

ORIGINAL ARTICLE

Plant communities of Italy: The Vegetation Prodrôme

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Abstract

The Vegetation Prodrôme of Italy was promoted in 2012 by the Italian “Ministry of Environment, Land and Sea Protection”, in collaboration with the “Italian Society of Botany”, to provide a comprehensive and systematic catalogue and description of Italian plant communities. The Prodrôme that is presented in this paper is the first full organic synthesis of the vegetation of Italy at the alliance syntaxonomic level. It fulfils several needs, the main one being a unified and comprehensive national framework that may make an important contribution to the definition of the European Vegetation Prodrôme. Syntaxonomy, as well as taxonomy, is sometimes based on considerations that may in part diverge: several authors tend to favour models that are divisive or aggregative to a greater or lesser extent in terms of flora, biogeography and ecology. These different points of view stimulate the scientific debate and allow the adoption of a framework that is more widely supported. The Prodrôme includes 75 classes, 2 subclasses, 175 orders, 6 suborders and 393 alliances. The classes were grouped into nine broad categories according to structural, physiognomic and synecological elements rather than to syntaxonomic criteria. The rank, full valid name, any synonymies and incorrect names are provided for each *syntaxon*. The short declaration highlights the physiognomy, synecology, syndynamics and distribution of the plant communities that belong to the *syntaxon*. The Prodrôme of the Italian Vegetation is linked to the European Strategy for Biodiversity, the European Habitats Directive and the European Working Groups related to the ecosystems and their services. In addition to basic applications, the Prodrôme can be used as a framework for scientific research related to the investigation of the relationships between plant communities and the environmental factors that influence their composition and distribution.

Keywords: *Phytosociology, syntaxonomy, Braun-Blanquet approach, nomenclature, checklist*

Introduction

The project “Syntaxonomic check-list of the Italian classes, orders and alliances (Vegetation Prodrôme of Italy)” was promoted in 2012 by the Italian “Ministry of Environment, Land and Sea Protection” in collaboration with the “Italian Society of Botany”. The aim of this project is to provide a comprehensive and systematic catalogue and description of Italian plant communities.

The scientific coordination of this project was entrusted to Edoardo Biondi and Carlo Blasi, who have, over the last 20 years, published numerous significant phytosociological syntheses (e.g. Biondi et al. 2003, 2005, 2006; Blasi et al. 2003, 2004, 2012b) and several reports on the progress being made in the implementation of the Habitats Directive in Italy (Biondi et al. 2010, 2012a, 2012b, 2014b; Biondi 2013). The authors of this paper have already

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written the Interpretation Manuals of the National Habitat (Biondi & Blasi 2009) and the Vegetation of Italy, which was combined with the Map of the Vegetation Series of Italy (Blasi 2010a, 2010b).

This project has led to a first, complete, organic synthesis of the vegetation of Italy at the syntaxonomic level of alliance. An updated version of the Vegetation Prodrôme at the level of suballiance is currently being prepared, once again on behalf of the Ministry of the Environment. The updated Prodrôme will contain a description of the typical associations of alliances and suballiances, as well as information on other elements that may prove useful for applied researches and environmental experts (synonyms, typical association, definition and description, ecology, distribution, vegetation structure and floristic composition, syndynamics, EUNIS (European Nature Information System) code, reference habitat *sensu* Habitats Directive, information on conservation condition and management, occurrence in the Italian National Parks and related references).

Scientific vision and main goals

The aim of this paper is to provide a syntaxonomic classification of the Italian vegetation according to the European Braun-Blanquet Phytosociological School (Braun-Blanquet 1964).

This Prodrôme, as well as the syntaxonomic synthesis, is not the end point of a process of classification, but a synthesis which finally places Italy on the same level as several other European countries (e.g. Mucina et al. 1993a; Bardat et al. 2001; Rivas-Martínez et al. 2001, 2002; Costa et al. 2012).

The Prodrôme fulfils several needs, the main one being a unified and comprehensive national framework that may make an important contribution to the definition of the European Vegetation Prodrôme (Pignatti 1990; Dierschke 1992; Mucina et al. 1993b; Rodwell et al. 1995; Mucina 1997).

Until this work was defined, only partial phytosociological syntheses had previously been carried out in Italy, which were related to some *syntaxa* (e.g. Bartolo & Brullo 1986, 1993; Brullo et al. 2001; Biondi et al. 2003; Brullo & Giusso del Galdo 2003; Di Pietro et al. 2004) or limited to portions of the Italian territory (e.g. Theurillat et al. 1995; Biondi et al. 2006).

Syntaxonomy, as well as taxonomy, is sometimes based on considerations that may in part diverge: several authors tend to favour models that are divisive or aggregative to a greater or lesser extent in terms of flora, biogeography and ecology. These different points of view stimulate the scientific debate and allow the adoption of a framework that is more widely supported. All these different opinions are related to the lack of a shared definition of the concepts of “class”, “order” and “alliance”. At the end of the last century, some authors

discussed the concept of class in phytosociology (Pignatti et al. 1995). Although there are no totally unequivocal recommendations for the definition of the class, two elements are particularly indicative: (i) ecological homogeneity of the associations that refer to the same class and (ii) wide distributional range. Therefore, classes with a local distribution should not be considered meaningful (Pignatti et al. 1995).

The only syntaxonomic level that was officially defined at the outset of phytosociology is that of the association, which was proposed by Flahault and Schöter (1910) and selected by means of a formal vote at the Third International Congress of Botany held in Brussels from 14 to 22 May 1910. In the following years, however, the definition was modified slightly until the universally accepted definition, proposed by Braun-Blanquet (1928), was agreed upon. As phytosociology gradually evolved over more than a century, an amendment to Braun-Blanquet's (1928) definition of association was deemed necessary, and this led to the last proposal made by Biondi (2011). This Prodrôme recovers the fundamental concepts of this last definition that explicitly fits in with the concepts related to ecology and landscape modelling in a dynamic phytosociological view (Biondi et al. 2011; Blasi et al. 2011a, 2011b; Blasi & Fronzoni 2011).

When designing the Prodrôme, we tried to reconcile two different needs that are often considered divergent: (i) maintain the ecological and biogeographical connections with the vegetation of central and northern Europe and (ii) highlight the important role of the flora and vegetation of central and southern Italy. We used the class level to provide the connection at the European level, and the orders and alliances to highlight the floristic and vegetation peculiarities of central and southern Italy.

In recent decades, new syntaxonomic syntheses have highlighted the crucial role of central and southern vegetation in terms of historical, biogeographical and ecological qualification at both the national and European level. According to relatively recent chorological assessments, most of our vegetation is endemic, or linked, above all, to the vegetation of south-eastern Europe (Biondi & Galdenzi 2012; Biondi et al. 2014b). The connection with the western part of the European Mediterranean is much weaker and mainly applies to the north-western part of the Italian peninsula and Sardinia. The syntaxonomic diversification in the Alpine sector, which contains a wide range of environments, is very high. While significant syntaxonomic connections with central-northern Europe are clearly recognizable in this area, several vegetation typologies in the southern Alps, which fall entirely within Italian territory, undoubtedly warrant an important syntaxonomic revision that is likely to bring to light new

endemic *syntaxa* and connections with the northern and central Apennines.

The composition of this biogeographical framework in Italy is totally different from that of the second half of the last century.

Results

The Prodrôme includes 75 classes, 2 subclasses, 175 orders, 6 suborders and 393 alliances.

The rank, full valid name, any synonymies and incorrect names are provided for each *syntaxon*. The short declaration highlights the physiognomy, synecology, syndynamics and distribution of the plant communities that belong to the *syntaxon*.

In order to facilitate the consultation of the Prodrôme, the classes were grouped into nine broad categories according to structural, physiognomic and synecological elements rather than to syntaxonomic criteria.

To achieve this syntaxonomic synthesis, we examined a vast number of vegetation studies encompassing: (i) Italian nationwide (e.g. Géhu et al. 1984; Landucci et al. 2013; Pesaresi et al. 2014), (ii) local geographic areas (e.g. Blasi et al. 2000, 2001, 2005, 2009, 2012a; Acosta et al. 2003; Di Pietro et al. 2010), (ii) European territories (e.g. Hegedúšová et al. 2012; Ribeiro et al. 2013), (iii) purely syntaxonomic issues (e.g. Biondi et al. 2014a) and (iv) the knowledge and conservation of the different Natura 2000 Habitats (e.g. Biondi et al. 2014b).

The literature that was consulted is grouped in two sections, i.e. (i) European nationwide synthesis and generic studies and (ii) Italian and European-specific studies, and is shown in Appendix 1.

The phytosociological nomenclature follows the rules of the International Code of Phytosociological Nomenclature (Weber et al. 2000).

I. FLOATING AND ROOTED AQUATIC VEGETATION

1 Cl.: *CHARETEA FRAGILIS* F. Fukarek ex Krausch 1964

[*Charetea fragilis* Fukarek 1961 (art. 8)]

Pioneer, rooted seagrass beds that grow in calm, clear, oligotrophic to mesotrophic, brackish to fresh waters, on underwater soils of ponds, lakes and surface waterways.

1.1 Ord.: *CHARETALIA HISPIDAE* Sauer ex Krausch 1964

[*Charetalia* Sauer 1937 *nom. nud.* (art. 2b, 8), *Lamprothamnetalia papulosi* van Raam & Schaminée in Schaminée, Weeda & Westhoff 1995 (art. 3b)]

Soft or hard water seagrass communities, with few phosphates, mainly colonized by species of the genus *Chara*.

1.1.1 All.: *Charion canescentis* Krausch 1964

[*Halo-Charion* Krausch 1968 (art. 3a, 29)]

Halophilous communities of coastal brackish waters, more rarely of inland waters, that are strongly mineralized.

1.1.2 All.: *Charion vulgaris* (Krause ex Krause & Lang 1977) Krause 1981

[*Thero-Charion asperae* Krause 1969 *nom. inval.* (art. 2d, 3e), *Charenion vulgaris* Krause 1969]

Therophytic and ephemeral communities of temporary, shallow and alkaline, mesotrophic to slightly eutrophic waters.

1.1.3 All.: *Charion fragilis* Krausch 1964

[*Limno-Charion* Krausch 1968 (art. 3a) p.p., *Charion asperae* Krause 1969 (art. 29), *Charion contrario-asperae* Pietsch 1987 (art. 29), *Charion rudis-hispidae* Pietsch 1987 (syntax. syn.), *Thero-Charion asperae* Krause 1969 (art. 22)]

Permanent communities that grow in oligo-mesotrophic alkaline, carbonate-rich waters.

1.2 Ord.: *NITELLETALIA FLEXILIS* Krause 1969

Communities that grow in soft, acidophilous to neutrophilous waters.

1.2.1 All.: *Nitellion flexilis* Segal ex Krause 1969

Atlantic and sub-Atlantic communities of acidic waters.

2 Cl.: *LEMNETEA MINORIS* O. Bolòs & Masclans 1955

[*Lemnetea* Tüxen 1953 (art. 8), *Lemnetea* Tüxen 1955 (art. 8), *Lemnetea minoris* Koch & Tüxen ex Schwabe & Tüxen 1981 (art. 31), *Hydrocharitetea morsus-ranae* Oberdorfer, Görs, Korneck, Lohmeyer, Müller, Philippi & Seibert 1967 (art. 2b, 8)]

Annual pleustophytic vegetation that colonizes fresh to brackish waters.

2.1 Ord.: *LEMNETALIA MINORIS* O. Bolòs & Masclans 1955

[*Lemnetalia* Tüxen 1955 (art. 8), *Lemnetalia minoris* Tüxen ex Schwabe & Tüxen 1981 (art. 31)]

2.1.1 All.: *Lemnion minoris* O. Bolòs & Masclans 1955

[*Lemnion minoris* Tüxen 1955 (art. 8), *Lemnion gibbae* Tüxen & Schwabe in Tüxen 1974 (syntax. syn.), *Lemno-Salvinion natantis* Slavnic 1956 (syntax. syn.)]

Floating pleustophyte communities that grow in eutrophic to hypertrophic waters.

2.1.2 All.: *Lemnion trisulcae* Den Hartog & Segal 1964

[*Riccio fluitantis-Lemnion trisulcae* Schwabe & Tüxen 1981 (art. 29)]

Pleustophytic plant communities that grow in oligo-mesotrophic to meso-eutrophic waters, sometimes dominated by species belonging to the *Ricciaceae* family.

2.1.3 All.: *Lemno minoris-Hydrocharition morsus-ranae* Rivas-Martínez, Fernández-González & Loidi 1999

[*Hydrocharition* Rübel 1933 *nom. nud.* (art. 2b, 8)]

Macroleustophytic communities that grow in mesotrophic to meso-eutrophic waters.

3 Cl.: POTAMETEA PECTINATI Klika in Klika & Novák 1941

[*Potametales* Klika in Klika & V. Novák 1941 (original name), *Potametea* Tüxen & Preising 1942 (art. 8), *Nymphaeetea* Klika in Klika & Hadač 1944 (art. 29), *Potametea* Tüxen & Preising ex Oberdorfer 1957 (art. 31), *Stratiotetea* Den Hartog & Segal 1964 (syntax. syn.), *Ceratophylletea* Den Hartog & Segal 1964 (art. 8), *Utricularietea neglectae* Den Hartog & Segal 1964 (syntax. syn.)]

Perennial macrophytic communities of fresh, occasionally brackish, mesotrophic to eutrophic, running or standing, waters.

3.1 Ord.: *POTAMETALIA PECTINATI* Koch 1926

[*Hydrocharitetalia* Rübel 1933 (syntax. syn.), *Magnopotametalia* Den Hartog & Segal 1964 (syntax. syn.), *Luronio-Potametalia* Hartog & Segal 1964, *Parvopotametalia* Den Hartog & Segal 1964 (art. 29), *Callitricho-Ranunculotalia* Passarge 1978 (syntax. syn.), *Nymphaeetalia albo-tetragonae* Passarge 1978 (syntax. syn.), *Callitricho-Potametalia* Schaminée, Lanjouw & Schipper 1990 (art. 29), *Nupharo-Potametalia* Schaminée, Lanjouw & Schipper 1990 (art. 29), *Ranunculo-Myriophylletalia* Passarge 1996 (syntax. syn.), *Luronio-Potametalia* Hartog & Segal 1964]

Submerged vegetation that grows in meso-eutrophic deep water dominated by rooted macrophytes (Elodeids and Nymphaeids).

3.1.1 All.: *Potamion pectinati* (Koch 1926) Libbert 1931

[*Potamion eurosibiricum* Koch 1926 (art. 34), *Parvo-Potamion eurosibiricum* Vollmar 1947 (art. 34), *Magnopotamion eurosibiricum* Vollmar 1947 (art. 34), *Eu-Potamion* (Koch 1926) Oberdorfer 1957 (art. 22), *Magnopotamion* (Vollmar 1947) Den Hartog & Segal 1964 (art. 22), *Hydrocharition morsus-ranae* Rübel 1933 (syntax. syn.), *Stratiotion* Den Hartog & Segal 1964 (syntax. syn.), *Potamion pectinati* (Koch 1926) Görz in Oberdorfer 1977 (art. 22)]

Floating and rooted submerged, macrophytic communities (Elodeids), of varying pioneer status, that grow in fresh and calm, standing or slow-flowing, moderately deep (0.5-4 m), mesotrophic to eutrophic waters.

3.1.2 All.: *Nymphaeion albae* Oberdorfer 1957

Rhizomatous macrophytic communities characterized by submerged plants with floating leaves of calm, standing to slow-flowing, moderately deep (1-4 m), mesotrophic to eutrophic waters.

3.1.3 All.: *Ranunculion aquatilis* Passarge 1964

[*Callitricho-Batrachion* Den Hartog & Segal 1964 (art. 22), *Ranunculion peltati* Schaminée, Lanjouw & Schipper 1990 (art. 29)]

Communities found in shallow, calm, stagnant to slow-flowing waters that can withstand summer emersions. They are characterised by Batrachids (term that includes various species of *Ranunculus* belonging to the subgenus *Batrachium* and species of the *Callitriche* genus), which grow in standing water.

3.1.4 All.: *Batrachion fluitantis* Neuhäusl 1959

[*Potamion* (Koch 1926) Libbert 1931 p.p. (syntax. syn.), *Callitricho-Batrachion* Hartog & Segal 1964 p.p., *Ranunculenion fluitantis* (Neuhäusl 1959) Hartog & Segal 1964 (corresp. name), *Propos.*: *Ranunculion fluitantis* Neuhäusl 1959 *nom. mut. propos.* (art. 45)]

Submerged floating rooted macrophytic communities (Batrachids) of running, oligotrophic and oligocalcareous to eutrophic and calcareous waters.

- 3.1.5 All.: *Zannichellion pedicellatae* Schaminée, Lanjouw & Schipper 1990 *em.* Pott 1992
Submerged, rooted, floating, macrophytic communities (Elodeids) of brackish, subtidal waters that reach inland areas as a result of pollution and eutrophication.
- 3.1.6 All.: *Potamion polygonifolii* Den Hartog & Segal 1964
[*Potamion graminei* (Hartog & Segal) Westhoff & Den Held 1969 *nom. illeg.* (art. 29), *Potamion* (Koch 1926) Libbert 1931 p.p. (syntax. syn.)]
Standing to slow-flowing, oligotrophic to mesotrophic communities.
- 3.1.7 All.: *Alopecuro-Glycerion spicatae* Brullo, Minissale, Spampinato 1994
Central-Mediterranean orophilous communities linked to lake environments with meso-eutrophic waters and muddy to peaty 1 m-deep backdrops, often subject to temporary desiccation during the summer.
- 3.2 Ord.: *UTRICULARIETALIA MINORIS* Den Hartog & Segal 1964
[*Lemno-Utricularietalia vulgaris* Passarge 1978 (syntax. syn.)]
Oligotrophic to eutrophic communities that grow in standing waters and are dominated by utricularids and ceratophyllids.
- 3.2.1 All.: *Utricularion vulgaris* Passarge 1964
Communities dominated by species that belong to the genus *Utricularia* (*Utricularia vulgaris*, *U. australis*) and grow in oligo-mesotrophic standing waters.
- 3.2.2 All.: *Ceratophyllion demersi* Den Hartog & Segal ex Passarge 1996
Communities dominated by *Ceratophyllum* sp.pl. that grow in eutrophic waters.

4 Cl.: HALODULO WRIGTHII-THALASSIETEA TESTUDINUM Rivas-Martínez, Fernández-González & Loidi 1998

- [*Halodulo-Thalassietea* Den Hartog 1976 (art. 2b, 8), *Halodulo-Cymodoceetea* Knapp in Knapp & Sell 1965 (art. 8)]
Infralittoral benthic phanerogamic communities directly related to macrothallophyte communities that grow on both soft and hard substrates, in tropical, subtropical and low-tide temperate oceans and seas.
- 4.1 Ord.: *THALASSIO TESTUDINUM-SYRINGODIETALIA FILIFORMIS* Knapp in Borhidi, Muñoz & Del Risco 1983
[*Thalassietalia* Den Hartog 1976 (art. 8)]
Pioneer vegetation of deep waters on muddy bottoms.
- 4.1.1 All.: *Syringodio filiformis-Thalassion testudinum* Borhidi in Borhidi, Muñoz & Del Risco 1983
[*Cymodoceion nodosae* Den Hartog 1976 (art. 8)]
Communities dominated by seaweeds that grow to a depth of up to 20 m.

5 Cl.: POSIDONIETEA OCEANICAE Hartog 1976 ex Géhu in Bardat, Bioret, Botineau, Boulet, Delpech, Géhu, Haury, Lacoste, Rameau, Royer, Roux & Touffet 2004

- [*Posidonietaea* Hartog 1976 *nom. nud.* (art. 2b, 8)]
Infralittoral benthic cormophyte that grows to a depth of up to 35 m in warm, temperate waters and is dominated by *Posidonia oceanica*.
- 5.1 Ord.: *POSIDONIETALIA OCEANICAE* Hartog 1976
- 5.1.1 All.: *Posidionion oceanicae* Br.-Bl., Roussine & Nègre 1952
[*Posidionion* Br.-Bl. 1931 (art. 8)]
Calcareous sea-bottom communities.

6 Cl.: RUPPIETEA MARITIMAE Tüxen ex Den Hartog & Segal 1964

- Aquatic, halophilous, perennial, cormophyte and bryophyte communities that grow on temporary or permanent littoral or continental salt-water pools and lagoons.
- 6.1 Ord.: *RUPPIETALIA MARITIMAE* Tüxen ex Den Hartog & Segal 1964
[*Zannichellietalia pedicellatae* Schaminée, Lanjouw & Schipper 1990 (syntax. syn.), *Zannichellio-Rupprietalia* Schaminée & Den Hartog in Schaminée, Weeda & Westhoff 1995 *nom. illeg.* (art. 29), *Riellietalia helicophyllae* Cirujano, Velayos & P. García 1993 (art. 5, 8), *Eleocharitetalia parvulae* Segal 1968 *nom. nud.* (art. 2b, 8)]
- 6.1.1 All.: *Ruppion maritimae* Br.-Bl. ex Br.-Bl., Roussine & Nègre 1952

[*Ruppion maritimae* Br.-Bl. 1931 *nom. nud.* (art. 2b, 8), *Ruppion maritimae* Br.-Bl. ex Westhoff in Bennema, Sissingh & Westhoff 1943 *nom. ined.* (art. 1), *Ruppion maritimae* Br.-Bl. 1931 *em.* Den Hartog & Segal 1964 (syntax syn.)]

Small, filiform, hydrophyte communities of brackish water that grow from winter to late spring and often dry up in summer.

6.1.2 All.: *Riellion helicophyllae* Cirujano, Velayos & P. García ex Rivas-Martínez, Fernández-González & Loidi 1999

Annual, ephemeral communities, characterized by aquatic bryophytes and small rushes, that grow in depressions and littoral brackish lagoons and are related to the alternating emersion and immersion phases of the tides in Mediterranean bioclimatic conditions.

7 Cl.: **ZOSTERETEA MARINAE** Pignatti 1953

Eulittoral and infralittoral deep benthic cormophyte communities that grow to a depth of up to 5 m on muddy and sandy substrates of lagoons, estuaries and calm coast shelves of temperate seas.

7.1 Ord.: *ZOSTERETALIA MARINAE* Béguinot ex Pignatti 1953

[*Zosteretalia* Béguinot 1941 *nom. nud.* (art. 2b, 8) p.p., *Zosteretalia* Br.-Bl. & Tüxen 1943 *nom. nud.* (art. 2b, 8) p.p., *Zosteretalia* Béguinot ex Pignatti 1953 *em.* Tüxen & Oberdorfer 1958 (art. 47) p.p., *Zosteretalia* Béguinot ex Pignatti 1953 *em.* Den Hartog 1976 (art. 47)]

7.1.1 All.: *Zosterion marinae* Christiansen 1934

[*Zosterion* Br.-Bl. & Tüxen ex Pignatti 1953 [*Zosterion* Br.-Bl. & Tüxen 1943 *nom. nud.* (art. 2b, 8)] (syntax syn.)]

Atlantic and Mediterranean communities.

8 Cl.: **CAULERPETEA** Giaccone & Di Martino 1997

Caulerpa vegetation of the marine benthic domain.

8.1 Ord.: *CAULERPETALIA* Giaccone & Di Martino 1997

8.1.1 All.: *Caulerpion* Giaccone & Di Martino 1997

Caulerpa taxifolia communities (of tropical origin), found throughout the Mediterranean sea, that often behave like invasive species of the *Posidonia oceanica* biocoenoses.

9 Cl.: **LITHOPHYLLETEA** Giaccone 1965 *em.* Giaccone 1994

Infralittoral and circalittoral shaded vegetation on hard and rocky substrates.

9.1 Ord.: *LITHOPHYLLETALIA* Giaccone 1965

Lower infralittoral and circalittoral communities.

9.1.1 All.: *Lithophyllion stictaeformis* Giaccone 1965

Sciaphilous communities of the circalittoral zone, that grow in standing with scattered light and constant temperature or slightly influenced by the seasonal periodicity.

9.2 Ord.: *RHODYMENIETALIA* Boudouresque 1971 *em.* Giaccone 1994

Upper infralittoral communities.

9.2.1 All.: *Peyssonnelion squamariae* Augier & Boudouresque 1975 *em.* Giaccone 1994

Communities including infralittoral shaded associations linked to unidirectional, hydrodynamic conditions caused by wave action.

9.2.2 All.: *Schotterion nicaensis* Boudouresque & Cinelli 1971 *em.* Giaccone 1994

Communities including infralittoral shaded associations linked to different hydrodynamic conditions, which may be either multidirectional or unidirectional, in both oligotrophic and eutrophic waters.

10 Cl.: **CYSTOSEIRETEA CRINITAE** Giaccone 1965

Infralittoral and circalittoral photophilous vegetation.

10.1 Ord.: *CYSTOSEIRETALIA CRINITAE* Molinier 1958 *em.* Giaccone 1994

10.1.1 All.: *Cystoseirion crinitae* Molinier 1958

Upper infralittoral communities, characterized by multidirectional or bidirectional hydrodynamics with strong fluctuations.

10.1.2 All.: *Sargassion hornschurchii* Giaccone 1973

Lower infralittoral and circalittoral Cistoseireti communities characterized by fluent unidirectional hydrodynamism.

10.2 Ord.: ULVETALIA Molinier 1958

Tionitrophilous vegetation consisting of permanent communities dominated by opportunistic species that belong above all to the *Uvales* group.

10.2.1 All.: *Ulvion laetevirentis* Berner 1931

Upper infralittoral, tionitrophilous vegetation of hard substrata that grows in a state of environmental alteration as replacement for the *Cystoseirion crinitae* alliance.

11 Cl.: ENTOPHYSALIDETEA Giaccone 1993

The only supralittoral and mediolittoral vegetation in the phytal system that is not constantly submerged and subjected to extreme diurnal and seasonal changes in temperature and salinity.

11.1 Ord.: ENTOPHYSALIDETALIA DEUSTAE Ercegovic 1932 *nom. mut.*

[Den. orig.: *Pleurocapsetalia crepidinum* Ercegovic 1932]

Supralittoral communities.

11.1.1 All.: *Entophysalidion deustae* Ercegovic 1932 *nom. mut.*

[Den. orig.: *Scopulonemeion hansgirgiani* Ercegovic 1932]

Supralittoral communities that grow in environmental conditions characterized by varying brightness in areas subjected to sea splashes in the Mediterranean Sea.

11.2 Ord.: BANGIETALIA ATROPURPUREAE Giaccone 1993

Upper mediolittoral communities.

11.2.1 All.: *Bangion atropurpureae* Giaccone 1993

Communities of the mesolittoral superior, that are subject to extreme diurnal and seasonal variation of temperature and salinity, and that form seasonal belts and populate overlapping horizons in the Mediterranean basin.

11.3 Ord.: RALFSIETALIA VERRUCOSAE Giaccone 1993

Lower mediolittoral communities.

11.3.1 All.: *Ralfsion verrucosae* Giaccone 1993

Perennial communities with strong seasonal periodicity of the mesolittoral inferior sub belt.

II. AMPHIBIOUS VEGETATION OF FRESH-WATERS, SPRINGS AND FENS

12 Cl.: BIDENTETEA TRIPARTITAE Tüxen, Lohmeyer & Preising ex Von Rochow 1951

[*Bidentetea tripartitae* Tüxen, Lohmeyer & Preising in Tüxen 1950 *nom. nud.* (art. 2b, 8)]

Pioneer annual nitrophilous and hygrophilous vegetation that grows on nitrogen-rich, muddy or silty-pebbly substrates.

12.1 Ord.: BIDENTETALIA TRIPARTITAE Br.-Bl. & Tüxen ex Klika in Klika & Hadač 1944

[*Bidentetalia tripartitae* Br.-Bl. & Tüxen 1943 *nom. nud.* (art. 2b, 8)]

12.1.1 All.: *Bidention tripartitae* Nordhagen 1940

[*Polygono-Chenopodion polyspermi* Koch 1926 *nom. amb.* (art. 36), *Chenopodion fluviatile* Tüxen in Poli & J. Tüxen 1960 *p.p.*, *Chenopodion rubri* (Tüxen 1960) Hilbig & Jage 1972 *p.p.*]

Therophytic communities from banks and low water beds of rivers, and low-lying wetlands periodically flooded on loamy and clayey eutrophic soils.

12.1.2 All.: *Chenopodion rubri* (Tüxen 1960) Hilbig & Jage 1972

[*Chenopodion fluviatile* Tüxen in Poli & J. Tüxen 1960 *nom. illeg.* (art. 34), *Chenopodion glauci* Heijný 1974 (syntax. syn.), *Chenopodion rubri* Soó 1968 *nom. nud.* 1968 (art. 2b), *Chenopodion rubri* Soó et al. 1969 *nom. nud.* (art. 2b)]

Riverbank communities on sandy or pebbly, sometimes muddy, soils.

13 Cl.: ISOETO-NANOJUNCETEA Br.-Bl. & Tüxen ex Westhoff, Dijk & Passchier 1946

[*Isoeto-Nanojuncetea* Br.-Bl. & Tüxen 1943 *nom. nud.* (art. 2b, 8), *Isoeto durieui-juncetea bufonii* Br.-Bl. & Tüxen ex Westhoff, Dijk & Paschier 1946, *Crypsietea aculeatae* Vicherek 1973 (syntax. syn.) *p.p.*, *Isoetetea velati* de Foucault 1988 (syntax. syn.), *Juncetea bufonii* de Foucault 1988 (art. 24, 29)]

Ephemeral amphibious vegetation from temporary ponds, mainly characterized by therophytes and occasionally accompanied by hemicryptophytes and dwarf geophytes, that grow on soils periodically flooded by oligotrophic, eutrophic or, rarely, sub-salt waters.

13.1 Ord.: ISOETETALIA DURIEUI Br.-Bl. 1936

[*Isoetalia* Br.-Bl. 1931 *nom. nud.* (art. 2b, 8), *Isoetetalia duriei* (Br.-Bl. 1936) O. Bolòs, Vigo, Masalles & Ninot 1996 (art. 29), *Isoetetalia* Br.-Bl. 1936 *em.* Rivas Goday 1970 (art. 47), *Scirpetalia setacei* de Foucault 1988 (art. 29)]

Thermophilous or sub-thermophilous (in the Mediterranean bioclimate), early spring blooming vegetation typical of oligotrophic soils that dry up in spring.

13.1.1 All.: *Isoetion durieui* Br.-Bl. 1936

[*Isoetion* Br.-Bl. 1931 (art. 8), *Isoetion duriei* (Br.-Bl. 1936) O. Bolòs, Vigo, Masalles & Ninot 1996 (art. 29), *Antinorio agrostideae-Isoetion velatae* de Foucault 1988, *Ophioglossolusitanici-Isoetion histricis* de Foucault 1988, *Elatino-Damasonion alismae* de Foucault 1988, *Crassulo-Lythrion borysthenici* de Foucault 1988]

Ephemeral, spring blooming communities, related to a warm Mediterranean climate, that colonize small areas and grow on soils that dry up in early spring in the low to medium topographic levels.

13.1.2 All.: *Menthion cervinae* Br.-Bl. ex Moor 1937 *nom. mut.*

[*Preslion cervinae* Br.-Bl. ex Moor 1937 (art. 45)]

Mediterranean therophytic communities that occur in marsh sites or sites characterized by deep-water runoff, on soils flooded for most of the spring.

13.1.3 All.: *Agrostion pourretii* Rivas Goday 1958 *nom. mut.*

[*Pre-Isoëtion* Rivas Goday 1958 *nom. inval.* (art. 3b), *Agrostion salmanticae* Rivas Goday 1958]

Spring blooming communities that are related to low-lying wetlands characterized by persistent water during the winter and spring and that grow on predominantly arenaceous soils.

13.1.4 All.: *Cicendion filiformis* (Rivas Goday in Rivas Goday & Borja 1961) Br.-Bl. 1967

Ephemeral, mesohygrophilous communities that grow in temporary shallow-water pools, mainly in Atlantic areas though with extensions into the Mediterranean Basin, along coastal areas and in hilly inland areas, that are widespread in the Mediterranean and Temperate sub-Mediterranean variant macrobioclimates, as well as in the Mesotemperate bioclimatic belt.

13.1.5 All.: *Cicendion filiformis-Solenopsis laurentiae* Brullo & Minissale 1998

Mediterranean-Atlantic, spring blooming communities from acidic soil that are moister than those belonging to *Isoetion* and that dry up in late spring (May-June).

13.2 Ord.: NANOCYPERETALIA FLAVESCENTIS Klika 1935

[*Elatino triandrae-Cyperetalia fusci* de Foucault 1988 (syntax. syn.)]

Mesohygrophilous, Mediterranean-Atlantic and continental communities found on oligo-mesotrophic to eutrophic, sometimes subhalophilous soils from intermediate topographic levels that bloom in late summer or fall.

13.2.1 All.: *Nanocyperion flavescens* Koch ex Libbert 1932

[*Nanocyperion flavescens* Koch 1926 *nom. nud.* (art. 2b, 8)]

Euro-Siberian communities dominated by small and medium tussock sedges from wet, sandy-clayey or organic, acidophilous to neutrophilous soils.

13.2.2 All.: *Verbenion supinae* Slavnić 1951

[*Heleochloion* Br.-Bl. in Br.-Bl., Roussine & Nègre 1952 (art. 3b), *Heleochloion* Br.-Bl. ex Rivas Goday 1956 (syntax. syn.), *Cypero-Spergularion salinae* Slavnić 1951 (syntax. syn.), *Heleochloion schoenoidis* Br.-Bl. ex Rivas Goday, Borja, Monasterio, Galiano & Rivas-Martínez 1956 (syntax. syn.), *Fimbristylidion dichotomae* Horvatić 1954, *Dichostilidion micheliani* Horvatić 1963, *Heleochloo-Cyperion micheliani* Pietsch & Müller-Stoll 1968, *Lythrion tribracteati* Rivas Goday & Rivas-Martínez ex Rivas Goday 1970]

Mediterranean sub-halo-nitrophilous communities related to substrates subjected to long periods of submersion, dominated by large, creeping species.

14 Cl.: LITTORELLETEA UNIFLORAE Br.-Bl. & Tüxen ex Westhoff, Dijk & Passchier 1946

[*Isoeto-Littorelletea* Br.-Bl. & Vliieger in Vliieger 1937 *nom. rejic.* (art. 35) p.p. ('...-Littorelleteales' art. 41b), *Littorelletea* Br.-Bl. & Tüxen 1943 (art. 8), *Juncetea bulbosi* Tüxen & Dierßen 1972 (syntax. syn.)]

Perennial, pioneer, dwarf, amphibious vegetation that colonizes the shore of oligo-mesotrophic lakes and ponds.

14.1 Ord.: LITTORELLETALIA UNIFLORAE Koch 1926**14.1.1. All.: *Littorellion uniflorae* Koch 1926**

[*Isoetion lacustris* Nordhagen ex Dierßen 1975 (syntax. syn.), *Isoetion lacustris* Nordhagen 1936 *nom. nud.* (art. 2b, 8) ('*Isoëtion*...' art. 41a)]

Oligotrophic, mountain lakeshore vegetation.

14.1.2 All.: *Eleocharition acicularis* Pietsch 1967

Continental communities of fluctuating water with loamy or silty-clay soils.

15 Cl.: **MONTIO FONTANAE-CARDAMINETEA AMARAE Br.-Bl. & Tüxen ex Klika & Hadač 1944**

[*Montio-Cardaminetea* Br.-Bl. & Tüxen 1943 (art. 8), *Aconito-Cardaminetea* Hadač 1956 (art. 29), *Montio-Cardaminetea* Br.-Bl. & Tüxen ex Klika 1947 (art. 23)]

Bryophyte-rich communities that colonize cold springs, small streams and dripping or wet walls, in an acidic to neutral-alkaline environment, found in the supra- to cryorotemperate bioclimatic belts, rarely in the lowland belt.

15.1 Ord.: *CARDAMINO AMARAE-CHRYSOSPLENIETALIA ALTERNIFOLII* Hinterlang 1992

[*Cardamino amarae-Caricetalia remotae* Kästner 1941 pro syn. nom. inval. (art. 2d, 3a) p.p., *Montio-Cardaminetalia auct.* (syntax. syn.), non Pawłowski in Pawłowski, Sokołowski & Wallisch 1928]

Communities that grow on carbonatic to acidic humo-peaty substrata, from the lowland to supratemperate bioclimatic belts.

15.1.1 All.: *Caricion remotae* Kästner 1941

[*Cardaminion* Maas 1959 (syntax. syn.), *Cardaminenion* (Maas 1959) Westhoff & Den Held 1969 (corresp. name)]

Mostly phanerogamic, mid-woodland communities that grow on oligotrophic soils, in the meso- and supratemperate bioclimatic belts.

15.2 Ord.: *MONTIO FONTANAE-CARDAMINETALIA AMARAE* Pawłowski in Pawłowski, Sokołowski & Wallisch 1928

[*Cardamino amarae-Caricetalia remotae* Kästner 1941 pro syn. nom. inval. (art. 2d, 3a) p.p., *Cardamino-Cratoneuretalia* Maas 1959 (syntax. syn.), *Cratoneuro-Philonotidetalia* Geissler 1976 prov. nom. inval. (art. 2d, 3b)]

Vegetation that occurs from the supra- to orotemperate bioclimatic belts, with extensions into the mesotemperate belt, and grows on mainly silicicolous (no-peaty) or calcium-poor substrata when cold waters are present.

15.2.1 All.: *Cratoneurion commutati* Koch 1928

Heliophilous stenothermal communities that occur in well-oxygenated springs and build tufa and travertine formations, from the meso- to orotemperate bioclimatic belts.

15.2.2 All.: *Cardamino amarae-Montion fontanae* Br.-Bl. 1926

[*Montion* Maas 1959 (syntax. syn.), *Montienion* (Maas 1959) Westhoff & Den Held 1969 (syntax. syn.), *Philonotidion seriatae* Hinterlang 1992 (syntax. syn.), *Epilobio nutantis-Montion fontanae* Zechmeister in Grabherr & Mucina 1993 (syntax. syn.)]

Communities that occur from the supra- to cryorotemperate bioclimatic belts, along streams close to cold springs with acidic waters, dominated by bryophytes.

15.2.3 All.: *Dermatocarpion rivulorum* Geissler 1976

Acidophilous communities dominated by bryophytes and lichens that colonize the pebbly banks of running-water streams, from the oro- to cryorotemperate bioclimatic belts.

16 Cl.: **PHRAGMITO AUSTRALIS-MAGNOCARICETEA ELATAE** Klika in Klika & Novák 1941

[*Phragmito-Magnocaricetales* Klika in Klika & V. Novák 1941 (original name), *Phragmitetea* Tüxen & Preising 1942 (syntax. syn.), *Bolboschoenetea* Tüxen & Vicherek in Tüxen & Hülbusch 1971 (syntax. syn.), Incl.: *Glycerio-Nasturtietea officinalis* Géhu & Géhu-Franck 1987, *Nasturtietea officinalis* Zohary 1973 nom. nud. (art. 2b, 8)]

Perennial helophyte and other aquatic plant communities that colonize marsh, fen and lacustrine environments as well as fluvial areas, on eutrophic to meso-oligotrophic soils of brackish and fresh waters.

16.1 Ord.: *PHRAGMITETALIA AUSTRALIS* Koch 1926

[*Phragmitetalia eurosibirica* Tüxen & Preising 1942 nom. illeg. (art. 34)]

Vegetation dominated by tall graminoid species subjected to regular, prolonged periods of flooding that grow on mineral meso-eutrophic, often muddy, soils.

16.1.1 All.: *Phragmition communis* Koch 1926

[*Phragmition australis* Koch 1926 nom. mut. propos. (art. 45), *Phragmition eurosibiricum* Tüxen & Preising 1942 (art. 34)]

Hygrophilous marshy communities that grow in fresh or brackish waters.

16.2 Ord.: *OENANTHETALIA AQUATICAE* Hejný in Kopechý & Hejný 1965

Eurosiberian pioneer vegetation that grows on disturbed edges of lentic or slow-flowing waters.

- 16.2.1 All.: *Eleocharito-Sagittarion* Passarge 1964
[*Oenanthion aquaticae* Heijny 1948 (art. 1), *Oenanthion aquaticae* Heijny ex Neuhäusl 1959]
Communities dominated by perennial or biennial species, typical of littoral areas that emerge after marked fluctuations in water level. These communities are often subjected to human disturbance, such as the mowing of ditches and drain edges.
- 16.3 Ord.: *MAGNOCARICETALIA ELATAE* Pignatti 1953
Communities characterized by tall sedges that grow on oligo-mesotrophic to eutrophic soils, which are mineral to organogenic in nature, and are subjected to varying degrees of periodic flooding.
- 16.3.1 All.: *Magnocaricion elatae* Koch 1926
[*Caricion rostratae* Balátová-Tulácková 1963 (syntax. syn.)]
Communities that grow on mesotrophic to dystrophic soils and are often peaty and flooded for prolonged periods.
- 16.3.2 All.: *Caricion gracilis* Neuhäusl 1959
[*Caricion gracilis* Neuhäusl 1959 em. Balátová-Tulácková 1963 (syntax. syn.)]
Communities that grow on eutrophic soils that are flooded for prolonged periods and are mineral to organogenic in nature.
- 16.3.3 All.: *Carici pseudocypero-Rumicion hydrolapathi* Passarge 1964
[*Cicution virosae* Heijny ex Segal in Westhoff & Den Held 1969 (syntax. syn.) [*Cicution* Heijny 1960 *nom. nud.* (art. 2b, 8)]]
Sedges and tall-herb communities that grow on the edge of peaty areas on silty soils.
- 16.4 Ord.: *SCIRPETALIA COMPACTI* Heijny in Holub, Heijny, Moravec & Neuhäusl 1967 *corr.* Rivas-Martínez, Costa, Castroviejo & E. Valdés 1980
[*Bolboschoenetalia maritimi* Heijny in Holub, Heijny, Moravec & Neuhäusl 1967 (art. 43)]
Subhalophilous reeds.
- 16.4.1 All.: *Scirpion compacti* Dahl & Hadač 1941 *corr.* Rivas-Martínez, Costa, Castroviejo & E. Valdés 1980
[*Scirpion maritimi* Dahl & Hadač 1941 (art. 43), *Scirpion maritimo-compacti* Rivas-Martínez, Costa, Castroviejo & E. Valdés 1980 *nom. illeg.* (art. 29), *Scirpion compacto-littoralis* Rivas-Martínez in Rivas-Martínez, Costa, Castroviejo & E. Valdés 1980]
Atlantic, continental or brackish Mediterranean reed communities.
- 16.5 Ord.: *NASTURTIO OFFICINALIS-GLYCERJETALIA FLUITANTIS* Pignatti 1953
Helophytic vegetation that grows on the shores of lotic or lentic waterbodies.
- 16.5.1 All.: *Glycerio fluitantis-Sparganion neglecti* Br.-Bl. & Sissingh in Boer 1942
[*Glycerion fluitantis* (Br.-Bl. & Sissingh in Boer 1942) Géhu & Géhu-Franck 1987 *nom. illeg.* (art. 29)]
Floating, procumbent communities of stagnant or slow-flowing waters.
- 16.5.2 All.: *Phalaridion arundinaceae* Kopecký 1961
[*Phalaridenion arundinaceae* (Kopecký 1961) Molina 1996]
Medium-sized graminoid communities that grow on the banks of rivers and streams.
- 16.5.3 All.: *Apion nodiflori* Segal in Westhoff & Den Held 1969
[*Nasturtion officinalis* Géhu & Géhu-Franck 1987 (syntax. syn.)]
Communities that grow on the banks of cold-water, mesotrophic to meso-eutrophic, shallow rivers.
- 17 Cl.: OXYCOCCO PALUSTRIS-SPHAGNETEA MAGELLANICI Br.-Bl. & Tüxen ex Westhoff, Dijk & Paschier 1946**
[*Oxycocco-Sphagnetea* Br.-Bl. & Tüxen 1943 *nom. inval.* (art. 2b, 8)]
Boreal vegetation of acid, oligotrophic, peat bogs with perennial vegetation dominated by *Sphagnum* and the presence of herbaceous phanerogams (mostly sedges), nano-phanerorophytes and, sometimes, of phanerophytes.
- 17.1 Ord.: *SPHAGNETALIA MAGELLANICI* Kästner & Flössner 1933 *nom. mut. propos.*
[*Sphagnetalia medii* Kästner & Flössner 1933 (syntax. syn.), *Sphagnetalia* Pawłowski in Pawłowski, Sokołowski & Wallisch 1928 *nom. nud.* (art. 2b, 8), *Erico-Ledetalia palustris* Nordhagen ex Tüxen 1937 p.p. ('*Ericeto...*' art. 41b) [*Ledetalia* Nordhagen 1936 *nom. nud.* (art. 2b, 8) p.p. (syntax. syn.)], *Erico-Sphagnetalia* Schwickerath 1940 p.p. ('*Ericeto...*' art. 41b)]
Continental and boreal vegetation.
- 17.1.1 All.: *Sphagnion magellanici* Kästner & Flössner 1933 *nom. mut. propos.*
[*Sphagnion medii* Kästner & Flössner 1933 (syntax. syn.), *Sphagnion fusci* Br.-Bl. 1926 *nom. nud.* (art. 2b, 8) ('*...fuscae*' art. 41b), *Calluno-Sphagnion fusci* Tüxen in Tüxen, Miyawaki & Fujiwara 1972 *nom. illeg.* (art. 29), *Sphagnion europaei* Schwickerath 1940 *nom. illeg.* (art. 34) p.p. ('*...europaeum*' art. 41b) (syntax. syn.)]

[Corresp.: *Sphagnenion continentale* Schwickerath 1940 *nom. illeg.* (art. 34) ('*Sphagnion...*' pro suball. art. 41b)], *Vaginato-Sphagnion europaei* P.A. Duvigneaud 1948 *nom. illeg.* (art. 34) p.p. ('... *europaeum*' art. 41b) [Corresp.: *Sphagnenion medio-fusci* P.A. Duvigneaud 1949 *nom. illeg.* ('*Sphagnion medio-fusci*' pro suball. art. 41b), *Carici pauciflorae-Sphagnenion papilloso* P.A. Duvigneaud 1949 pro syn. *nom. inval.* (art. 2d, 3a) ('(*Cariceto bauciflorae-*) *Sphagnion papilloso*' pro suball. art. 41a, 41b, 41c), *Sphagnenion papilloso* P.A. Duvigneaud 1949 p.p. ('*Sphagnion papilloso*' pro suball. art. 41b)]

Raised bog transitional communities that grow in the subcontinental and continental temperate areas, from the mountain to the subalpine belts. The alliance includes *Pinus mugo* s.l. shrub communities that grow in *Sphagnum* peat bogs.

18 Cl.: *SCHEUCHZERIO PALUSTRIS-CARICETEA NIGRAE nom. mut. propos. ex Steiner 1992*

[*Scheuchzerio-Caricetalia fuscae* Tüxen 1937 (original name), *Parvocaricetea* Westhoff in Westhoff & Den Held 1969 (syntax. syn.), *Scheuchzerietea palustris* Den Held, Barkman & Westhoff in Westhoff & Den Held 1969 (syntax. syn.), *Scheuchzerio-Caricetea fuscae* Tüxen 1937 (art. 45)]

Hygrophilous fen vegetation dominated by sedges, with the possible presence of various mosses including *Sphagnum*, that grows from the lowland (glacial relicts) to the cryorotemperate thermotype belts, on peaty, para-peaty and mineral soils characterized by oligotrophic to mesotrophic nutrient conditions, neutral-alkaline to moderately acid acidity, and no dry-periods.

18.1 Ord.: *SCHEUCHZERIETALIA PALUSTRIS* Nordhagen 1936

Vegetation that grows in pools and on floating mats of raised bogs, of transition bogs and fens with acid to alkaline waters.

18.1.1 All.: *Caricion lasiocarpae* Vanden Berghen in Lebrun, Noirfalise, Heinemann & Vanden Berghen 1949 Mesotrophic communities of fens and transition peat that form deposits and floating mats.

18.1.2 All.: *Rhynchosporion albae* Koch 1926

[*Molinio caeruleae-Rhynchosporion albae* de Foucault 1984 *nom. ined. et illeg.* (art. 1, 29) ('... *coeruleae...*' art. 41a), *Scheuchzerion palustris* Nordhagen 1936 (art. 22), *Scheuchzerion palustris* Nordhagen ex Tüxen 1937 (syntax. syn.)]

Pioneer communities with *Rhynchospora alba*, *R. fusca*, *Drosera intermedia*, *D. longifolia*, *Lycopodiella inundata* that grow in depressions on peaty or sandy soils in the presence of oligo-dystrophic waters, from the supra- to cryorotemperate thermotypes.

18.2 Ord.: *CARICETALIA NIGRAE* Koch 1926 *nom. mut. propos.*

[*Caricetalia goodenowii* Koch 1926 *nom. mut. illeg.* (art. 30), *Caricetalia fuscae* Koch 1926 *em. Br.-Bl.* 1949 (art. 47), *Propos.: Caricetalia nigrae* Koch *nom. mut. propos.* (art. 45)]

Acidophilous fen communities.

18.2.1 All.: *Caricion nigrae* Koch 1926 *em. Klika* 1934 *nom. mut. propos.*

[*Caricion fuscae* Koch 1926 *em. Klika* 1934 (art. 47) p.p., *Caricion canescentis-goodenowii* Nordhagen 1936 *nom. inval.* (art. 2d, 3m, 24), *Propos.: Caricion nigrae* Koch 1926 *nom. mut. propos.* (art. 45)]

Communities composed of oligotrophic to mesotrophic small sedges and bryophytes that grow in acid fens.

18.3 Ord.: *CARICETALIA DAVALLIANAE* Br.-Bl. 1949

[*Tofieldetalia* Oberdorfer 1949 *nom. nud.* (art. 2b, 8), *Caricetalia fuscae* Koch 1926 p.p. (syntax. syn.)]

Vegetation of neutral-alkaline (oligo)-mesotrophic fens that grow on peaty or mineral soils.

18.3.1 All.: *Caricion davallianae* Klika 1934

[*Schoenion ferruginei* Nordhagen 1936 (art. 29), *Eriophorion latifolii* Br.-Bl. & Tüxen 1943 *nom. nud.* (art. 2b, 8) (... *latifoliae*' art. 41b)]

Fen communities of peaty or non-peaty substrates that grow in the Temperate macrobioclimate, from the supra- to mesotemperate thermotypes.

18.3.2 All.: *Caricion atrofusco-saxatilis* Nordhagen 1943

[*Caricion incurvae* Br.-Bl. in Volk 1940, *Caricion bicoloris* Nordhagen 1935 *nom. inval.* (art. 2d, 3d), *Caricion atrofuscae* Nordhagen 1935 *nom. inval.* (art. 2d, 3d), *Caricion bicolori-atrofuscae* Nordhagen 1936 *nom. inval.* (art. 2d, 3d) p.p. ('... *bicoloris...*' art. 41b), *Caricion juncifoliae* Br.-Bl. in Volk 1940 *nom. mut. illeg.* (art. 30), *Corresp.: Caricion incurvae* Br.-Bl. (1940) 1949 ('*Caricion incurvae*' pro suball. art. 41b), *Propos.: Caricion maritimae* Br.-Bl. in Volk 1940 *nom. mut. propos.*]

Pioneer communities that grow on sandy-loamy, neutral-alkaline or slightly acidic, mineral soils, especially along streams and moraines, in the oro- to cryorotemperate thermotypes.

19 Cl.: UTRICULARIETEA INTERMEDIO-MINORIS Pietsch ex Krausch 1968

[*Utricularietea* Hartog & Segal 1964 p.p. (syntax. syn.)]

Infra-aquatic, submerged or partially floating, vegetation that grows in small ponds and ditches of acidic and neutral-alkaline bogs with dystrophic or oligotrophic shallow waters.

19.1 Ord.: UTRICULARIETALIA INTERMEDIO-MINORIS Pietsch ex Krausch 1968

[*Utricularietalia intermedio-minoris* Pietsch 1965 *nom. nud.* (art. 2b, 8), *Utricularietalia* Hartog & Segal 1964 p. p. (syntax. syn.)]

Boreal-subatlantic mountain vegetation, often also found at low altitudes.

19.1.1 All.: *Sphagno cuspidati-Utricularion minoris* Müller & Görs 1960

[*Utricularion* Hartog & Segal 1964 p.p.]

Acidophilous, *Sphagnum*-rich communities.

19.1.2 All.: *Scorpidio scorpidioidis-Utricularion minoris* Pietsch ex Krausch 1968

[*Scorpidio-Utricularion minoris* Pietsch 1965 *nom. nud.* (art. 2b, 8), *Utricularion* Hartog & Segal 1964 p. p. (syntax. syn.), Corresp.: *Scorpidio-Utricularienion minoris* (Pietsch 1965) Oberdorfer, Görs, Korneck, Lohmeyer, Müller, Philippi & Seibert 1967 *nom. nud.* (art. 2b, 8) ('...-*Utricularion* ...' pro suball. art. 41b)]

Communities that grow in neutral-alkaline bogs.

III. COASTAL AND CONTINENTAL HALOPHILOUS AND SAND DUNE VEGETATION**20 Cl.: AMMOPHILETEA Br.-Bl. & Tüxen ex Westhoff, Dijk & Passchier 1946**

[*Ammophiletea* Br.-Bl. & Tüxen 1943 (art. 8), *Euphorbio-Ammophiletea arundinaceae* Géhu & Géhu-Franck 1988 (art. 29, *nomen optimum*), *Ammophiletea canariensis* Esteve 1968 (art. 34)]

Psammophilous perennial vegetation from coastal sandy and fine-pebbly dunes with a Mediterranean, Atlantic and Macaronesian littoral distribution, that is important in dune construction and stabilization processes.

20.1 Ord.: AMMOPHILETALIA AUSTRALIS Br.-Bl. 1933

[*Ammophiletalia* Br.-Bl. 1931 (art. 2b), *Elymetalia arenarii* Br.-Bl. & Tüxen 1943 (art. 8), *Elymo-Ammophiletalia arenariae* Géhu-Franck 1969 (syntax. syn.), *Euphorbio-Ammophiletalia* Géhu & Géhu-Franck 1969 (syntax. syn.)]

Perennial herbaceous vegetation typical of the beach front and of embryonal and mobile dunes distributed in Mediterranean littoral areas with extensions into the thermo-Atlantic area.

20.1.1 All.: *Ammophilon australis* Br.-Bl. 1921 corr. Rivas-Martínez, Costa & Izco in Rivas-Martínez, Lousã, T. E. Diáz, Fernández-González & J.C. Costa 1990

[*Ammophilon arundinaceae* Br.-Bl. 1921 (art. 43), *Ammophilon* Br.-Bl. 1933 (art. 31), *Ammophilon borealis* Tüxen in Br.-Bl. & Tüxen 1952 (syntax. syn.), *Euphorbio-Ammophilon arenariae* Géhu & Géhu-Franck 1969 (syntax. syn.)]

Psammophilous perennial herbaceous communities that colonize mobile dunes in Mediterranean and Mediterranean-Atlantic littoral areas.

20.1.2 All.: *Agropyro-Minuartion peploidis* Tüxen in Br.-Bl. & Tx. 1952

[*Euphorbio-Agropyron junceiformis* Géhu & Géhu-Franck 1969 (syntax. syn.), *Agropyron junceiformis* (Tüxen in Br.-Bl. & Tüxen 1952) Rivas-Martínez, Costa, Castroviejo & E. Valdés 1980 (art. 29), *Honckenyo peploidis-Elytrigion boreoatlanticae* Tüxen in Br.-Bl. & Tüxen 1952 *nom. mut. & inv. propos.* (art. 45)]

Psammophilous perennial herbaceous communities that colonize embryonal dunes.

21 Cl.: CAKILETEA MARITIMAE Tüxen & Preising ex Br.-Bl. & Tüxen 1952

[*Cakiletea maritimae* Tüxen & Preising in Tüxen 1950 (art. 8), *Cakileto-Therosalicornietea* Pignatti 1953 (art. 35), *Cakilenea maritimae* Pignatti 1954 (corresp. name)]

Therophytic halo-nitrophilous pioneer vegetation from the beach front of emerged coasts, following the surf zone, on sandy and fine-pebbly beaches, where organic material, carried by the sea, accumulates and decomposes.

21.1 Ord.: EUPHORBIETALIA PEPLIS Tüxen 1950

Mediterranean and Mediterranean southern-Atlantic European vegetation.

21.1.1 All.: *Euphorbion pepelis* Tüxen 1950

[*Cakilion maritimae* Pignatti 1953 (syntax. syn.), *Thero-Atriplicion* Pignatti 1953 (syntax. syn.)]

Therophytic psammophilous halo-nitrophilous communities that colonize the dune front, behind the vegetation-free area in the surf zone, in Mediterranean and Cantabrian-Atlantic areas.

22 Cl.: HELICHRYSO-CRUCIANELLETEA MARITIMAE (Sissingh 1974) Géhu, Rivas-Martínez & Tüxen in Géhu 1975 em. Biondi & Géhu in Géhu & Biondi 1994

[*Helichryso-Crucianelletea* Géhu, Rivas-Martínez & Tüxen in Géhu 1975]

Chamaephytic and suffruticose vegetation, consisting of primary garrigues that develop mainly on the inland-facing slope of mobile dunes with more stable and compact sands and on rocky coastal cliffs.

22.1 Ord.: HELICHRYSO-CRUCIANELLETTALIA MARITIMAE Géhu, Rivas-Martínez & Tüxen 1973 em. Sissingh 1974
[*Crucianelletalia maritimae* Sissingh 1974]

Chamaephytic vegetation that develops on the inland-facing slope of semi-permanent dunes in Mediterranean and Cantabrian-Atlantic areas.

22.1.1 All.: *Crucianellion maritimae* Rivas Goday & Rivas-Martínez 1958

[*Ononidion ramosissimae* Pignatti 1952 (syntax. syn.)]

Western Mediterranean, chamaephytic, hind-dune communities that develop on semi-permanent dunes.

22.2 Ord.: HELICHRYSOTALIA ITALICI Biondi & Géhu in Géhu & Biondi 1994

Chamaephytic pioneer halotolerant primary and sub-primary vegetation that develops on cliffs and on coastal gravels in Mediterranean and thermo-Atlantic areas.

22.2.1 All.: *Helichryson litorei* Biondi ex Biondi in Biondi, Allegrezza, Casavecchia, Galdenzi, Gigante & Pesaresi 2013
[*Plantagini subulatae-Thymelaeion hirsutae* Bartolo & Brullo in Bartolo, Brullo & Signorello 1992 *nom. inval.* (art. 2b, 8), *Helichryson litorei* Biondi 2007 *nom. inval.* (art. 2b, 5, 17)]

Chamaephytic sub-halophilous primary or sub-primary garrigue communities found on rocky cliffs and in gravelly coastal systems, indifferent to the chemical nature of the substratum, linked to thermo, meso and infra-Mediterranean thermotypes.

22.2.2 All.: *Euphorbion pithyusae* Biondi & Géhu 1994

Chamaephytic, halotolerant, pioneer primary and sub-primary thermo-Mediterranean garrigue communities that develop on Tyrrhenian cliffs, with a Sardo-Corso-Balearic distribution.

23 Cl.: CRITHMO MARITIMI-STATICETEA Br.-Bl. in Br.-Bl., Roussine & Nègre 1952 em. Biondi 2007
[*Crithmo-Staticetea* Br.-Bl. in Br.-Bl., Emberger & Molinier 1947 *nom. nud.* (art. 2b, 8), *Crithmo maritimi-Limonietea* Br.-Bl. in Br.-Bl., Roussine & Nègre 1952 *nom. mut. propos.* (art. 45)]

Halo-chasmophytic and halo-tolerant vegetation with varying habitus that develops on rocky marine sites exposed to marine waters or subjected to marine salt spray.

23.1 Ord.: CRITHMO MARITIMI-STATICETALIA Molinier 1934

[*Crithmo-Limonietalia* Molinier 1934 *nom. mut. propos.* (art. 45)]

Chasmophytic vegetation of the first portion of the cliffs and rocky shores that grows in the Mediterranean area and sometimes extends into the Mediterranean-Atlantic area.

23.1.1 All.: *Crithmo maritimi-Staticion* Molinier 1934

[*Crithmo-Staticenion* Bartolo, Brullo & Marcenò 1982, *Crithmo-Limonion* Molinier 1934]

Central and western Mediterranean halo-chasmophytic communities that grow on rocky and sometimes gravelly formations along Mediterranean and Atlantic coasts.

23.1.2 All.: *Crucianellion rupestris* Brullo & Furnari 1988

Communities whose distribution is limited to the central-eastern Mediterranean and that sometimes grow in south-eastern Mediterranean areas. The alliance *Crucianellion rupestris* in these areas is a vicariant of the alliance *Crithmo-Staticion*.

23.1.3 All.: *Erodio corsici-Limonion articulati* (Gamisans & Muracciole 1984) Géhu & Biondi 1994

Endemic chasmophytic communities with a Sardo-Corsican distribution.

23.2 Ord.: SENECTIONETALIA CINERARIAE Biondi 2007

Halo-tolerant vegetation of the uppermost areas of the cliffs dominated by chomophytic and chamaephytic species, with chasmophytes and nano- and microphanerophytes.

23.2.1 All.: *Anthyllidion barbae-jovis* Brullo & De Marco 1989

Communities dominated by sub-halophilous and halo-tolerant shrubby nanophanerophytic and chamaephytic species of the uppermost sectors of the rocky cliffs, of varying steepness, distributed in central-western Mediterranean areas.

24 Cl.: JUNCETEA MARITIMI Br.-Bl. in Br.-Bl., Roussine & Nègre 1952

[*Juncetea maritimi* Br.-Bl. ex Tüxen & Oberdorfer 1958 (art. 31), *Asteretea tripolium* Westhoff & Beefink in Beefink 1962 (syntax. syn.)]

Mediterranean perennial salty and brackish grasslands.

24.1 Ord.: PUCCINELLIETALIA DISTANTIS (Soó 1968) Géhu & Rivas-Martínez 1982

Continental inundated pastures.

24.1.1 All.: Puccinellion distantis (Soó 1933) Pignatti 1953

[*Puccinellion distantis* Soó 1933 p.p., *Puccinellion limosae* Klika 1937 p.p.]

Inundated (even temporarily) continental pastures that extend into the Mediterranean basin, in areas with a Temperate or Mediterranean macrobioclimate, with a meso-Mediterranean thermotype.

24.2 Ord.: JUNCETALIA MARITIMI Br.-Bl. ex Horvatić 1934

[*Juncetalia maritimi* Br.-Bl. 1931 (art. 8)]

Communities dominated by hemicryptophytes that develop on wet and temporarily inundated soils.

24.2.1 All.: Juncion maritimi Br.-Bl. ex Horvatić 1934

[*Juncion maritimi* Br.-Bl. 1931 (art. 8)]

Mediterranean *Juncus*-dominated communities and salty, brackish grasslands that develop on highly wet or temporarily inundated soils.

24.2.2 All.: Halo-Artemision coerulescentis Pignatti 1953

[*Agropyro-Artemision coerulescentis* (Pignatti 1953) Géhu & Scoppola in Géhu, Scoppola, Caniglia, Marchiori & Géhu-Franck 1984 *nom. illeg.* (art. 29)]

Communities that develop on the edge of depressions that host mainly halophilous vegetation.

24.2.3 All.: Plantaginion crassifoliae Br.-Bl. in Br.-Bl., Roussine & Nègre 1952

Halophilous grassland communities, on sandy gravelly soils that are wet in winter and dry in summer, found on the inland slopes of dunal systems, in the transition area with lagoon halophilous communities.

25 Cl.: SAGINETEA MARITIMAE Westhoff, Leeuwen & Adriani 1962

[*Frankenietea pulverulenta* Rivas-Martínez in Rivas-Martínez & Costa 1976 (art. 8), *Frankenietea pulverulenta* Rivas-Martínez ex Castroviejo & Porta 1976 (syntax. syn.)]

Pioneer vegetation characterized by small therophytic, xerophilous, halophilous and sub-halophilous, occasionally sub-nitrophilous species, of the Atlantic and Mediterranean littorals.

25.1 Ord.: SAGINETALIA MARITIMAE Westhoff, Leeuwen & Adriani 1962

Vegetation linked to Temperate and Mediterranean macrobioclimates of beaches and salt-marshes.

25.1.1 All.: Saginion maritimae Westhoff, Leeuwen & Adriani 1962

Therophytic halophilous and sub-halophilous, mainly Atlantic communities, found also in European Mediterranean regions, that develop in inland and coastal areas, above all in the Temperate macrobioclimate, even in its Submediterranean variant.

25.1.2 All.: Sileno sedoidis-Catapodion loliacei de Foucault & Bioret 2010

Thermophilous therophytic communities, with an eastern Mediterranean *optimum* and a central Mediterranean extension.

25.2 Ord.: FRANKENIETALIA PULVERULENTAE Rivas-Martínez ex Castroviejo & Porta 1976

[*Frankenietalia pulverulenta* Rivas-Martínez in Rivas-Martínez & Costa 1976 (art. 2b)]

Vernal therophytic halophilous and sub-halophilous vegetation, on silty soils in the Mediterranean macrobioclimate.

25.2.1 All.: Frankenion pulverulenta Rivas-Martínez ex Castroviejo & Porta 1976

[*Saginion mediterraneum* Wolff 1968 *nom. illeg.* (art.34), *Frankenion pulverulenta* Rivas-Martínez in Rivas-Martínez & Costa 1976 (art. 2b), *Hordeion marini* Ladero, Navarro, Valle, Marcos, Ruiz & Santos 1984, *Polyopogonion subspathacei* Gamisans 1992]

Annual halophilous communities of temporarily inundated depressions.

25.2.2 All.: Gaudinio-Podospermion cani Brullo & Siracusa 2000

Annual halophilous communities with a marked pioneering nature linked to clayey badlands that develop in the inland areas of central Mediterranean territories, in the Mediterranean and Temperate macrobioclimates.

25.2.3 All.: Limonion avei Brullo 1988

Halophilous and sub-nitrophilous communities of silty-sandy or clayey formations periodically flooded, in areas with an arid Mediterranean macrobioclimate.

25.3 Ord.: *CRYPSIDETALIA ACULEATAE* Vicherek 1973

Euro-Asiatic and Mediterranean therophytic vegetation consisting of *Crypsis aculeata*, that grows on temporarily inundated substrates that dry up in summer.

25.3.1 All.: *Crypsidion aculeatae* Pignatti 1954

Euro-Asiatic and Mediterranean therophytic communities consisting of *Crypsis aculeata*, that develop on salty, temporarily inundated substrates that dry up in summer.

26 Cl.: *SARCOCORNIETEA FRUTICOSAE* Br.-Bl. & Tüxen ex A. Bolòs & O. Bolòs in A. Bolòs 1950 nom. mut. propos. Rivas-Martínez, T.E. Díaz, Fernandez-Gonzales, Izco, Loidi, Lousã & Penas 2002

[*Salicornietea fruticosae* Br.-Bl. & Tüxen 1943 (art. 8), *Salicornietea fruticosae* Br.-Bl. & Tüxen ex A. & O. Bolòs 1950 (art. 45), *Arthrocnemetea* Br.-Bl. & Tüxen 1943 corr. Bolòs 1957, *Salicornietea fruticosae* Br.-Bl. ex Tüxen & Oberdorfer 1958 (art. 8)]

Perennial vegetation dominated by succulent chamaephytes or nanophanerophytes, that develop in brackish marshes and salty soils of the Mediterranean and Saharo-Sindhi regions.

26.1 Ord.: *SARCOCORNIETALIA FRUTICOSAE* Br.-Bl. 1933 nom. mut. propos. Rivas-Martínez, T.E. Díaz, Fernandez-Gonzales, Izco, Loidi, Lousã & Penas 2002

[*Salicornietalia* Br.-Bl. 1933, *Salicornietalia* Br.-Bl. 1931 nom. nud. (art. 2b, 8), *Salicornietalia fruticosae* (Br.-Bl. 1933) Tüxen & Oberdorfer 1958 nom. illeg. (art. 22, 29), *Arthrocnemetalia fruticosi* (Br.-Bl. 1933) O. Bolòs 1967 nom. illeg. (art. 22, 29, 30)]

Communities comprising succulent *Chenopodiaceae* of temporarily inundated soils.

26.1.1 All.: *Sarcocornion fruticosae* Br.-Bl. 1933 nom. mut. propos. Rivas-Martínez, T.E. Díaz, Fernandez-Gonzales, Izco, Loidi, Lousã & Penas 2002

[*Salicornion fruticosae* Br.-Bl. 1931 (art. 8), *Salicornion fruticosae* Br.-Bl. 1933 (art. 45), *Arthrocnemion fruticosi* (Br.-Bl. 1933) O. Bolòs 1967 nom. illeg. (art. 29, 30), *Puccinellio maritimae-Halimionion portulacoidis* Géhu 1994 nom. nud. (art. 2b, 3o, 5, 8) ('...portulacoides' art. 41b), *Halimionion portulacoidis* Géhu 1976 (syntax. syn.)]

Perennial, littoral, Mediterranean and Mediterranean-Atlantic glasswort communities, dominated by *Sarcocornia fruticosa* and *S. perennis* subsp. *perennis*. Only vegetation dominated by *S. fruticosa*, a chamaephyte, succulent/phanerophyte that resembles a shrubby species, is present in Italy.

26.1.2 All.: *Arthrocnemion macrostachyi* Rivas-Martínez 1980 nom. mut. propos. Rivas-Martínez, T.E. Díaz, Fernandez-Gonzales, Izco, Loidi, Lousã & Penas 2002

[*Arthrocnemion glauci* Rivas-Martínez & Costa 1984 (art. 45)]

Perennial hyper-halophylous communities dominated by *Arthrocnemum macrostachyum* that are located in salt-marshes, in sectors not directly affected by tide variations, often found in salt pans, where they grow on the reliefs between the pools.

26.1.3 All.: *Suaedion verae* Brullo & Furnari 1988

[*Suaedenion verae* Peinado, Martínez-Parras, Bartolomé & Alcaraz 1989 (corresp. name), *Suaedenion verae* Rivas-Martínez, Lousã, T.E. Díaz, Fernández-González & J.C. Costa 1990, *Suaedion verae* (Rivas-Martínez, Lousã, T.E. Díaz, Fernández-González & J.C. Costa 1990) Rivas-Martínez, Fernández-González & Loidi 1999 (art. 40b)]

Marginal communities comprising perennial glassworts that develop on silty-clayey substrates slightly enriched by organic matter.

26.1.4 All.: *Sarcocornion alpini* (Rivas-Martínez, Lousã, T.E. Díaz, Fernández-González & J.C. Costa 1990) Brullo, Giusso Del Galdo, Minissale, Siracusa & Spampinato 2002

[*Sarcocornienion deflexae* Rivas-Martínez, Lousã, T.E. Díaz, Fernández-González & J.C. Costa 1990 corr. Géhu & Biondi 1995 (art. 29), *Sarcocornienion alpini* Rivas-Martínez, Lousã, T.E. Díaz, Fernández-González & J.C. Costa 1990]

Perennial halophylous, chamaephytic, Mediterranean communities, dominated by *Sarcocornia perennis* subsp. *alpini* typical of brackish marshes only occasionally reached by tides.

26.1.5 All.: *Inulion crithmoidis* Brullo & Furnari 1988

[*Salicornion fruticosae* Br.-Bl. 1933 p.p.]

Communities of halomorphic soils that are not subjected to submersion.

26.2 Ord.: *HALOCNEMETALIA CRUCIATI* Biondi, Casavecchia, Estrelles & Soriano 2013

[*Halocnemetalia strobilacei* nom. nud. (art. 2b, 8; in Asri & Ghorbanli 1997)]

Woody and semi-woody, succulent, hyper-halophyllous vegetation that spreads along the Mediterranean coasts, even as far as the Middle East, and marginally found in the Eurasian inlands.

- 26.2.1 All.: *Halocnemion cruciati* Biondi, Casavecchia, Estrelles & Soriano 2013
[*Halocnemion strobilacei* Géhu & Costa in Géhu, Costa, Biondi, Peris & Arnold 1984 p.p. (syn. syntax), *Zygophyllo-Arthrocnemion macrostrachyae* Géhu, Arnold, Géhu-Franck & Apostolides 1992 *nom. nud.* (art. 2b, 8)]
Halocnemum cruciatum communities of European and African Mediterranean littorals, including the Middle East, with extensions into the Sinai Peninsula, that grow in the arid to hyperarid Mediterranean macrobioclimate.
- 26.2.2 All.: *Halocnemion strobilacei* Biondi, Casavecchia, Estrelles & Soriano 2013
[*Halocnemion strobilacei* Géhu & Costa in Géhu, Costa, Biondi, Peris & Arnold 1984 p.p. (syntax. syn.)]
Halocnemum strobilaceum communities found along European coasts of the Mediterranean Basin and growing in the sub-Mediterranean variant of the Temperate macrobioclimate, mainly found in the meso-Mediterranean thermotype of the Mediterranean macrobioclimate.
- 26.2.3 All.: *Limoniastrion monopetalii* Pignatti 1953
Coastal communities dominated by *Limoniastrum monopetalum* that grow on sandy and sandy-silty soils.
- 26.3 Ord.: *LIMONIETALIA* Br.-Bl. & O. Bolòs 1958
[*Limonietalia* Br.-Bl. & O. Bolòs 1958 *em. Rivas-Martínez & Costa 1984* (art. 47), Incl.: *Limonion etrusci* Viciani, Foggi & Ferretti 2012 *nom. inval.* (art. 2b, 5, 8)]
Halophilous grasses with perennial species that belong mainly to the genus *Limonium* and grow along coastal areas on the edge of brackish depressions.
- 26.3.1 All.: *Limonion ferulacei* (Pignatti 1953) *em. Beeftink 1968*
[*Limonienion ferulacei* Pignatti 1952, *Limoniastrion monopetalii* Pignatti 1953 p.p.]
Thermo-Mediterranean communities that occur in northern Africa and in Sicily and grow on halomorphic salty soils that are rarely inundated and markedly arid.
- 26.3.2 All.: *Triglochino barrelieri-Limonion glomerati* Biondi, Diana, Farris & Filigheddu 2001
Halophyllous endemic Sardinian communities dominated by species of the genus *Limonium*, comprising hemicryptophytes and chamaephytes, with a significant presence of geophytes.

27 Cl.: *SPARTINETEA GLABRAE* Tüxen in Beeftink 1962

[*Spartinetea* Tüxen in Lohmeyer, A. Matuszkiewicz, W. Matuszkiewicz, Merker, Moore, Müller, Oberdorfer, Poli, Seibert, Sukopp, Trautmann, J. Tüxen, Tüxen & Westhoff 1962 *nom. nud.* (art. 2b, 8), *Spartinetea maritimae* Tüxen in Beeftink & Géhu 1973 (syntax syn.)]

Pioneer ampho-Atlantic and Mediterranean coastal vegetation consisting of perennial formations that grow on muddy brackish soils that are inundated for long periods of time; in the Mediterranean area, this vegetation only occurs in the northern Adriatic sector.

27.1 Ord.: *SPARTINETALIA GLABRAE* Conard 1935

[*Spartinetalia maritimae* Conard ex Beeftink & Géhu 1973 (syntax syn.)]

27.1.1 All.: *Spartinion anglicae* Géhu in Bardat, Bioret, Botineau, Boulet, Delpéch, Géhu, Haury, Lacoste, Rameau, Royer, Roux & Touffet 2004

[*Spartinion maritimae* (Conard 1935) Beeftink, Géhu, Ohba & Tüxen in Beeftink & Géhu 1973 *nom. illeg.* (art. 29) p.p., Pseud.: *Spartinion maritimae* sensu Géhu 1998 non (Conard 1935) Beeftink, Géhu, Ohba & Tüxen in Beeftink & Géhu 1973 *nom. illeg.* (art. 29), Non: *Spartinion glabrae* Conard 1935]

Halophilous pioneer European communities dominated by *Spartina maritima* that include invasive, non-native species of the same genus and colonize the coastal depressions directly affected by the width of the tidal regime.

28 Cl.: *THERO-SUAEDETEA SPLENDENTIS* Rivas-Martínez 1972

[*Therosalicornietea* (Pignatti 1954) Tüxen 1974 *nom. inval.* (art. 2d, 3m, 27) (*'Thero-Salicornietea'*), *Cakilo-Therosalicornietea* Pignatti 1954 p.p. (art. 35) (*'Cakileto-...'* art. 41b) (syntax. syn.) [*Cakilo-Therosalicornietea* Pignatti 1952 *nom. inval.* (art. 2b, 2d, 3f, 8) p.p. (*'Cakileto-therosalicornietea'* art. 41b), *Cakilo-Therosalicornietea* Pignatti 1953 *nom. inval.* (art. 2b, 8) p.p. (*'Cakileto-...'* art. 41b)], *Thero-Salicornietea strictae* Tüxen ex Géhu & Géhu-Franck 1984 [*Thero-Salicornietea strictae* Tüxen in Tüxen & Oberdorfer 1958 *nom. inval.* (art. 2b, 2d, 3f, 8)], *Therosalicornietea* Pignatti 1954 p.p. (*'Therosalicornietea'* pro subclass., art. 41b) (corresp. name), Propos.: *Thero-Salicornietea strictae* Tüxen ex Géhu & Géhu-Franck 1984 *nom. conserv. propos.* (art. 52)]

Pioneer coastal or continental vegetation of annual species of the genus *Salicornia* found in brackish marshes that are temporarily inundated and in salt pans.

28.1 Ord.: *THERO-SALICORNIETALIA* Tüxen in Tüxen & Oberdorfer ex Géhu & Géhu-Franck 1984

[*Thero-Salicornietalia strictae* Tüxen in Tüxen & Oberdorfer 1958 *nom. inval.* (art. 2b, 2d, 8, 3f), *Salicornietalia* Br.-Bl. 1933 p.p. (syntax. syn.), *Therosalicornietalia* Pignatti 1954 p.p. [*Therosalicornietalia* Pignatti 1952 *nom. inval.* (art. 2b, 8) p.p., *Therosalicornietalia* Pignatti 1953 *nom. inval.* (art. 2b, 8) p.p.], *Therosalicornietalia* Pignatti 1954 *em. Tüxen* 1974 *em. illeg.* (art. 24)]

Halophylous annual coastal and continental vegetation.

28.1.1 All.: *Salicornion patulae* Géhu & Géhu-Franck ex Rivas-Martínez 1990

[*Salicornion patulae* Géhu & Géhu-Franck 1984 *nom. nud.* (art. 2b, 8)]

Annual communities of diploid and tetraploid glassworts; they grow on humid and inundated sites with salty water along Mediterranean coasts, occasionally even in inland areas, and are always associated with strong salt concentrations.

28.2 Ord.: *THERO-SUAEDETALIA SPLENDENTIS* Br.-Bl. & O.Bolòs 1958

[*Thero-Salicornietalia* Pignatti 1952 *nom. ambig.* (art. 36), *Camphorosmo annuae-Salicornietalia prostratae* Borhidi 1996 (syntax. syn.)]

Halo-nitrophilous coastal and continental communities.

28.2.1 All.: *Thero-Suaedion splendidis* Br.-Bl. in Br.-Bl., Roussine & Nègre 1952

[*Thero-Salicornion* Br.-Bl. 1933 *nom. Ambig.* (art. 36)]

Halo-nitrophilous, mainly Mediterranean, pioneer communities that grow on deposits of organic debris carried by the waves to areas in the vicinity of lagoons. They are also found in coastal depressions that emerge during the summer season.

IV. CHASMOPHYTIC GLAREICOLOUS VEGETATION

29 Cl.: ***ADIANTETEA CAPILLI-VENERIS* Br.-Bl. in Br.-Bl., Roussine & Nègre 1952**

[*Adiantetia* Br.-Bl. & Tüxen 1943 (art. 8), *Adiantetia* Br.-Bl. in Br.-Bl., Emberger & Molinier 1947 (art.8)]
Chasmophytic vegetation that is rich in bryophytes and pteridophytes and grows in the water dripping crevices of calcareous rocks or of Tufa deposits. Mainly present in the Mediterranean macrobioclimate, though also in the Temperate macrobioclimate.

29.1 Ord.: ***ADIANTETALIA CAPILLI-VENERIS* Br.-Bl. ex Horvatić 1939**

[*Adiantetalia* Br.-Bl. 1931 *nom. nud.* (art. 2b, 8), *Pinguiculetalia longifoliae* F. Casas 1970 (syntax. syn.)]

29.1.1 All.: *Adiantion capilli-veneris* Br.-Bl. ex Horvatić 1939

[*Adiantion* Br.-Bl. 1931 *nom. nud.* (art. 2b, 8), *Adiantion* Br.-Bl. ex Horvatić 1934 *nom. nud.* (art. 2b, 8)]

Communities dominated by *Adiantum capillus-veneris* and rich in bryophytes that grow on siliceous or calcareous dripping cliffs. They can contribute to the genesis of travertine.

29.1.2 All.: *Polysticho setiferi-Phyllitidion scolopendri* Ubaldi ex Ubaldi & Biondi in Biondi, Allegrezza, Casavecchia, Galdenzi, Gasparri, Pesaresi, Vagge & Blasi 2014

[*Polysticho setiferi-Phyllitidion scolopendri* Ubaldi 2011 *nom. inval.* (art. 5)]

Fern-rich communities that are characteristic of the damp walls in narrow and shady ravines.

30 Cl.: ***ASPLENIETEA TRICHOMANIS* (Br.-Bl. in Meier & Br.-Bl. 1934) Oberdorfer 1977**

[*Asplenietea rupestris* Br.-Bl. in Meier & Br.-Bl. 1934 (art. 34)]

Non-nitrophilous, perennial vegetation dominated by chasmophytes and occasionally by chomophytes, that grows in the crevices of rocks, cliffs and walls. Communities with a holarctic distribution.

30.1 Ord.: ***ASPLENIETALIA GLANDULOSI* Br.-Bl. & Meier in Meier & Br.-Bl. 1934**

[*Asplenietalia petrarchae* Br.-Bl. & Meier in Meier & Br.-Bl. 1934 *nom. mut. illeg.*]

Chasmophytic, strictly thermophilous vegetation generally related to the Mediterranean macrobioclimate (thermo- and meso-Mediterranean thermotypes), that grows on various substrata (limestone, dolomite, conglomerate, schist, gneiss, volcanic).

30.1.1 All.: *Asplenion glandulosi* Br.-Bl. & Meier in Meier & Br.-Bl. 1934

[*Asplenion petrarchae* Br.-Bl. & Meier in Meier & Br.-Bl. 1934 *nom. mut. illeg.*, *Brassicion insularis* Gamisans 1991 *nom. nud.* (art. 2b, 8)]

Rupicolous communities that grow on calcareous substrata in the thermo- and meso-Mediterranean thermotypes.

- 30.1.2 All.: *Dianthion rupicolae* Brullo & Marcenò 1979
Mediterranean chasmophytic communities, generally mesophilous, present in southern Italy and Sicily.
- 30.1.3 All.: *Centaureion pentadactylis* Brullo, Scelsi & Spampinato 2001
Endemic communities of the Ionian side of the Aspromonte. These are strictly thermophilous chasmophytic communities that grow in the thermo-Mediterranean dry or subhumid to meso-Mediterranean subhumid bioclimatic belts, mainly on conglomerates, schists and gneisses.
- 30.1.4 All.: *Linaron caprariae* Foggi, Cartei, Pignotti, Signorini, Viciani, Dell'Olmo & Menicagli 2006
Silicicolous chasmophytic communities that replace the *Asplenio billotii-Umbilicion rupestris* de Foucault 1988 communities in the Tuscan Archipelago.
- 30.2 Ord.: *POTENTILLETALIA CAULESCENTIS* Br.-Bl. in Br.-Bl. & Jenny 1926
[*Asplenietalia rutaemurariae* (Br.-Bl. & Meier in Meier & Br.-Bl. 1934) Oberdorfer, Görs, Korneck, Lohmeyer, Müller, Philippi & Seibert 1967 pro syn. *nom. inval.* (art. 2d, 3a, 29)]
Chasmophytic vegetation of temperate Europe that grows in the Temperate macrobioclimate and in the oro-Mediterranean thermotype of the Mediterranean macrobioclimate, on calcareous substrata.
- 30.2.1 All.: *Potentillon caulescentis* Br.-Bl. in Br.-Bl. & Jenny 1926
[*Potentillon caulescentis* Theurillat 1994 (nomencl. syn.), *Kernero saxatilis-Potentillon caulescentis* Theurillat 1994 (corresp. name), *Physoplexido comosae-Potentillon caulescentis* Theurillat 1994 (corresp. name)]
Heliophilous communities, that may be xerophilous or mesophilous, found in the hilly to alpine belts.
- 30.2.2 All.: *Saxifragion lingulatae* (Rioux & Quézel 1949) Loisel 1951
Heliophilous chasmophytic communities of the Apuan Alps and Maritime Alps that grow on calcareous rocks in the supra- and oro-Mediterranean thermotypes.
- 30.2.3 All.: *Androsacion helveticae-Drabion tomentosae* Wraber 1970
Rupicolous, chamaephyte-rich vegetation of the alpine and sub-nival belts.
- 30.2.4 All.: *Saxifragion australis* Biondi & Ballelli ex Brullo 1983
Chasmophytic, mainly sciaphilous communities that grow in the Temperate macrobioclimate and in the supra- and oro-Mediterranean thermotypes of the Mediterranean macrobioclimate, on calcareous substrata in the central and southern Apennines and eastern Sicily.
- 30.3 Ord.: *ANDROSACETALIA VANDELLII* Br.-Bl. in Meier & Br.-Bl. 1934 *corr.* Rivas-Martínez, T.E. Díaz, Fernández-González, Izco, Loidi, Lousã & Penas 2002
[*Androsacetalia multiflorae* Br.-Bl. in Meier & Br.-Bl. 1934 (art. 44), *Asplenietalia septentrionalis* Oberdorfer, Görs, Korneck, Lohmeyer, Müller, Philippi & Seibert 1967 pro syn. *nom. inval.* (art. 2d, 3a), *Asplenietalia septentrionalis* Oberdorfer, Görs, Korneck, Lohmeyer, Müller, Philippi & Seibert ex Loisel 1970 *nom. illeg.* (art. 29)]
Calcifuge vegetation of siliceous rock crevices, found in the main European mountain chains, that grows above all in the Temperate macrobioclimate.
- 30.3a Subord.: *ASPLENIENALIA LANCEOLATO-OBOVATI* Loisel 1970
[*Asplenienalia lanceolato-obovati* Loisel 1970 ('*Asplenietalia* ...' pro subord. art. 41b) (*nom. correct.*), *Asplenietalia billotii-obovati* Loisel 1970 *nom. mut. illeg.*]
Chasmophytic communities that grow in the hilly and mountain belts in the Temperate macrobioclimate, as well as in the Mediterranean macrobioclimate in the supra-Mediterranean thermotype.
- 30.3a.1 All.: *Asplenion septentrionalis* Oberdorfer 1938
[*Asplenion septentrionalis* Gams 1927 pro syn. *nom. inval.* (art. 2d, 3a, 3e), *Asplenion septentrionalis* Malcuit 1929 *nom. inval.* (art. 2b, 8), *Asplenion septentrionalis* Focquet 1982 *nom. inval.* (art. 2d, 3o, 5), Corresp.: *Asplenion nadianthi-nigri-ceterach* Béguin & Theurillat 1984]
Chasmophytic continental communities that grow from the mesotemperate to the supratemperate thermotypes.
- 30.3a.2 All.: *Asplenion serpentini* Br.-Bl. & Tüxen ex Eggler 1955
[*Asplenion serpentini* Br.-Bl. & Tüxen 1943 *nom. nud.* (art. 2b, 8), *Asplenion cuneifolii* Br.-Bl. & Tüxen ex Eggler 1955 *nom. mut. illeg.*]
Chasmophytic communities that grow on serpentine rocks.
- 30.3b Subord.: *ANDROSACENALIA VANDELLII* Loisel 1970
Chasmophytic communities that grow in the subalpine and alpine belts.
- 30.3b.1 All.: *Androsacion vandellii* Br.-Bl. in Br.-Bl. & Jenny 1926 *corr.* Rivas-Martínez, T.E. Díaz, Fernández-González, Izco, Loidi, Lousã & Penas 2002
[*Androsacion multiflorae* Br.-Bl. in Br.-Bl. & Jenny 1926 (art. 44)]
Alpine and Pyrenean communities.

- 30.3b.2 All.: *Saxifragion pedemontanae* Barbero & Bono 1967
[*Saxifragion pedemontanae* (Barbero & Bono 1967) Theurillat in Theurillat, Aeschimann, Küpfer & Spichiger 1995 (corresp. name)]
Maritime Alps communities.
- 30.4 Ord.: *CHEILANTHETALIA MARANTO-MADERENSIS* Sáenz de Rivas & Rivas-Martínez 1979
Xerophilous rupicolous communities dominated by small fern belonging to the *Cheilanthes* and *Cosentinia* genera. Communities that grow on rocks that are siliceous, alkaline, rich in heavy metals, compact and not very permeable.
- 30.4.1 All.: *Phagnalo saxatilis-Cheilanthion maderensis* Loisel 1970 corr. F.J. Pérez, T.E. Díaz, P. Fernández & Salvo 1989
[*Phagnalo-Cheilanthion fragrantis* Loisel 1970 (art. 43), *Asplenio obovati-Cheilanthion maderensis* Loisel 1970 corr. Sáenz & Rivas-Martínez 1979 (art. 40)]
Thermophilous, silicicolous or basophilous, chasmophytic communities that grow in Mediterranean areas and the Maritime Alps.
- 30.5 Ord.: *ARENARIO BERTOLONI-PHAGNALETALIA SORDIDAE* Arrigoni & Di Tommaso 1991
Rupicolous and calcicolous vegetation of the calcareous mesozoic Sardinian mountains where they are the vicariant of the *Potentilletalia caulescentis* order.
- 30.5.1 All.: *Centaureo filiformis-Micromerion cordatae* Arrigoni & Di Tommaso 1991
Chasmophytic communities of the calcareous mountains of central-eastern Sardinia. This *syntaxon* is the vicariant of the *Potentillion caulescentis* alliance and of the more thermophilous *Asplenion glandulosi* alliance in Sardinia.
- 30.6 Ord.: *VIOLO BIFLORAE-CYSTOPTERIDETALIA ALPINAE* F. Casas 1970
Chasmo-chomophytic communities that grow in shaded, cool, snow-covered for long periods of time, sites from the mesotemperate to the orotemperate thermotypes.
- 30.6.1 All.: *Violo biflorae-Cystopteridion alpinae* F. Casas 1970
[*Asplenion viridis* Gams 1936 *nom. inval.* (art. 2d, 3d), *Cystopteridion* Richard 1972]
Chasmophytic communities that grow on shady, damp cliffs in southern-European mountains.
- 30.7 Ord.: *CENTAUREO KARTSCHIANAE-CAMPANULETALIA PYRAMIDALIS* Trinajstić ex Di Pietro & Wagensommer 2008
Chasmophytic communities with a Trans-Adriatic distribution, that grow on carbonate substrata in the Mediterranean macrobioclimate or in the sub-Mediterranean variant of the Temperate macrobioclimate.
- 30.7.1 All.: *Centaureo-Campanulion* Horvatić 1934
Chasmophytic communities with a northern Adriatic-Dalmatian distribution.
- 30.7.2 All.: *Asperulion garganicae* Bianco, Brullo, E. Pignatti & Pignatti 1988
Chasmophytic endemic communities of the Gargano peninsula.
- 30.7.3 All.: *Campanulo versicoloris-Dianthion japigici* Di Pietro & Wagensommer 2008
[*Caro multiflori-Aurinion megalocarpae* Terzi & D'Amico 2008 *syntax. syn.*] Chasmophytic communities of the Murge and Salento area.
- 30.8 Ord.: *HYPNO-POLYPODIETALIA VULGARIS* Jurko & Peciar ex Brullo, Scelsi & Spampinato 2001
Chasmo-chomophytic communities that grow on shaded, cool cliffs and walls of varying geological origin, in the thermo- to supratemperate belts of the Temperate bioclimatic area.
- 30.8.1 All.: *Hypno-Polypodium vulgaris* Mucina 1993
Chomophyte-rich communities characterized by the presence of calcifuge bryophytes and typical of shaded habitats, especially undergrowth.
- 31 Cl.: ***PARIETARIETEA JUDAICAE* Oberdorfer 1977**
[*Parietarienea rupestris* Rivas-Martínez in Rivas Goday 1956 (art. 2b, 3b, 8, 34), *Cymbalario-Parietarietea diffusae* Oberdorfer, Görs, Korneck, Lohmeyer, Müller, Philippi & Seibert 1967 *nom. nud.* (art. 2b, 8), *Parietarietea judaicae* Oberdorfer 1977 (art. 31)]
Nitrophilous and synanthropic perennial vegetation dominated by hemicryptophytes. Chasmo-chomophytic communities that develop in cliff and wall crevices.
- 31.1 Ord.: *TORTULO-CYMBALARIETALIA* Segal 1969
[*Parietarietalia* Rivas-Martínez ex Rivas Goday 1964, *Parietarietalia muralis* Rivas-Martínez 1960 *nom. nud.* (art. 2b, 8)]
- 31.1.1 All.: *Parietaron judaicae* Segal 1969
[*Parietario-Centranthion rubri* Rivas-Martínez 1960 *nom. inval.* (art. 8), *Parietario-Galium muralis* Rivas-Martínez 1960 *nom. inval.* (art. 8), *Linarion cymbalariae* Segal 1961 *nom. inval.* (art. 2b), *Linarion-Parietaron diffusae* Br.-Bl. 1964 *nom. inval.* (art. 2b), *Centrantho-Galium murale* Rivas Goday 1964 *nom. inval.* (art. 2b),

Parietario-Galium muralis Rivas-Martínez ex Rivas Goday 1964 *nom. inval.* (art.3f), *Parietario-Galium murale* Rivas-Martínez ex Br.-Bl. 1966 *nom. inval.* (art. 3f), *Galio-Parietarium* Rivas-Martínez ex Oberdorfer 1969 *nom. inval.* (art. 3f), *Galio-Parietarium mauritanicae* Rivas-Martínez 1969 *nom. inval.* (art. 3f), *Parietario-Centranthion rubri* Rivas-Martínez 1969 *nom. illeg.* (art. 22, 23), *Galio-Parietarium muralis* Vigo & Terradas 1969 *nom. illeg.* (art.22, 23, 34), *Centrantho-Parietarium judaicae* Rivas-Martínez 1975 *nom. illeg.* (art. 29), *Crithmo-Parietarium judaicae* Caneva *et al.* 1989 *nom. inval.* (art. 3b)]

Nitrophilous and thermophilous communities consisting primarily of chasmophytes. Communities related mainly to the Mediterranean macrobioclimate that also extend into the Temperate macrobioclimate, especially its sub-Mediterranean variant.

31.1.2 All.: *Cymbalaria muralis-Asplenion rutae-murariae* Segal 1969 *em. Mucina* 1993

[*Parietario-Centranthion sensu auct. non* Rivas-Martínez 1960 (pseudonym), *Asplenion rutae-murariae* Gams 1936 *nom. inval.* (art. 2b), *Tortulo-Linarion cymbalariae* Westhoff 1966 *nom. inval.* (art. 2b)]

Nitrophilous chasmophytic communities that grow on walls in central Europe, extending as far as the Mediterranean basin in Temperate macrobioclimate conditions.

31.1.3 All.: *Brassicion oleraceae* Rivas-Martínez, Fernández-González & Loidi 1999

Nitrophilous and sub-halophilous rupicolous communities that colonize the upper areas of limestone cliffs and are thus less exposed to marine aerosol.

31.2 Ord.: *CAPPARIDETALIA SPINOSAE* Biondi, Blasi & Galdenzi in Biondi, Allegrezza, Casavecchia, Galdenzi, Gasparri, Pesaresi, Vagge & Blasi 2014

Thermophilous communities consisting primarily of shrubs that colonize walls and cliffs in Mediterranean and thermo-Atlantic areas.

31.2.1 All.: *Artemisio arborescentis-Capparidion spinosae* Biondi, Blasi & Galdenzi in Biondi, Allegrezza, Casavecchia, Galdenzi, Gasparri, Pesaresi, Vagge & Blasi 2014

Thermophilous communities consisting primarily of shrubs that grow on walls and rocky slopes in the infra-Mediterranean and thermo-Mediterranean thermotypes (dry to arid ombrotype) within the Mediterranean macrobioclimate.

32 Cl.: **ANOMODONTO-POLYPODIETEA CAMBRICI** Rivas-Martínez 1975

[*Anogrammo-Polypodietaea* Rivas-Martínez 1975, *Polypodietaea* Jurko & Peciar 1963 *nom. nud.* (art. 2b, 8)]

Chasmo-chomophytic and epiphytic vegetation dominated by bryophytes and pteridophytes, that grows on shaded and damp rocks or trunks. These communities have their *optimum* in oceanic climatic conditions, in basal and hilly belts with meso- to supra-Mediterranean thermotypes.

32.1 Ord.: *ANOMODONTO-POLYPODIETALIA CAMBRICI* O. Bolòs & Vives in O. Bolòs 1957

32.1.1 All.: *Polypodium serrati* Br.-Bl. in Br.-Bl., Roussine & Nègre 1952

[*Polypodium* Br.-Bl. 1931 *nom. nud.* (art. 2b, 8), *Polypodium* Br.-Bl. in Br.-Bl., Emberger & Molinier 1947 *nom. nud.* (art. 2b, 8), *Homalothecio-Polypodium serrati* (Br.-Bl. in Br.-Bl., Roussine & Nègre 1952) Mateo 1983 *nom. illeg.* (art. 29)]

Basophilous and thermophilous communities dominated by *Polypodium cambricum* subsp. *serrulatum* that grow from sea level to areas with a supra-Mediterranean thermotype.

32.1.2 All.: *Bartramio-Polypodium serrati* O. Bolòs & Vives in O. Bolòs 1957

[*Anogrammion leptophyllae* Bellot & Casaseca in Bellot 1968 (syntax. syn.)]

Silicicolous and thermophilous chomophytic communities dominated by bryophytes and pteridophytes, that grow on carbonate-poor substrata, from sea level to areas with a supratemperate thermotype.

32.1.3 All.: *Pohlio crudae-Asplenion septentrionalis* Brullo & Siracusa in Brullo, Scelsi & Spampinato 2001

Orophilous and calcifuge communities dominated by bryophytes and pteridophytes that grow on shaded rocks in the supra-Mediterranean and oro-Mediterranean thermotypes.

32.1.4 All.: *Arenarion balearicae* O. Bolòs & Molinier 1969

Chomophytic Sardinian-Corsican-Balearic communities that grow on granitic rocks in shaded and damp sites.

33 Cl.: **THLASPIETEA ROTUNDIFOLII** Br.-Bl. 1948

[*Drypidetia spinosae* Quézel 1964 (syntax. syn.), *Scrophulario-Helichrysetea italici* Brullo, Scelsi & Spampinato 1998 (syntax. syn.)]

Perennial vegetation that grows on screes, loose debris substrata, slope deposits, moraines and stream terraces in the Boreal, Temperate and Mediterranean macrobioclimates.

33.1 Ord.: *STIPETALIA CALAMAGROSTIS* Oberdorfer & Seibert in Oberdorfer 1977

- [*Achnatheretalia calamagrostis* Oberdorfer & Seibert in Oberdorfer 1977 *nom. mut. illeg.* (art. 45)]
 Glareicolous thermophilous vegetation, dominated by *Stipa calamagrostis*, that grows on calcareous substrata in the mesotemperate and supratemperate thermotypes in the Alps and Apennines (in Italy).
- 33.1.1 All.: *Stipion calamagrostis* Jenny-Lips ex Quantin 1932
 [*Stipion calamagrostis* Jenny-Lips 1930 *nom. inval.* (art. 2d, 3b) ('... *calamagrostidis*' art. 41b), *Achnatherion calamagrostis* Jenny-Lips ex Quantin 1932 *nom. mut. illeg.* (art. 45)]
 Communities that grow on unstable calcareous screes, in the hilly and montane belts.
- 33.2 Ord.: *THLASPIETALIA ROTUNDIFOLII* Br.-Bl. in Br.-Bl. & Jenny 1926
 Vegetation that develops on loose screes, particularly calcareous ones, in the supra- to cryorotemperate thermotypes of the Alps.
- 33.2.1 All.: *Thlaspion rotundifolii* Jenny-Lips 1930
 [*Thlaspion rotundifolii* Jenny-Lips 1930 (nom correct) ('*Thlaspeion rotundifolii*' art. 41b), *Thlaspion rotundifolii* Br.-Bl. in Br.-Bl. & Jenny 1926 *nom. inval.* (art. 2b, 2d, 3f, 8) ('*Thlaspeion rotundifolii*' art. 41b), *Thlaspion rotundifolii* Jenny-Lips 1930 *em.* Zollitsch 1966 *nom. ined.* (art. 1), *Thlaspion rotundifolii* Jenny-Lips 1930 *em.* Zollitsch 1966 ex Lippert 1966 (art. 47)]
 Alpine communities that grow from the subalpine to nival belts.
- 33.2.2 All.: *Silenion marginatae* Lakusic 1966
 [*Peltarion alliaceae* Horvatić 1957 (syntax. syn.)]
 Communities that grow in northeastern Italy and the Dinarides on calcareous screes from sea level to supratemperate thermotype areas.
- 33.3 Ord.: *POLYSTICHETALIA LONCHITIS* Rivas-Martínez, T.E. Díaz, F. Prieto, Loidi & Penas 1984
 [*Polystichetalia lonchitidis* Rivas-Martínez, T.E. Díaz, F. Prieto, Loidi & Penas 1984 *nom. inval.* (art. 2b, 2d, 5, 3o, 8) ('... *lonchitis*' art. 41b)]
 Glareicolous fern-rich vegetation, characteristic of areas with long-lying snow cover, that grows in the Mediterranean and Eurosiberian high mountains.
- 33.3.1 All.: *Dryopteridion oreadis* Rivas-Martínez 1977 *corr.* Rivas-Martínez, T.E. Díaz, F. Prieto, Loidi & Penas 1984
 [*Dryopteridion oreadis* Rivas-Martínez 1977 *corr.* Rivas-Martínez, Fernández-González & Sánchez-Mata 1986 (art. 2b), *Dryopteridion abbreviatae* Rivas-Martínez 1977 (art. 43), *Dryopteridion oreadis* Rivas-Martínez 1977 *corr.* Rivas-Martínez Costa, Izco & Sáenz 1982 (art. 2b)]
 Glareicolous and silicicolous fern-rich communities that develop on moraines or on debris deposits due to frost wedging in the orotemperate and cryorotemperate thermotypes.
- 33.3.2 All.: *Petasition paradoxii* Zollitsch ex Lippert 1966
 [*Petasition paradoxii* Zollitsch 1966 *nom. ined.* (art. 1) p.p., *Petasition paradoxii* Zollitsch ex Lippert 1966 *em.* Béguin 1970 *nom. ined.* (art. 1), *Petasition paradoxii* Zollitsch ex Lippert 1966 *em.* Béguin 1972 (art. 47), *Arabidion alpinae* Béguin 1972 (syntax. syn.)]
 Glareicolous and calcicolous fern-rich communities that grow on semi-stabilized soily gravels in Alpine areas with supratemperate and orotemperate thermotypes.
- 33.4 Ord.: *DRABETALIA HOPPEANAE* Zollitsch ex Merxm. & Zollitsch 1967
 [*Drabetalia hoppeanae* Zollitsch 1966 *nom. ined.* (art. 1), *Drabetalia hoppeanae* Zollitsch ex Oberdorfer, Görs, Korneck, Lohmeyer, Müller, Philippi & Seibert 1967 *nom. nud.* (art. 2b, 8), *Drabetalia hoppeanae* Zollitsch 1968 (art. 22)]
 Glareicolous vegetation that grows on fine debris screes in the central Alps in the orotemperate and cryorotemperate thermotypes.
- 33.4.1 All.: *Drabion hoppeanae* Zollitsch ex Merxm. & Zollitsch 1967
 [*Drabion hoppeanae* Zollitsch 1966 *nom. ined.* (art. 1), *Drabion hoppeanae* Zollitsch ex Oberdorfer, Görs, Korneck, Lohmeyer, Müller, Philippi & Seibert 1967 *nom. nud.* (art. 2b, 8), *Drabion hoppeanae* Zollitsch 1968 (art. 22)]
 Alpine communities that grow on calcareous and schist-calcareous screes.
- 33.5 Ord.: *ANDROSACETALIA ALPINAЕ* Br.-Bl. in Br.-Bl. & Jenny 1926
 Glareicolous and silicicolous communities that grow from the upper supratemperate to the cryorotemperate thermotypes.
- 33.5.1 All.: *Galeopsision segetum* Oberdorfer 1957
 Glareicolous communities that develop on siliceous screes in warm sites in the mesotemperate and supratemperate thermotypes.
- 33.5.2 All.: *Androsacion alpinae* Br.-Bl. in Br.-Bl. & Jenny 1926

- Glareicolous Alpine communities that grow on siliceous screes, in cool sites in the orotemperate and cryorotemperate thermotypes.
- 33.5.3 All.: *Allosuro crispi-Athyrium alpestris* Nordhagen 1936
 [*Allosurion crispi* Jenny-Lips 1930 *nom. inval.* (art. 2b, 2d, 3b, 8) (*'Allosurion crispi'* art. 41a), *Allosuro-Athyrium alpestris* Nordhagen 1936 *nom. inval.* (art. 2d, 3d) (*'Allosereto-...'* art. 41b)]
 Glareicolous communities that grow on siliceous screes, in cool sites in the supratemperate and orotemperate thermotypes, in the Alps and Boreal Europe.
- 33.6 Ord.: *EPILOBIETALIA FLEISCHERI* Moor 1958
 [*Myricarietalia germanicae* G. Braun-Blanquet 1931 *nom. inval.* (art. 2b, 8), *Myricarietalia germanicae* G. Braun-Blanquet ex Br.-Bl. 1948 *nom. illeg.* (art. 31)]
 Perennial herbaceous vegetation that grows on pebbly and sandy shores of watercourses with a torrential regime, from the mesotemperate to cryorotemperate thermotypes.
- 33.6.1 All.: *Epilobion fleischeri* G. Braun-Blanquet ex Br.-Bl. 1949
 [*Epilobion fleischeri* G. Braun-Blanquet 1931 *nom. nud.* (art. 2b, 8), Pseud.: *Epilobion fleischeri* auct., non G. Braun-Blanquet 1931, *Salicion incanae* non Aichinger 1933]
 Perennial herbaceous communities that grow on pebbly and gravelly alluvial substrata of watercourses with a torrential regime in the mesotemperate to cryorotemperate thermotypes.
- 33.7 Ord.: *THLASPIETALIA STYLOSI* Avena & Bruno 1975
 Glareicolous vegetation of the Maritime Alps and Apennine calcareous screes that grows in the upper supratemperate to cryorotemperate thermotypes. These communities are characterized by the presence of many endemic taxa. This *syntaxon* is the vicariant, in this area, of the *Thlaspietalia rotundifolii* order that is typical of the Alps.
- 33.7.1 All.: *Linario-Festucion dimorphae* Avena & Bruno 1975
 [*Festucion dimorphae* Bonin 1969 *nom. inval.* (art. 2b, 8), *Isatidion allionii* Ubaldi 2011 *nom. inval.* (art. 5), incl.: *Thlaspienion stylosi* Avena & Bruno 1975, *Thlaspienion stylosi* (Avena & Brullo 1975) Feoli-Chiapella 1983]
 Glareicolous communities that grow on loose, calcareous screes, from the supratemperate to orotemperate thermotypes, in the central and southern Apennines. These communities are often dominated by *Festuca dimorpha*.
- 33.7.2 All.: *Violo magellensis-Cerastion thomasii* Biondi, Blasi & Allegrezza in Biondi, Allegrezza, Casavecchia, Galdenzi, Gasparri, Pesaresi, Vagge & Blasi 2014
 [*Crepido breviscapii-Violenion magellensis* Ubaldi 2011 *nom. inval.* (art. 5)]
 Glareicolous communities that grow on carbonate screes in the cryorotemperate thermotype of the central-southern Apennines.
- 33.7.3 All.: *Aquilegion bertolonii* (Tomaselli 1994) Biondi & Allegrezza in Biondi, Allegrezza, Casavecchia, Galdenzi, Gasparri, Pesaresi, Vagge & Blasi 2014
 [*Aquilegion bertolonii* Tomaselli 1994 (corresp. name)]
 Glareicolous communities that grow on carbonate screes in the supratemperate thermotype of the Apuan Alps.
- 33.8 Ord.: *SCROPHULARIO BICOLORIS-HELICHRYSSETALIA ITALICI* Brullo 1984
 Perennial vegetation dominated by chamaephytes and hemicryptophytes that grows on incoherent substrata, from sea level up to 1800 m, in central and southern Italy, Sicily, Sardinia and Corsica. It is likely to be widespread throughout the Tyrrhenian sector of the Italian peninsula.
- 33.8.1 All.: *Artemision variabilis* Biondi, Ballelli, Allegrezza, Taffetani & Francalancia 1994
 Chamaephytic nitrophilous communities that grow on river terraces and on other gravelly incoherent substrata in the thermo-Mediterranean and meso-Mediterranean thermotypes in southern Italy.
- 33.8.2 All.: *Linarion purpureae* Brullo 1984
 Pioneer communities that grow on calcareous, dolomite or pyroclastic screes in the montane belt and, more rarely, in the basal belt, in southern Italy and Sicily.
- 33.8.3 All.: *Euphorbion rigidae* Brullo & Spampinato 1990
 Pioneer glareicolous communities that grow on riverine gravel banks (typical of the “fiumare”) in a bioclimate that ranges from meso- to supra-Mediterranean humid-subhumid, in the south of Italy and in north-eastern Sicily.
- 33.8.4 All.: *Ptilostemone casabonae-Euphorbion cupanii* Angiolini, Bacchetta, Brullo, Casti, Giusso Del Galdo & Guarino 2005
 Endemic Sardo-Corsican vegetation. Pioneer thermophilous communities dominated by chamaephytes and hemicryptophytes, that grow on gravelly substrata in the Mediterranean macrobioclimate in the thermo-Mediterranean and meso-Mediterranean thermotypes.

V. SYNANTHROPIC, RUDERAL HERBACEOUS VEGETATION AND TALL-HERB COMMUNITIES

34 Cl.: *ARTEMISIETEA VULGARIS* Lohmeyer, Preising & Tüxen ex Von Rochow 1951

[*Artemisietea vulgaris* Lohmeyer, Preising & Tüxen in Tüxen 1950 (art. 8), *Onopordetea* Br.-Bl. 1964 (art. 8), *Onopordetea* Br.-Bl. 1967 (syntax. syn.), *Agropyretea repentis* Oberdorfer, Müller & Görs in Oberdorfer, Görs, Korneck, Lohmeyer, Müller, Philippi & Seibert 1967 (art. 8), *Agropyretea pungentis* Géhu 1968 (syntax. syn.), *Agropyretea intermedio-repentis* Müller & Görs 1969 (syntax. syn.), *Onopordetea acantho-nervosi* Rivas-Martínez 1975 (syntax. syn.)]

Perennial pioneer synanthropic ruderal and nitrophilous herbaceous vegetation that grows on soils rich in organic matter, in Eurosiberian and Mediterranean regions.

34.1 Ord.: *ARCTIO LAPPAE-ARTEMISIETALIA VULGARIS* Dengler 2002

[*Artemisietalia vulgaris* Tüxen 1947 *nom. ambig. propos. p.p.* Dengler 2002]

From meso-hygrophilous to meso-xerophilous perennial vegetation.

34.1.1 All.: *Arction lappae* Tüxen 1937

[*Chenopodium subalpinum* Br.-Bl. 1947 (art. 34), *Eu-Arction* (Tüxen 1937) Tüxen 1949 *nom. nud.* (art. 2b, 8), *Rumicion obtusifolii* Gutte 1972 (syntax. syn.), *Eu-Arctienion* Sissingh in Westhoff, Dijk & Passchier 1946 ('(Eu-) Arction' pro suball. art. 41b, 41c) (corresp. name)]

Communities consisting of Eurosiberian ruderal and nitrophilous herbaceous plants of lowland and mountainous areas that grow on deep soils and are also widespread in Mediterranean areas.

34.2 Ord.: *AGROPYRETALIA INTERMEDII-REPENTIS* Oberdorfer, Müller & Görs in Müller & Görs 1969

[*Agropyretalia repentis* Oberdorfer, Müller & Görs in Oberdorfer, Görs, Korneck, Lohmeyer, Müller, Philippi & Seibert 1967 *nom. nud.* (art. 2b, 8)]

Pioneer nitrophilous Eurosiberian temperate and sub-Mediterranean formations.

34.2.1 All.: *Convolvulo arvensis-Agropyrrion repentis* Görs 1966

Perennial Eurosiberian semi-ruderal and mesophilous grass-dominated communities.

34.2.2 All.: *Artemisio absinthii-Agropyrrion intermedii* auct., non Müller & Görs 1969

[*Artemisio-Agropyrrion intermedii* Müller & Görs 1969 p.p. (syntax. syn.), Pseud.: *Artemisio-Agropyrrion intermedii* auct., non Müller & Görs 1969]

Xerophilous thermophilous and sub-ruderal grassland communities dominated by *Elytrigia intermedia*, that grow mainly in continental regions.

34.2.3 All.: *Salvio-Dactylion* Ubaldi, Speranza & Tonioli in Ubaldi 2003

Relatively mesophilous hemicryptophytic grassland communities that grow in the northern Apennines in the Temperate macrobioclimate, with thermotypes ranging from mesotemperate to lower supratemperate.

34.2.4 All.: *Inulo viscosae-Agropyrrion repentis* Biondi & Allegranza 1996

Meso-hygrophilous continuous grassland communities of clayey soils that grow in the sub-Mediterranean variant of the Temperate macrobioclimate, with extensions into the Mediterranean macrobioclimate in case of hydro compensation.

34.2.5 All.: *Arundion collinae* Brullo, Giusso Del Galdo, Guarino & Sciandrello in Brullo C., Brullo, Giusso Del Galdo, Guarino, Minissale, Scuderi, Siracusa, Sciandrello & Spampinato 2010

Thermophilous communities dominated by *Arundo collina* (= *A. plinii*) that grow on marly-clayey sites, characterized by deep soils with a fairly good water content for most of the year.

34.3 Ord.: *AGROPYRETALIA PUNGENTIS* Géhu 1968

[*Agropyretalia pungentis* Géhu & Géhu-Franck 1969 *nom. illeg.* (art. 22), *Propos.: Elytrigietalia athericae* Géhu 1968 *nom. mut. propos.* (art. 45), *Elytrigietalia repentis* Oberdorfer, Müller & Görs in Oberdorfer, Görs, Korneck, Lohmeyer, Müller, Philippi & Seibert 1967 *nom. mut. propos.*]

Nitrophilous halophilous often subprimary coastal vegetation.

34.3.1 All.: *Agropyrrion pungentis* Géhu 1968 *em.* 1973

[*Agropyrrion pungentis* Géhu & Géhu-Franck 1969 *nom. illeg.* (art. 22), *Agropyro-Rumicion crispus* Nordhagen 1940 *nom. dub. et ambig.* (art. 36, 38) p.p. (syntax. syn.), *Angelicion litoralis* Tüxen in Beffink 1965 p.p., *Propos.: Elytrigion athericae* Géhu 1968 *nom. mut. Propos.* (art. 45)]

Pioneer, dense, subprimary, halophilous to halo-tolerant hemicryptophytic communities dominated by *Elytrigia pungens*, found along littorals, on the hind-dunes or on the edge of brackish, inundated areas, as well as in other habitats such as salty clay badlands.

- 34.4 Ord.: *BRACHYPODIO RAMOSI-DACTYLETALIA HISPANICAE* Biondi, Filigheddu & Farris 2001
 [*Lygeo-Stipetalia* Br.-Bl. & O. Bolòs 1958 *nom. conserv.* (art. 52) sin. p.p., *Thero-Brachypodietalia* Br.-Bl. ex Bharrucha 1933 *nom. amb.* (art. 36), *Thero-Brachypodietalia* Br.-Bl. 1931 *nom. nud.* (art. 2b, 8) p.p., *Thero-Brachypodietalia* Br.-Bl. ex Molinier 1934 *em.* Rivas-Martínez, Fernández-González & Loidi 1998 (art. 47) p.p., *Brachypodietalia retusi* Julve 1993 *nom. inval.* (art. 2d, 3o, 5), *Phlomido lychnitidis-Brachypodietalia retusi* Rossellò 1994 *nom. illeg.* (art. 22), *Brachypodietalia phoenicoidis* Br.-Bl. 1931 (art. 8), *Brachypodietalia phoenicoidis* Br.-Bl. ex Molinier 1934 (syntax. syn.)]
 Perennial hemicryptophyte and geophyte subnitrophilous vegetation of secondary formations that find their optimum in the sub-humid and humid Mediterranean macrobioclimate and that can also extend into the thermo-Mediterranean thermotype in case of edaphic compensation.
- 34.4.1 All.: *Thero-Brachypodium ramosi* Br.-Bl. 1925
 [*Brachypodienion retusi* O. Bolòs 1981, *Phlomido lychnitidis-Brachypodium retusi* Rivas-Martínez ex Mateo 1983 *nom. illeg.* (art.22), *Scabioso turolensis-Brachypodium retusi* Rossellò 1994 *nom. illeg.* (art.22), *Phlomido lychnitidis-Brachypodienion retusi* Mateo 1983 *nom. illeg.* (art. 22), *Thero-Brachypodium retusi* Br.-Bl. 1925 *nom. mut. prop.* Rivas-Martínez, Díaz, Fernández-González, Izco, Loidi, Lousa & Penas 2002]
 Perennial xerophytic communities mainly dominated by *Brachypodium retusum* that grow in constantly arid conditions and reduced soil thickness, found above all in the western Mediterranean regions.
- 34.4.2 All.: *Reichardio maritimae-Dactylion hispanicae* Biondi, Filigheddu & Farris 2001
 Sub-halophilous hemicryptophytic and sometimes sub-primary dense grassland communities that grow on silty-clayey substrates rich in organic matter, in coastal windy sites, in Mediterranean macrobioclimate and in thermo- and lower meso-Mediterranean thermotypes.
- 34.4.3 All.: *Leontodo tuberosi-Bellidion sylvestris* Biondi, Filigheddu & Farris 2001
 Perennial herbaceous communities, with a high degree of coverage, consisting of rosulate and, to a lesser extent, scapose hemicryptophytes, with a high number of bulbous and rhizomatous geophytes; they are in vegetative phase during the winter and flower in early spring.
- 34.4.4 All.: *Bromo-Oryzopsis miliaceae* O. Bolòs 1970
 [Propos.: *Bromo-Piptatherion miliacei* O. Bolòs 1970 *nom. mut. propos.* Rivas-Martínez, T.E. Díaz, Fernández-González, Izco, Loidi, Lousã & Penas 2002]
 Perennial nitrophilous herbaceous communities, dominated by hemicryptophytes with a late spring-summer flowering that grow in fallow fields in thermo- and meso-Mediterranean thermotypes.
- 34.4.5 All.: *Brachypodium phoenicoidis* Br.-Bl. ex Molinier 1934
 [*Brachypodium phoenicoidis* Br.-Bl. 1931 (art. 8)]
 Perennial dense, generally tall, calcicolous and meso-xerophilous grassland communities dominated by *Brachypodium phoenicoides*, that develop on deep clayey soils in western and partly central Mediterranean regions, in thermotypes ranging from meso- to supra-Mediterranean.
- 34.5 Ord.: *ONOPORDETALIA ACANTHII* Br.-Bl. & Tüxen ex Klika in Klika & Hadač 1944
 [*Onopordetalia acanthii* Br.-Bl. & Tüxen 1943 (art. 8), *Onopordetalia acanthii* Br.-Bl. & Tüxen ex Von Rochov 1950 (art. 22), *Bromo tectorum-Onopordetalia acanthii* (Br.-Bl. 1952) Ubaldi 2008 *nom. inval.* (art. 5)]
 Thermophilous vegetation dominated by perennial and biennial Eurosiberian and sub-Mediterranean thorny species of *Asteraceae*.
- 34.5.1 All.: *Onopordion acanthii* Br.-Bl. in Br.-Bl., Gajewski, Wraber & Walas 1936
 [*Onopordion* Br.-Bl. 1926 (art. 8), *Bromo tectorum-Onopordion acanthii* Ubaldi 2008 *nom. inval.* (art. 5)]
 Anthropogenic communities of large biennial thistles that grow in the subcontinental to sub-Mediterranean Temperate macrobioclimate.
- 34.5.2 All.: *Dauco carotae-Melilotion albi* Görs 1966
 [*Dauco-Melilotion* Görs ex Oberdorfer, Görs, Korneck, Lohmeyer, Müller, Philippi & Seibert 1967 (art. 8)]
 Communities of biennial and perennial species often forming the initial stage of succession on anthropogenic substrates; they grow on dry and nutrient-poor soils that contain large amounts of gravel or debris.
- 34.5.3 All.: *Erysimo wittmannii-Hackelion deflexae* Bernátová 1986
 [*Asperugienion procumbentis* Knapp 1971 *nom. inval.* (art. 8)]
 Nitrophilous communities of rock shelters frequented by ungulates that grow in mesotemperate to cryorotemperate thermotypes.
- 34.6 Ord.: *CARTHAMETALIA LANATI* Brullo in Brullo & Marcenò 1985
 [*Onopordetalia acantho-nervosi* Rivas-Martínez 1975 (art. 25)]
 Nitrophilous vegetation dominated by thorny species of *Asteraceae*, with a late spring-summer life cycle favored by extreme grazing, that grows in the Mediterranean macrobioclimate.

- 34.6.1 All.: *Silybo mariani-Urticion piluliferae* Sissingh ex Br.-Bl. & O. Bolòs 1958
[*Silybo-Urticion* Sissingh 1950 *nom. inval.* (art. 2d, 3b), *Sylibion mariani* Rivas-Martínez in Rivas-Martínez, Costa & Loidi 1992 (syntax. syn.), *Propos.: Urtico piluliferae-Sylibion mariani* Sissingh ex Br.-Bl. & O. Bolòs 1958 *nom. inv. propos.* Rivas-Martínez, T.E. Díaz, Fernández-González, Izco, Loidi, Lousã & Penas 2002]
Highly nitrophilous communities of deep, cool to humid soils.
- 34.6.2 All.: *Onopordion illyrici* Oberdorfer 1954
[*Brachypodium phoenicoidis* Br.-Bl. 1931 *p.p.*, *Scolymo-Carathamion lanati* Rivas Goday in Rivas Goday & Borja 1961, *Scolymo-Kentrophyllenion* Rivas Goday 1964]
Nitrophilous communities of thorny, large thermo-xerophilous hemicryptophytes, that grow in thermo- and meso-Mediterranean thermotypes, with extensions into the supra-Mediterranean thermotype and into the sub-Mediterranean variant of the Temperate macrobioclimate.
- 34.7 Ord.: *PODOSPERMO LACINIATI-ELYTRIGETALIA ATHERICAE* Biondi, Allegrezza & Pesaresi in Biondi, Allegrezza, Casavecchia, Galdenzi, Gasparri, Pesaresi, Vagge & Blasi 2014
Pioneer, paucispecific, hemicryptophytic and chamaephytic, halophilous to halotolerant communities of badlands; they grow in the Temperate macrobioclimate, particularly in its sub-Mediterranean variant, in the lower supratemperate to lower mesotemperate thermotypes and in the upper meso-Mediterranean thermotype of the Mediterranean macrobioclimate.
- 34.7.1 All.: *Podospermo laciniati-Elytrigion athericae* Pirone 1995
[*Podospermo laciniati-Elytrigenion athericae* (Pirone 1995) Biondi & Pesaresi 2004 (syntax. syn.)]
- 35 Cl.: EPILOBIETEA ANGUSTIFOLII Tüxen & Preising ex Von Rochow 1951**
[*Epilobietea angustifolii* Tüxen & Preising in Tüxen 1950 *nom. nud.* (art. 2b, 8), *Galeopsio speciosae-Senecionetea sylvatici* Passarge 1981 (art. 3b)]
Pioneer perennial herbaceous vegetation consisting of large macrophytes that grow on deep damp forest soils that are rich in organic matter; it is found in forest clearings or on the edges of forests in the Temperate macrobioclimate.
- 35.1 Ord.: *ATROPETALIA BELLADONNAE* Vlieger 1937
[*Epilobietalia angustifolii* (Vlieger 1937) Tüxen 1949 *nom. nud.* (art. 2b, 8, 29), *Circaeo-Stachyetalia sylvaticae* Passarge 1967 (syntax. syn.)]
Tall-herb vegetation of clearings of deciduous woodlands.
- 35.1.1 All.: *Atropion belladonnae* Br.-Bl. ex Aichinger 1933
[*Atropion* Br.-Bl. 1930 *nom. nud.* (art. 2b, 8), *Fragarion vescae* Tüxen 1949 *nom. inval.* (art. 2b, 8, 29), *Mycelido-Stachyon sylvaticae* Passarge (1967) 1978 (art. 29)]
Communities of mesophilous megaforbs that grow in clearings of deciduous forests on calcareous or neutrophilous deep and eutrophic soils.
- 35.1.2 All.: *Epilobion angustifolii* Tüxen ex Eggler 1952
[*Carici piluliferae-Epilobion angustifolii* Tüxen 1950 *nom. nud.* (art. 2b, 8) ('(*Carici piluliferae*)-...' art. 41c), *Epilobion angustifolii* Rübel 1933 *nom. nud.* (art. 2b, 8), *Epilobion angustifolii* Soó 1933 *nom. nud.* (art. 2b, 8)]
Communities of megaforbs on acidic well-nitrified soils that grow on the edges or in clearings of deciduous or coniferous forests.
- 36 Cl.: ORYZETEA SATIVAE Miyawaki 1960**
Weed vegetation of rice fields comprising vascular phanerogams and cryptogams, particularly algae.
- 36.1 Ord.: *CYPERO DIFFORMIS-ECHINOCHLOETALIA ORYZOIDIS* O. Bolòs & Masclans 1955
- 36.1.1 All.: *Oryzo sativae-Echinochloion oryzoidis* O. Bolòs & Masclans 1955
[*Oryzion sativae* Koch 1954 *nom. inval.* (art. 2d, 3b)]
Communities of European rice fields.
- 37 Cl.: PEGANO HARMALAE-SALSOLETEA VERMICULATAE Br.-Bl. & O. Bolòs 1958**
[Incl. *Ruderali-Mamihotetea utilissimae* Leonard in Taton 1949 *corr.* O. Bolòs 1988]
Vegetation of halo-nitrophilous, heliophilous chamaephytes and nanophanerophytes dominated by succulent *Chenopodiaceae* and entomophilous *Asteraceae*.
- 37.1 Ord.: *SALSOLO VERMICULATAE-PEGANETALIA HARMALAE* Br.-Bl. & O. Bolòs 1958

[*Onopordo-Salsoletalia vermiculatae* Rivas Goday & Rivas- Martínez 1963, Incl.: *Atriplicetalia glaucae* Rivas Goday & Rivas- Martínez 1963, Incl.: *Ipomoeetalia purpureae* Oberdorfer ex O. Bolòs 1988]
Nitrophilous arborescent vegetation of clayey and silty salty soils.

- 37.1.1 All.: *Artemision arborescentis* Géhu & Biondi (1986) 1994
Halo-tolerant communities that develop on littoral cliffs along the Mediterranean coasts characterized by a Mediterranean macroclimate, with thermo- to meso-Mediterranean thermotypes and dry to subhumid ombrotypes. They grow on cliffs and in inland areas, on substrates rich in organic matter.
- 37.1.2 All.: *Salsolo oppositifoliae-Suaedion mollis* Rigual 1972
[*Salsolo-Suaedion* Rigual 1972 (nom correct), *Suaedion fruticoso-verae* Peinado, Martínez Parrasa & Bartolomé 1986 (syntax. syn.)]
Nitrophilous communities on clayey hydromorphic soils that tolerate a certain degree of temporary salinity and grow in infra- and thermo-Mediterranean arid-semi-arid bioclimates.
- 37.2 Ord.: *NICOTIANO GLAUCAE-RICINETALIA COMMUNIS* Rivas-Martínez, Fernández-González & Loidi 1999
Shrubby vegetation of tropical invasive species that grows on arid habitats in the Mediterranean macroclimate, with an infra- to thermo-Mediterranean thermotype on nitrified and wet soils.
- 37.2.1 All.: *Nicotiano glaucae-Ricinion communis* Rivas-Martínez, Fernández-González & Loidi 1999
Tall scrub rich in tropical neophytes of the thermomediterranean zone.

38 Cl.: POLYGONO ARENASTRI-POETEA ANNUAE Rivas-Martínez 1975 corr. Rivas-Martínez, Báscones, T.E. Díaz, Fernández-González & Loidi 1991

[*Polygono-Poetea annuae* Rivas-Martínez in Géhu 1973 *nom. inval.* (art. 2d, 3b), *Polygono avicularis-Poetea annuae* Rivas-Martínez 1975 (art. 43), *Polygono-Poetea annuae* Rivas-Martínez 1975 *nom. superfl.* (art. 23), *Coronopodo-Polygonetalia avicularis* Lohmeyer 1970 *nom. inval.* (art. 2b, 2d, 3b, 8) ('*Coronopo-...*' art. 41b), *Plantaginetea majoris* Tüxen & Preising ex Von Rochow 1951 ('... *maioris*' art. 41a) (syntax. syn.) [Plantaginetea majoris Tüxen & Preising in Tüxen 1949 *nom. nud.* (art. 2b, 8) p.p. ('... *maioris*' art. 41a)], *Polygono-Poeneae annuae* (Rivas-Martínez 1975) Theurillat in Theurillat, Aeschmann, Küpfer & Spichiger 1995 (corresp. name)]

Nitrophilous pioneer vegetation of small therophytes and hemicryptophytes that grows on tamped and nitrified soils subjected to trampling: paths, roadsides, crevices of paved roads.

- 38.1 Ord.: *POLYGONO ARENASTRI-POETALIA ANNUAE* Tüxen in Géhu, Richard & Tüxen 1972 *corr.* Rivas-Martínez, Báscones, T.E. Díaz, Fernández-González & Loidi 1991
[*Polygono avicularis-Poetalia annuae* Tüxen in Géhu, Richard & Tüxen 1972 (art. 43), *Coronopodo-Polygonetalia* Lohmeyer 1970 *nom. inval.* (art. 2b, 2d, 3b, 8) ('*Coronopo-...*' art. 41b), *Potentillo-Polygonetalia avicularis* Tüxen 1947 p.p. (syntax. syn.) [Plantaginetalia majoris Tüxen & Preising in Tüxen 1949 *nom. illeg.* (art. 29) p.p. ('... *maioris*' art. 41a)]
Eurosiberian and Mediterranean vegetation.
- 38.1.1 All.: *Saginion procumbentis* Tüxen & Ohba in Géhu, Richard & Tüxen 1972
Pioneer perennial, bryophyte-rich communities with a creeping habitus related to trampling on wet and shady soils, in thermo- and meso-Mediterranean thermotypes.
- 38.1.2 All.: *Sclerochloo durae-Coronopodion squamati* Rivas-Martínez 1975
Trampled communities on clayey soils rich in organic matter, in areas with a Temperate and Mediterranean macrobioclimate.
- 38.1.3 All.: *Polygono arenastri-Coronopodion squamati* Br.-Bl. ex Sissingh 1969
[*Polygonion avicularis* Br.-Bl. 1931 *nom. nud.* (art. 2b, 8), *Polygono-Coronopodion* Br.-Bl. ex Sissingh 1969 ('...-*Coronopion*' art. 41b), *Matricario-Polygonion avicularis* Rivas-Martínez 1975 *nom. illeg.* (art. 24, 29, 43), *Matricario matricarioidis-Polygonion arenastri* Rivas-Martínez 1975 *corr.* Rivas-Martínez, Báscones, T.E. Díaz, Fernández-González & Loidi 1991 *nom. illeg.* (art. 29), *Polygonion avicularis* Br.-Bl. ex Tüxen 1949 *nom. illeg.* (art. 31) p.p. (syntax. syn.), *Polygonion avicularis* auct. non Aichinger 1933 p.p. (pseud.), Non: *Polygonion avicularis* Aichinger 1933]
Nitrophilous trampled communities on clayey substrates found in Eurosiberian regions.
- 38.2 Ord.: *SAGINO APETALAE-POLYCARPETALIA TETRAPHYLLI* de Foucault 2010
Thermophilous vegetation whose *optimum* is in Mediterranean regions, as far as western Turkey.
- 38.2.1 All.: *Polycarpion tetraphylli* Rivas-Martínez 1975
Communities mainly dominated by small, thermo-xerophilous, subnitrophilous, therophytic species, on trampled soils, in thermo- and meso-Mediterranean thermotypes.

39 Cl.: STELLARIETEA MEDIAE Tüxen, Lohmeyer & Preising ex Von Rochow 1951

[*Ruderali-Secalieta* Br.-Bl. in Br.-Bl., Gajewski, Wraber & Walas 1936 *nom. inval.* (art. 2d, 3f) p. p. (*'Rudereto-Secalinetales'* art. 41b), *Secalieta* Br.-Bl. in Br.-Bl., Roussine & Nègre 1952 *nom. inval.* (art. 2d, 3f) (*'Secalineta'* art. 41b), *Stellarietea mediae* Tüxen, Lohmeyer & Preising in Tüxen 1950 *nom. nud.* (art. 2b, 8), *Chenopodieta* Br.-Bl. in Br.-Bl., Roussine & Nègre 1952 p.p. (syntax. syn.), *Stellarieneae mediae* Hüppe & Hofmeister in Theurillat, Aeschmann, Küpfer & Spichiger 1995 [*Violeneae arvensis* Hüppe & Hofmeister 1990 *nom. inval.* (art. 2d, 3o, 5) (corresp. name), *Secalieneae cerealis* Rivas-Martínez, Bascónes, T.E. Díaz, Fernández-González & Loidi 1991 *nom. inval.* (art. 2d, 3o, 5)], *Secalino-Stellarieneae* Rivas Goday 1964, *Sisymbrietea officinalis* Gutte & Hilbig 1975 (syntax. syn.)]

Annual, ephemeral, weed ruderal nitrophilous and sub-nitrophilous vegetation found throughout the world with the exception of warm tropical regions.

39a Subcl.: STELLARIENEAE MEDIAE

[*Secalino-Stellarieneae* Rivas Goday 1964 (syntax. syn.), *Violeneae arvensis* Hüppe & Hofmeister 1990 (art. 5), *Secalieneae cerealis* Rivas-Martínez, Bascónes, T.E. Díaz, Fernández-González & Loidi 1991 (art. 8), *Stellarieneae mediae* Hüppe & Hofmeister ex Theurillat, Aeschmann, Küpfer & Spichiger 1995 (art. 28)]
Weed communities of arable crops.

39a.1 Ord.: CENTAUREETALIA CYANI Tüxen, Lohmeyer & Preising in Tüxen ex Von Rochow 1951

[*Secalietalia* Br.-Bl. 1931 *nom. nud.* (art. 2b, 8) p.p. (*'Secalinetalia'* art. 41b), *Secalietalia* Br.-Bl. in Br.-Bl., Gajewski, Wraber & Walas 1936 *nom. inval.* (art. 2d, 3f) (*'Secalinetalia'* art. 41b), *Secali-Violetalia arvensis* Br.-Bl. & Tüxen 1943 *nom. nud.* (art. 2b, 8) p.p. (*'Secalino-Violetalia arvensis'* art. 41b), *Secali-Violetalia arvensis* Br.-Bl. & Tüxen ex Sissingh in Westhoff, Dijk, Passchier & Sissingh 1946 *nom. inval.* (art. 2d, 3f) p. p. (*'Secalino-Violetalia arvensis'* art. 41b), *Centaureetalia cyani* Tüxen, Lohmeyer & Preising in Tüxen 1950 *nom. nud.* (art. 2b, 8), *Papaveretalia rhoeadis* Hüppe & Hofmeister in Theurillat, Aeschmann, Küpfer & Spichiger 1995 p.p. (syntax. syn.) [*Papaveretalia rhoeadis* Hüppe & Hofmeister 1990 *nom. inval.* (art. 2d, 3o, 5, 29)]

Weed vegetation of cereal crops (wheat, barley, oat, rye), on neutro-alkaline-rich or -poor soils.

39a.1.1 All.: *Caucalidion platycarpi* Tüxen ex Von Rochow 1950 *nom. mut.* Rivas-Martínez, T.E. Díaz, Fernández-González, Izco, Loidi, Lousã & Penas 2002

[*Caucalidion lappulae* Tüxen ex Von Rochow 1950 (art. 45), *Secalium medioeuropaeum* Tüxen 1937 *nom. inval.* (art. 2d, 3f) p.p. (*'Secalinion ...'* art. 41b)]

Temperate and supra-Mediterranean communities on silty and clayey soils.

39a.1.2 All.: *Roemerion hybridae* Br.-Bl. ex Rivas-Martínez, Loidi, Costa, T.E. Díaz & Penas 1999

[*Secalium* Br.-Bl. 1931 *nom. nud.* (art. 2b, 8) (*'Secalinion'* art. 41b), *Secalium cerealis* Br.-Bl. in Br.-Bl., Gajewski, Wraber & Walas 1936 *nom. nud.* (art. 2b, 3f) (*'Secalinion'* art. 41b), *Secalium mediterraneum* Tüxen 1937 *nom. nud.* (art. 2b, 8) p.p. (*'Secalinion ...'* art. 41b)]

Spring weed communities of cereal crops that grow on alkaline soils of calcareous, sometimes of clayey or basaltic nature, in meso-Mediterranean or lower supra-Mediterranean, semiarid dry or subhumid bioclimates.

39a.1.3 All.: *Ridolfion segeti* Nègre ex Rivas-Martínez, Fernández-González & Loidi 1999

[*Ridolfion segetum* Nègre ex El Antri 1983 (art. 5)]

Spring segetal communities that grow on clayey or clay-rich soils in thermo- or lower meso-Mediterranean, dry or subhumid bioclimates.

39a.2 Ord.: APERETALIA SPICAE-VENTI J. Tüxen & Tüxen in Malato-Beliz, J. Tüxen & Tüxen 1960

[*Spergularietalia arvensis* Hüppe & Hofmeister 1990 *nom. nud.* (art. 2d, 5)]

Cereal crop weed vegetation that grows on poor, sandy and sandy-loamy soils whose acidity varies.

39a.2.1 All.: *Scleranthion annui* (Kruseman & Vlieger 1939) Sissingh in Westhoff, Dijk, Passchier & Sissingh 1946

[*Aperion spicae-venti* Tüxen in Oberdorfer 1949 (syntax. syn.), *Agrostion spicae-venti* Tüxen ex Von Rochow 1951 (*'Agrostidion spicae-venti'* art. 41a, 41b) (syntax. syn.) [*Agrostion spicae-venti* (Kruseman & Vlieger 1939) Tüxen 1950 *nom. inval.* (art. 2b, 8) (*'Agrostidion spicae -venti'* art. 41a, 41b)], *Aphanion arvensis* J. Tüxen & Tüxen in Malato-Beliz, J. Tüxen & Tüxen 1960, *Arnosseridion minimae* Malato-Beliz, J. Tüxen & Tüxen 1960 (*'Arnosserion minimae'* art. 41b), *Scleranthion annui* Kruseman & Vlieger 1939 (*'Scleranthion annuae'* pro suball. art. 41b) (corresp. name), *Agrostienion spicae-venti* Oberdorfer 1948 *nom. inval.* (art. 2b, 8) (*'Agrostidion spica venti'* pro suball. art. 41a, 41b)]

Weed communities of crops that grow in humid ombrotype on acidic soils that may be poor in nutrients.

- 39a.3 Ord.:** *SOLANO NIGRI-POLYGONETALIA CONVOLVULI* (Sissingh in Westhoff, Dijk, Passchier & Sissingh 1946) O. Bolòs 1962
 [*Chenopodietalia albi* Tüxen & Lohmeyer ex Von Rochow 1951, *Chenopodietalia medioeuropaea* Tüxen 1937 *nom. illeg.* (art. 34), *Chenopodietalia albi* Tüxen & Lohmeyer in Tüxen 1950 *nom. nud.* (art. 2b, 8), *Polygono-Chenopodietalia* J. Tüxen in Lohmeyer, A. Matuszkiewicz, W. Matuszkiewicz, Merker, Moore, Müller, Oberdorfer, Poli, Seibert, Sukopp, Trautmann, J. Tüxen, Tüxen & Westhoff 1962 *nom. nud.* (art. 2b, 8), *Solano-Polygonetalia* (Sissingh in Westhoff, Dijk, Passchier & Sissingh 1946) O. Bolòs 1962 (syntax. syn.), *Eragrostietalia* J. Tüxen ex Poli 1966 ('*Eragrostidetalia*' art. 41b) (syntax. syn.), *Papaveretalia rhoeadis* Hüppe & Hofmeister ex Theurillat, Aeschimann, Küpfer & Spichiger 1995 *p.p.*, *Solano-Polygonetalia* Sissingh in Westhoff, Dijk, Passchier & Sissingh 1946 ('*Solano-Polygonetalia*' pro subord. art. 41b) (corresp. name)]
 Weed vegetation found mainly in summer root crops on eutrophic soils.
- 39a.3.1 All.:** *Digitario ischaemi-Setarion viridis* Sissingh in Westhoff, Dijk, Passchier & Sissingh 1946
 [*Eu-Polygono-Chenopodion polyspermi* (Koch 1926) Sissingh in Westhoff, Dijk, Passchier & Sissingh 1946 *nom. illeg.* (art. 34) *p.p.*, Pseud.: *Polygono-Chenopodion polyspermi* auct., non Koch 1926 *nom. amb.* (art. 36), *Panico-Setarion* Sissingh in Westhoff, Dijk, Passchier & Sissingh 1946 (corresp. name)]
 Weed communities of irrigated crops on silty-sandy soils.
- 39a.3.2 All.:** *Veronico agrestis-Euphorbion peplus* Sissingh ex Passarge 1964
 [*Veronico-Euphorbion* Sissingh 1942 *nom. ined.* (art. 1), *Veronico-Euphorbion* Knapp 1971 (art. 8, 29), *Fumario-Euphorbion* Müller in Görs 1966 (syntax. syn.)]
 Weed therophytic communities that grow on very fertile soils that are rich in organic matter, generally in horticultural crops.
- 39a.3.3 All.:** *Diploxia erucoidis* Br.-Bl. in Br.-Bl., Gajewski, Wraber & Walas 1936 *em.* Brullo & Marcenò 1980
 Weed therophytic communities of root and fertilized crops that are not irrigated in summer: olive groves, vineyards and orchards, on calcareous and marly soils, in thermo- and meso-Mediterranean thermotypes.
- 39a.3.4 All.:** *Chenopodion botryos* Brullo & Marcenò 1980
 Weed therophytic communities, related to root and fertilized crops that are not irrigated in summer, on siliceous soils, in thermo- and meso-Mediterranean thermotypes.
- 39a.3.5 All.:** *Fumarion wirtgenii-agrariae* Brullo in Brullo & Marcenò 1985
 [*Diploxia erucoidis-Urticion urentis* Carretero & Aguilera 1995 (syntax. syn.)]
 Weed therophytic communities of root and fertilized crops, in the thermo-Mediterranean thermotype, sometimes extending into the meso-Mediterranean thermotype.
- 39b Subcl.:** *CHENOPODIO-STELLARIENEA* Rivas Goday 1956
 [*Chenopodienea muralis* Rivas-Martínez, Bascónes, T.E. Díaz, Fernández-González & Loidi 1991 (art. 8, 17), *Sisymbrienea* Pott 1995 (art. 5), *Chenopodienea muralis* Rivas-Martínez, Bascónes, T.E. Díaz, Fernández-González & Loidi ex Theurillat, Aeschimann, Küpfer & Spichiger 1995 (syntax. syn.)]
 Synanthropic vegetation dominated by annual and biennial nitrophilous and seminitrophilous species that grows in ruderal and disturbed sites.
- 39b.1 Ord.:** *CHENOPODIETALIA MURALIS* Br.-Bl. in Br.-Bl., Gajewski, Wraber & Walas 1936
 [*Chenopodietalia* Br.-Bl. 1931 (art. 2c, 8), *Chenopodietalia* Br.-Bl. in Br.-Bl., Gajewski, Wraber & Walas 1936 *em.* Rivas-Martínez 1977 (art. 47) *p.p.*]
 Highly nitrophilous pioneer ruderal vegetation that grows in urban, suburban or ruderal habitats that are well exposed and sunny and is found in Mediterranean regions.
- 39b.1.1 All.:** *Chenopodion muralis* Br.-Bl. in Br.-Bl., Gajewski, Wraber & Walas 1936
 [*Chenopodion muralis* Br.-Bl. 1931 (art. 2c, 8), *Rudereto-Chenopodion* Rothmaler 1943 (art. 3a)]
 Nitrophilous thermo-continental communities of urban and rural habitats with a summer-autumn life cycle that are well suited to marked summer aridity.
- 39b.1.2 All.:** *Malvion parviflorae* (Rivas-Martínez 1978) Brullo in Brullo & Marcenò 1985
 [*Malvenion parviflorae* Rivas-Martínez 1978 (corresp. name)]
 Mediterranean nitrophilous communities, mainly with a spring life cycle that grow in habitats characterized by soils of varying depth that are rich in organic matter.
- 39b.1.3 All.:** *Mesembryanthenion crystallini* Rivas-Martínez, Wildpret, Del Arco, Rodríguez, Pérez de Paz, García-Gallo, Acebes, T.E. Díaz & Fernández-González 1993
 Nitrophilous communities of succulent prostrate plants, with a summer-autumn life cycle, that grow on arid, calcareous or silty soils, in littoral Mediterranean sectors in arid to dry ombrotypes.
- 39b.2 Ord.:** *THERO-BROMETALIA* (Rivas Goday & Rivas-Martínez ex Esteve 1973) O. Bolòs 1975

[*Thero-Brometalia annua* Rivas Goday & Rivas-Martínez 1963 (art. 3b, 34), *Thero-Brometalia annua* Rivas Goday & Rivas-Martínez ex Esteve 1973 (art. 34), *Brometalia rubenti-tectorum* Rivas-Martínez & Izco 1977 (syntax. syn.)]

Annual, subnitrophilous, thermoxerophilous, herbaceous communities that grow in abandoned and fallow fields, along roadsides and in disturbed areas in the Mediterranean region.

39b.2.1 All.: *Echio plantaginei-Galactition tomentosae* O. Bolòs & Molinier 1969

Annual sub-nitrophilous communities of western Mediterranean (even in the Eurosiberian sectors), related to fallow and abandoned fields in areas with abundant rainfall.

39b.2.2 All.: *Taeniathero-Aegilopion geniculatae* Rivas-Martínez & Izco 1977

[*Aegilopion* Rivas Goday & Rivas-Martínez 1963 (art. 3b)]

Annual nitrophilous and subnitrophilous communities that grow, regardless of the chemical nature of the substratum, in abandoned fields and along path edges.

39b.2.3 All.: *Fedio graciliflorae-Convulvulion cupaniani* Brullo & Spampinato 1986

Therophytic, thermoxerophilous and subnitrophilous communities that grow in cultivated and fallow areas on clayey and silty, neutral to alkaline soils, in the thermo- and meso-Mediterranean thermotypes.

39b.3 Ord.: *SISYMBRIETALIA OFFICINALIS* J. Tüxen ex W. Matuszkiewicz 1962

Ruderal annual vegetation that grows on soils that are rich in nutrients and nitrates, near or on the edge of human settlements and in rural areas.

39b.3.1 All.: *Sisymbrium officinalis* Tüxen, Lohmeyer & Preising ex Von Rochow 1951

[*Sisymbrium officinalis* Tüxen, Lohmeyer & Preising in Tüxen 1950 *nom. nud.* (art. 2b, 8)]

Eurosiberian and sub-Mediterranean ruderal and nitrophilous, mostly therophytic, communities with a spring life cycle.

39b.3.2 All.: *Hordeion leporini* Br.-Bl. in Br.-Bl., Gajewski, Wraber & Walas 1936 *corr.* O. Bolòs 1962

[*Hordeion murini* Br.-Bl. 1931 (art. 2c, 8), *Hordeion murini* Br.-Bl. in Br.-Bl., Gajewski, Wraber & Walas 1936 (art. 43, 45), *Rudereto-Hordeion* Rothmaler 1943 *pro syn.* (art. 3a)]

Therophytic communities that are mainly Mediterranean, nitrophilous and anthropogenic.

39b.3.3 All.: *Malvion neglectae* (Gutte 1966) Heijný 1978

[*Malvenion* Gutte 1966 (corresp. name)]

Eurosiberian sub-continental communities dominated by *Malva neglecta* and other nitrophilous and ruderal species that are prevalently annual and biennial and bloom in spring.

39b.4 Ord.: *URTICO-SCROPHULARIETALIA PEREGRINAE* Brullo ex Biondi, Blasi, Casavecchia & Gasparri in Biondi, Allegrezza, Casavecchia, Galdenzi, Gasparri, Pesaresi, Vagge & Blasi 2014

[*Urtico-Scrophularietalia peregrinae* Brullo in Brullo & Marcenò 1985 *nom. inval.* (art. 17)]

Ephemeral nitrophilous vegetation of tall therophytes and geophytes that grows on humid and deep soils in shady habitats, in the thermo-Mediterranean and meso-Mediterranean thermotypes.

39b.4.1 All.: *Veronico-Urticion urentis* Brullo in Brullo & Marcenò 1985

Weed communities of citrus groves, with a winter-spring life cycle, in shady habitats on deep, well-nitrified soils in the thermo-Mediterranean thermotype.

40 Cl.: *GALIO APARINES-URTICETEA DIOICAE* Passarge ex Kopecký 1969

[*Galio-Urticetea* Passarge 1967 (art. 3b), *Filipendulo ulmariae-Calystegieta sepium* Géhu & Géhu-Franck 1987 (syntax. syn.), *Lythro salicariae-Calystegieta sepium* Klauck 1993 (syntax. syn.), *Circaeo-Stachyetea* Ubaldi 2008 *nom. inval.* (art. 5)]

Nitrophilous, mainly perennial or therophytic vegetation that is either anthropogenic or natural, and grows in mesophilous to hygrophilous habitats, depending on the degree of edaphic humidity and/or shade.

40.1 Ord.: *GALIO APARINES-ALLIARIETALIA PETIOLATAE* Oberdorfer ex Görs & Müller 1969

[*Galio-Convulvuletalia sepium* Oberdorfer in Oberdorfer, Görs, Korneck, Lohmeyer, Müller, Philippi & Seibert 1967 *nom. inval.* (art. 2b, 8), *Galio-Alliarietalia* Oberdorfer ex Görs & Müller 1969 *nom. illeg.* (art. 29), *Glechometalia hederaceae* Tüxen & Brun-Hool 1975 (syntax. syn.), *Propos.:* *Lamio albi-Chenopodietalia boni-henrici* Kopecký 1969 *nom. amb. propos.* (art. 36)]

Mesophilous to meso-hygrophilous anthropogenic vegetation of sciaphilous and nitrophilous, perennial or annual tall-herbs that grows on cool, deep, nutrient-rich soils, from the plains to mountainous areas, in the supra-Mediterranean or supratemperate humid bioclimates.

- 40.1.1 All.: *Petasition officinalis* Sill. 1933 em. Kopecký 1969
[*Aegopodion podagrariae* Tüxen 1967 nom. illeg. (art. 29) p.p.]
Mesophilous or meso-hygrophilous forest edge communities dominated by perennial species, in the Temperate subhumid and humid macrobioclimate as well as in the Mediterranean macrobioclimate.
- 40.1.2 All.: *Geo-Alliarion* Lohmeyer & Oberdorfer ex Görs & Müller 1969
[*Alliarion* Oberdorfer 1962 (art. 2b), *Alliarion petiolatae* Oberdorfer in Hejný in Holub, Moravec & Neuhäusl 1967 (art. 25), *Galio-Alliarion petiolatae* Oberdorfer & Lohmeyer in Oberdorfer, Görs, Korneck, Lohmeyer, Müller, Philippi & Seibert 1967 (2b, nomen nudum), *Sambucion ebuli* Eliás 1986 (syntax. syn.)]
Thermophilous therophytic communities of mesophilous forest edges related to the Temperate and Mediterranean subhumid and humid bioclimates.
- 40.1.3 All.: *Balloto-Conion maculati* Brullo in Brullo & Marcenò 1985
[*Conio maculati-Sambucion ebuli* O. Bolòs & Vigo ex Rivas-Martínez, Bascónes, T.E. Díaz, Fernández-González & Loidi 1991, *Sambucion ebuli* (O. Bolòs & Vigo ex Rivas-Martínez, Bascónes, T.E. Díaz, Fernández-González & Loidi 1991) Rivas-Martínez & Costa 1998 (art. 2b), non *Sambucion ebuli* Eliás 1986, *Sambucion ebuli* Folch 1981 (art. 2b, 8), *Sambucion ebuli* O. Bolòs & Vigo 1984 (art. 8), *Sambucion ebuli* Rivas-Martínez ex Alcaraz 1984 (art. 5), *Sambucion ebuli* O. Bolòs & Vigo ex Rivas-Martínez, Bascónes, T. E. Díaz, Fernández-González & Loidi 1991 (art. 27a, 46H) (nomencl. syn.), *Sambucion ebuli* O. Bolòs & Vigo ex Alcaraz, P. Sánchez, De la Torre, Ríos & J. Alvarez 1991 (art. 31)]
Thermophilous communities, found on humid soils rich in nitrates, that grow along streams and canals with eu-hypertrophic waters.
- 40.1.4 All.: *Anthriscion nemorosae* Brullo in Brullo & Marcenò 1985
Sciaphilous and nitrophilous megaforb communities that grow in the Temperate macrobioclimate, sometimes extending into the Mediterranean macrobioclimate, in the supra-Mediterranean thermotype, and are found in the central-southern Apennines and Sicily.
- 40.1.5 All.: *Allion triquetri* O. Bolòs 1967
Communities of tall therophytes and hemicryptophytes with a winter-spring life cycle that grow on humid and deep soils, in ruderal shadowy areas, in thermo- and meso-Mediterranean thermotypes.
- 40.1.6 All.: *Parietario judaicae-Arion ivalici* Biondi, Casavecchia & Gasparri in Biondi, Allegrezza, Casavecchia, Galdenzi, Gasparri, Pesaresi, Vagge & Blasi 2014
Perennial herbaceous edge communities dominated by mesophilous and sciaphilous geophytes and hemicryptophytes; they grow on deep and humid soils that are rich in organic matter, often of anthropogenic origin, in the Mediterranean macrobioclimate, in the thermo- to meso-Mediterranean thermotypes and in the Temperate macrobioclimate with their optimum in the sub-Mediterranean variant of the mesotemperate thermotype.
- 40.2 Ord.: *IMPATIENTI NOLI-TANGERE-STACHYETALIA SYLVATICAE* Boulet, Géhu & Rameau in Bardat, Bioret, Botineau, Boulet, Delpéch, Géhu, Haury, Lacoste, Rameau, Royer, Roux & Touffet 2004
Forest edge and clearing communities found in the Eurosiberian region that grow on eutrophic and humid soils.
- 40.2.1 All.: *Impatienti noli-tangere-Stachyion sylvaticae* Görs ex Mucina in Mucina, Grabherr & Ellmauer 1993
[*Impatienti noli-tangere-Stachyion sylvaticae* Görs 1974 nom. inval. (art. 2d, 3b), Non: *Ranunculo-impatiention* Passarge 1967, *Stachyo-impatiention* Tüxen & Brun-Hool 1975 ('*Impatiention* ...' art. 41b) (corresp. name), *Stachyo-impatiention* Tüxen & Brun-Hool 1975]
Forest edge communities that grow on continually humid mature and humified soils.
- 41 Cl.: **FILIPENDULO ULMARIAE-CONVOLVULETEA SEPIUM** Géhu & Géhu-Franck 1987
[*Lythro salicariae-Calystegietea sepium* Klauk 1993 nom. illeg. (art. 22), Incl.: *Lathyro pratensis-Vicietea cracca* Passarge 1975]
Vegetation of primary or secondary perennial megaforbs, found in highly humid to periodically inundated habitats, on mineral eutrophic to mesotrophic soils, from lowland to mountainous areas, in both the Mediterranean and Temperate macrobioclimates.
- 41.1 Ord.: *CALYSTEGIETALIA SEPIUM* Tüxen ex Mucina 1993 nom. mut. propos. Rivas-Martínez, T.E. Díaz, Fernández-González, Izco, Loidi, Lousã & Penas 2002
[*Convolvuletalia sepium* Tüxen 1950 (art. 2b, 8), *Convolvuletalia sepium* Tüxen ex Mucina 1993 (art. 45)]
Vegetation of perennial nitrophilous hygrophilous megaforbs, often rich in neophytes, that develops on alluvium, periodically inundated soils (streambank margins, ditches and marshes).
- 41.1.1 All.: *Calystegion sepium* Tüxen ex Oberdorfer 1957 nom. mut. propos. Rivas-Martínez, T.E. Díaz, Fernández-González, Izco, Loidi, Lousã & Penas 2002

[*Convolvulion sepium* Tüxen 1947 (art. 8), *Senecionion fluviatilis* Tüxen 1950 (art. 8), *Senecionion fluviatilis* Tüxen ex Oberdorfer 1957 pro syn., *Cynancho-Convolvulion sepium* Rivas Goday & Rivas-Martínez 1963 (art. 3b), *Calystegion sepium* Tüxen ex Oberdorfer 1957 *nom. mut. propos.* (art. 45) (addenda)]

Nitrophilous tall-herb communities that develop in humid, periodically inundated, habitats that are subjected to long periods of drainage and occasionally have a moderate saline content.

41.1.2 All.: *Bromo ramosi-Eupatorion cannabini* O. Bolòs & Masalles in O. Bolòs 1983

[*Bromo ramosi-Eupatorienion cannabini* (O. Bolòs & Masalles in O. Bolòs 1983) I. Soriano 2001 (corresp. name)]

Communities of hygro-nitrophilous megaforbs dominated by *Eupatorium cannabinum*; in the Mediterranean macrobioclimate they grow above all along riverbanks, whereas in the Temperate macrobioclimate they grow mainly in ruderal and synanthropic areas.

41.1.3 All.: *Dorycnion recti-Rumicion conglomerati* Gradstein & Smittenberg 1977

[*Dorycnion recti* Géhu & Biondi 1988]

Communities of hygro-nitrophilous megaforbs that grow in the Mediterranean macrobioclimate, from the upper thermo-Mediterranean to meso-Mediterranean thermotypes.

41.2 Ord.: *LOTO PEDUNCULATI-FILIPENDULETALIA ULMARIAE* Passarge (1975) 1978

[*Filipenduletalia* De Foucault & Géhu 1980 *nom. inval.* (art. 2b, 2d, 3b, 8), *Filipenduletalia ulmariae* De Foucault & Géhu ex De Foucault 1984 *nom. inval.* (art. 2d, 5)]

Natural or semi-natural vegetation of hygrophilous mesotrophic megaforbs that grow in humid depressions, on soils often rich in undecomposed organic matter and subjected to flooding.

41.2.1 All.: *Thalictro flavi-Filipendulion ulmariae* De Foucault in Royer, Felzines, Misset & Thévenin 2006

[*Thalictro-Filipendulion ulmariae* De Foucault 1984 *nom. ined.* (art. 1), *Stachyo palustris-Cirsio oleracei* Julve & Gillet 1994 *nom. inval.* (art. 2b, 8), *Cirsio palustris-Filipendulion* Klauck 1993 ['...palustre-...' art. 41b] p.p., *Filipendulo-Cirsion oleracei* Duvigneaud 46 p.p.]

Hilly and lowland communities of megaforbs characterized by the absence of acidophilus species.

41.2.2 All.: *Filipendulo ulmariae-Chaerophyllion hirsuti* De Foucault 2011

[*Filipendulo ulmariae-Petasition* Br.-Bl. 1949 *nom. inval.* (art. 2, 3f), *Filipendulion ulmariae* Lohmeyer in Oberdorfer, Görs, Korneck, Lohmeyer, Müller, Philippi & Seibert 1967 p.p., *Filipendulo-Cirsion rivularis* De Foucault 1984 *nom. ined.* (art. 1), *Filipendulion ulmariae* Segal 1966 (syntax. syn.), *Cirsio palustris-Filipendulion ulmariae* Klauck 1993 p.p.]

Hygrophilous and subnitrophilous megaforb communities that grow in mountainous areas in the Temperate macrobioclimate from the meso- to supratemperate thermotypes.

42 Cl.: **CARDAMINETEA HIRSUTAE** Géhu 1999

[*Geranio purpurei-Cardaminenea hirsutae* Rivas-Martínez, Fernández-González & Loidi 1999 (nomencl. syn.) (art. 10b), *Cardamino hirsutae-Geranietea purpurei* (Rivas-Martínez, Fernández-González & Loidi 1999) Rivas-Martínez, Fernández-González & Loidi in Rivas-Martínez, Díaz, Fernández-González, Izco, Loidi, Lousã & Penas 2002 *nom. illeg.* (art. 22)]

Annual ephemeral vegetation, with a spring and summer life cycle, that develops in nitrified and semi-shaded habitats and that forms internal and external wood and shrub fringe communities.

42.1 Ord.: *GERANIO PURPUREI-CARDAMINETALIA HIRSUTAE* Brullo in Brullo & Marcenó 1985

[*Cardamino hirsutae-Geranietalia purpurei* Brullo in Brullo & Marcenó 1985 (art. 42)]

Ephemeral therophytic sciaphilous nitrophilous small vegetation, with a winter-spring life cycle, found in natural and seminatural habitats, on the edge of woods and shrublands, occasionally also in synanthropic habitats.

42.1.1 All.: *Cardaminion graecae* Biondi, Pinzi & Gubellini ex Biondi, Pinzi & Gubellini in Biondi, Allegrezza, Casavecchia, Galdenzi, Gigante & Pesaresi 2013

[*Cardaminion graecae* Biondi, Pinzi & Gubellini 2004 *nom. inval.* (art. 5, 17)]

Sciaphilous communities distributed above all in the central Apennines.

42.1.2 All.: *Valantio muralis-Galium muralis* Brullo in Brullo & Marcenó 1985

[*Geranio pusilli-Anthriscion caucalidis* Rivas-Martínez 1978 (syntax. syn.), *Erophilenion praecocis* O. Bolòs 1981 (syntax. syn.), *Parietarion lusitanico-mauritanicae* Rivas-Martínez, Fernández González, Lloidi, Lousã & Penas 2001, p.p., *nom. inval.* (art. 8), *Parietarion lusitanico-mauritanicae* Rivas-Martínez & Cantò in Rivas-Martínez, Díaz, Fernández-González, Izco, Loidi, Lousã & Penas 2002, p.p., *nom. illeg.* (art. 22)]

Central-southern Apennine communities of small, ephemeral, sciaphilous, nitrophilous therophytes with a winter-spring life cycle.

43 Cl.: MULGEDIO ALPINI-ACONITETEA VARIEGATI Hadač & Klika in Klika & Hadač 1944

[*Betulo-Adenostyletea* Br.-Bl. 1949 p.p. [*Betulo-Adenostyletea* Br.-Bl. & Tüxen 1943 *nom. nud.* (art. 2b, 8) p. p. (syntax. syn.), *Betulo-Adenostyletea* Br.-Bl. & Tüxen ex Br.-Bl. 1948 *nom. inval.* (art. 2d, 3f) p.p.], *Mulgedio alpini-Aconitetea variegati* Hadač & Klika in Klika & Hadač 1944 *nom. inval.* (art. 2b, 8)]

Perennial vegetation of megaforbs and tall grasses found on deep humid soils that are rich in organic matter, from the supra-Mediterranean to the criorotemperate thermotypes.

43.1 Ord.: ADENOSTYLETALIA ALLIARIAE Br.-Bl. 1931

[*Adenostyletalia* Br.-Bl. 1930 *nom. nud.* (art. 2b, 8)]

Mesohygrophilous vegetation dominated by megaforbs that grows on deep soils.

43.1.1 All.: Adenostylion alliariae Br.-Bl. 1926

[*Adenostylion* Luquet 1926 (art. 33), *Adenostylion alliariae* Pawłowski in Pawłowski, Sokołowski & Wallisch 1928 (art. 31)]

Communities of mesohygrophilous sciaphilous megaforbs that grow in the orotemperate thermotype on deep humid nutrient-rich soils.

43.1.2 All.: Arunco dioici-Petasition albi Br.-Bl. & Sutter 1977

Megaforb communities that develop on scree, along banks of streams, in high-altitude ravines, in the supratemperate thermotype.

43.1a Subord.: ADENOSTYLENALIA ALPINAЕ Biondi & Allegrezza in Biondi, Allegrezza, Casavecchia, Galdenzi, Gasparri, Pesaresi, Vagge & Blasi 2014

Communities of megaforbs of the supratemperate thermotype of the Apennines and part of the Balkan Peninsula; this suborder is the geographic vicariant of the Alpine vegetation dominated by *Adenostyles alliaria*.

43.1a.1 All.: Adenostylion alpinae Castelli et al. ex Castelli, Biondi & Ballelli in Biondi, Allegrezza, Casavecchia, Galdenzi, Gasparri, Pesaresi, Vagge & Blasi 2014

[*Adenostylion glabrae* Castelli, Biondi & Ballelli 2001 *nom. inval.* (art. 2b, 8)]

Communities of megaforbs that grow in the supratemperate thermotype of the Apennines on constantly humid, rocky-earthly, north-facing, mountainsides.

43.1a.2 All.: Aconition neapolitani Biondi & Allegrezza in Biondi, Allegrezza, Casavecchia, Galdenzi, Gasparri, Pesaresi, Vagge & Blasi 2014

Communities of megaforbs dominated by *Aconitum lycoctonum* subsp. *neapolitanum* that grow in the supratemperate thermotype of the Apennines; they develop on deep, humid soils in shallow lands, on the edges of beech woods and maple woods.

43.2 Ord.: CALAMAGROSTIETALIA VILLOSAЕ Pawł. in Pawł., Sokołowski & Wallisch 1928

[*Calamagrostietalia arundinaceae* Egger 1952 *nom. inval.* (art. 2b, 8)]

Thermophilous and mesophilous vegetation dominated by *Graminaceae* species.

43.2.1 All.: Calamagrostion arundinaceae (Luquet 1926) Jeník 1961

[*Calamagrostion atlanticum* Luquet 1926 *nom. illeg.* (art. 34), *Calamagrostion arundinaceae* Oberdorfer 1949 *nom. nud.* (art. 2b, 8) ('*Calamagrostidion arund.*' art. 41a et 41b), *Ligustico mutellinae-Luzulion desvauxii* Michalet & Philippe 1994 *nom. inval.* (art. 2d, 3o, 5) (syntax. syn.)]

Slope communities of *Graminaceae* and other helio-thermophilous basophilous megaforbs, in the oro- and criorotemperate thermotypes.

43.2.2 All.: Calamagrostion villosae Pawł. in Pawł., Sokołowski & Wallisch 1928

Slope communities of helio-thermophilous acidophilous tall-herbs and megaforbs.

43.3. Ord.: RUMICETALIA ALPINI Mucina in Karner & Mucina 1993

Perennial, mesohygrophilous to mesoxerophilous vegetation.

43.3.1 All.: Rumicion alpini Rübel ex Scharfetter 1938

[*Rumicion alpini* Rübel 1933 *nom. nud.* (art. 2b, 8), *Rumicion alpini* Rübel ex Klika in Klika & Hadač 1944 (art. 22), *Chenopodion subalpinum* Br.-Bl. 1948 *nom. illeg.* (art. 34) *Rumicion pseudalpini* Rübel ex Scharfetter 1938 *corr.* Loidi & Biurrun 1996]

Communities of highly nitrophilous tall-herbs, found in the supratemperate and orotemperate thermotypes, that grow in sites that are very rich in nitrates and ammonium (near alpine huts, impluvia in pastures, livestock resting places, etc.).

44 Cl.: TRIFOLIO MEDII-GERANIETEA SANGUINEI Müller 1962

[*Trifolio-Geranietea* Müller 1961 *nom. nud.* (art. 2b, 8), *Origano-Geranietea sanguinei* Van Leeuwen & Westhoff 1961 (art. 8), *Meso-Bromo-Arrhenatheretea* Doing 1963 p.p. (art. 8), *Xero-Bromo-Sedetea* Doing

1963 p.p. (art. 8), *Lathyro-Vicetea cracca* Passarge 1975 p.min.p. [typo excl.], *Trifolietea medii* van Gils & Kovács 1977, *Melampyro-Holcetea mollis* Passarge 1979 nom. inval. (art. 2d, 3b), *Melampyro-Holcetea mollis* Passarge 1994 (syntax. syn.), *Melampyro-Holcetea mollis* Passarge ex Klauck 1992 (syntax. syn.)]

Herbaceous linear vegetation that occurs directly on woodland edges or in contact with their mantle communities.

44.1 Ord.: *ORIGANETALIA VULGARIS* Müller 1962

[*Origanetalia vulgaris* Müller 1961 nom. nud. (art. 2b, 8)]

Mesophilous edge vegetation that grows on mature soils with abundant humus.

44.1.1 All.: *Trifolion medii* Müller 1962

[*Trifolionmedii* Müller 1961 nom. nud. (art. 2b, 8)]

Communities of the pre-forestal mesophilous edges, on marly calcareous and arenaceous rich and deep soils.

44.1.2 All.: *Digitali australis-Helleborion bocconei* Biondi, Vagge & Galdenzi in Biondi, Allegrezza, Casavecchia, Galdenzi, Gasparri, Pesaresi, Vagge & Blasi 2014

Pre-forestal mesophilous edge communities found in the central-southern Apennine calcareous mountains, where it is the vicariant of the alliance *Trifolion medii* Müller 1962, which is more continental and occurs further north; they can be observed from the upper mesotemperate to the upper supratemperate thermotypes.

44.1.3 All.: *Geranio nodosi-Digitalion luteae* Biondi, Vagge & Galdenzi in Biondi, Allegrezza, Casavecchia, Galdenzi, Gasparri, Pesaresi, Vagge & Blasi 2014

Pre-forestal mesophilous edge communities found in the central-northern Apennine mountains, mainly on the Tyrrhenian side, and on marly arenaceous and flysch substrates; within the Temperate macrobioclimate, sub-Mediterranean variant, and meso- and supratemperate thermotypes, they are the vicariant of the alliance *Digitali micranthae-Helleboreum bocconei* on acid soils.

44.2 Ord.: *ANTHERICO-GERANIETALIA SANGUINEI* Julve ex Dengler in Dengler, Berg, Eisenberg, Isermann, Jansen, Koska, Löbel, Manthey, Pätzolt, Spangenberg, Timmermann & Wollert 2003

[*Origanetalia vulgaris* Müller 1961 p.p. (art. 8), *Origanetalia vulgaris* Müller 1962 p.p., *Xero-Brometalia* Doing 1963 p.p. (art. 8), *Antherico ramosi-Geranietalia sanguinei* Julve 1993 (art. 5, 8)]

Thermo-xerophilous forest edge vegetation. In Italy it is mainly distributed from the pre-Alps to the southern tip of the Peninsula.

44.2.1 All.: *Geranion sanguinei* Tüxen in Müller 1962

[*Geranion sanguinei* Tüxen in Müller 1961 p.max.p. (Art. 8), *Cynancho-Geranion* (Müller 1962) Dierschke 1974a (art. 29a), *Brachypodio pinnati-Geranion* (Tüxen in Müller 1962) Van Gils & Kozłowska 1977 (art. 29a), *Tanaceto corymbosi-Bupleurion falcati* Julve 1993 (art. 5, 24a), *Agrostio-Peucedanion oreoselini* Reichhoff & Warthemann 2003 p.p.]

Communities of thermophilous xerophilous, prevalently calcicolous, forest edges, commonly found from the meso- to lower supratemperate thermotypes in central and southern Europe.

44.2.2 All.: *Dictamno albi-Ferulagion galbaniferae* (Van Gils, Keyzers & Launsdach 1975) De Foucault, Rameau & Royer ex Čarni & Dengler in Mucina, Dengler, Bergmeier, Čarni, Dimopoulos, Jahn & Matevski 2009

[*Dictamno-Ferulagion galbaniferae* (Van Gils, Keyzers & Launsdach 1975) De Foucault, Rameau & Royer 1983 nom. inval. (art. 5), *Geranion sanguinei* Tüxen in Müller 1961 p.min.p. (art. 8), *Geranion sanguinei* Tüxen ex Müller 1962 p.min.p. (typo excl.)]

Tall-herb, heliophilous and xerophilous edge communities, found in very alkaline soils and distributed in the Balkans, though they also extend into the southern-eastern and eastern Alps.

44.3 Ord.: *ASPHODELETALIA MACROCARPAE* Biondi & Allegrezza in Biondi, Allegrezza, Casavecchia, Galdenzi, Gasparri, Pesaresi, Vagge & Blasi 2014

Geophytic and hemicryptophytic herbaceous vegetation dominated by tall-herbs that forms heliophilous margins along the forest edges; these communities colonize abandoned secondary pastures in the meso- and supratemperate thermotypes through dynamic invasion.

44.3.1 All.: *Cyano triumfetti-Asphodelion macrocarpi* Biondi & Allegrezza in Biondi, Allegrezza, Casavecchia, Galdenzi, Gasparri, Pesaresi, Vagge & Blasi 2014

Communities of heliophilous subacidophilous herbaceous edges, dominated by *Asphodelus macrocarpus* and *Brachypodium genuense*, that colonize completely abandoned or seldom used secondary grasslands, on deep oligo-trophic soils; they can be found from the upper mesotemperate to the upper supratemperate thermotypes in the Apennines.

44.3.2 All.: *Hyperico calabricae-Asphodelion macrocarpi* Biondi, Gangale & Uzunov 2014 in Biondi, Casavecchia, Pesaresi, Gangale, Uzunov 2014

Communities that colonize abandoned secondary grasslands in the meso- and supratemperate thermotypes on silicate substrata from South Basilicata and Campania to Sicily. This *syntaxon* could be considered a vicariant of *Cyano triumfetti-Asphodelion macrocarpi* Biondi & Allegrezza 2014, described for calcareous substrata in the Umbro-Marchigiano Apennines.

44.4 Ord.: *MELAMPYRO PRATENSIS-HOLCETALIA MOLLIS* Passarge 1979

[*Teucro scorodoniae-Melampyretalia pratensis* Klauck 1992 *nom. superfl.* (art. 22) ('... *pratense*' art. 41.b), *Teucrietalia scorodoniae* De Foucault, Rameau & Royer 1983 *nom. inval.* (art. 2d, 3b) (syntax. syn.)]

Herbaceous vegetation of grasslands and edges found on acid oligotrophic substrata.

44.4.1 All.: *Holco mollis-Pteridion aquilini* Passarge (1994) 2002

[*Holco-Pteridienion aquilini* Passarge 1994 (corresp. name), *Holco mollis-Pteridion aquilini* (Passarge 1994) Rameau in Bardat, Bioret, Botineau, Boullet, Delpech, Géhu, Haury, Lacoste, Rameau, Royer, Roux & Touffet 2004]

Communities of forest, herbaceous, mesophilous margins dominated by *Pteridium aquilinum* in the meso- and supratemperate thermotypes.

44.4.2 All.: *Conopodio majoris-Teucro scorodoniae* Julve 1993 ex Boullet & Rameau in Bardat, Bioret, Botineau, Boullet, Delpech, Géhu, Haury, Lacoste, Rameau, Royer, Roux & Touffet 2004

[*Conopodio majoris-Teucro scorodoniae* Julve *nom. inval.* (art. 2d, 3o, 5), *Teucro scorodoniae* de Foucault, Rameau & Royer 1983 *nom. inval.* (art. 2d, 3o, 5) p.p.]

Atlantic and sub-Atlantic communities of acidophilous edges, with extensions into the Mediterranean basin; in Italy they occur in the northern Tyrrhenian sector, in the Ligurian and Tuscan-Emilian Apennines as well as in the connection area with the Po Plain.

44.4.3 All.: *Digitali ferrugineae-Pteridion aquilini* Biondi & Casavecchia in Biondi, Allegrezza, Casavecchia, Galdenzi, Gasparri, Pesaresi, Vagge & Blasi 2014

Communities of herbaceous mesophilous acidophilous edges dominated by *Pteridium aquilinum* that develop in the mesotemperate thermotype, even in its sub-Mediterranean variant; in the Apennines, the alliance is the vicariant of the *Holco mollis-Pteridion aquilini* Passarge (1994) 2002.

VI. SUPRA-TIMBERLINE CRYOPHILOUS VEGETATION OF CRYOTURBATE SOILS

45 Cl.: *CARICI RUPESTRIS-KOBRESIETEA BELLARDII* Ohba 1974

[*Kobresio-Elynetea* Oberdorfer 1957 *nom. inval.* (art. 2d, 3f)]

High-altitude climatophilous communities with an arctic-alpine distribution. Cryophilous communities, dominated by perennial small graminoids and pulvinate chamaephytes, that grow on windy ridges on neutro-basic substrata with acidic leached soils.

45.1 Ord.: *OXYTROPIDO-KOBRESIETALIA MYOSUROIDIS* Oberdorfer 1957 *nom. mut. propos.* Rivas-Martínez, Diaz, Fernández-González, Izco, Loidi, Lousa & Penas 2002

[*Oxytropido-Elynetalia myosuroidis* Oberdorfer ex Albrecht 1969 (art. 22), *Kobresietalia myosuroidis* Oberdorfer 1957, *Elynetalia myosuroidis* Oberdorfer 1957 (art. 45)]

45.1.1 All.: *Oxytropido-Kobresion myosuroidis* Br.-Bl. (1948) 1949 *nom. mut. propos.* Rivas-Martínez, Diaz, Fernández-González, Izco, Loidi, Lousa & Penas 2002

[*Elynon* Gams 1936 (art. 2b), *Elynon medioeuropaeum* Br.-Bl. 1948 (art. 34), *Oxytropido-Elynon myosuroidis* Br.-Bl. (1948) 1949 (art. 45)]

Primary arctic-alpine communities consisting of pulvinate chamaephytes that grow on neutro-basic cryoturbate soils, in the cryorotemperate thermotype, often on windy ridges.

46 Cl.: *FESTUCO-SESLERIETEA Barbéro & Bonin* 1969

[*Elyno-Seslerietea* Br.-Bl. 1948 (art. 45), *Seslerietea varia* Oberdorfer 1978 (syntax. syn.), *Propos.: Kobresyo myosuroides-Seslerietea caeruleae* Br.-Bl. 1948 *nom. mut. propos.* Rivas-Martínez, Diaz, Fernández-González, Izco, Loidi, Lousa & Penas 2002]

Basophilous primary grasslands (in some cases also secondary grasslands) consisting of graminoids and dwarf chamaephytes that grow on cryoturbate soils covered in snow for long periods of time. These communities range from the supratemperate thermotype to the cryorotemperate thermotype, where they are most widespread.

46.1 Ord.: *SESLERIETALIA TENUIFOLIAE* Horvat 1930

[*Seslerietalia apenninae* Bruno & Furnari 1966]

Xerophilous grasslands that grow on stony and less developed soils (lithosol and rendzina types), in the orotemperate and cryorotemperate thermotypes (sometimes even in the supratemperate thermotype) of the Balkan and Apennine reliefs.

46.1a Subord.: *SESLERIENALIA APENNINAE* Bruno & Furnari 1966 *em.* Lancioni, Facchi & Taffetani 2011

Xerophilous grasslands that grow at the highest altitudes in the central Apennines.

46.1a.1 All.: *Seslerion apenninae* Furnari in Bruno & Furnari 1966

[*Caricion kitaibeliana* Migliaccio 1970 *nom. inval.* (art.3f)]

Xerophilous and basophilous, grazed communities that grow from the supratemperate (sometimes even in the mesotemperate) up to the cryorotemperate thermotypes of the Apennines. These communities are characterized by the abundance of endemic, sub-endemic, Mediterranean-montane species and southern European orophytes.

46.1a.2 All.: *Carici humilis-Seslerion apenninae* Biondi & Allegrezza in Biondi, Allegrezza, Casavecchia, Galdenzi, Gasparri, Pesaresi, Vagge & Blasi 2014

Sub-primary xerophilous grasslands, dominated by *Sesleria apennina*, that grow along eroded mountainsides and windy ridges, in the mesotemperate and supratemperate thermotypes of the calcareous mountains of the Apennines.

46.2 Ord.: *SESLERIETALIA CAERULEAE* Br.-Bl. in Br.-Bl. & Jenny 1926

[*Astragaletalia sempervirentis* Barbero 1968 p.p. (syntax. syn.)]

Basophilous primary grasslands that grow from the supratemperate to cryorotemperate thermotypes in the Alps, northern Apennines, Carpathians and Pyrenees.

46.2.1 All.: *Seslerion caeruleae* Br.-Bl. in Br.-Bl. & Jenny 1926

[*Seslerion varia* Br.Bl. & Jenny 1926, *Astero-Seslerion* Hadač 1962 (art.8)]

Meso-xerophilous or xerophilous communities that grow in the inner and continental areas of the Alps and Jura mountains.

46.2.2 All.: *Caricion austroalpinae* Sutter 1962

Primary, meso-xerophilous or xerophilous grasslands that grow in the supratemperate and orotemperate thermotypes, on calcareous substrata and cryoturbate soils in the southern part of the central-eastern Alps.

46.2.3 All.: *Avenion sempervirentis* Barbero 1968

Basophilous, xero-thermophilous grasslands that grow in the orotemperate and cryorotemperate thermotypes in the Maritime Alps.

46.2.4 All.: *Caricion ferrugineae* G. Braun-Blanquet & J.Br.-Bl. 1931

Mesophilous or meso-hygrophilous swards that grow on slightly basic to moderately acidic soils in the orotemperate thermotype in the Alps.

46.2.5 All.: *Calamagrostion varia* Sillinger 1929

Tall-grass meadows, dominated by *Calamagrostis varia* and/or *Molinia arundinacea*, that grow on steep, sunny slopes characterized by rills in the montane and subalpine belts. These communities sometimes grow following the abandonment of mowing.

46.2.6 All.: *Caricion firmae* Gams 1936

[*Caricion firmae* (Gams 1936) Theurillat 1994]

Primary subalpine and alpine swards that grow on wind-exposed calcareous or dolomite slopes in the orotemperate and cryorotemperate thermotypes.

47 Cl.: **CARICETEA CURVULAE** Br.-Bl. 1948 *nom. cons. propos.* Rivas-Martínez, Diaz, Fernández-González, Izco, Loidi, Lousa & Penas 2002

[*funcetea trifidi* Hadač in Klika & Hadač 1944 (art. 36, 51), *Caricetea curvulae* Br.-Bl. 1948 (syntax. syn.), *Saginetea piliferae* Gamisans 1977, *Propos.: Caricetea curvulae* Br.-Bl. 1948 *nom. cons. propos.*]

Acidophilous grasslands with an arctic-alpine distribution.

47.1 Ord.: *CARICETALIA CURVULAE* Br.-Bl. in Br.-Bl. & Jenny 1926

Microtherm, acidophilous swards that grow in the upper orotemperate and cryorotemperate thermotypes.

47.1.1 All.: *Caricion curvulae* Br.-Bl. in Br.-Bl. & Jenny 1926

[*funcion trifidi* Krajina 1933]

Microtherm, acidophilous, climatic swards that grow in the cryorotemperate thermotype, from the Alps and northern Apennines to the Carpathians.

47.1.2 All.: *Nardion strictae* Br.-Bl. in Br.-Bl. & Jenny 1926

[*Nardo strictae-Trifolion alpini* Preising 1949 (art. 8), Incl.: *Galio saxatilis-Potentillion aureae* de Foucault 1994, *Campanulo barbatae-Potentillion aureae* de Foucault 1994, *Carici macrostyli-Nardion strictae* de Foucault 1994]

Acidophilous *Nardus stricta*-dominated grasslands that grow on the highest reliefs in central Europe.

47.1.3 All.: *Agrostion schraderianae* Grabherr 1993

Acidophilous, primary grasslands that colonize eroding slopes and impluvia in the orotemperate and cryorotemperate thermotypes of the central-eastern Alps.

48 Cl.: LOISELEURIO PROCUMBENTIS-VACCINIETEA MICROPHYLLI Eggler ex Schubert 1960

[*Loiseleurio-Vaccinietaea* Eggler 1952 (art. 8), *Loiseleurio-Cetrarietea* Suzuki & Umezumi in Suzuki 1964 (syntax. syn.), *Junctetea trifidi* Hadač in Klika & Hadač 1944 (art. 36) p.p.]

Climatophilous dwarf-shrub vegetation of the arctic-alpine and subarctic-subalpine heath that grow on cryoturbate soils. These communities constitute a mature stage or are dynamically linked to coniferous forests.

48.1 Ord.: *RHODODENDRO FERRUGINEI-VACCINIETALIA MICROPHYLLI* Br.-Bl. in Br.-Bl. & Jenny 1926

[*Loiseleurio-Vaccinietaea* Eggler 1952 *nom. nud.* (art. 2b, 8), *Empetretalia hermaphroditi* Schubert 1960 (syntax. syn.), *Rhododendro hirsuti-Ericetaliacarneae* Grabherr, Greimler & Mucina in Grabherr & Mucina 1993, Corresp.: *Rhododendro-Vaccinietaea* Rameau 1996 *nom. nud.* (art. 2b, 8) [*Rhododendro-Vaccinietaea* Rameau in Rameau, Mansion & Dumé 1993 *nom. inval.* (art. 2b, 2d, 3b, 8)], *Juniperetalia nanae* Rameau 1996 *nom. nud.* (art. 2b, 8) [*Juniperetalia nanae* Rameau in Rameau, Mansion & Dumé 1993 *prov. nom. inval.* (art. 2b, 2d, 3b, 8)]]

48.1.1 All.: *Loiseleurio procumbentis-Vaccinion microphylli* Br.-Bl. in Br.-Bl. & Jenny 1926

Silicolous, alpine heaths dominated by nano-phanerophytes and lichens.

48.1.2 All.: *Rhododendro ferruginei-Vaccinion myrtilli* A.Schnyd. 1930

[*Rhododendro-Vaccinion* Br.-Bl. in Br.-Bl. & Jenny 1926 *nom. nud.* (art. 2b, 8) ('*Rhodoreto-...*' art. 41b), *Rhododendro-Vaccinion* G. Braun-Blanquet & Br.-Bl. 1931 *nom. illeg.* (art. 29) ('*Rhodoreto-...*' art. 41b), Corresp.: *Rhododendro-Vaccinion* Br.-Bl. in Br.-Bl., Sissingh & Vlieger 1939]

Acidophilous shrub communities typically dominated by *Rhododendron* species with or without *Pinus mugo* s.l.. This vegetation is spread throughout the Alps, in the orotemperate and lower cryorotemperate thermotypes, with humid to hyperhumid ombrotypes.

48.1.3 All.: *Juniperion nanae* Br.-Bl. in Br.-Bl., Sissingh & Vlieger 1939

Subalpine, prostrate, shrub communities, typically dominated by *Juniperus communis* subsp. *alpina*, that grow on sunny slopes in Eurosiberian biogeographic region.

48.1.4 All.: *Ericion carneae* Rübel ex Grabherr, Greimler & Mucina in Grabherr & Mucina 1993

[*Ericion carneae* Rübel 1933 *nom. nud.* (art. 2b, 8)]

Subalpine, calcicolous or sub-acidophilous heaths, generally dominated by *Erica carnea*.

49 Cl.: SALICETEA HERBACEAE Br.-Bl. 1948

[*Salicetea herbaceae* Br.-Bl. in Br.-Bl., Emberger & Molinier 1947 *nom. nud.* (art. 2b, 8)]

Pioneer nano-phanerophytic and herbaceous vegetation that is rich in cryptogams and grows in sites subjected to long-lying snow cover in the orotemperate and cryorotemperate thermotypes.

49.1 Ord.: *SALICETALIA HERBACEAE* Br.-Bl. in Br.-Bl. & Jenny 1926

Acidophilous communities.

49.1.1 All.: *Salicion herbaceae* Br.-Bl. in Br.-Bl. & Jenny 1926

Silicolous communities consisting of nano-phanerophytes, pulvinate chamaephytes and hemicryptophytes that grow in sites subjected to long-lying snow cover in the orotemperate and cryorotemperate thermotypes.

49.2 Ord.: *ARABIDETALIA CAERULEAE* Rübel ex Nordhagen 1936

[*Arabidetalia caeruleae* Rübel 1933 *nom. nud.* (art. 2b, 8) ('... *coeruleae*' art. 41a), *Thlaspietaliarotundifolii* Br.-Bl. in Br.-Bl. & Jenny 1926 p.p. ('*Thlaspietalia...*' art. 41b) (syntax. syn.)]

Neuro-basophilous communities.

49.2.1 All.: *Arabidion caeruleae* Br.-Bl. in Br.-Bl. & Jenny 1926

[*Salicion retusae* Horvat 1949 (syntax. syn.)]

Perennial neuro-basophilous herbaceous communities that grow in sites subjected to long-lying snow cover in the upper orotemperate and cryorotemperate thermotypes of the Alps and Apennines.

VII. GRASSLAND VEGETATION

50 Cl.: TUBERARIETEA GUTTATAE (Br.-Bl. in Br.-Bl., Roussine & Nègre 1952) Rivas Goday & Rivas-Martínez 1963 nom. mut. propos. Rivas-Martínez, Diaz, Fernández-González, Izco, Loidi, Lousa & Penas 2002

[*Helianthemetea annua* Br.-Bl. in Br.-Bl., Roussine & Nègre 1952 (art. 34), *Helianthemetea annua* Br.-Bl. Ex Rivas Goday 1958 (art. 34), *Helianthemetea guttati* (Br.-Bl. in Br.-Bl., Roussine & Nègre 1952) Rivas Goday & Rivas-Martínez 1963 (art. 45), *Tuberarietea guttatae* Br.-Bl. in Br.-Bl., Roussine & Nègre 1952 *em.* Rivas-Martínez 1978, *Stipo-Brachypodietea distachyae* (Br.-Bl. in Br.-Bl., Emberger & Molinier 1947) Brullo 1985 (syntax. syn.)]

Annual, ephemeral, xerophytic and thermophilous non-nitrophilous vegetation, with a short winter-spring vegetative cycle. It grows mainly in the Mediterranean macrobioclimate, extending into the Temperate macrobioclimate, mostly in the Submediterranean variant of the mesotemperate thermotype, and is indifferent to the chemical nature of the substratum.

50.1 Ord.: TUBERARIETALIA GUTTATAE Br.-Bl. in Br.-Bl., Molinier & Wagner 1940 nom. mut. propos. Rivas-Martínez, Diaz, Fernández-González, Izco, Loidi, Lousa & Penas 2002

[*Helianthemetalia guttati* Br.-Bl. in Br.-Bl., Molinier & Wagner 1940 (art. 45)]

Therophytic, ephemeral, markedly arid vegetation that grows on oligotrophic, skeletal, less developed soils with a sandy-loamy texture.

50.1.1 All.: Tuberarion guttatae Br.-Bl. in Br.-Bl., Molinier & Wagner 1940 nom. mut. propos. Rivas-Martínez, Diaz, Fernández-González, Izco, Loidi, Lousa & Penas 2002

[*Helianthemion guttati* Br.-Bl. in Br.-Bl., Molinier & Wagner 1940 (art. 45), *Moenchion erectae* Rivas Goday 1958 (syntax. syn.), *Vulpion ligusticae* Aubert & Loisel 1971 (syntax. syn.)]

Annual, xerophytic, pioneer communities of thermo- and meso-Mediterranean thermotypes.

50.1.2 All.: Sclerantho-Myosoidion incrassatae Brullo, Scelsi & Spampinato 2001

Annual, xerophytic, acidophilous communities of ephemeral therophytes that grow in the oro-Mediterranean thermotype.

50.1.3 All.: Thero-Airion Tüxen ex Oberdorfer 1957

[*Thero-Airion* Tüxen 1951 *nom. nud.* (art. 2b, 8), *Airion caryophylleo-praecocis* (Tüxen ex Oberdorfer 1957) Rivas-Martínez 1978 *pro syn. nom. inval. et illeg.* (art. 2d, 3a, 29) ('...-praecocis' art. 41a)]

Annual, xerophytic, pioneer, Atlantic and European communities that grow on xeric soils, on sands and arenaceous rocks, in bioclimatic belts with thermotypes ranging from supra-Mediterranean to mesotemperate.

50.2 Ord.: MALCOLMIETALIA Rivas Goday 1958

Ephemeral therophytic vegetation that grows on sandy or sandy-pebbly soils, sometimes on the inland limit of the dune or even in different situations, outside the active dunal areas, for instance paleo-dunes, fluvial habitats and inland sub-salt soils; mainly spreads in the western Mediterranean and in the thermo-Atlantic.

50.3 Ord.: CUTANDIETALIA MARITIMAE Rivas-Martínez, Díez Garretas & Asensi 2002

Annual, xerophytic, pioneer vegetation of sandy, coastal, non-stabilized dunes that forms mosaics with the vegetation of the *Ammophiletea* class and grows along the Mediterranean coasts and in the most thermophilous areas of the Atlantic coasts.

50.3.1 All.: Alkanno-Maresion nanae Rivas Goday ex Rivas Goday & Rivas-Martínez 1963 corr. Díez Garretas, Asensi & Rivas-Martínez 2001

[*Maresion nanae* Géhu, Biondi, Géhu-Franck & Arnold 1986 *nom. nud.* (art. 2b, 8), *Maresio-Malcolmienion ramosissimae* Rivas-Martínez 1978 (corresp. name), *Maresio nanae-Malcolmion ramosissimae* (Rivas-Martínez 1978) Rivas-Martínez, Costa & Loidi 1992]

Annual, xerophytic, pioneer communities of coastal, sandy, non-stabilized dunes.

50.3.2 All.: Laguro ovati-Vulpion fasciculatae Géhu & Biondi 1994

Annual, xerophytic, pioneer communities of Mediterranean and thermo-Atlantic dunes in an early state of alteration owing to both natural and anthropic causes.

50.4 Ord.: BRACHYPODIETALIA DISTACHYAE Rivas-Martínez 1978

[*Trachynietalia distachyae* Rivas-Martínez 1978 *pro syn. nom. inval.* (art. 2d, 3a), Pseud.: *Thero-Brachypodietaliasensu* Theurillat, Aeschmann, Küpfer & Spichiger 1995, non Br.-Bl. ex Molinier 1934]

Annual, xerophytic vegetation related to calcicolous oligotrophic soils and lithosols on calcareous rocks.

50.4.1 All.: Hypochoeridion achyrophori Biondi & Guerra 2008

Annual, xerophytic, pioneer, basophilous communities that grow in the central European Mediterranean, in Mediterranean and Temperate macrobioclimates, in the thermo-Mediterranean to mesotemperate thermotypes; in Italy this *syntaxon* is a vicariant of the alliance *Trachynion distachyae*, which grows in the western Mediterranean and has its eastern limit in Mediterranean Provence.

50.5 Ord.: *STIPO-BUPLEURETALIA SEMICOMPOSTI* Brullo in Brullo, Scelsi & Spampinato 2001

Vegetation of annual, ephemeral, xerophilous, basophilous or neutrophilous species that are indifferent to the chemical nature of the substrata, and grow in the infra- and thermo-Mediterranean, dry, bioclimatic belts, occasionally extending into the meso-Mediterranean thermotype.

50.5.1 All.: *Onobrychido-Ptilostemion stellati* Brullo, Scelsi & Spampinato 2001

Annual, xerophytic, ephemeral communities related to extremely arid environmental conditions, mainly on marly and clayey substrata, though also on calcarenitic, conglomeratic or, more rarely, sandy substrata.

50.5.2 All.: *Sedo-Ctenopsion gypsophilae* Rivas Goday & Rivas-Martínez ex Izco 1974

Annual, xerophytic, ephemeral communities on gypseous bare soils.

50.5.3 All.: *Plantagini-Catapodium marini* Brullo 1985

Annual, xerophytic, ephemeral, subhalophilous communities that grow throughout the thermo-Mediterranean coastal habitats and are indifferent to the chemical nature of the substratum.

51 Cl.: *FESTUCO VALESIIACAE-BROMETEA ERECTI* Br.-Bl. & Tüxen ex Br.-Bl. 1949

[*Festucetea ovinae* Knapp 1942 *nom. ined.* (art. 1), *Festuco-Brometea* Br.-Bl. & Tüxen ex Br.-Bl. 1949 p.p., *Festuco-Brometea* Br.-Bl. & Tüxen 1943 *nom. nud.* (art. 2b, 8) p.p., incl.: *Cerastio-Carlinetea nebrodensis* Brullo 1983 (art. 29)]

Vegetation of primary and secondary pastures dominated by xerophilous and mesophilous hemicryptophytes of the hilly and mountainous areas of Europe and of the western sector of Siberia. They grow mostly on calcareous and alkaline or subacidic substrata.

51.1 Ord.: *FESTUCETALIA VALESIIACAE* Br.-Bl. & Tüxen ex Br.-Bl. 1949

Vegetation of the continental steppes of central and eastern Europe that generally grows in xeric, intra-alpine sectors, characterized by a continental climate with moderate annual precipitation. The distribution of this order is rarefied in the sub-oceanic sectors of Alps and in the Insubria sector.

51.1.1 All.: *Festucion valesiaca* Klika 1931

[*Festucion sulcatae* Soó 1929 (art. 8), *Caricion humilis-albae* Gams 1936 (art. 8), *Festucion sulcatae* Soó 1940 (art. 29), *Astragalo-Stipion* Knapp 1944 (Art. 1), *Festucion valesiaca-sulcatae* Eggler 1951 (Art. 29), *Festucion rupicolae* Soó 1940, *Festuco-Stipion* (Klika 1931) Krausch 1961, *Asplenio cuneifolii-Armerion serpentini* Kolbek, Moravec & Krahulec in Moravec, Baljtovi-Tuljkovi, Hada, Hejnž, Jenčk, Kolbek, Kopeckž, Krahulec, Kropi, Neuhäusl, Rybnček & Vicherek 1983 p.p., incl. *Astragalo austriaci-Achilleenion setaceae* Toman 1981, *Agropyro intermedii-Festucion valesiaca* Kolbek in Moravec, Baljtovi-Tuljkovi, Hada, Hejnž, Jenčk, Kolbek, Kopeckž, Krahulec, Kropi, Neuhäusl, Rybnček & Vicherek 1983, *Coronillo variae-Festucion rupicolae* Kolbek in Moravec, Baljtovi-Tuljkovi, Hada, Hejnž, Jenčk, Kolbek, Kopeckž, Krahulec, Kropi, Neuhäusl, Rybnček & Vicherek 1983]

Vegetation of the continental steppes dominated by species of the genus *Festuca* and *Stipa*; it grows on calcareous soils on the south-facing slopes of the warmest and driest areas of central Europe and of the Alps.

51.1.2 All.: *Stipo-Poion xerophilae* Br.-Bl. & Tüxen ex Br.-Bl. 1949

Xerophilous, calcicolous, steppe grasslands of inland valleys in the eastern Alps.

51.1.3 All.: *Stipo capillatae-Poion carniolicae* Br.-Bl. 1961

[*Stipo capillatae-Poion perconcinnae* Br.-Bl. 1961 *nom. mut. illeg.*]

Xerophilous, calcicolous, steppe grasslands of inland valleys with a continental climate that grow in the western Alps and are enriched by Mediterranean elements.

51.1.4 All.: *Cirsio-Brachypodium pinnati* Hadač & Klika in Klika & Hadač 1944

[*Danthonio-Stipion stenophyllae* Soó 1947 *nom. inval.* (art. 3b), *Festucion sulcatae* Soó 1947, non Soó 1930 *nom. illeg.* (art. 31), *Danthonio-Stipion stenophyllae* Soó 1949, *Cirsio-Brachypodium pinnati* Hadač & Klika in Klika & Hadač 1944 *nom. nud.* (art. 2b), *Cirsio-Brachypodium pinnati* Hadač & Klika ex Klika 1951 *nom. illeg.* (art. 31)]

Semi-dry grassland communities dominated by *Brachypodium pinnatum* and *Bromus erectus* that grow on calcareous, deep soils in warm, dry areas of central Europe.

51.1.5 All.: *Diplachnion serotinae* Br.-Bl. 1961

Calcicolous and xerophilous grassland communities that grow in inland, sub-continental valleys in the southern Alps.

51.2 Ord.: *BROMETALIA ERECTI* Koch 1926

[*Brometalia* Br.-Bl. 1931 (art. 8), *Koelerio-Phleetalia phleoidis* Korneck 1974 (syntax. syn.), *Brometalia erecti* Br.-Bl. 1936 *nom. amb. propos.* p.p. (typo excl.; art. 31), *Xero-Brometalia* Doing 1963 p.p. (art. 8), *Brometalia erecti* Br.-Bl. 1936 *nom. amb. propos. sensu* Korneck 1974 (typo excl.), *Xero-Brometalia erecti* Royer ex Dengler 1994 (art. 8, 12(2)), *Artemisio albae-Brometalia erecti* Ubaldi ex Dengler & Mucina in Mucina, Dengler, Bergmeier, Čarni, Dimopoulos, Jahn & Matevski 2009 (art. 22)]

Meso-xerophilous, calcicolous, sub-Atlantic and sub-Mediterranean, secondary grasslands of central-western Europe.

51.2a Subord.: *LEUCANTHEMO VULGARIS-BROMENALIA ERECTI* Biondi, Ballelli, Allegrezza & Zuccarello 1995
Mesophilous, calcicolous, secondary grassland vegetation.51.2a.1 All.: *Bromion erecti* Koch 1926

[*Mesobromion erecti* (Br.-Bl. & Moor 1938) Oberdorfer 1957 (syntax. syn.), *Mesobromenion* Br.-Bl. & Moor 1938 ('*Mesobromion*' pro suball. art. 41b) (corresp. name)]

Meso-xerophilous to xerophilous sub-Atlantic and Atlantic grasslands.

51.2a.2 All.: *Festuco amethystinae-Bromion erecti* Barbero & Loisel 1972

Mountain meso-xerophytic grasslands of Provence and Liguria.

51.2a.3 All.: *Koelerio macranthae-Phleion phleoidis* Korneck 1974

[*Euphorbio-Callunion sensu* Mucina & Kolbek in Mucina, Grabherr & Ellmauer 1993 non Schubert ex Passarge 1964 (pseudonym)]

Sub-Atlantic, acidocline to acidophilous grasslands that may be xerophilous to a greater or lesser extent, mostly found in the supratemperate thermotype.

51.2b Subord.: *ARTEMISIO ALBAE-BROMENALIA ERECTI* Biondi, Ballelli, Allegrezza & Zuccarello 1995

Vegetation of xerophilous, calcicolous, secondary grasslands.

51.2b.1 All.: *Xerobromion erecti* (Br.-Bl. & Moor 1938) Moravec in Holub, Heijny, Moravec & Neuhäusl 1967

[*Xerobromion* Br.-Bl. & Moor 1938 *nom. inval.* (art. 2d, 3e), *Xerobromenion* Br.-Bl. & Moor 1938 ('*Xerobromion*' pro suball. art. 41b) (corresp. name)]

Calcareous, discontinuous, sub-Atlantic to sub-continental grasslands that are sub-Mediterranean in nature.

51.3 Ord.: *PHLEO AMBIGUI-BROMETALIA ERECTI* Biondi, Allegrezza, Blasi & Galdenzi in Biondi, Allegrezza, Casavecchia, Galdenzi, Gasparri, Pesaresi, Vagge & Blasi 2014

Xerophilous and semi-mesophilous secondary grasslands, found from the supra-Mediterranean to the mesotemperate thermotypes, their *optimum* being in the latter, and often even in the sub-Mediterranean variant of the Temperate macrobioclimate; it is a vicariant of the order *Scorzonero-Chrysopogonetalia*, purely Illyrian, in the central-southern Apennines (with the exception of Calabria).

51.3.1 All.: *Phleo ambigu-Bromion erecti* Biondi, Ballelli, Allegrezza & Zuccarello ex Biondi & Galdenzi 2012

[*Cytiso-Bromion erecti* Bonin 1978 p.p. *nom. inval.* (art. 1), *Cytiso-Bromion caprini* Barbero & Bonin 1969 p.p. *nom. inval.* (art. 3), *Crepido lacerae-Phleion ambigu* Biondi & Blasi 1982 *nom. inval.* (art. 3, 5), *Phleo ambigu-Bromion erecti* Biondi, Ballelli, Allegrezza & Zuccarello 1995 *nom. inval.* (art. 2, 5, 17), *Seslerio nitidae-Caricion macrolepidis* Ubaldi 1997 (syntax. syn.), *Botriochloo ischaemoni-Bromion erecti* Ubaldi 1997 p.p. (syntax. syn.), *Siderition italicae* Ubaldi 2011 (syntax. syn.), *Knautio calycinae-Bromion caprini* Ubaldi 2011 (syntax. syn.)]

Xerophilous and semi-mesophilous secondary grasslands that grow from the supra-Mediterranean to the mesotemperate thermotypes in calcareous areas of the Apennines; their *optimum* is in the mesotemperate thermotype, frequently even in the sub-Mediterranean variant of the Temperate macrobioclimate.

51.4 Ord.: *SCORZONERO VILLOSAE-CHRYSOPOGONETALIA GRYLLI* Horvatić & Horvat in Horvatić 1963

[*Scorzonero villosae-Chrysopogonetalia grylli* Horvatić & Horvat in Horvatić 1957 (art. 2b, 8), *Scorzonero villosae-Chrysopogonetalia grylli* Horvatić & Horvat in Horvatić 1958 (art. 2b, 8), *Scorzoneretalia villosae* Horvatić 1973 (art. 3m), *Scorzoneretalia villosae* Horvatić 1975 (art. 3m)]

Vegetation of meso-xerophilous, secondary grasslands, distributed in the trans-Adriatic and west-Balkan regions.

51.4.1 All.: *Hippocrepido glaucae-Stipion austroitalicae* Forte & Terzi in Forte, Perrino & Terzi 2005

Steppe grasslands with *Stipa austroitalica* that grow in south-eastern Italy, on limestone, in the Mediterranean macrobioclimate.

51.4.2 All.: *Saturejion subspicatae* (Horvat 1974) Horvatić 1975

[*Saturejion subspicatae* Horvat 1962 (art. 3f), *Saturejion subspicatae* (Horvat 1962) Horvatić 1973 (art. 3f), *Saturejo subspicatae-Caricion humilis* (Horvat 1962) Trinajstić 1999]

- Xerophilous and rupicolous grasslands that grow on less developed soils from the supra-Mediterranean thermotype up to the upper mesotemperate thermotype.
- 51.4.3 All.: *Scorzonerion villosae* Horvatić 1963
[*Scorzonerion villosae* Horvatić 1949 (art. 2b, 8), *Scorzonerion villosae* Horvatić 1957 (art. 2b, 8)]
Meso-xerophilous Illyrian grasslands that develop on sub-acidic, generally shallow to moderately deep soils in the supra-Mediterranean thermotype of the Mediterranean macrobioclimate, and in the mesotemperate thermotype in the sub-Mediterranean variant of the Temperate macrobioclimate.
- 51.4.4 All.: *Hypochoeridion maculatae* Horvatić ex Terzi 2011
[*Hypochoeridion maculatae* Horvatić 1973 (art. 3f), *Hypochoeridion maculatae* Horvatić 1975 (art. 3f), *Hypochoeridion maculatae* Horvatić in Royer 1991 (art. 3o, 5)]
Mesophilous, Illyrian, eastern sub-Mediterranean, perennial grasslands that grow on generally evolved carbonatic substrata and in the Temperate macrobioclimate up to the lower supratemperate thermotype.
- 51.4 Ord.: *ONONIDETALIA STRIATAE* Br.-Bl. 1950
[*Seslerietalia galloprovincialis* Molinier 1934 *nom. nud.* (art. 2b, 8, 34) ('... gallo-provincialis' art. 41a), *Gemisto-Ononidetalia striatae* Br.-Bl. & Susplugas 1937 (art. 3f), *Ononidetalia striatae* Br.-Bl. in Br.-Bl., Emberger & Molinier 1947 (art. 8), *Astragaltetalia sempervirentis* Barbero 1968 (syntax. syn.)]
Xerophilous to meso-xerophilous communities that grow in the sub-Mediterranean climate, from the supra- to oro-Mediterranean thermotypes.
- 51.4.1 All.: *Genistion lobelii* Molinier 1934
Mediterranean-mountain grassland communities, dominated by pulvinate chamaephytes, that grow on calcareous and dolomite substrata of the Maritime Alps.
- 51.4.2 All.: *Lavandulo angustifoliae-Genistion cinereae* Barbero, Loisel & Quézel 1972
Chamaephytic garrigues that develop from meso- to oro-Mediterranean thermotypes, on calcareous and marly-calcareous substrata of the Maritime Alps and Provence.
- 51.5 Ord.: *ANTHEMIDETALIA CALABRICAЕ* Brullo, Scelsi & Spampinato 2001
Orophilous pulvinate vegetation of the siliceous mountains of Calabria that grows in the supra-Mediterranean thermotype.
- 51.5.1 All.: *Koelerio brutiae-Astragalion calabrici* Giacomini & Gentile ex Brullo, Gangale & Uzunov 2004
[*Koelerio-Astragalion calabri* Giacomini & Gentile 1961 *nom. inval.* (art. 8), *Koelerio-Astragalion calabri* Giacomini & Gentile 1966 *nom. inval.* (art. 8), *Koelerio-Astragalion calabri* Giacomini & Gentile ex Pignatti 1980 *nom. inval.* (art. 5), *Cirsio-Nardion* Giacomini & Gentile 1961 *nom. inval.* (art. 8) p.p., *Cirsio-Nardion* Giacomini & Gentile 1966 *nom. inval.* (art. 8) p.p., *Cytiso-Bromion caprini* Barbero & Bonin 1969 *nom. inval.* (art. 8), *Cytiso-Bromion erecti* Bonin 1978 *nom. inval.* (art. 1), *Ranuncolo-Nardion* Bonin 1978 *nom. inval.* (art. 1)]
Pulvinate vegetation endemic to the Sila mountains, where it is a vicariant of the *Armerion aspromontanae* Brullo, Scelsi & Spampinato 2001.
- 51.5.2 All.: *Armerion aspromontanae* Brullo, Scelsi & Spampinato 2001
Orophilous, pulvinate communities that are endemic to the Aspromonte.
- 52 Cl.: KOELERIO GLAUCAE-CORYNEPHORETEA CANESCENTIS Klika in Klika & V. Novák 1941**
[*Koelerio-Corynephoretales* Klika in Klika & V. Novák 1941 (original name), *Corynephoretea canescentis* Br.-Bl. & Tüxen 1943 (art. 8), *Festuco-Sedetetea* Oberdorfer 1957 (art. 8), *Festucetea vaginatae* Soó 1968 (syntax. syn.)]
Perennial, pioneer vegetation dominated by hemicryptophytes, with varying numbers of annual species, that grows on sandy oligotrophic soils whose stability may vary.
- 52.1 Ord.: *CORYNEPHORETALIA CANESCENTIS* Klika 1934
[*Koelerietalia* Oberdorfer 1957 *nom. inval.* (art. 2d, 3b)]
Xeric, discontinuous, mainly continental vegetation, dominated by acidophilous perennial species, often rich in lichens and bryophytes.
- 52.1.1 All.: *Corynephorion canescentis* Klika 1931
[*Spergulo-Corynephorion* (Klika 1931) Passarge 1960 *nom. illeg.* (art. 29)]
Perennial, discontinuous communities dominated by *Corynephorus canescens* that grow on acidic or decarbonate inland sands.
- 52.2 Ord.: *ARTEMISIO-KOELERIETALIA ALBESCENTIS* Sissingh 1974
Psammophilous communities of coastal, stabilized, or partially stabilized, Atlantic and sub-Atlantic dunes, on sands that may be calcareous to a greater or lesser extent.

52.2.1 All.: *Syntrichio ruraliformis-Lomelosion argenteae* Biondi, Sburlino & Theurillat in Sburlino, Buffa, Filesi, Gamper & Ghirelli 2013

[*Psammo-Koelerion* Pignatti 1952 p.p. *nom. illeg.* (art. 39)]

Perennial dry short-grasslands whose structure is mainly determined by a thick carpet of cryptogams among which therophytes, hemicryptophytes and chamaephytes occur; they inhabit the calcareous grey dunes and the N-Adriatic Italian coast, in a temperate-subatlantic bioclimatic context.

53 Cl.: POETEA BULBOSAE Rivas Goday & Rivas-Martínez in Rivas-Martínez 1978

Highly productive, perennial, mainly hemicryptophytic, Mediterranean pastures, with many therophytes, dominated by small *Graminaceae* and *Fabaceae*. They grow on both oligotrophic and eutrophic soils, from the thermo- to supra-Mediterranean thermotypes, with an ombrotype ranging from sub-arid to humid. These communities are distributed prevalently in the western Mediterranean and in Italy are widespread in Sardinia, though they may also be found in other areas with a Mediterranean macrobioclimate.

53.1 Ord.: *POETALIA BULBOSAE* Rivas Goday & Rivas-Martínez in Rivas Goday & Ladero 1970

53.1.1 All.: *Periballio-Trifolion subterranei* Rivas Goday 1964 *nom. inv. propos.* Rivas-Martínez, Díaz, Fernández-González, Izco, Loidi, Lousa & Penas 2002

[*Trifolion subterranei-Periballion* Rivas Goday 1964]

Communities that grow on acidic siliciculous soils, in the thermo- to supra-Mediterranean thermotypes and in dry to lower subhumid ombrotypes.

53.1.2 All.: *Plantaginion serrariae* Galán, Morales & Vicente 2000

Mediterranean communities of neutrophilous, prostrate, trampled plants that grow on clayey soils in Italy in the Mediterranean macrobioclimate.

54 Cl.: SEDO ALBI-SCLERANTHETEA BIENNIS Br.-Bl. 1955

[*Festuco-Sedetia* Oberdorfer 1957 *nom. inval.* (art. 2d, 3b) p.p. (syntax. syn.)]

Pioneer, open vegetation consisting of perennial (often succulent), dwarf chamaephytes and geophytes, accompanied by ephemeral therophytes, with a Eurosiberian and Mediterranean distribution. It develops on siliceous and calcareous rock surfaces, from the meso- to lower orotemperate and from the thermo- to supra-Mediterranean thermotypes, with an ombrotype ranging from semiarid to hyperhumid.

54.1 Ord.: *SEDO ALBI-SCLERANTHETALIA BIENNIS* Br.-Bl. 1955

[*Sempervivo-Sedetalia* (Br.-Bl. 1955) Müller 1961 *nom. illeg.* (art. 29), *Festuco-Sedetalia acris* Tüxen 1951 p. (syntax. syn.)]

Communities of siliceous rocks that grow mostly in the Temperate macrobioclimate.

54.1.1 All.: *Sedo albi-Scleranthion biennis* Br.-Bl. 1955

[*Sedo-Scleranthion* Br.-Bl. 1949 *nom. nud.* (art. 2b, 8), *Sempervivo-Sedion* (Br.-Bl. 1955) Müller 1961 *nom. illeg.* (art. 29)]

Thermophilous, central-European, mountain and alpine communities that colonize rupicolous habitats.

54.1.2 All.: *Vulpio ciliatae-Crepidion neglectae* Poldini 1989

Thermophilous communities of perennial (succulent and therophytic) euri-Mediterranean eastern plants that grow in the southeastern margins of the Alps and in the northern Adriatic territories of Carso.

54.2 Ord.: *ALYSSO ALYSSOIDIS-SEDETALIA ALBI* Moravec 1967

Vegetation that grows on calcareous rocks and on lithosols, in the Temperate and Mediterranean macrobioclimates.

54.2.1 All.: *Alyssso alyssoidis-Sedion albi* Oberdorfer & Müller in Müller 1961

Sub-Atlantic and central European communities that are often rich in therophytic species and grow on calcareous soils in the mesotemperate and supratemperate thermotypes.

54.2.2 All.: *Sedo albi-Véronicion dillenii* Oberdorfer ex Korneck 1974

[*Véronicion* Oberdorfer 1957 *nom. inval.* (art. 2d, 3b), *Arabidopsidion thalianae* sensu Mucina & Kolbek in Mucina, Grabherr & Ellmauer 1993 non Passarge 1964]

Pioneer acidophilous Sub-Atlantic and central European communities that grow in lowland and hilly areas.

55 Cl.: LYGEO SPARTI-STIPETEA TENACISSIMAE Rivas-Martínez 1978 *nom. conserv. propos.* Rivas-Martínez, Díaz, Fernández-González, Izco, Loidi, Lousa & Penas 2002

[*Thero-Brachypodietea* Br.-Bl. in Br.-Bl., Emberger & Molinier 1947 *nom. nud.* (art. 2b, 8), *Thero-Brachypodietea ramosi* Br.-Bl. ex A. & O. Bolòs 1949 *nom. amb. rejic.* in Rivas-Martínez, Fernández-González

& Loidi 1999 (art. 51, 36), *Dactylo hispanicae-Brachypodietea retusi* Julve 1993 *nom. inval.* (art.2d, 3o, 5) ('*Dactyloglomeratae* ssp. *hispanicae*-...' art. 41b), *Lygeo-Stipetea* Rivas-Martínez 1978 p.p. (syntax. syn.), Non: *Thero-Brachypodietea* sensu Theurillat, Aeschmann, Küpfer & Spichiger 1995, non Br.-Bl. ex A. Bolòs & O. Bolòs in A. Bolòs 1949, *Thero-Brachypodietea* Br.-Bl. in Br.-Bl., Roussine & Nègre 1951 *nom. amb. propos.* (art. 36), *Lygeo-Stipetea* Rivas-Martínez 1978 *nom. conserv. propos.* (art. 51), *Phlomidi lychnitidis-Brachypodietea retusi* Roselló 1994 (art. 8)]

Mediterranean, perennial, thermo-xerophilous, steppe grasslands dominated by tufted *Graminaceae*, found throughout the Mediterranean region, though with a western Mediterranean *optimum*; they grow on deep calcareous soils in the thermo- to supra-Mediterranean thermotypes, and in the semiarid to subhumid ombrotypes.

55.1 Ord.: *LYGEO SPARTI-STIPETALIA TENACISSIMAE* Br.-Bl. & O.Bolòs 1958

[*Thero-Brachypodietalia* Br.-Bl. 1931 *nom. nud.* (art. 2b, 8) p.p., *Thero-Brachypodietalia* Br.-Bl. ex Molinier 1934 *em.* Rivas-Martínez, Fernández-González & Loidi 1998 (art. 47) p.p., *Brachypodietalia retusi* Julve 1993 *nom. inval.* (art. 2d, 3o, 5), *Lygeo-Stipetalia* Br.-Bl. & O.Bolòs 1958 (syntax. syn.) [*Lygeo-Stipetalia* Br.-Bl. & O. Bolòs 1958 *em.* Rivas-Martínez 1978 (art. 47) p.p.], Non: *Thero-Brachypodietalia* sensu Theurillat, Aeschmann, Küpfer & Spichiger 1995, non Br.-Bl. ex Molinier 1934, *Thero-Brachypodietalia* Br.-Bl. ex Molinier 1934 *nom. amb. propos.* (art. 36), *Thero-Brachypodietalia* Br.-Bl. ex Bharucha 1933 *nom. amb.* (art. 36, 51), *Lygeo-Stipetalia* Br.-Bl. & O. Bolòs 1958 *nom. conserv. propos.* (art. 42), *Phlomidi lychnitidis-Brachypodietalia retusi* Roselló 1994 (art. 5)]

Mediterranean, thermo-xerophilous, steppe, perennial, herbaceous, savanna-like vegetation, dominated by tufted *Graminaceae*, that grows in the driest territories of the western Mediterranean, on clayey, often salty soils, occasionally on very steep badlands.

55.1.1 All.: *Moricandio arvensis-Lygeion sparti* Brullo, De Marco & Signorello 1990

Thermo-xerophilous grasslands dominated by *Lygeum spartum*, characterized by southern-Mediterranean steppe species such as *Capparis sicula* and *Moricandia arvensis*. They grow on clayey badlands and are restricted to territories characterized by a thermo-Mediterranean dry or subhumid bioclimate. In Italy the alliance represents the steppe grasslands of Sicily and southern Calabria.

55.1.2 All.: *Polygonion tenoreani* Brullo, De Marco & Signorello 1990

Grassland communities consisting of peculiar endemic species that are limited to badland habitats exclusively in Basilicata and northern Calabria, where they are vicariants, in the meso-Mediterranean subhumid bioclimatic belt, of the more xeric alliance *Moricandio-Lygeion*.

55.2 Ord.: *HYPARRHENIETALIA HIRTAE* Rivas-Martínez 1978

Thermo-xerophilous and sub-nitrophilous perennial herbaceous vegetation, dominated by tall tufted *Graminaceae*, that grows on non-clayey soils of various nature, and has its *optimum* in the thermo-Mediterranean thermotype, occasionally extending into the infra- or meso-Mediterranean thermotypes.

55.2.1 All.: *Hyparrhenion hirtae* Br.-Bl., P. Silva & Rozeira 1956

[*Dauco criniti-Hyparrhenion hirtae* O. Bolòs 1962 (art. 29), *Aristido-Hyparrhenion hirtae* Brullo, Scelsi & Spampinato 1997 (syntax. syn.), *Saturejo-Hyparrhenion hirtae* O. Bolòs 1962 (syntax. syn.)]

Perennial, steppe grasslands, dominated by *Hyparrhenia hirta*, that grow on substrata of various types with shallow soils, often characterized by rocky outcrops. They grow in the thermo-Mediterranean, dry to subhumid, bioclimatic belt.

55.2.2 All.: *Avenulo cincinnatae-Ampelodesmion mauritanici* Minissale 1995

Perennial, arid communities that are dominated by *Ampelodesmos mauritanicus* and are distributed in central Mediterranean regions, where they usually develop on calcareous marly or sandy, deep soils.

56 Cl.: *MOLINIO-ARRHENATHERETEA* Tüxen 1937

[*Molinieto-Arrhenatheretales* Tüxen 1937 (original name), *Molinio-ŷuncetea* Br.-Bl. in Br.-Bl., Emberger & Molinier 1947 (art. 8), *Arrhenatheretea* Br.-Bl. in Br.-Bl., Emberger & Molinier 1947 (art. 8), *Plantaginetea majoris* Tüxen & Preising ex Von Rochow 1951 (syntax. syn.), *Molinio-ŷuncetea* Br.-Bl. ex A. & O. Bolòs 1950 (syntax. syn.), *Agrostio stoloniferae-Arrhenatheretea* de Foucault 1989 (art. 29)]

Hygrophilous and mesophilous, often manured and irrigated, meadows that are typical of deep, damp soils and are mainly distributed in the Temperate macrobioclimate, and to a lesser extent in the Mediterranean macrobioclimate.

56.1 Ord.: *MOLINIETALIA CAERULEAE* Koch 1926

[*Anagallido-ŷuncetalia* Br.-Bl. 1967 (syntax. syn.)]

Temperate meadows that grow on permanently moist, often peaty, soils and are occasionally mown; they are found above all in Eurosiberian regions.

- 56.1.1 All.: *Calthion palustris* Tüxen 1937 em. Balátová-Tulácková 1978
[*Bromion racemosi* Tüxen 1951 (syntax. syn.)]
Semi-continental and subcontinental meadows of tall farbs that often grow on inundated soils in the meso- to lower orotemperate thermotypes.
- 56.1.2 All.: *Molinion caeruleae* Koch 1926
[*Molinio-funcion acutiflori* P.A. Duvigneaud 1949 p.p. (syntax. syn.)]
Humid and oligo-mesotrophic, unmanured meadows, dominated by *Molinia caerulea*, that grow in the meso- and supratemperate thermotypes.
- 56.2 Ord.: *ARRHENATHERETALIA ELATIORIS* Tüxen 1931
[*Arrhenatheretalia* Pawłowski 1928 nom. nud. (art. 2b, 8), *Poo alpinae-Trisetalia* Ellmauer & Mucina in Mucina, Grabherr & Ellmauer 1993 p.p. (syntax. syn.)]
Mesophilous and meso-hygrophilous, mown, often manured meadows that grow on well-drained, fertile, meso-eutrophic to eutrophic soils, mainly in Eurosiberian regions.
- 56.2.1 All.: *Arrhenatherion elatioris* Koch 1926
[*Bromo erecti-Arrhenatherenion* Rivas Goday & Rivas-Martínez 1963, *Trifolio-Arrhenatherenion* Rivas Goday & Rivas-Martínez 1963, *Malvo-Arrhenatherenion* Rivas Goday & Rivas-Martínez 1963, *Brachypodio-Centaureion nemoralis* Br.-Bl. 1967 (syntax. syn.)]
Mesic, productive, floristically-rich meadows that are regularly mown twice a year and are not intensively manured; they are distributed from the plain to the lower mountain belts.
- 56.2.2 All.: *Ranunculo neapolitani-Arrhenatherion elatioris* Allegrezza & Biondi 2011
Mesic and productive meadows, dominated by *Arrhenatherum elatius*, that grow in central and southern Italy from the upper mesotemperate to the lower supratemperate thermotypes, occasionally extending into the meso-Mediterranean thermotype, though only under compensatory edaphic conditions.
- 56.2.3 All.: *Trisetio flavescens-Polygonion bistortae* Br.-Bl. & Tüxen ex Marschall 1947
[*Trisetio-Polygonion bistortae* Br.-Bl. & Tüxen 1943 nom. nud. (art. 2b, 8) ('... *bistortae*' art. 41b), *Polygono bistortae-Trisetion* Br.-Bl. & Tüxen ex Marschall 1947 nom. *invers. illeg.*, *Phyteumato-Trisetion* Hundt ex Passarge 1969 (syntax. syn.), *Campanulo rhomboidalis-Trisetenion flavescens* Dierschke in Theurillat 1992 (corresp. name)]
Mesic meadows, regularly mown once a year, distributed in the upper supratemperate and lower orotemperate thermotypes; this alliance is distributed above all in the Alps.
- 56.3 Ord.: *TRIFOLIO REPENTIS-PHLEETALIA PRATENSIS* Passarge 1969
[*Trifolio-Cynosuretalia* Sougnez in Sougnez & Limbourg 1963 nom. *inval.* (art. 2d, 3b), *Poo alpinae-Trisetalia* Ellmauer & Mucina in Mucina, Grabherr & Ellmauer 1993 p.p. (syntax. syn.), *Veronico serpyllifoliae-Cynosurenalia* de Foucault 1989 (corresp. name)]
Pasture vegetation.
- 56.3.1 All.: *Cynosurion cristati* Tüxen 1947
[*Achilleo-Cynosurion* (Tüxen 1947) Passarge 1969 nom. *inval.* (art. 2d, 3m, 24), *Thymo-Cynosurion* Passarge 1969 (syntax. syn.), *Ranunculo-Cynosurion* Passarge 1969, *Alchemillo xanthochlorae-Cynosurion cristati* (Passarge 1969) de Foucault 1989, *Lino biennis-Gaudinon fragilis* de Foucault 1989 (syntax. syn.), *Rumici crisp-Cynosurion* de Foucault 1989 (syntax. syn.), *Gaudinio fragilis-Cynosurenion* Rivas Goday & Rivas-Martínez 1963, *Galio veri-Cynosurenion* Rivas Goday & Rivas-Martínez 1963]
Secondary mesophilous pastures, mown once a year, that grow on mesotrophic, nutrient-rich soils with a good water supply; they develop in the meso-, supratemperate and supra-Mediterranean thermotypes.
- 56.3.2 All.: *Poion alpinae* Gams ex Oberdorfer 1950
[*Poion alpinae* Gams 1936 nom. nud. (art. 2b, 8)]
Productive, subalpine, eutrophic pastures that grow on fertile soils that are very nutrient-rich owing to the constant presence of cattle and the resulting organic return.
- 56.4 Ord.: *HOLOSCHOENETALIA VULGARIS* Br.-Bl. ex Tchou 1948
[*Holoschoenetalia* Br.-Bl. 1931 (art. 8), *Paspalo-Heleochloetalia* Br.-Bl. in Br.-Bl., Roussine & Nègre 1952 (art. 35) (syntax. syn.), *Heleochloo-Paspaletalia distichi* Br.-Bl. in Br.-Bl., Roussine & Nègre 1952 nom. *inv.* (art. 45), *Crypsio-Paspaletaliadistichi* Br.-Bl. in Br.-Bl., Roussine & Nègre 1952 nom. *inv. et nom. mut.* Rivas-Martínez, T.E. Díaz, Fernández-González, Izco, Loidi, Lousã & Penas 2002 (syntax. syn.), *Phalaridetalia coerulescentis* Galán, Deil, Haug & Vicente 1997 (syntax. syn.), *Paspalo distichi-Polypogonetalia semiverticillatae* Delpéch & Géhu in Bardat, Bioret, Botineau, Boulet, Delpéch, Géhu, Haury, Lacoste, Rameau, Royer, Roux & Touffet 2004 nom. *inval.* (art. 3b)]
Vegetation of Mediterranean, meso-hygrophilous, perennial meadows and pastures (from thermo- to supra-Mediterranean) that occasionally extends into the sub-Mediterranean variant of the Temperate

- macrobioclimate; it grows on damp, deep soils that are subjected to temporary flooding, particularly from autumn to spring, though they remain damp in summer owing to the presence of a high water table.
- 56.4.1 All.: *Agrostio stoloniferae-Scirpoidion holoschoeni* de Foucault 2012
[*Holoschoenion* Br.-Bl. 1931 (art. 8), *Holoschoenetalia* Br.-Bl. in Br.-Bl., Emberger & Molinier 1947 *nom. nud.* (art. 2b, 8), *Junco acuti-Holoschoenenion* Herrera 1995 (corresp. name), *Molinio arundinaceae-Holoschoenion vulgaris* Br.-Bl. ex Tchou *nom. inval.* (art. 2b, 8) p.p.]
Southern, meso-hygrophilous meadows that grow on meso-eutrophic alkali-rich soils.
- 56.4.2 All.: *Dactylorhizo-Juncion striati* Brullo & Grillo 1978
Hygrophilous communities dominated by helophytes (rushes and sedges) that grow in depressions in the supratemperate thermotype (rarely mesotemperate) subjected to periodic submersions, on soils with low permeability and a rich silty-clayey component.
- 56.4.3 All.: *Gaudinio fragilis-Hordeion bulbosi* Galàn, Deil, Haug & Vicente 1997
Meso-hygrophilous Iberian and Italian meadows, characterized by perennial species, that are widespread in the Apennines, on highly clayey substrata.
- 56.4.4 All.: *Paspalo distichi-Agrostion semiverticillatae* Br.-Bl. in Br.-Bl., Roussine & Nègre 1952
[*Paspalo distichi-Polypogonion semiverticillati* Br.-Bl. in Br.-Bl., Roussine & Nègre 1952 *nom. mut. illeg.*, *Paspalo distichi-Polypogonion viridis* Br.-Bl. in Br.-Bl., Roussine & Nègre 1952 *nom. mut.*]
Pioneer grasslands on Mediterranean, alluvial, silty soils in sites inundated for long periods of time.
- 56.4.5 All.: *Agrostio scabriculumis-Elytrigion athericae* Brullo & Siracusa 2000
Hygrophilous herbaceous communities that grow in areas that are partially flooded in some periods of the year, but that have also adapted to dry periods and are characterized by the presence of sub-halophilous species.
- 56.4.6 All.: *Agrostion montelucci* Biondi in Biondi, Allegrezza, Casavecchia, Galdenzi, Gasparri, Pesaresi, Vagge & Blasi 2014
Paucispecific communities of hemicryptophytes that form thick grasslands and are dominated by *Agrostis montelucci*, an endemic species that colonises marshes rich in calcium carbonate, carbon dioxide and hydrogen sulphide (“acque albule”). This *syntaxon* grows in the central-southern Tyrrhenian part of Italy, in areas that contain springs linked to secondary volcanism, extending from the sea level to the lower supratemperate thermotype.
- 56.5 Ord.: *PLANTAGINETALIA MAJORIS* Tüxen ex Von Rochow 1951
[*Potentillo-Polygonetalia* Tüxen 1947 (art. 3b), *Plantaginetalia majoris* Tüxen 1950 *nom. nud.* (art. 2b, 8) p. p. (‘... maioris’ art. 41a), *Eleocharitetalia palustris* de Foucault 1984 (syntax. syn.), *Trifolio fragiferi-Agrostietalia stoloniferae* Tüxen 1970 (syntax. syn.), *Plantagini-Prunelletalia vulgaris* Elmauer & Mucina in Mucina, Grabherr & Elmauer 1993 (syntax. syn.), *Poo alpinae-Trisetalia* Ellmauer & Mucina in Mucina, Grabherr & Ellmauer 1993 p.p.]
Vegetation of trampled and grazed hygrophilous perennial pastures, often temporarily inundated, on damp and eutrophic soils rich in organic and mineral nutrients; it is widespread in the Temperate and Mediterranean macrobioclimates.
- 56.5.1 All.: *Lolio perennis-Plantaginion majoris* Sissingh 1969
[*Lolio-Plantaginion* Sissingh 1969 (syntax. syn.), *Plantagini-Prunellion* Eliáš 1980, *Propos.: Polygonion avicularis* Aichinger 1933 *nom. amb. propos.*]
Mesophilous and nitrophilous pastures that grow on damp, compact soils in hilly areas subjected to heavy grazing and trampling.
- 56.5.2 All.: *Trifolio fragiferi-Cynodontion dactylonis* Br.-Bl. & O. Bolòs 1958
Grazed and trampled communities on damp, compact and nutrient-rich soils that grow in the thermo- and supra-Mediterranean thermotypes.
- 56.5.3 All.: *Poion supinae* Rivas-Martínez & Géhu 1978
[*Poion variae* Tüxen 1950 (art. 8), *Alchemillo hybridae-Poion supinae* Elmauer & Mucina in Mucina, Grabherr & Ellmauer 1993 (syntax. syn.)]
Supra-orotemperate and oro-Mediterranean, heavily overgrazed and trampled communities, dominated by *Poa supina*.
- 56.6 Ord.: *CIRSIETALIA VALLIS-DEMONIS* Brullo & Grillo 1978
Mountain and mesophilous meadows and pastures, in flat, flood-free areas, on eutrophic productive soils of varying depth, that are typically acidophilous and develop on siliceous substrata of various types, in the supra-Mediterranean humid and hyperhumid bioclimatic belt. This vegetation is floristically differentiated by the presence of species distributed in the south, some of which are endemic to southern Italy and Sicily.
- 56.6.1 All.: *Plantaginion cupanii* Brullo & Grillo 1978
Montane meadows in Sicily and Calabria.

56.7 Ord.: TRIFOLIO-HORDEETALIA Horvatić 1963

Vegetation of periodically-flooded meadows of endorhoeic karstic basins (poljes), found throughout the Balkan Peninsula as well as in some areas of the central Apennines.

56.7.1 All.: *Ranunculion velutini* Pedrotti 1976

Central Apennine, damp meadows found in karstic plains with lacustrine sediments dominated by *Ranunculus velutinus*, that grow from the upper mesotemperate to the supratemperate thermotypes and are periodically flooded.

56.8 Ord.: SACCHARETALIA RAVENNAE Biondi, Blasi & Casavecchia in Biondi, Allegranza, Casavecchia, Galdenzi, Gasparri, Pesaresi, Vagge & Blasi 2014

Perennial, freshwater, hemicryptophyte vegetation, dominated by *Saccharum ravennae*, that is occasionally slightly halophyllous, temporarily flooded and grows on sandy and sandy-silty substrata of retrodunal areas and of estuaries. It often represents the ecological union between freshwater marsh vegetation of the order *Phragmitetalia australis* and the more halophyllous communities of the class *Juncetea maritima*.

56.8.1 All.: *Imperato cylindricae-Erianthion ravennae* Br.-Bl. & O. Bolòs 1958

[*Imperato cylindricae-Saccharion ravennae* Br.-Bl. & O. Bolòs 1958 *nom. mut. propos.* Rivas-Martínez, Diaz, Fernández-González, Izco, Loidi, Lousa & Penas 2002]

Meso-hygrophilous communities that develop in temporarily flooded areas, consisting of tall *Graminaceae* such as *Erianthus ravennae* (= *Saccharum ravennae*).

57 Cl.: AGROSTIETEA STOLONIFERAE Oberdorfer 1983

[*Agrostietea stoloniferae* Oberdorfer in Oberdorfer, Görs, Korneck, Lohmeyer, Müller, Philippi & Seibert 1967 *pro syn. nom. inval.* (art. 2b, 2d, 3a, 8), *Agrostietea stoloniferae* Müller & Görs in Görs 1969 *nom. inval.* (art. 2b, 8), *Molinio-Arrhenatheretea* Tüxen 1937 (art. 35) p.p. ('*Molinieto-Arrhenatheretales*' art. 41b) (syntax. syn.), *Plantaginetea majoris* Tüxen & Preising ex Von Rochow 1951 ('... *maioris*' art. 41a) [*Plantaginetea majoris* Tüxen & Preising in Tüxen 1950 *nom. nud.* (art. 2b, 8) ('... *maioris*' art. 41a) p.p.], *Agrostio stoloniferae-Arrhenatheretea elatioris* de Foucault 1984 *nom. inval.* (art. 2d, 3o, 5) p.p.]

Mesotrophic to eutrophic meadow vegetation that grows in areas that are flooded for long periods and is found in riverine habitats or maritime plains.

57.1 Ord.: POTENTILLO ANSERINAE-POLYGONETALIA AVICULARIS Tüxen 1947

[*Potentilletalia anserinae* Oberdorfer 1949 *nom. nud.* (art. 2b, 8) ('... *Anserinae*' art. 41a), *Agrostietalia stoloniferae* Müller & Görs 1969 (syntax. syn.) [*Agrostietalia stoloniferae* Oberdorfer, Görs, Korneck, Lohmeyer, Müller, Philippi & Seibert 1967 *nom. nud.* (art. 2b, 8), *Agrostietalia stoloniferae* Müller & Görs in Görs 1968 *nom. nud.* (art. 2b, 8)], *Trifolio fragiferi-Agrostietalia stoloniferae* Tüxen 1970]

Hygrophilous and Eurosiberian, mown and grazed meadows, characterized by short periods of flooding.

57.1.1 All.: *Mentho longifoliae-Juncion inflexi* Müller & Görs ex de Foucault 2008

[*Mentho-Juncion inflexi* Müller & Görs ex de Foucault 1984 *nom. ined.* (art. 1), *Mentho-Juncion inflexi* Müller & Görs 1969 *nom. inval.* (art. 2d, 3a), *Agropyro-Rumicion crispum* Nordhagen 1940 (art. 36) *nom. amb. prop.*, *Mentho aquaticae-Juncion inflexi* (de Foucault 1984) Julve 1993 *nom. inval.* (3o, 5, 17) p.p., *Mentho-Juncion inflexi* Rivas-Martínez, Fernández-González & Sánchez-Mata 1986 p. p. (corresp. name)]

Perennial hygrophilous herbaceous vegetation that grows on temporarily flooded, mineral- and organic nutrient-rich soils, in bioclimates whose thermotype ranges from the meso- to supratemperate and from thermo- to supra-Mediterranean.

57.1.2 All.: *Alopecurion pratensis* Passarge 1964

Continental, mown meadows that grow in bioclimates whose thermotype ranges from meso- to supratemperate.

57.1.3 All.: *Alopecurion utriculati* Zeidler 1954

[*Trifolion resupinati* Micevski 1957 p.p.]

Hygrophilous, oligo-halinous, Mediterranean and thermo-Atlantic, mown meadows that grow in the Mediterranean macrobioclimate in the thermo- to upper meso-Mediterranean thermotypes, extending as far as the sub-Mediterranean variant of the Temperate macrobioclimate.

57.1.4 All.: *Potentillion anserinae* Tüxen 1947

[*Lolio-Potentillion anserinae* Tüxen 1947 *nom. illeg.* (art. 22), *Potentillion anserinae* Oberdorfer 1949 *nom. nud.* (art. 2b, 8) ('... *Anserinae*' art. 41a), *Agrostion stoloniferae* Görs in Oberdorfer, Müller & Görs 1967 (art. 29,

31, 36), *Agropyro-Rumicion crispus* Nordhagen 1940 em. Tüxen 1950 p.p. (Non: *Agropyro-Rumicion crispus* Nordhagen 1940), *Lolio-Plantaginion majoris* Sissingh 1969 (syntax. syn.), *Alchemillo-Ranunculion repentis* Passarge 1979 (syntax. syn.), *Plantagini-Prunellion* Elias 1980 (syntax. syn.), *Ranunculo repentis-Agropyrion repentis* J. Duvign. 1986 (syntax. syn.)

Hygrophilous and meso-hygrophilous, trampled and overgrazed meadows, sometimes temporarily flooded, on a eutrophic substratum, that grow in the Temperate macrobioclimate, in bioclimatic belts with thermotypes ranging from meso- to orotemperate and in the Mediterranean macrobioclimate with meso- to oro-Mediterranean thermotypes.

57.2 Ord.: *DESCHAMPSIETALIA CESPITOSAE* Horvatić 1958

[*Eleocharetalia palustris* De Foucault 1984 *nom. ined.* (art. 1), *Eleocharitetalia palustris* de Foucault 2008 *nom. illeg.* (art. 22)]

Vegetation of hygrophilous Eurosiberian meadows flooded for long periods of time.

57.2.1 All.: *Ranunculo ophioglossifolii-Oenanthion fistulosae* de Foucault 2012

[*Alopecuro bulbosi-Oenanthion fistulosae* Julve 1989 *nom. ined.*]

Hygrophilous Atlantic-Mediterranean meadows, dominated by *Oenanthe fistulosa*, that grow in flooded areas on clayey nutrient-rich substrata.

58 Cl.: *NARDETEA STRICTAE* Rivas Goday in Rivas Goday & Rivas-Martínez 1963

[*Nardenea strictae* Rivas Goday & Borja 1961 (“subclassis *Nardetea*”), *Nardetea strictae* Oberdorfer 1949 (art. 8), *Nardo-Callunetea* Preising 1949 p.p. (syntax. syn.), *Carlinetea macrocephalae* Gamisans 1977 (syntax. syn.)]

Dense grassland vegetation that grows on acidic, decalcified, deep soils that are subjected to long hydromorphy and have a good organic component. It is found in the Atlantic, central European and Mediterranean regions, in the bioclimatic belts with cryoro-, oro- and supratemperate and supra- oro- and cryoro-Mediterranean thermotypes.

58.1 Ord.: *NARDETALIA STRICTAE* Oberdorfer ex Preising 1949

[*Nardetalia* Oberdorfer 1949 *nom. inval.* (art. 2b, 2d, 3b, 8), *Campanulo herminii-Nardetalia strictae* Rivas-Martínez, Fernández-González & Sánchez-Mata 1986 (syntax. syn.)]

58.1.1 All.: *Ranunculo pollinensis-Nardion strictae* Bonin 1972

[*Festucion violaceae* Avena & Bruno 1975 *nom. inval.* (art. 3b), *Festucion macratherae* Avena & Bruno *corr.* Petriccione & Persia 1995]

Acidophilous and mesophilous grasslands of calcareous and silicate substrata of the central-southern Apennines, in which partial or complete soil decarbonation occurs. This alliance is characterized by numerous endemic *taxa*.

58.1.2 All.: *Violion caninae* Schwickerath 1944

[*Nardo strictae-Galium saxatilis* Preising 1950 p.p., *Calluno vulgaris-Festucion tenuifoliae* Horvat 1959]

Acidophilous or acidocline grasslands of areas with an Atlantic-like, micro- and mesoclimate that grow from lowland to mountain areas.

58.1.3 All.: *Nardo strictae-Juncion squarrosi* (Oberdorfer 1957) Passarge 1964

[*Juncion squarrosi* Oberdorfer 1957 (*Juncion squarrosi* pro suball. art. 41b), *Nardo strictae-Galium saxatilis* Preising 1950 *emend.* Stieperaere 1990 (‘... *saxatile*’ art. 41b) *nom. ined.*]

Herbaceous communities, dominated by *Nardus stricta* and *Juncus squarrosus*, that grow on damp and peaty soils subjected to trampling. In Italy they are found exclusively in the western Alps.

58.2 Ord.: *FESTUCETALIA SPADICEAE* Barbero 1970

[Incl.: *Festucion spadiceae* Br.-Bl. 1972]

Acidophilous grasslands of the southern Alps that grow in the oro- and cryorotemperate thermotypes.

58.2.1 All.: *Festucion variae* Br.-Bl. 1926

[*Festucion variae* Guinocet 1938 (syntax. syn.)]

Thermophilous communities of the Alpine slopes.

58.2.2 All.: *Hyperico richeri-Festucion paniculatae* (Br.-Bl. 1972) De Foucault 2012

[*Festucion spadiceae* Br.-Bl. 1972 *nom. illeg.* (art. 31, non *Festucion spadiceae* Nègre 1969)]

Acidophilous Alpine and Apennine grasslands dominated by *Festuca spadicea*.

58.2.3 All.: *Nardo strictae-Agrostion tenuis* Sillinger 1933

Orophilous acidocline grasslands that grow in bioclimatic belts whose thermotype ranges from the upper mesotemperate to lower orotemperate; in Italy they are found in the Alps and in the northern Apennines.

VIII. HEATHS, GARRIGUES AND SHRUB-MANTLE VEGETATION

59 Cl.: CALLUNO VULGARIS-ULICETEA MINORIS Br.-Bl. & Tüxen ex Klika in Klika & Hadač 1944
[*Calluno-Ulicetea* Br.-Bl. & Tüxen 1943 (art. 8), *Calluno-Ulicetea* Br.-Bl. & Tüxen ex Westhoff, Dijk & Passchier 1946 (art. 22), *Nardo-Callunetea* Preising 1948 (syntax. syn.)]

Atlantic and sub-Atlantic small-shrub vegetation, dominated by chamaephytes and nano-phanerophytes (*Ericaceae* and *Genisteae* species), that grows on acidic substrata and poor soils.

59.1 Ord.: ULICETALIA MINORIS Quantin 1935

Western-Mediterranean small-shrub communities that grow on poor, highly acidic substrata in the Mediterranean and Temperate macrobioclimates.

59.1.1 All.: Cisto salviifolii-Ericion cinereae Géhu in Bardat, Bioret, Botineau, Boulet, Delpech, Géhu, Haury, Lacoste, Rameau, Royer, Roux & Touffet 2004

Xero-thermophilous communities dominated by *Erica cinerea* that grow in meso-Mediterranean and supra-Mediterranean thermotypes, mainly on ophiolitic substrata. Atlantic vegetation that reaches the Mediterranean regions.

59.2 Ord.: VACCINIO MYRTILLI-GENISTETALIA PILOSAE Schubert 1960

Sub-Atlantic and continental heaths that grow up to the supratemperate thermotype.

59.2.1 All.: Genisto pilosae-Vaccinion uliginosi Br.-Bl. 1926

[*Calluno-Genistion pilosaeatlanticum* P.A. Duvigneaud 1944 *nom. illeg.* (art. 34) p.p., *Genistion* Böcher 1943 p.p. (syntax. syn.)]

Sub-continental heaths that grow in lowland areas with supratemperate thermotypes.

59.2.2 All.: Genistion tinctorio-germanicae de Foucault 2008

[*Genistion tinctorio-germanicae* (Böcher 1943) de Foucault 1990 *nom. inval.* (art. 2d, 5), *Calluno-Genistion pilosae atlanticum* P.A. Duvigneaud 1944 *nom. illeg.* (art. 34) p.p., *Genistion* Böcher 1943 p.p. (syntax. syn.)]

Mesothermic and mesophilous heaths that grow on acidic to neutral substrata in the sub-Atlantic and sub-continental regions.

60 Cl.: CISTO LADANIFERI-LAVANDULETEA STOECHADIS Br.-Bl. in Br.-Bl., Molinier & Wagner 1940

[*Carici-Genistetea lobelii* Klein 1972 (syntax. syn.) p.p., *Carlinetea macrocephalae* Gamisans 1977 (art. 29) p.p., *Rumici-Astragaletea siculi* E. Pignatti, Pignatti, Nimis & Avanzini 1980 (syntax. syn.) p.p.]

Mediterranean, heliophilous, xerophytic vegetation, dominated by nano-phanerophytes and chamaephytes, that grows on eroded siliceous soils.

60.1 Ord.: LAVANDULETALIA STOECHADIS Br.-Bl. in Br.-Bl., Molinier & Wagner 1940

[*Lavanduletalia stoechadis* Br.-Bl. 1931 (art. 8), *Ulici-Cistetalia* Br.-Bl., P. Silva & Rozeira 1965 (syntax. syn.)]
Vegetation distributed in central and western Mediterranean regions.

60.1.1 All.: Cistion ladaniferi Br.-Bl. in Br.-Bl., Molinier & Wagner 1940

[*Cistion ladaniferi* Br.-Bl. 1931 (art. 8), *Cistion ladaniferi* suball. *medio-mediterraneum* Br.-Bl. in Br.-Bl., Molinier & Wagner 1940 (corresp. name, art. 34), *Cistion medio-mediterraneum* (Br.-Bl. in Br.-Bl., Molinier & Wagner 1940) O. Bolòs 1962 (art. 34), *Calicotomo spinosae-Cistion ladaniferi* (Br.-Bl. in Br.-Bl., Molinier & Wagner 1940) Rivas-Martínez 1979 (nomencl. syn.)]

Communities that grow from Spain to the Mediterranean sector of France and part of Liguria.

60.1.2 All.: Calicotomo villosae-Genistion tyrrhenae Biondi 2000

Communities that grow along south-western Tyrrhenian coasts and on the islands (except Sardinia). This *syntaxon* is the vicariant of the Sardinian alliances *Teucrion mari* and *Cistion ladaniferi* in these territories.

60.1.3 All.: Teucrion mari Gamisans & Murraciale 1984

Sardinian and Corsican communities that occur on poor soils in the bioclimatic belt with thermo-Mediterranean and meso-Mediterranean thermotypes.

60.2 Ord.: CARICI CARYOPHYLLEAE-GENISTETALIA LOBELII Klein 1972

[*Carlinetalia macrocephalae* Gamisans 1977 (syntax. syn.), Incl.: *Junipero-Astragalion genargentei* Ubaldi 2011 *nom. inval.* (art. 5)]

Vegetation that grows in the supra-Mediterranean and oro-Mediterranean thermotypes of Corsica, Sardinia and Sicily.

60.2.1 All.: Anthyllidion hermanniae Klein 1972

- Sardinian and Corsican acidophilous communities that grow in the supra-Mediterranean thermotype.
- 60.3 Ord.: *RUMICI-ASTRAGALETALIA SICULI* Pignatti & Nimis in E. Pignatti, Pignatti, Nimis & Avanzini 1980 [*Astragaletalia siculae* Giacobini ex Poli 1965 *nom. prov.* (art. 3b)]
Orophilous vegetation, dominated by hemicryptophytes and chamaephytes, that grows on volcanic substrata and finds its *optimum* in the bioclimatic belts with oro-Mediterranean and cryoro-Mediterranean thermotypes, sometimes extending as far as the supra-Mediterranean thermotype.
- 60.3.1 All.: *Rumici-Astragalion siculi* Poli 1965
Orophilous, chamaephytic communities that grow in the bioclimatic belts of the oro-Mediterranean and cryoro-Mediterranean thermotypes of Mount Etna.
- 61 Cl.: CISTO CRETICI-MICROMERIETEA JULIANAE Oberdorfer ex Horvatić 1958**
[*Cisto-Micromerietea* Oberdorfer 1954 (art. 8)]
Chamaephytic and nano-phanerophytic communities, often rich in pulvinate and thorny species, that grow throughout the central and eastern Mediterranean on various substrata. In the Italian Peninsula, the *syntaxon* is found on the Adriatic side of the central-southern Apennines and in the Ionian sectors.
- 61.1 Ord.: *CISTO CRETICI-ERICETALIA MANIPULIFLORAE* Horvatić 1958
Garrigues that are indifferent to the chemical nature of the substratum and grow from the coastal to the montane sectors.
- 61.1.1 All.: *Cisto cretici-Ericion manipuliflorae* Horvatić 1958
Nano-phanerophytic coastal calcicolous garrigues, dominated by *Erica manipuliflora* and *Calicotome infesta*, linked to post-fire dynamics. In Italy, this vegetation grows along the coastal Adriatic and Ionian sectors.
- 61.1.2 All.: *Cytiso spinescentis-Satureion montanae* Pirone & Tammaro 1997
Chamaephytic grasslands with eastern elements that grow in the bioclimatic belts with mesotemperate and lower supratemperate thermotypes, in the central-southern Apennines.
- 61.2 Ord.: *ARTEMISIO ALBAE-SATUREJETALIA MONTANAE* (Allegrezza, Biondi, Formica & Ballelli 1997) Biondi & Allegrezza in Biondi, Allegrezza, Casavecchia, Galdenzi, Gasparri, Pesaresi, Vagge & Blasi 2014
Chamaephytic and nanophanerophytic calcicolous rocky and pioneer vegetation that grows in the sub-Mediterranean variant of the Temperate macrobioclimate, from the mesotemperate to the supratemperate thermotypes. It is typical of Apennine reliefs, though it is also found in the Alps and in the Balkan Peninsula. It is the geographic vicariant of the order *Ononidetalia striatae*, which is distributed in south-western Europe.
- 61.2.1 All.: *Artemisio albae-Saturejion montanae* Allegrezza, Biondi, Formica & Ballelli 1997
Thermo-xerophilous garrigues that are rich in pulvinate species and grow on calcareous, arenaceous or conglomeratic substrata in the mesotemperate and lower supratemperate thermotypes of the Apennine reliefs.
- 62 Cl.: ROSMARINETEA OFFICINALIS Rivas-Martínez, T.E. Díaz, F.Prieto, Loidi & Penas 2002**
[*Ononido-Rosmarinetea* Br.-Bl. 1947 (art. 2b, 8), *Ononido-Rosmarinetea* Br.-Bl. in Br.-Bl., Roussine & Nègre 1952 (art. 35), *Rosmarinetea officinalis* Rivas-Martínez, T.E. Díaz, F. Prieto, Loidi & Penas 1991 (art. 17), *Serratulo nudicaulis-Jurineenea humilis* Peinado, Alcaraz & Martínez-Parras 1992 (corresp. name)]
Mediterranean calcicole vegetation dominated by chamaephytes and nanophanerophytes that grows on immature or eroded soils. These communities typically occur in the Mediterranean macrobioclimate, where the thermotype is mesomediterranean to oromediterranean, though they can also be found in the sub-Mediterranean variant of the temperate macrobioclimate, in the western and central Mediterranean.
- 62.1 Ord.: *ROSMARINETALIA OFFICINALIS* Br.-Bl. ex Molinier 1934
[*Rosmarinetalia* Br.-Bl. 1931 (art. 2b, 8), *Rosmarinetalia* Br.-Bl. in Br.-Bl. & Pawłowski 1931 (art. 3f), *Phlomidetalia purpureae* Rivas Goday & Rivas-Martínez 1969 (syntax. syn.)]
Garrigues mainly consisting of chamaephytes and nanophanerophytes that grow in Italy in coastal areas, in the Apennines and on islands.
- 62.1.1 All.: *Alyssion bertolonii* Pignatti in E. Pignatti & Pignatti 1977
[*Euphorbion ligusticae* Nowak 1987 (syntax. syn.)]
Garrigue communities that grow on ophiolitic substrates with neutral or alkaline pH, and occur from Piedmont to Tuscany, where the bioclimate is meso-Mediterranean to supratemperate.
- 62.1.2 All.: *Cisto eriocephali-Ericion multiflorae* Biondi 2000
Thermo-xerophilous, coastal and subcoastal garrigues that grow prevalently in the Tyrrhenian sector of the Italian peninsula. These communities pertain to the meso- and thermo-Mediterranean thermotypes.
- 62.1.3 All.: *Rosmarinion officinalis* Br.-Bl. ex Molinier 1934

[*Rosmarino-Ericion* Br.-Bl. 1931 *nom. nud.* (art. 2b, 8), *Rosmarino-Ericion* Br.-Bl. & Pawłowski 1931 *nom. nud.* (art. 2b, 8), *Rosmarino-Ericion* G. Braun-Blanquet 1936 (syntax. syn.)]

Communities that grow on coastal cliffs in the western Mediterranean.

- 62.1.4 All.: *Helianthemo italici-Aphyllanthion monspeliensis* Díez Garretas, Fernández-González & Asensi 1998
Garrigues that grow on calcareous soils in the western Mediterranean as far as western Liguria

- 62.2 Ord.: *ERYSIMO-FURINETALIA BOCCONEI* Brullo 1984

[*Erinacetalia* sensu Pignatti & Nimis in E. Pignatti, Pignatti, Nimis & Avanzini 1980 non Br.-Bl. 1940, *Lavanduletalia stoechadis* sensu Pignatti & Nimis in E. Pignatti, Pignatti, Nimis & Avanzini 1980 non Br.-Bl. 1940]

Orophilous, hemicryptophytic-chamaephytic vegetation that grows in the supra-Mediterranean thermotype on eroded soils of weathered limestone, dolomite, quartzite and metamorphic rocks.

- 62.2.1 All.: *Cerastio-Astragalion nebrodensis* Pignatti & Nimis ex Brullo 1984

[*Cerastio-Asragalion nebrodensis* Pignatti & Nimis in E. Pignatti, Pignatti, Nimis & Avanzini 1980 *nom. illeg.* (art. 5)]

Basiphilous and neutrophilous communities that grow on limestones, dolomites, 'diagenized' clays and flysch.

- 62.2.2 All.: *Armerion nebrodensis* Brullo 1984

[*Trifolion humilis* Pignatti & Nimis in E. Pignatti, Pignatti, Nimis & Avanzini 1980 non Quézel 1957]

Acidophilous communities of dwarf, densely-matted plants that grow on quartzites and quartz arenites.

63 Cl.: *CYTISETEA SCOPARIO-STRIATI* Rivas-Martínez 1975

[*Cytisetea scopario-striati* Rivas-Martínez 1974 (art. 3f)]

Mantle vegetation and communities of fruticose species dominated by *Fabaceae* that grow on acidic soils in Atlantic, sub-Atlantic and west-Mediterranean areas.

- 63.1 Ord.: *CYTISETALIA SCOPARIO-STRIATI* Rivas-Martínez 1975

[*Cytisetalia scopario-striati* Rivas-Martínez 1974 (art. 3f), *Retametalia sphaerocarphae* Rivas Goday 1980 (syntax. syn.)]

Western silicicolous vegetation.

- 63.1.1 All.: *Violion messanensis* Barbagallo, Brullo, Furnari, Longhitano & Signorello 1982

Acidophilous communities that can be found in the supra-Mediterranean thermotype of Sicily and Calabria.

- 63.1.2 All.: *Sarothamnion scoparii* Tüxen ex Oberdorfer 1957

[*Sarothamnion scopariae* Tüxen in Preising 1948 *nom. Nud.* (art. 2b, 8)]

Atlantic and continental communities of hills and mountains.

- 63.2 Ord.: *CYTISO VILLOSI-TELINETALIA MONSPESSULANAE* Rivas-Martínez, Galán & Cantó in Rivas-Martínez, T.E. Díaz, Fernández-González, Izco, Loidi, Lousã & Penas 2002

Shrub vegetation, dominated by *Fabaceae*, that forms communities of fruticose species and mantles of acidophilous Mediterranean forests. It grows on deep and acidic soils in the thermo- and meso-Mediterranean, subhumid and humid bioclimatic belts.

- 63.2.1 All.: *Telinion monspessulano-linifoliae* Rivas-Martínez, Galán & Cantó in Rivas-Martínez, T.E. Díaz, Fernández-González, Izco, Loidi, Lousã & Penas 2002

Western communities. In Italy, they only grow on the Tyrrhenian islands and along the Tyrrhenian coast of the peninsula.

64 Cl.: *RHAMNO CATHARTICAE-PRUNETEA SPINOSAE* Rivas Goday & Borja ex Tüxen 1962

[*Rhamno-Prunetea* Rivas Goday & Borja 1961 (art. 3b), *Crataego-Prunetea* Tüxen 1962 (art. 3a), *Sambucetea* Doing 1962 (art. 8), *Urtico-Sambucetea* Passarge & Hofmann 1968 (syntax. syn.), *Rhamno-Prunetea* Rivas-Martínez, Arnaiz & Loidi in Arnaiz & Loidi 1983 (nomencl. syn.), *Salicetea arenariae* Weber 1999 (syntax. syn.), *Lonicero-Rubetea plicati* Haveman, Schaminée & Stortfelder in Stortfelder, Schaminée & Hommel 1999 (syntax. syn.); incl. *Paliuretea spinae-christi* Trinajstić 1978]

Shrubland and mantle communities that are dynamically related to the deciduous forests of the *Quercus-Fagetea* class.

- 64.1 Ord.: *PRUNETALIA SPINOSAE* Tüxen 1952

[*Frangulo-Prunetalia insititiae* Rivas Goday 1964 (syntax. syn.)]

Shrub vegetation of mantles, shrublands and hedges that are dynamically related to deciduous forests; it mainly grows on well-structured, often calcareous, soils.

- 64.1.1 All.: *Berberidion vulgaris* Br.-Bl. 1950
Calicolous, xerophilous and mesophilous shrub communities distributed prevalently in sub-Atlantic and supra-Mediterranean areas.
- 64.1.2 All.: *Cytision sessilifolii* Biondi in Biondi, Allegrezza & Guitian 1988
[*Teucro chamaedrys-Cytisophyllion sessilifolii* Ubaldi 2011 *nom. inval.* (art. 5), *Ilici-Crataegion laciniatae* Ubaldi 2011 *nom. inval.* (art. 5)]
Mantle communities and Apennine shrublands that are also found in southern France as far as Provence. They grow on calcareous and marly-sandy substrates in the sub-Mediterranean variant of the mesotemperate bioclimate up to the lower supratemperate thermotype.
- 64.1.3 All.: *Berberido aetnensis-Crataegion laciniatae* Gianguzzi, Caldarella, Cusimano & Romano 2011
Shrub communities of thorny and creepy nanophanerophytes found in the supratemperate and lower mesotemperate thermotypes in northern Sicily, where they are a vicariant of *Berberidion vulgaris*.
- 64.1.4 All.: *Salici elaeagni-Hippophaeion fluviatilis* de Foucault & Julve 2001
[*Hippophaenion fluviatilis* Rübel ex Arlot 1985 *nom. inval.* (art. 2d, 5), *Hippophaion* Rübel 1933 *nom. nud.* (art. 2b, 8), *Salici elaeagni-Hippophaion fluviatilis* de Foucault & Julve in Julve 1993 *nom. inval.* (art. 2d, 3b) ('*Salici elaeagni* ssp. *elaegni-Hippophaeion rhamnoidis* ssp. *fluviatilis*' art. 41b)]
Tall-shrub communities, dominated by *Salix eleagnos* and *Hippophae fluviatilis*, that can be found on calcareous substrates along creeks in the central Alps.
- 64.1.5 All.: *Salici cinereae-Viburnion opuli* (Passarge 1985) de Foucault 1991
[*Salici-Viburnenion opuli* Passarge 1985 (corresp. name)]
Shrub communities that grow along slow-moving water courses and in flooded areas.
- 64.1.6 All.: *Humulo lupuli-Sambucion nigrae* de Foucault & Julve 2001
[*Humulo lupuli-Sambucion nigrae* de Foucault & Julve in Julve 1993 *nom. inval.* (art. 2d, 3b)]
Mesophilous and nitrophilous shrub communities with *Sambucus nigra* that grow along water courses and ditches, on eutrophic and moist soils.
- 64.2 Ord.: *LAURO NOBILIS-SAMBUCETALIA NIGRAE* Biondi, Blasi, Casavecchia, Galdenzi & Gasparri in Biondi, Allegrezza, Casavecchia, Galdenzi, Gasparri, Pesaresi, Vagge & Blasi 2014
Nitrophilous micro-forests characterised by *Sambucus nigra* and Mediterranean species that grow in wet and shady areas on soils rich in organic matter, in the meso-Mediterranean thermotype, occasionally even in the upper thermo-Mediterranean thermotype, of the Mediterranean macrobioclimate; they are also found in the Temperate macrobioclimate, particularly in its sub-Mediterranean variant.
- 64.2.1 All.: *Lauro nobilis-Sambucion nigrae* Biondi, Blasi, Casavecchia, Galdenzi & Gasparri in Biondi, Allegrezza, Casavecchia, Galdenzi, Gasparri, Pesaresi, Vagge & Blasi 2014
Nitrophilous micro-forests characterised by *Sambucus nigra* and Mediterranean species that grow in wet and shady areas, on soils rich in organic matter in the meso-Mediterranean thermotype, occasionally even in the upper thermo-Mediterranean thermotype, of the Mediterranean macrobioclimate; they are also found in the Temperate macrobioclimate, particularly in the Submediterranean variant.
- 64.3 Ord.: *PYRO SPINOSAE-RUBETALIA ULMIFOLII* Biondi, Blasi & Casavecchia in Biondi, Allegrezza, Casavecchia, Galdenzi, Gasparri, Pesaresi, Vagge & Blasi 2014
Mediterranean and sub-Mediterranean shrub vegetation with abundant *Rubus ulmifolius*.
- 64.3.1 All.: *Pruno spinosae-Rubion ulmifolii* O. Bolòs 1954
[*Ligustro-Rubion ulmifolii* Géhu & Delelis in Delelis 1973 (art. 3b), *Lonicerion periclymeni* Géhu, de Foucault & Delelis 1983 (syntax. syn.), *Pyracantho coccineae-Hippophaeion rhamnoidis* ssp. *fluviatilis* de Foucault & Julve 2001 (syntax. syn.)]
Thermophilous shrub and mantle communities that host several Mediterranean species and grow on moist soils.
- 64.3.2 All.: *Arundo plinii-Rubion ulmifolii* Biondi, Blasi, Casavecchia & Gasparri in Biondi, Allegrezza, Casavecchia, Galdenzi, Gasparri, Pesaresi, Vagge & Blasi 2014
Communities dominated by *Rubus ulmifolius* that occur on various types of soils with varying degrees of water retention: clay, pelitic, arenaceous and marly arenaceous soils that contain varying amounts of organic matter. These edaphic characteristics allow different species to grow depending on the water conditions found in the substrates. Thus, these communities represent ecological gradients that vary according to the water factor.
- 64.4 Ord.: *SAMBUCETALIA RACEMOSAE* Oberdorfer ex Passarge in Scamoni 1963
[*Pruno-Rubetalia* (Tüxen 1951) Weber 1974 (syntax. syn.), *Rubetalia plicati* Weber in Pott 1995 (syntax. syn.)]

Fast-growing shrub and brambles that grow on nitrified soils, such as forest mantles, on mountain conoids and on rills, prevalently in the central Alps and the Pyrenees.

64.4.1 All.: *Sambuco racemosae-Salicion capreae* Tüxen & Neumann in Tüxen 1950

[*Senecioni ovatae-Corylion avellanae* Weber 1997 (syntax. syn.), *Sambuco-Salicion capreae* Tüxen & Neumann 1950]

Shrub communities of the Alps that grow in forest clearings on organic matter-rich soils, often in contact with megaphorb vegetation. These communities are found in the supra- and lower orotemperate thermotypes.

64.5 Ord.: *PALIURETALIA SPINAE-CHRISTI* Trinajstić 1978

[*Cotino-Paluretalia* Fukarek 1960 p.p.] Shrub formations of mixed deciduous and evergreen forests that are the stages of recovery of the sub-Mediterranean deciduous and semi-deciduous woods that occur on substrates of carbonate nature in the eastern Mediterranean area (Balkan peninsula and eastern side of Italy).

64.5.1 All.: *Rhamno saxatilis-Paliurion* Biondi, Casavecchia, Biscotti & Pesaresi in Biondi, Casavecchia, Pesaresi, Gangale, Uzunov 2014

Vegetation of inland areas of the western Adriatic side of the Italian peninsula, sometimes occurring also in Tyrrhenian inland areas. This is currently known for Karst areas and in the Apennine intramountain lowlands. It represents the geographic vicariant alliance of the Balkan alliance *Rhamno (intermedii)-Paliurion* Trinajstić 1996.

IX. FOREST, WOODLAND AND SHRUBLAND VEGETATION

65 Cl.: *ALNETEA GLUTINOSAE* Br.-Bl. & Tüxen ex Westhoff, Dijk & Passchier 1946

[*Alnetea glutinosae* Br.-Bl. & Tüxen 1943 (art. 8), *Carici-Alnetea glutinosae* Passarge & Hoffmann 1968 (nomencl. syn.), *Carici-Salicetea cinereae* Passarge & Hoffmann 1968 (syntax. syn.), *Franguletea* Doing ex Westhoff & Den Held 1969 (syntax. syn.)]

Eurosiberian and Mediterranean swamp forest and shrubland vegetation; it grows on surface gley soils that are usually rich in undecomposed organic matter up to peat.

65.1 Ord.: *SALICETALIA AURITAE* Doing ex Westhoff in Westhoff & Den Held 1969

[*Salicetalia auritae* Doing 1962 *nom. nud.* (art. 2b, 8), *Alno-Salicetalia cinereae* Doing 1962 *nom. nud.* (art. 2b, 8), *Eriophoro-Salicetalia cinereae* Passarge & Hofmann 1968 *nom. inval.* (art. 2d, 3b), *Calamagrostio-Salicetalia cinereae* Passarge & Hofmann 1968 (syntax. syn.)]

Pioneer or permanent shrub vegetation dominated by willows that grow on saturated soils.

65.1.1 All.: *Salicion cinereae* Müller & Görs 1958

[*Alno-Salicion cinereae* Doing 1962 *nom. nud.* (art. 2b, 8), *Salicion auritae* Doing 1962 *nom. nud.* (art. 2b, 8), *Comaro-Salicion cinereae* Passarge & Hofmann 1968 (syntax. syn.), *Eriophoro-Salicion cinereae* Passarge & Hofmann 1968, *Frangulo-Salicion auritae* Oberdorfer, Müller & Görs 1967 (art. 29), *Alno-Salicion cinereae* Passarge & Hofmann 1968 (art. 31), *Salicion cinereae* Müller & Görs 1968]

Willow shrublands, dominated by *Salix cinerea*, that grow on permanently inundated, swampy, peaty or para-peaty soils.

65.2 Ord.: *ALNETALIA GLUTINOSAE* Tüxen 1937

[*Alnetalia glutinosae* Vlieger 1937 *nom. inval.* (art. 2d, 3b), *Irido-Alnetalia glutinosae* Passarge & Hofmann 1968 (syntax. syn.), *Calamagrostio-Alnetalia glutinosae* Passarge & Hofmann 1968]

Vegetation usually dominated by *Alnus glutinosa*.

65.2.1 All.: *Alnion glutinosae* Malcuit 1929

[*Irido-Alnion glutinosae* (Doing-Kraft in Maas 1959) Passarge & Hofmann 1968 *nom. inval.* (art. 2d, 3m, 24), *Irido-Alnion glutinosae* Doing-Kraft in Maas 1959 ('*Irido-Alnion* ...' pro suball. art. 41b) (corresp. name)]

Hygrophilous or meso-hygrophilous *Alnus glutinosa* forest communities found on soils that are swampy or water-logged nearly all year round, as well as on peaty soils that contain varying amounts of organic matter.

66 Cl.: *BETULO CARPATICAE-ALNETEA VIRIDIS* Rejmánek in Huml, Lepš, Prach & Rejmánek 1979

[*Mugo-Alnetea viridis* Egger 1952 *nom. nud.* (art. 2b, 8), *Betulo-Adenostyletea* Br.-Bl. 1950 p.p. (syntax. syn.), *Betulo-Adenostyletea* Br.-Bl. & Tüxen 1943 *nom. nud.* (art. 2b, 8) p.p., *Betulo-Adenostyletea* Br.-Bl. & Tüxen ex Br.-Bl. 1948 *nom. inval.* (art. 2d, 3f) p.p.]

Meso-hygrophilous thickets or microforests of deciduous bushes or small trees that grow on slopes and in shady ravines with abundant winter snow-cover in the orotemperate thermotype.

66.1 Ord.: ALNETALIA VIRIDIS Rübel 1933

[*Vératro-Salicetalia* Passarge 1978]

Meso-hygrophilous, alpine shrub vegetation.

66.1.1 All.: *Alnion viridis* A. Schnyd. 1930

[*Alnion viridis* Aichinger 1933, *Salicion pentandrae* Br.-Bl. 1950 (art. 8), *Salicion waldsteiniana* Oberdorfer 1978 (syntax. syn.), *Salicion helveticae* Rübel ex Theurillaat in Theurillaat, Aeschmann, Kùpfer & Spichiger 1994 (syntax. syn.), *Alnion viridis* Rübel 1933 *nom. nud.* (art. 2b, 8), *Betulo-Alnion viridis* Gams 1936 *nom. nud.* (art. 2b, 8)]

Shrub communities dominated by green alder (*Alnus viridis*) that colonize and improve ground stability in avalanche ravines, gullies and steep creeks.

67 Cl.: NERIO OLEANDRI-TAMARICETEA AFRICANAE Br.-Bl. & O. Bolòs 1958

Shrub and tall-grass communities that grow on the beds and banks of intermittent rivers and creeks in the Mediterranean, Saharo-Indic and Irano-Turanian regions, in the infra- to meso-Mediterranean thermotype.

67.1 Ord.: TAMARICETALIA AFRICANAE Br.-Bl. & O. Bolòs 1958 *em. Izco, Fernández-González & A. Molina* 1984

Halophilous vegetation characterized by species of the genus *Tamarix* (*Tamarix gallica*, *T. canariensis*; optimum *T. africana*).

67.1.1 All.: *Tamaricion africanae* Br.-Bl. & O. Bolòs 1958

Hygrophilous and sub-halophilous communities dominated by tamarisks that grow along intermittent or permanent water courses with a highly varied seasonal discharge, as well as in coastal wetlands. They are typical of the thermo-Mediterranean thermotype, occasionally occurring in the meso-Mediterranean thermotype.

67.2 Ord.: NERIO OLEANDRI-VITICETALIA AGNI-CASTI de Foucault, Bensettiti, Noble & Paradis 2012

Oligo-halophilous brushlands, with few *Tamarix* species other than *T. africana*. These communities are characterized by the presence of *Nerium oleander*. The soil substrate is scarcely mineralized and favors the access of species belonging to the *Quercetea ilicis* class.

67.2.1 All.: *Rubio ulmifolii-Nerion oleandri* O. Bolòs 1985

Shrubland communities dominated by *Nerium oleander* and *Vitex agnus-castus* that grow on the pebbly edge of water courses with an intermittent flow. These communities are widely distributed across the western and central Mediterranean.

68 Cl.: SALICI PURPUREAE-POPULETEA NIGRAE Rivas-Martínez & Cantó ex Rivas-Martínez, Bâscones, T.E. Díaz, Fernández-González & Loidi 2001

[*Salici purpureae-Populenea nigrae* Rivas-Martínez & Cantó ex Rivas-Martínez, Bâscones, T.E. Díaz, Fernández-González & Loidi 1991 (art. 27a), *Salici-Populenea nigrae* Rivas-Martínez & Cantó ex Rivas-Martínez 1987 (art. 5), *Populetea albae* Br.-Bl. 1962 (art. 2b), *Alno-Populetea* Fukarek & Fabijanic 1958 (art. 2b)]

Meso-hygrophilous, riparian, deciduous forests that grow along water courses and alluvial plains in the Eurosiberian and Mediterranean regions.

68.1 Ord.: POPULETALIA ALBAE Br.-Bl. ex Tchou 1948

[*Populetalia albae* Br.-Bl. 1931 (art. 8), *Rhododendro pontici-Prunetalia lusitanicae* A.V. Pérez, Galán & Cabezudo in A.V. Pérez, Galán, P. Navas, D. Navas, Y. Gil & Cabezudo 1999 (syntax. syn.)]

Riverine meso- and macroforests (i.e. forests of medium to tall height) that grow on fluvisols with a high water table along occasionally inundated, recent river terraces.

68.1.1 All.: POPULION ALBAE Br.-Bl. ex Tchou 1948

Riparian communities of the Mediterranean region that grow on soils with a high water table

68.1.2 All.: *Alno-Quercion roboris* Horvat 1950

[*Alno-Quercion roboris* Horvat 1937 *nom. inval.* (art. 2b), *Alno-Quercion roboris* Horvat 1937 *nom. inval.* (art. 3a), *Alnion incanae* Horvat 1938, non Pawlowski 1928]

Swamp forest communities dominated by *Quercus robur*, *Ulmus minor*, *Fraxinus oxycarpa* and *Alnus glutinosa*.

68.1.3 All.: *Osmundo regalis-Alnion glutinosae* (Br.-Bl., P. Silva & Rozeira 1956) Dierschke & Rivas-Martínez in Rivas-Martínez 1975

[*Alnion lusitanicum* Br.-Bl., P. Silva & Rozeira 1956 (art. 34), *Rhododendro-Alnenion* Rivas Goday & Rivas-Martínez in Rivas-Martínez 1965 (corresp. name), *Osmundo-Alnion* Dierschke & Rivas-Martínez in Dierschke 1975 (art. 31), *Rhododendro pontici-Prunion lusitanicae* A.V. Pérez, Galán & Cabezudo in A.V. Pérez, Galán, P. Navas, D. Navas, Y. Gil & Cabezudo 1999 (syntax. syn.)]

Alnus-dominated riparian communities that grow on acidic substrates in the western Mediterranean.

68.1.4 All.: *Alnion incanae* Pawłowski in Pawłowski, Sokołowski & Wallisch 1928

[*Alno-Padion* Knapp 1942 *nom. ined.* (art. 1)]

Mesophilous and meso-hygrophilous hardwood forests of the Eurosiberian region that grow along rivers in areas inundated exclusively during high-recurrence interval floods.

68.1.5 All.: *Platanion orientalis* I. Kárpáti & V. Kárpáti 1961

Riparian communities dominated by *Platanus orientalis* that co-occur with other hygrophilous species and grow along perennial water courses in the Mediterranean macrobioclimate and in the thermo-Mediterranean thermotype. These communities are found on a wide range of alluvial, hydromorphic soils, with sandy to pebbly textures.

68.1.6 All.: *Carici remotae-Fraxinion oxycarpae* Pedrotti ex Pedrotti, Biondi, Allegrezza & Casavecchia in Biondi, Allegrezza, Casavecchia, Galdenzi, Gasparri, Pesaresi, Vagge & Blasi 2014

[*Fraxinion angustifoliae* Pedrotti 1970 *nom inval.* (art. 3b), *Fraxinion angustifoliae* Pedrotti ex Biondi & Casavecchia in Biondi *et al.* 2010 *nom. inval.* (art. 5, 43)]

Communities dominated by *Fraxinus angustifolia* subsp. *oxycarpa* of southern-central Italy that grow in swampy areas, floodplains and in the last part of water courses.

69 Cl.: SALICETEA PURPUREAE Moor 1958

Azonal communities of willow brushwood and forests that grow along floodways, in both lowland and mountain areas.

69.1 Ord.: *SALICETALIA PURPUREAE* Moor 1958

[*Populetalia albae* Br.-Bl. ex Tchou 1948 p.p. [*Populetalia albae* Br.-Bl. 1931 *nom. nud.* (art. 2b, 8) p.p.] (syntax. syn.), *Salicetalia albae* Müller & Görs 1958 *nom. inval.* (art. 2d, 3b) p.p. ('... alba' art. 41b), *Salicetalia purpureae* Moor 1958, *Propos.:* *Myricarietalia* Aichinger 1933 *nom. ambig. propos.*]

Riparian, forest, floodway vegetation dominated by tall willows and pioneer willow shrubs, regularly inundated by seasonal floods.

69.1.1 All.: *Salicion albae* Soó 1930

[*Salicion albae* Tüxen ex Moor 1958 *nom. illeg.* (art. 31) p.p. [*Salicion albae* Tüxen 1955 *nom. nud.* (art. 2b, 8) p.p.] (syntax. syn.), *Salicion albae* Müller & Görs 1958 *nom. illeg.* (art. 31), *Populion albae* Tüxen 1931 *nom. nud.* (art. 2b, 8) p.p.]

Riparian, mature, forest communities consisting of tall willows that grow on floodways that are regularly inundated for long periods every year. These communities belong to the Eurosiberian region, where the thermotype is meso- to supratemperate.

69.1.2 All.: *Salicion triandrae* Müller & Görs 1958

Shrub willow communities on loamy substrates that grow on the edge of slow-moving rivers and are found in the Eurosiberian region.

69.1.3 All.: *Salicion apennino-purpureae* Allegrezza & Biondi in Biondi, Allegrezza, Casavecchia, Galdenzi, Gasparri, Pesaresi, Vagge & Blasi 2014

Pioneer communities of shrub willows of central and northern Italy. These communities grow on pebbly substrates either along floodways or on the banks of water courses whose flow is prevalently intermittent. They are associated with the meso- to supratemperate thermotypes.

69.1.4 All.: *Salicion incanae* Aichinger 1933

[*Salicion eleagni* Aichinger 1933 *nom. mut.*, *Salicion eleagno-daphnoidis* (Moor 1958) Grass in Mucina, Grabherr & Wallnöfer 1993 [*Salicion eleagni* Moor 1958 *nom. illeg.* (art. 32) ('... *elaeagni*' art. 41a)]

Communities that grow above all on the pebbly beds of streams in the montane parts of the Alps and Apennines.

69.1.5 All.: *Salicion pedicellatae* Galán, Pérez & Cabezudo in Pérez, Galán, Navas P., Navas D., Gil & Cabezudo 1999

[*Salicion pedicellatae* (Ubaldi 2003) Poldini & Vidali in Poldini, Vidali & Ganis 2011 *nom. inval.* (art. 5, 22, 23), *Salicenion pedicellatae* Ubaldi 2003 *nom. inval.* (art. 5) (corresp. name)]

Endemic alliance of southern Italy (Calabria, Sicily) associated with the thermo- and meso-Mediterranean thermotypes.

70 Cl.: QUERCETEA ILICIS Br.-Bl. in Br.-Bl., Roussine & Nègre 1952

[*Quercetea ilicis* Br.-Bl. in Br.-Bl., Emberger & Molinier 1947 (art. 8), *Quercetea ilicis* Br.-Bl. in Br.-Bl., Roussine & Nègre 1952 (art. 22), *Euphorbietea dendroidis* Zohary & Orshan 1966 (art. 8), *Pistacio lentisci-Rhammetea alaterni* Julve 1993 (syntax. syn.)]

Vegetation communities that include prevalently evergreen and sclerophyllous forests, maquis and garrigues. They are found throughout the Mediterranean macrobioclimate, but are associated exclusively with the mesotemperate thermotype in the Temperate macrobioclimate. They have no particular soil requirements.

70.1 Ord.: QUERCETALIA ILICIS Br.-Bl. ex Molinier 1934

[*Quercetalia ilicis* Br.-Bl. 1931 *nom. nud.* (art. 2b, 8), *Quercetalia ilicis* Br.-Bl. ex Molinier 1934 *em.* Rivas-Martínez 1975 (art. 47)]

Forests dominated by holm oak, cork oak and deciduous species. They represent the climatic vegetation in the coolest sectors of the Mediterranean macrobioclimate (meso-Mediterranean), but can also be found in the the sub-Mediterranean variant of the temperate macrobioclimate, usually associated with the mesotemperate thermotype, where they represent the edaphoxerophilous vegetation series.

70.1.1 All.: Fraxino orni-Quercion ilicis Biondi, Casavecchia & Gigante ex Biondi, Casavecchia & Gigante in Biondi, Allegrezza, Casavecchia, Galdenzi, Gigante & Pesaresi 2013

[*Fraxino orni-Quercion ilicis* Biondi, Casavecchia & Gigante 2003 *nom. inval.* (art. 5), incl.: *Erico-Quercion ilicis* Brullo, Di Martino & Marcenò 1977 *p.p.*]

Forest vegetation dominated by holm oak, cork oak and wild olive, occasionally with deciduous species. It can be found in European central Mediterranean regions, and is a vicariant alliance of *Quercion ilicis* Br.-Bl. ex Molinier 1934 in the western Mediterranean, and of *Aristolochio sempervirentis-Quercion ilicis* Barbero & Quézel ex Rivas-Martínez, Diaz, Fernández-González, Izco, Loidi, Lousa & Penas 2002 in the eastern Mediterranean.

70.2 Ord.: PISTACIO LENTISCI-RHAMNETALIA ALATERNI Rivas-Martínez 1975

[*Quercetalia ilicis* Br.-Bl. ex Molinier 1934 *p.p.* (syntax. syn.), *Quercetalia calliprini* Zohary 1955, *Rhamno-Prunetalia* Rivas Goday & Rivas-Martínez in Rivas Goday 1964 *p.p.* [*Xero-Prunetalia* Rivas Goday & Borja 1961 *nom. nud.* (art. 2b, 8)], *Tetraclinido-Arganietalia* Rivas Goday ex F. Casas & M.E. Sánchez 1972 (art. 2b, 3f), *Tetraclinido-Arganietalia* Rivas Goday ex Esteve 1973 (art. 2b, 3f)]

Maquis vegetation consisting of thermophilous sclerophyllous Mediterranean species. It mostly occurs in the thermo-Mediterranean thermotype, where it represents the climatic vegetation, whereas in the meso-Mediterranean thermotype this *syntaxon* represents the serial substitution communities of vegetation belonging to *Quercetalia ilicis* order.

70.2.1 All.: Ericion arboreae Rivas-Martínez (1975) 1987

[*Ericenion arboreae* Rivas-Martínez 1975 (art. 3b), *Ericenion arboreae* Rivas-Martínez ex Rivas-Martínez, Costa & Izco 1986 (corresp. name)]

Maquis and garrigue vegetation that grows in the western Mediterranean, extending as far as the Tyrrhenian sector of the Italian peninsula, where it colonizes acidic and subacidic soils. It can be found in the upper thermo-Mediterranean, supra-Mediterranean and mesotemperate sub-Mediterranean, subhumid and humid, bioclimatic belts.

70.2.2 All.: Oleo sylvestris-Ceratonion siliquae Br.-Bl. ex Guinochet & Drouineau 1944

[*Oleo-Ceratonion* Br.-Bl. 1936 *nom. nud.* (art. 2b, 8), *Oleo-Ceratonion* Br.-Bl. ex Guinochet & Drouineau 1944 *em.* Rivas-Martínez 1975 (art. 47), *Myrtion communis* Allier & Lacoste 1980 (syntax. syn.)]

Climatic shrub, preforest and forest vegetation of the thermo- and meso-Mediterranean thermotypes.

70.2.3 All.: Juniperion turbinatae Rivas-Martínez 1975 corr. 1987

[*Juniperion lyciae* Rivas-Martínez 1975 (art. 43)]

Shrublands that grow on sandy substrates, such as dune stretches and paleo-dunes, as well as on rocks in coastal areas of the lower thermo-Mediterranean dry bioclimatic belt.

70.2.4 All.: Periplocion angustifoliae Rivas-Martínez 1975

[*Quercococciferae-Tetraclinidion articulatae* Rivas Goday ex F. Casas & M.E. Sánchez 1972 (art. 3f), *Coccifero-Tetraclinidion* Rivas Goday 1964 (art. 2b, 3b), *Coccifero-Tetraclinidion* Rivas Goday ex Esteve 1973 (art. 3f)]

Markedly thermoxerophilous vegetation, consisting of sclerophyllous and summer deciduous species, prevalently related to rocky, or occasionally sandy, coastal substrates. It belongs to the infra- to thermo-Mediterranean, dry bioclimatic belts.

70.3 Ord.: *PINETALIA HALEPENSIS* Biondi, Blasi, Galdenzi, Pesaresi & Vagge in Biondi, Allegrezza, Casavecchia, Galdenzi, Gasparri, Pesaresi, Vagge & Blasi 2014

Forest vegetation dominated by *Pinus halepensis*, *Pinus pinea* and associated subspecies, varieties and ecotypes. This order comprises autochthonous stands, or at least naturally reproduced stands, that may derive from ancient plantations, growing in coastal areas, on rocky cliffs, or further inland, depending on the bioclimatic conditions. It can be found in the infra- to upper thermo-Mediterranean thermotypes, and occasionally even in the lower meso-Mediterranean thermotype, with subhumid to arid ombrotypes.

70.3.1 All.: *Pistacio lentisci-Pinion halepensis* Biondi, Blasi, Galdenzi, Pesaresi & Vagge in Biondi, Allegrezza, Casavecchia, Galdenzi, Gasparri, Pesaresi, Vagge & Blasi 2014

Rocky woods of *Pinus halepensis* and relative subspecies, that occur throughout the Mediterranean macrobioclimate, in the upper infra-Mediterranean to lower meso-Mediterranean thermotypes with subhumid to semiarid ombrotypes.

71 Cl.: *QUERCO ROBORIS-FAGETEA SYLVATICAE* Br.-Bl. & Vlieger in Vlieger 1937

[*Quercu-Fagetales* Br.-Bl. & Vlieger in Vlieger 1937 (original name, art. 41b), *Quercetea robori-sessiliflorae* Br.-Bl. & Tüxen 1943 (art. 8), *Quercetea robori-sessiliflorae* Br.-Bl. & Tüxen ex Br.-Bl. 1950 (syntax. syn.), *Quercetea pubescentis* Doing 1955 (art. 8), *Quercetea robori-petraeae* Br.-Bl. & Tüxen ex Oberdorfer 1957 (art. 31), *Quercetea pubescentis* Doing ex Scamoni & Passarge 1959 (syntax. syn.), *Quercetea pubescenti-petraeae* Jakucs 1960 (syntax. syn.), *Carpino-Fagetea* Jakucs 1967 (syntax. syn.), *Fraxino-Fagetea* Moor 1975 (syntax. syn.)]

Mesophilous and thermophilous forest vegetation of the Temperate macrobioclimate that grows in the mesotemperate and supratemperate thermotypes, occasionally extending as far as the Mediterranean macrobioclimate. It has no specific substrate requirements.

71.1 Ord.: *FAGETALIA SYLVATICAE* Pawłowski in Pawłowski, Sokołowski & Wallisch 1928

[*Carpino-Fagetalia* Scamoni & Passarge 1959 (syntax. syn.), *Luzulo-Fagetalia* Scamoni & Passarge 1959 (syntax. syn.), *Aremonio-Fagetalia* 1970 *nom. inval.* (art. 3b), *Tilietalia platyphylli* Moor 1973 (syntax. syn.), *Lathyro veneti-Carpinetalia betuli* Ubaldi 1995 (syntax. syn.) p.p., *Carpino-Fagenalia* Rameau (1981) 1996 *nom. inval.* (art. 2b, 2d, 3o, 5, 8)]

Mesophilous deciduous forests that typically grow in the supratemperate thermotype, as well as in cool sites where the soil is deep and moist in the mesotemperate thermotype. This vegetation type is distributed in the central European-Caucasian area.

71.1.1 All.: *Galio odorati-Fagion sylvaticae* Knapp ex Tüxen & Oberdorfer 1958 *nom. mut.*

[*Asperulo odoratae-Fagion* Knapp ex Tüxen & Oberdorfer 1958 (art. 45)]

Central European and alpine neutrophilous European beech communities.

71.1.2 All.: *Aremonio agrimonioidis-Fagion sylvaticae* (Horvat) Borhidi in Török, Podani & Borhidi 1989

[*Fagion illyricum* Horvat 1938 (art. 34), *Primulo-Fagenion* Borhidi 1963 (corresp. name)]

Eastern European and Balkan mesophilous forests dominated by European beech.

71.1.3 All.: *Geranio versicoloris-Fagion sylvaticae* Gentile 1970

[*Fagion mediterraneo-montanum* Br.-Bl. 1960 *nom. illeg.* (art. 34), *Aremonio-Fagion* Gentile 1963 *nom. inval.* (art. 2b, 7), *Fagion austro-italicum* Soó 1965 *nom. illeg.* (art. 34), *Fagion meridionale* Quézel 1967 *nom. illeg.* (art. 34), *Geranio striati-Fagion* Gentile 1969 (art. 45)]

European beech communities endemic to the southern Apennines and Sicily; they also extend into the central Apennines, where they grow in the warmest and driest sites of the supratemperate thermotype.

71.1.4 All.: *Tilio platyphylli-Acerion pseudoplatani* Klika 1955

[*Tilio-Acerion* Ellenberg & Klötzli 1972 *nom. inval.* (art. 2b, 2d, 3b, 8) p.p., *Lunario-Acerion* Moor 1973 (syntax. syn.)]

Alliance that includes mesophilous forests containing lindens and sycamore maples that grow in deep ravines.

71.1.5 All.: *Lauro nobilis-Tilion platyphylli* Biondi, Casavecchia & Biscotti ex Biondi, Casavecchia & Biscotti in Biondi, Allegrezza, Casavecchia, Galdenzi, Gigante & Pesaresi 2013

[*Lauro nobilis-Tilion platyphylli* Biondi, Casavecchia & Biscotti 2008 *nom. inval.* (art. 5)]

Tilia platyphyllos forest communities of the southern Apennines.

71.1.6 All.: *Carpinion betuli* Isler 1931

[*Quercus-Fagion* Rameau 1996 *nom. inval.* (art. 2b, 2d, 3o, 5, 8), *Fraxino-Carpinion* Tüxen 1937 p.p. (syntax. syn.) [*Carpinion* (Tüxen 1937) Oberdorfer 1953 *nom. illeg.* (art. 29, 31)], *Eu-Carpinion* Scamoni & Passarge 1959 *nom. illeg.* (art. 34)]

Mesophilous communities that grow in the lowlands and hills of western-central Europe.

- 71.1.7 All.: *Erythronio dentis-canis-Carpinion betuli* (Horvat 1958) Marinzek in Wallnofer, Mucina & Grass 1993 [*Carpinion illyricum* Horvat 1958, *Erythronio-Carpinion* (Horvat 1958) Borhidi 1996 (nomencl. syn.)]

Balkan, mesophilous forest communities that grow in Italy, extending into the eastern-central and southern Alps and pre-Alps. Some relict communities grow in the Po plain.

- 71.1.8 All.: *Physospermo verticillati-Quercion cerris* Biondi Casavecchia e Biscotti ex Biondi, Casavecchia & Biscotti in Biondi, Allegrezza, Casavecchia, Galdenzi, Gigante & Pesaresi 2013

[*Physospermo verticillati-Quercion cerris* Biondi Casavecchia e Biscotti 2008 *nom. inval.* (art. 5)]

Mesophilous forest communities of the Apennines that are a vicariant alliance of *Erythronio-Carpinion*.

- 71.1.9 All.: *Galio rotundifolii-Abietion albae* (Oberdorfer 1962) Rivas-Martínez 1987

Silver fir forests with central-European and Atlantic influences.

- 71.2 Ord.: *QUERCETALIA ROBORIS* Tüxen 1931

[*Quercetalia robori-sessiliflorae* Tüxen 1937 (art. 29), *Quercetalia robori-sessiliflorae* Br.-Bl. & Tüxen 1943 *nom. nud.* (art. 2b, 8) ('... robori-sessilifloræ' art. 41b), *Quercetalia robori-sessiliflorae* (Tüxen 1931) Br.-Bl. 1950 *nom. nud.* (art. 2b, 8, 29)]

Acidophilous, broadleaf, deciduous forests found on oligotrophic soils. These forests are dominated by European chestnut, pedunculate oak and silver birch, and grow in European regions with an Atlantic, sub-Atlantic or subcontinental climate. In Italy, they are found in the western-central Alps and in the upper western Po plain, on acidic substrates.

- 71.2.1 All.: *Quercion roboris* Malcuit 1929

[*Quercion robori-petraeae* Br.-Bl. 1932 (nomencl. syn.), *Dicrano scoparii-Quercion roboris* Passarge in Passarge & Hofmann 1968 (syntax. syn.)]

Acidophilous forest communities that grow in the plains and hills. This alliance includes pedunculate oak, European chestnut, silver birch and pine-oak stands, and is related to oceanic climates whose yearly precipitation ranges from 800 to 1500 mm.

- 71.2.2 All.: *Genisto germanicae-Quercion* Neuhausl & Neuhauslova-Novotna 1967

[*Quercion roboris acidiphilum* Schmid 1936 (art. 34), *Quercion petraeae* Zólyomi et Jakucs 1957 p.p., *Lysimachio-Quercion* Passarge et G. Hofmann 1968 (syntax. syn.), *Melampyro-Quercion* Passarge et G. Hofmann 1968 (syntax. syn.)]

This alliance includes subcontinental forest communities dominated by pedunculate oak, European chestnut and silver birch. These are xerophilous, acidophilous and oligotrophic communities of the lower supratemperate thermotype of the endalpic (intra-alpine) district.

- 71.2.3 All.: *Luzulo luzuloidis-Fagion sylvaticae* Lohmeyer & Tüxen in Tüxen 1954

[*Luzulo-Fagion* Klika *nom. nud.* (art. 2b, 8) ('Luzuleto-...' art. 41b), *Myrtillo-Fagion sylvaticae* Hoffmann & Passarge in Scamoni 1963 (syntax. syn.), *Galio-Fagion* Gamisans 1977 (syntax. syn.), *Ilici-Fagion* Br.-Bl. 1967, *Galio rotundifolii-Abietion albae* (Oberdorfer 1962) Rivas-Martínez 1987]

Acidophilous beech communities distributed in the supratemperate thermotype that grow on prevalently deep (acidic, leached brown soils), invariably well-drained, soils.

- 71.3 Ord.: *QUERCETALIA PUBESCENTI-PETRAEAE* Klika 1933

[*Quercetalia pubescenti-sessiliflorae* Quantin 1935 (nomencl. syn.), *Quercetalia pubescentis* Br.-Bl. 1931 (art. 8), *Orno-Ostryetalia* Jakucs 1959 (syntax. syn.), *Orno-Cotynetalia* Jakucs 1960 (art. 29)]

Mixed forest communities of thermophilous deciduous species that are dominated by oaks (*Quercus pubescens* s.l., *Q. cerris* and *Q. petraea*), hop hornbeans and manna ashes, and are widespread in the mesotemperate thermotype.

- 71.3.1 All.: *Quercion pubescenti-petraeae* Br.-Bl. 1932

[*Quercion pubescenti-sessiliflorae* Br.-Bl. 1932 (art. 45), *Quercion pubescentis* Tüxen 1931 (art. 8), *Quercion pubescentis* Br.-Bl. ex Klika 1937 (syntax. syn.), *Buxo-Quercion pubescentis* Zólyomi & Jakucs 1957 (syntax. syn.)]

Forest communities of deciduous oaks that can be found in Italy in the Maritime Alps and in the Ligurian Apennines, prevalently in sub-continental areas in the lower mesotemperate and lower supratemperate thermotypes.

- 71.3.2 All.: *Carpinion orientalis* Horvat 1958

Thermophilous forest communities distributed in both the Balkans and the Italian peninsula.

- 71.3.3 All.: *Crataego laevigatae-Quercion cerridis* Arrigoni 1997

[*Teucro siculi-Quercion cerridis* nom. conserv. propos in Blasi, Di Pietro & Filesi 2004, Incl.: *Teucro siculi-Quercion cerridis* Ubaldi 1988 nom. inval. (art. 3), *Teucro siculi-Quercion cerridis* Ubaldi 2003 (syntax. syn.), *Lonicero etruscae-Quercion pubescentis* p.p., *Lathyro montani-Quercion cerridis* Scoppola & Filesi 1998 (syntax. syn.), *Mespilo-Quercion cerridis* Ubaldi 2003 (syntax. syn.)]

Acidophilous forest communities with turkish oak and hungarian oak that are endemic to the southern-central Apennines; they are found in the Tyrrhenian sector and, to a lesser extent, in the lower and upper mesotemperate thermotypes.

71.3.4 All.: *Erythronio dens-canis-Quercion petraeae* Ubaldi (1988) 1990

Acidophilous forest communities that grow in the mesotemperate bioclimate in the north-western sector of the Italian peninsula.

71.3.5 All.: *Pino calabricae-Quercion congestae* Brullo, Scelsi, Siracusa & Spampinato 1999 em. Blasi, Di Pietro, Filesi 2004

Deciduous and semi-deciduous, acidophilous and neutrophilous, oak forests that grow in the meso-Mediterranean to supra-Mediterranean thermotypes of southern Italy.

71.4 Ord.: *BETULO PENDULAE-POPULETALIA TREMULAE* Rivas-Martínez & Costa in Rivas-Martínez, Díaz, Fernández-González, Izco, Loidi, Lousã & Penas 2002

[*Betulo pendulae-Populetales tremulae* Rivas-Martínez & Costa 1998 (art. 8)]

Secondary, deciduous, forest communities that can be found in the thermo- to lower orotemperate and meso- to lower oro-Mediterranean thermotypes, on acidic or neutral soils. They are distributed throughout the Eurosiberian region.

71.4.1 All.: *Corylo avellanae-Populion tremulae* (Br.-Bl. ex O. Bolòs 1973) Rivas-Martínez & Costa 1998

[*Corylo-Populion tremulae* Br.-Bl. 1961 (art. 2b, 7, 8), *Corylo-Populion tremulae* Br.-Bl. ex O. Bolòs 1973 (corresp. name), *Pulmonario affinis-Betulenion pendulae* Rivas-Martínez, Fernández-González, Loidi, Lousã & Penas 2001 (art. 2b)]

Deciduous forest communities of *Betula pendula*, *Corylus avellana* and *Populus tremula* that grow in oceanic and sub-continental variants of the temperate macrobioclimate, from the meso- to lower orotemperate, humid to hyperhumid bioclimatic belts. These communities are widespread from the Pyrenees as far as Scandinavia and Russia.

72 Cl.: ERICO CARNEAE-PINETEA SYLVESTRIS Horvat 1959

[*Roso pendulinae-Pinetea mugo* Theurillat in Theurillat, Aeschmann, Küpfer & Spichiger 1994 (syntax. syn.) (p.p.), *Pulsatillo-Pinetea sylvestris* Oberdorfer in Oberdorfer, Görs, Korneck, Lohmeyer, Müller, Philippi & Seibert 1967 (syntax. syn.) p.p., *Erico-Pinetea* Horvat 1959 em. Rameau 1998, *Epipactido atrorubentis-Pinetea* (Horvat 1959) Rameau 1994 nom. illeg. (art. 29), *Pino-Juniperetea* Rivas-Martínez 1964 p.p. (syntax. syn.), *Pyrolo-Pinetea* Korneck 1974]

This *syntaxon* includes western-central Alpine communities, such as xerophilous pine forests dominated by *Pinus sylvestris*, thermophilous pine forests dominated by *Pinus sylvestris* and *Ostrya carpinifolia*, as well as most of the dwarf mountain pine stands.

72.1 Ord.: *ERICO CARNEAE-PINETALIA SYLVESTRIS* Horvat 1959

Communities dominated by scots pine and/or dwarf mountain pine found on calcareous to neutral substrates that are often mesophilous.

72.1.1 All.: *Erico-Pinion mugo* Leibundgut 1948 nom. inv.

[*Pinion mugii* Gams 1936 (art. 8), *Mugeto-Rhododendron hirsuti* Knapp 1971 (art. 8)]

Basiphilous shrub and tree communities, dominated by *Pinus mugo* subsp. *mugo*, *P. mugo* subsp. *uncinata* and *P. cembra*, that grow in the upper supratemperate and orotemperate thermotypes of the endalpic, mesalpic and esalpic regions.

72.1.2 All.: *Erico-Fraxinion orni* Horvat 1959 nom. inv. propos. Theurillat, Aeschmann, Küpfer & Spichiger 1995

[*Orno-Ostryion* Tomazic 1940 p.p., *Fraxino orni-Ostryion carpinifoliae* Tomazic 1940 sensu Wallnöfer in Mucina, Grabherr & Wallnöfer 1993 p.p., *Orno-Ericion* Horvat 1959]

Illyrian pine forests, with *Pinus nigra* or *Pinus sylvestris* and *Ostrya carpinifolia*, that grow above all in the esalpic (i.e. prealpine) region, but extend to the mesalpic sector of the eastern Alps, from Slovenia and Carinthia to Friuli, Veneto and Lombardy. This *syntaxon* is linked to massive limestones.

72.1.3 All.: *Erico carneae-Pinion sylvestris* Br.-Bl. in Br.-Bl., Sissingh & Vlieger 1939 nom. inv. propos. Theurillat, Aeschmann, Küpfer & Spichiger 1995

[*Pinion sylvestris calcicolum* Aichinger 1933 (art. 34), *Chamaebuxo-Pinion* Wendelberger 1963 (art. 8), *Erico-Pinion* Br.-Bl. in Br.-Bl., Sissingh & Vlieger 1939 nom. inv. propos. (recomm. 10c, art. 42)]

Xerophilous forest communities, dominated by *Pinus sylvestris*, that grow prevalently on limestone substrates, often on debris deposits, in the mesotemperate to supratemperate bioclimatic belts.

72.2 Ord.: *ASTRAGALO MONSPESSULANI-PINETALIA SYLVESTRIS* Oberdorfer in Theurillat, Aeschmann, Küpfer & Spichiger 1995

[*Astragalo monspessulani-Pinetalia sylvestris* Oberdorfer 1992 *nom. inval.* (art. 2b, 8)]

Xerophilous communities that grow in the south-western Alps and in endalpic (intra-alpine) areas.

72.2.1 All.: *Deschampsio flexuosae-Pinion sylvestris* Br.-Bl. 1961

Xerophilous and meso-xerophilous communities, dominated by *Pinus sylvestris*, that grow on siliceous soils in intra-alpine valleys in the mesalpic or endalpic areas.

72.2.2 All.: *Ononido rotundifolii-Pinion sylvestris* Br.-Bl. & R. Rich. 1950

[*Ononido-Pinion* Br.-Bl. & R. Rich. 1950 (*nom. correct.*)]

Thermo-xerophilous pine communities dominated by *Pinus sylvestris* that grow on calcareous soils.

73 Cl.: JUNIPERO SABINAE-PINETEA SYLVESTRIS Rivas-Martínez 1965 *nom. inv. propos.* Rivas-Martínez, Díaz, Fernández-González, Izco, Loidi, Lousa & Penas 2002

[*Pino sylvestris-Juniperetea sabinae* Rivas-Martínez 1965 (art. 10c, 42), *Pulsatillo-Pinetea sylvestris* Oberdorfer in Oberdorfer, Görs, Korneck, Lohmeyer, Müller, Philippi & Seibert 1967 (syntax. syn.) p.p.]

Coniferous woodland communities and brushwoods dominated by juniper and co-occurring shrubs; they grow in the meso- to oro-Mediterranean and in the supra- to lower orotemperate thermotypes, are semi-continental and often relict.

73.1 Ord.: *JUNIPERO SABINAE-PINETALIA SYLVESTRIS* Rivas-Martínez 1965 *nom. inv. propos.* Rivas-Martínez, Díaz, Fernández-González, Izco, Loidi, Lousa & Penas 2002

[*Pino-Juniperetalia* Rivas-Martínez 1965 (art. 10c, 42), *Astragalo monspessulani-Pinetalia sylvestris* Oberdorfer ex Theurillat, Aeschmann, Küpfer & Spichiger 1995 (syntax. syn.)]

Potential natural forests dominated by *Pinus sylvestris* and *Juniperus thurifera* brushwoods.

73.1.1 All.: *Juniperion thuriferae* Rivas-Martínez 1969

Juniperus thurifera brushwood communities. These are relict communities in Italy that occur in the western Alps of Piedmont.

73.1.2 All.: *Epipactido atropurpureae-Pinion mugo* Stanisci 1997

Calciphilous, dwarf mountain, pine communities that grow in the central Apennines.

73.1.3 All.: *Daphno oleoidis-Juniperion alpinae* Stanisci 1997

Juniperus communis subsp. *alpina* communities that grow on calcareous mountains in the central and southern Apennines, between 1490 and 2300 (2400) m. These communities are found on moderately steep slopes, mainly on skeleton-rich soils and along mountain crests

73.2 Ord.: *JUNIPERETALIA HEMISPHAERICAE* Rivas-Martínez & J.A. Molina in Rivas-Martínez, Fernández-González & Loidi 1999

Forest and shrub vegetation dominated by conifers that grows on young, immature soils in high mountains in the Mediterranean area. These are permanent, relict communities located in the bioclimatic belts with supra- and oro-Mediterranean as well as supra- and orotemperate thermotypes.

73.2.1 All.: *Berberidion aetnensis* Brullo, Giusso & Guarino 2001

Forest and shrub, conifer communities that grow in the supra- to oro-Mediterranean thermotypes in southern Italy, Sicily and Sardinia.

74 Cl.: VACCINIO MYRTILLI-PICEETEA ABIETIS Br.-Bl. in Br.-Bl., Sissingh & Vlieger 1939

[*Vaccinietea uliginosi* Lohmeyer & Tüxen in Tüxen 1955 *nom. nud.* (art. 2b, 8)]

Forest communities, dominated by acidophilous conifers, that are distributed in circumboreal areas and are linked to regions with a cold to cold-temperate climate. In Italy they are found in the Alps as well as in some regions in the northern Apennines.

74.1 Ord.: *PICEETALIA EXCELSAE* Pawłowski in Pawłowski, Sokołowski & Wallisch 1928

[*Vaccinio-Piceetalia* Br.-Bl. in Br.-Bl., Sissingh & Vlieger 1939 *nom. illeg.* (art. 25, 29), *Abieti-Piceetalia abietis* Rameau 1998 *nom. illeg.* (art. 29), Corresp.: *Abieti-Piceetalia abietis* Rameau 1996 *nom. nud.* (art. 2b, 8)]

Distinctly oligotrophic, subalpine forest vegetation found in continental climates, occasionally in suboceanic climates of the mesalpic district. These communities consist of conifers and ericaceae that grow on markedly acidic soils.

- 74.1.1 All.: *Piceion excelsae* Pawłowski in Pawłowski, Sokołowski & Wallisch 1928
[*Vaccinio-Piceion* Br.-Bl. in Br.-Bl., Sissingh & Vlieger 1939 *nom. illeg.* (art. 29), *Piceion excelsae* Luquet 1926 *nom. nud.* (art. 2d, 3f) p.p.]
Coniferous forest communities, dominated by *Picea abies*, *Larix decidua*, *Pinus cembra* or *Abies alba*, that grow in the montane and subalpine areas on acidic and oligotrophic soils.
- 74.1.2 All.: *Betulion pubescentis* Lohmeyer & Tüxen ex Scamoni & Passarge 1959
[*Pinion medioeuropaeum* Libbert 1932 (art. 34), *Betulion pubescentis* Lohmeyer & Tüxen in Tüxen 1955 *nom. nud.* (art. 2b, 8), *Betulion pubescentis* Lohmeyer & Tüxen ex Oberdorfer 1957 *nom. inval.* (art. 2d, 3d), *Ledo-Pinion* Tüxen ex Passarge 1961, *Vaccinio-Betulion pubescentis* Ellenberg & Klötzli 1972 (art. 3b), *Piceo-Vaccinienion uliginosi* Oberdorfer 1992 *nom. inval.* (art. 2d, 3o, 5) [*Piceo-Vaccinienion uliginosi* Seibert in Oberdorfer 1990 *nom. nud.* (art. 2b, 8)] (corresp. name)]
This alliance includes silver birch forest communities that grow on moist, highly acidic, peaty soils. These communities colonize senescing peatlands and acidic swamps in the boreal, sub-boreal and temperate areas.
- 74.1.3 All.: *Dicrano undulati-Pinion sylvestris* (Libbert 1932) Matuszkiewicz 1962
[*Pinion medioeuropaeum* Libbert 1933 *nom. illeg.* (art. 34), *Pinion* Oberdorfer 1949 *nom. inval.* (art. 2b, 2d, 3b, 8), *Pinion* (Libbert 1933) Oberdorfer 1957 *nom. illeg.* (art. 31)]
Pinus sylvestris-dominated woodlands (sometimes forests). These are mesophilous, oligotrophic and acidophilous communities that grow mainly on sandy soils. In Italy they are usually only found in the central Alpine valleys.
- 74.1.4 All.: *Seslerio caeruleae-Pinion uncinatae* Vigo 1974
Pinus mugo ssp. *uncinata* communities that grow in the orotemperate thermotype, on both siliceous and calcareous substrates of the Pyrenees, western Alps and northern Apennines.

75 Cl.: **ROBINIETEA** Jurko ex Hadač & Sofron 1980

75.1 Ord.: *CHELIDONIO-ROBINIETALIA* Jurko ex Hadač & Sofron 1980

Anthropogenic forest vegetation dominated by the neophyte *Robinia pseudoacacia*, with a herb layer rich in nitrophilous species.

75.1.1 All.: *Balloto nigrae-Robinion* Jurko ex Hadač & Sofron 1980

European, nitrophilous communities, dominated by either *Robinia pseudoacacia* or *Ailanthus altissima*, that have been planted or naturalized and grow on sandy, dry, relatively poor soils.

75.1.2 All.: *Bryonio-Robinion* Ubaldi, Melloni & Cappelletti in Ubaldi 2003

Robinia pseudoacacia communities that grow in northern and central Italy in the plains and hills on deep, moist soils.

Future prospects

The Prodrome of the Italian Vegetation is linked to the European Strategy for the Biodiversity (European Commission 2011), the European Habitats Directive and the new European Working Groups related to the ecosystems and their services. They include the Mapping and Assessment Ecosystems and their Services Working Group (European Commission 2014) and the Green Infrastructure Working Group (European Commission 2013).

Bearing in mind the importance attached to the application of the Habitats Directive by the European Union (EU), a syntaxonomic checklist that is officially recognized for Italy not only allows habitats to be dealt with using a uniform language, but also enables the Italian Ministry of the Environment to start a general review of the Interpretation Manual of habitats according to the *syntaxa* currently recognized for our country. It is also important to point out that the

Prodrome is based on a detailed hierarchical syntaxonomic structure up to the alliance level. This structure provides a useful ecological definition of *syntaxa* as well as a link with the Italian Natura 2000 Habitats, thereby offering the possibility to assess the value of the plant communities in land management.

Furthermore, the Prodrome can be used as a framework for scientific research related to the investigation of links between plant communities and the environmental factors that influence their composition and distribution. In countries in which it was published several years ago, the Prodrome has been used to draw up programmes for the management of vegetation types or threatened plant species.

Although the Prodrome is not a monitoring tool, it may prove useful in the drafting of monitoring protocols for habitats and landscapes. It may also serve as a basic tool for the definition of management guidelines of Natura 2000 sites or landscapes, and as a framework for habitat restoration.

The Prodrôme, with its great ecological diversity that refers both to primary and secondary habitats, may also be a useful tool in the ecological and syndynamical qualification of the elements of the ecological networks (Blasi et al. 2008). Moreover, it can be useful in the qualification of the natural and seminatural communities that belong to the High Nature Value farmlands, whose importance for biodiversity conservation has been recognized in a number of EU policies (Galdenzi et al. 2012). There is a strong, ongoing debate in Italy on the relationship between the green economy and the value of the natural capital. One widely shared point of view regards the usefulness of vegetation types as a basic tool to promote new international research programmes on ecosystems and their services, as required by the Horizon 2020 programme.

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