

Distribution and conservation status of littoral vascular plant species along the European coasts

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Abstract. A comprehensive list of 1068 typical littoral plant species and subspecies has been composed. They are considered endemic in a wide sense and are subdivided into widespread, transregional, regional and local endemics, the latter three categories being considered as endemics s.s. For each taxon the distribution, habitat preference, endemic status and conservation status are given. The list, which is available upon request, is summarized in a number of figures and tables, from which it appears that 61 % of all species are endemics s.s., that ca. 30 % of all species are dune and beach species and another nearly 30 % are maritime rock species. Species of wet habitats are concentrated in northern and northwestern Europe, dune species in western and southwestern Europe, western Mediterranean and Black Sea. The conservation status of most species is indicated; 37 % is considered threatened. It is concluded that the Bern Convention and the European Habitat Directive offer an entirely insufficient framework for effective conservation action. It is suggested to take the present list as a starting point for a geographical/taxonomical/ecological data base of European coastal endemics.

Keywords: Cliff; Dune; Endemic; Saline water; Salt flat; Salt marsh.

Nomenclature: Names of vascular plants according to Tutin et al. (1964-1980); for names of species not treated there, see various local studies mentioned in the References.

Introduction

During the preparation of an ecological survey of coastal shores, dunes and cliffs in Europe, as part of a three-volume study of the 'Dry Coastal Ecosystems of the World' (van der Maarel 1993a) the authors of the many regional chapters were asked to provide information on the occurrence of endemic littoral plant species in the area they were to describe. In addition we received some more detailed surveys and separate publications on this matter. We ourselves had already started a list of typically littoral plant species and subspecies, i.e. species which are restricted, or largely so, to the coastal zone. While summarizing and integrating this informa-

tion for a chapter on the world biogeography of coastal ecosystems (van der Maarel & van der Maarel-Versluys in press) it occurred to us that this material was worthwhile elaborating for the sake of coastal conservation in Europe. Thus, we decided to complete the list, and also include species from 'wet coastal' ecosystems, i.e. salt marshes, tidal flats and saline waters (e.g. lagoons).

It should be clear from the beginning that many of these typically coastal species do not have a prominent role in the composition and structure of coastal plant communities, although some of them do, such as *Ammophila arenaria* (Marram grass) and *Hippophae rhamnoides* ssp. *maritima* (Sea buckthorn) in the dunes and *Puccinellia maritima* (Common salt-marsh grass) on salt marshes. On the other hand, many species dominating in coastal habitats are not confined to them, e.g. *Phragmites australis* (Common reed) in dune slacks, several willow (*Salix*) species in boreal and temperate dunes and several juniper (*Juniperus*) and oak (*Quercus*) species on Mediterranean dunes. Still, the exclusively coastal element in the coastal flora is very important, particularly in the outer zones (salt marshes, beaches, foredunes and maritime rocks under salt spray).

The European coastline is under growing pressure of urban-industrial and recreational development and its nutrient-poor and moist habitats suffer from nutrient enrichment and water extraction. We do not always realize how relatively small the areas occupied by coastal ecosystems are and how vulnerable the coastal flora is. We hope that this survey may ring some bells and may serve as a starting point for more systematic attempts to preserve the biodiversity of coastal plants.

Material and Methods

Selection of areas and species

Floristically, this survey is largely based on the delimitation, taxonomy and nomenclature of *Flora Europaea* (Fl. Eur.). The survey thus concerns the European continent including the European part of the former

Soviet Union, the European Atlantic islands and Mediterranean islands, but excluding the Macaronesian islands belonging to Spain, which are biogeographically different. They deserve a separate treatment, together with the Açores, treated in Fl. Eur., but left out in this survey. The Mediterranean coasts of Turkey, Turkish Aegean islands, Cyprus and other countries of Asia Minor are excluded because they are not included in Fl. Eur.

Additional floristic information was included for various regions for which detailed studies of the coastal flora and plant communities are available, notably the British Isles, France, the Iberian peninsula and the eastern Adriatic coast. This often regards taxonomically 'small' species, which were not recognized or accepted in Fl. Eur. Because of the often clearly distinct morphology and ecology of subspecies as recognized in Fl. Eur. (many of which are locally interpreted as species) we decided to include all subspecies in this survey. When no misunderstanding can occur we use the term species.

It is known that many plant species with an inland distribution have developed special coastal ecotypes with a different habitat preference, especially on dunes and cliffs. Akeroyd (in press) listed and commented on almost 100 European cases. Most of them have been given a taxonomic status below the level of subspecies and are not included in our survey. It is feasible that many of them are raised in taxonomic rank and/or that we should adopt the variety as the lowest taxonomic level to be included in the list.

A separate problem is formed by three very large genera: *Centaurea*, *Hieracium* and *Taraxacum* in the *Asteraceae*, and *Limonium* in the *Plumbaginaceae*. Many of the species in these genera are insufficiently known regarding their geographical distribution and ecology and can only be distinguished by specialists. We have only included species from these genera if the sources available to us were sufficiently explicit. As a result, the genera *Centaurea* and *Limonium* are well represented, the other two are not. This can be explained by two particular aspects: (1) these genera are well differentiated in the Mediterranean where many species have evolved in coastal habitats, and (2) phytosociologists have been active in describing plant communities and habitats of many of the species. In northern and north-western Europe there are several coastal areas which have been less intensively analyzed phytosociologically, and typical coastal taxa of lower rank may be distinguished there in the future.

Geographical range of species

In order to be able to present the results in a comprehensible form we adopted a division into phytogeographical regions, which fits the system of floristic regions of the world by Takhtajan (1969) as used by van der Maarel (1993b). These regions, as far as they occur in Europe, were subdivided into smaller regions as they are often used in a biogeographical connection, such as the Baltic region, western Europe and eastern Mediterranean. When detailed information was available on a sufficient number of locally occurring species, still smaller units were distinguished within these subregions, i.e. nations and some islands known for the accumulation of endemics, mentioned separately in Fl. Eur. Smaller and larger regions were, as far as possible, arranged in a hierarchical system and to the effect that characteristic species are listed for each category distinguished. Most of the Arctic-Subarctic coastal species occurring in Europe are widespread circumpolar species. There are also boreal and temperate species occurring both in Europe and in either North America or Asia, or both. Their number is much less, however; such species are included in the European region they are restricted to. Table 1 presents the hierarchy of regions. Note that group E refers to species occurring throughout Europe, whereas groups EA (Arctic-Subarctic), EW (western and southern Europe) and EWM (Mediterranean) refer to large parts of Europe.

The geographical range of the littoral species varies from widespread and common species such as the salt marsh species *Glaux maritima*, to very local endemics such as *Biscutella vincentina*, occurring on coastal rocks near Cabo São Vicente in SW Portugal. Naturally, our prime interest is in the endemic taxa (Krukeberg & Rabinowitz 1985). However, in the framework of this study it was not possible to determine the kind of endemism involved (Favarger & Contandriopoulos 1961). For the purpose of this study we divide the typical littoral species in four categories, mainly on the criterion of the relative extension of the distribution area (cf. Kohler 1970; Gaston 1991):

- local endemics,
- regional endemics,
- transregional endemics and
- widespread species.

The boundaries between these categories are not very sharp. Generally a species is called a local endemic if it occurs locally within a province or county, or at two or three places in adjoining provinces, and a regional endemic if it occurs in a large region covering several, usually neighbouring provinces. Transregional endemics occur in larger geographical units such as the British Isles or the Black Sea region; they are usually not

Table 1. Hierarchy of coastal regions with numbers of typical coastal species found in each region.

E: most of Europe	(32)	
EA: Arctic-Subarctic	(13)	
	EAL: Low Arctic (boreal)	(9)
	EAE: (Sub-) Arctic Europe	(14)
EN: N, NW Europe	(8)	
	ENN: N Europe	(4)
	ENW: NW Europe	(36)
	ENWB: Frisian - Baltic	(24)
EW: W, S Europe	(52)	
(Black Sea)		
	EWB: W Europe	(61)
	EWWB: British Isles	(40)
	EWWF: Atlantic France	(23)
	EWWS: SW Europe	(18)
	(SW France, N Portugal)	
	EWWSB: Bay of Biscay	(17)
	EWM: Mediterranean	(99)
	EWMW: W Mediterranean	(36)
	EWMWI: Iberian	(32)
	(- EWWS)	
	EWMWIP: C, S Portugal	(43)
	EWMWIS: Spain	(63)
	EWMWIB: Balearic Isl.	(41)
	EWMC: C Mediterranean	(12)
	EWMCL: Ligurian	(5)
	EWMCC: Corsica, Sardinia	(38)
	EWMCS: Sicily, Malta	(38)
	EWMCI: Italy	(40)
	EWMA: E Adriatic	(41)
	EWMAL: Liburnian	(34)
	EWMAD: Dalmatian	(25)
	EWMAV: Vardean	14)
	EWME: E Mediterranean	(29)
	EWMEG: Greece, Aegean islands	(60)
	EWMEK: Crete	(18)
	EWB: Black Sea	(45)
	EWBK: Crymea	(6)

considered endemics, but as a matter of fact they are, in that their actual distribution area is relatively small because of the narrow coastal zone they are restricted to; widespread species characterize still larger units such as western Europe and the Mediterranean, or even in more than one such unit.

Many species have their main distribution and optimal habitat in a coastal ecosystem, but are also found inland. These are mainly salt marsh species which also occur in dry continental, often saline habitats, for example *Halimione pedunculata*, and dry dune species occurring in inland sandy areas, e.g. *Helichrysum arenarium*. Other species are mainly distributed inland, but are represented in coastal ecosystems as well. Inasmuch as the

coastal populations of such species are isolated from the inland ones they may be considered as potentially littoral units, which may develop into a taxon of their own. They are also often considered character species of typically coastal plant community types. Some of them, e.g. *Lactuca tatarica*, character species of the association *Lactuco-Ammophiletum*, are confined to a small area, i.e. the Baltic coast of Germany and some of the Wadden islands, and are potential coastal endemics. As an indication of this potential we may mention the development, on the island Hiddensee off the German Baltic coast, of a white-flowered form, var. *hiddenseensis* (Hundt 1993). Therefore we consider it realistic to include such species in our survey.

This phenomenon is even more pronounced in the southeastern Mediterranean, where several littoral endemic species and subspecies occur which are closely related to inland desert species (Shmida 1984; Auerbach & Shmida 1985; Randall 1993). This area falls beyond the scope of this paper, however.

In several cases coastal forms of species with both a coastal and inland distribution have been assigned the status of subspecies, which, according to our knowledge, has not been confirmed in more general taxonomic works, neither mentioned by the specialists we consulted. Such provisional taxa, mainly Mediterranean ones, have not been included.

Habitat preference

There is a wide variety of habitats in which littoral species may occur, and there are several classification systems available. For the purpose of this survey we used simple categories as found in Chapman (1977) for wet and van der Maarel (1993b) for dry coastal ecosystems. We distinguish:

- shores, coastal fringes of low-lying land - dominating in Arctic and Boreal regions;
- salt marshes and salt flats;
- saline waters (e.g. lagoons);
- beaches, including shingle and pebble beaches, and sand flats;
- dunes;
- maritime rocks, including sea cliffs, and coastal slopes.

The category 'dunes' is diverse, including seaward dunes, dry dunes, dune slacks, dune lakes, dune scrub and dune woodland. However, most of the littoral dune species are restricted to the outer dune zones, i.e. seaward dunes and primary dune slacks.

Several species occur in more than one category, for instance, cliffs and salt marshes, cliffs and dunes, beaches and salt marshes. In order to simplify the statistics, the habitats of such species are summarized as either 'wet habitats' or 'dry habitats'. Note that wet dune slacks and dune lakes are included in 'dry habitats'! In other words, the wet habitats include the halosere, the dry habitats include the xerosere, hygrosere and hydrosere (Westhoff 1947).

Conservation status

Under this heading we combine data and (much more often) estimations concerning the overall rarity of the species, known or presumed changes in distribution area and population size, and known or assumed sensitivity to environmental disturbances, particularly eutrophication. Nowadays, much attention is paid to the state of the populations of rare species. Several systems with

a usually small number of categories are in use, particularly in relation to 'Red List' projects. Coastal species are generally strongly underrepresented in such systems. For instance, in the List of 'strictly protected flora species' (note the unscientific expression) added to the so-called Bern Convention (Anon. 1979), only 26 coastal species are listed.

Good use was made of a list for Italy (Conti et al. 1992), which was screened for coastal species by S. Pignatti (pers. comm.). Another source for checking the conservation category of species is the 'List of rare, threatened and endemic plants in Europe' compiled by the IUCN Threatened Plants Committee (Anon. 1977). This survey contains both a list for Europe, with over 1800 species and subspecies, and lists for the individual countries and important islands, with endemics, over 1700 in total, but it does not add habitat indications. Although this survey was useful for determining the status of ca. 100 coastal species, it does not seem to cover in the least the wealth of endemic and/or otherwise threatened species.

For the purpose of our survey we adopted four general categories:

- (1) declining, threatened, or probably extinct;
- (2) status uncertain, but attention needed;
- (3) no major changes known; probably stable, or advancing;
- (4) unknown.

Allocation of species to these categories refers to the entire distribution area of the species involved. Allocation of a species to any category is based on (a) estimated or presumed total population size, (b) possible threats resulting from environmental changes, (c) actual information obtained from local experts on decreasing or increasing distribution area, and (d) information obtained from major publications on the flora and vegetation of regions.

As to (a), this is mainly based on the size of the distribution area, which generally means that the conservation status is less critical in view of the larger distribution area. As to (b), species sensitive to eutrophication and to lowering of the phreatic level and species of dry open habitats are generally considered to be potentially in danger of being reduced in population size. As to (c), this information was obtained for only part of the regions and species involved. As to (d), a general source of reference here is van der Maarel (1993a) and general publications cited in the various chapters on regional dry coastal ecosystems in this book. Table 2 lists the most important publications per region.

Results and Discussion

Comprehensive species list

In total 1068 species and subspecies are included. The entire list, with authorities to the names, is available upon request from the authors; the list is also included in van der Maarel & van der Maarel-Versluys (in press). The high number of typical coastal taxa may surprise many. As far as we know, and as indicated in the Material and Methods section, most species included have not yet been listed in any conservation context. As such, the list may serve as a starting point for a more explicit and integrated coastal plant species conservation program.

No doubt the list is not definitive. Both our own work and that of our advisors will not be complete and completely correct. There may still be more coastal species and subspecies hidden in the literature; new taxa may also be expected to be found, particularly in certain eastern Mediterranean areas. On the other hand, species may have to be deleted, because (1) they were incorrectly included, (2) their status as a separate taxon is doubted in later taxonomical works, notably in the new edition of *Flora Europaea* under preparation, and (3) species may become extinct; on this latter point the present study cannot provide any data.

Relative importance of littoral species

The total number of coastal species can be compared first of all with the total number in the European countries included. Fl. Eur. mentions 11 557 species in 1541 genera. On the basis of the regional studies consulted for this survey (Table 2), which gave hundreds of new species, we estimate that a more realistic estimate would be 12 000. On the other hand, the non-European species and genera on the Açores included in Fl. Eur. must be subtracted. As to subspecies, Fl. Eur. is somewhat uneven in that for certain genera and families many more subspecies are recognized than for others, depending on the personal opinion of the specialists involved. On the basis of a random sample of 1200 species we estimate the number of additional subspecies to be 15 %. In addition there are many hundreds of 'small species' described but not numbered in Fl. Eur., particularly in species-rich genera such as the ones mentioned above. Therefore, we adopt 15 000 as our reference number of species and subspecies.

The conclusion is that the typically coastal species of Europe make up 7 % of the total European flora. This is not a high percentage as such, but it should be commented upon in the following way. First of all, many more species occur in the coastal ecosystems than the

Table 2. Major publications on flora and vegetation of European coastal regions – arranged from north to south – used for allocation of species to conservation status categories.

E Europe: Beeftink (1977); Dijkema et al. (1984); Géhu (1985).

A Low Arctic: Van der Maarel (1993d);

Iceland: Bjarnason (1983); Hadač (1969); Steindórsson 1976); Tüxen (1970);

N Norway: Thannheiser (1974).

EN N Europe: Hultén (1950); Lid (1985); Pålsson (1994).

ENW NW Europe:

S and C Norway: Lundberg (1993);

Denmark: Hansen (1981); Jensen (1993); Vestergaard (1989a, b);

S Sweden and Baltic region: Cramer (1993); Ericson and Wallentinus (1977); Hundt (1993); Krok and Almquist (1994); Olsson (1974); Rebassoo (1975); Wojterski (1993);

Wadden Sea region: Dijkema and Wolff (1983); Dijkema et al. (1993).

EW W Europe:

Netherlands, Belgium: Mennema (1994); Schaminée et al. (1995);

Westhoff (1947); Van der Maarel (1966); Van der Meulen and

Van der Maarel (1993); Westhoff and den Held (1969);

British Isles: Adam (1981); Boorman (1993); Clapham et al. (1987); Malloch (1993); Stace (1991); Rodwell (1991-1996); White & Doyle (1982);

France: Géhu (1975, 1978); Géhu & Géhu-Franck (1969, 1984, 1993).

EWS SW Europe: Izco (1993).

EWM Mediterranean:

W Mediterranean: Izco et al. (1984);

Portugal: Asensi Marfil et al. (1993); Diez Garretas (1984);

Spain: Asensi Marfil & Diez Garretas (1993); García Novo & Merino (1993); Rivas-Martínez et al. (1980);

Islas Baleares: de Bolòs et al. (1970); Llorens et al. (1992); Rivas-Martínez et al. (1992a, b);

France, NW Italy: Corre (1993);

Corse: Dierschke (1975);

Italy: Conti et al. (1992); Géhu et al. (1984a-c); Pignatti (1982, 1993);

W Balkan: Lovrić (1993a, b);

E Mediterranean: Géhu et al. (1984a, 1990);

Greece: Lavrentiades (1964, 1993), Wolff (1968);

Kriti: Géhu et al. (1987).

EMB Black Sea region: Lovrić (1993c); Vicherek (1971, 1972).

typically coastal ones. From inventories available in the Netherlands and in Britain we estimate that ca. 70 % of the European lowland flora is also found in the dunes. This includes particularly species of dry and wet grasslands, marshes, lakes, heathland, scrub, woodlands and ruderal habitat. Only species of peat bogs and limestone areas, and also montane and alpine habitats are much less or not at all represented. Since most of the coastal species can be considered endemics, a more realistic comparison would be with the endemics mentioned in Fl. Eur. The latter number appears to be 4850,

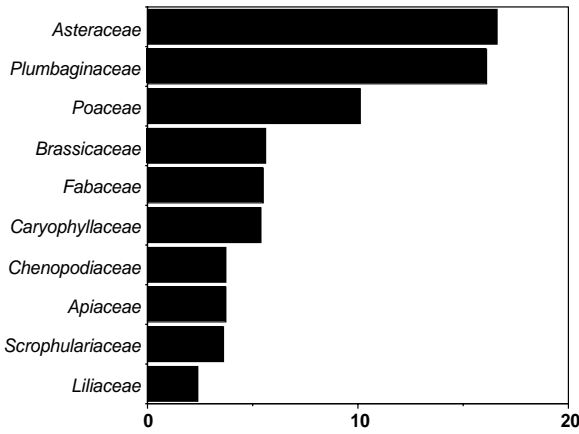


Fig. 1. Percentage of typical coastal species in the ten best represented families along the coasts of Europe.

590 of which are labelled as coastal. If we add the difference between our total coastal list (1068) and the coastal endemics in Fl. Eur. (590), i.e. 478, to the total Fl. Eur. endemics list, which gives 5328, then we can compare our number of typical coastal species, 1068, with ca. 5300 and obtain a figure of ca. 20%. This figure is probably much higher than most botanists would have expected.

Family and genus representation

In total 75 families are represented, most of them with few species, and 28 families with only one species. On the other hand, some families and genera are richer in littoral species than others. The ten best represented families are presented in Fig. 1. The *Asteraceae*, *Plumbaginaceae* and *Poaceae* together contain 42% of all typical littoral species. However, these families are also the largest in the European flora. We estimate that the typical coastal *Asteraceae* make up 11% of the total endemics in that family; for the *Poaceae* this figure is much higher, over 30%, while the *Plumbaginaceae* is a typical coastal family with near to 90% coastal species. Of course, other groupings may be more interesting from an ecological viewpoint, notably a division into life-form categories, but complete and reliable data for such ecological categories were not available to us.

Table 3 presents the distribution of representatives of the 19 best represented families over the European coastal regions, as well as the best represented genera. First a remark on the *Plumbaginaceae*: most members of this family belong to the genus *Limonium*. During our search for more endemics than Fl. Eur. gives, we collected information on ca. 60 new coastal endemics in this genus. With a total of 134 *Limonium* species as

Table 3. Numbers of typical coastal species and subspecies in the most important families (represented with more than 1% of the total species number) and genera along the coasts of Europe¹.

Family / region	T	E										
		A	N	W	W	W	W	W	W	W	W	B
		W				M			A		E	
Asteraceae	174	2	4	16	12	16	17	21	23	25	25	13
<i>Centaurea</i>	48	0	0	0	0	0	1	4	10	17	7	9
<i>Artemisia</i>	10	1	0	0	2	2	2	0	1	1	0	1
<i>Helichrysum</i>	9	0	0	0	1	1	3	1	0	0	2	1
<i>Taraxacum</i>	8	0	0	0	0	7	1	0	0	0	0	0
Plumbaginaceae	180	0	0	2	5	3	16	65	52	6	26	5
<i>Limonium</i>	157	0	0	1	5	2	11	58	48	5	25	3
<i>Armeria</i>	14	0	0	0	0	2	4	6	1	1	0	0
Poaceae	107	2	10	13	21	10	19	16	3	3	3	7
<i>Festuca</i>	13	0	0	0	0	3	7	1	0	0	0	2
<i>Puccinellia</i>	12	1	5	1	2	1	1	0	0	1	0	0
Brassicaceae	61	2	3	2	4	4	10	10	3	14	4	5
Caryophyllaceae	58	3	2	0	4	3	11	13	7	5	9	1
<i>Silene</i>	20	0	0	0	0	1	4	4	4	2	4	1
Fabaceae	58	2	1	3	3	3	9	17	6	12	2	0
Apiaceae	40	1	0	1	5	3	4	6	4	6	7	3
Chenopodiaceae	40	4	1	5	8	5	6	3	3	0	1	4
Scrophulariaceae	39	0	0	0	0	7	12	11	3	2	3	1
<i>Euphrasia</i>	12	0	0	0	0	4	8	0	0	0	0	0
Liliaceae	26	0	0	0	3	0	2	3	6	5	6	1
Cyperaceae	20	2	7	2	1	6	2	0	0	0	0	0
<i>Carex</i>	16	1	7	1	0	5	2	0	0	0	0	0
Boraginaceae	20	0	3	0	2	1	3	5	2	2	2	0
Lamiaceae	20	0	0	0	1	0	0	9	2	2	6	0
Rubiaceae	18	0	0	0	0	0	3	1	2	7	0	4
Gentianaceae	15	1	1	5	2	2	4	0	0	0	0	0
Juncaceae	14	2	1	2	1	1	3	2	1	0	1	0
<i>Juncus</i>	14	2	1	2	1	1	3	2	1	0	1	0
Euphorbiaceae	14	0	0	2	3	0	2	3	1	2	0	1
Primulaceae	11	2	2	0	0	1	3	1	2	0	0	0

¹Region codes refer to Table 1.

coastal endemics (i.e. 13% of the total), the statistics may be considered somewhat biased. Harper & Hawksworth (1995), while discussing whether numbers of species are a good indication of biodiversity, remark “species richness itself could be dangerously misleading” and then mention as a case that “the 242 species of *Hieracium* and 234 species of *Taraxacum* listed in the Norwegian flora (the first edition of Lid 1985) are better indicators of taxonomic traditions than of the scale of natural biological diversity¹”. We find this remark much more dangerous than the degree of misleading involved in large numbers of species within genera or families. Taxonomic skill is found all over Europe and the patterns of distribution of genus and family differentiation as revealed by the authoritative Fl. Eur. should be taken seriously. We fully agree with approaches towards ‘taxonomic’ and ‘phylogenetic’ diversity, where degrees of uniqueness of species are taken into account (see e.g.

Table 4. Distribution of typical coastal plant species by endemic type along the coasts of Europe.

Region ¹	T ²	% T	w ³	t	r	l
Broad distribution groups						
E	32	3	100 ⁴	0	0	0
EA	36	3	75	11	14	0
EW	52	5	98	2	0	0
EWM	99	9	94	5	0	0
Regional distribution groups						
EN	72	7	47	25	23	4
EWW	159	15	9	36	30	25
EWMW	213	20	21	6	33	40
EWMC	133	12	4	5	44	47
EWMA	114	11	1	11	72	16
EWME	107	10	12	10	42	36
EWMB	51	5	19	15	37	29
Total	1068	100%	321	136	348	263

¹Region codes refer to Table 1.

²T = total number; w = widespread; t = transregional endemic; r = regional endemic; l = local endemic.

³w, t, r and l are percentages of T.

⁴The two highest values in each endemic category are given in bold.

Faith 1995), and such approaches should also be carried out on the coastal flora. For the time being, we include the diversity of the genus *Limonium* in our statistics.

It follows from Table 3 that certain families and genera have most of their coastal endemics only in one part of Europe. The *Plumbaginaceae* and the genus *Limonium* have their optimum differentiation in southwestern Europe and the western Mediterranean, *Centaurea* in the eastern Mediterranean, while coastal *Puccinellia*, *Carex* and *Taraxacum* species are mainly found in northern and northwestern Europe.

Endemic status

Table 4 presents the distribution of the four types of endemic littoral species over the coastal areas of Europe. Naturally, the four broader European categories at the top of the table contain mostly widespread coastal species. Transregional endemics predominate in northern and western Europe, regional endemics in the eastern Adriatic and eastern Mediterranean, and local endemics in the western Mediterranean. This pattern changes somewhat regarding the western Mediterranean if *Limonium* is considered as one species. This trend is not easy to explain. It may partly be a matter of habitat representation (see below). It may also have to do with the age of the endemics. This refers particularly to the eastern Adriatic, where many endemics are palaeo-endemics, originating from the Tertiary (Lovrić 1987,

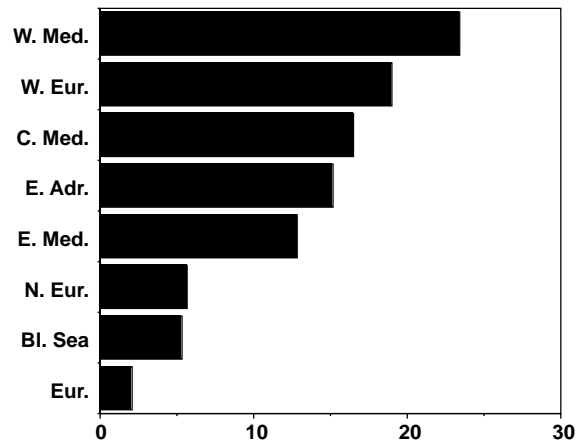


Fig 2. Percentage representation of the local, regional and transregional endemic coastal species along the coasts of Europe.

1993a). In several ways the eastern Adriatic coast is the most special one. It is only here that coastal species of endemic genera occur, notably *Cyathoselinum* (*Apiaceae*) and *Petteria* (*Fabaceae*). Another peculiarity is the occurrence of particular growth forms. *Cyathoselinum* itself is an example, some of its species, including *C.palmoides*, have a woody trunk with terminal rosettes of big, palm-like leaves. Another species of this genus, *C.globiferum*, is a very tall herb growing in a sort of column, up to 3 m high. Another example of this type is *Iris dalmatica*.

It may be questioned whether widespread typical littoral species are endemics or not. Even if the extension of their distribution area may be long, in the order of 2000 km, the total area occupied is still small because of the narrow distribution pattern. At any rate the transregional, regional and local coastal endemics would qualify as good endemics. Their total number is 622, which is 61 % of the total (Table 4). As Fig. 2 shows, these categories together are most diversified in the western Mediterranean and in western and southern Europe. At least for us it was a surprise that the coasts of western Europe are such an important source of endemics.

Habitat preference

The species of dunes and beaches appear to be almost exactly as numerous as the species of maritime rocks and cliffs; both approach 30 % representation (Fig. 3). Species of dry habitats, notably those occurring on both dunes and rocks, are also well represented. Species of salt marshes and saline waters are in the minority. According to the summary presented in Table 5, dune endemics are most numerous on dunes along the Black Sea and northern European coasts, whereas species

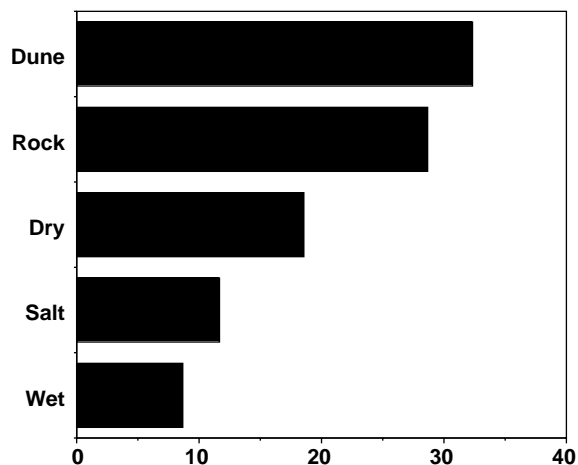


Fig. 3. Percentage representation of species of different habitat categories along the coasts of Europe. Dune = dune and beach species; Rock = species of maritime rocks and cliffs; Dry = species of dry habitats in general; Salt = species of salt marshes and saline waters; Wet = species of wet habitats in general.

of maritime rocks are predominant along the central Mediterranean and eastern Adriatic coasts. The accumulation of endemics in the western Mediterranean and southwestern Europe is divided over maritime rocks, dunes and salt flats. Species of salt marshes and wet habitats (shores) in general are the most important groups in northern Europe.

Conservation status

Table 6 gives some statistics on the conservation status. No less than 379 species, or 37% of all typical littoral species are considered as threatened, either because they have an extremely local distribution or in view of the reports on, and expectations about, their decline as a result of negative environmental impacts. For another 23% the situation is considered or estimated uncertain. The frequency figures for the category threatened are particularly high in the western Mediterranean and southwestern Europe, where also the share of local endemics is highest.

In many cases it was difficult to indicate any conservation status. As in Red List approaches criteria of different nature had to be combined. The 'conservation value', better be called 'conservation priority', is determined partly by the overall rarity of a species and the environmental threats the species is facing or may face in the near future.

General threats to plant species of coastal habitats include:

- Development of urban-industrial-recreational facili-

ties, especially in dunes, which has caused the loss of extensive areas. Examples are the development of harbours, the construction of golf courses (Boorman 1993) and the development of water extraction and water infiltration schemes (van Dijk 1985; van Dijk & de Groot 1987). The descriptions of the negative impact of urbanization and recreation on many dune systems in France, Spain, Italy, Croatia and Greece in Doody (1991) do not give much hope; even maintaining a status quo seems to be difficult.

- Lowering of the phreatic water level, particularly in the Netherlands, largely as a result of dune water extraction which has reduced the area of moist dune slacks considerably (Londo 1981; Grootjans et al. 1988; van Dijk 1989; T. Bakker & Stuyfzand 1993);

- Reclamation of salt marshes, which has led to the reduction in the overall abundance of salt marsh species in Denmark (e.g. Vestergaard 1989a);

- Cessation of grazing, which threatens especially salt marshes and coastal meadows (J. Bakker 1989; Vestergaard 1989), but also dune grassland and dune heath (Vestergaard & Hansen 1989; Géhu & Géhu-Franck 1993);

- Eutrophication as a result of nitrogen deposition (van der Maarel et al. 1985; van der Meulen & van der Maarel 1993);

- Extraction of sand, gravel and pebbles, which threat-

Table 5. Distribution of typical coastal species by habitat category¹; figures are percentage frequency per distribution group².

	DU	MR	DH	SM	WH	TD	TW
Broad distribution groups							
E ²	6	3	22	31 ³	38	31	69
EA	8	0	17	14	61	25	75
EW	35	6	16	20	29	51	49
EWM	35	9	24	17	15	68	32
Regional distribution groups							
EN	49	2	11	20	18	62	38
EW	34	32	22	6	6	88	12
EWMW	39	19	19	21	2	77	23
EWMC	11	57	26	5	1	94	6
EWMA	8	74	16	0	2	98	2
EWME	21	65	10	1	3	96	4
EWMB	60	13	17	10	0	90	10

¹DU = dunes and/or beaches;

MR = maritime rocks and cliffs;

DH = dry habitats in general (including both DU and MR);

SM = salt marshes and saline water;

WH = wet habitats in general (including SM and wet DU);

TD = subtotal: dry habitats;

TW = subtotal: wet habitats.

²Region codes refer to Table 1.

³Two highest figures for habitat types DU-WH in bold.

Table 6. Conservation status within regions (frequency %) for typical coastal species along the coasts of Europe.

Status ¹	↓	±	-/↑	?
Broad-distribution groups				
E ²	28	31	41	0
EA	8	11	64	17
EW	12	8	76	4
EWM	3	14	69	14
Regional-distribution groups				
EN	37	14	42	7
EW	49	30	17	5
EWMW	50	18	23	9
EWMC	62	21	3	14
EWMA	37	44	9	10
EWME	48	19	13	10
EWMB	10	23	29	38
Total numbers	416	236	296	125
¹ Status:				
↓ = declining, threatened, or probably extinct;				
± = status uncertain, but attention needed;				
- = no major changes known; probably stable; combined with:				
↑ = advancing;				
? = unknown.				
² Region codes refer to Table 1.				
³ Two highest figures for each category in bold.				

ens coastal ridges and promotes erosion, e.g. in northern France (Géhu & Géhu-Franck 1993);

- Loss of open dune habitats resulting from succession to denser and taller vegetation which did not take place to the same extent earlier, this because of the protective measures to prevent the formation of blowouts. This is particularly obvious in the Netherlands (e.g. Dijkema et al. 1993).

- Damage resulting from tourism (e.g. Boorman & Fuller 1977; van der Zande 1989);

- Shore erosion from waves made by vessels;

- Oil spills.

Of these different threats, airborne eutrophication and negative impacts of recreation as well as nearby agriculture and industrial activities are difficult to check unless local monitoring programs would exist. Besides, it is difficult to protect local species populations from such impacts.

In many parts of coastal Europe nature reserves have been established (Doody 1991), notably in Denmark, Germany (Hundt 1993), Norway (Lundberg 1993), Poland (Wojterski 1993), the Wadden Sea area (Dijkema et al. 1993), the mainland Netherlands (van der Meulen & van der Maarel 1993) and the United Kingdom. In the latter country the conservation includes many dune and cliff areas (Boorman 1993; Malloch 1993).

A next step would be to differentiate the threat to

individual coastal species according to the various categories presented. It would be most useful to collect such information during the revision of the species list.

Bern Convention and Habitat Directive

The Bern Convention listed 129 vascular plant species as to be protected; 26, or 20 % of them are coastal (according to our definition). The European Union Habitat Directive from 1992 (Anon. 1992) listed many more species, 290, of which 49 or 17 % are coastal. These percentages compare favourably with the percentage representation of coastal species in the European flora, 7 %. On the other hand, neither list is in any way representative. Most species selected by the Bern Convention are from maritime rocks and cliffs in the western and central Mediterranean; while the Habitat Directive paid some more attention to dune species (which make up about one third). The overlap between the two lists of coastal species is unsatisfactorily low: 18 species are in common, which means an overlap of only 32 %. Most of the selected species, but not all, are endemics, and almost 40% of them do not belong to the most urgent category, the local endemics.

Conclusion

We hope that this study will make clear that the European coastal ecosystems harbour numerous typical littoral plant species of which the majority can be considered endemics in a strict sense. For most of these species the future is either dark or unsure. At present European initiatives to protect rare and threatened coastal species are hopelessly insufficient. The list and statistics presented here should form a reference source supporting well-needed further action to build up a geographical/biosystematical/ecological data base for typical littoral plant species.

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App. 1. List of typical coastal plant species and subspecies along European coasts. Data largely according to *Flora Europaea*, completed with data collected in Van der Maarel (1993a) and additional information (see Acknowledgements and Table 9.2). Family name in a three-letter code added in front of the species name.

ADI = Adiantaceae	AIZ = Aizoaceae	Column 3: coastal habitat type (hab):
AMA = Amaranthaceae	API = Apiaceae	be = beaches (sand and shingle);
APO = Apocynaceae	ARA = Araceae	du = sand dunes;
ARE = Arecaceae	ARI = Aristolochiaceae	mr = maritime rocks and sea-cliffs;
ASC = Asclepiadaceae	ASP = Aspleniaceae	sh = shores (wet geolittoral and epilittoral);
AST = Asteraceae	BOR = Boraginaceae	sm = salt marshes and salt flats;
BRA = Brassicaceae	BRO = Bromeliaceae	sw = saline waters;
CAC = Cactaceae	CAM = Campanulaceae	dh = various dry coastal habitat types
CAR = Caryophyllaceae	CHE = Chenopodiaceae	(mainly dry dunes and maritime rocks);
CIS = Cistaceae	CON = Convolvulaceae	wh = various wet coastal habitat types
CRA = Crassulaceae	CUP = Cupressaceae	(mainly dune slacks and salt marshes).
CYP = Cyperaceae	DIP = Dipsacaceae	
ELA = Elaeagnaceae	EMP = Empetraceae	Column 4: extension of distribution area (end): l = local coastal
ERI = Ericaceae	EUP = Euphorbiaceae	endemic; r = regional coastal endemic; t = transregional coastal
FAB = Fabaceae	FRA = Frangulaceae	species; w = widespread coastal species. Additional letters: /a =
FUM = Fumariaceae	GEN = Gentianaceae	also North Africa and/or W Asia; /b = circumboreal; /g = en-
GER = Geraniaceae	HYD = Hydrocharitaceae	demic genus; /h = also inland; /m = also Açores; /n = neophyte
HYP = Hypericaceae	IRI = Iridaceae	from an other continent; /s = mainly subtropical; /t = mainly
ISO = Isoëtaceae	JUG = Juncaginaceae	tropical.
JUN = Juncaceae	LAM = Lamiaceae	
LIL = Liliaceae	LIN = Linaceae	Column 5: conservation status (con):
LYT = Lythraceae	MAL = Malvaceae	↓ = declining, threatened, or probably extinct;
NAJ = Najadaceae	ONA = Onagraceae	± = status uncertain, but attention needed;
OPH = Ophioglossaceae	ORC = Orchidaceae	- = no major changes known; probably stable;
ORO = Orobanchaceae	PAP = Papaveraceae	↑ = advancing;
PIN = Pinaceae	PLA = Plantaginaceae	? = unknown;
PLU = Plumbaginaceae	POA = Poaceae	H = Mentioned in the European Union Habitat Directive;
POL = Polygonaceae	POS = Posidoniaceae	B = Mentioned in the Bern Convention (see text).
PRI = Primulaceae	PYR = Pyrolaceae	
RAN = Ranunculaceae	RES = Resedaceae	
RHA = Rhamnaceae	ROS = Rosaceae	
RUB = Rubiaceae	RUP = Ruppiaceae	
SAL = Salicaceae	SAX = Saxifragaceae	
SCR = Scrophulariaceae	SOL = Solanaceae	
TAM = Tamatiaceae	THP = Thelypteridaceae	
THY = Thymelaceae	VAL = Valerianaceae	
VIO = Violaceae	ZAN = Zannichelliaceae	
ZOS = Zosteraceae	ZYG = Zygophyllaceae.	

App. 1 (continued)								
Fam.	Name	hab end con						
			CYP	<i>Carex salina</i>	sm w -	CYP	<i>Carex serotina</i>	
			CYP	<i>Carex subspatheacea</i>	sm w -		<i>ssp. pulchella</i>	wh t ↓
			FAB	<i>Lathyrus japonicus</i>		FAB	<i>Lotus uliginosus</i>	
				<i>ssp. japonicus</i>	dh w -		<i>ssp. vestitus</i>	du r ±
			POA	<i>Puccinellia distans</i>		GEN	<i>Centaurium littorale</i>	
				<i>ssp. borealis</i>	wh w -		<i>ssp. littorale</i>	du t ↓
			ROS	<i>Potentilla anserina</i>		GEN	<i>Gentianella uliginosa</i>	du t ↓
				<i>ssp. egedii</i>	sh w/i -	JUN	<i>Juncus articulatus</i>	
API	<i>Crithmum maritimum</i>	mr w -	EAE - Arctic-Subarctic European species					
AST	<i>Artemisia maritima</i>		JUN	<i>Juncus balticus</i>			<i>ssp. littoralis</i>	du t -
	<i>ssp. maritima</i>	sm w ±	ONa	<i>Oenothera ammophila</i>			<i>Juncus balticus</i>	wh w ↓
AST	<i>Hieracium peleteranum</i>		ORC	<i>Dactylorhiza majalis</i>			<i>Oenothera ammophila</i>	du t ↑
	<i>ssp. peleteranum</i>	dh w -		<i>ssp. purpurella</i>			<i>Dactylorhiza majalis</i>	wh r ↓
BRA	<i>Crambe maritima</i>	dh w ↓	AST	<i>Dendranthema arcticum</i>	dh r ?	PLU	<i>Armeria maritima</i>	
BRA	<i>Lepidium latifolium</i>	dh w/i -		<i>ssp. polare</i>			<i>ssp. maritima</i>	dh w ↓
CAR	<i>Sagina maritima</i>	wh w ±	AST	<i>Matricaria maritima</i>	wh r -	PLU	<i>Limonium vulgare</i>	
CAR	<i>Spergularia marina</i>	sm w/i ±		<i>ssp. phaeocephala</i>			<i>ssp. vulgare</i>	sm w ↓
CAR	<i>Spergularia media</i>	sm w/i ±	AST	<i>Matricaria maritima</i>			<i>Limonium vulgare</i>	dh w ↑
CHE	<i>Atriplex littoralis</i>	dh w/i ±		<i>ssp. subpolaris</i>	wh r -	POA	x <i>Ammocalamagrostis baltica</i> .	dh w ↑
CHE	<i>Bassia hirsuta</i>	dh w/i ↓	BRA	<i>Cakile edentula</i>		POA	<i>Calamagrostis epigejos</i>	du w/i -
CHE	<i>Chenopodium botryoides</i>	dh w/i -		<i>ssp. islandica</i>	be t -	POA	<i>Elymus farctus</i>	
CHE	<i>Suaeda maritima</i>		BRA	<i>Cochlearia fenestrata</i>	wh w ?	POA	<i>ssp. boreali-atlanticus</i>	du w -
	<i>ssp. maritima</i>	wh w ↓	CAR	<i>Stellaria humifusa</i>	sh w -	POA	<i>Elymus repens</i>	
CYP	<i>Carex extensa</i>	wh w ↑	CHE	<i>Atriplex lapponica</i>	dh t ±	POA	<i>ssp. arenosus</i>	du r ±
CYP	<i>Scirpus lacustris</i>		CYP	<i>Carex maritima</i>		POA	<i>Festuca rubra</i>	
	<i>ssp. tabernaemontani</i>	wh w -		<i>ssp. setina</i>	wh w -		<i>ssp. littoralis</i>	sm w -
ELA	<i>Hippophae rhamnoides</i>		GEN	<i>Gentianella detonsa</i>	sh t ↓	POA	<i>Leymus arenarius</i>	du w -
	<i>ssp. rhamnoides</i>	du w -	JUN	<i>Juncus gerardi</i>		POL	<i>Polygonum oxyspermum</i>	
FAB	<i>Lotus tenuis</i>	wh w/i -		<i>ssp. atrofusca</i>	sh w -		<i>ssp. raii</i>	be t ↓
FAB	<i>Tetragonolobus maritimus</i>	dh w/i ±	POA	<i>Puccinellia phryganodes</i>	sm w -	POL	<i>Rumex frutescens</i>	du n ±
GEN	<i>Centaurium pulchellum</i>	wh w ↓	POA	<i>Puccinellia tenella</i>	sh r ↓B	PYR	<i>Pyrola rotundifolia</i>	
JUG	<i>Triglochin maritima</i>	wh w -	PRI	<i>Primula egalikensis</i>	dh r ↓		<i>ssp. maritima</i>	dh t ↓
JUG	<i>Triglochin palustris</i>	sm w/i ±	PRI	<i>Primula nutans</i>	sh t ±	SCR	<i>Euphrasia atropurpurea</i>	mr r ↓
JUN	<i>Juncus gerardi</i>		EN - Species of N and NW Europe					
	<i>ssp. gerardi</i>	sm w -	API	<i>Ligusticum scoticum</i>	dh w ±	VAL	<i>Valeriana salina</i>	sh w -
JUN	<i>Juncus ranarius</i>	sh w ±	AST	<i>Taraxacum litorale</i>	wh w ±	ENWB - Species of Frisian and Baltic regions		
PLA	<i>Plantago maritima</i>		AST	<i>Taraxacum obliquum</i>	du w/i ↓	API	<i>Oenanthe lachenalii</i>	wh w/i -
	<i>ssp. maritima</i>	wh w ±	AST	<i>Taraxacum platyglossum</i>	du w/i ±	AST	<i>Artemisia campestris</i>	sh l ↓
POA	<i>Ammophila arenaria</i>		AST	<i>Taraxacum taeniatum</i>	du w ↓		<i>ssp. botnica</i>	sm t ↓
	<i>ssp. arenaria</i>	du w -	BRA	<i>Cochlearia danica</i>	dh w ↑	AST	<i>Artemisia maritima</i>	wh r ?
POA	<i>Puccinellia distans</i>		FAB	<i>Lathyrus japonicus</i>		AST	<i>ssp. humifusa</i>	wh r ?
	<i>ssp. distans</i>	wh/i w ↑		<i>ssp. maritimus</i>	du w -	AST	<i>Helichrysum arenarium</i>	
PRI	<i>Glaux maritima</i>	wh w/i ±	POA	<i>Festuca polesica</i>	du w -		<i>ssp. arenarium</i>	du r/i -
PRI	<i>Samolus valerandi</i>	wh w/i ±	RAN	<i>Ranunculus baudotii</i>	sw w ↓	AST	<i>Lactuca tatarica</i>	du r/i ↑
RUP	<i>Ruppia cirrhosa</i>	sw w ↓	ENN - Species of N Europe					
RUP	<i>Ruppia maritima</i>	sw w ↓	API	<i>Angelica archangelica</i>		BRA	<i>Cakile maritima</i>	
ZOS	<i>Zostera angustifolia</i>	sw w ↓		<i>ssp. litoralis</i>	sh t -		<i>ssp. baltica</i>	be r ↓
ZOS	<i>Zostera marina</i>	sw w ↓	CYP	<i>Carex glareosa</i>	wh t -	CAR	<i>Arenaria rigida</i>	du r ±
ZOS	<i>Zostera noltii</i>	sw w ↓	CYP	<i>Carex paleacea</i>	sm t -	CHE	<i>Atriplex calotheca</i>	dh r ?
			CYP	<i>Carex vacillans</i>	sm r ?	CHE	<i>Halimione pedunculata</i>	sm t/i ↓
			ENW - Species of NW Europe					
			AST	<i>Aster tripolium</i>		CHE	<i>Salicornia dolichostachya</i>	sm t ↓
				<i>ssp. tripolium</i>	sm w/i -		<i>ssp. strictissima</i>	sm t ↓
			AST	<i>Matricaria maritima</i>		FAB	<i>Anthyllis vulneraria</i>	
				<i>ssp. maritima</i>	dh w -		<i>ssp. maritima</i>	du r -
			AST	<i>Taraxacum agaurum</i>	du r ↓	POA	<i>Deschampsia cespitosa</i>	
				<i>Taraxacum commixtum</i>	du w ↓		<i>ssp. botnica</i>	sh r -
			AST	<i>Taraxacum dunense</i>	du r ↓	POA	<i>Deschampsia cespitosa</i>	
				<i>Taraxacum limbatum</i>	du w/i -		<i>ssp. paludosa</i>	sm l ?
			AST	<i>Taraxacum obliquum</i>	du t ↓	POA	<i>Festuca rubra</i>	
			BRA	<i>Cakile maritima</i>			<i>ssp. arenaria</i>	du t -
				<i>ssp. maritima</i>	be w -	POA	<i>Puccinellia maritima</i>	sm w -
			BRA	<i>Cochlearia officinalis</i>	sh w ↓	POL	<i>Polygonum oxyspermum</i>	
			CAR	<i>Honkenya peploides</i>	be w -		<i>ssp. oxyspermum</i>	be r ↓
			CHE	<i>Salicornia dolichostachya</i>		ROS	<i>Rosa rugosa</i>	du w/n ↑
				<i>ssp. dolichostachya</i>	sm w ±	SAL	<i>Salix arenaria</i>	du t -
			CHE	<i>Salicornia europaea</i>	sm w -	SCR	<i>Euphrasia botnica</i>	wh r ↓
			CYP	<i>Blysmus rufus</i>	sm w ±	SCR	<i>Euphrasia dunensis</i>	du l ↓
			CYP	<i>Carex arenaria</i>	du w -	SCR	<i>Linaria loeselii</i>	du t ±
						SCR	<i>Odontites verna</i>	
							<i>ssp. littoralis</i>	sm r ↓
BOR	<i>Mertensia maritima</i>	be w ±				VIO	<i>Viola tricolor</i>	
CHE	<i>Atriplex praecox</i>	be w/i -					<i>ssp. curtisii</i>	dh w -
CYP	<i>Carex mackenziei</i>	sh w -						
CYP	<i>Carex maritima</i>							
	<i>ssp. maritima</i>	wh w/i ±						

App. 1 (continued)

Fam.	Name	hab	end	con	EWW - Species of W Europe					
					API <i>Daucus carota</i>				PRI <i>Asterolimon linum-stellatum</i>	dh t/i ±
					ssp. <i>gummifer</i>	dh t -			RUB <i>Asperula occidentalis</i>	du t ?
					AST <i>Artemisia campestris</i>				SCR <i>Euphrasia tetraquetra</i>	dh t ↓
					ssp. <i>maritima</i>	du r ±			SCR <i>Hebe salicifolia</i>	mr t ±
					AST <i>Artemisia crithmifolia</i>	dh t -			SOL <i>Linaria arenaria</i>	du t ±
					AST <i>Helichrysum foetidum</i>	dh r -			SOL <i>Solanum maritimum</i>	du t ?
					AST <i>Helichrysum stoechas</i>				THP <i>Asplenium maritimum</i>	mr t -
					ssp. <i>stoechas</i>	du r/i -			VAL <i>Valerianella locusta</i>	du t ±
					AST <i>Senecio vulgaris</i>				ssp. <i>dunensis</i>	du t ±
					ssp. <i>denticulatus</i>	mr t ±			VIO <i>Viola kitaibeliana</i>	du t ±
					AST <i>Solidago virgaurea</i>				VIO <i>Viola riviniana</i>	dh r ±
					ssp. <i>rupicola</i>	mr r ±				
					BOR <i>Myosotis ramosissima</i>				EWWB - Species of the British Isles	
					ssp. <i>globularis</i>	du r -			AST <i>Senecio integrifolius</i>	
					BRA <i>Brassica oleracea</i>				ssp. <i>maritimus</i>	mr l ↓
					ssp. <i>oleracea</i>	dh t -			BRA <i>Arabis brownii</i>	du l ↓
					BRA <i>Raphanus raphanistrum</i>				BRA <i>Cochlearia scotica</i>	du r ±
					ssp. <i>maritimus</i>	dh r ±			BRA <i>Rhynchosinapis monensis</i>	du r ±
					BRO <i>Fascicularia pitcairniifolia</i>	mr n -			CAR <i>Cerastium fontanum</i>	mr l ↓
					CAR <i>Cerastium diffusum</i>				ssp. <i>scoticum</i>	mr l ↓
					ssp. <i>diffusum</i>	du w/i -			CAR <i>Silene dioica</i>	dh r ±
					CAR <i>Herniaria ciliolata</i>	dh t ±			ssp. <i>zetlandica</i>	dh r ±
					CAR <i>Silene vulgaris</i>				CYP <i>Carex recta</i>	sm l/b ↓
					ssp. <i>maritima</i>	dh t ±			FAB <i>Anthyllis vulneraria</i>	
					CAR <i>Spergularia rupicola</i>	mr t ±			ssp. <i>corbieri</i>	mr t -
					CHE <i>Atriplex glabriuscula</i>	be t ↓			FAB <i>Lupinus arboreus</i>	dh r ±
					CHE <i>Atriplex laciniata</i>	dh t ↓			GEN <i>Gentiana anglica</i>	
					CHE <i>Atriplex longipes</i>	dh t ±			ssp. <i>anglica</i>	du l ↓H
					CHE <i>Salicornia nitens</i>	sm t ↓			GEN <i>Gentiana anglica</i>	
					CHE <i>Salicornia pusilla</i>	sm t ↓			ssp. <i>cornubiensis</i>	du l ↓
					CIS <i>Tuberaria guttata</i>				GER <i>Geranium purpureum</i>	
					ssp. <i>breweri</i>	mr r ↓			ssp. <i>forsteri</i>	be l ↓
					CON <i>Calystegia sepium</i>				ORC <i>Dactylorhiza fuchsii</i>	
					ssp. <i>roseata</i>	dh r ↓			ssp. <i>hebridensis</i>	wh r ↓
					CYP <i>Carex trinervis</i>	wh t ↓			ORC <i>Dactylorhiza incarnata</i>	
					EUP <i>Euphorbia portlandica</i>	du t ↓			ssp. <i>coccinea</i>	du r ↓
					FAB <i>Anthyllis vulneraria</i>				ORC <i>Epipactis dunensis</i>	du r ↓
					ssp. <i>iberica</i>	dh l ±			ORO <i>Orobancha maritima</i>	dh t ↓
					FAB <i>Cytisus scoparius</i>				PLU <i>Limonium britannicum</i>	mr l ↓
					ssp. <i>maritimus</i>	mr t -			PLU <i>Limonium dodartiforme</i>	mr l ↓
					FAB <i>Genista tinctoria</i>				PLU <i>Limonium loganicum</i>	mr l ↓
					ssp. <i>littoralis</i>	mr t ±			PLU <i>Limonium paradoxum</i>	mr l ↓B
					FAB <i>Trifolium occidentale</i>	dh t ±			PLU <i>Limonium parvum</i>	mr l ↓
					FAB <i>Ulex europaeus</i>				PLU <i>Limonium procerum</i>	mr l ↓
					ssp. <i>maritimus</i>	dh r -			PLU <i>Limonium recurvum</i>	mr l ↓B
					GEN <i>Centaurium chloodes</i>	dh t ↓			PLU <i>Limonium transwallianum</i>	mr l ↓
					GEN <i>Centaurium scilloides</i>	wh t/a ±			POA <i>Bromus hordeaceus</i>	
					GER <i>Erodium cicutarium</i>				ssp. <i>ferronei</i>	mr t ±
					ssp. <i>bipinnatum</i>	du t ±			POA <i>Catabrosa aquatica</i>	
					GER <i>Erodium maritimum</i>	du t ±			ssp. <i>minor</i>	du r ↓
					GER <i>Geranium robertianum</i>				POA <i>Spartina anglica</i>	sm r ↓
					ssp. <i>maritimum</i>	be t ?			POL <i>Rumex hibernicus</i>	du r ↓
					JUN <i>Juncus maritimus</i>	sm t/i ↓			PRI <i>Primula scotica</i>	dh l ↓
					LIL <i>Asparagus officinalis</i>				RAN <i>Ranunculus flammula</i>	
					ssp. <i>prostratus</i>	dh t ±			ssp. <i>minimus</i>	mr r ↓
					OPH <i>Ophioglossum vulgatum</i>				SAX <i>Saxifraga hartii</i>	mr l ↓
					ssp. <i>ambiguum</i>	wh t ↓			SCR <i>Euphrasia campbelliae</i>	mr l ↓
					PLU <i>Limonium binervosum</i>	mr t -			SCR <i>Euphrasia eurycarpa</i>	mr l ↓
					PLU <i>Limonium humile</i>	sm t -			SCR <i>Euphrasia foulaensis</i>	dh l ↓
					POA <i>Bromus hordeaceus</i>				SCR <i>Euphrasia heslop-harrisonii</i>	mr l ↓
					ssp. <i>thomii</i>	du t -			SCR <i>Euphrasia marshalli</i>	mr l ↓
					POA <i>Festuca juncifolia</i>	du t ±			SCR <i>Euphrasia rhumica</i>	mr l ↓
					POA <i>Festuca rubra</i>				SCR <i>Euphrasia rotundifolia</i>	mr l ↓
					ssp. <i>pruinosa</i>	dh t -			SCR <i>Euphrasia vigursii</i>	du l/i ↓
					POA <i>Festuca tenuifolia</i>	du w/i -			SCR <i>Hebe speciosa</i>	mr r ±
					POA <i>Hordeum maritimum</i>	du t ↓				
					POA <i>Milium scabrum</i>	du t ↓			EWWF - Species of Atlantic France	
					POA <i>Puccinellia rupestris</i>	wh t ↓			API <i>Daucus carota</i>	
					POA <i>Spartina x townsendii</i>	sm t ↑			ssp. <i>gadecaei</i>	dh r ±
					POA <i>Vulpia ciliata</i>				API <i>Daucus x intermedius</i>	mr t ±
					ssp. <i>ambigua</i>	du t ±			AST <i>Hieracium eriophorum</i>	du r ↓
					POA <i>Vulpia membranacea</i>	dh w ±			AST <i>Hieracium prostratum</i>	du r ↓
					POL <i>Rumex rupestris</i>	mr t ?			AST <i>Hieracium umbellatum</i>	
					PRI <i>Anagallis tenella</i>	wh w/i ↓			ssp. <i>curtum</i>	mr l ↓

App. 1 (continued)								
Fam.	Name	hab end con	PLU		mr r ±	FRA		wh w -
				<i>ssp. depilata</i>			<i>Frankenia hirsuta</i>	wh w -
			PLU	<i>Armeria pubigera</i>		FRA	<i>Frankenia pulverulenta</i>	wh w/i -
				<i>ssp. pubigera</i>	du r ±	GEN	<i>Centaurium spicatum</i>	wh w ↓
			PLU	<i>Limonium salmonis</i>	mr r ±	GEN	<i>Centaurium tenuiflorum</i>	
AST	<i>Senecio helenitis</i>			<i>Festuca vasconensis</i>	dh l ↓		<i>ssp. acutiflorum</i>	wh w ?
	<i>ssp. candidus</i>	mr l ↓	POL	<i>Rumex acetosa</i>		GER	<i>Erodium laciniatum</i>	du w -
BOR	<i>Myosotis ruscinoensis</i>	du r ↓		<i>ssp. biformis</i>	mr r ±	IRI	<i>Gynandris sisyrychium</i>	mr w ?
BOR	<i>Omphalodes littoralis</i>		RUB	<i>Galium arenarium</i>	du r ±	JUN	<i>Juncus hybridus</i>	sm w -
	<i>ssp. littoralis</i>	du r ↓				JUN	<i>Juncus littoralis</i>	du w -
BRA	<i>Alyssum loiseleurii</i>	du l ↓BH	EWM - Mediterranean species			JUN	<i>Juncus subulatus</i>	sm w -
CAC	<i>Cereus peruvianus</i>	dh n ?				LAM	<i>Stachys maritima</i>	du w ?
CAC	<i>Opuntia monacantha</i>	dh n ↑	AIZ	<i>Mesembryanthemum crystallinum</i>	dh w -	LIL	<i>Allium commutatum</i>	mr w ±
CAC	<i>Opuntia stricta</i>	dh n ↑	AIZ	<i>Mesembryanthemum nodiflorum</i>	du w -	LIL	<i>Asparagus maritimus</i>	du w -
CAR	<i>Dianthus gallicus</i>	du r ↓	AMA	<i>Pancreatum maritimum</i>	du w -	LIL	<i>Urginea maritima</i>	dh w ?
CHE	<i>Salicornia emeric</i>	sm r ↓	API	<i>Daucus carota</i>		ORO	<i>Orobancha sanguinea</i>	du t ↓
CIS	<i>Tuberaria guttata</i>			<i>ssp. commutatus</i>	dh w -	PAP	<i>Hypecoum procumbens</i>	du w -
	<i>ssp. maritima</i>	mr l ↓	API	<i>Daucus carota</i>		PLA	<i>Plantago crassifolia</i>	wh w -
FAB	<i>Astragalus baionensis</i>	du r ±		<i>ssp. maritimus</i>	dh w -	PLA	<i>Plantago macrorrhiza</i>	wh w -
PLA	<i>Plantago subulata</i>		API	<i>Daucus carota</i>		PLU	<i>Limonium echioides</i>	sm w ±
	<i>ssp. littoralis</i>	mr l ±		<i>ssp. maximus</i>	mr w -	PLU	<i>Limoniastrum monopetalum</i>	wh w -
PLU	<i>Limonium ovalifolium</i>		API	<i>Echinophora spinosa</i>	du w -	PLU	<i>Limonium oleifolium</i>	
	<i>ssp. gallicum</i>	wh r -	API	<i>Pseudorhiza pumila</i>	du w -		<i>ssp. oleifolium</i>	wh w -
POA	<i>Dactylis glomerata</i>		AST	<i>Ambrosia maritima</i>	du w -	PLU	<i>Limonium sinuatum</i>	wh w/i -
	<i>ssp. marina</i>	mr r ±	AST	<i>Artemisia caerulescens</i>		PLU	<i>Limonium vulgare</i>	
POA	<i>Festuca huonii</i>	mr r ±		<i>ssp. caerulescens</i>	dh w ±		<i>ssp. serotinum</i>	sm w ±
POA	<i>Festuca ophioliticola</i>		AST	<i>Artemisia caerulescens</i>		POA	<i>Aeluropus littoralis</i>	du w -
	<i>ssp. armoricana</i>	mr r ±		<i>ssp. gallica</i>	sm t ±	POA	<i>Ammophila arenaria</i>	
RUB	<i>Galium neglectum</i>	du r ↓	AST	<i>Aster tripolium</i>			<i>ssp. arundinacea</i>	du w -
SCR	<i>Linaria thymifolia</i>	du r ↓		<i>ssp. pannonicus</i>	sm w -	POA	<i>Ampelodesmos mauritanica</i>	dh w -
			AST	<i>Asteriscus maritimus</i>	mr w -	POA	<i>Avellinia michelii</i>	wh w -
			AST	<i>Centauria sonchifolia</i>	du w ?	POA	<i>Cutandia maritima</i>	du w -
			AST	<i>Dittrichia viscosa</i>		POA	<i>Elymus elongatus</i>	
				<i>ssp. viscosa</i>	dh w/i -		<i>ssp. elongatus</i>	dh w -
API	<i>Angelica pachycarpa</i>	wh t ↓	AST	<i>Hedysnois cretica</i>	du w/i -	POA	<i>Elymus farctus</i>	
AST	<i>Centauria corcubionensis</i>	mr l ↓	AST	<i>Helichrysum italicum</i>			<i>ssp. farctus</i>	du w -
AST	<i>Helichrysum italicum</i>			<i>ssp. microphyllum</i>	mr w -	POA	<i>Hainardia cylindrica</i>	sm w/i -
	<i>ssp. serotinum</i>	du w -	AST	<i>Scabiosa atropurpurea</i>		POA	<i>Hyparrhenia hirta</i>	dh w/i -
AST	<i>Sonchus maritimus</i>			<i>ssp. maritima</i>	du t ±	POA	<i>Lagurus ovatus</i>	du w -
	<i>ssp. aquatilis</i>	wh t ?	AST	<i>Senecio gallicus</i>	du w -	POA	<i>Lophochloa pubescens</i>	du w -
BOR	<i>Omphalodes littoralis</i>		AST	<i>Xanthium strumarium</i>		POA	<i>Parapholis filiformis</i>	sm w -
	<i>ssp. gallaecica</i>	du l ↓		<i>ssp. italicum</i>	dh w/i -	POA	<i>Parapholis marginata</i>	wh w -
BRA	<i>Cochlearia aestuaria</i>	wh t ↓	BOR	<i>Echium arenarium</i>	dh w ?	POA	<i>Parapholis pycnantha</i>	sm w ?
CAR	<i>Silene littorea</i>	du r ±	BOR	<i>Heliotropium curassavicum</i>	dh n -	POA	<i>Puccinellia festuciformis</i>	
CAR	<i>Silene scabrifolia</i>		BRA	<i>Brassica oleracea</i>			<i>ssp. convoluta</i>	sm w -
	<i>ssp. galaecica</i>	du r ↓		<i>ssp. robertiana</i>	dh w ?	POA	<i>Puccinellia festuciformis</i>	
FAB	<i>Lupinus angustifolius</i>		BRA	<i>Cakile maritima</i>			<i>ssp. festuciformis</i>	sm w -
	<i>ssp. reticulatus</i>	du t -		<i>ssp. aegyptica</i>	be w -	POA	<i>Saccharum ravennae</i>	du w -
GEN	<i>Blackstonia perfoliata</i>		BRA	<i>Lobularia libyca</i>	du t ?	POA	<i>Sporobolus pungens</i>	du w/t -
	<i>ssp. imperfoliata</i>	wh w ↓	BRA	<i>Maresia nana</i>	du w ?	POA	<i>Stenotaphrum secundatum</i>	dh n -
IRI	<i>Iris spuria</i>		CAR	<i>Polycarpon alsinifolium</i>	du w -	POA	<i>Triplachne nitens</i>	dh w -
	<i>ssp. maritima</i>	mr t ?	CAR	<i>Polycarpon diphylum</i>	du w/i -	POA	<i>Trisetum aureum</i>	dh w -
PIN	<i>Pinus pinaster</i>		CAR	<i>Silene nicaeensis</i>	du w -	POS	<i>Posidonia oceanica</i>	sw w -
	<i>ssp. atlantica</i>	du w -	CAR	<i>Spergularia heldreichii</i>	du w ?	SOL	<i>Lycium intricatum</i>	mr n -
PLU	<i>Armeria euscadiensis</i>	dh l ↓	CAR	<i>Spergularia nicaeensis</i>	sm w -	SOL	<i>Solanum sodomaeum</i>	du n -
POA	<i>Puccinellia festuciformis</i>		CHE	<i>Arthrocnemum glaucum</i>	wh w -	ZYG	<i>Zygophyllum album</i>	sh t ?
	<i>ssp. tenuifolia</i>	sm w ±	CHE	<i>Atriplex halimus</i>	sm w -			
RES	<i>Sesamoides latifolia</i>	mr l ↓	CHE	<i>Beta macrocarpa</i>	sm w/s -			
SCR	<i>Linaria polygalifolia</i>	du t ?	CHE	<i>Haloenemum strobilaceum</i>	wh w ±			
				<i>Salsola kali</i>				
				<i>ssp. tragus</i>	dh w -	API	<i>Pseudorhiza minuscula</i>	du t -
			CHE	<i>Salsola soda</i>	dh w -	ARA	<i>Dracunculus muscivorus</i>	dh t ?
			CHE	<i>Suaeda altissima</i>	sm w ±	ARE	<i>Chamaerops humilis</i>	du w -
AST	<i>Centauria borjae</i>	mr l ↓H	CHE	<i>Suaeda splendens</i>	sm w ±	AST	<i>Aetheorhiza bulbosa</i>	
AST	<i>Leucanthemum crassifolium</i>	mr r ±	CON	<i>Ipomoea sagittata</i>	dh w ±		<i>ssp. bulbosa</i>	du w -
AST	<i>Solidago macrorrhiza</i>	du r ±	CON	<i>Ipomoea stolonifera</i>	du w/t ±	AST	<i>Anthemis maritima</i>	du w -
BRA	<i>Alyssum arenarium</i>	dh l ↓	CRA	<i>Aeonium arboreum</i>	dh w -	AST	<i>Centauria sphaerocephala</i>	
CAM	<i>Jasione crispa</i>			<i>Sedum litoreum</i>	mr w ?		<i>ssp. sphaeroc.</i>	du w -
	<i>ssp. maritima</i>	dh r ↓	CRA	<i>Sedum praealtum</i>	mr w ?	BOR	<i>Myosotis pusilla</i>	du t -
CAM	<i>Jasione montana</i>		CRA	<i>Cyperus capitatus</i>	du w -	BRA	<i>Malcolmia ramosissima</i>	du t ?
	<i>ssp. gallaecica</i>	dh l ↓	EPH	<i>Ephedra distachya</i>		CAR	<i>Polycarpon polycarpoides</i>	mr w -
CAR	<i>Silene vulgaris</i>			<i>ssp. distachya</i>	dh w/i ±	CAR	<i>Silene sericea</i>	du w -
	<i>ssp. thorei</i>	du r ±				CHE	<i>Halopeplis amplexicaulis</i>	sm w -
EUP	<i>Euphorbia polygonifolia</i>	dh t ↓	EUP	<i>Chrozophora tinctoria</i>	dh w -	DIP	<i>Pycnocomon ruitifolium</i>	du w ?
LIL	<i>Scilla merinoi</i>	du l ↓	EUP	<i>Euphorbia dendroides</i>	mr w -	EUP	<i>Euphorbia bumbellata</i>	dh w ±
PLU	<i>Armeria berlengensis</i>	mr l ↓H	EUP	<i>Euphorbia terracina</i>	dh w -	EUP	<i>Euphorbia pithyusa</i>	
PLU	<i>Armeria maritima</i>		FAB	<i>Lotus creticus</i>	dh w -		<i>ssp. pithyusa</i>	dh w -
	<i>ssp. miscella</i>	sm r ↓	FAB	<i>Ononis diffusa</i>	du w -			
PLU	<i>Armeria pubigera</i>		FAB	<i>Ononis variegata</i>	du w -			

App. 1 (continued)

Fam.	Name	hab end con	EWMWIP - Species of C and S Portugal and immediately adjoining S Spain			EWMWI - Species of the Iberian subcontinent (- EWWS)			EWMWIB - Species of the Balearic Islands		
			AIZ	<i>Disphyma crassifolium</i>	dh n -	BRA	<i>Diplotaxis siettiana</i>	dh l	↓BH		
			AIZ	<i>Lampranthus glaucus</i>	dh n -	CAR	<i>Dianthus hinoxianus</i>	du l/i	↓		
			AIZ	<i>Sesuvium portulacastrum</i>	be l/n -	CAR	<i>Loeflingia pentandra</i>	du l/i	↓		
FAB	<i>Dorycnium pentaphyllum</i>		API	<i>Daucus halophilus</i>	dh r ±	CHE	<i>Beta patellaris</i>	mr r/s	±		
	ssp. <i>gracile</i>	dh w -	API	<i>Seseli tortuosum</i>		CIS	<i>Helianthemum almeriense</i>	du l	↓		
FAB	<i>Ononis natrix</i>		API	<i>Seseli tortuosum</i>		FAB	<i>Ononis crispa</i>	du r	±		
	ssp. <i>ramosissima</i>	dh w/i -		ssp. <i>ramosissimum</i>	du r ±	FAB	<i>Ononis euphrasifolia</i>	du r	↓		
LAM	<i>Stachys brachyclada</i>	dh t ?	AST	<i>Centaurea sphaerocephala</i>		FRA	<i>Frankenia corymbosa</i>	sm r	±		
LIL	<i>Allium subvillosum</i>	du w ±		ssp. <i>lusitanica</i>	du r ?	FRA	<i>Frankenia thymifolia</i>	sm r	±		
PLU	<i>Armeria pungens</i>	du t ↓	AST	<i>Dittrichia viscosa</i>		GER	<i>Erodium sanguis-christi</i>	mr l	↓		
PLU	<i>Limonium auriculae-ursifolium</i>			ssp. <i>revoluta</i>	dh r/i ↓	JUN	<i>Juncus x donyanae</i>	du l	↓		
	ssp. <i>auriculae-ursifolium</i>	dh w ±	AST	<i>Serratula algarbiensis</i>	mr l ↓	LAM	<i>Rosmarinus tomentosus</i>	dh l	↓		
PLU	<i>Limonium diffusum</i>	sm t -		ssp. <i>perzlarae</i>	du l ↓	LAM	<i>Sideritis arboreocens</i>				
PLU	<i>Limonium duriusculum</i>	mr w -	BRA	<i>Biscutella vincentina</i>	mr l ↓H		ssp. <i>perzlarae</i>	du l	↓		
PLU	<i>Limonium girardianum</i>	sm t ±	BRA	<i>Lobularia maritima</i>	mr l ↓	LAM	<i>Teucrium charidemi</i>	mr l	↓		
PLU	<i>Limonium ramosissimum</i>		BRA	<i>Rhynchosinapis johnstonii</i>	du l ↓B	LAM	<i>Thymus glandulosus</i>	du l	↓		
	ssp. <i>confusum</i>	sm t ±	CAM	<i>Jasione lusitanica</i>	du r ↓H	LAM	<i>Thymus mastichina</i>				
PLU	<i>Limonium tremolsii</i>	mr t ±	CAR	<i>Herniaria algarvica</i>	du l ↓H	LIL	<i>Androcymbium europaeum</i>	du l	?		
POA	<i>Cutandia divaricata</i>	du w -	CAR	<i>Herniaria maritima</i>	du r ↓H	LYT	<i>Lythrum baeticum</i>	du l	↓		
POA	<i>Elymus flaccidifolius</i>	sm w -	CAR	<i>Loeflingia tavaresiana</i>	du l ↓B	PLU	<i>Armeria gaditana</i>	du l	↓		
POA	<i>Polypogon maritimus</i>		CAR	<i>Spergularia australis</i>	mr r ↓	PLU	<i>Armeria hirta</i>	du r	↓		
	ssp. <i>maritimus</i>	dh w -	CHE	<i>Salsola vermiculata</i>	mr l ±	PLU	<i>Armeria hispalensis</i>	sm r	↓		
POA	<i>Spartina versicolor</i>	sm w -	CIS	<i>Cistus palhinhae</i>	mr l ↓H	PLU	<i>Limonium arenosum</i>	du l	↓		
POA	<i>Sphenopus divaricatus</i>	dh t ?	CIS	<i>Tuberaria major</i>	dh l	PLU	<i>Limonium caesium</i>	sm r/i	±		
POL	<i>Rumex tingitamus</i>	du w -	CUP	<i>Juniperus oxycedrus</i>		PLU	<i>Limonium castellanense</i>	sm l	↓		
RUB	<i>Crucianella maritima</i>	du w -		ssp. <i>transtagana</i>	du r ±	PLU	<i>Limonium cavanillesii</i>	sm l	↓		
SCR	<i>Scrophularia ramosissima</i>	du w/i -	FAB	<i>Acacia cyclops</i>	mr n -	PLU	<i>Limonium cossonianum</i>	mr r	?		
SCR	<i>Teucrium belion</i>	du w -	FAB	<i>Astragalus vicentinus</i>	mr l ↓	PLU	<i>Limonium cymuliferum</i>	wh r	?		
TAM	<i>Tamarix africana</i>	sm w/i -	FAB	<i>Genista algarbiensis</i>	mr l ↓	PLU	<i>Limonium densissimum</i>	sm l	↓		
TAM	<i>Tamarix canariensis</i>	sm w/i -	FAB	<i>Ulex argenteus</i>		PLU	<i>Limonium dufourei</i>	sm l	↓		
				ssp. <i>erinaceus</i>	mr r ±	PLU	<i>Limonium emarginatum</i>	mr l	↓		
			FAB	<i>Ulex argenteus</i>		PLU	<i>Limonium emporitanum</i>	mr l	↓		
				ssp. <i>subsericeus</i>	du r ±	PLU	<i>Limonium estevei</i>	sm l	↓		
			JUG	<i>Triglochin striata</i>	sm n -	PLU	<i>Limonium eugeniae</i>	sm l/i	↓		
ARI	<i>Aristolochia baetica</i>	du l ?	JUN	<i>Juncus acutus</i>		PLU	<i>Limonium furfuraceum</i>	mr l	↓		
AST	<i>Centaurea sphaerocephala</i>			ssp. <i>leopoldii</i>	du r/z ↓	PLU	<i>Limonium gibertii</i>	mr l	↓		
	ssp. <i>polyacant.</i>	dh t -	LAM	<i>Teucrium polium</i>		PLU	<i>Limonium lacinianum</i>	sm l	↓		
AST	<i>Evax pygmaea</i>			ssp. <i>vincentinum</i>	dh r -	PLU	<i>Limonium malacitanum</i>	mr l	↓		
	ssp. <i>ramosissima</i>	du l ?	LAM	<i>Thymus carnosus</i>	du l ↓BH	PLU	<i>Limonium neocastellanense</i>	be l	↓		
AST	<i>Hedynois arenaria</i>	du w -	LIL	<i>Aloë vera</i>	dh n -	PLU	<i>Limonium parvibracteatum</i>	mr l	↓		
AST	<i>Helichrysum picardii</i>	du w -	MAL	<i>Lavatera mauritanica</i>	mr r ±	PLU	<i>Limonium thiniense</i>	sm l	↓		
AST	<i>Reichardia gaditana</i>	du w -	ONA	<i>Oenothera affinis</i>	dh n -	PLU	<i>Limonium thonii</i>	wh r	?		
BOR	<i>Echium gaditanum</i>	du r -	PLU	<i>Armeria pseudarmeria</i>	mr l ↓H	POA	<i>Cutandia memphitica</i>	du r	±		
BOR	<i>Omphaledes kuzinskyanae</i>	dh r ↓	PLU	<i>Armeria welwitschii</i>	dh l ↓	POA	<i>Festuca ampla</i>				
BRA	<i>Iberis linifolia</i>		PLU	<i>Limonium algarvense</i>	sm l ↓		ssp. <i>simplex</i>	du r	±		
	ssp. <i>welwitschii</i>	du r ?	PLU	<i>Limonium auriculae-ursifolium</i>		POA	<i>Gaudinia hispanica</i>	du l	↓H		
BRA	<i>Iberis procumbens</i>			ssp. <i>lusitanicum</i>	wh r ±	POA	<i>Hainardiopholis pauneroi</i>	sm l	↓		
	ssp. <i>procumbens</i>	dh r -	PLU	<i>Limonium auriculae-ursifolium</i>		POA	<i>Microprotyopsis tuberosa</i>	du l	↓H		
CAR	<i>Loeflingia baetica</i>	du r -		ssp. <i>multiflorum</i>	sm r ±	POA	<i>Puccinellia fasciculata</i>	sm l	↓		
CAR	<i>Silene longicaulis</i>	du w -	PLU	<i>Limonium ovalifolium</i>			ssp. <i>pungens</i>	sm l	↓		
CAR	<i>Silene ramosissima</i>	du w -		ssp. <i>lusitanicum</i>	wh r ±	POA	<i>Vulpia fontquerana</i>	du l	↓		
CAR	<i>Spergularia fimbriata</i>	wh r ?	POA	<i>Vulpia alopecuroides</i>	du t ±	PRI	<i>Coris hispanica</i>	dh l	↓		
CIS	<i>Halimium commutatum</i>	du w -	SCR	<i>Antirrhinum majus</i>		SCR	<i>Linaria benitoi</i>	du l	↓		
CIS	<i>Tuberaria bupleurifolia</i>	du w ?		ssp. <i>linkianum</i>	dc r ↓	SCR	<i>Linaria thursica</i>	du l	↓H		
EMP	<i>Corema album</i>	du w/z ↓	SCR	<i>Chaenorhinum serpyllifolium</i>		THY	<i>Thymelaea lanuginosa</i>	dh r	±		
FAB	<i>Astragalus lusitanicus</i>	dh r ±		ssp. <i>lusitanicum</i>	mr l ↓						
FAB	<i>Hedysarum flexuosum</i>	du w ±	SCR	<i>Linaria ficalhoana</i>	du l ↓BH						
FAB	<i>Lygos monosperma</i>	du w -	SCR	<i>Linaria lamarckii</i>	du l ↓						
FAB	<i>Ononis cossoniana</i>	du w ?									
FAB	<i>Ononis subspicata</i>	du w ?				API	<i>Apium bermejoi</i>	mr l	↓H		
FRA	<i>Frankenia boissieri</i>	wh r ±				API	<i>Naufraga balearica</i>	dh l	↓H		
LAM	<i>Thymus camphoratus</i>	du r ↓BH	AIZ	<i>Carpobrotus chilensis</i>	dh n -	AST	<i>Aetheorhiza bulbosa</i>				
ORO	<i>Cistanche phelypaea</i>	sm t ↓	API	<i>Seseli farrenyi</i>	dh l ↓		ssp. <i>willkommii</i>	du l	↓		
POA	<i>Avena longiglumis</i>	dh w -	AST	<i>Calendula suffruticosa</i>		AST	<i>Centaurea balearica</i>	mr l	↓BH		
POA	<i>Lophochloa salzmannii</i>	du n -		ssp. <i>algarbiensis</i>	dh r ±	AST	<i>Senecio rodriguezii</i>	mr l	↓		
POA	<i>Trisetaria dufourei</i>	du l ↓	AST	<i>Carduus myriacanthus</i>	du r ↓	BRA	<i>Diplotaxis ibicensis</i>	dh r	↓		
SCR	<i>Antirrhinum majus</i>		AST	<i>Centaurea seridis</i>		CAR	<i>Silene cambessedesii</i>	du l	↓		
	ssp. <i>cirrhigerum</i>	du r ?		ssp. <i>maritima</i>	du r ±	EUP	<i>Euphorbia margalidiana</i>	dh l	↓		
SCR	<i>Linaria pedunculata</i>	du r ?	AST	<i>Hymenostemma pseudanthemis</i>	du l ↓	FAB	<i>Anthyllis fulgurans</i>	mr l	↓		
SCR	<i>Odontites tenuifolia</i>	du r ↓	AST	<i>Launaea cervicornis</i>	mr r ±	FAB	<i>Anthyllis hermanniae</i>				
SCR	<i>Scrophularia frutescens</i>	du w -	AST	<i>Senecio flavus</i>	dh r/a ±		ssp. <i>hystrix</i>	mr l	↓		
			AST	<i>Taraxacum gaditanum</i>	du l ↓	FAB	<i>Genista dorycnifolia</i>	dh l	↓H		
			BOR	<i>Elizaldia calycina</i>	du l ↓	PLU	<i>Limonium alcidianum</i>	sm r	↓		
			BRA	<i>Brassica repanda</i>		PLU	<i>Limonium antonii-llorensii</i>	sm r	↓		
				ssp. <i>maritima</i>	mr l ↓	PLU	<i>Limonium barceloi</i>	sm r	↓		
						PLU	<i>Limonium bolosii</i>	sm r	↓		

App. 1 (continued)								
Fam.	Name	hab end con						
			CAR	<i>Spergularia macrorrhiza</i>	mr r ±	POA	<i>Panicum maximum</i>	mr r ±
			FAB	<i>Astragalus maritimus</i>	dh 1 ↓H	RUB	<i>Galium litorale</i>	du 1 ↓BH
			FAB	<i>Astragalus verrucosus</i>	mr 1 ↓H			
			GER	<i>Erodium corsicum</i>	mr r ±	EWMCI - Species of Italy		
PLU	<i>Limonium biflorum</i>	sm r ↓	PLU	<i>Armeria soleirolii</i>	dh 1 ↓H			
PLU	<i>Limonium boirae</i>	sm r ↓	PLU	<i>Limonium acutifolium</i>	mr r ±	AMA	<i>Pancretrium illyricum</i>	mr r -
PLU	<i>Limonium camposanum</i>	sm r ↓	PLU	<i>Limonium ampuriense</i>	mr 1 ↓	AST	<i>Centaurea aplolepa</i>	
PLU	<i>Limonium caprariense</i>		PLU	<i>Limonium articulatum</i>	mr r ±		ssp. <i>aplolepa</i>	dh r ±
	ssp. <i>caprariense</i>	mr r ±	PLU	<i>Limonium bosanum</i>	mr 1 ↓	AST	<i>Centaurea aplolepa</i>	
PLU	<i>Limonium caprariense</i>		PLU	<i>Limonium capit-marci</i>	mr 1 ↓		ssp. <i>cosana</i>	dh r ±
	ssp. <i>multiflorum</i>	mr r ±	PLU	<i>Limonium coralliforme</i>	mr 1 ↓	AST	<i>Centaurea aplolepa</i>	
PLU	<i>Limonium carregadorensis</i>	sm r ↓	PLU	<i>Limonium dictyocladum</i>	mr r ±		ssp. <i>lunensis</i>	dh r ±
PLU	<i>Limonium formenterae</i>	sm 1 ↓	PLU	<i>Limonium hermaeum</i>	dh 1 ↓	AST	<i>Centaurea cineraria</i>	
PLU	<i>Limonium gougetianum</i>	sm r ±	PLU	<i>Limonium insulare</i>	mr 1 ↓H		ssp. <i>cineraria</i>	mr r ?
PLU	<i>Limonium gymnesicum</i>	mr r ±	PLU	<i>Limonium laetum</i>	dh 1 ↓	AST	<i>Centaurea cineraria</i>	
PLU	<i>Limonium heterospicatum</i>	sm 1 ↓	PLU	<i>Limonium lausianum</i>	mr 1 ↓		ssp. <i>veneris</i>	mr r ?
PLU	<i>Limonium inarimense</i>	mr r ±	PLU	<i>Limonium merxmülleri</i>	mr 1 ↓	AST	<i>Centaurea kartschiana</i>	mr 1 ↓H
PLU	<i>Limonium magallufianum</i>	sm 1 ↓	PLU	<i>Limonium oleifolium</i>		AST	<i>Centaurea leucadea</i>	dh r ↓
PLU	<i>Limonium majoricum</i>	dh r ↓		ssp. <i>dictyocladum</i>	dh 1 ↓	AST	<i>Centaurea spinosociliata</i>	
PLU	<i>Limonium marisoliai</i>	sm r ↓	PLU	<i>Limonium oleifolium</i>			ssp. <i>tommasinii</i>	du r ↓
PLU	<i>Limonium migjornense</i>	sm r ↓		ssp. <i>sardoum</i>	dh 1 ?	BRA	<i>Aurinia leucadea</i>	dh r ↓
PLU	<i>Limonium minutiflorum</i>		PLU	<i>Limonium oristanum</i>	dh 1 ↓	BRA	<i>Matthiola incana</i>	
	ssp. <i>balearicum</i>	mr 1 ±	PLU	<i>Limonium pseudolaetum</i>	mr 1 ↓H		ssp. <i>rupestris</i>	dh r ?
PLU	<i>Limonium minutum</i>	mr r ±	PLU	<i>Limonium pulviniforme</i>	mr 1 ↓	CAM	<i>Campanula fragilis</i>	
PLU	<i>Limonium multiflorum</i>	mr 1 ↓	PLU	<i>Limonium strictissimum</i>	mr 1 ↓H		ssp. <i>fragilis</i>	mr r ?
PLU	<i>Limonium oleifolium</i>		PLU	<i>Limonium tenuifolium</i>	mr 1 ↓	CAR	<i>Dianthus rupicola</i>	
	ssp. <i>pseudodictyococl.</i>	dh 1 ↓	PLU	<i>Limonium tharrosianum</i>	mr 1 ↓		ssp. <i>rupicola</i>	mr t ↓H
PLU	<i>Limonium pseudarticulatum</i>	sm r ↓	POA	<i>Phleum crypsoides</i>		CHE	<i>Kochia saxicola</i>	mr r ↓BH
PLU	<i>Limonium pseudodictyocladon</i>	sm r ↓		ssp. <i>sardoum</i>	dh 1 ±	CHE	<i>Salicornia veneta</i>	sm 1 ↓H
PLU	<i>Limonium retusum</i>	sm 1 ↓	SCR	<i>Linaria flava</i>	du r ↓H	CIS	<i>Helianthemum sessiliflorum</i>	dh r ↓
PLU	<i>Limonium virgatum</i>	sm r ↓	SCR	<i>Scrophularia ramosissima</i>	dh r ↓	CON	<i>Convolvulus sabatius</i>	mr r ±
PLU	<i>Limonium wiedmannii</i>	sm 1 ↓				DIP	<i>Scabiosa crenata</i>	
THY	<i>Daphne rodriguezii</i>	dh 1 ↓BH	EWMCS - Species of Sicily and/or Malta				ssp. <i>dallaportae</i>	mr t ±
THY	<i>Thymelaea myrtifolia</i>	dh 1 ?				FAB	<i>Genista aspalathoides</i>	mr t ↓
			API	<i>Bupleurum dianthifolium</i>	dh r ↓	FAB	<i>Vicia giacominiiana</i>	dh r ↓
			AST	<i>Anthemis secundiramea</i>		IRI	<i>Romulea ligustica</i>	mr r ±
				ssp. <i>intermedia</i>	mr 1 ±	IRI	<i>Romulea requienii</i>	du r ±
API	<i>Daucus carota</i>		AST	<i>Anthemis secundiramea</i>		JUN	<i>Juncus rigidus</i>	wh r ±
	ssp. <i>hispidus</i>	du w ?		ssp. <i>urvilleana</i>	du 1 ±	LAM	<i>Stachys arenaria</i>	du r ↓
API	<i>Daucus muricatus</i>	dh t ?	AST	<i>Calendula suffruticosa</i>		LIL	<i>Muscari gussonei</i>	du r ↓BH
AST	<i>Helichrysum litoreum</i>	mr t ±		ssp. <i>maritima</i>	du 1 ↓	LIL	<i>Yucca gloriosa</i>	du n -
AST	<i>Launaea resedifolia</i>	dh w ?	AST	<i>Centaurea tauromenitana</i>	mr 1 ±	PLU	<i>Limonium avei</i>	mr 1 ↓
AST	<i>Senecio leucanthemifolius</i>	dh w ±	AST	<i>Chiladenus lopadusanus</i>	mr 1 ↓	PLU	<i>Limonium densissimum</i>	mr 1 ↓
BOR	<i>Anchusa aggregata</i>	du r ±	AST	<i>Cichorium spinosum</i>	dh r ↓	PLU	<i>Limonium etruscum</i>	mr r ↓
CIS	<i>Tuberaria praecox</i>	dh r ↓	AST	<i>Palaeocyanus crassifolius</i>	mr r ↓	PLU	<i>Limonium inarimense</i>	
CON	<i>Convolvulus cneorum</i>	mr t ?	AST	<i>Phagnalon metlesicisii</i>	dh r ↓		ssp. <i>inarimense</i>	mr 1 ↓
PLU	<i>Limonium cordatum</i>	mr r ±	BRA	<i>Brassica macrocarpa</i>	mr 1 ↓BH	PLU	<i>Limonium japygicum</i>	mr 1 ↓
PLU	<i>Limonium densiflorum</i>	sm r ↓	CAR	<i>Silene hicesiae</i>	mr 1 ↓H	PLU	<i>Limonium johannis</i>	mr 1 ↓
PLU	<i>Limonium graecum</i>		CHE	<i>Suaeda pelagica</i>	sm r ↓	PLU	<i>Limonium multiflorum</i>	mr r ?
	ssp. <i>divaricatum</i>	mr w -	DIP	<i>Scabiosa limonifolia</i>	dh r ↓	PLU	<i>Limonium pontium</i>	mr r ?
PRI	<i>Coris monspeliensis</i>	dh w -	ERI	<i>Erica sicula</i>	mr r ?	PLU	<i>Limonium ramosissimum</i>	
			EUP	<i>Euphorbia bivonae</i>	mr r ?		ssp. <i>tommasinii</i>	sm r ±
			FAB	<i>Cytisus aeolicus</i>	mr 1 ↓BH	PLU	<i>Limonium remotispiculum</i>	mr r ↓
			FAB	<i>Lygos raetam</i>		POL	<i>Polygonum robertii</i>	dh r ?
				ssp. <i>gussonei</i>	du r ±	PRI	<i>Primula palinuri</i>	mr 1 ↓
CAM	<i>Campanula sabatia</i>	mr 1 ↓BH	LAM	<i>Thymus richardii</i>		RUB	<i>Asperula crassifolia</i>	mr r ±
PLU	<i>Armeria ruscionensis</i>	mr r ?		ssp. <i>niidus</i>	dh r ↓	SCR	<i>Euphrasia marchesettii</i>	wh r ↓BH
PLU	<i>Limonium companyonis</i>	mr 1 ↓	LIL	<i>Allium lopadosanum</i>	dh r ↓			
PLU	<i>Limonium minutum</i>		LIL	<i>Allium obtusiflorum</i>	dh r ↓	EWMA - Species of the E Adriatic region		
	ssp. <i>minutum</i>	mr 1 ↓	LIL	<i>Scilla cupanii</i>	dh 1 ↓			
PLU	<i>Limonium ramosissimum</i>		LIL	<i>Scilla hughii</i>	dh 1 ↓	ADI	<i>Adiantum capillus-veneris</i>	
	ssp. <i>provinciale</i>	sm t ?	PLU	<i>Limonium aegusae</i>	mr 1 ↓		ssp. <i>visianii</i>	mr t ±
			PLU	<i>Limonium albidum</i>	mr 1 ↓	API	<i>Cyathoselinum palmoides</i>	mr r/g ↓
			PLU	<i>Limonium bocconi</i>	mr 1 ↓	API	<i>Cyathoselinum tomentosum</i>	mr r/g ↓
			PLU	<i>Limonium calcarae</i>	mr 1 ↓	API	<i>Daucus carota</i>	
API	<i>Rouya polygama</i>	du r ↓H	PLU	<i>Limonium ferulaceum</i>	mr 1 ↓		ssp. <i>major</i>	dh r ±
AST	<i>Artemisia densiflora</i>	dh 1 ↓	PLU	<i>Limonium intermedium</i>	mr 1 ↓	ASC	<i>Vincetoxicum croaticum</i>	mr r -
AST	<i>Centaurea horrida</i>	mr 1 ↓BH	PLU	<i>Limonium lilybaeum</i>	mr 1 ↓	AST	<i>Artemisia bioselettiana</i>	du r ±
AST	<i>Evax rotundata</i>	du r ↓	PLU	<i>Limonium minutiflorum</i>		AST	<i>Carduus nutans</i>	
	ssp. <i>minutiflorum</i>	dh r ±		ssp. <i>minutiflorum</i>	mr 1 ↓		ssp. <i>micropterus</i>	mr r -
AST	<i>Nananthea perpusilla</i>	dh r ±	PLU	<i>Limonium pachynense</i>	mr 1 ↓	AST	<i>Centaurea brachtii</i>	mr r ?
BOR	<i>Anchusa crisa</i>	du r ↓BH	PLU	<i>Limonium panormitanum</i>	mr 1 ?	AST	<i>Centaurea ragusina</i>	
CAR	<i>Dianthus morisianum</i>	mr 1 ↓	PLU	<i>Limonium ramosissimum</i>			ssp. <i>ragusina</i>	mr r ±
CAR	<i>Silene rosulata</i>			ssp. <i>siculum</i>	sm 1 ?	AST	<i>Centaurea spinosociliata</i>	
	ssp. <i>sanctae-theresiaae</i>	dh 1 ↓	PLU	<i>Limonium sibthorpiatum</i>	mr 1 ±		ssp. <i>spinosociliata</i>	mr r ±
CAR	<i>Silene succulenta</i>		PLU	<i>Limonium tenuiculum</i>	mr 1 ?			
	ssp. <i>corsica</i>	be r ↓	PLU	<i>Limonium todaroanum</i>	mr 1 ↓			
CAR	<i>Silene velutina</i>	mr 1 ↓BH						

App. 1 (continued)								
Fam.	Name	hab end con						
			CAR	<i>Minuartia thymifolia</i>	du r ?	BRA	<i>Lepidotrichum uechtritizianum</i>	du t ?
			CAR	<i>Silene succulenta</i>		BRA	<i>Syrenia montana</i>	du l ↓
				ssp. <i>succulenta</i>	be r ↓	CAR	<i>Silene thymifolia</i>	du r ↓
			LIL	<i>Allium bourgaei</i>		CRA	<i>Sedum sartorianum</i>	
PLU	<i>Goniolimon sartorii</i>	mr r ↓		ssp. <i>creticum</i>	mr r ↓		ssp. <i>ponticum</i>	du l/i ±
PLU	<i>Limonium antipaxorum</i>	mr l ↓	LIL	<i>Androcymbium rechingeri</i>	du l ↓B	CHE	<i>Atriplex tatarica</i>	du w/i -
PLU	<i>Limonium arcuatum</i>	mr l ↓	PLU	<i>Limonium calliopsium</i>	mr l ↓	CHE	<i>Camphorosma annua</i>	sm w/i -
PLU	<i>Limonium brevipetiolatum</i>	sm r ↓	PLU	<i>Limonium creticum</i>	mr l ↓	CHE	<i>Camphorosma songorica</i>	sm w/i -
PLU	<i>Limonium cephalonicum</i>	mr l ↓	PLU	<i>Limonium elaphonicum</i>	mr l ↓	CHE	<i>Halimione verrucifera</i>	sm w/i -
PLU	<i>Limonium coronense</i>	mr l ↓	PLU	<i>Limonium hierapetrae</i>	mr l ↓	CON	<i>Convolvulus persicus</i>	du r ±
PLU	<i>Limonium damboldtianum</i>	mr l ↓	PLU	<i>Limonium pigadiense</i>	mr l ↓	PAP	<i>Hypecoum ponticum</i>	du t ?
PLU	<i>Limonium frederici</i>	mr r ?	PLU	<i>Limonium rigidum</i>	mr l ↓	IRI	<i>Iris mangaliae</i>	mr r ?
PLU	<i>Limonium graecum</i>		PLU	<i>Limonium runemarkii</i>	mr l ↓	PLA	<i>Plantago cornuti</i>	dh w/i ?
	ssp. <i>graecum</i>	dh r ↓				PLU	<i>Goniolimon besseianum</i>	du t/i -
PLU	<i>Limonium hirsuticalyx</i>	ms r ↓	EWB - Species of the Black Sea region					
PLU	<i>Limonium ithacense</i>	mr l ↓	API	<i>Astrodaucus littoralis</i>	du t ±	PLU	<i>Goniolimon collinum</i>	mr r/i -
PLU	<i>Limonium kardamylii</i>	mr l ↓	APO	<i>Trachomitum tauricum</i>	dh l ?	PLU	<i>Limonium czurjukiense</i>	sm r ?
PLU	<i>Limonium melium</i>	mr l ↓	AST	<i>Artemisia arenaria</i>	du t/i -	PLU	<i>Limonium tomentellum</i>	sm w/i -
PLU	<i>Limonium ocymifolium</i>	mr r ?	AST	<i>Centaurea alba</i>		POA	<i>Elymus farctus</i>	
PLU	<i>Limonium phitosianum</i>	mr l ↓		ssp. <i>caliacrae</i>	mr r ?		ssp. <i>bessarabicus</i>	du r ±
PLU	<i>Limonium pylium</i>	mr l ?	AST	<i>Centaurea alba</i>		POA	<i>Elymus hispidus</i>	
PLU	<i>Limonium ramosissimum</i>			ssp. <i>euxina</i>	du l ?	POA	ssp. <i>varnensis</i>	du r ?
	ssp. <i>doerfleri</i>	sm l ↓	AST	<i>Centaurea arenaria</i>		POA	<i>Festuca arenicola</i>	du r ±
PLU	<i>Limonium saracinatum</i>	mr l ↓		ssp. <i>odessana</i>	du l ±	POA	<i>Festuca beckeri</i>	du r/i -
PLU	<i>Limonium zacyanthium</i>	mr l ↓	AST	<i>Centaurea cuneifolia</i>		POA	<i>Leymus racemosus</i>	
POA	<i>Elymus farctus</i>			ssp. <i>cuneifolia</i>	du t ±	POA	ssp. <i>racemosus</i>	du w/i -
	ssp. <i>rechingeri</i>	mr r ±	AST	<i>Centaurea margaritacea</i>		POA	<i>Leymus racemosus</i>	
RES	<i>Reseda tymphaea</i>	mr l ↓		ssp. <i>breviceps</i>	du l ±	POA	ssp. <i>sabulosus</i>	du w/i -
SCR	<i>Cymbalaria microcalyx</i>		AST	<i>Centaurea margaritacea</i>		RUB	<i>Phacelurus digitatus</i>	du w/i -
	ssp. <i>microcalyx</i>	mr r ±		ssp. <i>margaritacea</i>	du l ?	RUB	<i>Asperula littoralis</i>	du r ±
SCR	<i>Scrophularia taygetea</i>	mr l ?	AST	<i>Centaurea margaritacea</i>		RUB	<i>Asperula setulosa</i>	dh r ±
TAM	<i>Tamarix hampeana</i>	wh r/i -		ssp. <i>margaritaba</i>	du l ?	RUB	<i>Galium tenderiense</i>	du r ?
			AST	<i>Centaurea margaritacea</i>		EWBK - Species of the Krym peninsula		
				ssp. <i>protomargar.</i>	du l ?	API	<i>Seseli gummiferum</i>	
API	<i>Seseli gummiferum</i>		AST	<i>Centaurea pontica</i>	du l ↓		ssp. <i>gummiferum</i>	mr r ±
	ssp. <i>aegaeum</i>	mr r ±	AST	<i>Cirsium alatum</i>	dh t -	API	<i>Trinia crithmifolia</i>	mr l/i ?
ARE	<i>Phoenix theophrasti</i>	be l ↓	AST	<i>Helichrysum arenarium</i>		APO	<i>Trachomitum tauricum</i>	mr l ?
AST	<i>Anthemis ammanthus</i>			ssp. <i>ponticum</i>	du r ±	LIL	<i>Asparagus litoralis</i>	mr l ?
	ssp. <i>paleacea</i>	du l ↓	AST	<i>Steptoramphus tuberosus</i>	dh w/i -	RUB	<i>Asperula cretacea</i>	dh r ?
AST	<i>Anthemis filicaulis</i>	mr l ↓	BRA	<i>Alyssum borzaceanum</i>	dh l ↓	SCR	<i>Linaria sabulosa</i>	du l ?
AST	<i>Carlina diae</i>	mr l ↓	BRA	<i>Alyssum tenderiense</i>	du r ↓			
AST	<i>Centaurea aegialophila</i>	mr l ↓	BRA	<i>Cakile maritima</i>				
AST	<i>Centaurea pumilio</i>	du r ↓		ssp. <i>euxina</i>	be r -			