Syntaxa according to the Braun-Blanquet approach in Bulgaria

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Abstract. The application of the Braun-Blanquet approach for plant classification in Bulgaria is presented in the article. According to the literary review and the existing phytosociological data, 39 classes, 67 orders, 94 alliances, 218 associations, 48 subassociations, and 36 communities have been identified. So far the phytosociological researches in Bulgaria have been carried out either with a focus on a particular vegetation type, or as an inventory of specific geographical regions. The beech forests, dunes, Pontic steppes, ruderal vegetation, grasslands, halophytic communities and several other types have been relatively well studied. However, application of this method for most of the prevailing phytocoenoses in Bulgaria, such as oak forests and other xerophyllous forest types, dry pastures, meadows, etc. is very limited.

Key words: Bulgaria, nature conservation, phytosociology, syntaxonomy, vegetation

Introduction

It is impossible to research, monitor and control the processes unfolding within the ecological systems on a different scale without profound knowledge of the origin, development, composition, structure, and classification of plant communities, because they are the main components of biocoenoses and ecosystems. The late outset of natural sciences in Bulgaria is the main reason for the comparatively short history of phytosociological researches. The different approaches and methodological schools for investigation of the plant cover of Europe have influenced the development of Bulgarian phytosociology. For a number of different reasons, the investigation of Bulgarian vegetation was carried out according to the methodology of the so-called Russian, or Dominant School (Velchev & al. 1969; Pavlov 2006). At the same time, phytosociological researches in Europe followed the Floristic School (Braun-Blanquet 1964). This methodology has been gradually adopted by the neighboring countries to Bulgaria, such as Greece (Quézel 1964; Quézel & Barbero 1985 etc.), former Yugoslavia (Zupančić 1986; Sarić 1997; Kojić & al. 1998 etc.) and Romania (Coldea 1991; Doniţá & al. 1992; Ivan & al. 1993; Coldea & al. 1997; Sanda & al. 1999 etc.). The connections of Bulgaria with the West and Central European countries deepened up after 1989. This led to a more profound integration of Bulgarian science with the science of European countries and phytosociology makes no exception.

Classification of Bulgarian vegetation relates to its preservation. Nature conservation initiatives must be based now on the principles and approaches applied by the EU Member States. One of the major EC directives for nature conservation, Directive 92/43, deals

with preservation of natural habitats. Classification of the habitats is based on classification of the plant syntaxa, according to the methodology of Braun-Blanquet. The lack of scientific syntaxonomical background in Bulgaria poses problems in the application of the Habitat Directive and the establishment and management of the protected zones under NATURA 2000 network in Bulgaria. The problem is not only scientific, but also political.

Material and methods

This article presents the syntaxa reported from Bulgaria according to the methodology of Braun-Blanquet's (Sigmatic) school (Braun-Blanquet 1964; Müller-Dombois & Ellenberg 1974; Westhoff & Maarel 1978 etc.) up to subassociation level. Only the syntaxa with published phytosociological relevés (or, at least, synoptic tables) in scientific journals, books or dissertations are considered here. Reports relating to some practical activities, such as management plans and ecological evaluations, which however have no published results in the scientific journals, are not included in this work. Syntaxa identified in scientific publications, but without diagnostic or synoptic tables are not included too.

The order and nomenclature of the syntaxa on the alliance level follow the scheme of Rodwell & al. (2002), who have presented the most complete syntaxonomic system of the vegetation of Europe. Many syntaxa have been compared with the information provided by SynBioSys Europe (http://www.synbiosys.alterra.nl/eu) and this is reflected in the text.

Later revisions of some syntaxa are also reflected in the work. These revisions deal not only with assignment of a syntaxon to a different syntaxonomical level, but also with changes in the assignments from one syntaxon to others on a higher level.

The validations, corrections, adaptations and inversions of the names of some syntaxa are made according to the rules of ICPN (Art. 14, 41b, 42, 43, 45, 48) (Weber & al. 2000). Some syntaxa in the paper of Roussakova (2000) are not published, since their name types are not indicated in accordance to (Def. IV, Art. 5) Art. 16, but according to the Dominant (Russian) School, in contradiction to Def. I (ICPN). They are described as new syntaxa, or new nomenclature combinations according to the Rules.

Results and discussion

In line with the general development of phytocoenology (phytosociology) in Europe and in Bulgaria, the first data about the recent plant cover of Bulgaria could be found in some botanical studies (Georgiev 1891; Toshev 1903; Davidov 1905, 1909, 1912; Ivanchev 1912) and phytogeographical (Adamović 1907). Great credit goes to Stefanov (1921, 1924, 1927, 1943a, b, 1944a, b), Stoyanov (1921, 1927, 1928a, b, 1935, 1941, 1948), Yordanov (1924, 1931, 1936, 1939a, b), Ruskov (1935, 1936), Hristov (1944, 1946, 1948), and Kitanov (1947) for the investigation of Bulgarian vegetation in the first half of the 20th century. Their publications have mainly a general botanical, phytogeographical or forestry character. More precise and systematic researches of the vegetation have been made during the second half of the 20th century, when the main vegetation types, many of them rare and endemic to Bulgaria, have been investigated and some conclusions were drawn about the relationships and the processes in Bulgarian vegetation. The more important summary works according to the Dominant School are by Ganchev (1952, 1958, 1961), Penev (1953, 1960, 1984), Bondev (1959, 1966, 1973), Radkov (1961, 1963), Velchev (1962, 1971), Kochev (1967, 1969, 1976), Roussakova (1969, 1972, 1973, 1986), Stanev (1977, 1986), etc. Some more extensive collective works on the meadows and pastures (Ganchev & al. 1964), halophytic vegetation (Ganchev & al. 1971) and wetlands (Kochev & Yordanov 1981) in Bulgaria, and the map of Bulgarian vegetation (Bondev 1991) saw light during this period. The syntaxa published until 1997 according to the Dominant School and Braun-Blanquet's methodology in Bulgaria have been summarized by Apostolova & Slavova (1997). As a result from their work, 1789 associations belonging to 238 formations are described in Bulgaria.

The Floristic Method (Braun-Blanquet approach) has had a very limited application in Bulgaria. The first known classification studies according to this methodology were made by foreign authors. Most of them relate to small regions or investigate one or another vegetation type. There are several very important publications, which encouraged the researches according to this method in Bulgaria. Scientific researches into Bulgarian vegetation according to the Braun-Blanquet's methodology started with the first publication using this method in the country (Horvat & al. 1937).

One of the major works for the development of plant science is the latest edition of the monograph by Horvat & al. (1974) about vegetation on the Balkan Peninsula. After the democratic changes in Bulgaria that set in 1989, the Bulgarian scientists have shown an increasing interest in the Braun-Blanquet methodology. The first monograph by a Bulgarian scientist (Roussakova 2000) has encouraged the intensive researches by this method and they continue ever since, while the Braun-Blanquet approach is gaining ever greater popularity in the country and the joint efforts of Bulgarian and foreign scientists are increasing further.

The first work using the Braun-Blanquet method in Bulgaria was a publication about mountain vegetation in the Rila Mts by Horvat & al. (1937). The works of Soó (1955, 1957, 1963) included some relevés gathered during botanical outings in Bulgaria. Simon (1958) conducted a more detailed study of the alpine vegetation in the Pirin Mts and published some associations and a new alliance. Subsequently, some investigators of various vegetation types included Bulgaria into their works. The most important examples were the works by Jákucs (1961) about xerophilous forests in Southeast Europe, by Soó (1964) about the beech forests on the Balkan Peninsula, and by Vicherek (1971) about the Black Sea dunes and cliffs. All these works were generalized by Horvat & al. (1974) into the so far most comprehensive monograph about vegetation on the Balkan Peninsula. The authors not only had tried to present all described syntaxa according to the Braun-Blanquet approach, but they had also tried to draw some conclusions about Bulgarian vegetation using the studies of some Bulgarian authors by the Dominant Method, or merely floristic studies. Such publications included the works of Stefanov (1924), Penev (1953, 1960), Ganchev (1961, 1965), etc.

Several works according to the methodology of Braun-Blanquet were made during the period 1974–2000. They were also made by non-Bulgarian authors, despite the declared need by Bulgarian phytocoenologists for unification of the Bulgarian classification with that the European countries (Meshinev & al. 1993). These were the publications about the beech forests in the Balkan Range (Michalik 1985, 1990), stony vegetation of the alpine belt in the Pirin Mts (Mucina & al. 1986, 1990), some ruderal communities in Southwest Bulgaria (Mucina & Kolbek 1989), and spring communities with *Cardamine amara* in the mountains (Marhold & Valachovič 1998).

During the period 1937–2000, some Bulgarian authors have tried to apply the Braun-Blanquet methodology in their studies, but without syntaxonomic decisions in their works (Ruskov 1935, 1936, 1942; Hristov 1944, 1946, 1948, 1953; Stefanov & Stoyanov 1949; Chernyavski & Vezev 1952). The studies of Kolev (1965, 1976) on the weed and ruderal vegetation make an exception, but he failed to propose the names of the associations. Anyway, the publications of Kolev (1965, 1976) could be accepted as the first Bulgarian studies made according to the principles and methods of the Braun-Blanquet school. Unfortunately, such studies were exceptional during that period. The other exception is a short publication (Kochev & al. 1986) about the vegetation of the Danube wetlands in Bulgaria, which was made by a joint team of Bulgarian and Slovak scientists.

Changes in the political and economic conditions at the end of the 20th century have had a strong impact on many fields, including phytocoenology. The possibility for normal communication with scientists from other countries, the access to contemporary information and technologies, and the processes of European integration are amongst the main reasons for a wider application of the methodology of Braun-Blanquet for investigation of Bulgarian vegetation. The European habitat classification (Devillers & al. 1991; Devillers & Devillers-Terschuren 1996; Davies & Moss 1999; Davies & al. 2004) and the establishment of NATURA 2000 network for preservation of habitats did much to activate the phytosociological researches.

The first monograph by a Bulgarian author using the Braun-Blanquet method was a book by Roussakova (2000) on alpine and subalpine vegetation of the Rila Mts. Many new associations have been described, and the relationship of the Rila vegetation with the other mountains in South Europe and Carpathians were analyzed in this work. Her study has been preceded and followed by several smaller publications. They related to different types of vegetation, or were part of the characterization of some protected areas. Such are the studies of the plant communities in the Rila National Park (Roussakova & Vulchev 1999), the forests of *Pinus heldreichii* (Vulchev 2000), grass and forest communities in the Yundola Experimental Forestry Station (Dimitrov 2001, 2003, 2004a, b; Dimitrov & al. 2004b), the Dolna Topchiya Reserve (Pavlov & Dimitrov 2002), beech forests in the Petrohan Divide of the Balkan Range (Pavlov & Dimitrov 2003), partially the vegetation of the Vitosha Natural Park (Dimitrov

& al. 2004a) and Mt Lozenska (Dimitrov & Glogov 2003), the oak and Silver Lime forests in the Middle Danube Plain (Roussakova & Tzonev 2003; Tzonev 2003), ruderal communities in a landfill site near Sofia City (Dimitrov & al. 2005a), the spruce and fir forests in the Rila Mts (Roussakova & Dimitrov 2005), the mires in Mt Vitosha (Hájek & al. 2005), the communities of *Juniperus excelsa* in the Struma Valley (Tzonev & Dimitrov 2005), the main vegetation types in the Bulgarka Nature Park (Pavlov & al. 2006), the hygrophyte and hydrophyte vegetation in some protected areas along the Danube River (Tzonev 2009a), the semi-natural grasslands in Southeast Bulgaria (Apostolova & Meshinev 2006), grasslands rich in therophytes in Southeastern Bulgaria (Sopotlieva & Apostolova 2007), the sweet chestnut forests in Mt Belasitsa (Dimitrova & al. 2007), the mountain hay meadows in Bulgaria (Apostolova & al. 2007), and the communities of *Nardus stricta* in some mountains in Bulgaria (Velev & Apostolova 2008, 2009).

The dissertation studies of Tzonev (2002) and Dimitrov (2004a) have respectively characterized the vegetation of the Middle Danube Plain and the Yundola Experimental Forestry Station. They are the first dissertations prepared according to the Braun-Blanquet approach in Bulgaria. The third dissertation is by Sopotlieva (2008) who analysed the halophytic vegetation and dry grasslands in Southeast Bulgaria. The non effectively published by Tzonev (2002) syntaxa in *PhD Thesis* and the later papers were validated by Tzonev (2009b).

Several important publications have been prepared during that period in Bulgaria, which summarize the researches into different vegetation types. These are the studies on the Black Sea dunes (Tzonev & al. 2005), Western Pontic steppes (Tzonev & al. 2006a), beech forests in Bulgaria (Tzonev & al. 2006b), vegetation of the alpine mires and petrifying springs (Hájkova & al. 2006), halophytic vegetation along the Black Sea coast and Southeast Bulgaria (Tzonev & al. 2008), and vegetation of some mires and fens in Bulgaria (Hájek & al. 2008).

The results of an extensive study of the pastures and meadows in Bulgaria according to the Braun-Blanquet approach were summarized in a report (Meshinev & al. 2005) which has not been completely published yet. The Braun-Blanquet approach has been applied and syntaxonomical conclusions were drawn in some new publications which did not contain relevés or synoptic tables. These publications include the works of Asenov (2003), Pavlov & Dimitrov (2004), Dimitrov & al. (2005b), and Apostolova-Stoyanova & al. (2005).

All in all, within the nine years since the turn of the century, 37 publications applying the Braun-Blanquet approach came out, or were accepted for publication. In comparison, within the 20th century 23 publications saw light, including works which have not used this method consistently.

The following syntaxa were described on the territory of Bulgaria, according to the syntaxonomical scheme of Rodwell & al. (2002), as a result of a literature review (48 publications with phytosociological relevés or synoptic tables) and analyses of the existing information: 39 classes, 67 orders, 94 alliances, 218 associations, 48 subassociations (without typicum), and 36 plant communities (Appendix I). There are still three provisional association names (Tzonev 2009a) and two invalidly published subassociation names (Apostolova & Meshinev 2006; Sopotlieva 2008).

The diversity of Bulgarian vegetation and the important role of many endemic taxa in the formation of communities explain the description of a great number of syntaxa which are new for the region. Three new alliances were described on the territory of Bulgaria: *Cirsion appendiculati* Horvat et al. 1937, *Potentillo ternatae-Nardion* Simon 1958, *Veronico kellererii-Papaverion degeni* Mucina et al. 1990. The new associations are 110, 68 of them by Bulgarian authors, 29 by foreign authors and 13 by a joint Bulgarian-foreign team. The newly-described subassociations (without *typicum*) are 39: 24 by Bulgarians, eight by foreigners and seven jointly by Bulgarians and foreigners.

There are many syntaxonomical problems which must be solved in the future works. The more important are listed below in the paper. For example, the association *Elynetum pirinicum* described by Simon (1958), which has a geographical epithet in the name, must be valiadated according to the Code (Art. 34a). Vulchev (2000) has not determined the belonging of syntaxa from superior rank to the described new associations of *Pinus heldreichii*. Some syntaxa, which have been described by Sopotlieva (2008), are still not effectively published because they are listed only in their *PhD Theses*. Two new subassociations by Apostolova & Meshinev (2006) and Sopotlieva (2008) – *Bothriochloetum ischaemi* (Kristea 1937) Pop 1977 *typicum* Apostolova et Meshinev 2006 and *Hordeeto-Caricetum distantis* Micevski 1957 *typicum* Sopotlieva 2008 have not been validly published. They are described as "subas-

soc. *typicum*" with a holotype from Bulgaria, but on validly published (before 1 January 1979) associations from Romania and former Yugoslavia. This contradicts Art. 5 of ICPN. According to this article, the typus of subassociations published as *typicum* after 01.01.2002 must be the type of the association. If the association is not validly published (other country and other table), the type could only be a neotype, but not a holotype. However, these associations are validly published. Consequently, the two subassociations *typicum* with holotype from Bulgaria are not validly published, because it is impossible for their holotypes to be holotypes of the associations. These invalidly published subassociations have not been included in the checklist in Appendix I. There are also some debatable syntaxonomical revisions, like the transfer of the association *Campanulo alpinae-Nardetum strictae,* which is the holotype of the alliance *Potentillo-Nardion*, to the alliance *Seslerion comosae* (Velev & Apostolova 2009).

There are still one association nomen ambiguum (*Nardetum strictae* Greben. 1953) and one invalidly published alliance (*Lolio remotae-Linion*), which have not been validated, but they are included in the paper.

The two publications by Tzonev & al. (2006a) and Apostolova & Meshinev (2006) put forth a problematic question. They relate to the region of South Dobrudzha and investigate the steppe vegetation there. Tzonev & al. (2006a) have provided scientific arguments in their paper that the steppe communities on flatlands of the Dobrudzha Plateau belong to the endemic Bulgarian association *Paeonio tenuifoliae-Koelerietum brevis*. According to Apostolova & Meshinev (2006), very similar communities from the same locations belong to the association *Agropyro-Thymetum zigoidii* Dihoru 1970 described in Romania. The synoptic table presented in the work of Apostolova & Meshinev (2006) demonstrates more differences than similiarities between the two communities, but this problem requires further research.

Researches in Bulgaria have been so far aimed along two main lines: investigation of any kind of vegetation (beech forests, coniferous forests, dune vegetation, flood-plain forests, forests of *Pinus heldreichii*, ruderal and segetal grass vegetation, halophytic communities, etc.), or investigation of some geographical or administrative regions (Pirin Mts, Rila Mts, Middle Danube Plain, Yundola, Straldzha-Aytos region in Southeast Bulgaria, etc.). The following kinds of vegetation have been studied comparatively well: beech forests, spruce forests, Bosnian pine forests (*Pinus heldreichii*), floodplain forests ("longoz" forests), sand dunes along the Black Sea Coast, Western Pontic steppes, alpine and subalpine grasslands and heaths, weed and ruderal vegetation, mires and mountain springs, calcareous screes, halophytic communities and some others. Many prevailing plant communities in the natural plant cover of Bulgaria, however, have been poorly studied. These are the xerothermic oak forests, dry pastures, mesic meadows, chasmophytic communities, etc. There are no studies of the ten vegetation classes which are present on the territory of Bulgaria and could be accepted as probable on the basis of indirect data, or results from some studies which have been carried out with other methodologies (Appendix II). Such kinds of vegetation are the Mediterranean therophyte "pseudosteppes", littoral communities of sea grasses, vegetation of hyperhaline water basins, etc.

The scientific and educational sections applying the methodology of Braun-Blanquet in their publications are the Department of Dendrology of the University of Forestry, Sofia, and the sections of Applied Botany and Phytoecology and Ecology of the Institute of Botany with the Bulgarian Academy of Science, Sofia. Some researchers from the Department of Ecology and Environmental Protection at St Kliment Ohridski University of Sofia, the Directorates of some natural and national parks – Central Balkan, Vitosha, Vrachanski Balkan, and the Regional Forestry Directorate of Blagoevgrad are using Braun-Blanquet's method too. Owing to the lack of phytosociological trends and researchers, a serious lapse can be traced back to the Departments of Botany of Sofia and Plovdiv Universities. This will certainly affect the education of students and the establishment of a phytosociological school in Bulgaria, in order to meet the needs for unification of Bulgarian botanical science with the sciences of EU Member States.

The Bulgarian Society of Phytocoenology is the unifying link that has consistently worked for popularization and introduction of the Braun-Blanquet approach in Bulgaria since 1993. Most authors who use this method in Bulgaria are members of the Society. They take part in the national drives, such as the study of Bulgarian beech forests, or the establishment of NATURA 2000 network in Bulgaria. The Society plays a major part in the compilation of the *Red Data Book of Bulgarian Habitats*.

Appendix I

Syntaxa according to the Braun-Blanquet approach in Bulgaria

Salt marsh, sand-dune and sea-cliff vegetation

1. Class *Thero-Salicornietea strictae* Pignatti 1953
Order *Thero-Salicornietalia strictae* Pignatti 1953
Alliance *Thero-Salicornion strictae* Braun-Blanq. 1933
Assoc. *Salicornietum prostratae* Soó (1947) 1964 (Tzonev 2002, 2009b; Tzonev & al. 2008).
Assoc. *Suaedetum maritimae* Soó 1927
Assoc. *Suaedo-Bassietum hirsutae* Braun-Blanq. 1928 (Tzonev & al. 2008).

2. Class *Juncetea maritimi* Braun-Blanq. ex Tüxen et Oberd. 1952
Order *Juncetalia maritimi* Braun-Blanq. ex Horvatić 1934
Alliance *Juncion maritimi* Braun-Blanq. ex Horvatić 1934
Assoc. *Juncetum maritimi* (Rübel 1930) Pignatti 1953 (Tzonev & al. 2008).

3. Class *Festuco-Puccinellietea* Soó 1968 [recorded by Tzonev (2002) as class *Asteretea tripolii* Westh. et Beeftink 1962].
Order *Puccinellietalia* Soó 1947
Alliance *Puccinellion limosae* Soó 1933
Assoc. *Hordeetum hystricis* (Soó 1933) Wend. 1943 (Tzonev 2002, 2009b; Sopotlieva 2008).
Assoc. *Limonietum bulgaricum* Tzonev 2009 (Tzonev 2002, 2009b).
Assoc. *Diantho pallidiflori-Puccinellietum convolutae* Tzonev et al. 2008 (Tzonev & al. 2008).
Assoc. *Aeluropetum littoralis* (Prodán 1939) Şerb. 1965 (Tzonev & al. 2008).
Assoc. *Bupleuro tenuissimi-Camphorosmetum monspeliacae* Tzonev et al. 2008 (Tzonev & al. 2008).
Assoc. *Camphorosmetum annuae* Rapaics ex Soó 1933 (Tzonev & al. 2008; Sopotlieva 2008).
Assoc. *Petrosimono brachyatae-Puccinellietum convolutae* Tzonev et al. 2008 (Tzonev & al. 2008).
Community of *Artemisia santonicum* (Tzonev 2009b).
Community of *Puccinellia convoluta* (Sopotlieva 2008).

4. Class *Crithmo-Staticetea* Braun-Blanq. in Braun-Blanq. et al. 1952
Order *Crithmo-Staticetalia* Molin. 1934
Alliance *Crithmo-Staticion* Molin. 1934
Assoc. *Goniolimo collini-Crithmetum maritimi* Vicherek 1971 (Vicherek 1971).

5. Class *Cakiletea maritimae* Tüxen et Presing ex Braun-Blanq. et Tüxen 1952
Order *Euphorbietalia peplis* Tüxen ex Oberd. 1949 [recorded by Tzonev & al. (2005) as *Cakiletalia maritimae* Tüxen 1950).
Alliance *Euphorbion peplis* Tüxen ex Oberd. 1952
Assoc. *Cakilo euxinae-Salsoletum ruthenicae* Vicherek 1971 subassoc. *typicum* (Vicherek 1971).
subassoc. *crambetosum ponticae* Vicherek 1971

6. Class *Honckenyo-Elymetea arenarii* Tüxen 1966
Order *Elymetalia gigantei* Vicherek 1971
Alliance *Elymion gigantei* Morariu 1957 [recorded by Tzonev & al. (2005) within class *Ammophiletea* and order *Ammophiletalia* Braun-Blanq. et Tüxen ex Westh. et al. 1946].

Assoc. *Ammophilo arundinaceae-Elymetum gigantei* Vicherek 1971 subassoc. *typicum* (Vicherek 1971; Dimitrov & al. 2005b).
subassoc. *cakiletosum euxinae* Vicherek 1971
subassoc. *festucetosum vaginatae* Vicherek 1971
Assoc. *Xanthio italici-Leymetum sabulosi* Tzonev et al. 2005 (Tzonev & al. 2005).
Assoc. *Medicagini tenderiensis-Ammophiletum arundinaceae* Tzonev et al. 2005 (Tzonev & al. 2005).

7. Class *Ammophiletea* Braun-Blanq. et Tüxen ex Westh. et al. 1946

Order *Crucianelletalia maritimae* Sissingh 1974 [recorded by Tzonev & al. (2005) as order *Helichryso-Crucianelletalia maritimae* Géhu et al. in Géhu 1975].
Alliance *Sileno thymifoliae-Jurinion kilaeae* Géhu et al. 1989
Assoc. *Aurinio uechtritziani-Artemisietum campestris* Tzonev et al. 2005 subassoc. *typicum* (Tzonev & al. 2005).
subassoc. *pancratietosum maritimi* Tzonev et al. 2005

Rock crevice, scree and boulder-field vegetation

8. Class *Asplenietea trichomanis* (Braun-Blanq. in Meier et Braun-Blanq. 1934) Oberd. 1977

Community of *Ceterach javorkeanum* and *Sedum album* (Mucina & Kolbek 1989).
Order *Androsacetalia vandellii* Braun-Blanq. 1934
Alliance *Silenion lerchenfeldianae* Horvat et Pawł. in Horvat 1949
Assoc. *Sileno lerchenfeldianae-Potentilletum haynaldianae* Horvat et al. 1937 (Horvat & al. 1937; Simon 1958).
Assoc. *Geo-Saxifragetum cymosae* Roussakova 2000 (Roussakova 2000).
Order *Potentilletalia speciosae* Quézel 1964
Community of *Silene pusilla* and *Saxifraga oppositifolia* (Mucina & al. 1990).
Alliance *Ramondion nataliae* Horvat ex Simon 1958
Assoc. *Leontopodio-Potentilletum stojanovii* Simon 1957 subassoc. *typicum* (Simon 1958; Mucina & al. 1990).
subassoc. *asplenietosum fissum* Simon 1957
Assoc. *Hieracio pannosi-Caricetum kitaibelianae* Mucina et al. 1990 (Mucina & al. 1990).
Order *Parietarietalia* Rivas Mart. in Rivas Goday 1964
Alliance *Cymbalario-Asplenion* Segal 1969 emend. Mucina 1993
Assoc. *Cymbalarietum muralis* Görs 1966 [recorded by Mucina & Kolbek (1989) within class *Parietarietea judaicae* Rivas Mart. ex Rivas Goday 1964].

9. Class *Thlaspietea rotundifolii* Braun-Blanq. 1948

Order *Androsacetalia alpinae* Braun-Blanq. in Braun-Blanq. et Jenny 1926
Alliance *Androsacion alpinae* Braun-Blanq. in Braun-Blanq. et Jenny 1926
Assoc. *Oxyrio digynae-Poëtum contractae* Horvat et al. 1937 (Horvat & al. 1937; Simon 1958; Roussakova 2000).
Assoc. *Senecioni-Juncetum trifidi* Simon 1958 (Simon 1958; Roussakova 2000).
Order *Drypidetalia spinosae* Quézel 1967
Alliance *Silenion marginatae* Lakušić 1970
Assoc. *Bromo lacmonices-Geranietum macrorrhizi* Mucina et al. 1990 (Mucina & al. 1990).
Community of *Centranthus kellereri* (Velchev & Vassilev 1970; Mucina & al. 1990).
Order *Thlaspietalia rotundifolii* Braun-Blanq. in Braun-Blanq. et Jenny 1926
Alliance *Veronico kellererii-Papaverion degenii* Mucina et al. 1990

Assoc. *Papaveri degenii-Armerietum alpinae* Mucina et al. 1990 subassoc. *typicum* (Mucina & al. 1990).
subassoc. *festucetosum riloensis* Mucina et al. 1990
Assoc. *Veronico kellererii-Silenetum prostratae* Mucina et al. 1990 (Mucina & al. 1990).

Freshwater aquatic vegetation

10. Class *Lemnetea* O. Bolòs et Masclans 1955

Order *Lemnetalia minoris* Tüxen ex O. Bolòs et Masclans 1955
Alliance *Lemnion minoris* Tüxen ex O. Bolòs et Masclans 1955
Assoc. *Lemnetum minoris* Th. Müller. et Görs 1960 (Kochev & al. 1986; Tzonev 2002, 2009a, b).
Assoc. *Lemnetum gibbae* Miyaw. et Tüxen 1960 (Tzonev 2002, 2009a, b).
Assoc. *Wolffietum arrhizae* Miyaw. et Tüxen 1960 (Tzonev 2009b).
Assoc. *Spirodelo-Salvinietum natantis* Slavnić 1956 (Kochev & al. 1986; Tzonev 2002, 2009a, b).
Assoc. *Lemno-Azolletum fuliculoidis* Braun-Blanq. 1952 (Kochev & al. 1986).
Assoc. *Lemno-Spirodeletum* W. Koch 1954 (Kochev & al. 1986).
Alliance *Lemnion trisulcae* Hartog et Segal ex Tüxen et Schwabe-Braun in Tüxen 1974
Assoc. *Lemnetum trisulcae* Knapp et Stoffers 1962 [recorded by Tzonev (2002) within alliance *Lemnion minoris* Tüxen ex O. Bolòs et Masclans 1955] (Tzonev 2009a, b).

11. Class *Charetea fragilis* Fukarek ex Krausch 1964

Order *Charetalia hispidae* Sauer ex Krausch 1964
Alliance *Charion vulgaris* (W. Krause ex W. Krause et Lang 1977) W. Krause 1981
Community of *Chara vulgaris* (Kochev & al. 1986).

12. Class *Potametea* Klika in Klika et Novák 1941

Order *Potametalia* W. Koch 1926
Alliance *Ceratophyllion demersi* Hartog et Segal ex Passarge 1996
Assoc. *Ceratophylletum demersi* Hild 1956 [recorded by Kochev & al. (1986) and Tzonev (2002) as a community of *Ceratophyllum demersum*].
Alliance *Nymphaeion albae* Oberd. 1957
Assoc. *Nymphaeetum albae* Vollmar 1947 (Kochev & al. 1986; Tzonev 2009a).
Assoc. *Trapetum natantis* Kárpáti 1963 (Kochev & al. 1986; Tzonev 2002, 2009b).
Assoc. *Potametum natantis* Soó 1927 (Tzonev 2002, 2009b,).
Assoc. *Nymphoidetum peltatae* (P. Allorge 1922) Bellot 1951 (Kochev & al. 1986; Tzonev 2009a, b).
Community of *Marsilea quadrifolia* (Kochev & al. 1986; Tzonev 2002, 2009b).
Alliance *Parvopotamion* (Vollmar 1947) Hartog et Segal 1964 [recorded by Tzonev (2002) as alliance *Potamogetonion pectinati* (W. Koch 1926) Görs 1977].
Assoc. *Potametum crispi* Soó 1927 [described by Tzonev (2002) as a community of *Potamogeton crispus*].
Assoc. *Potamo-Najadetum marinae* Horvatić et Micevski in Horvatić 1933 subassoc. *najadetosum minoris* Oťaheľová 1980 (Kochev & al. 1986).
Community of *Potamogeton pectinatus* (Kochev & al. 1986).
Alliance *Magnopotamion* (W. Koch 1926) Libbert 1931 [recorded by Tzonev (2002) as alliance *Potamogetonion pectinati* (W. Koch 1926) Görs 1977].
Assoc. *Myriophylletum spicati* Soó 1927 (Tzonev 2002, 2009b).
Assoc. *Myriophylletum verticillati* Soó 1927 (Tzonev 2002, 2009b).
Assoc. *Potametum lucentis* Hueck 1931 (Kochev & al. 1986; Tzonev 2002, 2009b).
Assoc. *Potametum nodosi* (Soó 1960) Segal 1964 [recorded by Tzonev (2002) as a community of *Potamogeton nodosus* (*P. fluitans*) within alliance *Potamogetonion pectinati* Carstensen 1928].

Assoc. *Potametum pectinati* Carstensen 1928 [recorded by Kochev & al. (1968) as a community of *Potamogeton pectinatus*].

Alliance *Utricularion vulgaris* Hartog et Segal 1964 [recorded by Tzonev (2009a) within class *Lemnetea minoris* O. Bolòs et Masclans 1955 and order *Lemno-Utricularietalia* Passarge 1978].

Assoc. *Lemno-Utricularietum vulgaris* Soó 1928 (Tzonev 2009a).

Springs, shoreline and swamp vegetation

13. Class *Montio-Cardaminetea* Braun-Blanq. et Tüxen ex Klika et Hadač 1944

Order *Cardamino-Chrysosplenietalia* Hinterlang 1992

Alliance *Caricion remotae* Kästner 1941 [recorded by Hájek & al. (2005) within order *Montio-Cardaminetalia* Pawł. et al. 1928 as alliance *Cratoneuro filicini-Calthion laetae* Hadač 1983].

Assoc. *Angelico pancicii-Calthetum laetae* Hájek et al. 2005 (Hájek & al. 2005).

Assoc. *Brachythecio rivularis-Cardaminetum balcanicae* Marhold et Valachovič 1998 (Marhold & Valachovič 1998).

Order *Montio-Cardaminetalia* Pawł. et al. 1928

Alliance *Philonotidion seriatae* Hinterlang 1992 [recorded by Roussakova (2000) as alliance *Cardamino-Montion* Braun-Blanq. 1925].

Assoc. *Saxifragetum stellaris* Deyl 1940 [recorded by Roussakova (2000) as assoc. *Philonotido-Saxifragetum stellaris* Horvat 1949] (Hájek & al. 2005).

Alliance *Cratoneurion commutati* W. Koch 1928

Assoc. *Cratoneuretum falcati* Gams 1927 (Hájková & al. 2006).

14. Class *Isoëto-Nanojuncetea* Braun-Blanq. et Tüxen ex Westh. et al. 1946

Order *Crypsietalia aculeatae* Vicherek 1973

Alliance *Cypero-Spergularion salinae* Slavnić 1948

Assoc. *Crypsietum aculeatae* Wenzel 1934 (Tzonev & al. 2008).

Assoc. *Heleochloetum alopecuroidis* Rapaics et Ubriszy 1948 (Tzonev & al. 2008).

15. Class *Phragmito-Magnocaricetea* Klika in Klika et Novák 1941 [recorded by Tzonev (2002) as order *Phragmitetea communis* Tüxen et Preising 1942].

Order *Phragmitetalia communis* W. Koch 1926

Alliance *Oenanthion aquaticae* Hejný ex Neuhäusl 1959 [recorded by Tzonev (2009a, b) within order *Oenanthetalia aquaticae* Hejný in Kopecký et Hejný 1965].

Assoc. *Rorippo amphibiae–Oenanthetum aquaticae* (Soó 1928) Lohmeyer 1950 [recorded by Kochev & al. (1986) as a community of *Phelandrium aquaticum*] (Tzonev 2009a, b).

Assoc. *Bolboschoenetum maritimi* Eggler 1933 [recorded by Kochev & al. (1986) as a community of *Bolboschoenus maritimus*] (Sopotlieva 2008).

Alliance *Phragmition communis* W. Koch 1926

Assoc. *Typhetum angustifoliae* Pignatti 1953 (Kochev & al. 1986; Tzonev 2002, 2009a, b).

Assoc. *Typhetum latifoliae* G. Lang 1973 (Kochev & al. 1986; Tzonev 2002, 2009a, b).

Assoc. *Typhetum laxmanii* Nedelcu 1967 (Kochev & al. 1986; Tzonev 2002, 2009a, b).

Assoc. *Phragmitetum communis* Soó 1927 (Kochev & al. 1986; Tzonev 2002, 2009 a; Dimitrov & al. 2005b).

Assoc. *Scirpetum lacustris* (P. Allorge 1922) Chouard 1924 (Kochev & al. 1986; Tzonev 2009a, b).

Assoc. *Glycerietum maximae* Hueck 1931 (Kochev & al. 1986).

Assoc. *Sparganietum erecti* Roll 1938 (Kochev & al. 1986).

Assoc. *Eleocharietum palustris* Ubrizsy 1948 (Kochev & al. 1986).

Assoc. *Caricetum acutiformis* Eggler 1933 (Kochev & al. 1986).

Assoc. *Glycerietum aquaticae* Hueck 1931 (Tzonev 2009a).
Community of *Iris pseudacorus* (Tzonev 2009a).

Bogs and fens

16. Class *Scheuchzerio-Caricetea nigrae* Tüxen 1937

Order *Caricetalia davallianae* Braun-Blanq. 1949
Alliance *Caricion davallianae* Klika 1934 [recorded by Hájek & al. (2008) within order *Caricetalia fuscae*].
Assoc. *Dactylorhizo cordigerae-Eriophoretum latifolii* Hájek et al. 2008 (Hájek & al. 2008).
Assoc. *Carici flavae-Cratoneuretum filicini* Kovács et Felföldy 1960 (Hájek & al. 2008).
Assoc. *Eleochariti uniglumis-Caricetum distantis* Hájek et al. 2008 (Hájek & al. 2008).
Assoc. *Junco subnodulosi-Schoenetum nigricantis* P. Allorge 1922 (Hájek & al. 2008).
Order *Caricetalia fuscae* W. Koch 1926
Alliance *Caricion fuscae* W. Koch 1926 [recorded by Hájek & al. (2008) within order *Scheuchzerietalia palustris* Nordh. 1937 as alliance *Caricion canescenti-nigrae* Nordh. 1937].
Assoc. *Caricetum nigrae* Braun-Blanq. 1915 subassoc. *typicum* (Hájek & al. 2008).
subassoc. *sphagnetosum subsecundi* Steiner 1992
subassoc. *caricetosum viridulae* Hájek et al. 2008
Assoc. *Primulo exiguae-Primuletum deorum* Horvat et al. 1937 (Horvat & al. 1937; Roussakova 2000).
Assoc. *Primulo deorum-Caricetum nigrae* Roussakova 2000 (Roussakova 2000).
Assoc. *Primulo exiguae-Caricetum echinatae* Roussakova 2000 (Roussakova 2000; Hájek & al. 2005).
Assoc. *Primulo-Nardetum strictae* Roussakova 2000 (Roussakova 2000).
Assoc. *Drepanocladetum exannulati* Krajina 1933 (Hájek & al. 2005).
Assoc. *Cirsio heterotrichi-Caricetum nigrae* (Soó 1957) Hájek et al. 2005 subassoc. *typicum* (Hájek & al. 2005).
subassoc. *sphagnetosum subsecundi* Hájek et al. 2005
subassoc. *eriophoretosum vaginatae* Hájek et al. 2005
Alliance *Sphagno recurvi-Caricion canescentis* Passarge (1964) 1978 [described by Hájek & al. (2005) within order *Scheuchzerietalia palustris* Nordh. 1937].
Assoc. *Bruckenthalio-Sphagnetum capillifolii* Hájek et al. 2005 (Hájek & al. 2005).
Assoc. *Primulo-Trichophoretum caespitosae* Roussakova 2000 (Roussakova 2000).
Assoc. *Carici echinatae-Sphagnetum* Soó 1934 (Soó 1957).
Assoc. *Sphagno-Caricetum rostratae* Steffen 1931 subassoc. *typicum* (Hájek & al. 2008).
subassoc. *caricetosum limosae* Hájek et Háberová 2001
Alliance *Sphagno warnstorfii-Tomenthypnion nitentis* Dahl 1956
Assoc. *Geo coccinei-Sphagnetum contorti* Hájek et al. 2008 subassoc. typicum (Hájek & al. 2008).
subassoc. *caricetosum lasiocarpae* Hájek et al. 2008

17. Class *Oxycocco-Sphagnetea* Braun-Blanq. et Tüxen ex Westh. et al. 1946

Order *Sphagnetalia medii* Kästner et Flössner 1933
Alliance *Sphagnion medii* Kästner et Flössner 1933
Assoc. *Sphagno-Pinetum sylvestris* Kobendza 1930 (Hájek & al. 2008).

Temperate grasslands, heaths and fringe vegetation

18. Class *Molinio-Arrhenatheretea* Tüxen 1937

Order *Arrhenatheretalia* Pawł. et al. 1928
Alliance *Arrhenatherion elatioris* W. Koch 1926

Assoc. *Arrhenatheretum elatioris* Braun-Blanq. 1915 (Apostolova & al. 2007).
Community of *Poa pratensis* and *Dactylis glomerata* (Pavlov & al. 2006).
Alliance *Cynosurion cristati* Tüxen 1947
Assoc. *Pastinaco hirsutae-Festucetum nigrescentis* M. Dimitrov 2001 subassoc. *typicum* (Dimitrov 2001, 2004a).
subassoc. *verbascetosum pannosi* M. Dimitrov 2001
Assoc. *Festuco-Agrostidetum* Horvat 1951 (Apostolova & Meshinev 2006).
Order *Molinietalia* W. Koch 1926
Alliance *Calthion palustris* Tüxen 1937
Assoc. *Epilobio-Juncetum effusi* Oberd. 1953 subassoc. *caricetosum ovalis* M. Dimitrov 2001 (Dimitrov 2001, 2004a).
Assoc. *Scirpetum sylvatici* Ralski 1931 (Hájek & al. 2005).
Alliance *Veronico longifoliae-Lysimachion vulgaris* (Passarge 1977) Bál.-Tul. 1981
Assoc. *Euphorbio lucidi-Bolboschoenetum maritimi* (Tzonev 2009) nom. prov. (Tzonev 2009a, b).
Assoc. *Glycyrrhizo echinatae-Bolboschoenetum maritimi* (Tzonev 2009) nom. prov. (Tzonev 2009a).
Order *Paspalo-Heleochloetalia* Braun-Blanq. in Braun-Blanq. et al. 1952
Alliance *Trifolio-Cynodontion* Braun-Blanq. et O. Bolòs 1957
Assoc. *Trifolio fragiferi-Cynodontetum* Braun-Blanq. et O. Bolòs 1957 [recorded by Tzonev (2009a) within class *Plantaginetea majoris* Tüxen et Preising in Tüxen 1950, *Agrostietalia stoloniferae* Oberd. in Oberd. et al. 1967 and alliance *Agropyro–Rumicion crispi* Nordh. 1940].
Order *Plantagini-Prunelletalia* Ellmauer et Mucina in Mucina et al. 1993
Alliance *Plantagini-Prunellion* Eliáš 1980
Community of *Rumex acetosa* (Pavlov & al. 2006).
Order *Potentillo-Polygonetalia* Tüxen 1947
Alliance *Potentillion anserinae* Tüxen 1947
Assoc. *Plantagini majoris-Lolietum perennis* (Beger 1932) Dengler et al. 2003 (Sopotlieva 2008).
subassoc. *cynodontosum* Tüxen 1950
Community of *Calamagrostis epigejos* (Sopotlieva 2008).
Order *Trifolio-Hordeetalia* Horvatić 1963
Alliance *Trifolion resupinati* Micevski 1957
Assoc. *Hordeo-Caricetum distantis* Micevski 1957 (Sopotlieva 2008).
subassoc. *juncetosum* Micevski 1965

19. Class *Festuco-Brometea* Braun-Blanq. et Tüxen ex Soó 1947

Order *Festucetalia vaginatae* Soó 1957
Alliance *Festucion vaginatae* Soó 1938
Assoc. *Lepidotricho uechtritziani-Festcetum vaginatae* Soó 1955 nom. invers. propos. [described by Soó (1955) as assoc. *Festuca vaginata-Lepidotrichum uechtritzianum*].
Alliance *Scabiosion ucrainicae* Boşcaiu 1975 [recorded by Tzonev & al. (2005) within class *Ammophiletea* Braun-Blanq. et Tüxen ex Westh. et al. 1946 and order *Ammophiletalia* Braun-Blanq. 1933].
Assoc. *Alysso borzaeani-Ephedretum distachyae* Tzonev et al. 2005 (Tzonev & al. 2005).
Assoc. *Stachyo atherocalici-Caricetum ligericae* Tzonev et al. 2005 (Dimitrov & al. 2005b; Tzonev & al. 2005).
Community of *Festuca arenicola* (Tzonev & al. 2005).
Order *Festucetalia valesiacae* Braun-Blanq. et Tüxen ex Braun-Blanq. 1949
Alliance *Festucion valesiacae* Klika 1931 [recorded by Tzonev (2002) as alliance *Festucion rupicolae* Soó 1940].

Assoc. *Asphodelino tauricae-Onosmetum tauricae* Soó 1955 [described by Soó (1955) as assoc. *Asphodeline taurica-Onosma taurica*].
Assoc. *Thymo urumovii-Chrysopogonetum grylli* Tzonev 2009 (Tzonev 2002, 2009b).
Community of *Paeonia tenuifolia* and *Chrysopogon gryllus* (Tzonev 2002).
Assoc. *Bothriochloetum ischaemi* (Kristea 1937) Pop 1977 (Tzonev 2002; 2009b; Apostolova & Meshinev 2006; Sopotlieva 2008).
subassoc. *cichorietosum intybi* Tzonev 2009
subassoc. *asperuletosum cynanchicae* Sopotlieva 2006
subassoc. *thymetosum pannonici* Apostolova et Meshinev 2006
Assoc. *Stipetum stenophyllae* Meusel 1938 subassoc. *centauretosum stereophyllae* Tzonev 2009 (Tzonev 2002, 2009b).
Assoc. *Festuco valesiacae-Stipetum capillatae* Sill. 1930 (Sopotlieva 2008).
Assoc. *Medicagini-Festucetum valesiacae* Wagner 1941 (Sopotlieva 2008).
Assoc. *Trifolio arvensis-Festucetum valesiacae* Sopotlieva 2008 (Sopotlieva 2008).
Community of *Chrysopogon gryllus* (Sopotlieva 2008).
Order *Koelerio-Phleetalia phleoidis* Korneck 1974
Alliance *Chrysopogono-Danthonion* Kojić 1957 [described by Apostolova & Meshinev (2006) within *order Festucetalia valesiacae* Braun-Blanq. et Tüxen ex Braun-Blanq. 1949].
Assoc. *Agrostio-Chrysopogonetum grylli* Kojić 1959 subassoc. *brizetosum mediae* Kojić 1959 (Apostolova & Meshinev 2006).
Order *Scorzonero-Chrysopogonetalia* Horvatić et Horvat 1958
Alliance *Chrysopogono-Saturejion* Horvat et Horvatić in Horvatić 1934 [recorded by Tzonev (2002) as alliance *Saturejion montanae* Horvat 1962].
Assoc. *Potentillo pilosae-Achilleetum clypeolatae* Tzonev 2009 (Tzonev 2002, 2009 b).
Assoc. *Lino linearifolii-Gypsophiletum glomeratae* Tzonev 2009 subassoc. *typicum* (Tzonev 2002, 2009b).
subassoc. *celtitosum glabratae* Tzonev 2009
Assoc. *Euphorbio myrsinitis-Bothriochloetum* Jovan.-Dunj. 1955 subassoc. *medicaginetosum rhodopeae* Sopotlieva 2008 (Sopotlieva 2008).
Order *Seslerietalia rigidae* Gergely 1967
Alliance *Seslerion rigidae* Zólyomi 1936
Community of *Thymus vandasii* and *Potentilla cinerea* (Pavlov & al. 2006).
Order *Stipo pulcherrimae-Festucetalia pallentis* Pop 1968
Alliance *Pimpinello-Thymion zygoidis* Dihoru 1970 [recorded by Tzonev & al. (2006) within order *Festucetalia valesiacae* Braun-Blanq. et Tüxen ex Braun-Blanq. 1949].
Assoc. *Alysso caliacrae-Artemisietum lerchianae* Tzonev et al. 2006 subassoc. *typicum* (Tzonev & al. 2006a).
subassoc. *camphorosmetosum monspeliacae* Tzonev et al. 2006
Assoc. *Agropyro-Thymetum zygoidis* Dihoru 1970 (Apostolova & Meshinev 2006).
Assoc. *Paeonio tenuifoliae-Koelerietum brevis* Tzonev et al. 2006 (Tzonev & al. 2006a).

20. Class *Koelerio-Corynephoretea* Klika in Klika et Novák 1941 [recorded by Mucina & Kolbek (1989) as class *Sedo-Scleranthetea* Braun-Blanq. 1955].
Order *Alysso-Sedetalia* Moravec 1967 [recorded by Mucina & Kolbek (1989) as order *Sedo-Scleranthetalia* Braun-Blanq. 1955].
Alliance *Alysso-Sedion albi* Oberd. et Müller in Müller 1961
Community of *Achillea clypeolata* and *Verbascum longifolium* (Mucina & Kolbek 1986).
Order *Corynephoretalia canescentis* Klika 1934
Alliance *Thero-Airion* Tüxen ex Oberd. 1957

Assoc. *Vulpietum myuri* G. Phil. 1973 (Sopotlieva 2008).
Assoc. *Achilleo depressae-Poëtum bulbosae* Sopotlieva 2008 (Sopotlieva 2008).

21. Class *Trifolio-Geranietea sanguinei* Müller 1962
Order *Origanetalia vulgaris* Müller 1962
Alliance *Geranion sanguinei* Tüxen in Müller 1962
Community of *Calamagrostis arundinacea* (Dimitrov & al. 2004a).

Dry grasslands and semi-deserts

22. Class *Helianthemetea guttati* (Braun-Blanq. in Braun-Blanq. et al. 1952) Rivas Goday et Rivas Mart. 1963
Order *Helianthemetalia guttati* Braun-Blanq. in Braun-Blanq. et al. 1940
Alliance *Trifolion cherleri* Micevski 1970
Assoc. *Erysimo-Trifolietum* Micevski 1977 (Sopotlieva & Apostolova 2007; Sopotlieva 2008).

Montane tall-herb, grassland, fell-field and snow-bed vegetation

23. Class *Mulgedio-Aconitetea* Hadač et Klika in Klika 1948 [recorded by Horvat et al. (1937) as class *Betulo-Adenostyletea* Braun-Blanq. et Tüxen 1943].
Order *Adenostyletalia alliariae* et Braun-Blanq. 1931
Alliance *Cirsion appendiculati* Horvat et al. 1937
Assoc. *Angelico-Heracleetum verticillati* Horvat et al. 1937 (Horvat & al. 1937; Roussakova 2000).
Assoc. *Carici-Deschampsietum cespitosae* Roussakova 2000 (Roussakova 2000).
Assoc. *Salici-Alnetum viridis* Volić et al. 1962 (Roussakova 2000).
Order *Rumicetalia alpini* Mucina in Karner et Mucina 1993
Alliance *Rumicion alpini* Rübel ex Scharf. 1933
Assoc. *Senecioni-Rumicetum alpini* Horvat 1949 (Roussakova 2000).

24. Class *Salicetea herbaceae* Braun-Blanq. 1947
Order *Salicetalia herbaceae* Braun-Blanq. 1926
Alliance *Salicion herbaceae* Braun-Blanq. 1926
Assoc. *Soldanello pusillae-Plantaginetum gentianoidis* Boşcaiu 1971 (Roussakova 2000).
Assoc. *Primulo-Salicetum herbaceae* Roussakova, **assoc. nov.** hoc loco subassoc. *typicum* Roussakova, **subassoc. nov.** hoc loco [recorded by Roussakova (2000) p. 70, tab. 5 as assoc. *Primulo-Salicetum herbaceae* Gančev 1963 nom. nud., subassoc. *typicum* nom. nud.).
Holotype: Roussakova 2000: p. 70-71, tab. 5, rel. 5
subassoc. *poetosum mediae* (Roussakova 2000: 70-71, tab. 5) Roussakova **comb. nov.** hoc loco
Assoc. *Omalotheco-Alopecuretum gerardi* Mucina et al. 1990 (Mucina & al. 1990; Roussakova 2000).
Assoc. *Alopecuro riloensis-Ranunculetum crenati* Roussakova 2000 (Roussakova 2000).
Assoc. *Omalotheco-Polytrichetum piliferi* Roussakova 2000 (Roussakova 2000).
Assoc. *Alopecuretum riloensis* Roussakova 2000 subassoc. *typicum* (Roussakova 2000).
subassoc. *caricetosum pyrenaicae* Roussakova 2000
Assoc. *Alopecuro-Plantaginetum gentianoides* Roussakova 2000 (Roussakova 2000).
Assoc. *Achilleo clusianae-Luzuletum velenovskyi* Roussakova 2000 (Roussakova 2000).
Assoc. *Leontodonto-Plantaginetum atratae* Roussakova 2000 (Roussakova 2000).
Assoc. *Gentiano-Plantaginetum atratae* Mucina et al. 1990 (Mucina & al. 1990).
Assoc. *Bartsio-Salicetum reticulatae* Mucina et al. 1990 (Mucina & al. 1990).

Assoc. *Salicetum retusae-reticulatae* Braun-Blanq. 1926 (community of *Salix retusa* and *Salix reticulata* Roussakova 2000) [recorded by Roussakova (2000) within alliance *Salicion retusae* Horvat 1949].

25. Class *Carici rupestris-Kobresietea bellardii* Ohba 1974

Order *Oxytropido-Elynetalia* Oberd. ex Albrecht 1969 [recorded by Roussakova (2000) as order *Elynetalia* Oberd. 1937].

Alliance *Oxytropido-Elynion* Braun-Blanq. (1948) 1949

Assoc. *Seslerio-Elynetum bellardii* Roussakova 2000 (Roussakova 2000).

Assoc. *Elynetum pirinicum* Simon 1958 (Simon 1958).

Assoc. *Achilleo aizoonis-Seslerietum klasterskyi* Simon 1958 [decribed by Simon (1958) within alliance *Anthyllo-Seslerion klasterskyi* Simon 1958].

Assoc. *Carici rupestris-Seslerietum klasterskyi* Simon 1958 [decribed by Simon (1958) within alliance *Anthyllido-Seslerion klasterskyi* Simon 1958].

Assoc. *Festuco pirinensis-Seslerietum klasterskyi* Simon 1958 [decribed by Simon (1958) within alliance *Anthyllido-Seslerion klasterskyi* Simon 1958].

Community of *Dryas octopetala* (Roussakova 2000).

26. Class *Juncetea trifidi* Hadač in Klika et Hadač 1944

Order *Festucetalia spadiceae* M. Barbero 1970

Alliance *Festucion pictae* Krajina 1933 [recorded by Roussakova (2000) within class *Thlaspietea rotundifolii* Braun-Blanq. 1948 and order *Androsacetalia alpinae* Braun-Blanq. in Braun-Blanq. et Jenny 1926].

Assoc. *Festucetum pictae* Domin 1931 (Simon 1958; Roussakova 2000).

subassoc. *achilleetosum clusianae* (Simon 1958) Roussakova 2000

Order *Seslerietalia comosae* Simon 1958

Alliance *Poion violaceae* Horvat 1937

Assoc. *Campanulo-Caricetum curvulae* Roussakova, **assoc. nov.** hoc loco [recorded by Roussakova (2000) p. 83, tab. 16 as assoc. *Campanulo-Caricetum curvulae* Bondev 1959 nom. nud.]. **Holotype:** Roussakova 2000: p. 83-84, tab. 16, rel. 3

Assoc. *Festucetum vallidae* Horvat et al. 1937 subassoc. *typicum* (Horvat & al. 1937; Simon 1958; Roussakova 2000).

subassoc. *nardetosum strictae* Roussakova 2000

subassoc. *lerchenfeldietosum flexuosae* Roussakova, **subassoc. nov.** hoc loco [recorded by Roussakova (2000) p. 93, tab. 23 as assoc. *Festucetum vallidae* Horvat et al. 1937 subassoc. *lerchenfeldietosum flexuosae* Penev 1964 nom. nud.]. **Holotype:** Roussakova 2000: p. 93, tab. 23, rel. 2

Assoc. *Festucetum paniculatae* Horvat 1936 subassoc. *stipetosum pennatae* Roussakova 2000 (Simon 1958; Roussakova 2000).

Alliance *Potentillo ternatae-Nardion* Simon 1958

Assoc. *Campanulo alpinae-Nardetum strictae* (Simon 1958) Velev et Apostolova 2009 (Simon 1958; Velev & Apostolova 2009).

Assoc. *Nardetum strictae* Greb. 1950 nom. amb. rejic. propos. (Velev & Apostolova 2008).

Assoc. *Seslerio-Caricetum bulgaricae* Roussakova, **assoc. nov.** hoc loco [recorded by Roussakova (2000) p. 97-98, tab. 27 as assoc. *Caricetum bulgaricae* Gančev ex Roussakova subassoc. *seslerietosum comosae* Roussakova 2000 nom. nud. (ICPN Art. 4, Art. 5)]. **Holotype:** Roussakova 2000: p. 97-98, tab. 27, rel. 4

Assoc. *Nardo-Caricetum bulgaricae* Roussakova, **assoc. nov.** hoc loco [recorded by Roussakova (2000) p. 97-98, tab. 27 as assoc. *Caricetum bulgaricae* Gančev ex Roussakova nom. nud. subassoc. *nardetosum strictae* nom. nud. (ICPN Art. 4, Art. 5)]. **Holotype:** Roussakova 2000: p. 97-98, tab. 27, rel. 12

Assoc. *Festuco-Nardetum strictae* Roussakova, **assoc. nov.** hoc loco [recorded by Roussakova (2000) p. 99, tab. 28 as assoc. *Festuco-Nardetum strictae* Bondev 1959 nom. nud.]. **Holotype:** Roussakova 2000: p. 99, tab. 28, rel. 1

Assoc. *Carici-Festucetum microphyllae* Roussakova 2000 (Roussakova 2000).

Assoc. *Diantho-Nardetum strictae* Roussakova, **assoc. nov.** hoc loco subassoc. *typicum* Roussakova, **subassoc. nov.** hoc loco [recorded by Roussakova (2000) p. 100, tab. 29 as assoc. *Diantho-Nardetum strictae* Bondev 1959 nom. nud. subassoc. *typicum* nom. nud.). **Holotype:** Roussakova 2000: p. 100, tab. 29, rel. 7

subassoc. *festucetosum airoidis* Roussakova, **subassoc. nov.** hoc loco [recorded by Roussakova (2000) p. 102, tab. 30 as assoc. *Diantho-Nardetum strictae* Bondev 1959 nom. nud. subassoc. *festucetosum airoidis* Bondev 1959 nom. nud.]. **Holotype:** Roussakova 2000: p. 102, tab., 30 rel. 12

Community of *Poa media* (Roussakova 2000).

Alliance *Seslerion comosae* Horvat 1935

Assoc. *Carici-Festucetum riloensis* Horvat et al. 1937 (Horvat & al. 1937; Roussakova 2000).

Assoc. *Agrostio-Seslerietum comosae* Horvat et al. 1937 subassoc. *typicum* (Horvat & al. 1937; Simon 1958; Roussakova 2000).

subassoc. *caricetosum curvulae* Simon 1958

subassoc. *festucetosum airoidis* Roussakova, **subassoc. nov.** hoc loco [recorded by Roussakova (2000) p. 89, tab. 20 as assoc. *Agrostio-Seslerietum comosae* Horvat et al. 1937 subassoc. *festucetosum airoidis* Bondev 1959 nom. nud.]. **Holotype:** Roussakova 2000: p. 89, tab. 20, rel. 7

subassoc. *antennarietosum dioicae* Horvat et al. 1937

Temperate broadleaved forests and scrub

27. Class *Salicetea purpureae* Moor 1958

Order *Salicetalia purpureae* Moor 1958

Alliance *Salicion albae* Soó 1930

Assoc. *Amorpho–Salicetum albae* Tzonev 2009 nom. prov. (Tzonev 2009a, b).

28. Class *Populetea albae* Braun-Blanq. 1962

Order *Fraxinetalia* Scamoni et Passarge 1959

Alliance *Alnion incanae* Pawł. et al. 1928

Assoc. *Smilaco excelsae-Fraxinetum oxycarpae* (Soó 1957) D. Pavlov et M. Dimitrov 2002

subassoc. *typicum* Soó 1957 (Pavlov & Dimitrov 2002; Dimitrov & al. 2005b).

subassoc. *prunelletosum vulgaris* D. Pavlov et M. Dimitrov 2002

subassoc. *fritillarietosum ponticae* (D. Pavlov et M. Dimitrov 2002) M. Dimitrov, **nom. corr.** hoc loco [described by Pavlov & Dimitrov (2002) p. 10-14, tab. 1, rel. 16-25 as subassoc. *fritillarietosum stribrnyi* nom. nud. (ICPN Art. 43)].

Alliance *Alno-Quercion roboris* Horvat 1938 [recorded by Tzonev (2002) within order *Quercetalia pubescentis* Braun-Blanq. 1932].

Assoc. *Scutellario altissimae-Quercetum roboris* Roussakova et Tzonev 2003 (Tzonev 2002, 2009b; Roussakova & Tzonev 2003].

29. Class *Rhamno-Prunetea* Rivas Goday et Borja ex Tüxen 1962

Order *Prunetalia spinosae* Tüxen 1952

Alliance *Pruno tenellae-Syringion* Jovan. 1979

Assoc. *Coryletum avellanae* Soó 1927 (variant *Dryopteris filix-mas*) (Dimitrov & al. 2004a).

Community of *Carduus acanthoides* and *Corylus avellana* (Dimitrov & al. 2004a).
Community of *Symphoricarpus orbiculatus* (Dimitrov & al. 2004a).
Order *Sambucetalia racemosae* Oberd. 1957
Alliance *Sambuco racemosae-Salicion capreae* Tüxen et Neumann ex Oberd. 1957
Assoc. *Rubetum idaei* Pfeiff. 1936 (Dimitrov & al. 2004a).

30. Class *Querco-Fagetea* Braun-Blanq. et Vlieger in Vlieger 1937
Order *Fagetalia sylvaticae* Pawł. et al. 1928
Alliance *Carpinion betuli* Issler 1931
Assoc. *Galio sylvatici-Carpinetum betuli* Oberd. 1957 (Apostolova-Stoyanova & al. 2005).
Alliance *Cephalanthero-Fagion* Tüxen 1955
Assoc. *Tilio tomentosae-Fagetum sylvaticae* Tzonev et al. 2006 (Tzonev & al. 2006b).
Assoc. *Galio pseudaristati-Fagetum sylvaticae* Tzonev et al. 2006 (Tzonev & al. 2006b).
Alliance *Fagion sylvaticae* Luquet 1926
Assoc. *Luzulo luzuloidis-Fagetum sylvaticae* Meusel 1937 (Michalik 1990; Tzonev & al. 2006b).
Community of *Fagus sylvatica* and *Geranium macrorrhizum* (Tzonev & al. 2006b).
Assoc. *Festuco drymejae-Fagetum sylvaticae* Morariu et al. 1968 (Tzonev & al. 2006b).
Community of *Fagus sylvatica* and *Luzula sylvatica* (Tzonev & al. 2006).
Community of *Fagus sylvatica* and *Abies alba* (Tzonev & al. 2006b).
Assoc. *Asperulo-Fagetum sylvaticae* Sougnez et Thill 1959
Assoc. *Umbilico erecti-Fagetum sylvaticae* Tzonev et al. 2006 subassoc. *typicum* Tzonev et al. 2006 (Tzonev & al. 2006b).
subassoc. *laurocerasetosum officinalis* Tzonev et al. 2006
Assoc. *Aremonio agrimonoidis-Fagetum sylvaticae* Boşcaiu in Resmeriţă 1972 (Tzonev & al. 2006b).
subassoc. *allietosum ursini* Tzonev et al. 2006
subassoc. *violetosum reichenbachianae* Tzonev et al. 2006
Assoc. *Carpino-Fagetum* Paucă 1941 (Soó 1964; Dimitrov & al. 2004a).
Alliance *Tilio-Acerion* Klika 1955
Community of *Fagus sylvatica* and *Tamus communis* (Pavlov & al. 2006).
Order *Rhododendro pontici-Fagetalia orientalis* (Soó 1964) Passarge 1981
Alliance *Fagion orientalis* Quézel et al. 1992 [decribed by Tzonev & al. (2006b) within order *Fagetalia sylvaticae* Pawł. et al. 1928].
Assoc. *Rhododendro pontici-Fagetum orientalis* Stefanov ex Tzonev et al. 2006 (Tzonev & al. 2006b).
Assoc. *Cyclamini coum-Fagetum orientalis* Tzonev et al. 2006 (Tzonev & al. 2006b).
Assoc. *Primulo rubrae-Fagetum orientalis* Tzonev et al. 2006 (Tzonev & al. 2006b).

31. Class *Quercetea pubescentis* (Oberd. 1948) Doing Kraft 1955
Order *Fraxino orni-Cotinetalia* Jákucs 1961
Alliance *Syringo-Carpinion orientalis* Jákucs 1959
Assoc. *Querco-Carpinetum moesiacum* (Gančev 1961) Horvat et al. 1974 (Horvat & al. 1974).
Assoc. *Genisto lydiae-Quercetum pubescentis* Jákucs et Zólyomi 1960 (Jákucs 1961; Pavlov & Dimitrov 2004).
Assoc. *Oryzopsio holciformis-Carpinetum orientalis* Jákucs et Zólyomi 1960 (Jákucs 1961).
Assoc. *Arabido turritae-Carpinetum orientalis* Tzonev 2009 (Tzonev 2002, 2009b).
Order *Quercetalia pubescenti-petreae* Klika 1933
Alliance *Aceri tatarici-Quercion* Zólyomi 1957
Assoc. *Staphyleo-Tilietum tomentosae* Tzonev 2003 (Tzonev 2002, 2003, 2009b).
Alliance *Carpinion orientalis* Horvat 1958

Assoc. *Achilleo clypeolatae-Juniperetum excelsae* Tzonev et D. Dimitrov 2005 subassoc. *typicum* Tzonev et D. Dimitrov 2005 (Tzonev & Dimitrov 2005).
subassoc. *phleetosum graecum* Tzonev et D. Dimitrov 2005
Alliance *Quercion confertae* Horvat 1949
Assoc. *Quercetum frainetto-cerridis* Rudski 1955
subassoc. *quercetosum pedunculiflorae* (Ganchev 1961) Horvat et al. 1974 (Horvat & al. 1974).
subassoc. *quercetosum virgilianae* (Gančev 1961) Horvat et al. 1974
Assoc. *Cotino-Quercetum cerridis* Roussakova et Tzonev 2003 (Tzonev 2002, 2009b; Roussakova & Tzonev 2003).

Subalpine heaths and coniferous forests

32. Class *Loiseleurio-Vaccinietea* Eggler ex R. Schub. 1960

Order *Rhododendro-Vaccinietalia* Braun-Blanq. in Braun-Blanq. et Jenny 1926
Alliance *Rhododendro-Vaccinion* A. Schnyd. 1930
Assoc. *Empetro-Vaccinietum* Braun-Blanq. 1926 subassoc. *seslerietosum comosae* (Simon 1958) Roussakova 2000 (Simon 1958; Roussakova 2000).
Assoc. *Festuco-Vaccinietum uliginosi* Roussakova 2000 (Roussakova 2000).
Alliance *Juniperion nanae* Braun-Blanq. et al. 1939 [recorded by Roussakova (2000) as alliance *Junipero-Bruckenthalion* (Horvat 1949) Boşcaiu 1971 within class *Vaccinio-Piceetea* Braun-Blanq. in Braun-Blanq. et al. 1939 and order *Junipero-Pinetalia mugo* Boşcaiu 1971].
Assoc. *Bruckenthalio-Juniperetum sibiricae* Horvat 1938 (Roussakova 2000; Velev & Apostolova 2008).
Assoc. *Festuco-Juniperetum sibiricae* Roussakova, **assoc. nov.** hoc loco [recorded by Roussakova (2000) p. 123, tab. 48 as assoc. *Festuco-Juniperetum sibiricae* Bondev 1959 nom. nud.].
Holotype: Roussakova 2000: p. 123, tab. 48, rel. 8
Community of *Festuca valida* and *Juniperus sibirica* (Dimitrov & al. 2004a).
Assoc. *Campanulo abietinae-Juniperetum sibiricae* Simon 1966 (Roussakova 2000).
Assoc. *Seslerio-Juniperetum sibiricae* Roussakova 2000 (Roussakova 2000).
Assoc. *Nardo-Bruckenthalietum spiculifoliae* Roussakova, **assoc. nov.** hoc loco subassoc. *typicum* Roussakova, sub**assoc. nov.** hoc loco [recorded by Roussakova (2000) p. 125, tab. 50 as assoc. *Nardo-Bruckenthalietum spiculifoliae* Bondev 1959 nom. nud. subassoc. *typicum* nom. nud.].
Holotype: Roussakova 2000: p. 125, tab. 50, rel. 7
subassoc. *vaccinietosum myrtifolii* (Roussakova 2000, p. 125, tab. 50) Roussakova, **comb. nov.** hoc loco
Assoc. *Rhododendro myrtifolii-Vaccinietum* Borza (1955) 1959 (Roussakova 2000).
Assoc. *Festuco-Chamaecytisetum absinthioidis* Roussakova 2000 (Roussakova 2000).

33. Class *Erico-Pinetea* Horvat 1959

Order *Erico-Pinetalia* Horvat 1959
Alliance *Pinion heldreichii* Horvat 1946
Assoc. *Festuco penzesii-Pinetum heldreichii* Vulchev 2000 (Vulchev 2000).
Assoc. *Brachypodio sylvatici-Pinetum heldreichii* Vulchev 2000 (Vulchev 2000).
Assoc. *Geranio macrorhizi-Pinetum heldreichii* Vulchev 2000 (Vulchev 2000).
Community of *Sesleria comosa* and *Pinus heldreichii* (Vulchev 2000).

34. Class *Vaccinio-Piceetea* Braun-Blanq. in Braun-Blanq. et al. 1939

Order *Junipero-Pinetalia mugo* Boşcaiu 1971
Alliance *Pinion mugo* Pawł. 1928

Assoc. *Lerchenfeldio-Pinetum mugo* Roussakova, **assoc. nov**. hoc loco subassoc. *typicum* Roussakova, **subassoc. nov.** hoc loco [recorded by Roussakova (2000) p. 117, tab. 43 as assoc. *Lerchenfeldio-Pinetum mugo* Bondev 1959 nom. nud. subassoc. *typicum* nom. nud.]. **Holotype:** Roussakova 2000: p. 117, tab. 43, rel. 20

subassoc. *eriophoretosum vaginati* (Roussakova 2000, p. 119, tab. 44) Roussakova, **comb. nov.** hoc loco

subassoc. *cetrarietosum islandicae* (Roussakova 2000, p. 120, tab. 45) Roussakova, **comb. nov.** hoc loco

subassoc. *cirsietosum appendiculati* (Roussakova 2000, p. 121, tab.46) Roussakova, **comb. nov.** hoc loco

Order *Piceetalia excelsae* Pawł. in Pawł. et al. 1928

Alliance *Piceion excelsae* Pawł. et al. 1928

Assoc. *Digitali viridiflorae-Pinetum sylvestris* M. Dimitrov 2004 (Dimitrov 2004a, b; Dimitrov & al. 2004b).

Assoc. *Veronico urticifoliae-Abietetum albae* Roussakova et M. Dimitrov 2005 subassoc. *typicum* (Dimitrov 2004a, b; Dimitrov & al. 2004b; Roussakova & Dimitrov 2005).

subassoc. *cardaminetosum bulbiferae* Roussakova et M. Dimitrov 2005

Assoc. *Moehringio pendulae-Piceetum abietis* Roussakova et M. Dimitrov 2005 (Roussakova & Dimitrov 2005).

Alliance *Pinion peucis* Horvat 1950

Community of *Pinus peuce* (Roussakova & Vulchev 1999).

Community of *Calamagrostis arundinacea* and *Pinus peuce* (Dimitrov & al. 2004a, b).

Weed communities

35. Class *Stellarietea mediae* Tüxen et al. ex von Rochow 1951

Order *Atriplici-Chenopodietalia albi* (Tüxen 1937) Nordh. 1950

Alliance *Lolio remoti-Linion* Tüxen 1950 nom. invalid.

Assoc. *Erucetum vesicariae* Kolev 1976 nom. mut. propos. [described by Kolev (1976) as assoc. *Eruca sativa*].

Assoc. *Camelino alyssi-Lolietum remoti* Tzonev, M. Dimitrov et Roussakova, **nom. nov.** hoc loco [described by Kolev (1976) as assoc. *Lolium remotum-Spergula linicola-Camelina linicola*].

Alliance *Panico-Setarion* Sissingh in Westh. et al. 1946

Assoc. *Hibisco trioni-Cynodontetum* Kolev 1976 nom. invers. propos. [described by Kolev (1976) as assoc. *Cynodon dactylon-Hibiscus trionum*].

Assoc. *Chondrillo junceae-Sorghetum halepensis* Kolev 1976 [described by Kolev (1976) as assoc. *Chondrilla juncea-Sorghum halepense*].

Assoc. *Equiseto arvensi-Xanthietum italici* Kolev 1976 [described by Kolev (1976) as assoc. *Equisetum arvense-Xanthium italicum*].

Alliance *Polygono-Chenopodion polyspermi* Braun-Blanq. et Tüxen 1943

Assoc. *Salvio verticillatae-Rumicetum acetosellae* Kolev 1976 [described by Kolev (1976) as assoc. *Salvia verticillata-Rumex acetosella*].

Alliance *Scleranthion annui* (Kruseman et Vlieger 1939) Sissingh in Westh. et al. 1946 [recorded by Kolev (1976) as alliance *Aperion spicae-venti* (Kruseman et Vlieger 1939) Tüxen in Oberd. 1949].

Assoc. *Myosotido strictae-Anthemidetum austriacae* Tzonev, M. Dimitrov et Roussakova, **nom. nov.** hoc loco [described by Kolev (1976) as assoc. *Anthemis austriaca-Vicia pannonica-Myosotis stricta*].

Assoc. *Hypecoo grandiflori-Anthemidetum austriacae* Kolev 1976 nom. invers. propos. [described by Kolev (1976) as assoc. *Anthemis austriaca-Hypecoum grandiflorum*].

Assoc. *Arabidopsio thalianae-Raphanetum raphanistri* Tzonev, M. Dimitrov et Roussakova, **nom. nov.** hoc loco [described by Kolev (1976) as assoc. *Anthemis arvensis-Raphanus raphanistrum-Arabidopsis thaliana*].

Assoc. *Sclerantho annui-Matricarietum tenuifoliae* Tzonev, M. Dimitrov et Roussakova, **nom. nov.** hoc loco [described by Kolev (1976) as assoc. *Brassica campestris-Scleranthus annuus-Matricaria tenuifolia*].

Order *Centauretalia cyani* Tüxen et al. ex von Rochow 1951

Alliance *Caucalidion* von Rochow 1951

Assoc. *Veronico hederifoliae-Sinapietum arvensis* Tzonev, M. Dimitrov et Roussakova, **nom. nov.** hoc loco [described by Kolev (1976) as assoc. *Sinapis arvensis-Bifora radians-Vicia striata-Veronica hederifolia*].

Assoc. *Camelino rumelicae-Sisymbrietum orientalis* Tzonev, M. Dimitrov et Roussakova, **nom. nov.** hoc loco [described by Kolev (1976) as assoc. *Sisymbrium orientale-Bifora radians-Camelina rumelica*].

Assoc. *Consolido orientalis-Anthemidetum austriacae* Kolev 1976 nom. mut. propos. [described by Kolev (1976) as assoc. *Anthemis austriaca-Delphinium orientale*].

Order *Chenopodietalia muralis* Braun-Blanq. in Braun-Blanq. et al. 1936

Alliance *Chenopodion muralis* Braun-Blanq. in Braun-Blanq. et al. 1936

Assoc. *Xanthietum spinosi* Felföldy 1942 (Mucina & Kolbek 1989).

Order *Eragrostietalia* Tüxen in Poli 1966

Alliance *Amarantho-Chenopodion* Morariu 1943 [recorded by Tzonev (2009a) as alliance *Eragrostion* Tüxen ex Oberd. 1954].

Assoc. *Tribulo–Tragetum* Soó et Tímár in Tímár 1954 (Tzonev 2009a).

Assoc. *Polygono-Amaranthetum crispi* Vicol et al. 1971 (Mucina & Kolbek 1989).

Assoc. *Centaureo diffusae-Berteroetum* Oberd. 1957 (Mucina & Kolbek 1989).

Community of *Polygonum arenastrum* and *Cynodon dactylon* (Mucina & Kolbek 1989).

Order *Sisymbrietalia* Tüxen ex Oberd. 1962 [recorded by Kolev (1965) as order *Chenopodietalia albi* Tüxen et Lohmeyer 1950].

Alliance *Malvion neglectae* (Gutte 1972) Hejný 1978

Assoc. *Malvo-Chenopodietum vulvariae* Gutte 1966 (Mucina & Kolbek 1989).

Alliance *Sisymbrion officinalis* Tüxen et al. ex von Rochow 1951

Assoc. *Datura stramonii-Malvetum neglectae* (Athenstadt 1941) Lohmeyer 1950 (Kolev 1965).

Assoc. *Cynodonto-Atriplicetum tataricae* Morariu 1943 (recorded by Kolev 1965 as assoc. *Hordeum murinum-Atriplex tatarica* (Felföldy 1942) Tüxen 1950).

Assoc. *Erigeronto-Lactucetum serriolae* Lohmayer in Oberd. 1957 (Mucina & Kolbek 1989).

Assoc. *Hordeetum murini* Libbert 1933 (Sopotlieva 2008).

Community of *Bromus arvensis* (Sopotlieva 2008).

36. Class *Artemisietea vulgaris* Lohmeyer et al. ex von Rochow 1951

Order *Agropyretalia repentis* Görs 1966

Alliance *Artemisio-Kochion prostratae* Soó 1964 [decribed by Tzonev (2009b) within class *Festuco-Brometea* Braun-Blanq. et Tüxen in Braun-Blanq. 1949 and order *Festucetalia valesiacae* Braun-Blanq. et Tüxen ex Braun-Blanq. 1949].

Assoc. *Hedysaro bulgarici-Camphorosmetum monspeliacae* Tzonev 2009 (Tzonev 2002, 2009b).

Order *Onopordetalia acanthii* Braun-Blanq. et Tüxen ex Klika et Hadač 1944

Alliance *Arction lappae* Tüxen 1937

Assoc. *Balloto nigrae-Chenopodietum boni-henrici* Müller in Seybold et Müller 1972 (Kolev 1965).

Assoc. *Tanaceto-Artemisietum vulgaris* Sissingh 1950 (Kolev 1965).

Assoc. *Leonuro-Arctietum tomentosi* (Felföldy 1942) Lohmeyer 1950 (Kolev 1965).

Alliance *Onopordion acanthii* Braun-Blanq. et al. 1926
Assoc. *Carduo acanthoidis-Onopordetum acanthii* Soó 1947 (Mucina & Kolbek 1989).
Assoc. *Onopordetum acanthii* Braun-Blanq. 1936 (Kolev 1965).
Assoc. *Echio-Melilotetum* Tüxen 1947 [by Kolev (1965) as assoc. *Echium vulgare-Melilotus albus* Tüxen 1942].
Community of *Ballota nigra* and *Artemisia absinthium* (Mucina & Kolbek 1989).
Community of *Achillea pannonica* and *Elymus repens* (Dimitrov & al. 2005a).

37. Class *Epilobietea angustifolii* Tüxen et Preising ex von Rochow 1951
Order *Atropetalia* Vlieger 1937
Alliance *Epilobion angustifolii* (Rübel 1933) Soó 1933
Assoc. *Campanulo sparsae-Epilobietum angustifolii* M. Dimitrov 2004 (Dimitrov 2004a, b).

38. Class *Galio-Urticetea* Passarge ex Kopecký 1969 [recorded by Mucina & Kolbek (1989) as class *Robinietea* Jurko ex Hadač et Sofron 1980].
Order *Chelidonio-Robinietalia* Jurko ex Hadač et Sofron 1980
Alliance *Balloto nigrae-Robinion* Hadač et Sofron 1980
Community of *Geranium lucidum* and *Robinia pseudoacacia* (Mucina & Kolbek 1989).
Assoc. *Urtico-Sambucetum ebuli* Braun-Blanq. et al. 1952 (Mucina & Kolbek 1989).

39. Class *Bidentetea tripartitae* Tüxen et al. ex von Rochow 1951
Order *Bidentetalia tripartitae* Braun-Blanq. et Tüxen ex Klika & Hadač 1944
Alliance *Bidention tripartitae* Nordh. 1940
Assoc. *Polygono-Bidentetum tripartitae* (W. Koch 1926) Lohmeyer 1950 (Kolev 1965; Tzonev 2002, 2009b).

Appendix II

Classes of highly probable occurence in Bulgarian undocumented so far

Class *Zosteretea* Pignatti 1953

Class *Ruppietea maritimae* Tüxen 1960

Class *Saginetea maritimae* Westh. et al. 1962

Class *Adiantetea* Braun-Blanq. 1948

Class *Isoëto-Littorelletea* Braun-Blanq. et Vlieger in Vlieger 1937

Class *Thero-Brachypodietea ramosi* Braun-Blanq. ex O. Bolòs et Vayr. 1950

Class *Elyno-Seslerietea* Braun-Blanq. 1948

Class *Cisto-Micromerietea julianae* Oberd. 1954

Class *Polygono arenastri-Poëtea annuae* Rivas-Mart. 1975 corr. Rivas-Mart. et al. 1991

Class *Oryzetea sativae* Miyaw. 1960

Conclusions

The syntaxa described in Bulgaria are presented in phytosociological relevés published in 48 works. The publications using the Braun-Blanquet method before the democratic changes are fragmentary and mostly by foreign authors. Most Bulgarian authors have published during the last years of the 20th century and the first years of the 21th century. Bulgarian phytosociology has marked a rapid progress in recent years. In spite of this, it is still lagging considerably behind the development and tendencies in Europe. Neither a joint centre, nor a concept for its development exists to compensate for this lagging behind. Its importance for nature conservation has been misjudged not only by the State institutions, which are working on these problems (Ministry of the Environment and Waters and State Forestry Agency), but even by the scientific community. There are few scientists working in this scientific area. They are insufficient to handle the great number of the obtaining scientific and practical tasks. This problem became particularly noticeable during the establishment of NATURA 2000 in Bulgaria. There is an urgent need to increase phytosociological knowledge and qualification of Bulgarian botanists, agronomists, forest engineers. This related to the development of NATURA 2000 network in Bulgaria, new management plans for the protected areas and zones, ecological activities in agriculture and forest management, mapping out of vegetation and habitats, etc. The studies of Bulgarian vegetation, which is remarkable for its diversity and uniqueness in Europe, must continue in the future.

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