkari, N., Alonso-Zarazaga, M. A., & al. (eds), Catalogue of Life Checklist (12, May 2014). https://doi.org/10.48580/d4tn-382 [Last accessed 8.3.2022]

Rottenberg, A. & Zohary, D. 1996: The wild ancestry of the cultivated artichoke. – Genet. Resour. Crop Evol. **43:** 53-58.

Roy, D. B., Alderman, D., Anastasiou, P., Arianoutsou, M., Augustin, S., Bacher, S., Başnou, C., Beisel, J., Bertolino, S., Bonesi, L., Bretagnolle, F., Chapuis, J. L., Chauvel, B., Chiron, F., Clergeau, P., Cooper, J., Cunha, T., Delipetrou, P., Desprez-Loustau, M., Détaint, M., Devin, S., Didžiulis, V., Essl, F., Galil, B.S., Genovesi, P., Gherardi, F., Gollasch, S., Hejda, M., Hulme, P. E., Josefsson, M., Kark, S., Kauhala, K., Kenis, M., Klotz, S., Kobelt, M., Kühn, I., Lambdon, P. W., Larsson, T., Lopez-Vaamonde, C., Lorvelec, O., Marchante, H., Minchin, D., Nentwig, W., Occhipinti-Ambrogi, A., Olenin, S., Olenina, I., Ovcharenko, I., Panov, V. E., Pascal, M., Pergl, J., Perglová, I., Pino, J., Pyšek, P., Rabitsch, W., Rasplus, J., Rathod, B., Roques, A., Roy, H., Sauvard, D., Scalera, R., Shiganova, T.A., Shirley, S., Shwartz, A., Solarz, W., Vilà, M., Winter, M., Yésou, P., Zaiko, A., Adriaens, T., Desmet, P. & Reyserhove, L. (eds.), 2020: *Limonium hyblaeum* Brullo. In: DAISIE - Inventory of alien invasive species in Europe. Version 1.7. Research Institute for Nature and Forest (INBO). Checklist dataset https://doi.org/10.15468/ybwd3x [Last accessed 3.2.2022 via GBIF.org].

Schierenbeck, K. A. & Ellstrand, N. C. 2009: Hybridization and the evolution of invasiveness in plants and other organisms. – Biol. Invas. **11:** 1093-1105.

Sciandrello, S., Minissale, P. & Giusso del Galdo, G. 2020: Vascular plant species diversity of Mt. Etna (Sicily): endemicity, insularity and spatial patterns along the altitudinal gradient of the highest active volcano in Europe. – PeerJ **8:** e9875. http://doi.org/10.7717/peerj.9875

Seebens, H., Blackburn, T. M., Dyer, E. E., Genovesi, P., Hulme, P.E., Jeschke, J. M., Pagad, S., Pyšek, P., Winter, M., Arianoutso,u M., Bacher, S., Blasius, B., Brundu, G., Capinha, C., Celesti-Grapow, L., Dawson, W., Dullinger, S., Fuentes, N., Jäger, H., Kartesz, J., Kenis, M., Kreft, H., Kühn, I., Lenzner, B., Liebhold, A., Mosena, A., Moser, D., Nishino, M., Pearman, D., Pergl, J., Rabitsch, W., Rojas-Sandoval, J., Roques, A., Rorke, S., Rossinelli, S., Roy, H. E., Scalera, R., Schindler, S., Štajerová, K., Tokarska-Guzik, B., van Kleunen, M., Walker, K., Weigelt, P., Yamanaka, T. & Essl, F. 2017: No saturation in the accumulation of alien species worldwide. – Nat. Commun. **8:** 14435. https://doi.org/10.1038/ncomms14435

Sharma, B. D., Shetty, B. V., Vajravelu, E., Kumari, G. R., Vivekananthan, K., Chandrabose, M., Swaminathan, M. S., Chandrasekaran, R., Subba Rao, G. V., Ellis, J. L., Rathakrishnan, N. C., Karthikeyan, S., Chandrasekaran, V. & Srinivasan, S. R. 1977: Flora of Nilgiris, Tamil Nadu. – Biol. Mem. **2(1-2):** 1-186.

Smith, A. L., Hodkinson, T. R., Villellas, J., Catford, J.A., Csergő, A. M., Blomberg, S. P., Crone, E. E., Ehrlén, J., Garcia, M. B., Laine, A. L., Roach, D. A., Salguero-Gómez, R., Wardle, G. M., Childs, D. Z., Elderd, B. D., Finn, A., Munné-Bosch, S., Baudraz, M. E. A., Bódis, J., Brearley, F. Q., Bucharova, A., Caruso, C. M., Duncan R. P., Dwyer, J. M., Gooden, B., Groenteman, R., Hamre, L. N., Helm, A., Kelly, R., Laanisto, L., Lonati, M., Moore, J. L., Morales, M., Olsen, S. L., Pärtel, M., Petry, W. K., Ramula, S., Rasmussen, P. U., Enri S. R., Roeder, A., Roscher, C., Saastamoinen, M., Tack, A. J. M., Töpper, J. P., Vose, G. E., Wandrag, E. M., Wingler, A. & Buckley, Y. M. 2020: Global gene flow releases invasive plants from environmental constraints on genetic diversity. – PNAS **117(8):** 4218-4227. https://doi.org/10.1073/pnas.1915848117.

Spencer, R. 2002: *Fabaceae*. In: Spencer R. (ed.), Horticultural Flora of South-eastern Australia, **3.** – Sydney.

Stastny, M., Russell-Mercier ,J. L. & Sargent, R. D. 2020: No evidence that rapid adaptation impedes biological control of an invasive plant. – Evol. Applic. **13(9):** 2472-2483. https://doi.org/10.1111/eva.13053

Stastny, M. & Sargent, R. D. 2017: Evidence for rapid evolutionary change in an invasive plant in response to biological control. – J. Evol. Biol. **30:** 1042-1052. https://doi.org/10.1111/jeb.13078

Stebbins, G. L. 1985: Polyploidy, hybridization, and the invasion of new habitats. – Ann. Missouri Bot. Gard. **72:** 824-832.

Stinca, A., Chirico, G. B., Incerti, G. & Bonanomi, G. 2015: Regime shift by an exotic nitrogen-fixing shrub mediates plant facilitation in primary succession. – PLoS ONE **10(4):** e0123128. https://doi.org/10.1371/journal.pone.0123128

te Beest, M., Le Roux, J. J., Richardson, D. M., Brysting, A. K., Suda, J., Kubesová, M. & Pyšek, P. 2012: The more the better? The role of polyploidy in facilitating plant invasions. – Ann. Bot. **109:** 19-45. https://doi.org/10.1093/aob/mcr277

Thellung, A. 1919: Beiträge zur Adventivflora der Schweiz (III). – Mitteil. Bot. Mus. Univ. Zürich **83:** 684-815.

Tongiorgi Tomasi, L. 1984: L'isola dei semplici. – Kos **1(5):** 61-84.

Torbjörn, T., Herbertsson, l., Olofsson, J. & Olsson, P. A. 2021: Ecological indicator and traits values for Swedish vascular plants. – Ecol. Indicators **120:** 106923. https://doi.org/10.1016/j.ecolind.2020.106923.

Unwin, C. W. J. 1952: Sweet peas, their history, development, culture. – Cambridge.
Upson, R. & Lewis, R. 2014: Updated vascular plant checklist and atlas for the Falkland Islands. – Kew.
USDA-ARS 2010: *Senecio squalidus* L. National Genetic Resources Program, Germplasm Resources Information Network (GRIN). – Beltsville.
USDA-NRCS 2010: *Senecio squalidus* L. - Oxford ragwort. The PLANTS Database. –National Plant Data Center, Baton Rouge, LA, USA. (http://plants.usda.gov)
Verloove, F. 2006: Catalogue of neophytes in Belgium Catalogue of neophytes in Belgium (1800-2005). – Meise.
Walsh, N. G. 1996: *Plumbaginaceae*. – Pp. 296-299 in: Walsh, N. G. & Entwisle T. J. (eds), Flora of Victoria, **3.** – Melbourne.
Widmer, T. L., Guermache, F., Dolgovskaia, M. Y. & Reznik, S. Y. 2007: Enhanced growth and seed properties in introduced vs. native populations of Yellow Starthistle (*Centaurea solstitialis*). – Weed Sci. **55(5):** 465-473.
Yakimowski, S. B. & Rieseberg, L. H. 2014: The role of homoploid hybridization in evolution: a century of studies synthesizing genetics and ecology. – Amer. J. Bot. **101(8):** 1247-1258. https://doi.org/10.3732/ajb.1400201.

Address of the author:
Salvatore Pasta,
Istituto di Bioscienze e BioRisorse (IBBR), Consiglio Nazionale delle Ricerche (CNR), UOS di Palermo, Corso Calatafimi 414, I-90129, Palermo, Italy. E-mail: salvatore.pasta@iibbr.cnr.it