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The Mediterranean floristic element in the flora and vegetation of Romania

Abstract

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The aim of this study was to select a list of Mediterranean taxa (*sensu stricto*) from the vascular flora of Romania as well as to reveal the vegetation types in which these species occur and the community types in which they are dominant. A total of 139 Mediterranean taxa were selected, of which 121 were recorded in phytosociological releves and 18 were considered as subspontaneous i.e., escaped cultivation. The relatively high proportion (up to almost 9%) of Mediterranean taxa in the flora of some regions of Romania suggests the potential role of calcareous, open habitats in their establishment. Most community types that host Mediterranean species were described in Dobrogea (the Black Sea coast included), the Danube Plain and adjacent calcareous mountains, a pattern suggesting that the dispersal of these plants followed the Illyric route and then the fluvial corridors across the south Carpathians.

Key words: calcareous habitats, dominant species, floristic proportion, host communities, Illyric route, subspontaneous species.

Introduction

It's known that chorological analyses give interesting information regarding the climatic influences, the migration ways in the post-glacial period, but also the possible genetic interferences between the extant plant populations within a certain area.

The Mediterranean chorotype in the Romanian floristic literature is regarded either in a broad sense (Eurimediterranean) or in a narrow sense (Stenomediterranean), but most often is subdivided in 5-6 categories, especially following Adamović's (1933) system.

In our study, we started from the premise that the following statements are true: "*The most numerous and typical among our Mediterranean elements grow in the south-western part of the country ... and in Dobrogea*" (Călinescu 1946, p. 62), and "*... the influence of the Mediterranean climate is present mostly in the south (Banat and Oltenia) and south-east (Dobrogea)*" (Pop 1979, p. 178).

Rexhepi (1997), in his study concerning the Mediterranean, Submediterranean and Illyric floristic elements in Kosovo region, distinguished six subtypes within the Mediterranean ele-

ment: Widespread Mediterranean, East Mediterranean, West Mediterranean, Subatlantic-Mediterranean, Mediterranean-Pontic and Central-European Mediterranean.

Jovanović (1997) stated that he revealed in the ruderal flora of Belgrad city area "... *the presence of 397 different floristic elements belonging to 17 area groups and 7 basic area types*" (p. 441), which in our opinion means an inoperational, excessive subdivision of the floristic chorotypes (such as Mediterranean-Pontic-South-Siberian group, Mediterranean-South-Siberian-Oriental-Turanian group, Mediterranean-Oriental-Turanian group, and so on). Drawing pertinent and reliable inferences by employing such chorotypes is very difficult.

Quite often, the same plant species was assigned by different authors to two or three chorotypes, sometimes rather separate. Therefore, we think that, the cluster analysis performed on about 20% of the European vascular flora by Finnie & al. (2007) who distinguished 18 floristic elements, can represent a way to clarify the phytogeographic status of each taxon (species or subspecies).

Mediterranean taxa (*sensu stricto*) in the Romanian vascular flora

Taking into account the last two monographs on the chormophytes of Romania (Ciocârlan 2009; Sârbu & al. 2013), we selected those taxa on which there is a consensus as being considered Mediterranean, as well as some taxa that were treated slightly different in the two mentioned monographs but were assigned to the Eumediterranean chorotype by Adamović (1933). Accordingly, we ended up with a list of 145 Mediterranean taxa (*sensu stricto*), of which 127 were recorded in different phytosociological releves (Table 1) and 18 were considered subspontaneous, as the latter escaped cultivation and have survived sporadically in various plant communities.

The proportion of Mediterranean taxa in the flora of some regions of Romania (Table 2) suggests possible dispersal routes and the potential role of calcareous, open habitats in their establishment and subsequent integration into communities.

Table 1. Mediterranean species and subspecies (*sensu stricto*) in the vascular flora of Romania (from Cocârlan 2009 and Sârbu & al. 2013).

No.	Taxon	**Vegetation types** (in italics, associations in which the taxon is dominant)
1.	*Dryopteris pallida* (Bory) Maire & Petitmengin [rare]	?
2.	*Ranunculus muricatus* L.	Bidention tripartiti
3	*R. millefoliatus* Vahl	Agrostion stoloniferae
4.	*Aristolochia clematitis* L.	*Convolvulo-Aristolochietum clematitis* Convolvulo-Agropyrion repentis
5.	*Glaucium corniculatum* (L.) Rudolph	Caucalidion lappulae
6.	*Hypecoum procumbens* L.	Elymion gigantei
7.	*Hypecoum torulosum* A. E. Dahl.	Elymion gigantei
8.	*Celtis australis* L.	*Celto-Juglandetum regiae* Syringo-Carpinion orientalis
9.	*Castanea sativa* Mill. [cultural relict]	*Castaneo-Quercetum*
10.	*Glinus lotoides* L.	Chenopodion glauci, Nanocyperion
11.	*Scleranthus perennis* subsp. *marginatus* (Guss.) Nyman	*Polytricho piliferi-Scleranthetum perennis* *Sclerantho-Erysimetum cuspidata*e *Sclerantho-Teucrietum polii*

Table 1. continued.

12.	*Silene italica* (L.) Pers. subsp. *italica*	Fraxino orni-Cotinion
13.	*S. thymifolia* Sm.	Polygono-Chenopodion
14.	*Lychnis coronaria* (L.) Desr.	*Lychnio coronariae-Qercetum cerris* Quercion frainetto, Syringo-Carpinion orientalis
15.	*Amaranthus graecizans* L.	Polygono-Chenopodion, Amarantho-Chenopodion albi
16.	*Suaeda splendens* (Pourr.) Gren. & Godr. [very rare]	Thero-Salicornion
17.	*Plumbago europaea* L.	Festucion valesiacae
18.	*Polygonum maritimum* L.	Bidention tripartiti
19.	*Rumex pulcher* subsp. *woodsii* (De Not.) Arcang.	Sisymbrion officinalis
20.	*Sedum ochroleucum* Chaix [rare]	?
21.	*S. caespitosum* (Cav.) DC.	Festucion pseudovinae, Pimpinello-Thymion zygoidi
22.	*S. cepaea* L.	Quercion petraeae, Quercion frainetto
23.	*Potentilla pedata* Willd.	? Festuco-Brometea
24.	*Sanguisorba minor* subsp. *polygama* (Walst. & Kit.) Holub	? Festuco-Brometea
25.	*Crataegus monogyna* subsp. *azarella* (Griseb.) Franco	Fraxino orni-Cotinion
26.	*Sorbus graeca* (Spach) Schauer	Quercetalia pubescentis
27.	*Psoralea bituminosa* L.	Festuco-Brometea
28.	*Trigonella gladiata* M. Bieb.	*Trigonello gladiatae-Orlayetum* Festucion valesiacae, Festucion rupicolae
29.	*Medicago orbicularis* (L.) Bartal.	Festucion valesiacae, Sisymbrion officinalis
30.	*M. rigidula* (L.) All.	Chrysopogono-Festucion pseudodalmaticae, Bromo-Festucion pallentis
31.	*Trifolium patens* Schreb.	Arrhenatheretalia
32.	*T. pallidum* Waldst. & Kit.	*Lolio-Alopecuretum pratensis trifolietosum pallidi* Deschampsion caespitosae
33.	*T. echinatum* M. Bieb.	*Agrostetum stoloniferae-Trifolietosum echinati* *Trifolio echinati-Agrostietum stoloniferae* Sisymbrion officinalis, Festucion pseudovinae
34.	*T. angustifolium* subsp. *intermedium* (Guss.) Kožuharov [rare]	?
35.	*T. purpureum* Loisel.	Chrysopogono-Danthonion
36.	*T. resupinatum* L.	*Lolio-Alopecuretum pratensis trifolietosum resupinati* *Caricetum gracilis-trifolietosum resupinati* Deschampsion caespitosae, Potentillion anserinae
37.	*T. suffocatum* L. [rare]	?
38.	*T. michelianum* Savi	*Lolio-Alopecuretum pratensis trifolietosum micheliani*
39.	*T. hybridum* subsp. *elegans* (Savi) Asch. & Graebn.	Calthion, Agropyro-Rumicion
40.	*Astragalus depressus* L.	Chrysopogono-Festucion pseudodalmaticae
41.	*Coronilla scorpioides* (L.) W. D. J. Koch	Asparago verticillati-Paliurion, Festucion rupicolae
42.	*C. emerus* subsp. *emeroides* (Boiss. & Spruner) Hayek [rare]	?
43.	*Vicia amphicarpa* Dorthes [rare]	?
44.	*V. peregrina* L.	Caucalidion lappulae
45.	*V. ervilia* (L.) Willd.	Caucalidion lappulae
46	*V. narbonensis* L.	Festucion valesiacae, Caucalidion lappulae
47.	*Lathyrus aphaca* L.	*Consolido-Polygonetum convolvuli lathyretosum aphacae* *Apero-Lathyretum aphacae* Atriplicion nitentis, Veronico-Euphorbion, Potentillion anserinae
48.	*L. latifolius* L.	Geranion sanguinei, Quercion petraeae
49.	*L. setifolius* L.	Bromo-Festucion pallentis
50.	*L. cicera* L.	Caucalidion lappulae
51.	*L. sphaericus* Retz.	Asparago verticillati-Paliurion, Chrysopogono-Festucion pseudodalmaticae, Festucion rupicolae, Seslerio-Festucion pallentis

Table 1. continued.

52.	*Pisum elatius* Steven	Caucalidion lappulae, Veronico-Euphorbion
53.	*Paliurus spina-christi* Mill.	*Asphodelino luteae-Paliuretum spina-christi* Prunion spinosae, Asparago verticillati-Paliurion
54.	*Euphorbia chamaesyce* L. subsp. *chamaesyce* [rare]	?
55.	*E. myrsinites* L.	Pimpinello-Thymion zygoides
56.	*Bifora radians* M. Bieb.	*Stachyo annuae-Setarietum pumilae biforetosum radiantis* Veronico-Euphorbion, Scleranthion annui, Panico-Setarion, Caucalidion lappulae
57.	*Smyrnium perfoliatum* L.	Galio-Alliarion
58.	*Myrrhoides nodosa* (L.) Cannon	Galio-Alliarion
59.	*Scandix pecten-veneris* L.	Caucalidion lappulae
60.	*Pimpinella tragium* Vill.	Pimpinello-Thymion zygoides
61.	*Cnidium silaifolium* (Jacq.) Simonk. subsp. *silaifolium*	Cynosurion, Bromo-Festucion pallentis, Geranion sanguinei
62.	*Viola alba* Besser ssp. *dehnhardtii* (Ten.) W. Becker [rare]	?
63.	*V. hymettia* Boiss. & Heldr.	*Violo hymettiae-Cynodontetum* Festucion vaginatae, Festuco-Mollugion
64.	*Clypeola jonthlaspi* L.	Festucion valesiacae
65.	*Eruca vesicaria* subsp. *sativa* (Mill.) Thell. [cultural relict]	Sisymbrion officinalis
66.	*Iberis saxatilis* L. [rare]	?
67.	*Myagrum perfoliatum* L.	Caucalidion lappulae, Sisymbrion officinalis, Atriplicion nitentis, Panico-Setarion
68.	*Sisymbrium irio* L.	Sisymbrion officinalis
69.	*Diplotaxis viminea* (L.) DC.	Veronico-Euphorbion
70.	*Rapistrum rugosum* subsp. *orientale* (L.) Arcang.	Caucalidion lappulae, Sisymbrion officinalis
71.	*Reseda alba* L. [rare]	?
72.	*R. phyteuma* L.	Alysso-Sedion, Artemisio-Agropyrion
73.	*Ecbalium elaterium* (L.) A. Rich.	*Cynodonto-Atriplicetum tataricae ecballietosum elaterii* Atriplicion nitentis, Scolymion hispanici
74.	*Primula veris* subsp. *columnae* (Ten.) Lüdi	Seslerion rigidae, Festuco saxatilis-Seslerion bielzii, Asplenio septentrionalis-Festucion pallentis
75.	*Periploca graeca* L.	Alno-Ulmion
76.	*Asperula arvensis* L.	Caucalidion lappulae
77.	*A. laevigata* L. [rare]	?
78.	*Galium divaricatum* Lam.	Thero-Airion, Corynephorion canescentis
79.	*G. debile* Desv.	Filipendulion, Agrostion stoloniferae
80.	*G. purpureum* L.	Thero-Airion, Bromo-Festucion pallentis
81.	*Valerianella coronata* (L.) DC.	Chrysopogono-Festucion pseudodalmaticae, Festucion valesiacae
82.	*V. pumila* (L.) *DC* subsp. *pumila*	Festucion rupicolae
83.	*Jasminum fruticans* L.	*Rhamno catharticae-Jasminetum fruticantis*
84.	*Calystegia silvatica* (Kit.) Griseb.	Alno-Ulmion
85.	*Cuscuta planiflora* Ten.	Panico-Setarion, Dauco-Melition
86.	*Cynoglossum creticum* Mill.	Robinion pseudacaciae
87.	*Bellardia trixago* (L.) All. [rare]	?
88.	*Kickxia elatine* subsp. *crinita* (Mabille) Greuter [rare]	?
89.	*Teucrium scordium* subsp. *scordioides* (Schreb.) Maire & Petitm.	Magnocaricion elatae, Agrostion stoloniferae, Potentillion anserinae
90.	*Salvia sclarea* L.	Bromo-Festucion pallentis, Festucion valesiacae
91.	*Hyoscyamus albus* L.	Onopordion acanthii
92.	*Scolymus hispanicus* L.	*Lolio-Scolymetum hispanici*; *Cakileto euxiniae-Salsoletum ruthenicae scolymetosum hispanicae*

Table 1. continued.

		Secali sylvestris-Brometum tectori scolymetosum hispanici *Cynodonto-Atriplicetum tataricae scolymetosum hispanici* Amarantho-Chenopodion albi, Malvion neglectae, Euphorbion peplis
93.	*Anthemis triumfettii* (L.) DC.	Achnatherion calamagrostis
94.	*Cirsium acarna* (L.) Moench	Onopordion acanthii
95.	*C. creticum* (Lam.) D'Urv. subsp. *creticum*	Arction lappae, Dauco-Melilotion
96.	*Centaurea solstitialis* L. subsp. *solstitialis*	*Carduo acanthoidis-Onopordetum acanthii centauretosum solstitialis* Amarantho-Chenopodion albi, Sisymbrion officinalis, Malvion neglectae, Atriplicion nitentis, Jurineo arachnoideae-Euphorbion steposae, Cynosurion, Onopordion acanthii, Dauco-Melilotion, Arction lappae, Convolvulo-Agropyrion
97.	*Sonchus asper* subsp. *glaucescens* (Jord.) Ball [rare]	?
98.	*Crepis nicaeensis* Pers.	Bromo-Festucion pallentis
99.	*Allium sphaerocephalon* subsp. *arvense* (Guss.) Arcang.	Agropyro-Kochion, Prunion spinosae, Prunion fruticosae, Stipo-Festucetalia pallentis
100.	*A. moschatum* L.	Festucion valesiacae, Festucion vaginatae
101.	*Asphodeline lutea* (L.) Rchb.	*Asphodelino luteae-Paliuretum asphodelinetosum* Prunion spinosae, Prunion fruticosae, Asparago verticillati-Paliurion
102.	*Gagea granatelii* (Parl.) Parl.	Pimpinello-Thymion zygoides, Quercion pubescentis-petraeae
103.	*Muscari commutatum* Guss.	Festucion valesiacae
104.	*Gladiolus illyricus* W.D.J. Koch	Chrysopogono-Festucion pseudodalmaticae
105.	*Orchis papilionacea* L.	Danthonio-Brachypodion
106.	*O. coriophora* subsp. *fragrans* (Pollini) Sudre	Molinion caeruleae
107.	*Juncus hybridus* Brot. (*J. bufonius* subsp. *mutabilis* (Cavi) I. Grinț.)	Nanocyperion, Scorzonero-Juncion gerardii
108.	*Sorghum halepense* (L.) Pers.	*Setario pumilae-Sorghetum halepensis* *Cynancho acuti-Sorghetum halepensis* Malvion neglectae, Amarantho-Chenopodion albi, Atriplicion nitentis, Panico-Setarion, Caucalidion lappulae
109.	*Psilurus incurvus* (Gouan) Schinz & Thell.	Festucion valesiacae, Alysso petraei-Sedion
110.	*Dasypyrum villosum* (L.) P. Candargy	*Trifolio molinerii-Dasypyretum villosae* Thero-Airion, Festucion valesiacae, Amarantho-Chenopodion albi, Sisymbrion officinalis, Chrysopogono-Festucion pseudodalmaticae, Matricario matricarioidis-Polygonion arenastri
111.	*Gastridium ventricosum* (Gouan) Schinz & Thell.	Festucion valesiacae
112.	*Sclerochloa dura* (L.) P. Beauv.	*Sclerochloo durae-Polygonetum avicularis* Amarantho-Chenopodion albi, Sisymbrion officinalis, Malvion neglectae, Jurineo arachnoideae-Euphorbion steposae, Caucalidion lappulae
113.	*Sporobolus pungens* (Schreb.) Kunth	Elymion gigantei
114.	*Lolium multiflorum* Lam.	Arction lappae
115.	*Vulpia ciliata* Dumort. subsp. *ciliata*	Thero-Airion
116.	*Cynosurus echinatus* L.	Festucion valesiacae, Sisymbrion officinalis
117	*Elymus panormitanus* (Parl.) Tzvelev	Syringo-Carpinion orientalis
118.	*Bromus rigidus* Roth [rare]	?
119.	*B. scoparius* L. [rare]	?
120.	*Aegilops geniculata* Roth	Onopordion acanthii, Festucion valesiacae
121.	*A. neglecta* Bertol.	*Medicago minimae-Aegilopsetum triaristati* Onopordion acanthii, Festucion valesiacae, Sisymbrion officinalis, Chrysopogono-Festucion pseudodalmaticae
122.	*A. triuncialis* L. [rare]	Festucion vaginatae, Festucion valesiacae

Table 1. continued.

123.	*A. lorentii* Hochst. [rare]	?
124	*Phleum subulatum* (Savi) Asch. & Graebn. subsp. *subulatum* [rare]	?
125.	*Secale strictum* (C. Presl) C. Presl	Moehringion muscosae, Asplenion septentrionalis
126.	*Hordeum bulbosum* L. subsp. *bulbosum*	Sisymbrion oficinalis
127.	*Tragus racemosus* (L.) All.	*Tribulo-Tragetum racemosi* Puccinellio limosae-Halimionion verruciferae, Bassio laniflorae-Bromion tectorum, Amarantho-Chenopodion albi, Salsonion ruthenicae, Malvion neglectae, Atriplicion nitentis, Festucion vaginatae, Sisymbrion officinalis

Apart from these 127 taxa, several subspontaneous Mediterranean species, like *Trigonella foenum-graecum* L., *Papaver somniferum* L., *Ficus carica* L., *Morus nigra* L., *Silene pendula* L., *Mespilus germanica* L., *Cercis siliquastrum* L., *Spartium junceum* L., *Ornithopus sativus* Brot., *Salvia officinalis* L., *Chrysanthemum coronarium* L., *Calendula officinalis* L., *Vicia sativa* L., *V. articulata* Hornem., *Sinapis alba* L. subsp. *alba*, *Melissa officinalis* L., *Consolida ajacis* (L.) Schur, *Adonis annua* L., occur sporadically.

Table 2. Number and proportion of Mediterranean taxa (*sensu stricto*) in the vascular flora of various geographic areas of Romania.

Region	**Total no. taxa**	**Mediterranean taxa (no./%)**	**Reference**
Dobrogea	1911	46/2.4	Skolka & al. (2005)
Romanian Back Sea coast	594	36/6.0	Făgăraş (2008)
Prut valley	1360	35/2.4	Tofan-Burac & Chifu (2002)
Milcov drainage basin	1093	23/2.1	Coroi (2001)
Gurghiu valley	1194	7/0.6	Sămărghiţan (2005)
Crişul Alb valley	1249	20/1.6	Ardelean (1999)
Crişurilor Plain	787	70/8.8	Pop (1968)
Sadu drainage basin	1106	4/0.5	Drăgulescu (1995)
Luncavăţ upper basin	933	24/2.6	Niculescu (2006)
Piatra Craiului Mountains	991	20/2.0	Mihăilescu (2001)
Stânişoarei Mountains	1408	11/0.8	Oprea & Sîrbu (2009)
Pădurea Craiului Mountains	856	19/2.2	Groza (2008)
Siriu Mountain	880	23/2.6	Dihoru (1975)
Ţarcu, Godeanu and Cernei Mountains	1630	72/4.5	Boşcaiu (1971)

Coenotic integration of the Mediterranean floristic element (*sensu stricto*)

The peculiar edaphic and climatic conditions extant in certain regions have promoted the local abundance of 23 Mediterranean species that have become dominant or co-dominant in 18 plant associations and 14 subassociations, of which (*nota bene!*) three are forest communities and two are scrubs.

The syntaxonomic framework of those plant associations in which one or two Mediterranean taxa are dominant is given below (the distribution of these community types is roughly indicated through the names of localities, geographic regions or provinces):

CAKILETEA MARITIMAE R. Tx. & Prsg. 1950
Euphorbietalia peplis R. Tx. 1950
Cakilion euxiniae Morariu 1967 corr. Rodwell & al. 2002
1. *Cakileto euxiniae-Salsoletum ruthenicae* Vicherek 1971
– *scolymetosum hispanicae* (Pop 1969) Coldea 2012: Vama Veche

PHRAGMITETEA R. Tx. & Prsg. 1942
Phragmitetalia W. Koch 1926
Magnocaricion W. Koch 1926
2. *Caricetum gracilis* Almquist 1929
- *trifolietosum resupinati* Dihoru & al. 1973: Mehedinţi

KOELERIO-CORYNEPHORETEA Klika in Klika & Novák 1941
Festucetalia vaginatae Soó 1957
Bassio laniflorae-Bromion tectorum (Soó 1957) Borhidi 1996
3. *Secali sylvestris-Brometum tectori* Hargitai 1940
– *scolymetosum hispanici* (Pop 1970) Coldea 2012: Vama Veche, Mamaia, Năvodari
Festucion vaginatae Soó 1938
4. *Violo hymettiae-Cynodontetum* Cîrţu 1973: Oltenia, southern Moldavia
Sedo-Scleranthetalia Br.-Bl. 1955
Thero-Airion R.Tx. ex Oberd. 1957
5. *Trifolio molinerii-Dasypyretum villosae* Boşcaiu & Resm. 1969: Danube Gorge, Mehedinţi Plateau, Olt lower basin, Ţarcu-Godeanu-Cernei Mountains
Alysso alyssoidis-Sedion albae Oberd. & Th. Müller in Th. Müller 1961
6. *Sclerantho-Erysimetum cuspidata*e Csűrös & al. 1968: Caraş-Severin
7. *Polytricho piliferi-Scleranthetum perennis* Moravec 1967: Ţarcu-Godeanu-Cernei Mountains
8. *Sclerantho-Teucrietum polii* Andrei & Popescu 1967: Pricopanu, Popina Island

FESTUCO-BROMETEA Br.-Bl. & R. Tx. ex Klika & Hadač 1944
Stipo pulcherrimae-Festucetalia pallentis Pop 1968
Chrysopogono-Festucion pseudodalmaticae Coldea & Sârbu 2012
9. *Medicago minimae-Aegilopsetum triaristati* Roman 1974: Mehedinţi Plateau
Festucetalia valesiacae Br.-Bl. & R. Tx. ex. Br.-Bl. 1949
Festucion valesiacae Klika 1931
10. *Trigonello gladiatae-Orlayetum* Dihoru (1969) 1970: Dobrogea, Siriu Mountain

MOLINIO-ARRHENATHERETEA R.Tx. 1937
Molinietalia caeruleae W. Koch 1926
Agrostion stoloniferae Soó (1933) 1971
11. *Agrostetum stoloniferae* (Ujvarosi 1941) Burduja & al. 1956
- *trifolietosum echinati* Morariu & al. 1973: Moldova Veche

Potentillo-Polygonetalia R.Tx. 1947
Potentillion anserinae R. Tx. 1937
12. *Lolio-Alopecuretum pratensis* Bodrogközy 1962
- *trifolietosum pallidi* Păun (1964) 1966: Oltenia
- *trifolietosum resupinati* Păun (1964) 1966: Oltenia
- *trifolietosum micheliani* Păun (1964) 1966: Oltenia
13. *Trifolio echinati-Agrostietum stoloniferae* Morariu & al. 1973: Eforie Sud, Moldova Veche
– *trifolietosum resupinati* Păun (1964) 1966: Banat, Oltenia

PLANTAGINETEA MAJORIS R. Tx. & Preising 1950
Plantaginetalia majoris R. Tx. & Preising 1950
Scolymion hispanici Morariu 1967
14. *Lolio-Scolymetum hispanici* Morariu 1959: Dobrogea

ARTEMISIETEA VULGARIS Lohmeyer & al. in R. Tx. 1950
Onopordetalia Br.-Bl. & R.Tx. ex Klika & Hadač 1944
Onopordion acanthii Br.-Bl. & al. 1936
15. *Carduo acanthoidis-Onopordetum acanthii* Soó ex Jarolinek & al. 1997
- *centauretosum solstitialis* (Coroi & Coroi 1998) Sanda & al. 2001: Moldavia
Agropyretalia repentis Oberd. & al. 1967
Convolvulo-Agropyrion repentis Görs 1966
16. *Convolvulo-Aristolochietum clematitis* Ubrizsy 1967 em. Coldea & Ştefan 2012: Moldavia

POLYGONO ARENASTRI-POETEA ANNUAE Rivas-Martinez 1975 corr. Rivas-Martinez & al. 1991
Polygono arenastri-Poetalia annuae R.Tx. in Géhu & al. 1972 corr. Rivas-Martinez & al. 1991
Matricario matricarioidis-Polygonion arenastri Rivas-Martinez 1975 corr. Rivas-Martinez & al. 1991
17. *Sclerochloo durae-Polygonetum avicularis* Soó ex Kornek 1969 corr. Mucina 1993: Dobrogea, Romanian Black Sea coast, Prut valley, Milcov basin

STELLARIETEA MEDIAE R. Tx., Lohmeyer & Preising in R.Tx. 1950
Papaveretalia rhoeadis Hüppe & Hoffmeister ex Manthey in Dengler & al. 2003
Caucalidion lappulae (R.Tx. 1950) von Rochow 1951
18. *Consolido-Polygonetum convolvuli* Morariu (1943) 1967
- *lathyretosum aphacae* (Spiridon 1970) Oprea & Sârbu 2012: Bucharest, Danube Plain, Oltenia
19. *Stachyo annuae-Setarietum pumilae* Felfoldy 1942 corr. Mucina 1993
- *biforetosum radiantis* Viţalariu 1974: Crasna basin
Atriplici-Chenopodietalia albi (R. Tx. 1937) Nordhagen 1940
Panico-Setarion Sissingh in Westhoff & al. 1946
20. *Setario pumilae-Sorghetum halepensis* Ştefan & Oprea 1997: southern Moldavia
Scleranthion annui (Kruseman & Vlieger 1939) Sissingh in Westhoff & al. 1946
21. *Apero-Lathyretum aphacae* R. Tx. & von Rochow 1951: Maramureş, Oltenia
Eragrostietalia J. Tx. ex Poli 1966
Amarantho-Chenopodion albi Morariu 1943

22. *Cynancho acuti-Sorghetum halepensis* Ştefan & Oprea 1997: Vrancea
23. *Tribulo-Tragetum racemosi* Soó & Timár in Timár 1954: Dobrogea, Romanian Black Sea coast, Prut valley

Sisymbrietalia J. Tx. in Lohmeyer & al. 1962

Atriplicion nitentis Passarge 1978

24. *Cynodonto-Atriplicetum tataricae* Morariu 1943
    – *ecballietosum elaterii* (Morariu 1959) Oprea & Sârbu 2012: Dobrogea (Constanţa and Vama Veche)
    – *scolymetosum hispanici* (Morariu 1959) Oprea & Sârbu 2012: Constanţa

QUERCO-FAGETEA Br.-Bl. & Vlieger 1937 em. Borhidi 1996

Qercetalia roboris R. Tx. 1931

Castaneo-Quercion Soó 1962 em. Soó 1971

25. *Castaneo-Quercetum* Horvat I. 1938: Baia-Mare

QUERCETEA PUBESCENTI-PETRAEAE (Oberdorfer 1948) Jakus 1960

Fraxino orni-Cotinetalia Jakus 1960

Syringo-Carpinion orientalis Jakus & Vida 1959

26. *Celto-Juglandetum regiae* Jovanović 1957 em. Roman 1974: Mehedinţi Plateau

Quercion frainetto I. Horvat 1954

27. *Lychnio coronariae-Qercetum cerris* Sanda & al. 2003: Giurgiu, Oltenia, Muntenia, Banat, Crişurilor Plain

Asparago verticillati-Paliurion Sanda & Popescu 1999

28. *Asphodelino luteae-Paliuretum spina-christi* Sanda & Popescu 1999: Dobrogea
    - *asphodelinetosum* Sanda & Popescu 1999: Dobrogea
29. *Rhamno catharticae-Jasminetum fruticantis* (Mihai & al. 1964) Mititelu & al. 1993: Dobrogea

Most of the above plant (sub)associations were described in Dobrogea, southern Moldavia, Oltenia, Mehedinţi Plateau and the Danube gorge, which suggests that the dispersal of the Mediterranean plants followed the Illyric route and then the fluvial corridors across the south Carpathians. Regarding the presence of such Mediterranean taxa (*sensu stricto*) in the composition of different vegetation types, one can note that:

- six species occur in (semi)-halophilous habitats, but none is (co)dominant in any community type (according to Pop 2002);

- 36 species, representing about 6% of the regional vascular flora, occur along the Black Sea coast (within Romanian borders) and some of them are dominant in six plant associations (Făgăraş 2008); at the scale of the whole Dobrogea region, the number of such species and community types increases to 46 and 10, respectively (Skolka & al. 2005);

- within the area of Cluj-Napoca city, Filipaş (2007) found a total of 1058 species, of which 1.8% were Mediterranean (*sensu stricto*); most of the latter occur in ruderal communities, where their proportion can reach 4% (i.e., in *Polygono avicularis-Matricarietum matricarioidis*) and even 6.2% (i.e., in *Setario-Stachyetum annuae*);

- in the forest (co)dominated by *Quercus cerris* or *Q. frainetto*, the proportion of the Mediterranean floristic element varies between 2 to 6% (Pop & Cristea 2002), which

is an argument for the inclusion of the regions Banat and Oltenia into the Dacian-Illyric floristic province;

- an evidence for considering the Cerna valley as " … *the richest and most interesting in the entire Europe* … " (Călinescu 1946, p. 41) comes from the data published by Boşcaiu (1971), as in both herbaceous and forest communities installed on calcareous shallow soils and outcrops, the proportion of the Mediterranean floristic element reaches the highest values: *Asplenio-Ceterachetum* – 15.9%, *Achnateretum calamagrostis* – 17.8%, *Festucetum xanthinae* – 13.3%, *Geranio robertianae-Fagetum* – 9.0%, *Syringo-Carpinetum orientalis* – 19.4%;

- in the colline and montane forests of Cluj county, the proportion of Mediterranean species varies between 0.5 and 1%, but on limestone habitats it can reach 3.6% (i.e., *Melampyro bihariensi-Carpinetum*) and sometimes 5% (i.e., *Quercetum roboripetraeae*) (Pop & al. 2002);

In conclusion, we agree with Boşcaiu's (1971) statement according to which the positioning of the south Carpathian-Danubian region"… *at the crossing of so different migration waves in terms of origin and intensity has developed the phylogenetic potentialities of the Carpathian massifs* " (p. 484).

A more detailed study based on historical data could reveal the variation in the distribution of Mediterranean species that is presumably due to climate change.

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