Segetal vegetation in the Czech Republic: synthesis and syntaxonomical revision

Segetální vegetace České republiky: syntéza a syntaxonomická revize

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D e d i c a t e d t o t h e m e m o r y o f S l a v o m i l H e j n ý

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A phytosociological synthesis of the segetal vegetation in the Czech Republic was performed using methods of the Zürich-Montpellier school. In total, 712 relevés made by the author in this country in 1955–2000 were classified, and 22 associations and one unranked community were distinguished. Each syntaxon is characterized by diagnostic species, documented by a synoptic table, and the syntaxonomy, structure, species composition, ecology, dynamics, distribution and variability of each syntaxon are commented on. Names are revised according to the rules of the International Code of Phytosociological Nomenclature. All syntaxa belong to the class *Stellarietea mediae* and associations are assigned to the orders *Centaureetalia cyani* (alliances *Caucalidion lappulae*, *Fumario-Euphorbion*, and *Sherardion*), *Atriplici-Chenopodietalia* (alliances *Scleranthion annui*, *Polygono-Chenopodion polyspermi, Arnoseridion minimae*, and *Panico-Setarion*), and *Eragrostietalia* (alliance *Eragrostion*).

K e y w o r d s : association, community, constant species, Czech Republic, diagnostic species, distribution, dynamics, ecology, syntaxonomy, threatened species, weeds

Introduction

Man's interest in weeds is as old as agriculture, but the various branches of weed science developed only in the course of the last two centuries. The need of farmers to eradicate several noxious weeds first led to the accumulation of valuable empirical knowledge, which resulted in the development of a specialized literature on weed control, starting with the older mechanical measures, then dealing with chemical methods and finally the modern integrated methods, which nowadays prevail in the literature on this topic.

In the last decades efforts have been directed towards finding effective strategies for managing weeds and so minimize the use of herbicides; for this a comprehensive understanding of weed ecology, populations of weed species and their communities is needed (Altieri & Liebman 1988).

Weeds have been studied by botanists for a long time, mainly as subject of compendial floras and/or floristic contributions. Weed vegetation became a subject of geobotanical studies as early as the beginning of the 20th century. Segetal[1] (as well as ruderal) communities were first studied phytosociologically and early on became an integral part of the

[1] Holzner (1978) proposed a better term "agrestal" plants and vegetation, but this was not adopted even though Boas (1952) earlier proposed nearly the same term in his "Ackerpflanzen"; the term "segetal" applies to cereal fields (Latin origin: seges), but more generally it applies to arable land.

Braun-Blanquet hierarchical system (among the first contributions on this topic was Braun-Blanquet 1931), which later on was named the Zürich-Montpellier school by its followers (Westhoff & van der Maarel 1978). From the beginning many contributions on segetal vegetation from various parts of the world were published, mostly from Central Europe, but there was also Braun-Blanquet's early contribution from the (sub-) Mediterranean (Braun-Blanquet et al. 1936).

Tüxen (1937) took over some Braun-Blanquet's syntaxa of a higher rank and described several associations that are still valid to days (e.g. *Alchemillo arvensis-Matricarietum chamomillae, Scleranthо annui-Arnoseridetum minimae, Panico-Chenopodietum polyspermi*). At about the same time several new associations were described for the Netherlands in a paper by Kruseman & Vlieger (1939), followed by a more comprehensive national synthesis (Westhoff et al. 1946, Sissingh 1950); new alliances *Scleranthion annui* and *Panico-Setarion* were published in these contributions. A new system of segetal and ruderal plant communities was proposed by Tüxen (1950) in a work that has since become an indispensable manual for weed scientists and is still relevant to days; of course, many syntaxa included in this publication were later validated and some still need to be. The class *Stellarietea mediae* (including two orders *Centaureetalia* and *Chenopodietalia albi*) was established in this publication (Tüxen 1950).

Further divergence of the syntaxa at the highest level established by using separate classes, *Secalietea* for cereal and *Chenopodietea* for root crop communities and pioneer ruderals (Braun-Blanquet 1951, valid in Braun-Blanquet et al. 1952) did not prove useful. This concept was adopted above all by Oberdorfer (1957a, 1983), who used it up to 1990s (Oberdorfer 1993), by Passarge (1964) and Czech and Slovak researchers (Holub et al. 1967, Krippelová 1981, Kropáč 1981). This formal framework was used in both editions of the survey of the threatened plant communities of the Czech Republic (Moravec 1983, 1995). However, most researchers turned to the concept of a single class *Stellarietea mediae* (Hofmeister 1975, Passarge 1976, Krippelová & Mucina 1988, Nezadal 1989, Kropáč & Mochnacký 1990).

In 1950–1960 research on segetal communities was carried out over a wide area of the European temperate zone and the Mediterranean. With the increase in the number of relevés and new associations, the ranks of alliances and orders changed markedly. Malato-Beliz et al. (1960) importantly presented a new concept of the order *Secalietalia* Br.-Bl. 1936 (with one alliance *Caucalidion* Tx. 1950) and established the new order *Aperetalia* (with two alliances *Arnoseridion* and *Aphanion*). Thus the order *Centaureetalia* was cancelled without any amendation. This system was adopted by most researchers in other countries and for a long time also by Czech authors. This was not strictly in accord with the International Code of Phytosociological Nomenclature (Weber et al. 2000; further referred to as Code). However, the Code was first published in 1978, and is dealt with in a special section below.

Several attempts were made to unify the system of segetal and ruderal communities in Central and NW Europe (Tüxen 1961, 1966, Lohmeyer et al. 1962, Matuszkiewicz 1962), but most proposals only discussed the issue and no new syntaxa were validly published; this applies also to new orders *Polygono-Chenopodietalia*, *Eragrostietalia* and *Sisymbrietalia*. Oberdorfer et al. (1967) proposed a new system for *Polygono-Chenopodietalia* by establishing two new alliances, viz. the basiphilous *Fumario-Euphorbion* and acidophilous *Spergulo-Oxalidion* (only the former was validly published before).

A publication by Ellenberg (1950) influenced ecological research on weed communities. His ideas stimulated new proposals for classifying segetal communities using ecological-sociological groups (Hilbig et al. 1962, Passarge 1964, Holzner 1973, Kropáč 1981) based on a synthesis of relevés. The validity of such groups is limited to a given area and time. Using this concept, associations were characterized by so-called diagnostically important group(s) of species (Schubert & Mahn 1968, Kropáč 1981).

With the increase in the number of contributions from various areas came the awareness that segetal vegetation geographically varied. The issue of vicarious syntaxa was solved by Passarge (1985) using *Papaveretum argemones*; see also an attempt of Nezadal (1989) to compare Mediterranean weed vegetation with that of the temperate zone of Europe.

Segetal communities were drastically influenced by new agronomical systems in the second half of the 20th century. This was most marked in industrialized countries, where the effect became obvious as early as the 1960s (Tüxen 1962, Bachthaler 1969). From the ecological viewpoint these changes were attributed to the "effect of levelling ecological conditions on arable land" (Holzner 1978), but were caused by a complex of environmental factors associated with modern agriculture (for an analysis of the individual factors see Bachthaler 1969). A deep insight into these processes is provided by Sukopp (1981). In Central Europe, ecologically specialized species of the *Caucalidion* (Wagenitz & Meyer 1981) and *Arnoseridion* alliances (Kulp & Cordes 1986) disappeared first. Kulp & Cordes (1986) point to an interesting phenomenon, the displacing of *Teesdalio-Arnoseridetum* by *Aphano-Matricarietum.* A similar displacing of *Caucalido-Scandicetum* and *Caucalido-Adonidetum* by *Euphorbio-Melandrietum* is recorded by Hilbig (1985) and Kropáč (1988), respectively. In syntaxonomical terms, the so-called central association (sensu Dierschke 1981) of the alliance displaced floristically richer marginal associations.

The syntaxonomy of floristically impoverished communities was studied by Brun-Hool (1963) who termed such communities as "fragmental" and proposed that they should be classified at the level of higher syntaxa starting with the alliance (see Brun-Hool 1963: 73–84 for details). A similar principle of classification of synanthropic communities, which accentuated their syngenetical relationship, is proposed by Kopecký & Hejný (1974).

Many studies on changes in segetal vegetation were published, several of a great importance. Kornaś (1961) refers to the disappearance of *Spergulo-Lolietum remoti* in the Gorce Mts (S Poland) and the changes that occurred in the segetal communities in the Gorce Mts over a period of 35 years (Kornaś 1987). Detailed studies of changes in weed vegetation over a period of 40 years in Germany are published by Hilbig & Bachthaler (1992) and in S Poland by Trzcinska-Tacik (1991). Studies of abandoned arable fields also contributed to our understanding of the general principles of succession (Prach et al. 1993, 1997, Jongepierová et al. 2004, Ruprecht et al. 2005).

Among weeds there are not only noxious plants (Pyšek 2001) but also disappearing segetal plants, which may be important for mankind. For Central-European countries the red lists of endangered plants indicate that many segetal plants are threatened by extinction. Archaeophytes, alien species introduced since the beginning of Neolithic agriculture until the discovery of America (Richardson et al. 2000, Pyšek et al. 2002, 2003, 2004a), are an important part of weed communities (Chytrý et al. 2005, Pyšek et al. 2004b, Pyšek & Jarošík 2005) and nowadays regularly appear on national red lists (Holub & Procházka 2000). Various measures for conserving segetal plants have been taken (Schlenker 1981,

Hilbig & Illig 1988, Pilotek 1988, Otte et al. 1988; Schneider et al. 1994), including the Czech Republic (Petříček et al. 1999).

Classifying segetal communities into abstract units within classical syntaxonomic concept has proven difficult (see Holzner 1978 for a discussion of the main reasons for these difficulties). Somewhat similar views are expressed in a theoretical study by Czech authors (Kropáč et al. 1971) and resulted in the presentation of a new concept of agroecophases. Seasonal changes in a habitat may result in the seasonal formation of different communities. Holzner (1973) came to a similar conclusion and distinguished three associations on the same field within one year: spring ("Vernalassoziation"), summer ("Aestivalassoziation") and autumn associations ("Autumnalassoziation"). All three associations together form a group of communities (so called "Gesellschaftsgruppe"). This concept was proposed earlier by Kropáč et al. (1971) who used the term "association chain". In the present paper, I follow Holzner (1973) and distinguish three associations in the course of a year and use the term equilocal associations, proposed by Fukarek et al. (1964).

What system should be applied? There is no generally accepted system for European segetal vegetation. In the Czech Republic (and former Czechoslovakia), a system was developed and gradually improved (Kropáč 1981, Moravec 1983, 1995, Kropáč 1997) taking the situation in neighbouring countries into account. The system of Hüppe & Hofmeister (1990) is synecologically sound and recognizes two orders within *Stellarietea*, i.e. *Papaveretalia* consisting of basiphilous communities and *Sperguletalia* acidophilous communities. Its only shortcoming is that in its development the rules of the International Code of Phytosociological Nomenclature were not applied. This was corrected by Mucina (1993) in the synthesis of the Austrian *Stellarietea* and followed by Jarolímek et al. (1997) and Mochnacký (2000) in Slovakia. Unfortunately, the content of both alliances was changed so much (compared to Tüxen 1950 and the publications of his followers mentioned above) that it would be better to declare their names "nomina ambigua" and reject them. For example, nearly half of the original *Centaureetalia* species are now included in *Atriplici-Chenopodietalia*. Nevertheless, in the present paper I follow, for the sake of compatibility with publications from neighbouring countries, the corrections introduced by Mucina (1993) and others.

The preparation of this synthesis started as part of the project European Vegetation Survey (Mucina et al. 1993), led in the Czech Republic by J. Moravec, Institute of Botany, Czech Academy of Sciences, Průhonice. Some parts of the manuscript were finished in 1994–1998 and deposited at the Institute of Botany in Průhonice when the project finished. Subsequently, the relevés were supplied to the Czech National Phytosociological Database (Chytrý & Rafajová 2003; hereafter referred to as Database) and used for analyses of factors affecting species richness and diversity of weed vegetation (Lososová et al. 2004, Pyšek et al. 2005b) and the occurrence of archaeophytes and neophytes (Pyšek et al. 2005a). Alternative approaches to analysing the data proved useful and may help in the revision of currently accepted syntaxa and reveal particularly poorly delimited syntaxa (Chytrý & Tichý 2003).

This paper represents the first synthesis of segetal vegetation in the Czech Republic based on the classical geobotanical methods of the Zürich-Montpellier school. The established units are verified in accordance with the Code; their ecology, dynamics and distribution as well as their role in agriculture, natural vegetation and plant protection are described. Special attention is paid to comments on syntaxonomic interpretations and the

literature on the respective syntaxa from other European countries. The present study also links to recent large syntheses of various vegetation types in the Czech Republic or former Czechoslovakia (e.g. Knollová & Chytrý 2004, Botta-Dukát et al. 2005, Roleček 2005).

History of research in the Czech Republic

The first interest in weed vegetation related to weed control date back to the end of the 19th and beginning of the 20th century. Some valuable publications appeared then (Učík 1887, Procházka 1907), followed by a comprehensive textbook by Baudyš (1941), which became a major source of information for a long period. Interest in segetal vegetation began relatively late, however, segetal plants as a part of the flora and phytogeography were not neglected by the early botanists (Čelakovský 1868–1883, 1870, Oborny 1883–1886, Formánek 1887–1892, Laus 1908, Schustler 1918, Domin 1928, Suza 1928). Yet in the first half of the 20th century contributions on segetal vegetation only appeared as amendments to studies on natural vegetation (Firbas 1929 and Klika 1936, the latter, however, being an important addition). A survey of Central-European plant communities (Klika & Hadač 1944) also contains a section on weed communities, ruderal vegetation and communities of clearings, treated according to the system of Braun-Blanquet & Tüxen (1943). This survey was later published also in a textbook by Klika (1948). More attention was paid to segetal vegetation after World War II, namely at the Faculty of Science, Charles University Prague, where theses on this topic, supervised by J. Klika, later also J. Jeník, were submitted in the Department of Geobotany (e.g. Vojta 1954, Aulická 1961, Jehlík 1963, Bezděk 1966, Kolková 1975). Contributions on weed vegetation were also published in the Agronomic Faculty of the Agricultural University Brno (Kühn 1955, 1963a, 1963b, 1965, 1971, 1972, 1974, 1978, 1979, Kühn & Uhrecký 1959) and the Agronomic Faculty of the Agricultural University Prague (Volf 1964, 1965, 1971, 1974, Volf & Kropáč 1974, Hilbig & Volf 1984).

The centre of research on segetal and synanthropic vegetation in a broad sense was founded at the Institute of Botany of the Czechoslovak Academy of Sciences in Průhonice, when the Department of Anthropophytes was established in 1962. This owed much to S. Hejný, the then director of the Institute of Botany. The present author was responsible for the research on segetal vegetation when this department was established. The results of this long-term research were previously only partially published (see the References). For a short time, weed-crop interactions were studied at the Institute of Botany (Kovář 1988). Cooperation between Czech and Slovak weed scientists started in the 1970s and resulted in several symposia held in Bratislava, Slovakia, which included papers on segetal vegetation (Mochnacký 2000). Recently, research on segetal vegetation started to develop at the Faculty of Sciences and the Faculty of Education of the Masaryk University in Brno (Otýpková 2001, Lososová 2003, 2004, Lososová et al. 2004).

In addition, another branch of weed science and weed control was developed at the Agronomic Faculty of the Agricultural University in Prague (Hron & Vodák 1959, Hron 1970, Hron & Kohout 1982, Kohout 1987, Kohout et al. 1996). Scientific control of weeds based on biology and ecology is a traditional research topic of the Research Institute for Plant Production in Praha-Ruzyně.

Materials and methods

This synthesis is based on 712 relevés made by the author in 1955–2000, from March to October, in plots of a standard size ± 100 m^2 (plots not marked, deviation ± 10%). Plots were selected in a stratified random design, in order to include the geographic and climatic variation of the country and the full range of crops. In particular fields, sampling sites were usually located where weed vegetation was well developed, most diverse but homogeneous which was achieved by an initial visual inspection (to avoid marginal effects and agrotechnical anomalies). Thus, the relevés may be biased towards higher species richness than that found in average weed vegetation in the area (Chytrý 2001). Despite every effort to cover the whole area, there are few relevés from Moravia and Silesia. The samples were collected by using the Domin 11-degree cover-abundance scale (Mueller-Dombois & Ellenberg 1974, Westhoff & van der Maarel 1978, Moravec et al. 1994). In addition, the height of the stand, total cover, crop cover and weed cover were recorded for each relevé, and notes on the vertical structure of the stand, phenology of selected weeds, development of the crops, slope and aspect of the site were taken. All relevés are stored in the Czech National Phytosociological Database and the numbers assigned to them are cited below in the text for the particular syntaxa.

The data were synthesized using the classical tabular technique, which includes the rearranging of tables and results in a synoptic table of syntaxa (Mueller-Dombois & Ellenberg 1974, Westhoff & van der Maarel 1978, Moravec 1994). All the syntaxa were characterized by diagnostic species (Whittaker 1962, Westhoff & van der Maarel 1978), i.e. groups of species with a percentage constancy in the particular syntaxon markedly higher than in other syntaxa; in principle they constitute a combination of differential species and exceptionally may serve as "character species". By means of these groupings syntaxa, starting with associations, were identified and/or established. The rules of the Code were applied to all syntaxa and in the case of incorrect name(s), pertinent article(s) are quoted. Differences between the nomenclatural synonyms ("syn.") and the syntaxonomic synonyms ("syntax. syn.") are emphasized because the latter may be important in future studies. Species with a constancy exceeding 60%, exceptionally 50%, are designated constant species. Dominant species were not evaluated but agronomically "important weeds" are designated in the text. These are species with covers exceeding 25% and were categorized as follows: (W1) – very common and a serious weed everywhere (incl. ruderal sites), (W2) – very common and occasionally a serious weed, (W3) – common and serious weed mainly in warm to mildly warm areas, (W4) – common and serious weed mainly in mildly warm to cold areas, (W5) – locally a serious weed in wet places in fields and/or in humid areas, (W6) – locally a serious weed as a result of insufficient field management (field borders, leys, etc.), (W7) – alien that is a potential weed. The delimitation of important weeds was further based on publications (e.g. Kropáč 1982 b, Hron 1982, Kropáč 1988, Kohout et al. 1996). Threatened species are those on the national Red List (Holub & Procházka 2000) and the present author's supplements suggesting further monitoring or transfer to another category; following symbols are used: (EX) – extinct, (? EX) – missing (probably extinct), (CR) – critically endangered, (EN) – endangered, (VU) – vulnerable. Soil conditions were determined when vegetation was sampled, by using soil maps 1: 50 000 (deposited at Research Institute for Amelioration and Protection of Soils, Praha) that were constructed according to the methods of Němeček et al. (1967).

Later on, the soil data were compared with that indicated in the synthetic soil map of the Czech Republic 1: 200 000 (Novák et al. 1989–1993). Nomeclature of soil types follows Tomášek (2003), with small additions (e.g. verti-haplic chernozem, cambic arenosol, dystric cambisol). Climatic conditions were obtained from Vesecký et al. (1958, 1961) and Quitt (1971). Data for agricultural farming zones (subzones) follow Hamerník & Rosůlek (1966). Distribution of syntaxa was categorized according to the regional phytogeographical classification of the Czech Republic (Skalický 1988) and potential natural vegetation according to Neuhäuslová et al. (1998). The names of geomorphological units follow Demek (1965, 1987) with minor modifications. The nomenclature follows Kubát et al. (2002). Bryophytes were not systematically recorded and therefore are not included in the total number of species or their constancy evaluated (only the symbol + is used). Nomenclature of bryophytes follows Frey et al. (1995).

Abbreviations used in the text: a.s.l. – above sea level, art. – article in the Code, as. – association, ass. – associations, C – comment(s), com. – community, comm. – communities, em. – emendavit, L – list of species, loc. – local, l.c. – loco citato, n.n. – nomen nudum, nom. mut. propos. – nomen mutatum propositum, nom. prov. – nomen provisorium, opt. – optimum, op. c. – opere citato, p.p. – pro parte, p.p. max. – pro parte maxima, p.p. min. – pro parte minima, R – relevé(s), s.l. – sensu lato, s. str. – sensu stricto, subas. – subassociation, subass. – subassociations, suppl. – supplementum, syn. – nomenclatoric synonym, syntax. syn. – syntaxonomic synonym, TR – table of relevés, TS – synthetic table. Names of the authors of the syntaxa are written in full with the exception of Br.-Bl. – Josias Braun-Blanquet, and Tx. – Reinhold Tüxen.

Conspectus of syntaxa

Class: *Stellarietea mediae* Tx., Lohmeyer et Preising in Tx. ex von Rochow 1951
- Order: *Centaureetalia cyani* Tx., Lohmeyer et Preising in Tx. ex von Rochow 1951
  - Alliance: *Caucalidion lappulae* Tx. ex von Rochow 1951
    - Association: *Caucalido daucoidis-Conringietum orietalis* Klika 1936
    - Association: *Lathyro tuberosi-Adonidetum aestivalis* Kropáč et Hadač in Kropáč et al. 1971
    - Association: *Consolido regalis-Anthemidetum austriacae* Kropáč et Mochnacký 1990
    - Association: *Veronicetum hederifolio-trilobae* Kropáč as. nova
    - Association: *Veronicetum hederifolio-triphylli* Slavnić 1951
    - Association: *Valerianello locustae-Thlaspietum perfoliati* Kropáč et Hadač in Kropáč et al. 1971
    - Community *Taraxacum* sect. *Ruderalia*
    - Association: *Euphorbio exiguae-Melandrietum noctiflori* G. Müller 1964
  - Alliance: *Fumario-Euphorbion* Th. Müller ex Görs 1966
    - Association: *Stachyo annuae-Setarietum pumilae* Felföldy 1942 corr. Mucina in Mucina et al. 1993
    - Association: *Mercurialetum annuae* Kruseman et Vlieger ex Sissingh in Westhoff et al. em. Th. Müller in Oberdorfer 1983
    - Association: *Lamio-Veronicetum politae* Kornaś 1950

Alliance: *Sherardion* Kropáč et Hejný in Kropáč 1978
Association: *Aethuso-Galeopsietum* G. Müller 1964
Association: *Papaveretum argemones* Kruseman et Vlieger 1939
Order: *Atriplici-Chenopodietalia albi* (Tx. 1937) Nordhagen 1940
Alliance: *Scleranthion annui* (Kruseman et Vlieger 1939) Sissingh in Westhoff et al. 1946
Association: *Aphano-Matricarietum chamomillae* Tx. 1937 em. Passarge 1957 nom. mut. propos.
Association: *Holco-Galeopsietum* Hilbig 1967
Association: *Erophilo-Arabidopsietum thalianae* Kropáč in Krippelová 1981
Association: *Spergulo arvensis-Scleranthetum annui* Kuhn 1937
Alliance: *Polygono-Chenopodion polyspermi* Koch ex Tx. 1937
Association: *Panico-Chenopodietum polyspermi* Tx. 1937
Association: *Galeopsio-Chenopodietum polyspermi* Oberdorfer 1957
Alliance: *Arnoseridion minimae* Malato-Beliz et al. 1960
Association: *Sclerantho annui-Arnoseridetum minimae* Tx. 1937
Alliance: *Panico-Setarion* Sissingh in Westhoff et al. 1946
Association: *Echinochloo cruris-galli-Setarietum viridis* Kruseman et Vlieger in Sissingh et al. 1940
Association: *Echinochloo cruris-galli-Setarietum pumilae* Felföldy 1942 corr. Mucina in Mucina et al. 1993
Order: *Eragrostietelia* J. Tüxen ex Poli 1966
Alliance: *Eragrostion* Tx. ex Oberdorfer 1954
Association: *Portulacetum oleraceae* Felföldy 1942

Description of the syntaxa

Stellarietea mediae Tx., Lohmeyer et Preising in Tx. ex von Rochow 1951

Therophyte communities on arable land and disturbed ruderal sites in the Holarctis. The distribution of this class was originally indicated as the Euro-Siberian region, optimally in the temperate to (sub)-meridionale zone, however some elements are recorded in the boreal to subarctic zone (Tüxen 1950: 112, R. Knapp 1959: 130, Böttcher 1971, Dorogostayskaya 1972, etc.), as well as at higher altitudes in the tropics (Tüxen 1950: 113) and distant territories (Miyawaki 1969).

Original diagnosis: Tüxen (1950: 111–140) et Rochow (1951: 8–27, et Table on p. 6)
Syn.: *Ruderali-Secalietea* ("*Rudereto-Secalinetales*", followed by "*Rudereto-Secalinetea*") Br.-Bl. in Br.-Bl. et al. 1936 p.p. max. (art. 3f)
Syntax. syn.: *Secalietea* Br.-Bl. 1951 p.p. (art. 3f, 8), *Secalietea* Br.-Bl. in Br.-Bl. et al. 1952 p.p. (art. 3f), *Chenopodietea* Br.-Bl. 1951 p.p. (art. 8), *Chenopodietea* Br.-Bl. in Br.-Bl. et al. 1952 p.p., *Thero-Chenopodietea* Lohmeyer, J. Tüxen et Tx. in J. Tüxen 1966 p.p. (art. 29), *Onopordo-Sisymbrietea* Görs 1966 p.p. (art. 3b), *Sisymbrietea* Gutte et Hilbig 1975 p.p., *Polygono-Chenopodietea* Eliáš 1986 p.p. (art. 29)
Incl.: *Secalinia* Br.-Bl. 1931 p.p. max. (art. 3f, 8), *Secali-Violetalia arvensis* Br.-Bl. et Tx. ex Sissingh in Westhoff et al. 1946 p.p. max. (pro ordine), *Anagallidetalia* R. Knapp 1948 p.p. max. (pro ordine)

Diagnostic species: *Agrostemma githago* (CR), *Amaranthus powellii*[+], *A. retroflexus, Anagallis arvensis, Anthemis cotula*[+], *Arenaria serpyllifolia, Atriplex patula, A. sagittata*[+], *Bromus arvensis, B. japonicus, B. secalinus* (CR), *B. sterilis*[+], *Capsella bursa-pastoris, Centaurea cyanus, Chenopodium album, Ch. ficifolium*[+],

Ch. glaucum[+], *Ch. pedunculare, Ch. strictum*[+], *Ch. suecicum, Conyza canadensis*[+], *Descurainia sophia*[+], *Diplotaxis muralis*[+], *Echinochloa crus-galli, Erodium cicutarium, Erysimum cheiranthoides, Euphorbia helioscopia, E. peplus*[+], *Fallopia convolvulus, Fumaria officinalis, Galinsoga parviflora, G. quadriradiata* (*G. ciliata*), *Geranium pusillum, Lactuca serriola*[+], *Lamium amplexicaule, L. purpureum, Lolium temulentum* (? EX), *Malva neglecta*[+], *M. pusilla*[+], *Matricaria recutita* (*Chamomilla recutita, Matricaria chamomilla*), *Myosotis arvensis, Odontites vernus* subsp. *vernus, Persicaria lapathifolia* subsp. *lapathifolia, P. maculosa, Polygonum aviculare, Rhinanthus alectorolophus* (VU), *Senecio vernalis*[+], *S. vulgaris, Sisymbrium officinale*[+], *Solanum nigrum, Sonchus asper, S. oleraceus, Stellaria media, Thlaspi arvense, Tripleurospermum inodorum* (*T. perforatum, Matricaria perforata, M. inodora*), *Urtica urens*[+], *Veronica persica, V. sublobata* (*V. hederifolia* subsp. *lucorum*), *Vicia angustifolia, V. sativa, V. villosa* subsp. *villosa, Viola arvensis*. – Some of above-mentioned species possess phytocoenotic optimum in a lower syntaxon and in that case they are marked there (opt.)

The list of diagnostic species is based on the results of this study and is unlikely to be valid over large geographic areas. Research in various parts of the world have identified the class *Stellarietea* in different regions, obviously with a modified list of taxa. In the Czech Republic some diagnostic taxa of this class were present in prehistoric times (Opravil 1978). Nezadal (1989) attempted to establish two races of this class: one for the temperate zone (*Capsella bursa-pastoris* race) and a second for the meridionale zone (*Lolium rigidum* race). Similar problems were solved in the Sino-Japanese region (Miyawaki 1969), and other parts of the world. Recently, a new and quite different list of species for Spain and Portugal was published by Rivas-Martínez et al. (2002: 481).

The class *Stellarietea mediae* includes all of the segetal comm. (weed comm. on arable land) as well as the pioneer ruderal comm. that grow on uncultivated but loose anthropogenous ground. The diagnostic species, in general, are prevalently therophytes with a ruderal strategy (Grime 1979), well adapted to inhabiting of freshly denuded or new sites. From the viewpoint of succession, these comm. may be either first phases of secondary succession (intensity of disturbance is low) or blocked successional stages (disturbance regularly repeated). Comm. of *Stellarietea* are distributed throughout the Czech Republic from the lowlands to the montane levels and are present in various species combinations depending on the climate and soil.

There have been several attempts to divide the class into subclasses, one was put forward by Hüppe & Hofmeister (1990) and completed by Pott (1992). This concept was adopted by Slovak scientists, who validated the proposal. Consequently, the class *Stellarietea* may or may not be divided into two subclasses depending on floristic differences and the nature of man-made environment (different impact and intensity of disturbance as mentioned above): (a) *Violenea arvensis* for the segetal comm., (b) *Sisymbrienea* for the ruderal comm.

This is not formally adopted in the current publication because of the lack of a syntaxonomical revision of the order *Sisymbrietalia* (possibly *Eragrostietalia*). For information, the syntaxonomy of both subclasses is only briefly presented:

(a) *Violenea arvensis* Hüppe et Hofmeister ex Jarolímek et al.1997

Syn.: *Violenea arvensis* Hüppe et Hofmeister 1990 (art. 5)
Syntax. syn.: *Secalienea* Rivas-Martínez 1987 (art. 1, 3f), *Stellarienea mediae* Rivas-Martínez et al. 2001 (art. 29)
Nomenclatural type: *Centaureetalia cyani* Tx., Lohmeyer et Preising in Tx. ex Rochow 1951, holotypus in Jarolímek et al. (1997: 90)

Diagnostic species see op. c., p. 90

(b) *Sisymbrienea* Pott 1992 (including the order *Sisymbrietalia* J. Tüxen in Lohmeyer et al. 1962, and possibly also the order *Eragrostietalia* J. Tüxen ex Poli 1966) is outside the scope of the current publication and the orders are left in the class *Stellarietea.* – Note: For details see Jarolímek et al. (1997), the diagnostic species are enumerated on pp. 122 and 172. In this publication, the presumably diagnostic species of the subclass are marked $^{+}$ (the diagnostic species of *Stellarietea* as cited above).

Centaureetalia cyani Tx., Lohmeyer et Preising in Tx. ex von Rochow 1951

Basiphilous segetal communities growing in cereal fields and root crops in temperate to submeridionale zones of the Euro-Siberian region.

Original diagnosis: Tüxen (1950: 125–140) et Rochow (1951: 22–27 et Table 6)
Nomenclature type: *Caucalidion lappulae* Tx. ex Rochow 1951, lectotypus designatus in Mucina (Mucina et al. 1993: 113)
Syn.: *Papaveretalia rhoeadis* Hüppe et Hofmeister 1990 (art. 5, 29)
Syntax. syn.: *Secalietalia* Br.-Bl. 1931 p.p. min. (art. 3f), *Secalietalia* Br.-Bl. in Br.-Bl. et al. 1936 p.p. (art. 3f), *Secalietalia* Br.-Bl. in Br.-Bl. et al. 1936 em. J. Tüxen et Tx. in Malato-Beliz et al. 1960 p.p. max. (art. 3f)[2], *Secali-Violetalia arvensis* Br.-Bl. et Tx. ex Sissingh in Westhoff et al. 1946 p.p. min. (art. 3f), *Anagallidetalia* R. Knapp 1948 p.p.
Incl.: *Secalietalia* (Br.-Bl.1936) Sissingh in Westhoff et al. 1946 (pro subordine)

Diagnostic species: *Aethusa cynapium* subsp. *agrestis, Avena fatua, Campanula rapunculoides, Galium spurium, Lithospermum arvense, Medicago lupulina, Melampyrum arvense* (VU), *Neslia paniculata, Papaver rhoeas, Ranunculus arvensis* (VU), *Sherardia arvensis, Sinapis arvensis, Veronica hederifolia, Vicia pannonica* subsp. *pannonica* (EN). – Note: (a) Some of the taxa possess their optimum also in alliances, possibly in associations, and they are marked respectively (opt.); (b) *Polygonum rurivagum* seems to have its optimum just in this order but further observations are necessary.

Segetal comm. in winter (partly spring) cereals and legume-grain mixtures, in winter rape and root-crops consisting of therophytes of winter, early spring, spring and summer life forms (composition depends on type of cultivation). Comm. prefer warm to mildly warm climatic regions and nutrient-rich and base-rich soils with a neutral to slightly alkaline reaction. Phytosociologically, these comm. may be separated into three different groupings based on temperature, soil base-status and type of cultivation.

Caucalidion lappulae Tx. ex von Rochow 1951

Segetal communities in cereals and legume-grain mixtures (preferably winter cultures) and winter rape in warm areas of the temperate to submeridionale zones of Euro-Siberian region.

Original name form: *Caucalidion lappulae* (*eurosibiricum*) Tx. 1950
Original diagnosis: Tüxen (1950: 134–139) et Rochow (1951: 25–26)
Nomenclature type: *Sileno noctiflorae-Lathyretum aphacae* Kuhn (1937: 36–40, Table 7), holotypus designatus in Rochow (1951: 26)
Syn.: *Secalion medioeuropaeum* Tx. 1937 (art. 3f, 34), *Caucalidion lappulae* (*eurosibiricum*) Tx. 1950 (art. 34), *Caucalidion platycarpi* auct. (art. 30)
Syntax. syn.: *Caucalis-Conringia-Orlaya* Vereine Meusel 1940 (art. 3c), *Triticion sativae* Klika 1941 (art. 3f, 8), *Consolido-Eragrostion poaeoidis* Soó et Timár in Timár 1957 p.p.
Incl.: *Triticion sativae* Kruseman et Vlieger 1939 (art. 3f – pro suball.), *Delphinietum consolidae* R. Knapp 1948 (pro associatione sensu latissimo)

[2] Lately, the concept of *Secalietalia* in this amendation has been proceeded without respect to the Code (art. 3f), and many new findings have been achieved, especially in the Mediterranean region (Nezadal 1989, Ferro 1990).

N o n : *Secalion* Br.-Bl. 1931 (art. 3f), *Secalion* Br.-Bl. in Br.-Bl. et al. 1936 (art. 3f), *Secalion mediterraneum* Tx. 1937 (art. 3f, 34), *Secalion cerealis* Br.-Bl. (1931) 1936 em. Nezadal 1989 (art. 3f)

D i a g n o s t i c s p e c i e s : *Adonis aestivalis* (EN), *A. flammea* (CR), *Ajuga chamaepitys* (EN), *Anagallis foemina* (VU), *Anthemis austriaca* (VU ?), *Bifora radians* (EN), *Bupleurum rotundifolium* (CR), *Camelina microcarpa, Caucalis platycarpos* subsp. *platycarpos* (EN), *Conringia orientalis* (CR), *Consolida regalis*, *Euphorbia exigua, E. falcata* (VU), *Fumaria vaillantii, Galium tricornutum* (CR), *Kickxia spuria* (EN), *Lathyrus aphaca* (CR), *L. tuberosus, Nigella arvensis* (CR), *Silene noctiflora, Stachys annua* (EN), *Thlaspi perfoliatum*, *Thymelaea passerina* (EN), *Veronica triloba* (EN); this list should be completed for the submeridionale zone by some species that are nowadays rare, missing and/or extinct in the Czech Republic (cf. Holub & Procházka 2000): *Legousia hybrida*, *L. speculum-veneris*, *Melampyrum barbatum* (EX), *Myagrum perfoliatum* (EX), *Orlaya grandiflora*, *Scandix pecten-veneris* (? EX), *Turgenia latifolia* (? EX), *Vaccaria hispanica* (? EX), *Vicia grandiflora* subsp. *sordida*, *V. pannonica* subsp. *striata*. – Note: (a) *Consolida orientalis,* alien to the Cz. Rep. (Jehlík 1998) has lately become a component of the *Caucalidion* in the Czech Republic, (b) some of the *Caucalidion* species are transgressive into basifilous comm. of the *Fumario-Euphorbion* (see there).

S y n t a x o n o m i c c o m m e n t s : (1) The related mediterranean alliance *Secalion* (see above) usually contains several *Caucalidion* taxa, but mainly mediterranean taxa, e.g. *Adonis microcarpa, Asperula arvensis* (once also in the Czech Republic, now EX), *Bifora testiculata, Bupleurum lancifolium, Hypecoum imberbe, Neslia apiculata, Papaver hybridum, Rapistrum rugosum, Vicia peregrina* etc.). For more information see Nezadal (1989: 91–93). (2) *Consolido-Eragrostion* Soó et Timár in Timár 1957 also contains some *Caucalidion* taxa plus taxa of *Panico-Setarion* and *Eragrostion* (for details see Soó 1961: 428–432).

Communities of this alliance occur in the warm areas of the European temperate zone especially on base-rich calcareous soils. In the southern submeridionale zone these comm. also occur on neutral to slightly acid soils. Importantly in the temperate zone these comm. occur in the lowlands to colline areas, whereas in the south they occur at higher altitudes (Kropáč 1982a, Nezadal 1989). Most of the *Caucalidion* taxa are archaeophytes of thermophilous character and of southern origin; once they were common components of these comm. but more recently have became endangered or vanished.

Outside of the Czech Republic, *Caucalidion* comm. are recorded in many European countries. Below are a selection of the relevant publications for other European states: Slovakia (Jarolímek et al. 1997, Mochnacký 2000), Germany (Schubert & Mahn 1968, Hilbig 1973, Passarge 1964, 1978a, Oberdorfer 1983, 1993, Hüppe & Hofmeister 1990), the Netherlands (Westhoff & den Held 1969, Haveman et al. 1998), France (Gehu et al. 1985), Poland (Kornaś 1969, Warcholińska 1990), Switzerland (Brun-Hool 1963, 1964), Austria (Holzner 1973, Mucina 1993), Hungary (Soó 1961, 1971), Roumania (Morariu 1943, 1967, Grigore & Coste 1975), Bulgaria (Kolev 1963), Croatia, Serbia, formerly Yougoslavia (Kovačević 1970, Kojić 1975), Spain (Nezadal 1989), Italy (Pignatti 1957), Ukraine, Crimea (Solomakha 1990) and Russia, Bashkiria (Mirkin et al. 1985, Schubert et al. 1981). Fragmentary *Caucalidion* was once recorded also from S Sweden (Merker 1966).

1. *Caucalido daucoidis-Conringietum orientalis* Klika 1936 (Table 1: col. 1)

D a t a b a s e n o s . : 342058 to 342074 (first part), 342019 to 342029 (second part)
O r i g i n a l n a m e f o r m : *Caucalis daucoides-Conringia orientalis*-Assoz. Klika 1936
O r i g i n a l d i a g n o s i s : Klika (1936: 511–512)
N o m e n c l a t u r e t y p e : Klika (1936: 512), holotypus (single relevé)
S y n t a x . s y n . : *Sileno noctiflorae-Lathyretum aphacae* Kuhn 1937 p.p. min., *Bupleuretum rotundifolii* Kuhn 1937 p.p. min., *Caucalido daucoidis-Scandicetum pectinis-veneris* Tx. 1937 p.p. min., *Caucalidetum lappulae* Morariu 1943 p.p., *Caucalido latifoliae-Adonidetum flammeae* Tx. 1950 p.p. (art. 2b, 7), *Camelino microcarpae-*

Euphorbietum falcatae Tx. 1950 p.p. (art. 2b, 7), *Kickxio-Euphorbietum falcatae* Kropáč 1974 nom. prov. p.p. (art. 3b)
Non: *Sinapio arvensis-Biforetum radiantis* Soó 1947, *Biforo radiantis-Euphorbietum falcatae* Pignatti 1957, *Anthemido austriacae-Camelinetum microcarpae* Holzner 1973, *Camelino microcarpae-Anthemidetum austriacae* Holzner 1973 nom. invers. propos. (Mucina 1993).

Syntaxonomic comments: The most closely related com. is *Camelino microcarpae-Euphorbietum falcatae* (cf. Tüxen 1950: 136–137, where Klika's association is also presented among the synonyms) but not *Caucalido-Scandicetum* (validly published only by Tüxen 1937: 17–18 and not by Libbert 1930), which is erroneously supposed by some authors to be the most thermophilous and calciphilous as., because "this association is lacking of proper characteristic species and contains in lower constancy also species of the *Agrostidion spicae-venti*" (Tüxen 1950: 138–139). Anyway, it is clear that in accordance with the Code the correct name is that of Klika.

Diagnostic species: *Caucalis platycarpos* subsp. *platycarpos*, *Conringia orientalis, Galium tricornutum, Bifora radians, Bupleurum rotundifolium,* and very rare *Adonis flammea* (no in current relevés); missing (probably extinct) *Scandix pecten-veneris,* definitely extinct *Asperula arvensis*[3]
Constant species: *Adonis aestivalis, Anagallis arvensis, Avena fatua, Campanula rapunculoides, Chenopodium album, Caucalis platycarpos* subsp. *platycarpos*, *Cirsium arvense, Conringia orientalis, Consolida regalis, Convolvulus arvensis, Elytrigia repens, Euphorbia exigua, Fallopia convolvulus, Lathyrus tuberosus, Neslia paniculata, Papaver rhoeas, Polygonum aviculare, Silene noctiflora, Sinapis arvensis, Thlaspi arvense, Veronica persica, Viola arvensis*
Important weeds: *Avena fatua* (W3), *Campanula rapunculoides* (W6), *Cirsium arvense* (W1), *Convolvulus arvensis* (W1), *Elytrigia repens* (W1), *Fallopia convolvulus* (W1), *Lathyrus tuberosus* (W6), *Papaver rhoeas* (W3), *Sinapis arvensis* (W3), *Thlaspi arvense* (W2)
Threatened species: *Adonis aestivalis* incl. f. *citrinus* (EN), *Adonis flammea* (? EX to CR), *Ajuga chamaepitys* (EN), *Anagallis foemina* (VU), *Bifora radians* (EN), *Bupleurum rotundifolium* (CR), *Caucalis platycarpos* subsp. *platycarpos* (EN), *Conringia orientalis* (CR), *Euphorbia falcata* (VU), *Galeopsis angustifolia* (VU), *Galium tricornutum* (CR), *Kickxia spuria* (EN), *Melampyrum arvense* (VU), *M. barbatum* (? EX, 19.7.1973, Klentnice, N of Mikulov, herb. Z. Kropáč, Database rel. no. 342026), *Nigella arvensis* (CR), *Ranunculus arvensis* (VU), *Stachys annua* (EN), *Vicia pannonica* subsp. *pannonica* (EN)

Structure and species composition: Nowadays very rare com., the stands of which are fully developed in the second half of June and July before winter cereals (mostly wheat) and/or winter legume-grain mixtures are harvested. As a rule, stands are three-layered, reaching (60)–80–(120) cm in height with a medium total cover of 90% (crops covered 60%). Weed cover of around 50% harboured in the upper layer the diagnostic species *Conringia orientalis, Galium tricornutum* and rarely *Bupleurum rotundifolium,* the middle layer *Bifora radians, Euphorbia falcata, Caucalis *platycarpos*,* and the lower layer *Anagallis foemina*, *Ajuga chamaepitys, Kickxia spuria* and rarely *Nigella arvensis.* In addition to the diagnostic species in the upper layer are *Lathyrus tuberosus, Adonis aestivalis*, once also *Adonis flammea* and of the higher syntaxa *Papaver rhoeas, Sinapis arvensis, Avena fatua* and many others. In the middle and lower layers there are also some species of the alliance (*Silene noctiflora, Consolida regalis, Euphorbia exigua,* rarely *Fumaria vaillantii*). Among the companions some *Festuco-Brometea* species (*Falcaria vulgaris*, *Nonea pulla, Salvia verticillata, Coronilla varia, Vicia tenuifolia,* etc.) are remarkably highly constant.

Ecology, dynamics and distribution (Table 2, Fig. 1): This endangered com. is present only in the warmest part of the Czech Thermophyticum (mainly the

[3] With all the associations the diagnostic species are presented in decreasing constancy

Lounské Středohoří hills, Dolní Poohří basin, Libochovická and Slánská tabule plateaus, Český Kras hills, a few solitary hills of the Rožďalovická pahorkatina hills and Východní Polabí basin) and the Pannonicum (Mikulovská pahorkatina and Znojemsko-brněnská pahorkatina hills). Most localities are confined to the foot of hills with an inclination of 10–15°, preferably with a S, SW or SE orientation and on base-rich soils of heavy texture with gravel and many stones that are rarely agriculturally exploited but are suitable for vineyards. No doubt more localities existed in the past in the Pannonicum (Otýpková 2001, Lososová 2003) but nowadays these ecotopes have gradually been replaced by ecologically less specific ass. (*Lathyro-Adonidetum* and/or *Euphorbio-Melandrietum*, see e.g. Kropáč 1988).

Variability: The main variability is manifested in the two subass.: (1) *Caucalido daucoidis-Conringietum orientalis typicum* (identical to the type as.); (2) *Caucalido daucoidis-Conringietum orientalis euphorbietosum falcatae* **subas. nova hoc loco** (see Appendix 1)[4]. The first subas. lacks the differential species of the second subas., which is characterized by *Euphorbia falcata, Ajuga chamaepitys*, *Kickxia spuria* and rarely *Bupleurum rotundifolium* (only here).

Ecological differences between these subass. are based mainly on soil conditions. The second subas. develops on clayey-loamy to clayey soils (marl clays, marls prevail and carbonaceous loess; soil type is verti-haplic to luvic chernozem, possibly also pellic vertisol) whereas the first is confined to clayey-loamy and loamy soils with gravel and stones (rendzinas on limestones or pararendzinas on marlstones). Climatic differences are small, however, the second subas. occurs at relatively low altitudes (within 200–300 m) and in warmer climates (T4 sec. Quitt 1971).

References: (a) Cz. Rep.: Klika (1936, one relevé, holotypus), Kühn & Uhrecký (1959, R nos. 14, 15, 22 sine denom.), Aulická (1961, TR sub *Caucalido-Adonidetum flammeae conringietosum* p.p. max.), Bezděk (1966, TR sub *Caucalido-Adonidetum flammeae biforetosum* p.p.), Kropáč (1981, L, C sub *Kickxio-Euphorbietum falcatae* p.p.; 1988, TS sub *Caucalido-Adonidetum flammeae*; 1995, L, C), Otýpková (2001, TR sub *Lathyro-Adonidetum* p.p.), Lososová (2003, L, C, and two R); (b) other countries: Morariu (1943, TR sub As. de *Caucalis lappula* p.p.), Tüxen (1950, L, C sub *Camelino-Euphorbietum falcatae*), Soó (1961, L, C sub *Caucalido-Setarietum* p.p.), Pinke (2000, TR sub *Camelino-Anthemidetum austriacae caucalidetosum* p.p. max.).

2. *Lathyro tuberosi-Adonidetum aestivalis* Kropáč et Hadač in Kropáč, Hadač et Hejný 1971 (Table 1, col. 2)

Database nos.: 342030–342057 and 342075–342092
Original diagnosis: Kropáč, Hadač et Hejný (1971: 150)
Nomenclature type: Kropáč, Hadač et Hejný (1971: 150), holotypus (single relevé)[5]
Non: *Caucalido latifoliae-Adonidetum flammeae* Tx. ex Oberdorfer 1957, *Galio-Adonidetum* R. Schubert et Köhler 1964

Syntaxonomic comments: *Caucalido latifoliae-Adonidetum flammeae* is distributed mainly in the submediterranean area and *Galio-Adonidetum* is a local as. occurring on limestones in Thuringia (Thüringen, Germany) with an ecology between *Lathyro-*

[4] Recommendation 7A of the Code was applied to all the new syntaxa in this paper.

[5] Holotype relevé is also in the Database (no. 342030) and should have a priority over the one published in Kropáč et al. (1971), because *Conringia orientalis* instead of *Caucalis platycarpos* subsp. *platycarpos* has been erroneously printed in the original publication.

Adonidetum and *Caucalido-Scandicetum*, and covers the comm. not only of the *Caucalidion* but also *Fumario-Euphorbion*.

Diagnostic species: *Adonis aestivalis* and some *Caucalidion* species (*Silene noctiflora* and *Consolida regalis* with higher constancy); differential species regarding the *Consolido-Anthemidetum*: *Caucalis* **platycarpos*, Fumaria vaillantii, and *Camelina microcarpa* (with lower constancy). As to the *Caucalido-Conringietum* is negatively characterized (by absence of *Conringia orientalis, Bifora radians,* and mostly of *Galium tricornutum*).

Constant species: *Adonis aestivalis, Anagallis arvensis, Avena fatua, Chenopodium album, Cirsium arvense, Consolida regalis, Convolvulus arvensis, Elytrigia repens, Euphorbia helioscopia, Fallopia convolvulus, Galium aparine, Papaver rhoeas, Polygonum aviculare, Silene noctiflora, Sinapis arvensis, Thlaspi arvense, Viola arvensis.*

Important weeds: *Avena fatua* (W3), *Cirsium arvense* (W1), *Consolida orientalis* (W7), *Convolvulus arvensis* (W1), *Elytrigia repens* (W1), *Fallopia convolvulus* (W1), *Galium aparine* (W1), *Lathyrus tuberosus* (W6), *Papaver rhoeas* (W3), *Sinapis arvensis* (W3), *Thlaspi arvense* (W2).

Threatened species: *Agrostemma githago* (CR), *Adonis aestivalis* (EN), *Anagallis foemina* (VU), *Anthemis austriaca* (VU), *Caucalis platycarpos* subsp. *platycarpos* (EN), *Galeopsis angustifolia* (VU), *Galium tricornutum* (CR), *Ranunculus arvensis* (VU), *Valerianella rimosa* (EN), *Veronica opaca* (CR), *Vicia pannonica* subsp. *pannonica* (EN), and rarely may be found as transgressive from the preceding association: *Ajuga chamaepitys* (EN), *Bifora radians* (EN), *Conringia orientalis* (CR), *Kickxia spuria* (EN), *Stachys annua* (EN).

Structure and species composition: Fully developed stands can be found in the second half of June and July, mainly in winter cereals and winter legume-grain mixtures, reaching (70) 90 (120) cm in height (depending on crop, stands in spring barley are shorter). Medium cover of a fully developed canopy is 95%, in which the crop covers ca 70% of the surface and weeds 50%. As a rule, stands of weeds are three-layered; upper layer reaches (40) 50–70 (80) cm in height, the middle layer (20) 30–50 (60) cm and lower layer (5) 10–15 (20) cm. The upper layer is characterized by the diagnostic *Adonis aestivalis* accompanied usually by *Lathyrus tuberosus, Papaver rhoeas, Sinapis arvensis,* rarely *Camelina microcarpa* and regularly by *Avena fatua* that overtops the canopy together with flowering *Consolida orientalis*, which continues to spread in this com. Included in the middle layer are *Consolida regalis* and *Silene noctiflora* (*Caucalidion* species) accompanied by *Thlaspi arvense* and *Fallopia convolvulus*, in the lower layer other *Caucalidion* species (*Euphorbia exigua, Fumaria vaillantii,* sometimes *Caucalis* **platycarpos*) accompanied by species of higher syntaxa (e.g. *Anagallis arvensis, Viola arvensis*, etc.).

Ecology, dynamics and distribution (Table 2, Fig. 1): Thermophilous com. previously relatively widely distributed in the Czech Thermophyticum and Pannonicum but now progressively in decline due to new agronomy practices. It prefers base-rich soils, which are neutral to slightly alkaline, such as various chernozems on undulating plains and hilly terrain with moderate slopes. These soils produce very good yields of sugar beet and wheat. Outside of the Czech Thermophyticum there is a remarkable locality on limestone near the town of Strakonice, which was recorded in 1968 but not confirmed in 1990. Probably more localities existed on the borders of its distribution. In the Pannonicum many localities were recorded recently (Otýpková 2001, Lososová 2004). Owing to the progressive change to a more uniform habitat this as. is gradually being replaced by *Euphorbio-Melandrietum* and possibly the fragmentary comm. of the alliance (cf. Kropáč 1988).

Variability: Two subass. are distinguished: (1) *Lathyro tuberosi-Adonidetum aestivalis typicum* (identical to type as.), (2) *Lathyro tuberosi-Adonidetum aestivalis*

raphanetosum **subas. nova hoc loco** (see Appendix 1). The first subas. lacks differential species of the second one, which is characterized by the following differential species: *Raphanus raphanistrum, Vicia tetrasperma*, *Centaurea cyanus,* and in more acid habitats also by *Anthemis arvensis* and *Scleranthus annuus*. Like the previous as., the differences are based less on climatic and more on soil conditions. Most of the localities of the first subas. are on haplic or luvic (degraded) chernozem on loess, and only a few on pararendzinas, whereas the second subas. is confined to various pararendzinas with substrates consisting of leached marlstones and skeletal cambisols on slates and greywackes. The remarkable results of Otýpková (2001) from the Bílé Karpaty Mts indicate that this as. is enriched there by *Lathyrus aphaca* (with a high constancy value); comm. with this species were earlier described from SW Germany (Kuhn 1937, Rochow 1951).

References: (a) Cz. Rep.: Kropáč et al. (1971, one R, holotypus), Vojta (1954, TR/lost/ sub as. *Caucalis lappula-Lathyrus tuberosus* p.p.), Kühn & Uhrecký (1959, R no. 17 sine denom.), Aulická (1961, TR sub *Caucalido-Adonidetum flammeae consolidetosum* p.p. max.), Bezděk (1966, TR sub *Caucalido-Adonidetum flammeae aperetosum* p.p.), Volf (1971 et 1974, TR sub as. *Sinapis arvensis-Convolvulus arvensis* p.p.), Kropáč (1981, L, C; 1988, TS; 1995, L, C), Otýpková (2001, TR p.p.), Lososová (2004, TS); (b) Slovakia: Jarolímek et al. (1997, TS), Mochnacký (2000, TS); (c) other countries: Wilmanns (1956, TS sub *Caucalis lappula-Lathyrus tuberosus* Ass.), Zeidler (1962, R sub *Caucalido-Adonidetum flammeae*), Szotkowski (1981, TR sub *Caucalido-Scandicetum* p.p.), Wnuk (1989, TR sub *Caucalido-Scandicetum/Vicietum tetraspermae* p.p.).

3. *Consolido-Anthemidetum austriacae* Kropáč et Mochnacký 1990 (Table 1: col. 3)

Database nos.: 342163–342177
Original diagnosis: Kropáč et Mochnacký (1990: 104–111)
Nomenclature type: Kropáč et Mochnacký (1990, Table 1, rel. 1, holotypus) – see also Database no. 342163
Non: *Anthemido austriacae-Camelinetum microcarpae* Holzner 1973, *Anthemido austriacae-Consolidetum orientalis* Slavnić 1951

Syntaxonomic comments: Holzner (1973: 41–47 and tab. suppl.) states that his association is the most thermophilous in Austria; species composition is not far from *Caucalido-Conringietum orientalis.* Slavnić (1951: 87 and Table 1 on pp. 88–89) records a very specific association from the Serbian Banat, which includes several submediterranean species and a similar species composition is known from neighbouring countries (see *Consolido orientalis-Vicietum striatae* Soó 1947 in Tüxen 1950: 137).

Diagnostic species: *Anthemis austriaca, Consolida regalis, Centaurea cyanus,* and further *Atriplici-Chenopodietalia* species in relative high constancy as differentials against other *Caucalidion* ass.; see also *Trifolium arvense* and *Anthemis ruthenica* with the variability.
Constant species: *Anagallis arvensis, Anthemis austriaca, Capsella bursa-pastoris, Centaurea cyanus, Chenopodium album, Cirsium arvense, Consolida regalis, Convolvulus arvensis, Descurainia sophia, Elytrigia repens, Fallopia convolvulus, Lamium amplexicaule, Medicago lupulina, Papaver rhoeas, Polygonum aviculare, P. rurivagum, Silene noctiflora, Stellaria media, Thlaspi arvense, Tripleurospermum inodorum, Viola arvensis.*
Important weeds: *Apera spica-venti* (W4), *Avena fatua* (W3), *Cirsium arvense* (W1), *Convolvulus arvensis* (W1), *Elytrigia repens* (W1), *Fallopia convolvulus* (W1), *Papaver rhoeas* (W3), *Thlaspi arvense* (W2), *Tripleurospermum inodorum* (W1). – Note: *Anthemis austriaca* may locally become an important weed.
Threatened species: *Anthemis ruthenica* (VU), *Filago arvensis* (VU), *Misopates orontium* (CR), *Polycnemum arvense* (CR), and further, not typical species in this community (*Agrostemma githago* – CR, *Anagallis foemina* – VU, *Caucalis *platycarpos* – EN, *Ranunculus arvensis* – VU) have also been found here. – Note: According to achieved results *Anthemis austriaca* should be transferred from the category VU (C3) into the group of species requiring further monitoring (C4) – see Holub & Procházka (2000).

Structure and species composition: Com. develops in stands of cereals and its phenological optimum is in June and July. At that time the canopy reaches from 80–110 cm (in winter wheat) to 110–150 cm (in winter rye). Medium cover of canopy amounts to 90%, of which the crop accounts 70% and weeds 55%. Stands of weeds are normally three-layered; in the upper layer the blue flowers of *Centaurea cyanus* together with red flowers of *Papaver rhoeas* are conspicuous, accompanied by *Avena fatua* (*Centaureetalia*), as well as *Raphanus raphanistrum, Vicia hirsuta, V. tetrasperma* (*Atriplici-Chenopodietalia*) and *Stellarietea* species. Middle layer is made up of the diagnostic species *Anthemis austriaca* and *Consolida regalis* together with *Silene noctiflora* and *Euphorbia exigua* (in medium constancy), and *Papaver argemone* and *Lithospermum arvense* are conspicuous. In the lower layer are mainly species of higher syntaxa, in particular *Polygonum rurivagum* occurs frequently in this com.

Ecology, dynamics and distribution (Table 2, Fig. 2): Specialized thermophilous com. with limited distribution in the Czech Thermophyticum and Pannonicum due to its ecological requirements for particular soil conditions: acidic loamy-sandy and gravelly soils. Main centres of distribution are at Pražská plošina plateau, the terraces of the middle course of the river Labe and the lowlands of the south-Moravian Pannonicum. These habitats correspond to sugar beet-rye subzone with specialized vegetables. In the Czech Thermophyticum this as. coincides with the *Tilio-Betuletum*, which is questionable after the recent numerical analysis of the alliance *Carpinion* (Knollová & Chytrý 2004). – Note: For dot maps of the distribution see also Kropáč & Mochnacký (1990, Fig. 1 and 2).

Variability: Two subass. were distinguished by Kropáč & Mochnacký (1990): (1) *Consolido-Anthemidetum austriacae typicum,* (2) *Consolido-Anthemidetum austriacae trifolietosum arvensis.* Type relevé of the first subas. is the same as type relevé of the as. (op. c., rel. no. 1 in Table 1 on p. 106–108, Database no. 342163). Type relevé of the second subas. was not designated in the above publication but is designated here: rel. no. 6 in Table 3 on p. 116–121, and the same in the Database no. 342172 – **lectotypus hoc loco designatus.**

In addition, some variants are distinguished. Among others, the geographic variant from Slovakia, floristically characterized by *Vicia grandiflora* and *V. pannonica,* is interesting. Very interesting is the variant with *Anthemis ruthenica* (see the characteristics, op. c., p. 123 and Table 3); this peculiar com. occurs also on arable land (mainly in winter rye) at lower altitudes (150–200 m), even growing abundantly in gravelly-sandy soils along the middle course of the Labe river, in S Moravia and suitable ecotopes in Slovakia. – Note: Two ass. with this species are described for other countries: (a) *Anthemido ruthenicae-Sperguletum arvensis* growing in sandy soils in the Austrian Pannonicum (Holzner 1974) and (b) *Anthemido ruthenicae-Descurainietum sophiae* growing on the Ukrainian steppe zone (Solomakha 1988).

References: (a) Cz. Rep.: Kropáč & Mochnacký (1990, TR), Kropáč (1981, L, C; 1995, L, C); (b) Slovakia: Jarolímek et al. (1997, TS), Mochnacký (2000, TS).

4. *Veronicetum hederifolio-trilobae* **as. nova hoc loco** (Table 1, col. 4)

Database nos.: 342178–342207
Original diagnosis: Next paragraphs and Appendix 1
Syn.: *Veronicetum hederifolio-trilobae* Kropáč 1997 (art. 3o, 7)

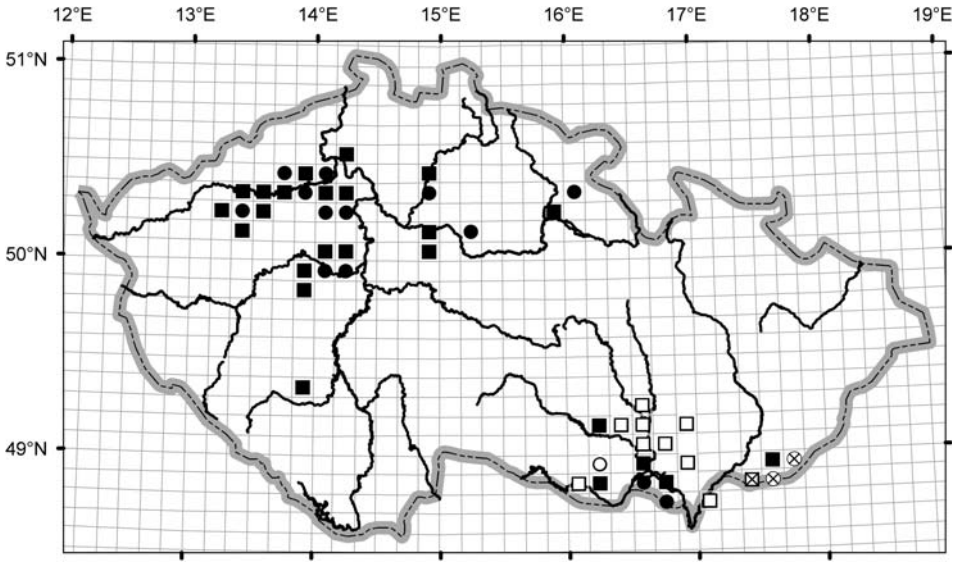

Fig. 1. Distribution of the communities of *Caucalidion* in the Czech Republic. ● *Caucalido-Conrigietum* (including data from ○ Lososová 2003 and ⊗ Otýpková 2001); ■ *Lathyro-Adonidetum* (□ Lososová 2004, ⊠ Otýpková 2001).

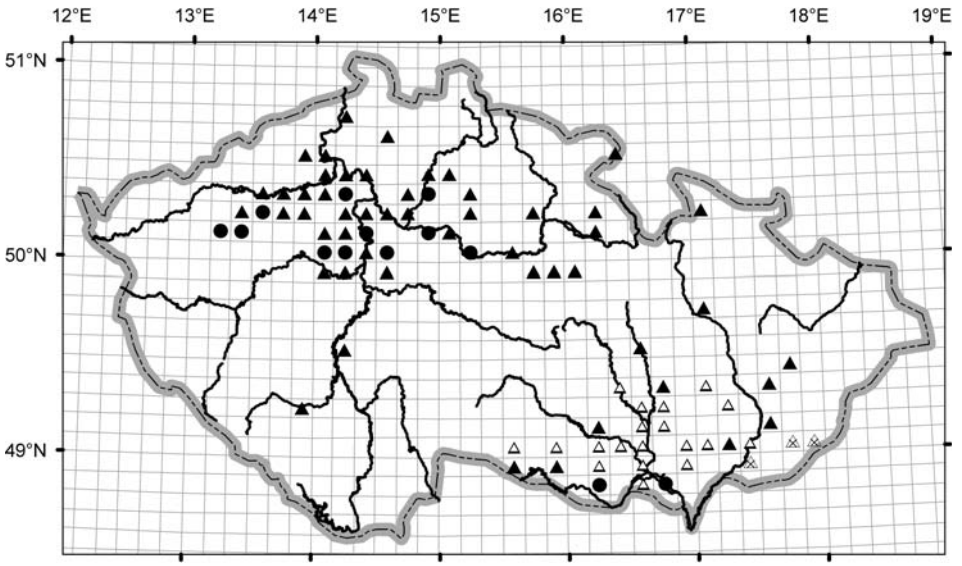

Fig. 2. Distribution of the communities of *Caucalidion* in the Czech Republic. ● *Consolido-Anthemidetum*; ▲ *Euphorbio-Melandrietum* (including data from △ Lososová 2004, ⧋ Otýpková 2001).

Syntax. syn.: *Veronico-Adonidetum aestivalis* Kropáč et Hadač in Kropáč et al. 1971 p.p., *Consolido-Veronicetum* Kropáč 1981 p.p. (art. 3o, 7).
Pseudonym: *Veronicetum trilobo-triphylli* sensu Holzner 1973 non Slavnić 1951, *Veronicetum trilobae-triphyllidi* auct.
Non: *Veronicetum hederifolio-triphylli* Slavnić 1951, *Veronicetum hederifolio-sublobatae* Kropáč 1997 (art. 3o, 7).

Diagnostic species: *Veronica triloba* (opt.), *V. hederifolia* (opt.), *Adonis aestivalis* (juv.), *Conringia orientalis* (juv.), and above all negative differentials towards the *Veronicetum hederifolio-triphylli*: *Anthemis austriaca*, *Holosteum umbellatum*, *Scleranthus annuus*, and *Veronica triphyllos* with very low constancy
Constant species: *Adonis aestivalis, Capsella bursa-pastoris, Chenopodium album, Cirsium arvense, Consolida regalis, Descurainia sophia, Fallopia convolvulus, Galium aparine, Lamium amplexicaule, Papaver rhoeas, Polygonum aviculare* agg., *Silene noctiflora, Sinapis arvensis, Stellaria media, Thlaspi arvense, Veronica hederifolia, V. sublobata, V. triloba, Viola arvensis*
Important weeds: *Avena fatua* (W3), *Capsella bursa-pastoris* (W2), *Cirsium arvense* (W1), *Fallopia convolvulus* (W1), *Galium aparine* (W1), *Papaver rhoeas* (W3), *Polygonum aviculare* agg. (W2), *Sinapis arvensis* (W3), *Stellaria media* (W2), *Thlaspi arvense* (W2), *Veronica persica* (W2), *V. sublobata* (W2). – Note: In this com. these species are most common weeds at the seedling (overwintering as well as spring annuals) or sprouting (perennials) phases to the stalk and budding, possibly flowering (fruiting) phases. For farmers it is the last moment how to elaborate the scheme of weed control for the current year (for details see the special literature cited).
Threatened species: *Veronica triloba* (EN), *Adonis aestivalis* (EN), *Conringia orientalis* (CR), and rarely may occur here also *Caucalis *platycarpos* (EN), *Ranunculus arvensis* (VU), *Veronica agrestis* (EN), *V. opaca* (CR), *V. praecox* (VU)

Structure and species composition: Middle-rich com. reaching its phenological optimum at the end of the winter agroecophase, from March till the first half of May (depending on weather), only in stands of winter crops (mainly wheat, legume-grain, rye, barley and rape). Cereals are then tillering or shooting and at a height of (5) 10–20 (30) cm depending on the cultivar (winter rape is taller and may be 80 cm when about to flower). Medium canopy cover is 70–80% (in winter rape up to 95%), with the crop at 50–60% and weeds at 30–40%. It is the period of rapid growth. Well developed stands of weeds are normally made up of two layers with the diagnostic species in the lower layer (10–15 cm): *Veronica triloba* and *V. hederifolia*, which are prostrate when flowering and fruiting, always together with seedling to flowering stage of certain other plants (*Fallopia convolvulus, Lamium amplexicaule, Stellaria media, Polygonum aviculare* agg., *Viola arvensis*, etc.). The upper layer, which is (10) 15–25 (30) cm in height, consists of diagnostic species of the *Caucalidion* (*Adonis aestivalis*, *Consolida regalis, Silene noctiflora,* rarely *Conringia orientalis*) at the stem stage, possibly with buds, always together with certain other plants (*Capsella bursa-pastoris, Thlaspi arvense* – at the flowering stage, and *Descurainia sophia, Galium aparine, Papaver rhoeas*, *Sinapis arvensis*, etc. – at the stem stage, with buds).

Ecology, dynamics and distribution (Table 2, Fig. 3): Thermophilous com. rather widely distributed in the Czech Thermophyticum and Pannonicum mainly on neutral to slightly alkaline middle heavy loamy soils; these soils are suitable for crops typical of the sugar beet farming zone. In the Pannonicum some localities are probably mapped along with the next as.

Variability: Fairly variable as., depending on the crop rotation it alternates with the ass. *Lathyro-Adonidetum*, *Euphorbio-Melandrietum* and occasionally *Caucalido-Conringietum*. However, this variability is probably only manifested at the level of variants and owing to the lack of records is omitted here.

References: (a) Cz. Rep.: Kropáč et al. (1971, one R sub *Veronico-Adonidetum* p.p.), Kropáč (1981, L, C sub *Consolido-Veronicetum* p.p.; 1997, TS), Otýpková (2001, TR pars sub *Lamio-Thlaspietum*, R nos. 38–50); (b) other countries: Holzner (1973, TR pars sub *Veronicetum trilobo-triphylli*).

5. *Veronicetum hederifolio-triphylli* Slavnić 1951 (Table 1: col. 5)

Database nos.: 342208–342221
Original name form: Ass. *Veronica hederifolia-Veronica triphyllos* Slavnić 1951
Original diagnosis: Slavnić (1951: 87 et 163, French summary, Table 3 on pp. 92–93)
Nomenclature type: Slavnić (1951: 92–93, Table 3, rel. 6), **lectotypus hoc loco designatus** (see this relevé at the end of Appendix 2)
Syntax. syn.: *Consolido-Veronicetum* Kropáč 1981 (art. 3o, 7) p.p.
Pseudonym: *Veronicetum trilobo-triphylli* sensu Holzner 1973 non Slavnić 1951, *Veronicetum trilobae-triphyllidi* auct.
Non: *Veronicetum hederifolio-trilobae* as. nova (see preceding as.)

Syntaxonomic comments: The taxonomic study by Fischer (1967) distinguished three species in the *Veronica hederifolia* agg.; the species in Slavnić's relevés (see distribution in Fischer, op. c., fig. 8) is probably *Veronica triloba*, but this is not a reason for changing the name (Code, art. 29). Main inaccuracy, however, occurs in the ecological broadening of the author's original concept. Slavnić (1951: 87 et 163) recorded the as. from sandy to sandy-loamy alluvial soils and selected both *Veronica* species, the species of *Scleranthion* and possibly *Atriplici-Chenopodietalia* (*Arabidopsis thaliana, Scleranthus annuus, Spergula arvensis, Vicia hirsuta, Centaurea cyanus,* etc.) as character species (see Table 3 on p. 92–93). Of course, several species of the *Caucalidion* were also present (*Adonis aestivalis, Camelina microcarpa, Anthemis austriaca*), plus several submediterranean species (*Papaver hybridum, Ornithogalum refractum* Willd., etc.). The concept of Slavnić (1951) is adopted here.

Diagnostic species: *Veronica triphyllos* (opt.), *V. praecox*, *Holosteum umbellatum* together with young plants of *Consolida regalis* and *Silene noctiflora* (as *Caucalidion* species); from other spring ass. some species are transgressive: *Veronica hederifolia* and *V. sublobata*, even *Veronica triloba,* but with respect to the previous as. differential species are important: *Anthemis austriaca, Arabidopsis thaliana, Erophila verna, Myosotis stricta, Scleranthus annuus,* and other *Atriplici-Chenopodietalia* species. – Note: *Veronica triphyllos* is rather thermophilous plant but evidently with acidophilous tendency (note its constancy values in *Erophilo-Arabidopsietum*, even in *Sclerantho-Arnoseridetum*). Ellenberg (1950: 110) classified it in the group of *Raphanus raphanistrum.*
Constant species: *Anthemis austriaca, Arenaria serpyllifolia, Capsella bursa-pastoris, Chenopodium album, Cirsium arvense, Consolida regalis, Descurainia sophia, Fallopia convolvulus, Lamium amplexicaule, Papaver rhoeas, Raphanus raphanistrum, Silene noctiflora, Sinapis arvensis, Stellaria media, Thlaspi arvense, Veronica polita, V. sublobata, V. triloba, V. triphyllos, Viola arvensis*
Important weeds: *Capsella bursa-pastoris* (W2), *Cirsium arvense* (W1), *Descurainia sophia* (W6), *Fallopia convolvulus* (W1), *Lamium amplexicaule* (W2), *Papaver rhoeas* (W3), *Raphanus raphanistrum* (W4), *Sinapis arvensis* (W3), *Stellaria media* (W2), *Thlaspi arvense* (W2), *Veronica polita* (W3), *V. sublobata* (W2). – This is a selection of most common weeds and real situation may be variable. See also the remark to the previous as.
Threatened species: *Androsace elongata* (EN), *Erysimum repandum* (CR), *Veronica praecox* (VU), *V. triloba* (EN). – Note: Only taxa observed by the author in this com. are referred to; Holzner (1973) mentioned also *Androsace maxima* (EX in the Cz. Rep.). As to *Anthemis austriaca* see the remark at the *Consolido-Anthemidetum austriacae* (as. no. 3).

Structure and species composition: It is a spring as. that develops in winter wheat and winter rye. Stands 20–30 cm tall are one or two-layered with the prostrate species in the lowest layer (5–10 cm): *Veronica hederifolia, V. triloba, V. sublobata* accompanied by *Stellaria media* (all at the flowering stage). The upper layer (10–20 to 25 cm) is made up of the diagnostic *Veronica triphyllos, V. praecox* and *Holosteum umbellatum,* accompanied by *Arabidopsis thaliana, Arenaria serpyllifolia, Capsella bursa-pastoris, Erophila verna*, *Lamium amplexicaule*, *Myosotis stricta*, *Valerianella locusta*, *Viola*

arvensis (at the flowering stage) and juvenile plants of *Anthemis austriaca, Consolida regalis, Descurainia sophia*, *Papaver argemone*, *P. rhoeas*, *Raphanus raphanistrum*, *Silene noctiflora*, etc.

Ecology, dynamics and distribution (Table 2, Fig. 3): Thermophilous com. of the Czech Thermophyticum and Pannonicum mainly growing on light soils of a loamy sandy or gravelly sandy texture; corresponding soil type is the cambic arenosol. Scattered localities on the Středočeská tabule plateau and the terraces of the middle-course of the Labe river were recently included in a study from the Pannonicum (Lososová 2004), using a broader syntaxonomic concept according to Holzner (1973).

Variability: An attempt to determine the variability at the subass. level was made by Mochnacký in Jarolímek et al. (1997: 107), see also Mochnacký (2000: 177–178). This was justified because he saw differences in the floristic composition and ecology of cereals and vineyards and established *Veronicetum hederifolio-triphylli holosteetosum* for vineyards. However this contradicted to the rules of the Code, because the subas. *typicum* must be identical with the type of the as.; the original table (Slavnić1951: 92–93) contains *Holosteum umbellatum* in all eight relevés and one must be selected as lectotype of the as. (see above), and thus *Holosteum umbellatum* cannot be used to define the second subas.

References: (a) Cz. Rep.: Kropáč (1981, L, C sub *Consolido-Veronicetum* p.p.; 1995, L, C; 1997, TS), Lososová (2004, TS sub *Veronicetum trilobo-triphylli*); (b) Slovakia: Mochnacký (1986, TR; 2000, TS), Jarolímek et al. (1997, TS); (c) other countries: Slavnić (1951, TR), Gondola (1964, TS sub spring aspect of winter rye), Wójcik (1965, TR sub *Vicietum tetraspermae consolidetosum* var. *Veronica triphyllos* p.p.), Holzner (1973, TR suppl. sub *Veronicetum trilobo-triphylli* p.p.), Mucina (1993, L, C sec. Holzner).

Syntaxonomic comments on the vernal ass.: The last two comm. (and possibly other spring weed comm.) are classified by many authors as aspects of the corresponding comm., however, groupings of ephemeral spring plants differ floristically, which is statistically more significant than several other differences, for instance that between the comm. of cereals and root crops (Kropáč et al. 1971, Holzner 1973, and recently Lososová et al. 2004). Holzner's designation of these comm. as "spring associations" (Vernal-assoziatione, see Holzner 1973: 7–9) is adopted here. It fully corresponds with the concept of agroecophases (cf. Kropáč et al. 1971). Numerical methods of classifying segetal comm. (Lososová 2004, Lososová et al. 2004) indicate that the vernal segetal vegetation can be placed at most into two groups. In *Caucalidion* these methods indicate only one vernal as., namely *Veronicetum hederifolio-triphylli.* Nevertheless, results presented here confirm the existence of two ecologically well founded vernal ass. in *Caucalidion*, in addition to other vernal ass. in other alliances (see below). It is noteworthy, that *Veronicetum hederifolio-triphylli* alternates with *Consolido-Anthemidetum austriacae*, but the existence of the latter association is not supported by numerical analyses. No doubt, different approaches will reveal new findings and further research on this topic is necessary.

Several anothers have published information on vernal associations: *Lamio amplexicauli-Thlaspietum arvensis* Krippelová 1981, and *Veronicetum hederifolio-sublobatae* Kropáč 1997 nom. inval. Both comm. resemble one another and both lack "good diagnostic species". In this respect the as. of Krippelová (validly published) is possibly the "quasi central association" of all vernal types of segetal vegetation with very broad synecology and distribution. Of course, they may be better classified at the level of the comm., a concept that is acceptable (Jarolímek et al. 1997, Mochnacký 2000).

6. *Valerianello locustae-Thlaspietum perfoliati* Kropáč et Hadač in Kropáč, Hadač et Hejný 1971 (Table 1: col. 6)

Database nos.: 342358–342364
Original diagnosis: Kropáč, Hadač et Hejný (1971: 150)
Nomenclature type: Kropáč, Hadač et Hejný (1971: 150), holotypus (single relevé, see also Database no. 342358)
Non: *Valerianello olitoriae-Arabidopsietum thalianae* Tx. 1950 (art. 3b)

Diagnostic species: *Thlaspi perfoliatum, Plantago media, Valerianella locusta* (opt.), and some young plants of the *Caucalidion* (*Consolida regalis*, *Adonis aestivalis*), together with high constancy of *Taraxacum* sect. *Ruderalia*, *Veronica polita*, and *Silene latifolia* subsp. *alba*.
Constant species: *Atriplex patula, Capsella bursa-pastoris, Consolida regalis, Elytrigia repens, Fallopia convolvulus, Geranium pusillum, Lamium amplexicaule, Plantago lanceolata, P. media, Rumex crispus, Silene latifolia* subsp. *alba*, *Sinapis arvensis, Stellaria media, Taraxacum* sect. *Ruderalia*, *Thlaspi perfoliatum, Veronica polita, V. sublobata* and *Viola arvensis.*
Important weeds: *Capsella bursa-pastoris* (W2), *Elytrigia repens* (W1), *Rumex crispus* (W2), *Silene latifolia* subsp. *alba* (W6), *Sinapis arvensis* (W3), *Stellaria media* (W2) and *Taraxacum* sect. *Ruderalia* (W6). – Note: Locally *Rumex obtusifolius* (W6) may be the most serious weed.
Threatened species: *Adonis aestivalis* (EN), *Anagallis foemina* (VU), *Erysimum repandum* (CR), *Veronica opaca* (CR), *V. praecox* (VU), *V. triloba* (EN). – Listed species may be rarely present.

Structure and species composition: Species-rich com. occurring in perennial fodder crops early in spring, especially lucerne (5)10–20 (30) cm tall; in this respect it belongs to the spring ass. The specific physical properties of the topsoil, i.e. its compactness due to not ploughing are favourable for he establishment of hemicryptophytes, in particular the yellow flowered dandelions are very conspicuous. These soil conditions are suitable for *Plantago media, P. lanceolata* and other plants such as *Silene latifolia* subsp. *alba*, *Elytrigia repens, Glechoma hederacea,* etc. Stands are usually differentiated into two layers, of which the lower (up to 10 cm) is occupied by dandelion's rosettes and flower stalks together with prostrate stems of *Veronica polita* (subdominant), *V. sublobata,* rarely *V. triloba,* accompanied by *Stellaria media* (all at the flowering stage). In this layer there may also be early stages of growth of various mosses (e.g. *Bryum argenteum, Phascum cuspidatum, Barbula unguiculata, Pottia truncata, Eurhynchium hians* and *E. schleicheri*). The upper layer (15–25 cm) consists of the diagnostically important *Thlaspi perfoliatum, Valerianella locusta, Consolida regalis,* and rarely *Adonis aestivalis* together with tall plants of *Capsella bursa-pastoris* (all at flowering stage). Total cover of stands is about 90%, of which that of the crop amounts to 60% and weeds 55%.

Ecology, dynamics and distribution (Table 2): Thermophilous com. with a poorly known distribution due to lack of records. Ecology of this as. is similar to that of *Veronicetum hederifolio-trilobae* with specific soil properties facilitating the formation of the com. with its specific life forms. Further research will either support or refute the existence of this as.

General remarks about weed syntaxonomy of perennial fodder crops: Segetal comm. of these crops (lucerne, clovers, sainfoin, their mixtures with grasses, etc.) on arable land were normally not considered by geobotanists. In a theoretical study (Kropáč et al. 1971), a new as. *Valerianello-Thlaspietum perfoliati* was proposed and placed in a new alliance *Veronico politae-Taraxacion* (op .c., p.150), which was being adopted until recently (e.g. Kropáč in Moravec 1995: 159–160). However, this synthesis shows that *Valerianello-Thlaspietum perfoliati* can be placed in *Caucalidion.* Another pos-

sibility is to put it into *Fumario-Euphorbion* (see e.g. the proposal by Th. Müller in Oberdorfer 1983: 74). A separate alliance *Trifolio-Medicaginion sativae* Balázs 1944 em. Soó 1961 is proposed by Hungarian geobotanists (see Soó 1961: 427), however this is not based on segetal components. Thus further studies on comm. in perennial fodder crops are important for both theoretical and agronomical reasons. Nevertheless, present synthesis indicates that the alliance *Veronico politae-Taraxacion* Kropáč et Hadač in Kropáč, Hadač et Hejný 1971 should be **cancelled hoc loco**.

References: Cz. Rep. only: Kropáč et al. (1971, one R), Kropáč (1995, L, C).

7. *Taraxacum* sect. *Ruderalia* com. (Table 1: col. 7)

Database nos.: 342365–342375
Unranked com. – rules of the Code need not be applied.
Constantly dominant species: *Taraxacum* sect. *Ruderalia, Capsella bursa-pastoris, Cirsium arvense, Elytrigia repens, Plantago major* subsp. *major, Polygonum aviculare, Rumex crispus, Silene latifolia* subsp. *alba, Sinapis arvensis, Stellaria media, Tripleurospermum inodorum, Veronica polita, V. persica.* Locally may be dominated by *Rumex obtusifolius.*

Diagnostic species of the *Caucalidion*: *Consolida regalis, Silene noctiflora, Euphorbia exigua, Lathyrus tuberosus*, and the others scattered (*Adonis aestivalis*, *Anthemis austriaca*, *Fumaria vaillantii*)
Important weeds: *Capsella bursa-pastoris* (W2), *Cirsium arvense* (W1) *Elytrigia repens* (W1), *Plantago major* subsp. *major* (W6), *Rumex crispus* (W2), *Silene latifolia* subsp. *alba* (W6), *Sinapis arvensis* (W3), *Stellaria media* (W2), *Taraxacum* sect. *Ruderalia* (W6), *Tripleurospermum inodorum* (W1), and locally *Rumex obtusifolius* (W6)
Threatened species: *Adonis aestivalis* (EN), *Veronica praecox* (VU)

This is an impoverished com. of *Caucalidion* found in perennial fodder crops (especially lucerne) growing in the Czech Thermophyticum and Pannonicum, and some areas of the Mesophyticum; its distribution nearly coincides with that of *Caucalidion* and *Euphorbio-Melandrietum*. Stands are well developed in spring (structure is similar to the preceding as.) and disappear with the first mowing; after regeneration various facies of the *Caucalidion* comm. develop in the same habitat. It should be emphasized, however, that only stands that develop in the first 2 to 3 years of exploitation are considered, because older stands start to undergo succession and deserve special study (Soukupová 1984, Prach et al. 1996).

8. *Euphorbio exiguae-Melandrietum noctiflori* G. Müller 1964 (Table 1, col. 8)

Database nos.: 342093–342162
Original name form: Die *Euphorbia exigua-Melandrium noctiflorum* Assoziation (*Euphorbio-Melandrietum*) G. Müller 1964
Original diagnosis: Müller G. (1964: 137–150)
Nomenclature type: **Neotypus hoc loco designatus** (see Appendix 2)[6].
Syntax. syn.: *Papaveri-Melandrietum noctiflori* Wasscher 1941 nom. prov. (art. 3b), *Lathyro-Melandrietum noctiflori* Oberdorfer 1957 nom. prov. (art. 3b, 29), *Melandrietum noctiflori* Lang 1973 (art. 29)

Syntaxonomic comments: Passarge (loc. c.) published only the name of Wasscher's ass. but did not validate it (in Scamoni et Passarge 1963: 170) as assumed by Haveman et al. (1998: 217). In addition, Oberdorfer (1983: 30–34) only published a syn-

[6] Recommendation of the Code 21 A has been followed because the original publication contains only synthetic table (op. c., Table 2, p. 142-147), and the same applies to the next publications over the neighbouring territory (see e.g. Schubert et Mahn 1968: 177-205, and others); an attempt to contact the author failed.

thetic table under the name *Papaveri-Melandrietum noctiflori* Wasscher 1941. Anyhow, in the original concept of Wasscher (1941: 440–441) some species of the *Scleranthion* are included (together with *Scandix pecten-veneris*!) but not *Caucalidion.* The results of Haveman et al. (1998: 214, table) are not far from the concept of Wasscher and so it may be supposed that *Papaveri-Melandrietum noctiflori* Wasscher (if it is validated) is a subatlantic race of the *Euphorbio-Melandrietum.*

Diagnostic species: As. does not possess its own diagnostic species since it may be held for the so-called central as. of the alliance sensu Dierschke (1981, 1988) which is accepted also by some other scientists (e.g. by Oberdorfer 1983: 30); usually *Silene noctiflora* and *Euphorbia exigua* reach very high constancy values.
Constant species: *Anagallis arvensis, Avena fatua, Chenopodium album, Cirsium arvense, Convolvulus arvensis, Euphorbia exigua, Fallopia convolvulus, Polygonum aviculare, Sherardia arvensis, Silene noctiflora, Sinapis arvensis, Sonchus asper, Stellaria media, Thlaspi arvense, Veronica persica, Viola arvensis.*
Important weeds: *Avena fatua* (W3), *Cirsium arvense* (W1), *Convolvulus arvensis* (W1), *Elytrigia repens* (W1), *Fallopia convolvulus* (W1), *Galium aparine* (W1), *Papaver rhoeas* (W3), *Sinapis arvensis* (W3), *Thlaspi arvense* (W2), *Tripleurospermum inodorum* (W1). At the level of subass. and/or variants: *Mentha arvensis* (W5), *Raphanus raphanistrum* (W4), *Stachys palustris* (W5), *Tussilago farfara* (W5).
Threatened taxa (their occurrence in the as. is not typical, but they may rarely be found here): *Anagallis foemina* (VU), *Caucalis platycarpos* subsp. *platycarpos* (EN), *Euphorbia falcata* (VU), *Galeopsis angustifolia* (VU), *Galium tricornutum* (CR), *Kickxia elatine* (EN), *K. spuria* (EN), *Nigella arvensis* (CR), *Ranunculus arvensis* (VU), *Stachys annua* (VU), *Valerianella rimosa* (EN), *Veronica opaca* (CR), *V. praecox* (VU). – Note: *Euphorbia exigua* should be included at least in the category of rare taxa requiring further monitoring (see this category in Holub & Procházka 2000).

Structure and species composition: Mainly occurs in cereals, especially winter wheat, but also spring barley and oats and sometimes in young stands of lucerne and clover and other crops. Fully developed canopy reaches (80) 90 (130) cm in height in winter wheat and 50–70 cm in spring barley, and the heights of other crops depend on the crop and the cultivar. In general, the medium cover is 90%, of which crops make up 70% and weeds 50%. The weeds in winter wheat form three layers, and two in lower growing spring crops. In the three-layered stands, the middle layer is made up of important species like *Silene noctiflora* and *Euphorbia exigua* and the upper of the distinctive *Lathyrus tuberosus* plus various species of higher syntaxa (*Avena fatua*, *Sinapis arvensis*, *Papaver rhoeas*, *Convolvulus arvensis*, *Cirsium arvense*, etc.). In two-layered stands, the diagnostic species occur mainly in the upper layer, while tall weeds such as *Avena fatua* overtop the stands (characteristic of spring barley). *Euphorbio-Melandrietum* may occur in stubble and *Euphorbia exigua, Silene noctiflora,* together with *Sherardia arvensis* and regenerated *Consolida regalis* are able to continue in growing if the stubble ploughing is not performed.

Ecology, dynamics and distribution (Table 2, Fig. 2): Rather thermophilous com. with a wide distribution in the Czech Thermophyticum and Pannonicum and occurring occasionally in the Mesophyticum. The decline of this com. is not so marked, but is becoming less rich in species. It prefers loamy soils on loess, possibly also neutral to acid loesslike deposits, but some localities are on polygenetic loams and light sandy-loamy and gravelly soils on slates and greywackes. Soils from loess, which are either luvic (degraded) chernozem, orthic luvisol or orthic greyzem are best for this com. and the cultivation of sugar beet and barley. Nevertheless, there are few localities not situated in the Thermophyticum and Pannonicum (e.g. Velká Veleň SWW of Benešov nad Ploučnicí, Šonov E of Broumov, Rovná NE of Strakonice, Vápenná NW of Jeseník). The surveys of all these localities are in the Database. In general, it is the only as. of *Caucalidion*, with a broad ecological amplitude, and so its distribution corresponds to that of this alliance in

the Czech Republic. This as. may gradually replace all the other ass. of *Caucalidion* in their ecotopes. However, as a result of ongoing homogenization of habitats it may be replaced by fragmentary *Caucalidion* comm. (Kropáč 1988, Kropáč & Lecjaksová 2001).

V a r i a b i l i t y : Very variable with two major groups at the subass. level: (1) *Euphorbio exiguae-Melandrietum noctiflori typicum* – identical to the neotype of the as., (2) *Euphorbio exiguae-Melandrietum noctiflori raphanetosum* **subas. nova hoc loco** (see Appendix 1).

The first subas. lacks differential species and the second is characterized by *Raphanus raphanistrum*, *Vicia tetrasperma*, *V. hirsuta*, *Centaurea cyanus*, *Scleranthus annuus* and possibly other species of the *Scleranthion.* As in the preceding ass., soil conditions play a major role. Whereas the typical subas. occurs mainly on various subtypes of chernozems and/or orthic luvisol on loesses, the second subas. occurs mainly on various skeletal cambisols (eutric on slates, mollic on effusive rocks), cambic pararendzinas (on leached marlstones) and partly on albic luvisols (on loesslike deposits and polygenetic loams). *Euphorbio-Melandrietum* belongs to the most variable comm. in the *Caucalidion.* Most probably several geographic races or vicariants (regional ass. sensu Passarge 1985) may exist. Species composition (Haveman et al. 1998) in Subatlantic areas differs from that in Central Europe, as originally stated (Müller 1964). In Slovakia, Krippelová (1981) followed by Mochnacký (2000) reported *Euphorbio-Melandrietum* enriched by *Ajuga chamaepitys, Anagallis foemina, Euphorbia falcata, Kickxia spuria* and *Stachys annua.* Similar results published recently Otýpková (2001) and Lososová (2004). Further studies are needed, especially in the Pannonian region.

R e f e r e n c e s : (a) Cz. Rep.: Kühn (1955, R no. 37, 125; 1965, R no. 63 – all sine denom.), Volf (1971 et 1974, TR sub as. *Sinapis arvensis-Convolvulus arvensis* p.p.), Kropáč (1981, L, C; 1988, TS; 1995, L, C), Otýpková (2001, TR), Lososová (2004, TS); (b) Slovakia: Kropáč (1974, TS), Krippelová (1981, TR), Jarolímek et al. (1997, TS), Mochnacký (2000, TS); (c) other countries: Wasscher (1941, TR p.p.), Sissingh (1946, L, C sec. Wasscher), Knapp R. (1948, L, C sub *Delphinietum consolidae* p.p. max.), Tüxen (1950, L, C sec. Wasscher), Knapp & Knapp (1953, TS sub *Delphinietum mont.-subalp.* p.p.), Oberdorfer (1957a, TS sub *Lathyro-Melandrietum noctiflori*; 1983, TS sec. Wasscher), Zeidler (1962 et 1965, R sub *Caucalidion* et al. comm.), Müller G. (1964, TS), Passarge (1964, TS sub Ass-Gr. *Melandrium noctiflorum*), Wójcik (1965, TR sub *Vicietum tetraspermae* a *Melandrium noctiflorum* p.p. max.), Rodi (1967a, TS sub *Caucalidion*), Fijałkowski (1967, TR sub *Lathyro-Melandrietum*), Schubert & Mahn (1968, TS), Westhoff & den Held (1969, L, C sec. Wasscher), Hilbig (1973, TS), Holzner (1973, TR suppl.), Lang (1973, TR suppl.), Nezadal (1975, TR sub *Lathyro-Silenetum*), Hofmeister (1975, TR; 1981, TR sub *Lathyro-Silenetum*), Kużniewski (1975, TS), Passarge (1976, TR sec. Wasscher; 1978b, R et TS sub *Camelino-Consolidetum regalis* as. nova p.p. max.), Szotkowski (1981, R sub *Caucalido -Scandicetum* et *Papaveretum argemones* p.p.), Borowiec et al. (1985, TS), Wnuk (1989, TR sub *Vicietum tetraspermae consolidetosum* p.p. max.), Hüppe & Hofmeister (1990, TS sec. Wasscher), Ries (1992, TR), Mucina (1993, L, C), Haveman et al. (1998, TS sec. Wasscher).

Fumario-Euphorbion Th. Müller ex Görs 1966

Segetal communities in root crops, vineyards and perennial fodder crops growing in warm areas of the temperate to submeridionale zones of the Euro-Siberian region

O r i g i n a l d i a g n o s i s : Görs (1966: 479–483, 490–494)

N o m e n c l a t u r e t y p e : *Lamio amplexicauli-Veronicetum politae* Kornaś (1950: 411–417), **lectotypus hoc loco designatus**

S y n t a x . s y n . : *Veronico-Euphorbion pepli* Sissingh 1942 p.p. (art. 1), (*Eu-*)*Polygono-Chenopodion polyspermi* Koch 1926 em. Sissingh in Westhoff et al. 1946 p.p. (art. 34), *Veronico-Euphorbion* Sissingh ex Passarge 1964 p.p.

P s e u d o n y m : *Fumario-Euphorbion* sensu Passarge 1981 non Görs 1966, *Veronico-Euphorbion* sensu Mucina in Mucina et al. 1993 non Sissingh ex Passarge 1964

Incl.: *Galinsogo-Euphorbenion pepli* Passarge 1981 p.p. min.
Non: *Polygono-Chenopodion polyspermi* Koch ex Tx. 1937

Note: The alliance *Veronico-Euphorbion* Sissingh ex Passarge 1964 closely corresponds to the (*Eu-*)*Polygono-Chenopodion polyspermi* Koch 1926 em. Sissingh in Westhoff et al. 1946 because it includes both basiphilous and acidophilous comm. (see five ass. groups in Passarge 1964: 95–105). Delimitation of the basiphilous ass. into a separate alliance *Fumario-Euphorbion* was done only by Görs (1966), who validated Th. Müller's manuscript (see op.c., p. 479 footnote).

Diagnostic species: *Aethusa cynapium* subsp. *agrestis, Amaranthus retroflexus, Chenopodium hybridum, Euphorbia helioscopia, Mercurialis annua, Microrrhinum minus, Persicaria lapathifolia* subsp. *lapathifolia, Solanum nigrum, Sonchus oleraceus, Veronica polita* (some are "*Stellarietea* species" with their optimum in the alliance)

Syntaxonomic comments: (1) The species listed are based on the synthesis of the results from the Czech Republic. Görs (1966: 480 et 490–491 tabs.) also mentions *Atriplex patula, Lamium amplexicaule* and *Fumaria officinalis*; the last mentioned species was listed also by Mucina (see Mucina et al. 1993: 118) together with *F. rostellata* and *F. schleicheri*. Th. Müller (in Oberdorfer 1983: 96 and p. 105 tab.) also mentions *Euphorbia peplus, Geranium dissectum, Valerianella dentata*, and as differentials *Euphorbia exigua, Lathyrus tuberosus* and *Fumaria vaillantii.* Obviously, many transgressive *Caucalidion* species occur in the *Fumario-Euphorbion* ass. because of crop rotation. On the other hand, diagnostic species of *Fumario-Euphorbion* may serve as useful differentials against the *Caucalidion* (present in the *Caucalidion* comm., but only as seedlings and/or juvenile plants). – (2) Passarge (1981) studied garden weeds and listed among the diagnostic species e.g. *Euphorbia peplus, Galinsoga ciliata (G. quadriradiata*), *Urtica urens,* etc., which is acceptable for the Czech Republic. – (3) Some aliens have recently begun to spread and gradually naturalize, e.g. *Abutilon theophrasti, Iva xanthiifolia* and *Amaranthus powellii*; the last mentioned species has only become common in warm regions (Jehlík 1998).

Comm. of the alliance are known from all over the European temperate zone and some localities in the submeridionale zone; they occur in warm places and on base-rich soils.

In the Czech Republic they occur in the lowlands and hills. Comm. consists of therophytes, which require high temperatures for germination and develop during warm summer season. Their germination is also stimulated by the repeated cultivation of root crops.

Outside the Czech Republic, comm. of this alliance have been recorded in various countries. First of all, they were described "born" in Germany then studied further e.g. by Wedeck (1972), Hofmeister (1981), Oberdorfer (1983), Hüppe & Hofmeister (1990). For several European countries, comm. of this alliance may be found under *Polygono-Chenopodion polyspermi* (Kornaś 1950, Brun-Hool 1963, Wójcik 1980, Lorenzoni 1978, etc.). In Mediterranean countries there is a vicariant alliance *Fumarion wirtgenii-agrariae* Brullo in Brullo et Marceno (1985) and other Mediterranean alliances in the Iberian Peninsula are referred to by Nezadal (1989).

9. *Stachyo annuae-Setarietum pumilae* Felföldy 1942 corr. Mucina 1993 (Table 1: col. 9)

Database nos.: 342001–342018
Original name form: *Setaria glauca-Stachys annua*-ass. Felföldy 1942 (art. 43)
Original diagnosis: Felföldy (1942: 130–132, text in Hung. and Table 20)
Nomenclature type: Felföldy (1942: 131, Table 20, rel. 3), **lectotypus hoc loco designatus** (see this relevé at the end of Appendix 2)
Syntax. syn.: *Ajugo chamaepitys-Stachyetum annuae* Slavnić 1951 p.p. max., *Caucalido lappulae-Setarietum* Soó 1961 p.p. min. (art. 29), *Ajugo chamaepitys-Setarietum glaucae* Krippelová 1981 p.p. (art. 43), *Kickxio spuriae-Euphorbietum falcatae* Kropáč 1974 p.p. (art. 3b)
Incl.: *Chenopodio-Setarietum stachyetosum annuae* Zahradníková-Rošetzká 1955 p.p. max., *Amarantho retroflexi-Diplotaxietum muralis lappuletosum* Holzner 1973 p.p. max.
Non: *Echinochloo-Setarietum pumilae* Felföldy 1942 corr. Mucina 1993, *Linarietum spuriae* Kruseman et Vlieger 1939, *Kickxietum spuriae* auct. (Art. 30), *Linario spuriae-Stachyetum annuae* Lorenzoni 1965

Syntaxonomic comments: This com. was not recognized in former Czechoslovakia (Kropáč 1974, 1981) as its centre of distribution is in the Pannonian subregion (see below). Mucina (in Mucina et al. 1993: 136–137) placed this as. in *Panico-Setarion,* however, its species composition (lower constancy of the *Panico-Setarion* species) and ecology (extremely basiphilous) indicate it should be in the *Fumario-Euphorbion* (see also relatedness to the *Caucalidion* in the original account by Felföldy 1942, p. 97, and later on by Soó 1961, p. 432).

Diagnostic species: *Euphorbia falcata, Anagallis foemina, Kickxia spuria, Stachys annua, Ajuga chamaepitys, Galeopsis angustifolia, Euphorbia platyphyllos, Kickxia elatine*
Constant species: *Aethusa cynapium* subsp. *agrestis*, *Anagallis arvensis, A. foemina, Chenopodium album, Cirsium arvense, Convolvulus arvensis, Euphorbia exigua, E. falcata, Fallopia convolvulus, Kickxia spuria, Medicago lupulina, Silene noctiflora*, *Sinapis arvensis, Sonchus asper, Taraxacum* sect. *Ruderalia*, *Veronica persica, V. polita, Viola arvensis*
Important weeds: *Aethusa cynapium* subsp. *agrestis* (W3), *Campanula rapunculoides* (W6), *Cardaria draba* (W6), *Carduus acanthoides* (W6), *Chenopodium album* (W1), *Cirsium arvense* (W1), *Convolvulus arvensis* (W1), *Diplotaxis muralis* (W6), *Elytrigia repens* (W1), *Falcaria vulgaris* (W6), *Fallopia convolvulus* (W1), *Lathyrus tuberosus* (W6), *Setaria pumila* (W3), *S. viridis* (W3), *Sinapis arvensis* (W3), *Sonchus asper* (W2), *Veronica persica* (W2), *V. polita* (W3). – Note: Some of these species play the role of weeds only locally (e.g. *Carduus acanthoides, Cardaria draba, Falcaria vulgaris, Diplotaxis muralis*). *Setaria* species do not play here such an important role as they do e.g. in comm. of the *Panico-Setarion.* On the other hand, constant and locally dominant species as e.g. *Anagallis arvensis, Euphorbia exigua, E. falcata* do not play a role of important weeds.
Threatened species: *Ajuga chamaepitys* (EN), *Anagallis foemina* (VU), *Caucalis *platycarpos* (EN), *Euphorbia falcata* (VU), *Galeopsis angustifolia* (VU), *Kickxia elatine* (EN), *K. spuria* (EN), *Stachys annua* (EN); rarely observed in this com.: *Bupleurum rotundifolium* (CR), *Conringia orientalis* (CR), *Erysimum repandum* (CR), *Nigella arvensis* (CR), *Veronica opaca* (CR)

Structure and species composition: Com. of the autumn agroecophase, stands of which may form either in crops or on stubble after the harvesting of cereals (possibly also other stalk crops); such com. develops in stubbles providing there is no stubble ploughing. Various root crops and/or vegetables prevail among crops, however, similar com. may develop in undersown perennial fodder crops (lucerne, sainfoin, clovers, etc.) after the main crop is harvested. Stratification of stands depends on field management, however, the stands are low, one- or two-layered, reaching on average (10) 20–30 (40) cm. The bottom layer (5–10 cm) is made up of several diagnostic species (*Ajuga chamaepitys, Anagallis foemina, Kickxia spuria, K. elatine*) along with *Anagallis arvensis, Veronica polita, V. persica, Medicago lupulina,* etc. The upper layer (15) 20–30 (40) cm is made up of further diagnostic species (*Euphorbia falcata, Stachys annua, Galeopsis angustifolia, Euphorbia platyphyllos*) along with species of higher syntaxa, including important weeds

(*Chenopodium album* var., *Cirsium arvense*, *Convolvulus arvensis*, *Fallopia convolvulus*, *Setaria viridis*, *S. pumila,* etc.). Of the companions, the marked participation of *Onopordetalia* and *Festuco-Brometea* species is worth mentioning.

Ecology, dynamics and distribution (Table 2, Fig. 4): Very thermophilous and basiphilous com. of limited distribution in the Czech Thermophyticum and Pannonicum growing on base-rich soils of a heavy texture. Vineyards (on slopes) are a suitable habitat as is arable land, particularly that in the lowland maize farming area.

Variability: In the Czech Republic, there is little variability as the centre of distribution lies in the SE-European Pannonicum (Felföldy 1942, Pinke 2000). Pinke (2000) distinguished two variants in the Hungarian lowlands and depressions along the Danube river: (a) typical, (b) var. with *Oxalis stricta* plus *Persicaria maculosa, Chenopodium polyspermum, Myosotis arvensis* and some other species characteristic of wet places, which accords with our results and indicates a differentiating group (*Lapsana communis*, *Persicaria maculosa*, *Chenopodium polyspermum*, *Myosotis arvensis*) growing in depressions in the middle course of the Labe river, where there is a fluvi-gleyic phaeozem of heavy texture. Further studies are needed, because this as. is recorded for the first time from the Czech Republic.

References: (a) Cz. Rep.: Kropáč (1981, L, C sub *Kickxio-Euphorbietum falcatae* p.p.), Otýpková (2001, TR sub *Setario-Veronicetum politae* p.p.); (b) Slovakia: Zahradníková-Rošetzká (1955, TR sub syn. above, p.p. max.), Kropáč (1974, TS sub *Kickxio -Euphorbietum falcatae* p.p.), Krippelová (1981, TR sub *Ajugo chamaepitys-Setarietum glaucae* p.p.), Jarolímek et al. (1997, TS), Mochnacký (2000, TS); (c) other countries: Felföldy (1942, TR), Slavnić (1951, TR sub *Ajugo chamaepitys-Stachyetum annuae* p.p. max.), Soó (1961, L, C sub *Caucalido lappulae-Setarietum* p.p. min.), Holzner (1973, TR suppl. sub *Amarantho retroflexi-Diplotaxietum muralis lapputetosum* p.p. max.), Mucina (1993, L, C), Pinke (2000, TR).

10. *Mercurialetum annuae* Kruseman et Vlieger ex Sissingh in Westhoff et al. 1946 em. Th. Müller in Oberdorfer 1983 (Table 1: col. 10)

Database nos.: 342337–342357

Original name form: *Mercurialetum annuae* Krus. et Vl. nom. prov. (Kruseman et Vlieger 1939, p. 369 et 372, Table 8 on p. 367–368), (art. 3b)

Original diagnosis: *Mercurialetum annuae* Kruseman et Vlieger ex Sissingh in Westhoff et al. (1946: 23–24)

Nomenclature type: Suitable relevés are not at disposal; original table no. 8 (Kruseman et Vlieger, op. c.) represents the subatlantic wing of association (see the variability) and Th. Müller (in Oberdorfer 1983: 98–100) published only synthetic table. I think the expert judgement should be delegated to him.

Syntax. syn.: *Mercurialetum annuae* Kruseman et Vlieger ex Sissingh in Westhoff et al. 1946 p.p., *Fumarietum officinalis* Tx. 1950 p.p. min. (art. 2b, 3, 7), *Panico sanguinalis-Mercurialetum annuae* Tx. 1950 p.p. min. (art. 2b, 3, 7), *Veronico agrestis-Fumarietum* J. Tüxen 1955 p.p., *Amarantho-Fumarietum* J. Tüxen 1955 p.p., *Setario-Fumarietum* J. Tüxen 1955 p.p., *Setario-Veronicetum politae* Oberdorfer 1957 p.p., *Amarantho-Chenopodietum* Soó in Timár 1957 p.p. min., *Hyoscyamo-Chenopodietum hybridi* Mucina in Mucina et al. 1993 p.p.

Incl.: *Mercurialetum annuae* R. Knapp 1948 (pro assoc. s.l.), *Chenopodio-Setarietum stachyetosum annuae* Zahradníková-Rošetzká 1955 p.p., *Amarantho retroflexi-Diplotaxietum muralis amaranthetosum* Holzner 1973

Non: *Mercuriali-Chenopodietum polyspermi* Holzner 1973

Diagnostic species: *Mercurialis annua,* and with high constancy alliance species: *Amaranthus retroflexus, Persicaria lapathifolia* subsp. *lapathifolia, Euphorbia helioscopia, Sonchus oleraceus, Veronica polita*; also transgressive *Echinochloa crus-galli* and *Galinsoga parviflora* (*Panico-Setarion*), and possibly other species. – Note: *Mercurialis annua* is also a frequent component of some *Panico-Setarion* comm., occurs in several Mediterranean syntaxa (see e.g. Poli 1966) and takes part in various ruderal comm. (cf. Jarolímek et al. 1997). This is why some syntaxonomists do not hold it for a suitable diagnostic species. All depends on the syntaxonomist's experience (deliberately expressed by Th. Müller in Oberdorfer 1983, p. 101 at the bottom and p. 102 contd.).

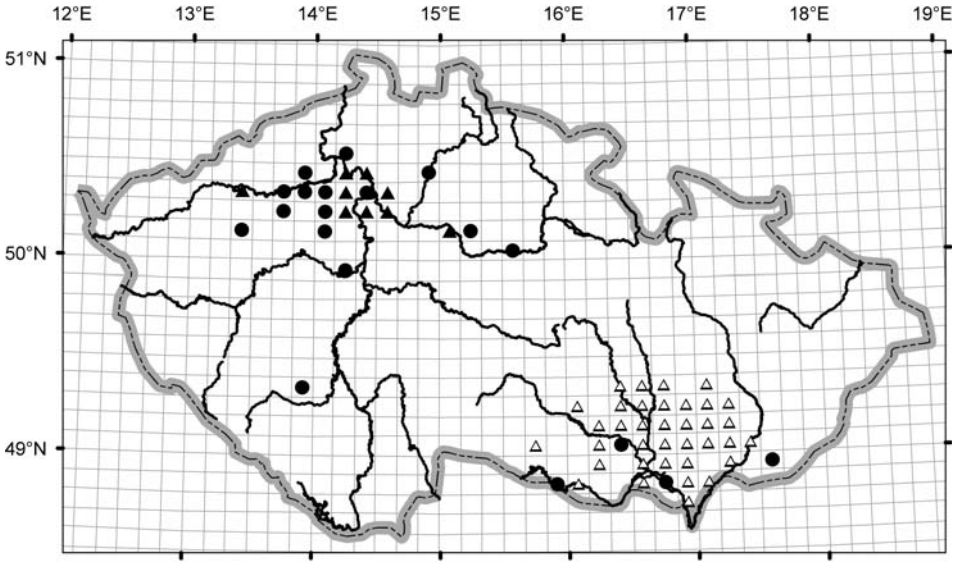

Fig. 3. Distribution of the communities of *Caucalidion* in the Czech Republic. ● *Veronicetum hederifolio-trilobae*; ▲ *Veronicetum hederifolio-triphylli* (including data from △ Lososová 2004).

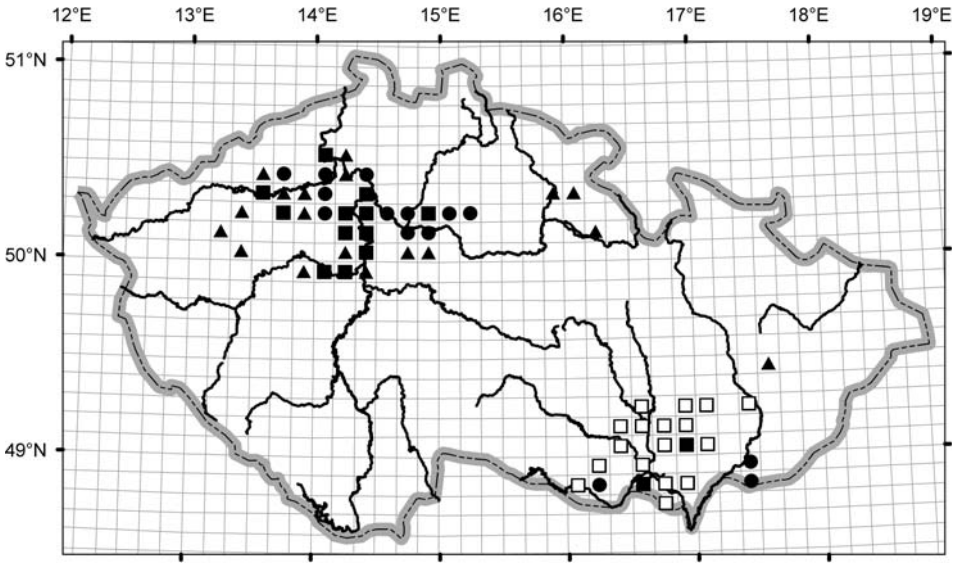

Fig. 4. Distribution of the communities of *Fumario-Euphorbion* in the Czech Republic. ● *Stachyo-Setarietum*; ■ *Mercurialetum annuae*; □ *Setario-Fumarietum* (data from Lososová 2004); ▲ *Lamio-Veronicetum.*

Constant species: *Amaranthus retroflexus, Anagallis arvensis, Avena fatua, Capsella bursa-pastoris, Chenopodium album* var., *Cirsium arvense, Echinochloa crus-galli, Euphorbia helioscopia, Galinsoga parviflora, Mercurialis annua, Persicaria *lapathifolia, Sinapis arvensis, Sonchus asper, S. oleraceus, Stellaria media, Tripleurospermum inodorum, Veronica persica, V. polita*
Important weeds: *Abutilon theophrasti* (W7), *Amaranthus lividus* (W7), *A. powellii* (W3), *A. retroflexus* (W3), *Avena fatua* (W3), *Capsella bursa-pastoris* (W2), *Chenopodium album* (W1), *Cirsium arvense* (W1), *Convolvulus arvensis* (W1), *Echinochloa crus-galli* (W3), *Galinsoga parviflora* (W3), *Lathyrus tuberosus* (W6), *Mercurialis annua* (W3), *Panicum miliaceum* subsp. *agricola* (W7), *Persicaria *lapathifolia* (W3), *Setaria pumila* (W3), *S. viridis* (W3), *Sinapis arvensis* (W3), *Solanum nigrum* (W3), *Sonchus asper* (W2), *S. oleraceus* (W3), *Stellaria media* (W2), *Veronica persica* (W2), *V. polita* (W3). – It should be noted that *Mercurialis annua* is a poisonous plant.
Threatened species: *Ajuga chamaepitys* (EN), *Anagallis foemina* (VU), *Anthemis cotula* (VU), *Euphorbia falcata* (VU), *Hyoscyamus niger* (VU), *Kickxia spuria* (EN), *Malva pusilla* (VU), *Stachys annua* (EN), *Veronica opaca* (CR)

Structure and species composition: This com. is fully developed in summer and continues to grow until root crops are harvested. Most important among the crops is maize (corn or silage), various mixtures of maize with sunflower, horse-bean, etc., and finally sugar beet and various vegetables (head cabbage, savoy cabbage, etc.). The stratification of stands is dependent on the crop. Stands of maize reach up to 200–250 cm and are three-layered, of which the upper layer (about 100–150cm) consists of the dominant *Amaranthus retroflexus* (frequently together with *A. powellii*), *Chenopodium album, Cirsium arvense, Echinochloa crus-galli* and climbing plants of *Convolvulus arvensis.* In the middle layer (about 20–60 cm) are *Mercurialis annua, Persicaria *lapathifolia*, *Avena fatua*, *Chenopodium hybridum*, *Galinsoga parviflora*, *Euphorbia helioscopia*, *Sonchus asper*, *S. oleraceus*, *Sinapis arvensis*, *Solanum nigrum*, and locally *Stachys annua* (relatively common in the Pannonicum). In the bottom layer (5–20 cm) are *Veronica polita*, *V. persica*, *Microrrhinum minus*, *Stellaria media*, *Anagallis arvensis*, and rarely *A. foemina*, *Ajuga chamaepitys* and *Kickxia spuria.* In stands of sugar beet and vegetables (head cabbage, etc.), there are usually only two layers. In this case, the taller weeds (*Amaranthus retroflexus, Chenopodium album, Echinochloa crus-galli,* etc.) overtop the crop, and the bottom layer (about 5–50 cm), which is usually not distinctly stratified, consists of diagnostic and other species. Occurrence of several *Caucalidion* species (*Euphorbia exigua, Silene noctiflora, Lathyrus tuberosus, Anagallis foemina*) is remarkable, and the species of *Malvion neglectae* (Gutte 1972) Hejný 1978 and *Chenopodion glauci* Hejný 1979 also typically occur in this community.

Ecology, dynamics and distribution (Table 2, Fig. 4): Thermophilous com., which is distributed in the Czech Thermophyticum and Pannonicum, where it is confined to base- and nutrient-rich middle heavy textured soils. Habitat corresponds to the maize and sugar beet farming zones in the lowlands where substantial quantities of vegetables are grown.

Variability: This as. is fairly variable as it is widely distributed in Europe. At least two races can be distinguished according to Th. Müller (in Oberdorfer 1983: 101–102, and Table 156): (a) southern *Veronica polita-Amaranthus retroflexus* race (*Panico sanguinalis-Mercurialetum annuae* Tx. 1950 p.p., *Setario-Fumarietum* J. Tüxen 1955 p.p., *Amarantho-Fumarietum* J. Tüxen 1955 p.p., *Setario-Veronicetum politae* Oberdorfer 1957 p.p.), (b) subatlantic *Veronica agrestis* race (*Mercurialetum annuae* Kruseman et Vlieger ex Sissingh in Westhoff et al. 1946, *Veronico agrestis-Fumarietum* J. Tüxen 1955, *Mercuriali-Fumarietum* Kruseman et Vlieger 1939 em. J. Tüxen 1955 sec. Westhoff et den Held 1969).

The southern race occurs in the Czech Republic; in the south-Moravian Pannonicum, presence of *Stachys annua* is remarkable. Obviously, a proper study is desirable.

References: (a) Cz. Rep.: Kropáč (1981, L, C; 1995, L, C sub *Amarantho-Fumarietum*), Lososová (2004, TS sub *Setario-Fumarietum*); (b) Slovakia: Zahradníková-Rošetzká (1955, TR, syn. see above p.p.), Vilčeková (1981, TR sub *Setario-Veronicetum politae* p.p.), Eliáš (1983, L, C sub *Panico-Mercurialetum*), Jarolímek et al. (1997, TS sub *Setario-Veronicetum politae*), Mochnacký (2000, TS as preceding); (c) other countries: Kruseman & Vlieger (1939, TR), Sissingh (1946, L, C; 1950, TR), Knapp R. (1948, L, C), Tüxen (1950, L, C sub *Fumarietum officinalis* p.p. et *Panico-Mercurialetum* p.p. min.), Tüxen J. (1955, TS sub *Amarantho-Fumarietum* p.p., *Setario-Fumarietum* p.p., *Veronico-Fumarietum* p.p.), Oberdorfer (1957a, TS sub *Setario-Veronicetum politae* p.p.), Soó in Timár (1957, L, C sub *Amarantho-Chenopodietum* p.p. min.), Brun-Hool (1963, TR sub *Setario-Fumarietum* p.p., *Veronico-Fumarietum* p.p., *Setario-Veronicetum politae* p.p.), Passarge (1964, TS sub Ass-Gr. *Fumarietum* p.p. et Ass-Gr. *Veronicetum politae* p.p.), Hilbig (1967b et 1973, TS sub *Panico-Mercurialetum*), Schubert & Mahn (1968, TS sub *Rorippo-Chenopodietum* Rasse v. *Mercurialis annua* p.p.), Westhoff & den Held (1969, L, C sub *Mercuriali-Fumarietum),* Holzner (1973, TR suppl. sub *Amarantho retroflexi-Diplotaxietum muralis amaranthetosum* p.p.), Th. Müller in Oberdorfer (1983, TS), Gehu et al. (1983, L, C sub *Mercuriali-Fumarietum*), Hüppe & Hofmeister (1990, TS), Mucina (1993, L, C sub *Setario-Veronicetum politae* p.p. et *Hyoscyamo-Chenopodietum hybridi* p.p.), Haveman et al. (1998, TS).

11. *Lamio amplexicauli-Veronicetum politae* Kornaś 1950 (Table 1: col. 11)

Database nos.: 342304–342336
Original diagnosis: Kornaś (1950: 411–417)
Nomenclature type: Kornaś (1950; Table 12 between p. 412 and p. 413, rel. no. 9), **lectotypus hoc loco designatus**
Syntax. syn.: *Thlaspio-Veronicetum politae* Görs 1966 p.p. max., *Setario-Veronicetum politae* Oberdorfer 1957 p.p.
Non: *Veronico-Lamietum hybridi* Kruseman et Vlieger 1939, *Soncho-Veronicetum agrestis* Br.-Bl. 1970 em. Th. Müller et Oberdorfer in Oberdorfer 1983, *Thlaspio-Fumarietum officinalis* Görs in Oberdorfer et al. ex Passarge et Jurko 1975

Syntaxonomic comments: There are slight differences in the floristic composition of Kornaś' as. and that of Görs; the former does not contain *Fumaria vaillantii, Geranium dissectum* and *Euphorbia peplus* (in Görs' with a low constancy) but does contain *Anthemis arvensis* and *Centaurea cyanus* (both at a high constancy), *Neslia paniculata* and *Silene noctiflora* (at medium constancy). Synecology of both ass. is very similar.

Diagnostic species: *Microrrhinum minus,* along with constantly dominant *Fumario-Euphorbion* species: *Euphorbia helioscopia*, *Veronica polita, Persicaria lapathifolia* subsp. *lapathifolia*, *Aethusa cynapium* subsp. *agrestis,* and transgressive *Caucalidion* species (with high constancy *Silene noctiflora* and *Euphorbia exigua*)
Constant species: *Aethusa *agrestis, Anagallis arvensis, Avena fatua, Capsella bursa-pastoris, Chenopodium album, Cirsium arvense, Convolvulus arvensis, Elytrigia repens, Euphorbia exigua*, *E. helioscopia, Fallopia convolvulus, Lamium amplexicaule, Microrrhinum minus, Neslia paniculata, Persicaria *lapathifolia, Plantago *major, Silene noctiflora, Sinapis arvensis, Sonchus asper, Stellaria media, Thlaspi arvense, Veronica persica, V. polita, Viola arvensis*
Important weeds: *Aethusa *agrestis* (W3), *Amaranthus retroflexus* (W3), *Avena fatua* (W3), *Capsella bursa-pastoris* (W2), *Chenopodium album* (W1), *Cirsium arvense* (W1), *Convolvulus arvensis* (W1), *Euphorbia helioscopia* (W2), *Fallopia convolvulus* (W1), *Lathyrus tuberosus* (W6), *Persicaria *lapathifolia* (W3), *Sinapis arvensis* (W3), *Sonchus asper* (W2), *Stellaria media* (W2), *Thlaspi arvense* (W2), *Veronica persica* (W2), *V. polita* (W3)
Threatened species: *Adonis aestivalis* (EN), *Anagallis foemina* (VU), *Anthemis cotula* (VU), *Caucalis *platycarpos* (EN), *Conringia orientalis* (CR), *Galium tricornutum* (CR), *Hibiscus trionum* (CR)[7], *Malva pusilla* (VU), *Veronica opaca* (CR)

[7] *Hibiscus trionum* was noted only once as an ephemerophyte (21. 09. 1973, Praha 4, local part Spořilov, SE border of the capital, nowadays no arable land)

Structure and species composition: Fully developed com. occurs after the cultivation of root crops has been finished and is typical of an autumn agroecophase, which is very rich in species. Its stratification depends on the crop, most important of which are sugar beet and various vegetables, possibly also potatoes, and to a minor extent maize (mostly silage maize) and various mixtures of silage maize with sunflower, horsebean, etc. Except in maize, the stands are usually two-layered, reaching an average of 50 cm in height (in sugar beet). The taller plants are concentrated in the upper layer, the most important of which are the weeds *Amaranthus retroflexus* and *Chenopodium album*, which frequently overtop the stands, and several other species (*Sinapis arvensis, Persicaria *lapathifolia, Lathyrus tuberosus, Convolvulus arvensis, Sonchus asper, Thlaspi arvense, Fallopia convolvulus,* etc.). Only in the bottom layer (5–25 cm) are the diagnostically important *Microrrhinum minus, Euphorbia helioscopia, Aethusa *agrestis, Silene noctiflora Euphorbia exigua, Veronica polita* and species of higher syntaxa (*Anagallis arvensis, Lamium amplexicaule, Veronica persica, Viola arvensis,* etc.).

Ecology, dynamics and distribution (Table 2, Fig. 4): Rather thermophilous com. confined to neutral and slightly acid soils of middle heavy texture throughout the whole area of the Czech Thermophyticum and probably Pannonicum, but in suitable ecotopes also in the Mesophyticum. Habitat corresponds mostly to the sugar beet farming zone.

Variability: Although the set of 33 relevés (see the Database) is rather large, only a few differential groups (presumably variants) can be distinguished: (a) special alluvial form (with *Amaranthus lividus, A. powellii, Galinsoga ciliata,* etc. – cf. also Passarge 1981), (b) typical group, which can be considered as an equilocal com. of *Euphorbio-Melandrietum typicum* (possibly *Lathyro-Adonidetum typicum*), (c) group with *Raphanus raphanistrum* probably corresponding to *Euphorbio-Melandrietum raphanetosum.* Of course, this is tentative and further studies are needed.

Representative synthesis and variability of *Thlaspio-Veronicetum politae* Görs 1966 can be found in Oberdorfer 1983 (elaborated by Th. Müller, see tabs. 157 and 158). Recently, a study on the calcareous upland in W Germany (Eifel) was published (Wedeck 2002), which includes ecologically founded lower syntaxa. Types of comm. transitional between *Lamio-Veronicetum politae* and *Echinochloo-Setarietum* are described by Siciński (1974) and Wnuk (1989).

References: (a) Cz. Rep.: Aulická (1961, TR sub *Neslio-Veronicetum persicae* p.p. max.), Kropáč (1988, TS error. sub *Thlaspio-Fumarietum*), Hejný & Kropáč (1995, L, C sub *Amarantho-Fumarietum* et *Thlaspio-Veronicetum politae*), Otýpková (2001, TR sub *Setario-Veronicetum politae* p.p. et *Euphorbio-Veronicetum persicae* p.p.); (b) Slovakia: Vilčeková (1981, TR sub *Veronico-Fumarietum*), Eliáš (1983, L, C sub *Setario-Veronicetum politae* et *Amarantho-Fumarietum*), Jarolímek et al. (1997, TS sub *Setario-Veronicetum politae*), Mochnacký (2000, TS as preceding); (c) other countries: Kornaś (1950, TR), Oberdorfer (1957a, TS sub *Setario-Veronicetum politae* p.p. et *Fumarietum* s.l., p.p.), Brun-Hool (1963, TR sub *Setario-Veronicetum politae* p.p.), Passarge (1964, TS sub Ass-Gr. *Fumarietum* p.p. et Ass-Gr. *Veronicetum politae* p.p.), Görs (1966, TR sub *Thlaspio-Veronicetum politae*), Wedeck (1970, TR; 1972, TR et 2002, TR sub *Thlaspio-Veronicetum politae*), Holzner (1973, TR suppl. sub *Mercuriali-Chenopodietum polyspermi* p.p.), Siciński (1974, TR), Warcholińska (1974, TR; 1990, TS sub *Bilderdykio-Lamietum amplexicauli* p.p.), Hofmeister (1975, TR; 1981, TR sub *Thlaspio-Veronicetum politae*), Wójcik (1980, TR), Szotkowski (1981, TR), Th. Müller in Oberdorfer (1983, TS sub *Thlaspio-Veronicetum politae*), Wnuk (1989, TR), Hüppe & Hofmeister (1990, TS sub *Thlaspio-Veronicetum politae*), Mucina (1993, L, C sub *Setario-Veronicetum politae* p.p.), Günther & van Elsen (1993, TR sub *Thlaspio-Veronicetum politae*).

Sherardion Kropáč et Hejný in Kropáč 1978

Segetal communities in cereal and root crops in mildly warm areas of the temperate European zone

Original diagnosis: Kropáč (1978: 205–207 et 210–213, Table 1)
Nomenclature type: *Aethuso cynapium-Galeopsietum tetrahit* G. Müller 1964, **lectotypus hoc loco designatus**
Non: *Triticion sativae* (Kruseman et Vlieger 1939) Passarge 1964 (art. 3f)

Diagnostic species: *Fumaria rostellata, Galeopsis ladanum*, *Geranium dissectum, Lithospermum arvense* (opt.), *Neslia paniculata* (opt.), *Ranunculus arvensis* (opt., VU), *Sherardia arvensis* (opt.), *Valerianella dentata, Veronica agrestis* (EN), *V. opaca* (CR)

Comments on the delimitation of *Sherardion*: (1) Some of the diagnostic species used to be ranked at the level of *Centaureetalia*, possibly *Caucalidion*, however with their optimum here (opt.), they may serve to differentiate it from *Scleranthion*. – (2) This alliance has a marginal position relative to *Centaureetalia*, which is indicated by the significant overlapping of many *Atriplici-Chenopodietalia* species. On the other hand, many of *Caucalidion* species are absent. – (3) For the detailed delimitation of *Sherardion* see the original diagnosis (citation above); but *Kickxia elatine* and *Misopates orontium* were later on omitted. – (4) In any case, the existence of a transitional group of species was revealed also by Oberdorfer (1957a: 32–34) and is mentioned in the larger synthesis by Schubert & Mahn (1968: 143). See also Passarge (1964: 114–117 and 1978a: 149–150). – (5) Possibly the rank of suballiance is more appropriate for this transitional grouping, however for the present it is ranked as an alliance, because further research may reveal its position and result in many changes (see e.g. the critical opinion in Lososová 2004).

Comm. of this alliance occur on neutral to acid soils in area of Central Europe that have a mildly warm climate. In the Czech Republic they occur in the hills and submontane zone. The typical parent material in these areas are various siliceous or decalcified substrates (slates, marlstones), volcanic substrates (basalts and their deposits, spilites, melaphyres, etc.) and other neutral intrusive rocks (amfibolites, granodiorites, etc.).

Outside the Czech Republic, these comm. occur in Germany (Müller 1964), Austria (Knapp & Knapp 1953, Kielhauser 1956, Holzner 1973, Mucina 1993), Slovakia (Kropáč 1974, Kropáč & Hejný 1975, Passarge & Jurko 1975 sub *Rhinantho-Avenetum fatuae*), Poland (Kornaś 1968 sub *Geranio dissecti-Silenetum gallicae*), and lower units with various ass. labelled as "montaneous form *Galeopsis tetrahit*" are cited in various publications.

Note: Related alliance *Legousion speculum-veneris* Kutschera 1966 (with diagnostic species *Legousia speculum-veneris, Vicia villosa* subsp. *pseudovillosa, Sherardia arvensis, Neslia paniculata, Valerianella dentata, V. locusta, Microrrhinum minus, Thlaspi perfoliatum* – see op. c., p. 37–38) is more thermophilous and prefers subhumide climate.

12. *Aethuso cynapium-Galeopsietum tetrahit* G. Müller 1964 (Table 1: col. 12)

Database nos.: 342222–342271 and 342721–342729
Original name form: Die *Aethusa cynapium-Galeopsis tetrahit* Assoziation (*Aethuso-Galeopsietum*) G. Müller 1964
Original diagnosis: Müller G. (1964: 262–269)
Nomenclature type: **neotypus hoc loco designatus** – see Appendix 2 (recommendation of the Code, art. 21 is applied because the original paper contains only synthetic table and the same is true for the publications from the neighbouring territory; an attempt to contact the author failed)

Diagnostic species: *Neslia paniculata* (opt.), *Geranium dissectum*, *Veronica agrestis*, *Fumaria rostellata*, and differentials *Aethusa cynapium* subsp. *agrestis*, *Avena fatua*, *Campanula rapunculoides*, *Sinapis arvensis* (towards *Atriplici-Chenopodietalia,* of which transgressive *Galeopsis tetrahit*, *Lapsana communis* and others are characteristic)
Constant species (those with 50–60% constancy are marked with cross): *Aethusa *agrestis*$^+$, *Anagallis arvensis, Avena fatua*$^+$, *Capsella bursa-pastoris, Chenopodium album*$^+$, *Cirsium arvense, Convolvulus arvensis, Elytrigia repens, Fallopia convolvulus, Galeopsis tetrahit, Galium aparine*$^+$, *Lapsana communis, Myosotis arvensis, Neslia paniculata, Polygonum aviculare, Raphanus raphanistrum, Rumex crispus, Scleranthus annuus*$^+$, *Sherardia arvensis*$^+$, *Sonchus arvensis*$^+$ *Stellaria media, Taraxacum* sect. *Ruderalia, Thlaspi arvense, Tripleurospermum inodorum, Veronica arvensis*$^+$, *V. persica, Vicia hirsuta, Viola arvensis*
Important weeds: *Cirsium arvense* (W1), *Convolvulus arvensis* (W1), *Elytrigia repens* (W1), *Galeopsis tetrahit* (W4), *Galium aparine* (W1), *Lapsana communis* (W4), *Raphanus raphanistrum* (W4), *Sonchus arvensis* (W1), *Stellaria media* (W2), *Thlaspi arvense* (W2), *Tripleurospermum inodorum* (W1), and at the level of variants *Agrostis stolonifera* (W5), *Mentha arvensis* (W5)
Threatened species: *Anthemis cotula* (VU), *Aphanes arvensis* (VU), *Odontites vernus* subsp. *vernus* (EN), *Ranunculus arvensis* (VU), *R. sardous* (CR), *Rhinanthus alectorolophus* (VU), *Veronica agrestis* (EN), *V. opaca* (CR). – Note: I recommend to include *Fumaria rostellata* at least in the last group (taxa requiring further study and monitoring, LR, DD cf. Holub & Procházka 2000); this species is bound preferably to this association.

Structure and species composition: This com. is one of the richest in species; it is fully developed in summer mainly in cereals (winter or spring, wheat, barley, rye or oats), mixtures with legumes and meadow clover (young stands), flax and root crops (fodder beet, potatoes). Vertical structure depends on the crop and is two- or three-layered. The tallest crops are winter rye and winter rape (100–150 cm) followed by wheat (about 100 cm), then clover, spring barley and flax. In general, total cover amounts on average to 90%, while crops reach 60% and weeds nearly 55–60%. Most of the biomass of weeds is in the middle layer (25–60 cm) where it is made up of the diagnostic species *Neslia paniculata, Galeopsis tetrahit,* and *Lapsana communis,* followed by *Sinapis arvensis* and *Campanula rapunculoides,* and then in the bottom layer (up to 30 cm) of *Aethusa *agrestis, Sherardia arvensis, Valerianella dentata, Geranium dissectum* and *Fumaria rostellata*. Biomass in the middle layer is made up of many constant species (*Raphanus raphanistrum, Myosotis arvensis, Vicia hirsuta,* etc.).

Ecology, dynamics and distribution (Table 2, Fig. 5): Typical com. of hilly country in the Czech and Moravian Mesophyticum in habitats on neutral to slightly acid relatively light soils, with gravel and stones, which corresponds mostly to the potato farming zone.

Variability: Three subass. were distinguished earlier by G. Müller (1964): (1) *Aethuso-Galeopsietum typicum,* (2) *Aethuso-Galeopsietum melandrietosum noctiflori,* (3) *Aethuso-Galeopsietum rumicetosum acetosellae*. All of these three subass. accord with the present results. However, G. Müller did not designate the type relevé of either the as. or subass., thus there is a need to designate the neotypes (see Appendix 2). The subas. *typicum* lacks differential species and its type relevé is the same as that of the as. The subas. *melandrietosum noctiflori* is characterized by *Silene noctiflora,* locally also by *Consolida regalis* and probably by other *Caucalidion* species. The subas. *rumicetosum acetosellae* is characterized by *Rumex acetosella,* and locally also by *Odontites vernus* subsp. *vernus*.

Ecological differences among the subass. are associated slightly with climatic conditions but more so with soil conditions. The subas. *melandrietosum noctiflori* occurs on mollic cambisols (parent materials are basic effusive substrates, marlstones and/or leached limestones), whereas the subas. *rumicetosum acetosellae* occurs on dystric cambisols (on

acidic metamorphic substrates such as gneiss, etc.) and subas. *typicum* on eutric cambisols. Variants may be seen on wet places (characteristic group of species: *Mentha arvensis, Stachys palustris, Ranunculus repens, Equisetum arvense, Tussilago farfara, Agrostis stolonifera,* etc.).

References: (a) Cz. Rep.: Kühn (1971, one R), Kolková (1975, TR sub *Aethuso-Galeopsietum rumicetosum* et sub *Neslio-Veronicetum persicae*), Kropáč (1981, L, C; 1995, L, C); (b) Slovakia: Kropáč (1974, TS sub *Galeopsis tetrahit-Sinapis arvensis* com.); (c) other countries: Müller G. (1964, TS), Schubert & Mahn (1968, TS), Hilbig (1973, TS), Holzner (1973, TR suppl.), Mucina (1993, L, C).

Comment on *Soncho-Veronicetum agrestis* Br.-Bl. 1970 em. Th. Müller et Oberdorfer in Oberdorfer 1983.: This as. is very closely related to *Aethuso-Galeopsietum*. It was described by Braun-Blanquet (1949, 1970) from high altitudes in Alpine valleys in Switzerland (e.g. in the Engadin Valley up to 1800 m a.s.l.) and further data from the Switzerland are available in Brun-Hool (1963). Similar contributions are published for Austria (Kielhauser 1956, Ries 1992, Mucina 1993) and Germany (Th. Müller in Oberdorfer 1983, Wedeck 1972). This com. is characterized by a relative high constancy of *Veronica agrestis* and *V. opaca*, as well as other *Sherardion* species. In the Czech Republic, it cannot be separated from *Aethuso-Galeopsietum*, nevertheless some relevés from potato fields at supracolline to submontane levels seem to resemble this as. In Slovakia, *Myosotido-Sonchetum arvensis* Passarge in Passarge et Jurko 1975 seems to be similar. See also the distribution of *Veronica agrestis* and *V. opaca* (Meusel et al. 1978), which indicates something about the ecology of both species.

13. *Papaveretum argemones* Kruseman et Vlieger 1939 (Table 1: col. 13)

Database nos.: 342655–342686 (part one), 342272–342295 (part two)
Original diagnosis: Kruseman & Vlieger (1939: 343–347, Table 4)
Nomenclature type: To select the lectotype among nine relevés in the table of Kruseman et Vlieger would be misleading because these relevés represent a subatlantic wing of the association (see variability); this should be delegated on the expert on this association, Harro Passarge (Eberswalde, Germany).
Syn.: *Scleranthus annuus-Myosurus minimus*-Assoziation Libbert 1932 (art. 2b)
Syntax. syn.: *Myosotido strictae-Veronicetum triphylli* Holzner 1973 p.p.
Incl.: Ass.-Gr. *Papaveretum argemones* Passarge 1964 (art. 3c), *Chamomillo-Papaverenetum argemones* Passarge 1985 (art. 3c), *Myosotido strictae-Papaverenetum argemones* Passarge 1985 (art. 3c)
Non: *Filagini-Aperetum* Oberdorfer 1957, *Erophilo-Arabidopsietum thalianae* Kropáč in Krippelová 1981

Syntaxonomic comments: (1) Prior to the Czech synthesis, comm. with *Arabidopsis thaliana, Erophila verna, Myosotis stricta, Papaver argemone* and *Veronica triphyllos* were assigned partly to *Veronicetum hederifolio-triphylli* and mainly to *Erophilo-Arabidopsietum thalianae,* and the presence of *Papaver argemone* in these comm. was evaluated only at subass. level (Kropáč 1981, 1995). Only recently was there an attempt to identify *Papaveretum argemones* at the level of as. (cf. Kropáč 1997). – (2) *Papaver argemone* is not a "faithful" species since it occurs with medium constancy in *Veronicetum hederifolio-triphylli, Sclerantho-Arnoseridetum, Aphano-Matricarietum* and *Consolido-Anthemidetum austriacae.* It is also a ruderal plant. – (3) Conspicuous in the current synthesis of Czech relevés is a low constancy of *Papaver dubium* and *Vicia villosa* subsp. *villosa*, compared to studies in other countries.

Diagnostic species: *Papaver argemone, Lithospermum arvense* (opt.), and differentials towards the *Scleranthion*: *Neslia paniculata*, *Papaver rhoeas*, *Valerianella dentata*, *Consolida regalis*, *Ranunculus arvensis*,

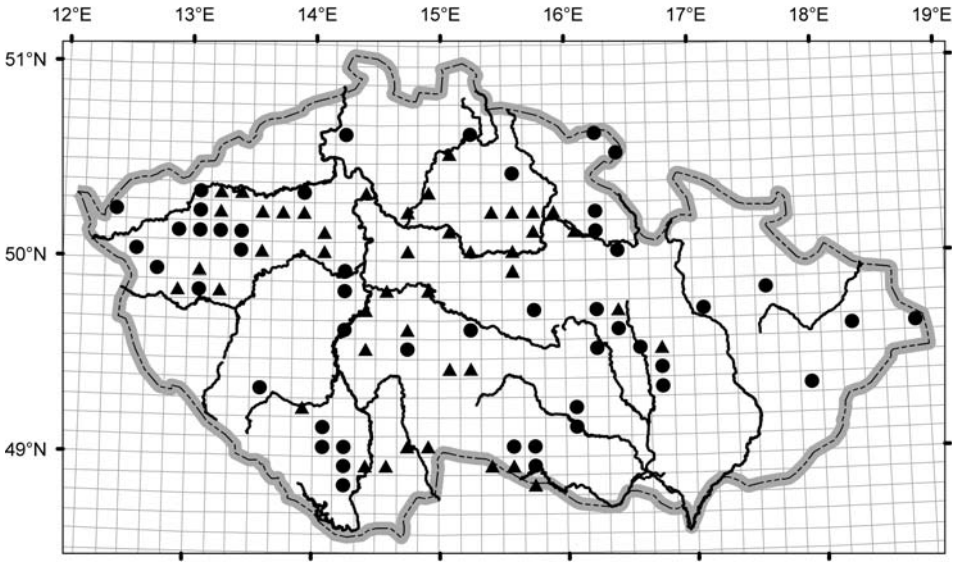

Fig. 5. Distribution of the communities of *Sherardion* in the Czech Republic. ● *Aethuso-Galeopsietum*; ▲ *Papaveretum argemones.*

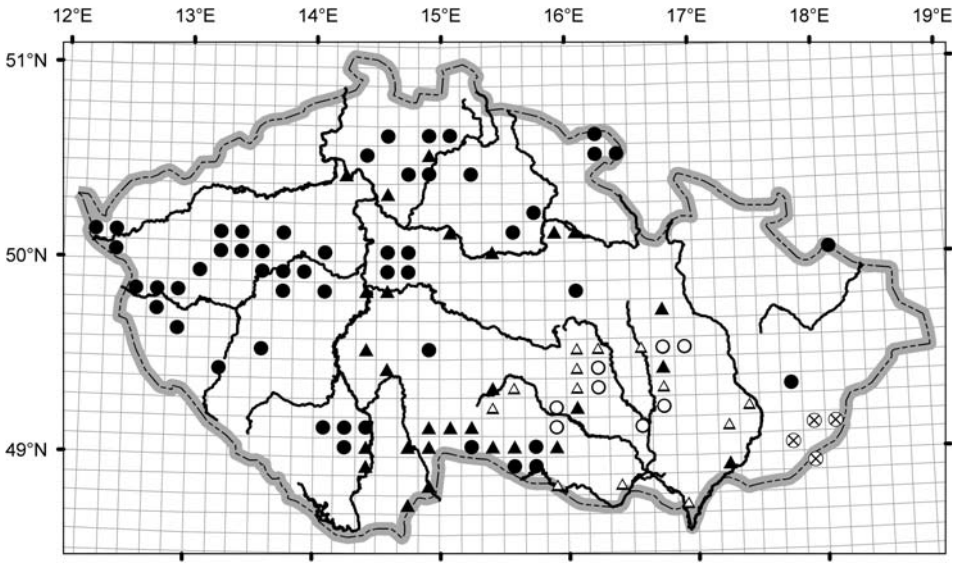

Fig. 6. Distribution of the communities of *Scleranthion* in the Czech Republic. ● *Aphano-Matricarietum* (including data from ○ Lososová 2004 and ⊗ Otýpková 2001); ▲ *Erophilo-Arabidopsietum* (△ Lososová 2004).

Silene noctiflora; transgressive from the *Scleranthion*: *Arabidopsis thaliana*, *Myosotis stricta*, *Veronica triphyllos*, *Erophila verna*

Constant species (those with 50–60% constancy are marked with cross): *Arabidopsis thaliana*+, *Capsella bursa-pastoris, Chenopodium album*+, *Cirsium arvense, Elytrigia repens, Fallopia convolvulus, Galeopsis tetrahit*+, *Galium aparine*+, *Lamium amplexicaule, L. purpureum*+, *Myosotis arvensis*, *Papaver argemone, Polygonum aviculare* agg., *Raphanus raphanistrum*+, *Stellaria media, Taraxacum* sect. *Ruderalia*+, *Thlaspi arvense*, *Tripleurospermum inodorum, Veronica persica*+, *V. sublobata*, *Viola arvensis*

Important weeds: *Anthemis arvensis* (W4), *Arabidopsis thaliana* (W4), *Capsella bursa-pastoris* (W2), *Cirsium arvense* (W1), *Galeopsis tetrahit* (W1), *Galium aparine* (W1), *Raphanus raphanistrum* (W4), *Stellaria media* (W2), *Thlaspi arvense* (W2), *Tripleurospermum inodorum* (W1), *Veronica sublobata* (W2)

Threatened species: *Agrostemma githago* (CR), *Anthemis austriaca* (VU), *A. cotula* (VU), *Myosurus minimus* (VU), *Ranunculus arvensis* (VU), *Veronica agrestis* (EN), *V. opaca* (CR), *V. triloba* (EN). – As to *Anthemis austriaca* see recommendation at the *Consolido-Anthemidetum austriacae* (as well as with other ass.) on trasferring this species into the category of further monitoring, where *Papaver argemone, P. dubium* and *Myosotis discolor* are also included (see Holub & Procházka 2000).

Structure and species composition: Com. is fully developed in spring (April, May) in various winter crops (wheat, rye, rape, legume-grain mixtures), rarely in spring crops (barley, oat), or young stands of clover. Stands (10) 20–30 (40) cm tall are first two-layered and then gradually become three-layered (the tallest crops are rye and rape reaching up to 150 cm). In the middle to upper layer are the diagnostic species *Papaver argemone* and *Lithospermum arvense*, as well as the differentials *Neslia paniculata, Valerianella dentata, Consolida regalis* and *Papaver rhoeas* (all at the flowering stage), accompanied by *Arabidopsis thaliana, Capsella bursa-pastoris, Raphanus raphanistrum, Thlaspi arvense,* etc. The bottom layer consists of *Myosotis stricta, Veronica triphyllos, Erophila verna* (all with flowering stems) and flowering prostrate *Veronica* spp. (*V. sublobata* dominant, along with *V. persica,* rarely *V. hederifolia* and *V. triloba*). Medium cover of canopy is 80%, of which the crop makes up 60% and weeds ca. 45%.

Ecology, dynamics and distribution (Table 2, Fig. 5): Com. of moderately undulating terrain in the Czech and Moravian Mesophyticum. Ecologically it is similar to *Aethuso-Galeopsietum* but does also occur in the lowlands of the Czech Thermophyticum; preferred soils are similar to the preceding com. but in lowlands along rivers this com. occurs on river terraces on cambic arenosols.

Variability: Ample data are summarized by Passarge (1985) who distinguished two regional ass. – vicariants of *Papaveretum argenones*: (a) subatlantic based on the original findings by Kruseman & Vlieger (1939), (b) subcontinental vicariant (with diagnostic *Myosotis stricta, Lithospermum arvense*, etc.) which accords with findings for Central Europe, including the Czech Republic. In the Czech Republic, there is still little information on this as., nevertheless, it seems possible to distinguish at least three variants: (a) typical variant – on eutric cambisols, (b) variant with *Consolida regalis* (possibly also *Anthemis austriaca*) – on luvisols and cambic arenosols on river terraces, (c) variant with *Myosotis discolor* – on dystric cambisols where the climate is suboceanic.

References: (a) Cz. Rep.: Jehlík (1963, TR sub *Filagini-Aperetum* p.p.), Kühn (1965, R no. 233, 250 sine denom.), Kropáč (1997, TS); (b) Slovakia: Passarge in Passarge & Jurko (1975, TR suppl., p.p.); (c) other countries: Libbert (1932, L, C see syn.), Kruseman & Vlieger (1939, TR), Sissingh (1946, L, C; 1950, TR), Passarge (1957, TS; 1959b, TR; 1964, TS sub Ass-Gr. *Papaveretum argemones*; 1985a, TS), Oberdorfer (1957a, TS sub *Filagini-Aperetum* p.p. min.; 1957b, TS), Knapp R. (1958, TS sub *Raphanetum* p.p.), Brun-Hool (1963, TR sub group with *Papaver dubium* et *Caucalidion* sp. div.), Wójcik (1965, TR with var.), Vollrath (1967, TR), Rodi (1967a, TS; 1967b, L, C), Meisel (1967, TS), Wedeck (1971, TR), Westhoff & den Held (1969, L, C), Hilbig (1973, TS), Holzner (1973, TR suppl. sub *Myosotido strictae-Veronicetum triphylli* p.p.), Nezadal (1975, TR),

Siciński (1974, TR), Warcholińska (1974, TR), Szotkowski (1981, TR), Oberdorfer (1983, TS), Gehu et al. (1985, C), Otte (1984, TS, impoverished com.), Pilotek (1988, L, C), Wnuk (1989, TR), Warcholińska (1990, TS et suball. *Papaverenion argemones*), Hüppe & Hofmeister (1990, TS), Mucina (1993, L, C), Günther & v. Elsen (1993, TR mixed with *Caucalidion* spp.), Haveman et al. (1988, TS).

Atriplici-Chenopododietalia albi (Tx.1937) Nordhagen 1940

Acidophilous segetal communities of cereal and root crops in temperate to submeridionale zones of the Euro-Siberian region.

Original diagnosis: Tüxen (1937: 21–38) sub *Chenopodietalia medioeuropaea* (art. 34)
Nomenclature type: *Polygono-Chenopodion polyspermi* Koch ex Tx. 1937, **lectotypus hoc loco designatus**
Syn.: *Chenopodietalia medioeuropaea* Tx. 1937 (art. 34), *Chenopodietalia albi* Tx. et Lohmeyer in Tx. 1950 (art. 2b, 8), *Sperguletalia arvensis* Hüppe et Hofmeister 1990 (art. 5, 29)
Syntax. syn.: *Secali-Violetalia arvensis* Br.-Bl. et Tx. ex Sissingh in Westhoff et al. 1946 p.p. min. (art. 3f), *Anagallidetalia* R. Knapp 1948 p.p., *Aperetalia spicae-venti* J. Tüxen et Tx. in Malato-Beliz et al. 1960 p.p., *Lolio-Linetalia* J. Tüxen et Tx. in J. Tüxen 1966 p.p. min. (art. 2b, 8), *Polygono-Chenopodietalia* auct. p.p. (art. 29)
Incl.: *Solano-Polygonetalia* Sissingh in Westhoff et al. 1946 (pro subordine)
Non: *Chenopodietalia* Br.-Bl. in Br.-Bl. et al. 1936, *Chenopodietalia mediterranea* Tx. 1937

Syntaxonomical comments and correct name of the order: (1) In general, the concept is that of Hüppe & Hofmeister (including acidophilous comm. of cereals), however the name proposed by these authors was invalidly published. – (2) This concept was adopted first by Mucina (in Mucina et al. 1993: 122–139) and then Jarolímek et al. (1997: 108–122). Although Mucina (op. c., p. 122) used the invalid name (*Chenopodietalia albi* – see above), later on, Mucina (in Jarolímek et al., op. c., p. 108) used the valid name but without explicitly designating the type. – (3) Thus, implicitly the alliance *Panico-Setarion* would become the type of the order as in Mucina et al. (1993: 122), but because of the invalidly published order *Chenopodietalia albi*, however, this should be rejected. – (4) Of the three validly published alliances, I select *Polygono-Chenopodion polyspermi* Koch 1926 (validly published by Tüxen 1937: 26–33) as the lectotype. The ecological parameters of this alliance best fit those of the order. – (5) For useful comments on the various historical approaches to the syntaxonomy of this order (as well as other higher units) see Tüxen 1950 (p. 94–97, cf. Nordhagen 1940).

Diagnostic species: *Anthemis arvensis, Bromus secalinus* (CR), *Camelina alyssum* (EX), *Centaurea cyanus* (opt.), *Cerastium glomeratum, Erodium cicutarium, Erysimum cheiranthoides, Filago arvensis* (VU), *Gagea pratensis, Linaria arvensis* (CR), *Lolium remotum* (? EX), *Lycopsis arvensis, Myosotis arvensis* (opt.), *Papaver argemone* (opt.), *P. dubium* (opt.), *Persicaria lapathifolia* subsp. *pallida*, *P. maculosa, Raphanus raphanistrum, Scleranthus annuus, Spergula arvensis* subsp. *arvensis, Stachys arvensis* (? EX), *Veronica arvensis, V. triphyllos, Vicia angustifolia* (opt.)*, V. hirsuta.* – Differential species (towards the *Centaureetalia*): *Arabidopsis thaliana, Erophila verna, Galeopsis bifida, G. pubescens*, *G. tetrahit, Holcus mollis, Lapsana communis, Rumex acetosella* subsp. *acetosella.* – Some of order species possess their optimum in a lower syntaxon and in that case are marked there (opt.).

Segetal comm. in cereals and legume-grain mixtures (winter or spring), in winter rape and young stands of meadow clover (and/or young clover-grass mixtures) as well as in root-crop cultures built up by therophytes of various life forms (in dependence on the culture type), and often with participation of perennial weeds. Comm. prefer a mildly warm climate and acid soils preferably on siliceous substrates from the lowland to montane levels. Phytosociologically, this comm. is separated into four groups according to their affinity

for oceanity or continentality, temperature and precipitation preferences, and dependence on type of cultivation.

R e m a r k : In earlier times specialized comm. existed in flax crops in various European countries, mainly in E Europe (up till 1955–60). Komarov (1940, p. 530–531 et 548) refers to the studies of Cinger (Zinger) on specialized species (*Camelina linicola, Spergula maxima, S. linicola, Lolium remotum*) from the forest zone of W Russia. Kornaś (1961, 1968) has similar references for the Polish Gorce Mts. It is likely that the comm. of *Lolio-Linetalia* (see above) and the alliance *Lolio remoti-Linion* (cf. Tüxen 1950: 139–140), which are extinct (cf. Oberdorfer 1983: 45–47), would have been placed here.

Scleranthion annui (Kruseman et Vlieger 1939) Sissingh in Westhoff, Dijk et Passchier 1946

Segetal communities of cereals and legume-grain mixtures, less so of rape, young meadow clovers and clover-grass mixtures and but also root crops; they occur in the European temperate zone and occasionally in the boreale and submeridionale zones of the Euro-Siberian region

O r i g i n a l d i a g n o s i s : Sissingh in Westhoff et al. (1946: 14–17)
N o m e n c l a t u r e t y p e : *Spergulo arvensis-Scleranthetum annui* Kuhn (1937: 41–43), **lectotypus hoc loco designatus**
S y n . : *Agrostion spicae-venti* Tx. in (?) Oberdorfer 1949 (art. 29), *Agrostion spicae-venti* Tx. ex Rochow 1951 (art. 29), *Aphanion arvensis* J. Tüxen et Tx. in Malato-Beliz et al. 1960 (art. 29), *Aperion spicae-venti* auct. (art. 29, 30)
I n c l . : *Scleranthion annui* Kruseman et Vlieger 1939 (pro suball.), *Aphanenion arvensis* (J. Tüxen et Tx. in Malato-Beliz et al. 1960) Oberdorfer 1983, *Raphanetum raphanistri* R. Knapp 1948 (pro associatione s.l.)

D i a g n o s t i c s p e c i e s : *Anthemis arvensis* (opt.), *Apera spica-venti, Myosotis discolor, M. stricta, Scleranthus annuus* (opt.), *Veronica arvensis* (opt.), *Viola tricolor* subsp. *tricolor*, and many order species bound to the alliance.

Comm. of this alliance prefer mildly warm to cold habitats and (rather) acid soils on siliceous substrates on the Bohemian Massif. Distribution of these comm. are among the largest in the Czech Republic (Figs 6 and 7) occurring from the lowlands to the mountains; they may be substitute comm. of acidophilous oak forests and possibly also woodrush beech and fir forests. Corresponding comm. occur in all European countries including the northern (R. Knapp 1959, Vevle 1988), southern (Pignatti 1957, Nezadal 1989), eastern and north-eastern areas (Morariu 1943, Mirkin et al. 1985, Solomakha 1987, 1988). Most references are, however, published under *Aphanion* and possibly other synonyms (see above).

14. *Aphano-Matricarietum chamomillae* Tx. 1937 em. Passarge 1957 nom. mut. propos. (art. 45) (Table 1: col. 14)

D a t a b a s e n o s . : 342376–342441
O r i g i n a l n a m e f o r m : *Alchemilla arvensis-Matricaria chamomilla* Ass. Tx. 1937 (art. 45)
O r i g i n a l d i a g n o s i s : Tüxen (1937: 18–19)
N o m e n c l a t u r e t y p e : Original table by Tüxen (op. c.) is only synthetic and the neotype might be selected among the published relevés from the corresponding territory (see e.g. 172 relevés in Hofmeister 1981, Table 3 suppl.; probably prof. Hofmeister might take on this task).
S y n . : *Vicietum tetraspermae* Kruseman et Vlieger 1939, *Alchemillo-Matricarietum* auct.
S y n t a x . s y n . : *Galeopsio-Matricarietum chamomillae* Oberdorfer 1957 p.p., *Aphano-Matricarietum* Tx. 1937 em. Schubert et Mahn 1968 p.p.
P s e u d o n y m : *Vicietum tetraspermae* sensu Kornaś 1950 non Kruseman et Vlieger 1939
Non: *Papaveretum argemones* Kruseman et Vlieger 1939

Syntaxonomic comments: (1) Tüxen's (1937) *Alchemillo-Matricarietum* is a broad concept including *Papaveretum argemones* and part of three groups at the level of subass. (see later on, Tüxen 1950: 132). – (2) *Vicietum tetraspermae* was considered by Tüxen (1950: 131) to be a local variant of *Alchemillo-Matricarietum*, which was legitimate as can be seen by comparing both tables [see Kruseman & Vlieger 1939, Table 5 on p. 348–354: *Alchemilla arvensis* 82%, *Matricaria chamomilla* 64%, *Vicia tetrasperma* 45%, etc., all the relevant species correspond to Tüxen (1937, op. c.) except for *Legousia speculum-veneris* 82%!]. – (3) Only Passarge (1957) amended *Alchemillo-Matricarietum* by excluding *Papaveretum argemones.* – (4) Schubert & Mahn (1968), in contrast, broadened *Aphano-Matricarietum* Tx. 1937 by including some of the *Polygono-Chenopodion polyspermi* comm. – (5) The concept of *Vicietum tetraspermae* sensu Kornaś 1950 is syntaxonomically well founded and has for a long time been used by Polish scientists, however the name should be corrected (some Polish authors write "em. Kornaś 1950").

Diagnostic species: *Vicia tetrasperma*, *Aphanes arvensis, Matricaria recutita* (*M. chamomilla, Chamomilla recutita*), and with higher constancy *Apera spica-venti, Centaurea cyanus, Myosotis arvensis, Veronica arvensis, Vicia hirsuta*

Constant species (those with 50–60% constancy are marked with cross): *Anagallis arvensis, Apera spica-venti, Aphanes arvensis, Capsella bursa-pastoris, Centaurea cyanus, Chenopodium album*$^{+}$*, Cirsium arvense, Elytrigia repens*$^{+}$*, Fallopia convolvulus, Galium aparine, Matricaria recutita*$^{+}$*, Myosotis arvensis, Poa annua, Polygonum aviculare*$^{+}$*, Stellaria media, Thlaspi arvense, Tripleurospermum inodorum, Veronica arvensis, V. persica, Vicia angustifolia*$^{+}$*, V. hirsuta, V. tetrasperma, Viola arvensis*

Important weeds: *Anthemis arvensis* (W4), *Apera spica-venti* (W4), *Centaurea cyanus* (only locally), *Cirsium arvense* (W1), *Elytrigia repens* (W1), *Fallopia convolvulus* (W1), *Galium aparine* (W1), *Matricaria recutita* (W4, only locally; medicinal), *Mentha arvensis* (W5), *Persicaria hydropiper* (W5), *Raphanus raphanistrum* (W4), *Stachys palustris* (W5), *Tripleurospermum inodorum* (W1), *Vicia hirsuta* (W4), *V. tetrasperma* (W4)

Threatened species: *Aphanes arvensis* (VU), *Filago arvensis* (VU), *Myosurus minimus* (VU), *Ranunculus arvensis* (VU), *R. sardous* (CR), *Veronica agrestis* (EN). – Note: As to locally transgressive *Anthemis austriaca* (VU ?) see the remark at the syntaxon no. 3. *Centaurea cyanus* is listed in the group of rare or scattered taxa (see Holub & Procházka 2000) which is legitimate, but dense populations can be observed until recently (2004). In earlier times, *Agrostemma githago* occurred in this as. in dense populations, too.

Structure and species composition: Species-rich com. traditionally belonging to the best known and most widely distributed in the Czech, Moravian and Silesian agricultural landscapes. It may be considered a classic as. with its own species composition and special colour appearance in the fields. Canopy is fully developed in June and July and reaches (80) 90–100 (130) cm in winter wheat (in rye it is higher, spring barley lower and oats in the middle). This com. may also develop in winter rape (where it is tall) and young meadow clover (middle sized). In general, medium cover is 95%, of which the crop amounts for 75% and weeds 50%. The biomass of weeds in cereals usually occurs in three layers, the upper layer is very conspicuous and includes the diagnostic species *Matricaria recutita* (white-yellow flowers) plus *Centaurea cyanus* (blue) and *Papaver rhoeas* (red); stand is usually overtopped by a veil of *Apera spica-venti*, with airy panicles and more recently by a widespread *Tripleurospermum inodorum*. In the middle layer there is the diagnostic species *Vicia tetrasperma* along with *V. hirsuta* and *V. angustifolia*, as well as other species (*Myosotis arvensis, Anthemis arvensis, Raphanus raphanistrum, Thlaspi arvense,* etc.). The diagnostic *Aphanes arvensis* only occurs in the lower layer, along with species like *Veronica arvensis, Anagallis arvensis, Viola arvensis, Stellaria media,* etc. Providing there is no stubble ploughing the last-mentioned plants may survive in the stubble. Only in this as. in suited habitats are groups of species like *Juncus bufonius*, *Sagina procumbens*,

Ranunculus sardous, Hypericum humifusum, *Myosurus minimus* and others of the *Nanocyperion* observed (cf. Jehlík 1963, Table 23; he referred also about *Centunculus minimus* and *Isolepis setacea*). Also the first stages of some species of *Bryophyta* develop in this as. and may be observed in stubble, e.g. *Phascum cuspidatum, Barbula unguiculata, Pottia truncata, Dicranella varia, Pohlia nutans, Eurhynchium schleicheri, E. hians, Anthoceros agrestis, Riccia* sp. and *Bryum* sp. Worth noting is a contribution by Preis (1937) on *Centunculo-Anthoceretum* Koch 1926 growing in stubble on arable land (most probably a stubble phase of *Aphano-Matricarietum*). See also the well documented stubble comm. of *Nanocyperion* recorded from Poland (Wójcik 1968) and later from Slovakia (Mochnacký 1984, 1988).

Ecology, dynamics and distribution (Table 2, Fig. 6): Typical com. of moderately undulating terrain in the Czech and Moravian Mesophyticum (including Carpathian Mesophyticum) with a preference for slightly acid middle-heavy loamy soils in the colline belt of a minor part of the Czech Thermophyticum and Pannonicum, and for acid relatively light, gravelly soils in the supracolline belt; habitat of this com. corresponds partly with the sugar beet-barley (at lower altitudes) and potato-barley (at higher altitudes) farming subzones.

Variability: Wide European distribution extending from W to Central Europe (with some extension to the east and the south) results in great variability in this as. Generally, several vicariants ("races") are distinguished in other countries, of which the *Tripleurospermum inodorum* race corresponds best with the Czech species composition (see Hilbig 1967a, Holzner 1973, Nezadal 1975, Oberdorfer 1983, Mucina 1993). As for the other races, the *Matricaria chamomilla* race prefers a suboceanic mild climate, and the *Galeopsis tetrahit* race occurs at higher altitudes (see e.g. Hilbig 1965, 1973). In addition, the subillyric race (Holzner 1973, Mucina 1993) with *Legousia speculum-veneris*, is worth mentioning (cf. also *Vicio pseudovillosae-Legousietum* Kutschera 1966 em. Mucina 1993). As for the subass., three are usually recognized: (a) *euphorbietosum exiguae,* (b) *typical,* (c) *scleranthetosum annuae* (cf. e.g. Tüxen 1950, Meisel 1967, Mucina 1993). In addition to the basiphilous subas. *euphorbietosum exiguae* there is the subas. *alopecuretosum myosuroidis* (Oberdorfer 1957a, 1983), which is also basiphilous (with *Consolida regalis, Sherardia arvensis*) but more confined to subatlantic climate (see also *Alopecuro-Matricarietum* Wasscher 1941, later referred to in Meisel 1967 and Hofmeister 1981). In addition, the subas. *papaveretosum argemones* was classified by Pignatti (1957) and Passarge (1964) and in Austria even the subas. *polygonetosum hydropiperis* Holzner 1973 (see also Mucina 1993).

What is the value of these results? The analysis of 66 relevés in the Database revealed five coherent groups: (a) "typical" group, without differentials, (b) group with *Persicaria hydropiper* and a subgroup with *Ranunculus sardous* (most probably a variant and subvariant), (c) group with *Consolida regalis* (and other thermophilous and partly basiphilous species), (d) group with *Rumex acetosella* and *Spergula arvensis* (evidently acidophilous), (e) small group with *Papaver argemone* (thermophilous and partly acidophilous at lower altitudes). Groups c, d and e are similar to the above subass.

A revision of *Aphano-Matricarietum* in a broad European context including more relevés from the east is highly desirable; limits of *Aphano-Matricarietum* Tx. 1937 em. Passarge 1957 relative to *Vicietum tetraspermae* sensu Kornaś 1950 and possibly

Delphinio consolidae-Brometum secalini Denissow, Tx. et Preising in Tx. ex Wójcik 1984 should be defined (contribution by Wójcik 1984 is very informative on this point).

References: (a) Cz. Rep.: Preis (1937, three R sub *Centunculo-Anthoceretum*, stubble stand), Jehlík (1963, TR sub *Galeopsio-Matricarietum* vicariant et *Galeopsio-Matricarietum centunculetosum*), Kühn (1955, R no. 79, p. 6), Kropáč (1981, L, C; 1988, TS; 1995, L, C), Otýpková (2001, TR), Lososová (2004, TS); (b) Slovakia: Jarolímek et al. (1997, TS), Mochnacký (1984, TR; 2000, TS); (c) other countries: Tüxen (1937, TS; 1950, L, C), Kruseman & Vlieger (1939, TR sub *Vicietum tetraspermae* syn.!), Wasscher 1941 (TS sub *Alopecuro-Matricarietum*), Kielhauser (1956, L, C), Oberdorfer (1957a, TS; 1983, TS), Passarge (1957, L, C; 1964, TS sub Ass.-Gr. *Matricarietum chamomillae*; 1978b, TS et typus sub *Galio spurii-Matricarietum* ass.nov.), Pignatti (1957, TR), Knapp R. (1958, TS sub *Raphanetum raphanistri* p.p.), Kloss (1960, TR), Soó (1961, L, C), Meisel (1962, TS; 1967, TS), Zeidler (1962 et 1965 some R), Müller G. (1963/64, TS), Brun-Hool (1963, TR, TS; 1964, TR), Hilbig (1965, TS, TR; 1967a, TS; 1973, TS), Rodi (1967a, TS sub *Galeopsio-Matricarietum*), Vollrath (1967, TR), Schubert & Mahn (1968, TS), Bornkamm & Köhler (1969, TS ecol. water gradients), Holzner (1973, TR suppl.), Warcholińska (1974, TR); 1990, TS sub *Aphano-Chamomilletum*), Nezadal (1975, TR), Kuźniewski (1975, TS), Hofmeister (1975 et 1981, TR suppl.), Kump (1975, L, C), Schlüter (1975, pedohydrol. types), Callauch (1981, TR, impoverished com.), Géhu et al. (1985, L, C), Borowiec et al. (1987, TR), Hüppe & Hofmeister (1990, TS), Ries (1992, TR), Mucina (1993, L, C), Günther & v. Elsen (1993, TR), Peppler-Lisbach & v. Elsen (2002, TS).
References sub *Vicietum tetraspermae* sensu Kornaś 1950: Kornaś (1950, TR), Nowiński (1964, TR sub *Vicietum angustifolio-hirsutae*), Wójcik (1965, TR with three subass.; 1978, L, C with limits between *Aphano-Matricarietum* and *Vicietum tetraspermae*; 1984, TR sub *Consolido-Brometum secalini* and limits among this as., *Vicietum tetraspermae* and *Aphano-Matricarietum*), Fijałkowski (1967, TR), Wiśniewski (1970, TR), Siciński (1974, TR), Warcholińska (1974, TR with three subass.; 1990, TS), Szotkowski (1981, TR suppl.), Wnuk (1989, TR).

15. *Holco-Galeopsietum* Hilbig 1967 (Table 1: col. 15)

Database nos.: 342597–342654
Original diagnosis: Hilbig (1967a: 166–173)
Nomenclature type: **neotypus hoc loco designatus** (according to the Code, art. 21A the neotype has been selected by the author himself among the relevés used for the synthetic table, op. c., Table 6 on p. 168–170 – see Appendix 2)
Syn.: As. *Holcus mollis-Spergula arvensis* Volf 1964 (art. 2b, 7)
Syntax. syn.: *Violo-Galeopsietum* G. Müller 1964 p.p. (art. 2b, 7), *Galeopsio-Matricarietum chamomillae* Oberdorfer 1957 p.p., *Galeopsio-Aphanetum arvensis* (Oberdorfer 1957) Meisel 1962 p.p. (art. 29), *Holco-Scleranthetum annui* Kutschera 1966 p.p., *Vicio craccae-Campanuletum rapunculoidis* Kutschera 1966 p.p. min., *Aegopodio-Campanuletum rapunculoidis* Kutschera 1966 em. Mucina 1993 p.p., *Alchemillo-Sonchetum arvensis* Passarge in Passarge et Jurko 1975 p.p., *Galeopsio-Sperguletum arvensis* Passarge in Passarge et Jurko 1975 p.p.
Non: *Spergulo arvensis-Scleranthetum annui* Kuhn 1937

Diagnostic species: *Holcus mollis,* and with high constancy the order species *Galeopsis tetrahit, Rumex acetosella* subsp. *acetosella, Spergula arvensis* subsp. *arvensis*, *Achillea millefolium* agg., also many "meadow species" (e.g. *Alchemilla vulgaris* agg. and others)
Constant species (50–60% constancy is indicated by cross): *Achillea millefolium* agg., *Capsella bursa-pastoris, Cirsium arvense*$^{+}$, *Elytrigia repens, Fallopia convolvulus, Galeopsis tetrahit, Holcus mollis, Lapsana communis*$^{+}$, *Mentha arvensis*$^{+}$, *Myosotis arvensis, Persicaria maculosa, Poa annua*$^{+}$, *Ranunculus repens*$^{+}$, *Raphanus raphanistrum, Rumex *acetosella, Scleranthus annuus, Spergula *arvensis, Stellaria media, Vicia angustifolia*$^{+}$, *V. hirsuta*$^{+}$, *Viola arvensis*
Important weeds: *Anthemis arvensis* (W4), locally, *Elytrigia repens* (W1), *Galeopsis tetrahit* (W4), *Holcus mollis* (W6), *Mentha arvensis* (W5), loc., *Poa annua* (W6), loc., *Raphanus raphanistrum* (W4), *Ranunculus repens* (W5), *Rumex *acetosella* (W6), *Spergula *arvensis* (W4), *Stellaria media* (W2), loc., *Tripleurospermum inodorum* (W1), loc.
Threatened species: *Agrostemma githago* (CR), *Aphanes australis* (CR), *Camelina alyssum* (EX), *Centunculus minimus* (EN), *Hypochaeris glabra* (CR), and rarely *Ranunculus arvensis* (VU) and *Rhinanthus alectorolophus* (VU) were observed very sporadically in this com.

Structure and species composition: This com. occurs in stands of various crops, mainly winter rye, oats and potatoes, but also other winter and spring cereals and mixtures with legumes, in flax, meadow clover, alsike clover, white clover and mixtures of grass and clover, and in stubble. Differences are manifested mostly at the level of facies. Vertical structure is variable and depends on the type of crop and its cultivation. The tallest crop, winter rye (up to 150 cm and more) may be three-layered, but usually two layers of weeds develop, e.g. in potatoes (with a 40 cm stand height). Cereals and mixtures with legumes mature in summer, while other cultures and stubble are present until autumn. *Holcus mollis* is often the most important and dominant species, with its stalks and leaves in the middle and lower layers, exceptionally its panicles (mostly sterile) reach the top layer. Generally, the species composition is similar to *Spergulo-Scleranthetum*, but some species are missing. Typical for this as. is, however, the frequent presence of companions from various contact comm., mainly meadows and pastures (*Achillea millefolium* agg., *Alchemilla vulgaris* agg., *Cerastium holosteoides, Stellaria graminea, Prunella vulgaris, Rumex acetosa,* etc.), but also woodlands (e.g. *Equisetum sylvaticum*), and a high constancy of hygrophilous plants is typical; *Bryophyta* (*Dicranella varia, Ditrichum cylindricum, Bryum bicolor* and others) occur in stubble and depressions of the soil surface in potatoe.

Ecology, dynamics and distribution (Table 2, Fig. 7): Specific com. with a distribution spanning altitudes from the colline to the montane zone in the Czech and Moravian Mesophyticum, also occurring in the Carpathian Mesophyticum and Czech and Moravian Oreophyticum (the Krušné hory Mts and Sudetes include areas at the submontane to montane level, and in contrast the lowest locality is in the Ralská pahorkatina hills). Soils are very acid, nutrient-poor and light, gravelly and stony, derived from siliceous rocks and deposits of various types and geological periods (cf. com. 17). Corresponding farming subzone is potato-oats and some montane pastures. Generally, *Holco-Galeopsietum* is a typical com. of the Central-European Hercynian mountains, and occurs in the Krušné hory Mts and Sudetes in the Czech Republic and adjoining regions.

Variability: A large-scale synthesis, published by Hilbig et Volf (1984), distinguished seven vicariants ("races"), of which the race with *Viola tricolor* subsp. *tricolor* occurs only at high altitudes of the Krušné hory Mts and Sudetes, and the race with *Apera spica-venti* at intermediate altitude in the Děčínské stěny, Lužické hory Mts and Jizerské hory Mts, as well as the foothills of Šumava. The race with *Galeopsis bifida* occurs most probably in the Oravské Beskydy Mts (Kropáč 1974). However, the current synthesis and revision of relevés does not confirm clearly the existence of the above mentioned races, e.g. *Apera spica-venti* occurs only sporadically (in 29% relevés) mainly in winter cereals at low altitudes and the same holds for *Viola *tricolor*, which is infrequent there. Two different groups are present in the relevé material studied: (a) group with *Vicia tetrasperma,* and possibly *Geranium dissectum, Valerianella dentata, Sherardia arvensis*, (b) group with various species of "meadows and pastures" such as *Alchemilla vulgaris* agg., *Agrostis capillaris, Hypericum maculatum, Rumex acetosa, Leucanthemum vulgare,* etc. This relevé material is inadequate for establishing well-founded subass. In other countries, e.g. Schubert & Mahn (1968) formulated a subas. with *Sherardia arvensis* and *Melandrium noctiflorum* (op. c., p. 275 et 278) and Nezadal (1975: 100–102) the form ("Ausbildungsform") with *Vicia tetrasperma* at low altitudes with the climate relatively warm. The latter corresponds well with the group (a), which contains subthermophilous species (including *Vicia tetrasperma*). In contrast, the group (b) occurs at high altitudes, preferably at the submontane and montane

levels. *Viola tricolor* subsp. *polychroma* is found at high altitudes (more than 800 m) in the Krušné hory Mts, which accords with the findings of Schubert & Mahn (1968: 269, see the race with *Viola tricolor* subsp. *polychroma*) in the neighbouring regions of Germany. Most of the relevés include *Mentha arvensis, Ranunculus repens, Stachys palustris,* etc., because the *Holco-Galeopsietum* occurs in relatively wet habitats. Also the subgroup with *Persicaria hydropiper, Sagina procumbens,* etc. is very common.

References: (a) Cz. Rep.: Kühn (1955, R no. 130, 148; 1965, R no. 150, 167), Kühn & Uhrecký (1959, R no. 52), Volf (1964, L, C; 1971 et 1974, TR), Volf & Kropáč (1974, TR suppl.), Kropáč (1981, L, C; 1988, TS; 1995, L, C), Plocek (1982, TR); (b) Slovakia: Kropáč (1974, TS), Passarge in Passarge & Jurko (1975, TR suppl., only part under *Alchemillo-Sonchetum*, Table 6); (c) other countries: Hilbig (1967a, 1973, TS), Rodi (1967a, TS sub *Galeopsio-Matricarietum* p.p.), Schubert & Mahn (1968, TS), Kornaś (1968, TR, several relevés), Kutschera (1966, TR sub *Holcus mollis-Scleranthus annuus* Ass., *Aegopodium podagraria-Campanula rapunculoides* Ass. et *Aegopodium podagraria-Viola tricolor* Ass.), Müller G. (1963/64, TS), Militzer (1966, L, C; 1970, TR), Passarge (1971, TS sub *Holcus-Apera* Ges.), Meisel (1973, TS), Holzner (1973, TR suppl.), Nezadal (1975, TR), Passarge & Passarge (1977, TS et TR sub *Holcus-Cirsium arvense* Ges. et *Holcus-Scleranthus annuus* Ges.), Hilbig & Volf (1984, TS), Hüppe & Hofmeister (1990, TS), Mucina (1993, L, C sub *Spergulo-Scleranthetum* p.p.), Günther & van Elsen (1993, TS sub *Spergulo-Chrysanthemetum segetum* p.p.).

16. *Erophilo-Arabidopsietum thalianae* Kropáč in Krippelová 1981 (Table 1, col. 16)

Database nos.: 342687–342720 and 342296–342303 (addition)
Original diagnosis: Kropáč in Krippelová (1981: 61–62)
Nomenclature type: Kropáč in Krippelová (1981: 62), holotypus (single relevé), stored also in the Database (no. 342687)
Syn.: *Erophilo-Arabidopsietum* Kropáč 1981 (art. 2b, 7)
Pseudonym: *Erophilo-Arabidopsietum* sensu Passarge 1978 non Sissingh 1941
Non: *Arabidopsietum thalianae* Sissingh 1942, *Valerianello olitoriae-Arabidopsietum thalianae* nom. prov. Tx. 1950 (art. 3b), *Myosotido strictae-Veronicetum triphylli* Holzner 1973, *Arabidopsio thalianae-Myosotidetum ramosissimae* R. Knapp 1975, *Veronicetum hederifolio-sublobatae* Kropáč 1997 (art. 2b, 7)

Syntaxonomic comments: (1) In the Slovakia (Czechoslovakia at that time) this as. was recognized by Krippelová in 1975 after comparing her results with the Kropáč's manuscript. This is why the correct name was then published in the book of Krippelová (1981). – (2) The contribution by Vollrath (1967) is worth mentioning as it presents under *Valerianello olitoriae-Arabidopsietum thalianae* Tx. 1950 a com. corresponding to *Erophilo-Arabidopsietum* (Vollrath, op. c., p. 140 et Table 3 in suppl.); Vollrath found this com. in cereals (!) whereas Tüxen (1950: 130) indicated it occurred on non-cultivated but disturbed ground, with *Myosotis ramosissima* as a typical plant in such habitats (cf. also R. Knapp 1975: 145–153). – (3) In response to my request prof. H. Dierschke (Göttingen, Germany) denied the existence of a syntaxon under the name *Erophilo-Arabidopsietum* Sissingh 1941 (the letter is in my correspondence). Of course, *Arabidopsietum thalianae* Sissingh 1942 exists in the alliance *Arabidopsion thalianae* Passarge 1964, which contains ephemerous communities in disturbed habitats, preferably not on arable land (see Kolbek in Moravec 1995: 88–89, Kolbek et al. 2001: 40–50).

Diagnostic species: *Arabidopsis thaliana, Erophila verna, Veronica triphyllos, Myosotis stricta,* and negatively characterized by the absence of *Caucalidion* species
Constant species (50–60% constancy indicated by cross): *Arabidopsis thaliana, Capsella bursa-pastoris, Chenopodium album*$^{+}$, *Cirsium arvense*$^{+}$, *Elytrigia repens, Erophila verna, Fallopia convolvulus, Galeopsis tetrahit*$^{+}$, *Galium aparine*$^{+}$, *Lamium amplexicaule*$^{+}$, *Myosotis arvensis, M. stricta*$^{+}$, *Polygonum aviculare* agg.$^{+}$, *Raphanus raphanistrum, Scleranthus annuus*$^{+}$, *Stellaria media, Taraxacum* sect. *Ruderalia*$^{+}$, *Thlaspi arvense, Tripleurospermum inodorum*$^{+}$, *Veronica arvensis*$^{+}$, *V. sublobata, V. triphyllos, Viola arvensis.*

Important weeds: *Arabidopsis thaliana* (W4), *Capsella bursa-pastoris* (W2), *Elytrigia repens* (W1), *Galium aparine* (W1), *Raphanus raphanistrum* (W4), *Senecio vernalis* (W7) – loc., *Stellaria media* (W2), *Thlaspi arvense* (W2), *Tripleurospermum inodorum* (W1), *Veronica sublobata* (W2)
Threatened species: *Agrostemma githago* (CR), *Anthemis austriaca* (VU ?), *Myosurus minimus* (VU), *Ranunculus arvensis* (VU), *R. sardous* (CR), *Veronica agrestis* (EN), *V. opaca* (CR), *V. triloba* (EN) – these species were found here only rarely. As to *Anthemis austriaca* see also the recommendation at the *Consolido-Anthemidetum austriacae* (as well at other ass.) that it would be better to transfer it into the group of further monitoring where e.g. *Myosotis discolor* and *Veronica verna* are included (cf. Holub & Procházka 2000).

Structure and species composition: This com. reaches its phenological optimum at the end of winter agroecophase (April and May) in various winter crops (mainly rye, then wheat, barley, rape and various fodder crops). Stands of cereals at tillering and stalk shoot extension reach a height of (10) 15–30 (40) cm depending on the crop and cultivar (winter rye and winter rape are rather tall, may be 100 cm in a fully developed stand). Medium canopy cover is 90%, with up to 70% for the crop and 50% for the weeds. These parameters are, however, variable depending on the weather and field management. Vertical structure of weed population is normally two-layered, with the diagnostic *Arabidopsis thaliana* in the upper layer along with *Capsella bursa-pastoris* and *Thlaspi arvense* (all at the flowering stage), as well as *Myosotis arvensis, Raphanus raphanistrum* and *Tripleurospermum inodorum* (at stem elongation to budding stage). In the lower layer are concentrated the diagnostic *Erophila verna, Veronica triphyllos, Myosotis stricta,* along with *Veronica hederifolia, V. sublobata* (all at the flowering to fruiting stage) accompanied by *Viola arvensis, Stellaria media* and *Scleranthus annuus*.

Ecology, dynamics and distribution (Table 2, Fig. 6): Typical spring com. widely distributed in the Czech and Moravian Mesophyticum as well as the Carpathian Mesophyticum on light, acid and gravelly soils, and in some localities in the Czech Thermophyticum and Pannonicum (here it may be linked to the *Papaveretum argemones* or even the *Veronicetum hederifolio-triphylli*). The corresponding farming subzone is potato-rye. – Note: Fig. 6 shows a gap in the distribution in the Krušnohorská soustava mountain range and Sudetes, which is due to lack of studies in the area.

Variability: Depending on climatic conditions the following variants (subass.?) may be distinguished: (a) at low altitude in warm climates on gravelly-sandy to sandy-loamy soils the variant with *Anthemis austriaca, Veronica polita* and *Papaver rhoeas* prevails; *Descurainia sophia* and *Senecio vernalis* occur locally; (b) at colline levels where the climate is mild (and with suboceanic influence) the variant with *Myosotis discolor* (and very rarely *Veronica verna*) is of interest; (c) the type relevé is characteristic of the typical variant (Nová Ves nad Lužnicí, S Bohemia) as are most relevés. In addition, the impoverished comm. with *Arabidopsis thaliana* was recorded recently (Kropáč & Lecjaksová 2001).

References: (a) Cz. Rep.: Kropáč (1981, L, C; 1995, L, C; 1997, TS), Kropáč & Lecjaksová (2001, TR), Otýpková (2001, TR), Lososová (2004, TS); (b) Slovakia: Krippelová (1981, TR), Jarolímek et al. (1997, TS), Mochnacký (2000, TS); (c) others: Passarge (1978a, among the list of syntaxa), Kornaś (1950, TR sub *Vicietum tetraspermae,* spring aspect with *Myosotis stricta* p.p.), Vollrath (1967, C, TR suppl. sub *Valerianello-Arabidopsietum* p.p. max.).

17. *Spergulo arvensis-Scleranthetum annui* Kuhn 1937 (Table 1: col. 17)

Database nos.: 342511–342596
Original name form: Ass. v. *Scleranthus annuus* und *Spergula arvensis* Kuhn 1937
Original diagnosis: Kuhn (1937: 41–43)
Nomenclature type: **neotypus hoc loco designatus** (see Appendix 2)
Syn.: *Spergulo-Raphanetum* Kropáč 1981 (art. 2b, 7, 29)
Syntax. syn.: *Galeopsio-Matricarietum chamomillae* Oberdorfer 1957 p.p., *Galeopsio-Aphanetum arvensis* (Oberdorfer 1957) Meisel 1962 p.p. (art. 29), *Vicio pseudovillosae-Scleranthetum annui* Kutschera 1966 p.p. max., *Violo tricoloris-Scleranthetum annui* nom. prov. Passarge in Passarge et Jurko 1975 p.p. (art. 3b)
Non: Ass. à *Scleranthus annuus* Gaume 1924, Ass. à *Scleranthus annuus* Malcuit 1929, Ass. à *Scleranthus annuus* et *Spergula arvensis* Br.-Bl. 1931 (art. 2b, 7), *Scleranthetum annui* Br.-Bl. in Br.-Bl. et al. 1936, *Sclerantho annui-Arnoseridetum minimae* Tx. 1937, *Trifolio arvensis-Scleranthetum annui* Morariu 1943, *Holco-Galeopsietum* Hilbig 1967, *Scleranthus annuus-Myosurus minimus*-Ass. auct.

Syntaxonomical comments: Correct name was published by Kuhn (see above), however the single relevé contained accidental *Holcus mollis* (see Kuhn, op. c., p. 41–42), which resulted in *Spergulo-Scleranthetum* being later declared "nomen ambiguum" (see Oberdorfer 1983: 40) or *Holco-Galeopsietum* is a synonym of *Spergulo-Scleranthetum* (see Mucina 1993: 125). To avoid such mistakes a neotype was established (Appendix 2).

Diagnostic species: As. does not possess its own diagnostic species and is characterized negatively in comparing with other ass. of the *Scleranthion*; it can be held for the central as. of the alliance sensu Dierschke (1981, 1988). Nevertheless, this as. is well recognized by the high constancy of *Scleranthus annuus*, *Spergula arvensis* subsp. *arvensis*, *Raphanus raphanistrum*, *Rumex acetosella* subsp. *acetosella*, and other *Scleranthion* species. – Note: Compare the conception and essential importance of negative characteristics in Vollrath (1967: 145–147) and in Oberdorfer (1983: 40).
Constant species (50–60% constancy indicated by cross): *Anagallis arvensis*$^{+}$, *Capsella bursa-pastoris, Chenopodium album, Cirsium arvense, Elytrigia repens, Fallopia convolvulus, Galeopsis tetrahit, Myosotis arvensis, Poa annua*$^{+}$, *Raphanus raphanistrum, Rumex acetosella* subsp. *acetosella*$^{+}$, *Scleranthus annuus, Spergula arvensis* subsp. *arvensis*, *Stellaria media, Thlaspi arvense*$^{+}$, *Tripleurospermum inodorum, Vicia angustifolia*$^{+}$, *V. hirsuta, Viola arvensis*
Important weeds: *Anthemis arvensis* (W4), locally, *Cirsium arvense* (W1), *Elytrigia repens* (W1), *Galeopsis tetrahit* (W4), *Persicaria hydropiper* (W5), loc., *Poa annua* (W6), loc., *Raphanus raphanistrum* (W4), *Rumex* acetosella* (W6), loc., *Scleranthus annuus* (W4), loc., *Spergula* arvensis* (W4), *Stellaria media* (W2), loc., *Tripleurospermum inodorum* (W1), *Vicia hirsuta* (W4), loc.
Threatened species: *Anthemis cotula* (VU), *Aphanes arvensis* (VU), *Ranunculus arvensis* (VU), *R. sardous* (CR), *Rhinanthus alectorolophus* (VU), *Veronica agrestis* (EN). – *Agrostemma githago* (CR), *Filago arvensis* (VU), *Veronica opaca* (CR) were rarely observed in this com.

Structure and species composition: This com. is among the most widely distributed occurring in various crops, mainly cereals (winter and spring varieties) and mixtures with legumes, meadow clover and mixtures with alsike and/or white clover, possibly in clover-grass mixtures, rape, flax, fodder-beet, kale, potatoes and stubble. Stands are structured very differently depending on the crop, three-layered stands may be observed in cereals (the tallest of which is winter rye – up to 180 cm, followed by oats – up to 100 cm, and legume-grain mixtures – the most common), in other crops (except rape) normally two-layered stands develop. Total cover amounts on average to 90%, of which ca 50% is weeds. This com. becomes fully developed from July and August (in cereal and legume-grain mixtures) to October (in root crops and stubble). A relatively lower constancy is characteristic of *Apera spica-venti, Aphanes arvensis*, *Centaurea cyanus, Vicia tetrasperma* (compared with com. no. 14), and also *Veronica persica, Fumaria officinalis, Lamium amplexicaule, Geranium pusillum* and *Atriplex patula*, i.e. otherwise quite com-

mon *Stellarietea* species avoiding nutrient-poor soils. Among the companions the rather low constancy of *Convolvulus arvensis* is obvious when compared with *Elytrigia repens* and *Cirsium arvense.* This com. contains many species that grow in wet places, and the first stages of various *Bryophyta* are often observed in the lowermost layer.

Ecology, dynamics and distribution (Table 2, Fig. 7): Very typical com. in the Czech and Moravian Mesophyticum and the Carpathian Mesophyticum, mainly growing in colline to supracolline belts in nutrient-poor substrates derived from Proterozoic and older Paleozoic rocks of the Bohemian Massif, acidic Permocarboniferous rocks, Cretaceous decalcified sandstones, Tertiary and Quaternary decalcified sediments and mineral-poor substrates of the West-Carpathian flysh. Corresponding loamy-sandy to sandy-loamy soils, with a high content of gravel and stones (often more than 50%) occur in the potato-oats subzone.

Variability: It is possible to distinguish three subass.: (1) *Spergulo arvensis-Scleranthetum annui typicum*, (2) *Spergulo arvensis-Scleranthetum annui sherardietosum* **subas. nova hoc loco**, (3) *Spergulo arvensis-Scleranthetum annui violetosum tricoloris* **subas. nova hoc loco** (see Appendix 1).

The first subas. lacks differential species and occurs throughout the Czech Republic; the type relevé is that of the as. The second subas. is characterized by *Sherardia arvensis* and, in alternation, other *Sherardion* species together with some *Centaureetalia* species (e.g. *Avena fatua*, *Sinapis arvensis,* etc.). This subas. mainly occurs in rather warm habitats at low altitudes. Soil texture is middle heavy to heavy and type dystric planosol, possibly stagno-gleyic and luvic cambisol. This subas. seems to be present throughout the Czech Republic but further observations are necessary. The third subas. is less well known, but occurs mainly on extremely poor siliceous substrates, often also at high altitudes, where dystric cambisols prevail. The soils are rather light, loamy-sandy to gravelly-sandy with stones. Locally, in waterlogged habitats stagno-dystric cambisols may occur. This subas. is simlar to *Holco-Galeopsietum* but is characterized by *Viola tricolor* subsp. *tricolor*, *Rhinanthus alectorolophus,* and various species of *Molinio-Arrhenatheretea*. All the three subas. may include variants in wet habitats characterized by the following species: *Mentha arvensis, Stachys palustris* (water table is rather deep in the soil), and especially *Persicaria hydropiper, Juncus bufonius, Sagina procumbens, Ranunculus sardous, Myosurus minimus,* etc. (habitat is moist at the soil surface throughout the year). Here, dystric gleysols develop locally.

General remarks on the *Spergulo-Scleranthetum*: The only reason why many comm. were not classified in particular ass. was the "shortage of good as. species": *Galeopsio-Aphanetum* Meisel 1962 is very similar to *Spergulo-Scleranthetum* (cf. Meisel 1962: 85–87 et tabs. suppl., then Meisel 1967: 131 et tabs. suppl. sub *Aphanes*-Ges.). Voigtländer's (1966: 96–98 et table) com. *Spergula arvensis-Scleranthus*-Ges. from NE Germany fully corresponds to *Spergulo-Scleranthetum.* Many subass. labelled as "*scleranthetosum*" deserve probably the rank of an as. – see Borowiec et al. (1987: 235–237 sub *Aphano-Matricarietum*), Warcholińska (1974: 142–143 sub *Vicietum tetraspermae*) and Schubert & Mahn (1968: 248–268 sub *Aphano-Matricarietum* Rasse v. *Galeopsis tetrahit* subas. *Spergula arvensis*). A com. similar to the *Spergulo-Scleranthetum sherardietosum* (see here the variability) was described by Knapp (1958: 186–188, and Table on p. 214–216) from Germany (Vogelsberg uplands) sub *Raphanus-Galeopsis tetrahit*-Ass.

References: (a) Cz. Rep.: Vojta (1954 sub *Spergulo arvensis-Scleranthetum annui* "as. nova", C, TR lost), Kühn (1955, R no. 74, 79, 87, 127; 1965, R no. 154, 233), Kühn & Uhrecký (1959, Table 2, R no. 41, 45, 47, 48, 51), Aulická (1961, TR), Jehlík (1963, TR sub *Galeopsio-Matricarietum chamomillae scleranthetosum* (Kuhn 1937) subas. et comb. nova), Volf (1964, L, C; 1965, L, C); 1971 et 1974, TR), Kolková (1975, TR sub *Aphano-Matricarietum scleranthetosum*), Kropáč (1981, L, C sub *Spergulo-Raphanetum*; 1995, L, C), Otýpková (2001, TR), Lososová (2004, TS); (b) Slovakia: Passarge & Jurko (1975, TR sub *Violo tricoloris-Scleranthetum annui*), Jarolímek et al. (1997, TS), Mochnacký (2000, TS), both including the *Holco-Galeopsietum*; (c) other countries: Kuhn (1937, one relevé), Knapp & Knapp (1953, L, C sine denom.), Wilmanns (1956, TS incl. *Holco-Galeopsietum*), Oberdorfer (1957a, TS sub *Galeopsio-Matricarietum*; 1983, TS sub *Galeopsio-Aphanetum*), Knapp R. (1958, TS sub *Raphanetum raphanistri*; 1959, TR sub *Galeopsis speciosa-Galeopsis bifida* Ass.), Kutschera (1966, TR sub *Vicia villosa* subsp. *pseudovillosa-Scleranthus annuus*-Ass.), Voigtländer (1966, TR sub *Spergula arvensis-Scleranthus annuus* Ges., *Aphanes arvensis* Ges. et *Spergula arvensis-Erodium cicutarium* Ges.), Meisel (1967, TS suppl. sub *Aphanes*-Ges.), Jage (1972, TR sub *Scleranthus annuus* Ges.), Warcholińska (1974, TR sub depleted com. *Aphanion*), Nezadal (1975, TR sub *Scleranthus annuus* Ges.), Solomakha (1987, TR sub *Elytrigio-Aperetum spicae-venti* p.p.), Wnuk (1989, TR sub *Vicietum tetraspermae sperguletosum*), Warcholińska (1990, TS sub *Vicio nigrae-Rumicetum acetosellae, Polygono hydropiperi-Sperguletum arvensis* p.p. et *Raphano-Rumicetum acetosellae* p.p.), Mucina (1993, L, C, incl. *Holco-Galeopsietum*).

Polygono-Chenopodion polyspermi Koch ex Tx. 1937

Segetal communities in root crops, some legume-grain mixtures and young clover-grass mixtures, mainly in the temperate zone but also in the boreale and submeridionale zones of the Euro-Siberian region

Original diagnosis: Tüxen (1937: 26–33)
Nomenclature type: *Panico-Chenopodietum polyspermi* Tx. 1937, p. 29–31, **lectotypus hoc loco designatus**
Syn.: *Spergulo-Oxalidion* Görs in Oberdorfer et al. 1967, *Oxalidion europaeae* (Görs 1967) Passarge 1978a (art. 29)
Syntax. syn.: *Veronico-Euphorbion pepli* Sissingh 1942 p.p. (art. 1), (*Eu-*)*Polygono-Chenopodion polyspermi* Koch 1926 em. Sissingh in Westhoff et al. 1946 p.p. (art. 34), *Veronico-Euphorbion* Sissingh ex Passarge 1964 p.p., *Spergulo-Erodion* J. Tüxen ex Passarge 1964 p.p.
Incl.: *Eu-Polygono-Chenopodienion* (Sissingh in Westhoff et al. 1946) Oberdorfer 1957 em. Th. Müller et Oberdorfer in Oberdorfer 1983 p.p. max., *Galinsogo-Euphorbenion pepli* Passarge 1981 p.p.
Non: *Fumario-Euphorbion* Th. Müller ex Görs 1966, *Polygono-Chenopodion* W. Koch 1926 em. Sissingh in Westhoff et al. 1946 denuo em. Th. Müller et Oberdorfer in Oberdorfer 1983

Syntaxonomic comments: (1) Alliance *Polygono-Chenopodion polyspermi* was designated by Koch (1926) with *Bidentetum tripartiti*, but he cited also *Panico-Chenopodietum polyspermi* Br.-Bl. (Schedae IV, Nr. 303, 1921), which was confirmed by Tüxen (1937: 29) who presented this as. with "Br.-Bl. 1921" in parentheses. – (2) The *Panico-Chenopodietum polyspermi* Tx. 1937 is selected here as the lectotypus of the alliance of the four ass. listed by Tüxen (1937). – (3) This alliance in this form corresponds to the original conception of Tüxen (1937) of one containing acidophilous segetal comm. in rather wet habitats (ass. *Bidentetum tripartiti* and *Atriplicetum litoralis* were later transferred into their own alliances). – (4) Görs (in Oberdorfer et al. 1967) designated the alliance *Spergulo-Oxalidion* (with *Panico-Chenopodietum polyspermi* Br.-Bl. 1921 and further acidophilous associations), which became the younger nomenclatural synonym of *Polygono-Chenopodion polyspermi* (cf. right opinion by Th. Müller et Oberdorfer in Oberdorfer 1983, p. 83).

Diagnostic species: *Chenopodium polyspermum, Persicaria maculosa* (opt.), *Erysimum cheiranthoides* (opt.), *Oxalis fontana,* and some order species as *Galeopsis tetrahit, Lapsana communis, Raphanus raphanistrum, Spergula *arvensis,* etc.; transgressive from *Panico-Setarion* are *Galinsoga parviflora* and *Echinochloa crus-galli*. – Note: Abroad publications usually list also *Galinsoga ciliata* (i.e. *G. quadriradiata*),

Cerastium glomeratum, and several species of wet places as differentials (e.g. *Bidens tripartita, Persicaria amphibia, P. hydropiper, Rorippa sylvestris, Symphytum officinale, Myosoton aquaticum,* etc. – see Mucina 1993: 132, and other publications).

Comm. of this alliance are well studied throughout the European temperate zone, but less so in the boreale and submeridionale zones (e.g. Tüxen 1937, 1950, Sissingh 1946, 1950, Oberdorfer 1957a, 1983, Passarge 1959, 1964, Lorenzoni 1963, Vollrath 1967, Schubert & Mahn 1968, Wójcik 1973, 1980, Vevle 1988, Hüppe & Hofmeister 1990, Mucina 1993). In the Czech Republic they have been little studied.

18. *Panico-Chenopodietum polyspermi* Tx. 1937 (Table 1: col. 18)

Database nos.: 342736–342744
Original diagnosis: Tüxen (1937: 29–31)
Nomenclature type: **neotypus hoc loco designatus** – see Appendix 2 (original table of Tüxen is synthetic and is followed the art. 21 of the Code; the neotype is selected deliberately among the accurately published relevés by Vollrath 1967 and is presented here owing to the difficulty of obtaining this publication)
Syn.: *Panico-Chenopodietum polyspermi* Br.-Bl. 1921 (art. 1), Ass. a *Chenopodium polyspermum-Polygonum persicaria* Malcuit 1929 (art. 2b, 7), *Oxalido-Chenopodietum polyspermi* Sissingh 1942 (art. 1), *Oxalido-Chenopodietum polyspermi* Sissingh in Westhoff et al. 1946, *Oxalido-Chenopodietum polyspermi subatlanticum* Tx. 1950 (art. 34), *Oxalido-Chenopodietum polyspermi medioeuropaeum* Tx. 1950 (art. 34)
Syntax. syn.: *Oxalido-Chenopodietum* Sissingh 1950, *Chenopodio-Oxalidetum fontanae* Sissingh 1950 nom. inv. Th. Müller et Oberdorfer in Oberdorfer 1983, *Rorippo-Chenopodietum polyspermi* Köhler 1962, *Chenopodio-Oxalidetum strictae* auct.
Incl.: Ass.-Gr. *Chenopodietum polyspermi* Passarge 1964, Hauptass. *Panico-Chenopodietum polyspermi* R. Knapp 1948
Non: *Galeopsio-Chenopodietum polyspermi* Oberdorfer 1957, *Galeopsio-Sperguletum arvensis* Passarge in Passarge et Jurko 1975

Diagnostic species: *Chenopodium polyspermum, Oxalis fontana,* and alliance species *Persicaria maculosa, Erysimum cheiranthoides*; negatively characterized by absence of most species of the *Fumario-Euphorbion*.
Constant species (50–60% constancy is indicated by cross): *Anagallis arvensis*$^+$, *Capsella bursa-pastoris, Chenopodium album, C. polyspermum, Cirsium arvense*$^+$, *Elytrigia repens*$^+$, *Erysimum cheiranthoides, Fallopia convolvulus, Galeopsis tetrahit, Galinsoga parviflora*$^+$, *Galium aparine*$^+$, *Geranium pusillum*$^+$, *Gnaphalium uliginosum*$^+$, *Lamium purpureum, Lapsana communis, Oxalis fontana*$^+$, *Persicaria maculosa, Plantago *major, Poa annua, Ranunculus repens*$^+$, *Raphanus raphanistrum, Rumex crispus, Sonchus asper*$^+$, *Stellaria media, Taraxacum* sect. *Ruderalia, Thlaspi arvense, Tripleurospermum inodorum, Veronica persica*
Important weeds: *Chenopodium album* (W1), *C. polyspermum* (W4), *Cirsium arvense* (W1), *Elytrigia repens* (W1), *Galeopsis tetrahit* (W4), *Galinsoga parviflora* (W3), *Galium aparine* (W1), *Persicaria maculosa* (W4), *Ranunculus repens* (W5), *Raphanus raphanistrum* (W4), *Rumex crispus* (W2), *Thlaspi arvense* (W2), *Tripleurospermum inodorum* (W1)
Threatened species: In one relevé *Kickxia elatine* (EN) has been recorded near the town Švihov (district Klatovy), 1971.

Structure and species composition: This com. occurs in root crops (potatoes, fodder beet) and summer legume-grain mixtures and is fully developed in late summer to autumn. In root crops it is usually two-layered with a canopy height of around 40–50 cm overtopped by dominant *Chenopodium album, Cirsium arvense, Tripleurospermum inodorum* and less frequently by *Echinochloa crus-galli,* with the upper layer composed of the diagnostic *Chenopodium polyspermum, Persicaria maculosa* and *Erysimum cheiranthoides,* together with numerous companions, such as *Galinsoga parviflora*, *G. quadriradiata* (recent decades), etc. In the lower layer is *Oxalis fontana,* accompanied by *Stellaria media, Lamium purpureum, Veronica persica, Plantago major*

subsp. *major, Poa annua*, *Ranunculus repens, Stachys palustris* and *Gnaphalium uliginosum* (to mention only the most frequent).

Ecology, dynamics and distribution (Table 2, Fig. 8): The distribution of the com. is more extensive than shown on the map, which is due to a lack of records. It likely occurs in a major part of the Czech and Moravian Mesophyticum as well as the Carpathian Mesophyticum, and in a minor part of the Thermophyticum and Pannonicum. Suitable habitats are periodically flooded alluvions of major rivers and waterlogged places near brooks and fishponds, where the soils are polygenetic loams, pre-quaternary sandy-clays and/or other non-carbonaceous alluvial deposits. In these areas the farming of sugar beet-barley and potato-barley prevail.

Variability: Only data are for other countries. Early studies tried to distinguish between the subatlantic and central-European races (cf. Tüxen 1950), and were followed by Brun-Hool (1963) who accepted the reality of two ass., (a) subatlantic *Oxalido-Chenopodietum* Sissingh 1950, and (b) subcontinental *Panico-Chenopodietum* Br.-Bl. 1921. This view, however, was later rejected. The main problem is in the delimitating between comm. of *Polygono-Chenopodion* and *Panico-Setarion* on the one hand, and comm. of *Polygono-Chenopodion* and *Fumario-Euphorbion* on the other (see Krippelová 1980; and synoptic Table 1, where this is reflected). There is ample information in Oberdorfer (1983: 85–95), where the broader concept of *Chenopodio-Oxalidetum fontanae* Sissingh 1950 nom. invers. is elaborated probably by Th. Müller, and various syntaxonomical views may be consulted. At our disposal is also the valuable material of Vollrath (1967, tabs. in suppl.) with ecological implications of the possible existence of lower units. Earlier Brun-Hool (1963) distinguished three subass.: (a) *typicum,* (b) *linarietosum spuriae* (with *Kickxia spuria,* and rarely *K. elatine, Euphorbia exigua, Melandrium noctiflorum, Aethusa cynapium, Sherardia arvensis*), (c) *scleranthetosum* (with *Rumex acetosella, Spergula arvensis, Scleranthus annuus*). In addition, it is likely that the *Rorippo-Chenopodietum polyspermi* Köhler 1962 growing in waterlogged habitats is most probably a "good as."

References: (a) Cz. Rep.: Vojta (1954, TR sub as. *Equisetum arvense-Mentha arvensis*), Jehlík (1963, TR sub *Galeopsio-Chenopodietum* p.p.), Kolková (1975, TR as previously), Kropáč (1981, L, C sub *Rorippo-Chenopodietum* et *Oxalido-Chenopodietum*; 1988, TS sub *Chenopodio-Oxalidetum*), Hejný & Kropáč (1995, L, C sub *Rorippo-Chenopodietum* et *Oxalido-Chenopodietum*), Kusák (1994, TR), Otýpková (2001, TR), Lososová (2004, TS); (b) Slovakia: Krippelová (1981, TR), Jarolímek et al. (1997, TS), Mochnacký (2000, TS), Hadač et al. (1997, TR sub *Oxalido-Chenopodietum*); (c) other countries: Libbert (1932, one R), Tüxen (1937, TS; 1950, L, C sub *Oxalido-Chenopodietum*), Kruseman & Vlieger (1939, TR recte ad *Panico-Setarion*), Morariu (1943, 4R), Sissingh (1946, L, C sub *Oxalido-Chenopodietum*; 1950, TR as previously), Knapp R. (1948, L, C sub "Hauptass."), Braun-Blanquet (1949, L, C), Rochow (1951, TS), Oberdorfer (1957a, TS; 1983 et collab. Th.Müller, TS sub *Chenopodio-Oxalidetum*), Tüxen & Oberdorfer (1958, TR sub various ass. p.p. min.), Passarge (1959a, L, C sub *Polygono-Chenopodion* Ges.; 1959b, TR; 1964, TS sub Ass-Gr. *Chenopodietum polyspermi*; 1976, TR ad *Rorippo-Chenopodietum*), Soó (1961, L, C sub *Rorippo-Setarietum*), Zeidler (1962, 1965, R sub *Oxalido-Chenopodietum*), Brun-Hool (1963, TR; 1964, TR), Lorenzoni (1963, TR; 1964, TR; 1978, L, C), Rodi (1967a, TS), Hilbig (1967, TS sub *Rorippo-Chenopodietum*; 1973, TS sec. Jage 1972), Vollrath (1967, TR suppl.), Schubert & Mahn (1968, TS sub *Rorippo-Chenopodietum* p.p.), Westhoff & den Held (1969, L, C sub *Oxalido-Chenopodietum subatlanticum*), Holzner (1973, TR suppl.), Wójcik (1973, L, C; 1980 TR sub *Oxalido-Chenopodietum*), Kump (1974, TR), Nezadal (1975, 3R sub *Rorippo-Chenopodietum*), Lorenzoni (1978, L, C sub *Oxalido-Chenopodietum*), Hofmeister (1981, TR sub *Rorippo-Chenopodietum*), Szotkowski (1981, TR sub *Oxalido-Chenopodietum*), Gehu et al. (1985, L, C sub *Oxalido-Chenopodietum*), Hüppe & Hofmeister (1990, TS sub *Chenopodio-Oxalidetum*), Mucina (1993, L, C), Haveman et al.(1998, TS sub *Chenopodio-Oxalidetum*).

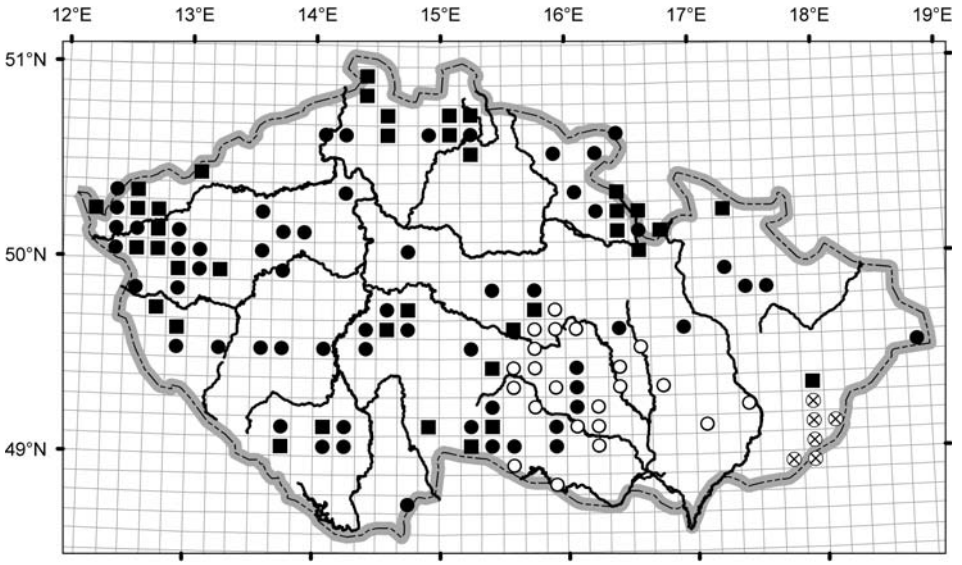

Fig. 7. Distribution of the communities of *Scleranthion* in the Czech Republic. ● *Spergulo-Scleranthetum* (including data from ○ Lososová 2004 and ⊗ Otýpková 2001); ■ *Holco-Galeopsietum.*

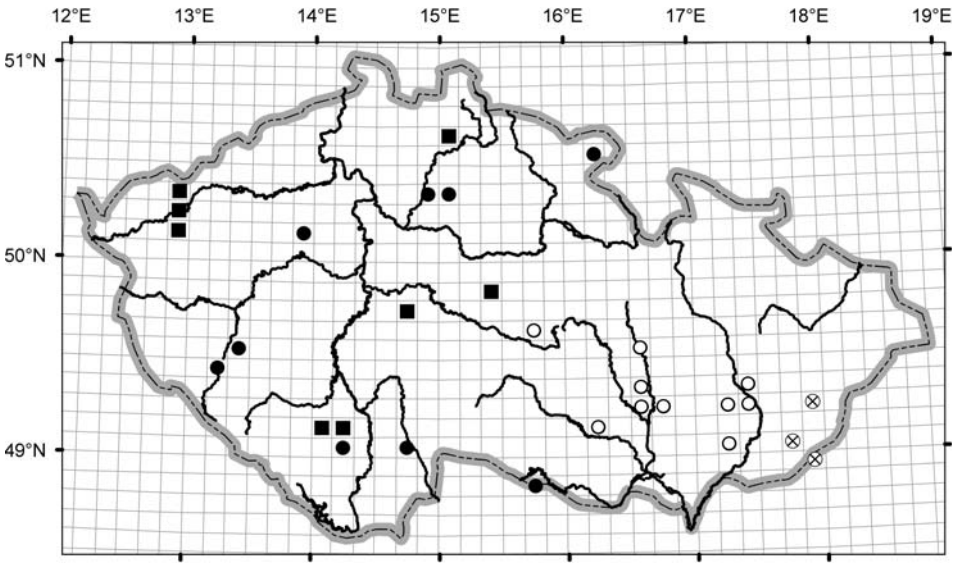

Fig. 8. Distribution of the communities of *Polygono-Chenopodion* in the Czech Republic. ● *Panico-Chenopodietum* (including data from ○ Lososová 2004 and ⊗ Otýpková 2001); ■ *Galeopsio-Chenopodietum.*

19. *Galeopsio-Chenopodietum polyspermi* Oberdorfer 1957 (Table 1, col. 19)

Database nos.: 342745–342756
Original diagnosis: Oberdorfer (1957a: 60–62, synthetic table)
Nomenclature type: impossible to be stated now
Syntax. syn.: *Holco-Galeopsietum* Hilbig 1967 p.p. min., *Chenopodio-Oxalidetum fontanae* Sissingh 1950 nom. inv. Th. Müller et Oberdorfer in Oberdorfer 1983 p.p., *Galeopsio-Sperguletum arvensis* Passarge in Passarge et Jurko 1975 p.p. max.

Syntaxonomical comments: The concept of this as. is not clearly defined by the author (Oberdorfer 1957a) because in the last synthesis of *Chenopodio-Oxalidetum fontanae* (see the syn.) this as. was included in a broader concept. In the current study the synthetized relevés contain the alliance species of at least medium constancy and most characteristic species of the order with high constancy. This as. is similar to *Galeopsio-Sperguletum* (see the syn.), which is close to *Holco-Galeopsietum* (see Passarge in Passarge et Jurko, op. c., Table 8, suppl. 5, rel. 4–15). For further evaluation of this as., additional studies are needed.

Diagnostic species: *Persicaria maculosa, Chenopodium polyspermum, Erysimum cheiranthoides* (as alliance species), and high constancy values of *Galeopsis tetrahit*, *Erodium cicutarium*, *Raphanus raphanistrum*, *Spergula arvensis* subsp. *arvensis, Vicia hirsuta*, *Scleranthus annuus* (only slight transgression of *Holcus mollis*)
Constant species (50–60% constancy is indicated by cross): *Anagallis arvensis, Atriplex patula, Capsella bursa-pastoris, Centaurea cyanus, Chenopodium album, Ch. polyspermum*+, *Cirsium arvense, Convolvulus arvensis, Elytrigia repens, Equisetum arvense*+, *Erodium cicutarium, Fallopia convolvulus, Galeopsis tetrahit, Galium aparine*+, *Geranium pusillum*+, *Gnaphalium uliginosum, Lamium amplexicaule*+, *Lapsana communis, Mentha arvensis, Myosotis arvensis, Persicaria maculosa, Plantago *major*+, *Poa annua*+, *Polygonum aviculare*+, *Raphanus raphanistrum, Scleranthus annuus, Sonchus asper*+, *Spergula *arvensis, Stellaria media, Taraxacum* sect. *Ruderalia*+, *Thlaspi arvense, Tripleurospermum inodorum, Veronica arvensis*+, *V. persica*+, *Vicia hirsuta, Viola arvensis*
Important weeds: *Chenopodium album* (W1), *Cirsium arvense* (W1), *Elytrigia repens* (W1), *Galeopsis tetrahit* (W4), *Mentha arvensis* (W5), *Persicaria maculosa* (W4), *Raphanus raphanistrum* (W4), *Spergula *arvensis* (W4), *Stellaria media* (W2), *Tripleurospermum inodorum* (W1)
Threatened species: no

Structure and species composition: This is a very species rich com. associated with the autumn agroecophase of root crops, possibly also summer legume-grain mixtures and/or silo-maize. Stands of potatoes, fodder beet and kale ca 40 cm tall are usually two-layered and silo-maize (up to 200 cm) three-layered. Tallest weeds are *Chenopodium album, Cirsium arvense* and *Tripleurospermum inodorum,* which usually overtop relatively low canopies, followed by medium tall *Spergula *arvensis, Galeopsis tetrahit, Chenopodium polyspermum, Raphanus raphanistrum, Persicaria maculosa,* etc. The bottom layer consists of *Erodium cicutarium, Scleranthus annuus, Veronica arvensis* and others (presence of *Anagallis arvensis* and *Medicago lupulina* is exceptional). The weeds are often abundant (exceeding 50% of the total cover of about 80%).

Ecology, dynamics and distribution (Table 2, Fig. 8): Due to inadequate research there are only scattered records, which indicate it occurs in several parts of the Czech Mesophyticum and Czech Oreophyticum; it is recorded at higher altitudes growing in habitats with nutrient-poor, acid light soils with gravel and stones, which corresponds to the potato-oats subzone.

Variability: There are at least two groups (in addition to "typical"): (a) group with *Valerianella dentata, Medicago lupulina* and *Avena fatua* – slightly thermophilous, (b) group with *Arabidopsis thaliana, Holcus mollis* and *Rumex *acetosella* – extremely acidophilous; further research on this group is, however, necessary.

References: (a) Cz. Rep.: Jehlík (1963, TR), Kolková (1975, TR); (b) Slovakia: Passarge in Passarge & Jurko (1975, TR sub *Galeopsio-Sperguletum* p.p.); (c) other countries: Oberdorfer (1957a, TS), Th. Müller & Oberdorfer in Oberdorfer (1983, TS sub *Chenopodio-Oxalidetum* submontane and montane forms p.p.).

Arnoseridion minimae Malato-Beliz, J. Tüxen et Tx. 1960

Segetal communities of cereals and legume-grain mixtures (stalk crops in general) that occur only in areas of the European temperate zone with a suboceanic climate.

Original diagnosis: Malato-Beliz, J. Tüxen & R. Tüxen (1960: 145–147)
Nomenclature type: *Sclerantho annui-Arnoseridetum minimae* Tx. 1937, **lectotypus hoc loco designatus**
Incl.: *Alchemilla arvensis-Arnoseris minima* Vereine Meusel 1940 (art. 3d, 10), *Arnoseridenion minimae* (Mal.-Bel. et al. 1960) Oberdorfer 1983, *Teesdalio-Arnoseridenion* Warcholińska 1990 (art. 29)
Non: *Scleranthion annui* (Krus. et Vlieger 1939) Sissingh in Westhoff et al. 1946 (erroneously by Kropáč in Moravec 1995)

Diagnostic species: (a) Cz. Rep.: *Aphanes australis* (*A. microcarpa* auct.), *Arnoseris minima, Filago minima, Hypochaeris glabra, Illecebrum verticillatum* (loc.), *Teesdalia nudicaulis*; (b) outside the Cz. Rep.: *Anthoxanthum aristatum* (*A. puelii*), *Evax carpetana, Galeopsis segetum, Mibora minima, Moenchia erecta, Molineriella laevis, Ornithopus perpusillus, Spergula pentandra, Teesdalia coronopifolia, Trisetum ovatum.* – Note: *Illecebrum verticillatum*, referred to earlier by Hejný (in Holub et al. 1967), has similar ecology as some *Nanocyperion* taxa brought out by other authors for the *Arnoseridion* (see References).

Syntaxonomic comments: (1) This comm. has been studied over a long period in W Europe (Allorge 1922, Chouard 1925, Malcuit 1929, Tüxen 1937) and together with later contributions its specific composition and ecology became more evident, which resulted in the establishment of a separate alliance quite different from other *Scleranthion* comm. (as the rank of alliance is justified, it is held in the present paper). – (2) New findings from the Iberian Peninsula were recently summarized and various concepts criticized by Nezadal (1989, p. 37–46). In addition, Nezadal established another related alliance from the Mediterranean Iberian Peninsula, viz. *Rumicion bucephalophori* (op. c., p. 55–74). – (3) It is evident that many of the diagnostic *Arnoseridion* taxa may also occur in the *Corynephoretalia canescentis* Klika 1934 em. Tx. 1962 and *Trifolio arvensis-Festucetalia ovinae* Moravec 1967 (e.g. *Teesdalia nudicaulis, Filago minima, Hypochaeris glabra, Spergula pentandra, Veronica dillenii* and *V. verna*). Using the classic syntaxonomic concept, they are differential species against *Scleranthion.* – (4) Last-mentioned groupings in *Arnoseridion* were studied mainly by Polish scientists (see Wójcik 1965 and Warcholińska 1974, 1990). Warcholińska (1990) proposed that *Arnoseridion* be broadened and the establishment of two suballiances: (a) *Teesdalio-Arnoseridenion* (corresponding to the concept of Oberdorfer 1983), (b) *Veronico-Spergulenion morisoni* (containing many *Corynephoretalia* species on arable land).

These comm. of the alliance occur in areas that experience mild winter climate and have light soils extremely poor in nutrients due to leaching and acidification. The distribution of these comm., derived from the records in most relevant publications, ranges from W Europe eastwards: Malato-Beliz et al. (1960), Nezadal (1989), Tüxen (1937, 1950), Oberdorfer (1957a, 1983), Schubert & Mahn (1968), Passarge (1957, 1964), Holzner

(1973), Kornas (1950), Bielska (1989). In the Czech Republic these comm. are not adequately studied or there are only few relevés and fragmentary observation on several of the diagnostic species in older floristic contributions.

20. *Scleranthо annui-Arnoseridetum minimae* Tx. 1937 (Table 1, col. 20)

Database nos.: 342730–342735
Original name form: *Scleranthus annuus-Arnoseris minima*-Ass. Tx. 1937
Original diagnosis: Tüxen (1937: 19–21)
Nomenclature type: Original table by Tüxen (op. c.) is synthetic and the neotype should be selected probably by German authors (distribution centre is located in NW Germany)
Syn: As. à *Scleranthus annuus, Arnoseris minima* et (localement) *Radiola linoides* Chouard 1925 (art. 10), *Teesdalio nudicaulis-Arnoseridetum minimae* Tx. 1950 (art. 29)
Syntax. syn.: As. à *Chrysanthemum segetum* et *Myosurus minimus* Allorge 1922 (art. 2b, 7) p.p., As. à *Scleranthus annuus* Malcuit 1929 (art. 2b, 7) p.p., *Setario-Arnoseridetum* Passarge 1957 p.p.
Incl.: *Arnoserido-Scleranthetum* Hauptass. Knapp 1948 (art. 3c), Ass-Gr. *Arnoseridetum minimae* Passarge 1964

Diagnostic species: *Teesdalia nudicaulis*, *Arnoseris minima, Veronica verna*, *Hypochaeris glabra*, *Aphanes australis*, *Filago minima*
Constant species: *Arabidopsis thaliana, Arnoseris minima, Capsella bursa-pastoris, Chenopodium album, Erodium cicutarium, Fallopia convolvulus, Myosotis stricta, Raphanus raphanistrum, Rumex *acetosella, Scleranthus annuus, Spergula *arvensis, Teesdalia nudicaulis, Veronica arvensis, V. sublobata, V. verna, Vicia angustifolia, Viola arvensis*
Important weeds: *Raphanus raphanistrum* (W4)*, Rumex *acetosella* (W4)*, Scleranthus annuus* (W4)*, Spergula *arvensis* (W4)
Threatened species: *Aphanes australis* (CR), *Arnoseris minima* (CR), *Filago minima* (VU), *Hypochaeris glabra* (CR), *Teesdalia nudicaulis* (EN), *Veronica verna* (monitoring needed!)

Structure and species composition: This is a com. of extreme habitats in winter rye (possibly some cultivars of wheat). Stands are not dense (about 80% total cover of which cereals make up 60% and weeds 40%) and slightly stratified (at least two-layered). Diagnostic species are confined to the lower layer (up to 15–25 cm) and in the upper layer are some constantly accompanying species such as *Raphanus raphanistrum, Arabidopsis thaliana, Spergula* arvensis, Vicia angustifolia,* etc. Phenological optimum of this com. is in spring.

Ecology, dynamics and distribution (Table 2, Fig. 10): The few Czech records confirm the results from other countries that define the important ecological factors: soil and the influence of suboceanic climate. Six records are for light-textured, nutrient-poor acid soils on terraces of gravelly sands in the Czech Mesophyticum (only one record from the Czech Thermophyticum), which correspond to the potato-rye farming subzone. The main centre is located on the flat ground of the Třeboňská pánev basin and corresponding localities in adjacent Austria (NW Waldviertel region, cf. Mucina 1993, p. 124).

References: (a) Cz. Rep.: Hejný in Holub et al. (1957, L, C sub *Arnoseridion*), Jehlík (1963, TR sub *Filagini-Aperetum* supposed as impoverished *Teesdalio-Arnoseridetum*), Kropáč (1981, L, C; 1995, L, C), Prach (1999, L, C sub *Arnoseridion* et *Radiolion*); (b) other countries (further not discerned between *Scleranthо-Arnoseridetum* Tx. 1937 and *Teesdalio-Arnoseridetum* Tx. 1950): Allorge (1922, L, C sub com. a *Chrysanthemum segetum* et *Myosurus minimus* p.p.), Chouard (1925, L, C see above syn., p.p.), Malcuit (1929, L, C see syn. above p.p.), Libbert (1930, L, C sub Ass. v. *Scleranthus annuus-Myosurus minimus* p.p.; 1932, TS as previously p.p.), Tüxen (1937, TS; 1950, L, C), Kruseman & Vlieger (1939, TR), Wasscher (1941, TS), Sissingh (1946, L, C; 1950, TR), Knapp R. (1948, L, C sub Haupt-Ass.), Kornaś (1950, 4R), Passarge (1957, TS sub *Arnoseris minima*-Gr. incl. *Setario-Arnoseridetum*; 1959b, TR; 1964, TS sub Ass.-Gr. *Arnoseridetum* incl. vicariants; 1971, TS), Oberdorfer (1957a, TS; 1983, TS), Nowiński (1964, TR), Wójcik (1965, TR, incl. contact comm.), Merker (1966, C), Voigtländer (1966, TR sub *Arnoseris minima-Trifolium arvense* Ges. et *Teesdalio-Arnoseridetum*), Vollrath

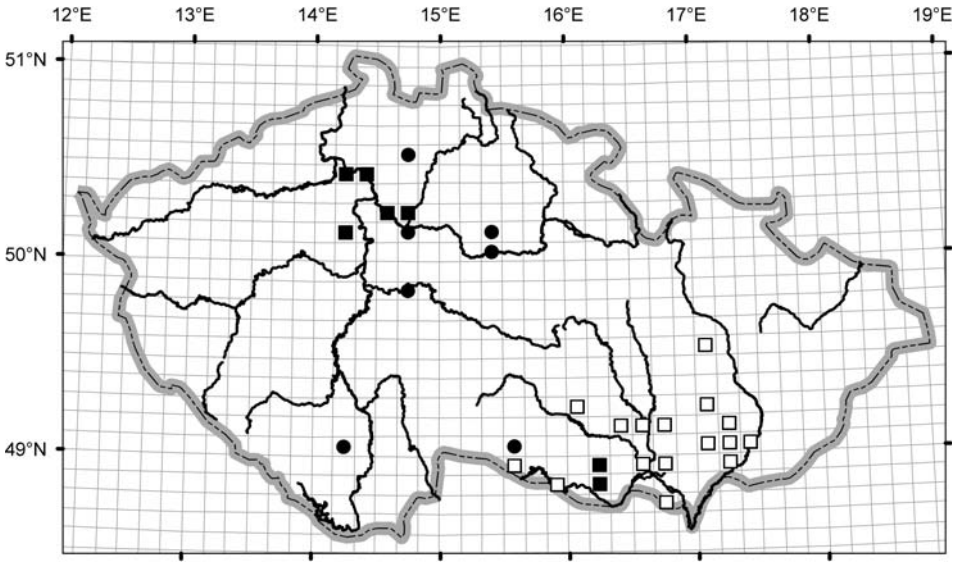

Fig. 9. Distribution of the communities of *Panico-Setarion* in the Czech Republic. ● *Echinochloo-Setarietum viridis*; ■ *Echinochloo-Setarietum pumilae* (including data from □ Lososová 2004).

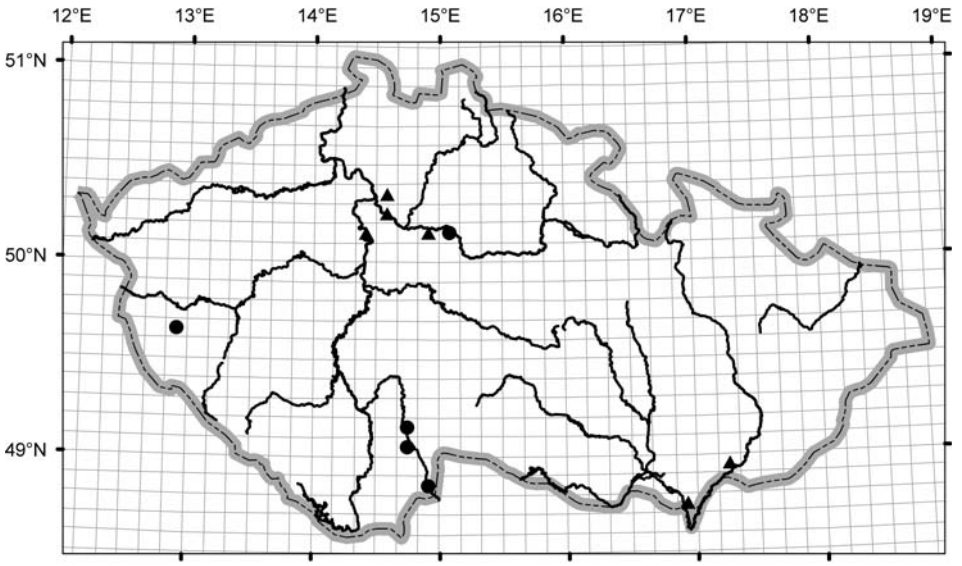

Fig. 10. Distribution of the communities of *Arnoseridion* and *Eragrostion* in the Czech Republic. ● *Scleranthо-Arnoseridetum*; ▲ *Portulacetum*.

(1967, TR sub *Setario-Arnoseridetum*), Schubert & Mahn (1968, TS), Westhoff & den Held (1969, L, C), Jage (1972, TS), Holzner (1973, TR suppl.), Siciński (1974, TR), Warcholińska (1974, TR), Nezadal (1975, TR, incl. vicariants), Kuźniewski (1975, TS), Kutzelnigg (1984, TR, incl. vanishing spp.), Kulp & Cordes (1986, TS, conversion to *Aphano-Matricarietum*), Borowiec et al. (1987, TS), Pilotek (1988, L, C, incl. protection of endangered spp.), Bielska (1989, TR), Wnuk (1989, TR, incl. contact comm.), Hüppe & Hofmeister (1990, TS), Warcholińska (1990, TS; 1995, TS), Ries (1992, TR), Mucina (1993, L, C), Haveman et al. (1998, TS).

Panico-Setarion Sissingh in Westhoff, Dijk et Passchier 1946

Segetal communities of root crops, vegetables and special crops in the temperate to submeridionale European zone.

Original diagnosis: Sissingh in Westhoff, Dijk & Passchier (1946: 20–21)
Nomenclature type: *Panicetum ischaemi* Tx. et Preising in Tx. ex Passarge 1959, lectotypus designatus in Mucina (Mucina et al. 1993: 135)
Syntax. syn.: *Spergulo-Erodion* J. Tüxen 1966 (art. 2b, 8), *Spergulo-Erodion* J. Tüxen ex Passarge 1964, *Digitario-Setarion* Sissingh in Westhoff et al. 1946 em. Hüppe et Hofmeister 1990 (art. 30)
Incl.: *Panico-Setarienion* (Siss. in Westh. et al. 1946) Oberdorfer 1957, *Digitario-Setarienion* (Siss. in Westh. et al. 1946) Th. Müller in Oberdorfer 1983 (art. 30)
Non: *Eragrostion* Tx. ex Oberdorfer 1954

Diagnostic species: *Digitaria ischaemum, Echinochloa crus-galli* (opt.), *Erodium cicutarium* (opt.), *Galinsoga parviflora* (opt.), *Setaria pumila, S. viridis*

Syntaxonomic comments: (1) *Spergulo-Erodion* proposed by J. Tüxen (1966), validated by Passarge (1964), for acidophilous comm. of root crops on loamy-sandy soils includes four "Association-Groups" and contains ass. such as *Panicetum ischaemi, Echinochloo-Setarietum viridis, Echinochloo-Setarietum pumilae, Spergulo-Chrysanthemetum segetum, Setario-Stachyetum arvensis* and *Lycopsietum arvensis* (for synonyms except Passarge's small vicariants see below). – (2) Nearly the same concept as that of J. Tüxen ex Passarge was proposed in the amendation of *Panico-Setarion* by Hüppe & Hofmeister (1990: 70–71); all of the three last-mentioned ass. in the preceding paragraph were incorporated. Thus only the older *Spergulo-Erodion* was confirmed. – (3) These three last-mentioned ass. have not been recorded in the Czech Republic (some were recorded in adjacent countries). However, at least the *Lycopsietum arvensis* might have been recorded in the Czech Republic (see the synthesis and comments by Th. Müller in Oberdorfer 1983: 84–85). – (4) The problematics of possible suballiances are left open in the present paper, because more information is needed on the concept of the alliance by J. Tüxen ex Passarge (1964) and by Hüppe & Hofmeister (1990), which seems promising.

Comm. of this alliance prefer warm to mildly warm areas with rather acid soils of a loamy-sandy to sandy-loamy texture. In the Czech Republic they occur in the lowlands and hilly country of the colline belt; they may be considered to be substitute comm. of alluvial woodlands (especially *Querco-Ulmetum*) and oak-hornbeam woodlands (above all *Melampyro-Carpinetum*). Outside the Czech Republic, comm. of this alliance are known to occur in most European countries including the southern and south-eastern ones.

21. *Echinochloo cruris-galli-Setarietum viridis* Kruseman et Vlieger in Sissingh, Vlieger et Westhoff 1940 (Table 1, col. 21)

Database nos.: 342757–342763
Original name form: Ass. van *Echinochloa crus-galli* en *Setaria viridis* Kruseman et Vlieger in Sissingh et al. 1940
Original diagnosis: Kruseman & Vlieger in Sissingh et al. (1940: 60 and footnote on p. 60); there was explicitely stated that 15 relevés in Kruseman & Vlieger (1939: 360–364 incl. Table 7), also belonged to the diagnosis erroneously under *Panico-Chenopodietum polyspermi* (noticed by Tüxen op. c., p. 60)
Nomenclature type: Presumably an expert from the Netherlands mihgt designate it
Syn.: *Panico cruris-galli-Sperguletum arvensis* (Kruseman et Vlieger 1939) Tx. 1950 (art. 29), *Spergulo-Echinochloetum cruris-galli* auct. (art. 29)
Syntax. syn.: *Panico cruris-galli-Galinsogetum parviflorae* Tx. et W. Becker 1942 p.p. (art. 1)
Pseudonym: *Panico-Chenopodietum polyspermi* sensu Kruseman et Vlieger 1939 non Tx. 1937
Non: *Echinochloo cruris-galli-Setarietum pumilae* Felföldy 1942 corr. Mucina 1993

Diagnostic species: Besides constantly dominant alliance species (*Echinochloa crus-galli*, *Galinsoga parviflora*, *Setaria viridis*) high constancy of *Erodium cicutarium*, *Scleranthus annuus*, *Spergula arvensis* subsp. *arvensis*, and medium constancy of *Arabidopsis thaliana* and *Vicia hirsuta* (all as differantials towards the next as.)
Constant species: *Anagallis arvensis, Capsella bursa-pastoris, Chenopodium album, Echinochloa crus-galli, Elytrigia repens, Equisetum arvense, Erodium cicutarium, Fallopia convolvulus, Galinsoga parviflora, Raphanus raphanistrum, Scleranthus annuus, Setaria viridis, Spergula *arvensis, Stellaria media, Viola arvensis*
Important weeds: *Chenopodium album* (W1), *Echinochloa crus-galli* (W3), *Elytrigia repens* (W1), *Fallopia convolvulus* (W1), *Galinsoga parviflora* (W3), *Raphanus raphanistrum* (W4), *Setaria viridis* (W3), *Spergula *arvensis* (W4)
Threatened species: no

Structure and species composition: Stands are fully developed in summer to autumn after the cultivation of root crops, among which are mainly potatoes and fodder beet but also some vegetables, has finished. Stands are normally 30–40 cm tall with a total cover of to 90%, of which the weeds make up 50%. Differentiation into layers is indistinct, but weeds such as *Chenopodium album* and *Echinochloa crus-galli* usually overtop the canopy. The upper layer (20–40 cm) is dominated by *Setaria viridis, Galinsoga parviflora, Raphanus raphanistrum* and somewhat shorter *Spergula *arvensis*, while plants of *Scleranthus annuus*, rosettes of *Erodium cicutarium* and accompanying *Stellaria media* and *Viola arvensis* are confined to the lower layer.

Ecology, dynamics and distribution (Table 2, Fig. 9): This com. is inadequately recorded from the Czech Republic because it was not properly distinguished from the next as.; it occurs mainly in the colline belt of the Czech Mesophyticum, but also in lowlands of the Czech Thermophyticum. It prefers the light-textured acid soils of the potato-barley farming subzone.

References: From the Czech Republic and Slovakia no data available till now; Sissingh (1946, L, C; 1950, TR), Tüxen (1950, L, C), Kornaś (1950, TR), J. Tüxen (1953, L, C), Oberdorfer (1957a, TS sub *Panico-Galinsogetum* p.p.), Passarge (1959b, TR sub *Setario-Galinsogetum* p.p. max.; 1964, TS sub Ass-Gr. *Panicetum cruris-galli* et *Spergulo-Panicetum cruris-galli* p.p.), Nowiński (1964, TR), Vollrath (1967, TR sub *Setario-Galinsogetum* p.p. max.), Wiśniewski (1967, TR), Westhoff & den Held (1969, L, C), Siciński (1974, TR), Warcholińska (1974, TR; 1990, TS), Nezadal (1975, TR sub *Setario-Galinsogetum* p.p. max.), Wójcik (1980, TR), Szotkowski (1981, TR), Th. Müller in Oberdorfer (1983, TS sub *Setario-Galinsogetum* "Westliche Rasse"), Gehu et al. (1985, C), Solomakha (1987, TR sub *Echinochloo-Elytrigietum repentis* p.p.), Hüppe & Hofmeister (1990, TS sub *Spergulo-Echinochloetum cruris-galli*), Haveman et al. (1998, TS).

22. *Echinochloo cruris-galli-Setarietum pumilae* Felföldy 1942 corr. Mucina in Mucina et al. 1993 (Table 1, col. 22)

Database nos.: 342764–342772
Original name form: *Setaria glauca-Echinochloa crus-galli*-ass. Felföldy 1942 (art. 43)
Original diagnosis: Felföldy (1942: 132–133)
Nomenclature type: Presumably some of the Slovak colleagues might designate it (cf. 206 relevés compiled in Jarolímek et al. 1997 and in Mochnacký 2000)
Syn.: *Setario glaucae-Galinsogetum parviflorae* Tx. 1950 (art. 29, 43)
Syntax. syn.: *Mercuriali-Chenopodietum polyspermi* Holzner 1973 p. p. max., *Setario glaucae-Galinsogetum parviflorae* Tx. 1950 em. Th. Müller et Oberdorfer in Oberdorfer 1983 p.p. min. (art. 29, 43)
Non: *Echinochloo cruris-galli-Setarietum viridis* Kruseman et Vlieger in Sissingh et al. 1940, *Echinochloo-Polygonetum lapathifolii* Soó et Csürös in Soó 1961

Diagnostic species: *Setaria pumila* and *Echinochloa crus-galli*, *Galinsoga parviflora*, *Setaria viridis* (alliance spp.) with some transgressive *Fumario-Euphorbion* spp. (*Amaranthus retroflexus, Persicaria *lapathifolia, Chenopodium hybridum, Veronica polita,* etc.) and with low constancy some *Caucalidion* spp. (*Euphorbia exigua, Silene noctiflora, Stachys annua*). – Note: In comparison with the preceding as. most of the *Scleranthion* species are absent.
Constant species: *Amaranthus retroflexus, Capsella bursa-pastoris, Chenopodium album, Cirsium arvense, Echinochloa crus-galli, Elytrigia repens, Euphorbia helioscopia, Fallopia convolvulus, Galinsoga parviflora, Persicaria *lapathifolia, Raphanus raphanistrum, Setaria pumila, S. viridis, Sinapis arvensis, Stellaria media, Thlaspi arvense*
Important weeds: *Amaranthus retroflexus* (W3), *Chenopodium album* (W1), *Cirsium arvense* (W1), *Convolvulus arvensis* (W1), *Echinochloa crus-galli* (W3), *Elytrigia repens* (W1), *Fallopia convolvulus* (W1), *Galinsoga parviflora* (W3), *Persicaria *lapathifolia* (W3), *Setaria pumila* (W3), *S. viridis* (W3), *Sinapis arvensis* (W3), *Thlaspi arvense* (W2)
Threatened species: *Anthemis cotula* (VU), *Stachys annua* (EN) – rarely in this com.

Structure and species composition: Stands develop in root crops and various vegetables that are fully developed in late summer and the stratification depends on the crop; relatively low stands (around 30–40 cm) of potatoes and/or vegetables (kohlrabi, savoy-cabbage, etc.) or tall stands of maize (up to 200 cm). Low stands are at least two-layered but those in maize normally three-layered. Among the tall weeds are *Amaranthus retroflexus, Chenopodium album, Cirsium arvense, Echinochloa crus-galli* and *Persicaria *lapathifolia* (they overtop low stands and/or make up the upper layer in maize). Middle sized weeds are *Setaria* spp., *Galinsoga parviflora, Euphorbia helioscopia, E. exigua* and *Sinapis arvensis,* while *Veronica polita, Stellaria media, Viola arvensis*, etc. occur in the lowermost layer. Total cover is variable, as is that of the weeds (30–70%), and dependent on the crop and its cultivation. Some *Sisymbrietalia* species (e.g. *Amaranthus powellii, Conyza canadensis, Chenopodium ficifolium, Anthemis cotula, Descurainia sophia, Diplotaxis muralis, Malva pusilla, Sisymbrium officinale, Urtica urens*) commonly occur in this com.

Ecology, dynamics and distribution (Table 2, Fig. 9): This com. occurs in the lowlands of the Czech Thermophyticum and Pannonicum mainly on nutrient rich neutral to slight acid light-textured soils; corresponding farming zone is sugar beet with special vegetables. In other countries this as. has been investigated in the Pannonian region, where it was originally described (Felföldy 1942). For Central Europe many references exist under *Setario glaucae-Galinsogetum parviflorae* (but non *Echinochloo-Setarietum viridis*, cf. the synonyms and references).

Variability: The few relevés from the Czech Republic do not allow a finer classification, however, those from other countries indicate many units of a lower rank.

References: (a) Cz. Rep.: Kropáč (1981, L, C sub *Setario-Galinsogetum*), Hejný & Kropáč in Moravec (1995, L, C sub *Setario-Galinsogetum*), Lososová (2004, TS); (b) Slovakia: Krippelová (1981, TR), Eliáš (1983, L, C), Mochnacký (1984a, TR; 2000, TS), Jarolímek et al. 1997, TS); (c) other countries: Felföldy (1942, TR), Morariu (1943, TR sub *Panico-Chenopodietum polyspermi*), Tüxen (1950, L, C sub *Setario-Galinsogetum* et syn.), Pignatti (1953, TR sub *Panico-Polygonetum persicariae* as. nova p.p.), Kielhauser (1956, L, C), Oberdorfer (1957a, TS sub *Panico sanguinalis-Galinsogetum* p.p.), Soó (1961, C), Gondola (1964, TS sub *Setario-Digitarietum*), Hilbig (1967b, TS sub *Setario-Galinsogetum* s.l.), Kovačević (1970, C), Holzner (1973, TR sub *Mercuriali-Chenopodietum polyspermi*), Warcholińska (1974, TR sub *Galinsogo-Setarietum*; 1990, TS sub *Setario-Chamomilletum* p.p.), Nezadal (1975, TR sub *Setario-Galinsogetum* p.p. min.), Grigore & Coste (1975, C), Th. Müller with Oberdorfer (in Oberdorfer 1983, TS sub *Setario-Galinsogetum* em., p.p.), Solomakha (1988, TR sub *Amarantho-Setarietum*), Hüppe & Hofmeister (1990, TS sec. Th. Müller in Oberd. 1983), Mucina (1993, L, C), Pinke (2000, TR).

Syntaxonomic comments on the last two associations and other related communities

(1) *Echinochloo-Setarietum viridis* has not been recorded in the Czech Republic because it was not distinguished from the *Echinochloo-Setarietum pumilae*, although the synecology and species composition of both ass. are quite different. – (2) Most researchers place their relevés in *Setario-Galinsogetum parviflorae*, supposing that this is the only main as. of *Panico-Setarion* (see the synonyms). – (3) This opinion is clearly expressed in the broader concept of *Setario-Galinsogetum parviflorae* Tx. 1950 em. Th. Müller et Oberdorfer in Oberd. 1983. According to this conception three vicarious races can be distinguished: (a) western subatlantic race corresponding to *Echinochloo-Sperguletum arvensis* Tx. 1950, i.e. correctly to *Echinochloo-Setarietum viridis* (only with *Setaria viridis*); (b) southern submediterranean race corresponding to the *Digitario sanguinalis-Galinsogetum parviflorae* Oberdorfer 1957 (with *Setaria viridis, S. pumila*, *Digitaria sanguinalis*); (c) eastern subcontinental race corresponding to *Setario glaucae-Galinsogetum parviflorae* Tx. 1950 s. str., i.e. to *Echinochloo-Setarietum pumilae* (with *Setaria pumila* and *S. viridis* but not *Digitaria sanguinalis* and several thermophilous species). I find this concept syntaxonomically too broad. – (4) There is no doubt that *Panico-Setarion* comm. are related to (a) the *Eragrostion* (see below the diagnostic species of which *Digitaria sanguinalis* is most important); (b) the *Polygono-Chenopodion polyspermi* and especially *Fumario-Euphorbion* (see the species *Amaranthus retroflexus, Chenopodium hybridum, Mercurialis annua, Stachys annua, Veronica polita*). See also *Stachyo annuae-Setarietum pumilae* placed by Mucina in Panico-Setarion (Mucina 1993: 136–137 and his remarks on p. 137), but here in the *Fumario-Euphorbion*. – (5) *Panicetum ischaemi* Tx. et Preising in Tx. ex Passarge 1959 (lectotype of *Panico-Setarion* – see above) is not included in the current publication, although it is well recorded from other countries (Mucina 1993, Th. Müller in Oberd. 1983). It is a com. of acidic and very light, gravelly sandy soils, but is not a valid synonym of *Echinochloo-Setarietum viridis* (so did Th. Müller, op. c., p. 80). – (6) In addition, *Setarietum viridis-verticillatae* Kopecký in Hejný et al. 1979 occurs not only in ruderal habitats but also on arable land (see Mucina 1993: 138).

Eragrostietalia J. Tüxen ex Poli 1966

Thermophilous communities of therophytes on loose substrata mainly in S and SE Europe.

Original diagnosis: Poli (1966: 63–64)
Nomenclature type: *Eragrostion* Tx. ex Oberdorfer 1954, holotypus designatus in Poli (1966: 64)
Syn.: *Eragrostietalia* J. Tüxen 1961 (art. 1), J. Tüxen in Lohmeyer et al. 1962 (art. 2b, 8), J. Tüxen in Matuszkiewicz 1962 (art. 2b, 8)
Syntax. syn.: *Solano-Polygonetalia* (Siss. in Westhoff et al. 1946) O. de Bolós 1962 p.p., *Solano-Polygonetalia* O. de Bolós 1962 em. Brullo et Marceno 1980 p.p., *Eragrostietalia* J. Tüxen 1961 em. Soó 1971
Non: *Chenopodietalia* [*muralis*] Br.-Bl. in Br.-Bl. et al. 1936

Diagnostic species: (a) reaching into Central Europe: *Amaranthus albus, A. blitoides, Cynodon dactylon, Digitaria sanguinalis* (incl. subsp. *pectiniformis*, i.e. *D. ciliaris* auct.), *Diplotaxis muralis, D. tenuifolia, Eragrostis cilianensis* (*E. megastachya, E. major*), *E. minor* (*E. poaeoides*), *E. pilosa, Euphorbia waldsteinii* (*E. virgata*), *Heliotropium europaeum, Hibiscus trionum, Portulaca oleracea, Setaria verticillata*; (b) with optimum in the S to SE Europe: *Amaranthus graecizans, Aristolochia clematitis, Corispermum canescens, C. nitidum, C. leptopterum, Equisetum ramosissimum, Euphorbia segetalis, Psyllium arenarium* (*Plantago arenaria*), *Salsola kali* subsp. *ruthenica* (*S. australis* auct.), *Sorghum halepense, Tragus racemosus, Tribulus terrestris, Xanthium spinosum*. – Note: Some of the species sub (b) used to occur in secondary habitats as aliens in the Czech Republic. Some invaders only occur in the comm. of *Eragrostietalia*, e.g. *Ambrosia artemisiifolia, Artemisia annua, Chenopodium aristatum, Ch. botrys, Iva xanthiifolia, Panicum capillare, P. miliaceum* subsp. *agricola, Setaria macrocarpa,* etc. (cf. Jehlík 1998).

Thermophilous segetal as well as ruderal and semi-natural comm. preferring light-textured soils that dry and warm up rapidly; they mostly consist of therophytes with C4 assimilation an S-R life strategy (Grime 1979). Several species have a clumped spatial distribution and a prostrate habitus, with a rich system of fine roots (e.g. *Eragrostis* spp., *Digitaria* spp., *Setaria* spp.) and/or creeping rhizomes (e.g. *Cynodon dactylon*), and others possess xeromorphic characters (*Portulaca oleracea, Salsola kali*); see also the characteristics cited by Krippelová & Mucina (1988), Mucina (1993) and Mochnacký (2000). Distribution centre of the order is in S and SE Europe, becoming rare or even extinct in the north-west territories (cf. Poli 1966). The associated cultivated plants are maize, sunflower, tobacco, asparagus, cucumber, red pepper, melon and similar subtropical plants, and vines. Comm. of the *Eragrostietalia* occur also on non-cultivated ground and various waste places (railway tracks, river embankments, surroundings of gravelworks, sandworks and various earthworks).

Various groupings of plants and numerous ass. are recorded and grouped in several alliances, of which only *Eragrostion* and *Salsolion ruthenicae* may be relevant for the Czech Republic. In any case, these comm., on the NW border of their distribution, perform poorly (for a survey of other alliances see Mucina 1993 and Jarolímek et al. 1997).

Syntaxonomic comments: (1) The existence of this order was criticized from the beginning owing to its unclear delimitation from the Central-European higher syntaxa (cf. Lohmeyer et al. 1962, Oberdorfer et al. 1967). – (2) Several amendations of the Central-European *Solano-Polygonetalia* (see the syntax. syn.) by O. de Bolós (1962) and Brullo & Marceno (1980, 1985) did not resolve the problem. – (3) Useful comments by Nezadal (1989) on the relations of the Mediterranean order *Chenopodietalia* [*muralis*] Br.-Bl. 1936, inclusive of the alliance *Diplotaxion erucoidis*, close to *Eragrostion*, which has not been so far considered a synonym (cf. Poli 1966). In Nezadal's opinion (op. c., p.127 and p. 131–134), however, both alliances and both orders exist, *Eragrostietalia* (and *Eragrostion*)

on light soils in Eastern Mediterranean and *Chenopodietalia* [*muralis*] (and *Diplotaxion*) on relatively heavy soils in the Western Mediterranean.

Eragrostion Tx. ex Oberdorfer 1954

Segetal communities of root crops, mainly vegetables, vineyards, orchards and special crops (tobacco, asparagus), and also ruderal habitats in the Pannonian subregion with localities in the Balkan Peninsula and Pontic province.

Original diagnosis: Oberdorfer (1954: 385–386 et Table on p. 387)
Nomenclature type: Oberdorfer (loc. c.) designated *Hibisco trionum-Panicetum ciliaris* as. nova; but he referred simultaneously to several closely related ass., viz. *Setario-Heliotropietum* Slavnić (1944) 1951 and *Eragrostietum majori-minoris* Slavnić (1944) 1951, possibly *Hibisco trionum-Eragrostietum megastachyae* Tx. 1950 that Oberdorfer held as questionable (op. c., p. 386) and so did Poli (1966: 67). Tüxen (1950: 122) himself expressed similar opinion. I think the correct designation should be postponed until a revision of the alliance is performed.
Syn.: *Amaranthion* Tx. et Preising 1942 (art. 1), *Eragrostion* Tx. in Slavnić 1944 (art. 1)
Syntax. syn.: *Tribulo-Eragrostion poaeoidis* Soó et Timár in Timár 1957 p.p. max., *Consolido-Eragrostion poaeoidis* Soó et Timár in Timár 1957 p.p. min.
Incl.: *Eragrostienion* Tx. 1950 (art. 2b, 8)
Non: *Diplotaxion* Br.-Bl. in Br.-Bl. et al. 1936

Diagnostic species: (a) for the Cz. Rep.: *Amaranthus albus, Cynodon dactylon, Digitaria ischaemum, D. sanguinalis* subsp. *sanguinalis, Diplotaxis muralis, D. tenuifolia, Eragrostis minor* (*E. poaeoidis*)*, E. pilosa* (CR), *Hibiscus trionum* (CR), *Portulaca oleracea, Setaria verticillata*; (b) outside the Cz. Rep.: *Aristolochia clematitis, Corispermum nitidum, Equisetum ramosissimum, Eragrostis cilianensis* (*E. megastachya, E. major*)*, Heliotropium europaeum, Kochia laniflora, Orobanche ramosa* (tobacco), *Salsola kali* subsp. *ruthenica*, *Tragus racemosus, Tribulus terrestris* and some transgressive of the *Panico-Setarion,* possibly of the *Festucion vaginatae* Soó 1929.

Note: For detailed ecological studies as to water demands of the alliance components see Bodrogközy (1983).

Syntaxonomic comments: (1) Group of species different from the *Panico-Setarion*, which was established by Tüxen (1950: 119–122) as a suballiance; he enumerated the list of species and probable ass. – (2) Tüxen (op. c., p. 119) also proposed the name *Eragrostion*, when Slavnić submitted his thesis at the University of Wien, 1944 (see also the footnote in Tüxen, op. c., p. 121). – (3) In addition, Tüxen (loc. c.) mentioned *Amarantho-Chenopodion albi* as a possible name. This name was proposed by Morariu in his characterization of *Diplotaxion*, which he considered a possible alternative alliance (Morariu 1943, p. 183). Morariu, however, placed both new ass. in *Diplotaxion* (op. c., p. 202) and only considered the possible existence of a vicarious alliance. – (4) Worth noticing is that Slavnić (1951: 94) did not accept *Eragrostion* and left the two new ass. in *Diplotaxion* and one as. in *Polygono-Chenopodion.* – (5) The concept of *Eragrostienion* was adopted by Oberdorfer (1957a) but within *Polygono-Chenopodion* and in Oberdorfer (1983), Th. Müller ranked the alliance *Eragrostion* in *Polygono-Chenopodietalia.* – (6) Hungarian authors designated two alliances, viz. *Tribulo-Eragrostion* and *Consolido-Eragrostion* and placed them at first in *Centaureetalia* (Soó 1961) but later in *Eragrostietalia* em. (Soó 1971). In their opinion, both alliances are vicariants of *Panico-Setarion* in the Pannonian subregion. See also the remark on *Caucalidion* in the current paper. – (7) Poli (1966: 63) thought that *Diplotaxion* was only an imperfectly defined part of *Eragrostion*, however as shown in various contributions (outside the scope of the cur-

rent paper), *Diplotaxion* occurs as a distinct alliance mainly in the Mediterranean (cf. Nezadal 1989).

Comm. of this alliance thrive best only in the warmer areas of Europe (mainly in the south-east); in Central Europe they occur on arable land only in an impoverished form and also in warm ruderal habitats. In the Czech Republic they occur only in warm lowlands.

Selected abroad references: Spain (Tüxen & Oberdorfer 1958), Italy (Poli 1966), Germany (Tüxen 1950, Oberdorfer 1957a, 1983), Slovakia (Eliáš 1982, 1983, Mochnacký 1984a, 2000, Jarolímek et al. 1997), Hungary (Timár 1957, Soó 1961, Bodrogközy 1983), Yougoslavia, Serbia (Slavnić 1951, Kojić 1975), Greece (Oberdorfer 1954), Roumania (Morariu 1943), Bulgaria (Kolev 1963), Ukraine (Solomakha 1988). Poli (1966: 64–69) surveyed over Europe altogether 14 ass. within her concept of the *Eragrostion*, of which in the last Czech survey (Hejný & Kropáč in Moravec 1995) two ass. on arable land and two ass. on ruderal sites were mentioned. For the time being only *Portulacetum oleraceae* has been synthetized while *Hibisco-Eragrostietum poaeoidis* Soó et Timár 1957 has not any more been confirmed for the Czech Republic.

23. *Portulacetum oleraceae* Felföldy 1942 (Table 1: col. 23)

Database nos.: 342773–342781
Original name form: *Portulaca oleracea*-ass. Felföldy 1942
Original diagnosis: Felföldy (1942: 135)
Nomenclature type: Felföldy (1942: 135, Table 23, rel. 1), **lectotypus hoc loco designatus**
Syn.: *Digitario-Portulacetum* Timár et Bodrogközy 1959 (art. 29)
Syntax. syn.: *Panico sanguinalis-Eragrostietum minoris* Tx. ex Rochow 1951 p.p. max.
Non: *Galinsogo-Portulacetum* Br.-Bl. 1949

Diagnostic species: *Portulaca oleracea, Digitaria ischaemum, D. sanguinalis, Eragrostis minor*
Constant species: *Amaranthus retroflexus, Capsella bursa-pastoris, Chenopodium album, Echinochloa crus-galli, Erodium cicutarium, Galinsoga parviflora, Raphanus raphanistrum, Setaria pumila, S. viridis, Stellaria media, Taraxacum* sect. *Ruderalia*
Important weeds: *Amaranthus retroflexus* (W3), *Chenopodium album* (W1), *Digitaria ischaemum* (W3), *Echinochloa crus-galli* (W3), *Galinsoga parviflora* (W3), *Setaria pumila* (W3), *S. viridis* (W3), *Stellaria media* (W2)
Threatened species: *Veronica opaca* (CR) – rarely

Structure and species composition: Specialized com. of root crops and vegetables with a phenological optimum from the late summer till autumn. Vertical structure depends on the crop; in maize (up to 200 cm) it is three-layered but in vegetables (cucumber, kohlrabi, fodder carrot) only two-layered (20–40 cm tall). Among the tallest weeds are *Amaranthus retroflexus, A. powellii, Chenopodium album* and *Echinochloa crus-galli*; these plants may reach up to 100 cm and form either the upper layer in tall stands (as maize) or overtop stands of various vegetables. A substantial part of the biomass is concentrated in the upper layer of middle-sized vegetables; it is made up of *Galinsoga parviflora, Setaria spp., Raphanus raphanistrum, Conyza canadensis,* etc. Only in the lower layer are the diagnostic *Digitaria* spp., *Portulaca oleracea* and *Eragrostis minor* along with *Stellaria media* and *Erodium cicutarium* but also with *Malva neglecta* and *Urtica urens* (*Sisymbrietalia* species). Characteristic feature may be a mosaic of several populations.

Ecology, dynamics and distribution (Table 2, Fig. 10): Very thermophilous com. that occurs in the lowest parts of the lowlands and adjoining slopes of the Czech Thermophyticum and Pannonicum on light-textured soils; its habitats correspond to the maize-rye subzone with dense crops of vegetables on flat ground and vineyards (preferably on slopes).

References: (a) Cz. Rep.: Kühn & Uhrecký (1959, R no. 12, 13, 24), Kropáč (1981, L, C), Hejný & Kropáč (1995, L, C); (b) Slovakia: Mochnacký (1984a, TR; 2000, TS), Jarolímek et al. (1997, TS); (c) other countries: Felföldy (1942, TR), Morariu (1943, TR sub *Amaranthus albus-Eragrostis poaeoides* p.p.), Tüxen (1950, L, C sub *Panico-Eragrostietum*), Slavnić (1951, TR sub *Panico-Portulacetum*), Timár (1953, TR; 1957, TR sub *Hibisco-Eragrostietum* p.p.), Soó (1961, L, C sub *Digitario-Portulacetum*), Bodrogközy (1983, TS sub *Digitario-Portulacetum*), Th. Müller in Oberdorfer (1983, TS sub *Digitario-Eragrostietum*), Solomakha (1988, TR sub *Amarantho albi-Echinochloetum* p.p.).

Syntaxonomic comments: (1) Very close relations exist between *Portulacetum oleraceae* and *Panico sanguinalis-Eragrostietum minoris* (cf. the synthetic table no. 149, col. 15 in Oberdorfer 1983 and p. 75 ibid. and see also Tüxen 1950: 120–121). – (2) For the identification of *Portulacetum oleraceae* the presence of *Digitaria sanguinalis*, *Eragrostis minor* and *Portulaca oleracea* is important (*Eragrostis megastachya*, i.e. *E. cilianensis* and possibly *E. pilosa* are now rare in Central Europe). – (3) *Portulaca oleracea* by itself does not identify *Portulacetum* and this is why *Galinsogo-Portulacetum* Br.-Bl. 1949 is only regarded as a regional as. of *Panico-Setarion*. – (4) In any case, *Portulacetum oleraceae* synthetized in this publication is an impoverished com. at the border of its distribution.

Table 1. – Synoptic table of the *Stellarietea* weed communities in the Czech Republic. Numbering of the communities corresponds to the text, abbreviation of the names of communities are derived from the first letters of species names. Constancy (%) of the species in each community is given; species recorded in only one relevé are marked +.

Column	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Community	CC	LA	CA	Vhtl	Vhtp	VT	TRc	EM	SSp	Ma	LV	AG	Pa	AM	HG	EA	SSc	PCh	GCh	SA	ESv	ESp	Po
Number of relevés	28	46	15	30	14	7	11	70	18	21	33	59	13	66	58	42	86	9	12	6	7	9	9
Average number of species	36	32	36	25	31	35	30	35	36	33	38	41	30	32	34	27	33	35	43	24	31	30	29
1. *Caucalido-Conringietum*																							
Caucalis platycarpos	**75**	33	+	7	+			6	22		+												
Conringia orientalis	**71**	+		23					+		6												
Galium tricornutum	**39**	4						3			+												
Bifora radians	**32**	+																					
Bupleurum rotundifolium	**7**								+														
2. *Lathyro-Adonidetum*																							
Adonis aestivalis	86	**96**		60		57	+				15			+									
3. *Consolido-Anthemidetum*																							
Anthemis austriaca		17	**93**	+	64	29	+	3	11		6	+	16	6		12				+	+		+
Trifolium arvense			**53**					3				8	5	9	+		7						44
Anthemis ruthenica			**13**																				
4. *Veronicetum hederifolio-trilobae*																							
Veronica triloba (opt.)	+			**73**	64	29		+					+			+							
5. *Veronicetum hederifolio-triphylli*																							
Veronica triphyllos (opt.)		+	20	10	**93**	+		+				5	43	5		62				50			
Veronica praecox				20	**50**	29	+	+															
Holosteum umbellatum			+		**43**								4			12							
6. *Valerianello-Thlaspietum*																							
Thlaspi perfoliatum	7	4		10	+	**100**																	

Column	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Community	CC	LA	CA	Vhtl	Vhtp	VT	TRc	EM	SSp	Ma	LV	AG	Pa	AM	HG	EA	SSc	PCh	GCh	SA	ESv	ESp	Po
Number of relevés	28	46	15	30	14	7	11	70	18	21	33	59	13	66	58	42	86	9	12	6	7	9	9
Average number of species	36	32	36	25	31	35	30	35	36	33	38	41	30	32	34	27	33	35	43	24	31	30	29
Plantago media		+				**71**	+								+								
Valerianella locusta	+	+			36	**43**	+					+	+	+		+							
7. *Taraxacum* sect. *Ruderalia* com.																							
Taraxacum sect. *Ruderalia*	36	48	27	53	29	**100**	**100**	53	67	38	42	56	50	30	43	52	43	67	58	+	29	22	67
*Silene *alba*	21	28	40	+	29	71	64	17	17	+	18	17	18	8	16	17	17		+			+	+
8. *Euphorbio-Melandrietum* and *Caucalidion*																							
Silene noctiflora	96	80	87	70	79	43	45	94	83	43	73	27	16	8			+					44	22
Consolida regalis	86	89	93	90	93	86	73	43	56	+	18	8	32	18		5							
Euphorbia exigua	79	54	47	13	21		18	73	94	14	70	3					+					22	
Lathyrus tuberosus	68	54	+	27	14	57	18	40	56	24	55						+						
Fumaria vaillantii	39	28		23	21	+	+	3			6	+											
Camelina microcarpa	25	13	+		+	+		6				3		+	+								
Consolida orientalis		13						+															
9. *Stachyo-Setarietum pumilae*																							
Euphorbia falcata	36							+	**94**	+													
Anagallis foemina	57	7	+			+		6	**72**	14	21												
Kickxia spuria	18	+						+	**61**	+													
Stachys annua	21	+						+	**44**	29												22	
Ajuga chamaepitys	18	+							**33**	10													
Galeopsis angustifolia	7	4						3	**17**														
Euphorbia platyphyllos		4						+	**17**		+												
Kickxia elatine								+	**11**									+					
10. *Mercurialetum annuae*																							
Mercurialis annua	7							7	11	**90**												22	+
11. *Lamio-Veronicetum*																							
Microrrhinum minus	25	13	13	+			+	14	22	29	**67**	+		+				+					22
Fumario-Euphorbion																							
Veronica polita	32	41	27	53	64	100	100	50	72	76	82	8	16	5	+	14			+			56	33
*Aethusa *agrestis* (opt.)	57	54	40	30	29	+	27	44	61	43	61	53	18	9	3	5	3	+	17		+	33	22
Euphorbia helioscopia (opt.)	54	67	33	27	14	+	18	54	33	81	91	47	18	11	17	12	27	44	42		29	67	22
*Persicaria *lapathifolia* (opt.)		13						26	17	86	64	27	+	6	9	+	17	33	25		+	78	44
Amaranthus retroflexus (opt.)	+	7						+	17	95	45		+									89	89
Chenopodium hybridum	18	9			21	+		6	+	52	33	3							+			56	44
Sonchus oleraceus (opt.)	+	9	20				18	24	39	76	39	12			7		+	+				33	56
Solanum nigrum (opt.)								6	11	57	33				+				+		+		
12. *Aethuso-Galeopsietum*																							
Neslia paniculata (opt)	71	54	20	53	36	43	+	21	+	24	64	**71**	45	17	+	17	10	+	25		29	22	+
Geranium dissectum		11	+				+	17		+	12	**32**	11	11	9	+	13	22	+				
Veronica agrestis	+			+				3			6	**31**	5	+		7	6						
Fumaria rostellata		+		+								**17**	4	3			2	+					
13. *Papaveretum argemones*																							
Papaver argemone	7	7	47	7	50			6				8	**61**	15	5	7			25	50			
Lithospermum arvense (opt.)	14	20	40	20	21			6			6	20	**43**	14	10	26	8	+	33	+		+	
Sherardion																							
Sherardia arvensis (opt.)	32	35	20					61	33	10	52	54	5	11	7		9		+			+	
Valerianella dentata	11	13	+	+	14	29		20			6	41	38	17	7	14	7		33			+	
Veronica opaca		4		+		+		4	+	+	15	17	+			+	+						+
Ranunculus arvensis (opt.)	11	13	13	7			8	6				14	18	9	3	5	3						
Galeopsis ladanum		+						+				3		+		+	2						
Centaureetalia																							
Papaver rhoeas	61	65	73	87	71	43	18	50	22	38	42	25	41	35	5	10	3	+	+			22	22
Avena fatua	61	70	33	27	+	+	45	59	56	71	82	53	7	24	7		13	33	25		29	56	+
Sinapis arvensis	86	72	33	77	64	100	91	74	78	76	91	46	25	18		+	12	22				78	33
Medicago lupulina	54	35	73	+	+	29	+	56	61	38	45	41	5	15	5	+	3	+	25			22	44
Campanula rapunculoides	68	28	13	33	+	57	18	43	50	10	33	51	13	5	17	5	14		+				
Veronica hederifolia	14	7	+	60	50	29		+				5	43	3		45							

Columm	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Community	CC	LA	CA	Vhtl	Vhtp	VT	TRc	EM	SSp	Ma	LV	AG	Pa	AM	HG	EA	SSc	PCh	GCh	SA	ESv	ESp	Po
Number of relevés	28	46	15	30	14	7	11	70	18	21	33	59	13	66	58	42	86	9	12	6	7	9	9
Average number of species	36	32	36	25	31	35	30	35	36	33	38	41	30	32	34	27	33	35	43	24	31	30	29
Galium spurium	36	30	27					11		38	21	10	+	6				+				22	
Polygonum rurivagum	29	13	60					6	11	14	+	+		8			3			+			
14. *Aphano-Matricarietum*																							
Vicia tetrasperma		15	33	+				21		+	6	41	29	**67**	17	21	30	44	17		29		
Aphanes arvensis			+		21			3				20	38	**61**	33	24	14	+		50			
Matricaria recutita (opt.)	+	+	13		+		+	6	+		9			**59**	+	+	6	44			29		
15. *Holco-Galeopsietum*																							
Holcus mollis												+	+	3	**100**		3		25				
16. *Erophilo-Arabidopsietum*																							
Arabidopsis thaliana			20		50		27	+			9	24	54	26	22	**86**	27	44	25	83	57		
Erophila verna					36							3	39	3		**69**	2			50			
17. *Spergulo-Scleranthetum* and *Scleranthion*																							
Scleranthus annuus		7	40	+	36			13	+		9	51	46	38	71	57	80	+	75	100	100		
Veronica arvensis (opt.)		11	20	10	14	+	+	21			12	53	45	70	45	57	44	22	50	83	29		
Apera spica-venti		4	40				+	13			9	17	20	77	29	33	24		+	33	29		
Anthemis arvensis (opt.)		7	13					+				44	27	44	47	31	41		42	33	29		+
Myosotis stricta		+	+	+	21		+					5	46	9	5	55	12			67			
*Viola *tricolor*								+				10	5	+	29		8		+	50			
Myosotis discolor													9	3	+	12	6		+	33			
18. *Panico-Chenopodietum*																							
Chenopodium polyspermum		+						3	11	+	+	7	+	+	+		3	**100**	50		+		
Oxalis fontana		+	+					4			+	3			3	+	3	**56**	+				+
19. *Galeopsio-Chenopodietum* and *Polygono-Chenopodion*																							
Persicaria maculosa (opt.)		9		+	+			34	17	14	21	37	+	29	67	12	40	78	67		29	+	
Erysimum cheiranthoides (opt.)		+	+		+			13		10	15	14		3	16	+	10	67	25				33
20. *Sclerantho-Arnoseridetum* et *Arnoseridion*																							
Teesdalia nudicaulis																				**83**			
Arnoseris minima																				**67**			
Veronica verna													+			+				**67**			
Hypochaeris glabra															+					**50**			
Aphanes australis															+					+			
Filago minima																				+			
21. *Echinochloo-Setarietum viridis*																							
Erodium cicutarium (opt.)	21	13	47	27	57	29	18	20	50	38	30	34	25	20	24	33	24		83	83	**100**	44	78
22. *Echinochloo-Setarietum pumilae*																							
Setaria pumila (opt.)	+							7	44	43	+	+									29	**89**	78
Panico-Setarion																							
Galinsoga parviflora (opt.)			13		+			14	17	62	36	3			5			56	17		100	78	89
Echinochloa crus-galli (opt.)				+				4	22	90	27	3						22	+		71	89	100
Setaria viridis	11	+	20					9	56	24		+		+	3		+				71	78	78
Atriplici-Chenopodietalia																							
Raphanus raphanistrum	+	20	53	30	79	+	18	34	11	+	30	66	54	48	72	64	77	67	83	83	86	78	89
Myosotis arvensis (opt.)	14	46	47	30	29	+	36	50	17		27	88	63	89	74	60	74	44	92	+	29		
Vicia angustifolia (opt.)	18	17	47	7	14	+		37	11		6	39	29	59	57	36	53	+	17	83	29		22
Galeopsis tetrahit	21	26	13	10	+			21			18	78	52	48	91	50	79	67	100	33	29		
Lapsana communis	18	17	13	7	+		+	33	22	+	24	85	29	44	50	17	49	67	75				
Centaurea cyanus (opt.)		13	60	7	14			19			12	46	45	67	26	43	30	22	83	33	+		
Vicia hirsuta	+	7	33				18	20			+	66	32	64	50	38	64	33	83	+	57		
Lycopsis arvensis	+	4	20	+				6			6	34	16	18	9	12	17	+	33	+	43	22	+
*Persicaria *pallida*	+	9	20	10	+		+	10		+	12	5	+	12	38	5	35	22	33	+	29		
*Rumex *acetosella*			27		+			6				19	23	15	74	31	53	+	42	83	29		33
*Spergula *arvensis*			+					+				36	11	14	72	19	76	22	83	67	100		+
Papaver dubium (opt.)	+	9	13	7	14		+	6				8	13	14			5	22	17	33			+
Galeopsis bifida		+						6			+	20	5	12	21		21	+	17	+			
Galeopsis pubescens												5		+	10		3	+	17				
Filago arvensis				13										+			+			+			

Column	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
Community	CC	LA	CA	Vhtl	Vhtp	VT	TRc	EM	SSp	Ma	LV	AG	Pa	AM	HG	EA	SSc	PCh	GCh	SA	ESv	ESp	Po	
Number of relevés	28	46	15	30	14	7	11	70	18	21	33	59	13	66	58	42	86	9	12	6	7	9	9	
Average number of species	36	32	36	25	31	35	30	35	36	33	38	41	30	32	34	27	33	35	43	24	31	30	29	
23. *Portulacetum oleraceae* incl. *Eragrostion* et *Eragrostietalia*																								
Portulaca oleracea										+														**56**
Digitaria sanguinalis																								**44**
Eragrostis minor																								**44**
Digitaria ischaemum			20	+							+													**44**
Sisymbrietalia																								
Descurania sophia	50	48	60	67	79	57	36	19	28	19	18	7	11	3		10	+					22	22	
Conyza canadensis	+	4	40	+	14	29	18	16	44	29	+	+		3		+	3		+	33	+	44	44	
Lactuca serriola	+	7	13	+	+		18	9	17	10	6			+										
Malva neglecta		+					+	7	+	29	15								+		+		56	
Chenopodium ficifolium		7						+		14	21	+						22	25			33	+	
Anthemis cotula		+						9		10	+	3	+	3			2					22		
Diplotaxis muralis					+			6	28	10												22	22	
Senecio vernalis				+	14		+	3								5	+						+	
Amaranthus powellii									+	43	9										+	56	44	
Chenopodium glaucum										24	18							+	+		+		+	
Urtica urens										24	+						+	+				22	44	
Atriplex sagittata							+			24	6								+			+		
Malva pusilla		+						3		+	+											22		
Euphorbia peplus								+	11	+								+						
Erucastrum gallicum								+	+													+	+	
Stellarietea																								
Fallopia convolvulus	100	85	100	97	93	86	64	91	72	38	88	93	93	95	79	93	88	89	100	100	86	89	56	
Viola arvensis	86	85	93	90	100	86	64	84	72	33	82	86	89	98	90	88	90	33	100	83	100	56	33	
Chenopodium album	71	63	73	67	64	57	64	70	67	100	100	64	50	50	48	52	64	89	100	67	100	100	100	
Capsella bursa-pastoris	39	41	87	77	86	100	91	57	33	76	73	80	89	70	74	88	84	78	92	83	86	67	100	
Stellaria media	36	52	73	90	71	100	91	89	50	76	91	92	91	86	72	86	86	89	92	50	86	78	89	
Thlaspi arvense	75	76	87	93	86	29	45	66	22	29	85	88	91	64	40	62	53	89	83	50	43	67	44	
Tripleurospermum inodorum	25	48	80	43	21	57	64	57	28	76	58	71	80	73	41	57	78	78	75	50	29	44	44	
Polygonum aviculare	75	78	73			57	82	67	39	29	58	61		55	28		44	44	58	33	43	44	22	
Lamium amplexicaule	43	35	60	77	86	71	27	41	22	33	64	41	70	39	10	55	22	44	50	33	+	44	33	
Arenaria serpyllifolia	25	22	33	33	79	57	45	17	44	19	33	29	30	20	5	19	13	22	42		43	+	22	
Veronica persica	64	54	40	57	21	57	73	76	72	67	91	75	50	62	26	40	38	67	58		+	22	33	
Anagallis arvensis	82	61	87	13	21			89	100	62	91	68	20	71	33	19	50	56	75		71	56	22	
Geranium pusillum	18	50	27	53	36	86	36	41	33	52	45	39	30	18	29	31	26	56	58		29	44	56	
Lamium purpureum	+	15	33	27	+	+	27	31	11	19	21	42	50	29	22	43	29	67	42		+	+	+	
Sonchus asper	46	46	53	13	29		45	60	72	71	76	49	5	23	31	+	29	56	58		19	44	44	
Atriplex patula	54	48	27	37	29	71	64	53	33	33	48	53	14	29	10	5	29	33	67		+	22		
*Fumaria*officinalis*	21	41	27	40	29		+	19	+	14	55	32	20	11	5	10	24	44	25			+	+	
Veronica sublobata	11	15	20	63	64	86	36				6	15	88	12	10	93	3		33	67				
Senecio vulgaris							+	6	22	38	18	5	+		+			22	+			+	33	
*Vicia*villosa*	+	+	20		14			9			6	8	7	6	3	+			+			22		
Vicia sativa		7			+			10			6	19	5	6	5	5	8		33					
*Odontites*vernus*		7						13				8		18	12	5	10					+		
Galinsoga quadriradiata								+		29	6				+		+	+				+	22	
Agrostemma githago		+	+										5		+	5	+							
Rhinanthus alectorolophus		+										3			3		5							
Polygonum aviculare agg.				70	50								75			57								
Companions																								
(a) *Convolvulo-Agropyrion* p.p.																								
Cirsium arvense	86	80	80	70	71	57	73	77	78	67	85	85	77	68	59	57	73	56	92	+	57	100	22	
Elytrigia repens	75	63	73	40	50	100	91	57	50	38	79	69	66	58	72	62	71	56	92	33	86	78	44	
Convolvulus arvensis	89	80	67	20	21	57	18	77	94	52	73	59	18	41	24	14	26	33	67	+	57	56	56	
Sonchus arvensis	36	33	27	13	14	29	18	41	11	19	58	61	13	18	26	7	28		25		+	33		
(b) *Onopordetalia*																								
Daucus carota	32	15	27	+	14	43	45	17	39		18	22	+	12	9	14	13		33		+	+		

Column	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Community	CC	LA	CA	Vhtl	Vhtp	VT	TRc	EM	SSp	Ma	LV	AG	Pa	AM	HG	EA	SSc	PCh	GCh	SA	ESv	ESp	Po
Number of relevés	28	46	15	30	14	7	11	70	18	21	33	59	13	66	58	42	86	9	12	6	7	9	9
Average number of species	36	32	36	25	31	35	30	35	36	33	38	41	30	32	34	27	33	35	43	24	31	30	29
Artemisia vulgaris		7	13		29	29	27	10	17	33	18	8	+	8	3		2		+		+	44	22
Linaria vulgaris	29	22	20		+	+	+	21	17		9	10	9	6	10	+	15	+	17	+			
Euphorbia esula	+	4		+	+				17		+	10	5	5	5		3	+	+				
Cardaria draba	18	13	+	13	21	29	27	10	17	+	9	+	+										
Echium vulgare	+	+	+			29		+	11			3		5			3						
Cichorium intybus	11	4					+	6	22	10	+				+								
Carduus acanthoides	7	4				29	18	+	33														
Melilotus officinalis	18	4			+			4			6						+						
Reseda lutea	14							7	28	10	+												
Crepis biennis							+	+				+	4		+								
Cirsium vulgare		+				29	+	+															
Cerinthe minor	11							+	17														
Hyoscyamus niger								3		14	12												
(c) *Lamio-Chenopodietalia boni-henrici*																							
Galium aparine	32	61	27	67	36	57	27	46	11	48	55	61	57	61	29	52	42	56	50	50	+	22	
Rumex obtusifolius		11		+		43	18	6		14	6	12	7	9	31	14	15	44	17				
Rubus fruticosus agg.	+	7	13				+	3			15	22	11		5		6		42				
Glechoma hederacea		7				57	+	6	+		+		+					+					
Poa trivialis								3				10	5	15	12	+	10						
Tanacetum vulgare												7		+	3		7						
Arctium tomentosum		7				29	+	3		14													
Arctium lappa						29	27																
Anthriscus sylvestris												+	4	+			+						
Epilobium ciliatum													+	+	5	+	5						
Armoracia rusticana								+				3			+								
Aegopodium podagraria															7			22					
(d) *Polygonion avicularis*																							
*Plantago*major*	21	15	20	10	21	43	82	46	39	48	73	47	21	23	40	17	37	78	58		57	+	44
Polygonum arenastrum	25	24	40			57	18	39	33	24	24	44		20	29		26		42		43	22	33
Poa annua		4	20	13	21	+	55	19	+	38	27	44	43	67	50	45	50	78	58	+	57	22	44
Matricaria discoidea		7	+	+				16		24	18	20	11	32	26	+	36	+	33	+	29		
Spergularia rubra													+	8	5	5	15			33	43		
(e) *Agropyro-Rumicion* s.l.																							
Rumex crispus	36	24	20	10	21	71	82	44	11	10	45	68	43	47	34	31	48	67	42	+	29	+	22
Mentha arvensis	+	9				+	+	27	+	10	24	47	9	23	55	14	40	33	67	+	+		
Equisetum arvense		+	13					19	+	+	27	34	7	21	22	21	29	+	58	33	71		+
Ranunculus repens	+	4	+				+	10		+		34	18	12	50	14	37	56	17				
Stachys palustris	7	4	+					26		+	15	39	7	17	34	+	30	50	25		+		
Trifolium repens		7					+	7			6	25	5	15	34	7	35	+	33		+		+
Tussilago farfara	18	15	+	+			+	24			6	25	11	5	17	7	15	+					
Potentilla anserina	7	9						19	+	+	6	12	5	3	9	+	17	22	+				
Agrostis stolonifera							+				6	14	5	12	9	10	15	33	33	+	+		
Potentilla reptans	21	4				+	+	4	11		6		+				2	22					
Trifolium hybridum								4				14	4		10		9	+	17		+		
Persicaria amphibia	+						+			+	+					+	5				+	22	
Veronica serpyllifolia													5	3	14	5	7				+		
Symphytum officinale		+				+		+				3					2	+					
Rorippa sylvestris					+				+	+	9											33	33
(f) *Isoëto-Nanojuncetea* (incl. *Bidention* p.p.)																							
Plantago uliginosa		13	13				+	21	+	29	12	17	+	41	16	+	21	+	17				
Gnaphalium uliginosum							+	4			6	17	5	33	43	5	42	56	67		43		
Persicaria hydropiper												12	7	18	38	12	35	33	25	+	29		
Juncus bufonius												+	4	20	17	5	14	+	+		+		
Sagina procumbens													5	24	14	+	9	+	17		+		
Myosurus minimus							18						7	5		14							
Ranunculus sardous								4				+		8		7	2						

Column	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Community	CC	LA	CA	Vhtl	Vhtp	VT	TRc	EM	SSp	Ma	LV	AG	Pa	AM	HG	EA	SSc	PCh	GCh	SA	ESv	ESp	Po
Number of relevés	28	46	15	30	14	7	11	70	18	21	33	59	13	66	58	42	86	9	12	6	7	9	9
Average number of species	36	32	36	25	31	35	30	35	36	33	38	41	30	32	34	27	33	35	43	24	31	30	29
Gypsophila muralis												+		5	+		2						
(g) *Molinio-Arrhenatheretea* (incl. *Nardo-Callunetea* p.p.)																							
Achillea millefolium agg.		9	13		14	29	27	16			6	44	16	23	60	38	43	33	42	33	29		
Plantago lanceolata	11	13	20			71	45	16	44	+	9	12	7	14	17	7	10		25		43	+	
Cerastium holosteoides		+	+		+	+	18	9			6	24	13	30	48	21	26	+	33	+			
Trifolium pratense	+	+				+	+	9	+			17	7	8	7	+	12	+	17		+		+
Vicia cracca		4	+				18	7			6	14	5	12	14	5	12					+	
Lolium multiflorum		7			+		+	7		+		+	+	14	+	5	3						
Hylotelephium telephium				+				3				5	4	+	12	5	7		17				
Trifolium campestre	+		+					3				3	+	5	+		2						
Crepis capillaris			13									+	4	6	7		2		17				
Festuca pratensis							18	+				+		+	7	+	3						
Phleum pratense												5	4	3	9		8		+				
Poa pratensis		+										+		5	+		+						
Rumex acetosa								6				+	+		14	+							
Alchemilla vulgaris agg.												3		+	33		5						
Stellaria graminea												3	+		14	+	7						
Lathyrus pratensis								+				5			7		6						
Prunella vulgaris															17		10	+	+				
Dactylis glomerata							+					3			5		+						
Galium mollugo								+						+	3		2						
Leucanthemum vulgare															14		+		+				
Hypericum maculatum															17		2						
Sanguisorba officinalis															12		2						
*Pastinaca*sativa*		+					+					+				+							
(h) *Festuco-Brometea* (incl. *Sedo-Scleranthetea* p.p.)																							
Falcaria vulgaris	25	15	+				+	4	50	+	9	3	4										
*Knautia*arvensis*	21	7							17			5		+	5		5		+	33			
Hypericum perforatum		4						+	+			3		3	+		2						
*Silene*vulgaris*	11								+		+	3					+						
Vicia tenuifolia	11	4				+	+		+														
Nonea pulla	18	+						+	17	+													
Poa compressa			+					+			+		+	5									
Achillea collina	7					+	+									+							
Centaurea scabiosa	7											+					2		+				
Salvia verticillata	21							+	28														
Coronilla varia	14							+	22														
Relics of crops:																							
Avena sativa		+						3				5	+	3	9	+	8	22	+		29		
Hordeum distichon							27	4	22		6	7		5	+		6	+	+			+	
Triticum aestivum		+						9	+		+	3		+	3		5		+				
Secale cereale		4						3				7	+	3	3		5					+	
*Brassica*napus*								+				5	4	6	3	+	7						
Solanum tuberosum			+									5		3	+		9						
Medicago sativa								+			+	+				+							
Bryophyta:																							
Bryum sp.		+	+		+	+		+	+	+	+	+		+	+		+			+			
Bryum argenteum		+	+				+	+	+		+	+	+	+	+	+	+						
Phascum cuspidatum		+	+			+	+	+	+	+	+	+	+	+		+							
Barbula unguiculata		+			+	+		+	+		+	+		+	+	+	+						
Ceratodon purpureus			+		+			+				+	+	+	+		+			+			
Pottia truncata			+			+	+		+	+				+	+		+			+			
Dicranella varia		+	+					+	+	+		+		+	+								
Riccia sp.		+	+									+	+	+	+		+						
Eurhynchium hians							+	+	+					+			+						
Brachythecium albicans												+	+	+			+						

Columm	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Community	CC	LA	CA	Vhtl	Vhtp	VT	TRc	EM	SSp	Ma	LV	AG	Pa	AM	HG	EA	SSc	PCh	GCh	SA	ESv	ESp	Po
Number of relevés	28	46	15	30	14	7	11	70	18	21	33	59	13	66	58	42	86	9	12	6	7	9	9
Average number of species	36	32	36	25	31	35	30	35	36	33	38	41	30	32	34	27	33	35	43	24	31	30	29
Dicranella schreberana												+			+		+						
Eurhynchium schleicheri						+								+		+							
Brachythecium rutabulum								+								+							
Anthoceros agrestis														+	+								
Dicranella crispa															+		+						
Barbula convoluta								+															
Abietinella abietina									+														
Pohlia nutans												+											
Pottia intermedia									+														
Pseudephemerum nitidum																	+						
Bryum bicolor															+								
Ditrichum cylindricum															+								
Pottia lanceolata																+							
Pottia sp.								+															

Species in three columns: *Acer pseudoplatanus* juv. 13:+, 15:3, 17:+; *Acinos arvensis* 1:+,8:+,9:+; *Agrimonia eupatoria* 2:+,9:+,12:+; *Alopecurus pratensis* 15:3,16:+,17:2; *Bromus *hordeaceus* 7:+,12:+,17:+; *Carduus nutans* 2:+,8:3,9:+; *Chenopodium rubrum* 12:+,15:+,19:17; *Equisetum sylvaticum* 14:+,15:+,17:2; *Erysimum repandum* 5:+,6:+,9:11; *Gagea pratensis* 13:4, 16:10, 20:+; *Holcus lanatus* 14:3, 15:3, 17:2; *Linum usitatissimum* 8:+,15:+,17:2; *Lotus corniculatus* 8:+,15:3,17:2; *Nigella arvensis* 1:+,8:+,9:+; *Potentilla argentea* 7:+,14:+,15:+; *P. supina* 2:+,10:+,14:+; *Sisymbrium officinale* 7:+,21:+,22:22; *Veronica chamaedrys* 12:+,15:5, 17:+; *Vicia *pannonica* 1:+,2:+,8:+.

Species in two columns: *Agrostis capillaris* 11:+,15:26; *A. gigantea* 15:+,17:5; *Allium vineale* 5:+,10:+; *Alyssum alyssoides* 1:7,2:+; *Amaranthus blitum* 9:+,10:6; *Androsace elongata* 5:+,16:+; *Atriplex prostrata* subsp. *latifolia* 2:+,10:+; *Bidens tripartita* 15:+,17:+; *Bunias orientalis* 2:+,11:+; *Chenopodium suecicum* 8:+,10:+; *Datura stramonium* 10:19, 22:+; *Deschampsia caespitosa* 15:+,17:+; *Euphorbia cyparissias* 9:11, 17:2; *E. waldsteinii* 1:+,9:+; *Heracleum *sphondylium* 12:+,15:5; *Herniaria glabra* 17:+,20:+; *Leontodon autumnalis* 15:3, 17:+; *Leucosinapis alba* 3:+,14:+; *Lysimachia nummularia* 15:+,18:+; *Melilotus albus* 3:+, 9:11; *Misopates orontium* 3:+,14:+; *Onopordum acanthium* 7:+,9:+; *Panicum miliaceum* subsp. *agricola* 10:+, 22:+; *Picris hieracioides* 1:+,9:22; *Poa supina* 15:14,17:9; *Ranunculus acris* 15:5,17:+; *R. bulbosus* 12:+,13:+; *Salix caprea* juv. 14:+,15:+; *Solanum lycopersicum* 10:14, 11:+; *Trifolium dubium* 14:6, 17:3; *Valerianella rimosa* 2:+, 8:+; *Vicia villosa* subsp. *varia (V. glabrescens)* 10:+,17:+.

Species in one column: *Abutilon theophrasti* 10:+; *Acer negundo* juv. 22:+; *Achillea ptarmica* 15:+; *A. setacea* 9:17; *Alopecurus myosuroides* 8:+; *Amaranthus albus* 10:10; *Angelica sylvestris* 15:+; *Anthemis tinctoria* 17:+; *Arrhenatherum elatius* 8:+; *Asperugo procumbens* 3:+; *Beta vulgaris* 2:+; *Bistorta major* 15:+; *Camelina alyssum* 15:5; *Campanula patula* 15:+; *Centaurea *jacea* 15:+; *Centaurium pulchellum* 8:+; *Centunculus minimus* 15:+; *Cerastium arvense* 15:+; *Chaerophyllum aureum* 12:5; *Ch. bulbosum* 13:+; *Chenopodium strictum* 10:+; *Coronopus squamatus* 11:+; *Cuscuta epithymum* 9:+; *Epilobium angustifolium* 17:+; *Eryngium campestre* 9:11; *Euphorbia stricta* 2:+; *Festuca rubra* agg. 15:+; *Ficaria *bulbifera* 13:+; *Fumaria *wirtgenii* 10:+; *Heracleum mantegazzianum* 15:3; *Hibiscus trionum* 11:+; *Hypericum humifusum* 15:9; *Hypochaeris radicata* 17:+; *Lactuca sativa* 22:+; *Lepidium campestre* 17:+; *Lolium perenne* 15:+; *Lupinus angustifolius* 23:+; *L. polyphyllus* 13:+; *Luzula campestris* 15:+; *Lychnis flos-cuculi* 17:+; *Melampyrum arvense* 1:7; *M. barbatum* 1:+; *Myosotis ramosissima* 3:13; *Myosoton aquaticus* 18:+; *Orobanche minor* 8:+; *Phragmites australis* 10:+; *Pimpinella major* 15:+; *P.*saxifraga* 1:+; *Pinus sylvestris* juv. 15:3; *Pisum arvense* 15:+; *Poa palustris* 15:+; *Polycnemum arvense* 3:+; *Ranunculus auricomus* agg. 15:3; *R. nemorosus* 15:+; *Rhinanthus minor* 15:3; *Rumex*tenuifolius* 13:4; *Salvia nemorosa* 9:+; *Sambucus nigra* juv. 8:+; *Sanguisorba minor* 9:17; *Scabiosa ochroleuca* 9:11; *Senecio sylvaticus* 17:+; *S. viscosus* 7:+; *Setaria verticillata* 22:+; *Sorbus aucuparia* juv. 15:+; *Torilis japonica* 8:+; *Trifolium aureum* 17:+; *Urtica dioica* 17:+; *Veronica prostrata* 8:+; *Vicia sepium* 15:3; *Viola *polychroma* 15:3.

Table 2. Overview of the ecological characteristic of communities treated in the present paper. Classification of climatic regions follows Quitt (1971). Equiocal communities are those occurring in other periods of the year. See text for further details.

Community	Altitudinal belt (m a.s.l.)	Climatic region temperature precipitation	Parent material	Soil type	Soil texture	Potential natural vegetation	Contact community	Equilocal community	Distribution
1. *Caucalido-Conringietum*	lowland, colline (160) 200–350 (400)	T4 T2 (MT11) 8–9 (10)°C 450–600 mm	limestone, marlstone, carbonate loess, marl, (marl clay)	rendzina, pararendzina, haplic and verti-haplic chernozem, (pellic vertisol)	clayey-loamy, loamy, (clayey), gravelly, stony, base-rich, alkaline	*Brachypodio pinnati-Quercetum, Quercetum pubescenti-roboris,* (*Lathyro versicoloris-Quercetum, Pruno mahaleb-Quercetum*)	*Lathyro-Adonidetum*	*Veronicetum hederifolio-trilobae, Stachyo-Setarietum pumilae*	Small islands on selected habitats of the Czech Thermophyticum and Pannonicum
2. *Lathyro-Adonidetum*	lowland, colline (170) 200–400 (500)	T4 T2 (MT 11) ¨ 8–9°C 500–650 mm	loess, marlstone, slate, (greywacke), (basic effusive rocks)	haplic and luvic chernozem, pararendzina, (eutric to mollic cambisol)	loamy, clayey-loamy, gravelly, base-rich, neutral to slightly alkaline	*Brachypodio pinnati-Quercetum, Potentillo albae-Quercetum, Primulo veris-Carpinetum*	*Caucalido-Conringietum, Euphorbio-Melandrietum,* (*Consolido-Anthemidetum*)	*Veronicetum hederifolio-trilobae, Lamio-Veronicetum politae* (partly), (*Valerianello-Thlaspietum*)	Selected habitats of major part of the Czech Thermophyticum and Pannonicum
3. *Consolido-Anthemidetum*	lowland, colline (supracolline) (170) 200–400 (620)	T4 T2 (MT11) 8–9°C 500–650 mm	gravelly sand, mixed loess and sand, slate, acid and neutral rocks	cambic arenosol, eutric cambisol, mollic cambisol	loamy-sandy, sandy-loamy, gravelly stony, slightly acid	*Tilio-Betuletum, Melampyro-Carpinetum luzuletosum*	*Lathyro-Adonidetum raphanetosum, Euphorbio-Melandrietum raphanetosum, Aphano-Matricarietum*	*Veronicetum hederifolio-triphylli, Lamio-Veronicetum politae* (partly), (*Panico-Setarion*)	Selected habitats of minor part of the Czech Thermophyticum and Pannonicum
4. *Veronicetum hederifolio-trilobae*	lowland, colline (160) 200–350 (450)	T4 T2 MT11 (7) 8–9 (10)°C (450) 500–600 (650) mm	loess, marlstone, slate, greywacke, (marl)	chernozems, pararendzina, eutric to mollic cambisol, (pellic vertisol)	loamy, clayey-loamy, sandy-loamy, gravelly, base-rich, neutral to alkaline	*Brachypodio pinnati-Quercetum, Potentillo albae-Quercetum, Melampyro-Carpinetum*	*Veronicetum hederifolio-triphylli*, (*Valerianello-Thlaspietum*)	*Lathyro-Adonidetum, Euphorbio-Melandrietum,* (*Caucalido-Conringietum*)	Selected habitats of major part of the Czech Thermophyticum and Pannonicum
5. *Veronicetum hederifolio-triphylli*	lowland, lower colline (160) 200–250 (270)	T4 T2 (MT11) 8–9 (10)°C 450–600 mm	gravelly sand, eolic sand, slate, acid intrusive rocks	cambic arenosol, eutric cambisol	loamy-sandy, sandy and gravelly, slightly acid	*Tilio-Betuletum, Melampyro-Carpinetum luzuletosum,* (*Querco-Ulmetum*)	*Veronicetum hederifolio-trilobae, Papaveretum argemones*	*Consolido-Anthemidetum,* (*Echinochloo-Setarietum viridis*)	Selected habitats of minor part of the Czech Thermophyticum and roughly whole area ot the Pannonicum
6. *Valerianello-Thlaspietum*	lowland, lower colline (180) 250–270 (290)	T4 T2 (MT11) 8–9°C 500–650 mm	loess, marlstone, slate, (greywacke)	chernozems, pararendzina, orthic luvisol, (eutric cambisol)	loamy, clayey-loamy, sandy-loamy, gravelly, base-rich, neutral to alkaline	*Brachypodio pinnati-Quercetum, Potentillo albae-Quercetum, Melampyro-Carpinetum*	*Veronicetum hederifolio-trilobae, Taraxacum* sect. *Ruderalia*	*Lathyro-Adonicletum, Euphorbio-Melandrietum,* (*Caucalido-Conringietum*)	Probably conforming with both above-mentioned vernal associations (lack of records)

Community	Altitudinal belt (m a.s.l.)	Climatic region temperature precipitation	Parent material	Soil type	Soil texture	Potential natural vegetation	Contact community	Equilocal community	Distribution
7. *Taraxacum* sect. *Ruderalia*	lowland, colline (supracolline) 200–400 (500)	T4 T2 MT11 (MT10 MT9) 7–9°C 500–700 mm	loess, loesslike deposits, polygenetic loams, slate, greywacke	chernozems, orthic-luvisol, dystric planosol, pararendzina, eutric cambisol	loamy, sandy-loamy, (clayey-loamy), gravelly, neutral to slightly acid	*Melampyro-Carpinetum, Carici pilosae-Carpinetum,* (*Potentillo albae-Quercetum*)	*Valerianello-Thlaspietum, Veronicetum hederifolio-trilobae*	*Euphorbio –Melandrietum, Lathyro-Adonidetum*	Roughly whole area of the Czech Thermophyticum and Pannonicum
8. *Euphorbio-Melandrietum*	lowland, colline (supracolline) (160) 200–450 (550)	T2 MT11 MT10 (MT9) (6) 7–8 (9)°C (500) 550–700 mm	loess, loesslike deposits, polygenetic loams, slate, greywacke, (basic effusive rocks)	luvic chernozem, orthic greyzem, orthic luvisol, dystric planosol, pararendzina, eutric cambisol, (mollic cambisol)	loamy, sandy-loamy, (clayey-loamy), gravelly, (stony), neutral to slightly acid	*Melampyro-Carpinetum, Carici pilosae-Carpinetum,* (*Potentillo albae-Quercetum*), (*Tilio-Betuletum*)	*Lathyro-Adonidetum, Consolido-Anthemidetum Aphano-Matricarietum,* (*Aethuso-Galeopsietum*)	*Veronicetum hegerifolio-trilobae, Lamio-Veronicetum politae,* (*Veronicetum hederifolio-triphylli*), (*Papaveretum argemones*)	Roughly whole area of the Czech Thermophyticum and Pannonicum with several islands in the Czech and Moravian Mesophyticum and Carpathian Mesophyticum
9. *Stachyo-Setarietum pumilae*	lowland, lower colline (160) 200–250 (300)	T4 T2 8–9 (10)°C 450–600 mm	marl, marl clay, marlstone, carbonate loess	pararendzina, verti-haplic chernozem, (pellic vertisol)	clayey-loamy, clayey, gravelly, stony, base-rich, alkaline	*Brachypodio pinnati-Quercetum, Quercetum pubescenti-roboris,* (*Lathyro versicoloris-Quercetum*), (*Pruno mahaleb-Quercetum*)	*Mercurialetum annuae*	*Caucalido-Conringietum euphorbietosum falcatae*	Small islands on selected habitats of the Czech Thermophyticum and Pannonicum
10. *Mercurialetum annuae*	lowland, lower colline (145) 200–300 (340)	T4 T2 8–9 (10)°C 450–600 mm	loess, carbonate and other alluvial sediments, (marl clay)	haplic to luvic chernozem, fluvi-gleyic phaeozem, eutric fluvisol, (pararendzina)	loamy, sandy-loamy, (clayey-loamy), (gravelly), base-rich, nutrient-rich, slightly alkaline	*Potentillo albae-Quercetum,Melampyro-Carpinetum,* (*Querco-Ulmetum*)	*Lamio-Veronicetum politae, Stachyo-Setarietum pumilae, Echinochloo-Setarietum pumilae*	*Lathyro-Adonidetum, Euphorbio-Melandrietum,* (*Caucalido-Conringietum*)	Selected habitats of major part of the Czech Thermophyticum and Pannonicum
11. *Lamio-Veronicetum politae*	lowland, colline (150) 200–350 (450)	T2 MT11 MT10 8–9°C 500–650 mm	loess, loesslike deposits, marlstone, slate, various terrace and alluvial deposits	haplic to luvic chernozem, orthic to albic luvisol, eutric cambisol, eutric fluvisol, (pararendzina)	loamy, clayey-loamy, sandy-loamy, (gravelly), base-rich, neutral to slightly acid	*Melampyro-Carpinetum, Carici pilosae-Carpinetum,* (*Potentillo albae-Quercetum*), (*Querco-Ulmetum*)	*Mercurialetum annuae, Echinochloo-Setarietum pumilae*	*Euphorbio-Melandrietum, Lathyro-Adonidetum,* (*Consolido-Anthemidetum*)	Roughly whole area of the Czech Thermophyticum and probably Pannonicum (lack of records) with several islands in the Czech Mesophyticum
12. *Aethuso-Galeopsietum*	supracolline, submontane (300) 400–650 (780)	MT11 to MT9 MT7 (MT5 MT4) (5) 6–7 (8)°C (550) 600–750 (800) mm	loesslike deposits, polygenetic loams, marlstone, slate, greywacke, basic effusive rocks, (acid metamorphic rocks)	orthic to albic luvisol, pararendzina, eutric cambisol, mollic cambisol, (dystric cambisol)	sandy-loamy, loamy-sandy, gravelly, stony, slightly acid	*Melampyro-Carpinetum, Carici pilosae-Carpinetum, Luzulo albidae-Quercetum, Tilio cordatae-Fagetum, Melico-Fagetum,* (*Luzulo-Fagetum*),	*Aphano-Matricarietum, Euphorbio-Melandrietum,* (*Spergulo-Scleranthetum*), (*Holco-Galeopsietum*)	*Papaveretum argemones,* (*Erophilo-Arabidopsietum*)	Prevailing area of the Czech and Moravian Mesophyticum and also Carpathian Mesophyticum and only little area of the Czech Thermophyticum

13. *Papaveretum argemones*	colline, supracolline (200) 300–500 (630)	T2 MT11 to MT9 MT7 (MT5) (6) 7–8 (9)°C (500) 550–700 (750) mm	loess, loesslike deposits, polygenetic loams, marlstone, slate, greywacke, gravelly sand, (acid and neutral intrusive and metamorphic rocks)	orthic to albic luvisol, pararendzina, eutric cambisol, cambic arenosol, (dystric cambisol)	sandy-loamy, loamy-sandy, gravelly, slightly acid	*Melampyro-Carpinetum, Carici pilosae-Carpinetum, Luzulo albidae-Quercetum, Festuco ovinae-Quercetum, Tilio cordatae-Fagetum, Melico-Fagetum, (Luzulo-Fagetum)*	*Veronicetum hederifolio-triphylli, Erophilo-Arabidopsietum, (Scleranthо-Arnoseridetum)*	*Aethuso –Galeopsietum, Aphano-Matricarietum, (Panico –Setarion)*	Major part of the Czech and Moravian Mesophyticum and minor part of the Czech Thermophyticum
14. *Aphano-Matricarietum*	colline, supracolline (225) 350–500 (665)	T2 MT11 to MT9 (MT7) (6) 7–8 (9)°C (550) 600–700 (800) mm	loess, loesslike deposits, polygenetic loams, sandy-clayey sediments, slate, greywacke, acid sandstone, (gravelly sand), (acid to neutral intrusive and metamorphic rocks)	orthic to albic luvisol, stagno-gleyic luvisol, dystric planosol, eutric cambisol, luvic cambisol, (cambic arenosol), (dystric cambisol)	loamy, clayey-loamy, sandy-loamy, loamy-sandy, gravelly, slightly acid	*Melampyro-Carpinetum, Carici pilosae-Carpinetum, Luzulo albidae-Quercetum, (Molinio-Quercetum), (Vaccinio-Quercetum), (Luzulo-Fagetum)*	*Euphorbio-Melandrietum, Aethuso-Galeopsietum, (Consolido-Anthemidetum), (Spergulo-Scleranthetum)*	*Erophilo-Arabidopsietum, Panico-Chenopodietum, (Papaveretum argemones)*	Major part of the Czech and Moravian Mesophyticum as well as Carpathian Mesophyticum and minor part of the Czech Thermophyticum
15. *Holco-Galeopsietum*	colline, submontane, (montane) (265) 400–800 (950)	(MT9) MT7 MT5 MT4 (MT3 MT2 CH7) (4) 5–7 (8)°C (550) 600–800 (1200) mm	acid intrusive and metamorphic rocks, acid sandstone, polygenetic loams with gravels, (slate), (greywacke)	dystric cambisol, spodo-dystric cambisol, ferro-humic podzol, eutric cambisol, dystric planosol	loamy-sandy, sandy-loamy, gravelly, stony, acid, nutrient-poor	*Luzulo albidae-Quercetum, Vaccinio-Quercetum, Luzulo-Fagetum, (Violo reichenbachianae-Fagetum)*	*Spergulo-Scleranthetum,* (diffusive transitions into this as.)	*Erophilo-Arabidopsietum, Galeopsio-Chenopodietum*	Prevailing area of the Czech and Moravian Mesophyticum with some area of the Carpathian Mesophyticum and little area of the Czech and Moravian Oreophyticum
16. *Erophilo-Arabidopsietum*	lowland, supracolline (155) 200–550 (650)	T2 MT11 to MT9 (MT7 MT5) (6) 7–8 (9)°C (500) 550–700 (750) mm	gravelly sand, eolic sand, polygenetic loams with gravels, (acid intrusive and metamorphic rocks)	cambic arenosol, eutric cambisol, dystric planosol, (dystric cambisol)	loamy-sandy, sandy-loamy, gravelly, acid	*Luzulo albidae-Quercetum, Vaccinio-Quercetum, (Tilio-Betuletum), (Festuco ovinae-Quercetum), (Luzulo-Fagetum)*	*Papaveretum argemones, Veronicetum hederifolio-triphylli*	*Aphano-Matricarietum, Spergulo-Scleranthetum, (Echinochloo-Setarietum viridis)*	Major part of the Czech and Moravian Mesophyticum and also part of the Carpathian Mesophyticum and minor part of the Czech Thermophyticum
17. *Spergulo-Scleranthetum*	colline, supracolline, (submontane) (225) 400–600 (775)	(MT11) MT10 MT9 MT7 MT5 (MT4 MT3) (5) 6–7 (8)°C (550) 600–750 (850) mm	acid intrusive and metamorphic rocks, acid Permocarboniferous rocks ,acid sandstone, slate, greywacke, polygenetic loams with gravels, (acid clays and various mineral-poor substrates)	dystric cambisol, spodo-dystric cambisol, stagno-gleyic cambisol, dystric planosol, (albic luvisol)	loamy-sandy, sandy-loamy, gravelly, stony, acid, nutrient-poor	*Luzulo albidae-Quercetum, Vaccinio-Quercetum, Luzulo-Fagetum, (Festuco altissimae-Fagetum)*	*Aphano-Matricarietum, Aethuso-Galeopsietum, Holco-Galeopsietum*	*Erophilo-Arabidopsietum, Galeopsio-Chenopodietum*	Whole area of the Czech and Moravian Mesophyticum and also of the Carpathian Mesophyticum and only on selected habitats of the Czech Thermophyticum

Community	Altitudinal belt (m a.s.l.)	Climatic region temperature precipitation	Parent material	Soil type	Soil texture	Potential natural vegetation	Contact community	Equilocal community	Distribution
18. *Panico-Chenopodietum*	colline, supracolline (215) 350–450 (510)	T2 MTl1 to MT9 (MT7) (6) 7–8 (9)°C (550) 600–700 (750) mm	polygenetic loams, loesslike deposits, pre-quaternary sandy-clays, acid alluvial sediments, slate, acid sandstone	dystric planosol, stagno-gleyic luvisol, eutric flavisol, eutric cambisol, (cambic arenosol)	loamy, clayey-loamy, sandy-loamy, gravelly, slightly acid	*Melampyro-Carpinetum, Carici pilosae-Carpinetum, Luzulo albidae-Quercetum,* (*Molinio-Quercetum*), (*Pruno-Fraxinetum*)	*Lamio-Veronicetum politae, Galeopsio-Chenopodietum,* (*Echinochloo-Setarietum viridis*)	*Aphano-Matricarietum,* (*Spergulo-Scleranthetum*), (*Erophilo-Arabidopsietum*)	Prevailing part of the Czech and Moravian Mesophyticum (with references from the Carpathian Mesophyticum) and small part of the Czech Thermophyticum
19. *Galeopsio-Chenopodietum*	supracolline, (submontane) (400) 450–550 (600)	MTl1 to MT9 (MT7) (5) 6–7 (8)°C (550) 600–750 (850) mm	acid intrusive and metamorphic rocks, acid sandstone, (polygenetic loams with gravels)	dystric cambisol, eutric cambisol, cambic arenosol, (dystric planosol)	sandy-loamy, loamy-sandy, gravelly, stony, acid, nutrient-poor	*Luzulo albidae-Quercetum, Vaccinio-Quercetum, Luzulo-Fagetum*	*Panico-Chenopodietum, Holco-Galeopsietum, Aethuso-Galeopsietum*	*Spergulo-Scleranthetum*	Only small part of the Czech Mesophyticum and Czech Oreophyticum (lack of records)
20. *Scleranthо-Arnoseridetum*	(lowland), colline (187) 413–430 (462)	(T2) MT10 (MT7) (5) 6–7 (8)°C (550) 600–700 (750) mm	terrace gravel-sand, acid alluvial sediments, (acid intrusive rocks)	cambic arenosol, eutric fluvisol, (dystric cambisol)	loamy-sandy, sandy, gravelly, strongly acid, nutrient-poor	*Vaccinio-Quercetum, Festuco ovinae-Quercetum*	*Spergulo-Scleranthetum*, (*Erophilo-Arabidopsietum*), (*Corynephoretalia*)	not stated	Selected habitats of the Czech Mesophyticum and rarely of the Czech Thermophyticum (lack of records)
21. *Echinochloo-Setarietum viridis*	(lowland), colline (190) 215–355 (480)	(T2) MT10 MT9 (MT7) (5) 6–7 (8)°C (550) 600–700 (750) mm	terrace gravel-sand, loesslike deposits with gravels, (acid intrusive and metamorphic rocks)	cambic arenosol, albic luvisol, (eutric cambisol)	sandy-loamy, loamy-sandy,gravelly, acid	*Luzulo albidae-Quercetum,* (*Vaccinio-Quercetum*), (*Molinio-Quercetum*)	*Panico-Chenopodietum, Echinochloo-Setarietum pumilae*	*Spergulo-Scleranthetum*, (*Aphano-Matricarietum*), (*Erophilo-Arabidopsietum*)	Selected habitats of the Czech Mesophyticum and partly of the Czech Thermophyticum (lack of records)
22. *Echinochloo-Setarietum pumilae*	lowland (155) 160–245 (280)	T4 T2 8–9 (10)°C 500–650 (700) mm	loess, carbonate alluvial sediments, acid alluvial sediments	haplic chernozem, haplic phaeozem, fluvi-gleyic phaeozem, eutric fluvisol	sandy-loamy, loamy-sandy, gravelly, neutral to slightly acid	*Melampyro-Carpinetum, Primulo veris-Carpinetum, Querco-Ulmetum,* (*Pruno-Fraxinetum*)	*Mercurialetum annuae, Lamio-Veronicetum politae, Echinochloo-Setarietum viridis, Portulacetum oleraceae*	*Euphorbio-Melandrietum, Aphano-Matricarietum,* (*Veronicetum hederifolio-triphylli*)	Selected habitats of the Czech Thermophyticum and Pannonicum
23. *Portulacetum oleraceae*	lowland 160–195 (205)	T4 T2 (8) 9–10°C 500–600 mm	eolic sand, gravelly sand, carbonate alluvial sediments, acid alluvial sediments	cambic arenosol, fluvi-gleyic phaeozem, eutric fluvisol	loamy-sandy, sandy, gravelly, slightly acid	*Festuco ovinae-Quercetum, Querco-Ulmetum*	*Echinochloo-Setarietum pumilae, Mercurialetum annuae*	not stated	Very selected habitats of little part of the Czech Thermophyticum and Pannonicum

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Souhrn

Syntéza segetální vegetace je zpracována pro území České republiky nově. Opírá se o 712 autorových snímků pořízených v období let 1955–2000 a přihlíží k domácí i zahraniční literatuře. Snímkový materiál byl uložen v České národní fytocenologické databázi a v příspěvku je pouze výběr typových snímků. Syntéza byla provedena klasickou tabelární technikou vypracovanou curyšsko-montpellierskou fytocenologickou školou. Veškerá segetální vegetace je řazena do třídy *Stellarietea mediae*. Celkem bylo identifikováno 23 vegetačních typů (z toho 22 asociací) náležejících do 3 řádů (*Centaureetalia cyani, Atriplici-Chenopodietalia, Eragrostietalia*) a 8 svazů: *Caucalidion lappulae* (*Caucalido daucoidis-Conringietum orientalis, Lathyro tuberosi-Adonidetum aestivalis, Consolido regalis-Anthemidetum austriacae, Veronicetum hederifolio-trilobae, Veronicetum hederifolio-triphylli, Valerianello locustae-Thlaspietum perfoliati, Euphorbio exiguae-Melandrietum noctiflori*, společ. *Taraxacum* sect. *Ruderalia*), *Fumario-Euphorbion* (*Stachyo annuae-Setarietum pumilae, Mercurialetum annuae, Lamio-Veronicetum politae*), *Sherardion* (*Aethuso-Galeopsietum, Papaveretum argemones*), *Scleranthion annui* (*Aphano-Matricarietum chamomillae, Holco-Galeopsietum, Erophilo-Arabidopsietum thalianae*, *Spergulo arvensis-Scleranthetum annui*), *Polygono-Chenopodion polyspermi* (*Panico-Chenopodietum polyspermi, Galeopsio-Chenopodietum polyspermi*), *Arnoseridion minimae* (*Scleranto annui-Arnoseridetum minimae*), *Panico-Setarion* (*Echinochloo cruris galli-Setarietum viridis*, *Echinochloo cruris galli-Setarietum pumilae*), *Eragrostion* (*Portulacetum oleraceae*). Jsou navrženy podstatné změny v obsahu a členění svazů. Syntaxonomicky neudržitelným se ukázal svaz *Veronico politae-Taraxacion* a je touto publikací zrušen. Nově je publikována asociace *Veronicetum hederifolio-trilobae* a vymezeno její postavení vzhledem k asociaci *Veronicetum hederifolio-triphylli*. Je uvedeno 5 nových subasociací a podle možností stanoveny lektotypy a neotypy příslušných syntaxonů. Jména syntaxonů byla revidována nebo nově navržena v souladu s posledním vydáním Mezinárodního kódu fytocenologické nomenklatury. Je uvedena základní synonymika. Každý vegetační typ je charakterizován druhovým složením, jsou uvedeny taxony diagnostické, konstantní, ohrožené, významné plevele, je uvedena struktura porostů, ekologie a dynamika, variabilita, rozšíření na území České republiky s poznámkami o výskytu v okolních evropských státech. Problematika syntaxonomická, nomenklatorická a další je řešena formou komentářů na příslušných místech textu. U každého vegetačního typu je uvedena pokud možno vyčerpávající literatura domácí, slovenská a ostatní zahraniční.

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Appendix 1. – New syntaxa described in the paper. Diagnostic species are marked with *. Database nos. refer to the numbers of relevés in the Czech National Phytosociological Database (Chytrý & Rafajová 2003).

***Veronicetum hederifolio-trilobae* Kropáč ass. nova**
Database nos.: 342178–342207. – Holotypus no. 342200. – Cítoliby (district Louny), SE margin of the village, alt. 243 m, haplic chernozem on loess with skelet of marlstone, winter wheat 15 cm of height, total cover 80%, crop cover 60%, weed cover 35%, 28 April 1970. – **Adonis aestivalis* 4, *Thlaspi arvense* 4, **Veronica hederifolia* 4, **V. triloba* 4, *Cirsium arvense* 3, *Elytrigia repens* 3, *Fallopia convolvulus* 3, *Lamium amplexicaule* 3, *L. purpureum* 3, *Stellaria media* 3, *Veronica polita* 3, *Viola arvensis* 3, *Aethusa cynapium* subsp. *agrestis* 2, *Capsella bursa-pastoris* 2, *Consolida regalis* 2, *Fumaria officinalis* 2, *Galium aparine* 2, *Neslia paniculata* 2, *Polygonum aviculare* agg. 2, *Sinapis arvensis* 2, *Veronica persica* 2, *Chenopodium album* 1, *Geranium pusillum* 1, *Silene noctiflora* 1, *Taraxacum* sect. *Ruderalia* 1, **Conringia orientalis* +.
N o t i c e : For all new syntaxa the relevé area is ± 100 m^2.

***Caucalido daucoidis-Conringietum orientalis euphorbietosum falcatae* Kropáč subass. nova**
Database nos.: 342019–342029. – Holotypus no. 342019. – Oblík Hill (distr. Louny), SSW footslope, near the lonely farmstead, alt. 290 m, inclination 15° , verti-haplic chernozem on marl, winter rye 150 cm of height, total cover 80%, crop cover 45%, weed cover 60%, 11 June 1964. – *Sinapis arvensis* 6, **Caucalis platycarpos* subsp. *platycarpos* 5, **Conringia orientalis* 5, *Euphorbia exigua* 5, *Sherardia arvensis* 5, *Adonis aestivalis* 4, *Anagallis arvensis* 4, *Campanula rapunculoides* 4, *Convolvulus arvensis* 4, *Fallopia convolvulus* 4, *Anagallis foemina* 3, *Consolida regalis* 3, *Knautia arvensis* subsp. *arvensis* 3, *Microrrhinum minus* 3, *Silene noctiflora* 3, *Atriplex patula* 2, *Chenopodium album* 2, *Cirsium arvense* 2, *Elytrigia repens* 2, **Euphorbia falcata* 2, *Falcaria vulgaris* 2, *Fumaria vaillantii* 2, *Papaver rhoeas* 2, *Polygonum rurivagum* 2, *Potentilla reptans* 2, *Viola arvensis* 2, **Ajuga chamaepitys* 1, **Kickxia spuria* 1, *Lamium amplexicaule* 1, *Linaria vulgaris* 1, *Medicago lupulina* 1, *Polygonum arenastrum* 1, *Valerianella dentata* 1, *Veronica polita* 1, *Chenopodium hybridum* +, *Euphorbia helioscopia* +, *Lathyrus tuberosus* +, *Neslia paniculata* +, *Vicia tenuifolia* +.

***Lathyro tuberosi-Adonidetum aestivalis raphanetosum* Kropáč subass. nova**
Database nos.: 342075–342092. – Holotypus: 342090. – Lechovice (distr. Beroun), 2 km SWW of the town, alt. 365 m, eutric cambisol on slate, winter wheat 80 cm of height, total cover 90%, crop cover 70%, weed cover 45%, 20 June 1972. – *Consolida regalis* 5, *Papaver rhoeas* 5, *Convolvulus arvensis* 4, *Polygonum aviculare* 4, *Tripleurospermum inodorum* 4, *Viola arvensis* 4, **Adonis aestivalis* 3, *Cirsium arvense* 3, *Fallopia convolvulus* 3, *Galium aparine* 3, *Lamium amplexicaule* 3, *Stellaria media* 3, *Veronica persica* 3, *V. polita* 3, **Vicia tetrasperma* 3, *Atriplex patula* 2, *Avena fatua* 2, *Campanula rapunculoides* 2, *Fumaria officinalis* 2, *Lapsana communis* 2, *Myosotis stricta* 2, *Sinapis arvensis* 2, *Thlaspi arvense* 2, *Anagallis arvensis* 1, **Centaurea cyanus* 1, *Euphorbia helioscopia* 1, *Galium spurium* 1, *Lithospermum arvense* 1, *Medicago lupulina* 1, *Neslia paniculata* 1, *Papaver dubium* 1, **Raphanus raphanistrum* 1, *Veronica arvensis* 1, *V. sublobata* 1, *Linaria vulgaris* +, *Taraxacum* sect. *Ruderalia* +.

***Euphorbio exiguae-Melandrietum noctiflori raphanetosum* Kropáč subass. nova**
Database nos.: 342130–342162. – Holotypus: 342131. – Jevišovice (distr. Znojmo, EES of Moravské Budějovice), 1 km SW of the village, alt. 370 m, albic luvisol on polygenetic loams, spring barley 50 cm of height and low undercrop of lucerne, total cover 90%, crop cover 80%, weed cover 40%, 18 June 1971. – *Cirsium arvense* 4, *Convolvulus arvensis* 4, *Medicago lupulina* 4, *Sherardia arvensis* 4, **Silene noctiflora* 4, *Tripleurospermum inodorum* 4, **Vicia hirsuta* 4, *Fallopia convolvulus* 3, **Raphanus raphanistrum* 3, *Stellaria media* 3, *Thlaspi arvense* 3, *Veronica persica* 3, **Euphorbia exigua* 2, *Lamium amplexicaule* 2, *Neslia paniculata* 2, *Persicaria maculosa* 2, *Polygonum aviculare* 2, **Scleranthus annuus* 2, *Sonchus asper* 2, *Veronica polita* 2, **Vicia tetrasperma* 2, *Viola arvensis* 2, *Capsella bursa-pastoris* 1, **Centaurea cyanus* 1, *Chenopodium album* 1, *Galium spurium* 1, *Persicaria lapathifolia* subsp. *pallida* 1, *Rumex crispus* 1, *Taraxacum* sect. *Ruderalia* 1, *Vicia angustifolia* 1, *Anthemis austriaca* +, *Euphorbia helioscopia* +, *Fumaria officinalis* +, *Valerianella dentata* +.

***Spergulo arvensis-Scleranthetum annui sherardietosum* Kropáč subass. nova**
Database nos.: 342565–342587. – Holotypus: 342567. – Třebanice (distr. Prachatice, NW of Lhenice), 0.4 km EEN of the village, alt. 520 m, luvic cambisol on weathered granulite, oats 80 cm of height, total cover 100%, crop cover 80%, weed cover 60%, 27 June 1968. – *Stellaria media* 6, **Raphanus raphanistrum* 5, *Capsella bursa-pastoris* 4, *Chenopodium album* 4, *Cirsium arvense* 4, *Galium aparine* 4, *Persicaria maculosa* 4, *Polygonum aviculare* 4, *Daucus carota* 3, *Elytrigia repens* 3, *Fallopia convolvulus* 3, *Galeopsis tetrahit* 3, *Plantago major* subsp. *major* 3, **Sherardia arvensis* 3, *Sonchus arvensis* 3, *S. asper* 3, **Spergula arvensis* subsp. *arvensis* 3, *Anagallis arvensis* 2, *Atriplex patula* 2, *Fumaria officinalis* 2, *Gnaphalium uliginosum* 2, *Mentha arvensis* 2, *Poa trivialis* 2, **Rumex acetosella* subsp. *acetosella* 2, *Taraxacum* sect. *Ruderalia* 2, *Tussilago farfara* 2, *Vicia hirsuta* 2, *Viola arvensis* 2, *Apera spica-venti* 1, *Aphanes arvensis* 1, *Prunella vulgaris* 1, *Ranunculus repens* 1, **Scleranthus annuus* 1, **Sinapis arvensis* 1, *Trifolium repens* 1, *Veronica arvensis* 1, *Vicia angustifolia* 1, *Myosotis stricta* +, *Silene latifolia* subsp. *alba* +

***Spergulo arvensis-Scleranthetum annui violetosum tricoloris* Kropáč subass. nova**
Database nos.: 342588–342596. – Holotypus: 342590. – Řídelov (distr. Jihlava, NW of Telč), 0.7 km NW of the village, alt. 615 m, dystric cambisol on weathered gneiss, winter wheat 60 cm of height, total cover 90%, crop cover 70%, weed cover 40%, 14 June 1971. – *Galium aparine* 6, *Galeopsis tetrahit* 5, *Anthemis arvensis* 4, *Capsella bursa-pastoris* 4, *Poa annua* 4, *Stellaria media* 4, *Elytrigia repens* 3, *Fallopia convolvulus* 3, *Myosotis arvensis* 3, *Persicaria hydropiper* 3, *Plantago pauciflora* 3, **Spergula arvensis* subsp. *arvensis* 3, **Achillea millefolium* agg. 2, *Arabidopsis thaliana* 2, *Cirsium arvense* 2, *Mentha arvensis* 2, *Persicaria lapathifolia* subsp. *pallida* 2, *Potentilla anserina* 2, **Scleranthus annuus* 2, *Trifolium repens* 2, *Veronica arvensis* 2, *Vicia angustifolia* 2, *Viola arvensis* 2, *Chenopodium album* 1, *Gnaphalium uliginosum* 1, *Juncus bufonius* 1, *Matricaria discoidea* 1, **Raphanus raphanistrum* 1, **Rumex acetosella* subsp. *acetosella* 1, *Solanum tuberosum* 1, **Viola tricolor* subsp. *tricolor* 1, *Plantago major* subsp. *major* +, *Prunella vulgaris* +

Appendix 2. – Neotypes for the syntaxa treated in the paper.

Euphorbio exiguae-Melandrietum noctiflori G. Müller 1964
Neotypus hoc loco designatus: Database no. 342093. – Uhřetice (distr. Chrudim), 0.6 km NNW of the village, alt. 245 m, luvic chernozem on loess, winter wheat 140 cm of height, total cover 100%, crop cover 75%, weed cover 45%, 22 June 1972. – **Consolida regalis* 5, *Papaver rhoeas* 5, *Galium aparine* 4, *Thlaspi arvense* 4, *Campanula rapunculoides* 3, *Cirsium arvense* 3, *Convolvulus arvensis* 3, **Lathyrus tuberosus* 3, *Polygonum aviculare* 3, *Rumex crispus* 3, **Silene noctiflora* 3, *Tripleurospermum inodorum* 3, *Aethusa cynapium* subsp. *agrestis* 2, *Avena fatua* 2, *Descurainia sophia* 2, *Elytrigia repens* 2, *Fallopia convolvulus* 2, *Fumaria officinalis*

2, *Lamium amplexicaule* 2, *Sherardia arvensis* 2, *Sinapis arvensis* 2, *Stellaria media* 2, *Anagallis arvensis* 1, *Atriplex patula* 1, **Euphorbia exigua* 1, *Silene latifolia* subsp. *alba* 1, *Tussilago farfara* 1, *Veronica persica* 1, *Lactuca serriola* +, *Poa compressa* +, *Vicia sativa* +.

Aethuso cynapium-Galeopsietum tetrahit G. Müller 1964
Neotypus hoc loco designatus: Database no. 342230. – Křepice (distr. Strakonice), 0.1 km N of the village, alt. 475 m, eutric cambisol on weathered granulite and gneiss, oats 60 cm of height with low undercrop of meadow clover, total cover 95%, crop cover 70%, weed cover 50%, 12 June 1968. – *Galeopsis tetrahit* 5, **Neslia paniculata* 5, *Fallopia convolvulus* 4, *Mentha arvensis* 4, *Rumex crispus* 4, *Thlaspi arvense* 4, **Aethusa cynapium* subsp. *agrestis* 3, *Centaurea cyanus* 3, *Euphorbia helioscopia* 3, *Plantago major* subsp. *major* 3, *Spergula arvensis* subsp. *arvensis* 3, *Stachys palustris* 3, *Stellaria media* 3, *Anagallis arvensis* 2, *Anthemis arvensis* 2, **Avena fatua* 2, *Chenopodium album* 2, *Elytrigia repens* 2, *Equisetum arvense* 2, *Veronica persica* 2, *Vicia hirsuta* 2, *Viola arvensis* 2, *Achillea millefolium* agg. 1, *Atriplex patula* 1, *Capsella bursa-pastoris* 1, *Cirsium arvense* 1, **Geranium dissectum* 1, *Lamium amplexicaule* 1, *Lapsana communis* 1, *Myosotis arvensis* 1, *Poa annua* 1, *Polygonum aviculare* 1, *Raphanus raphanistrum* 1, *Scleranthus annuus* 1, **Sherardia arvensis* 1, **Valerianella dentata* 1, *Tripleurospermum inodorum* +, *Veronica sublobata* +.

Aethuso cynapium-Galeopsietum tetrahit melandrietosum noctiflori G. Müller 1964
Neotypus hoc loco designatus: Database no. 342247. – Vyšný (distr. Český Krumlov), NW margin of the village, alt. 590 m, eutric cambisol on weathered granulite with admixtute of limestone, spring barley 60 cm of height, total cover 95%, crop cover 60%, weed cover 60%, 25 June 1968. – **Neslia paniculata* 5, **Campanula rapunculoides* 4, *Cirsium arvense* 4, *Euphorbia helioscopia* 4, *Fallopia convolvulus* 4, *Galeopsis tetrahit* 4, *Rumex crispus* 4, **Silene noctiflora* 4, *Thlaspi arvense* 4, *Veronica persica* 4, *Vicia hirsuta* 4, **Aethusa cynapium* subsp. *agrestis* 3, *Convolvulus arvensis* 3, *Elytrigia repens* 3, *Lapsana communis* 3, **Medicago lupulina* 3, *Papaver rhoeas* 3, *Polygonum aviculare* 3, **Sherardia arvensis* 3, *Sonchus arvensis* 3, *Vicia angustifolia* 3, *Anagallis arvensis* 2, **Avena fatua* 2, *Capsella bursa-pastoris* 2, *Chenopodium album* 2, *Erodium cicutarium* 2, *Fumaria officinalis* 2, *Galeopsis bifida* 2, *Lycopsis arvensis* 2, *Mentha arvensis* 2, *Myosotis arvensis* 2, *Raphanus raphanistrum* 2, *Rubus fruticosus* agg. 2, *Stellaria media* 2, *Vicia tetrasperma* 2, *Viola arvensis* 2, *Artemisia vulgaris* 1, *Centaurea cyanus* 1, *Galium aparine* 1, *Lamium amplexicaule* 1, *Lithospermum arvense* 1, *Persicaria maculosa* 1, *Plantago major* subsp. *major* 1, *P. pauciflora* 1, *Poa annua* 1, *P. trivialis* 1, **Veronica polita* 1, *Daucus carota* +, *Sonchus asper* +

Aethuso cynapium-Galeopsietum tetrahit rumicetosum acetosellae G. Müller 1964
Neotypus hoc loco designatus: Database no. 342264. – Opatov (distr. Cheb), 0.5 km NNE of the village, alt. 620 m, dystric cambisol on weathered gneiss, winter rye 140 cm of height, total cover 95%, crop cover 60%, weed cover 55%, 8 June 1972. – *Anthemis arvensis* 4, *Elytrigia repens* 4, *Lapsana communis* 4, *Myosotis arvensis* 4, *Poa annua* 4, *Scleranthus annuus* 4, *Stellaria media* 4, *Tripleurospermum inodorum* 4, *Viola arvensis* 4, **Aethusa cynapium* subsp. *agrestis* 3, *Capsella bursa-pastoris* 3, *Euphorbia helioscopia* 3, *Fallopia convolvulus* 3, **Odontites vernus* subsp. *vernus* 3, *Sonchus arvensis* 3, *Thlaspi arvense* 3, **Valerianella dentata* 3, *Veronica arvensis* 3, *Vicia angustifolia* 3, *V. hirsuta* 3, *Anagallis arvensis* 2, *Aphanes arvensis* 2, *Cerastium holosteoides* 2, *Galeopsis tetrahit* 2, **Neslia paniculata* 2, *Polygonum aviculare* 2, **Rumex acetosella* subsp. *acetosella* 2, *Trifolium repens* 2, *Tussilago farfara* 2, *Vicia cracca* 2, *Arenaria serpyllifolia* 1, **Campanula rapunculoides* 1, *Equisetum arvense* 1, *Fumaria officinalis* 1, *Galium aparine* 1, *Linaria vulgaris* 1, *Ranunculus repens* 1, *Stellaria graminea* 1, **Viola tricolor* subsp. *tricolor* 1, *Chenopodium album* +, *Erodium cicutarium* +, *Papaver rhoeas* +, *Persicaria lapathifolia* subsp. *pallida* +, *Silene latifolia* subsp. *alba* +, *Silene vulgaris* subsp. *vulgaris* +

Spergulo arvensis-Scleranthetum annui Kuhn 1937
Neotypus hoc loco designatus: Database no. 342511. – Lipník (distr. Třebíč, NE of Jaroměřice nad Rokytnou), 1.3 km SSW of the village, alt. 515 m, eutric cambisol on weathered granite, winter rye 160 cm of height, total cover 90%, crop cover 60%, weed cover 45%, 17 June 1971. – **Scleranthus annuus* 6, **Spergula arvensis* subsp. *arvensis* 5, *Arabidopsis thaliana* 4, *Centaurea cyanus* 4, *Chenopodium album* 4, *Vicia angustifolia* 4, *Anthemis arvensis* 3, *Capsella bursa-pastoris* 3, *Cirsium arvense* 3, *Elytrigia repens* 3, **Raphanus raphanistrum* 3, **Rumex acetosella* subsp. *acetosella* 3, *Spergularia rubra* 3, *Thlaspi arvense* 3, *Vicia hirsuta* 3, *Anagallis arvensis* 2, *Apera spica-venti* 2, *Fallopia convolvulus* 2, *Galeopsis bifida* 2, *Poa annua* 2, *Polygonum aviculare* 2, *Rumex crispus* 2, *Tripleurospermum inodorum* 2, *Viola arvensis* 2, *Cerastium holosteoides* 1, *Galeopsis tetrahit* 1, *Myosotis arvensis* 1, *Persicaria maculosa* 1, *P. lapathifolia* subsp. *pallida* 1, *Veronica arvensis* 1, *Vicia tetrasperma* 1, *Achillea millefolium* agg. +, *Matricaria discoidea* +, *Myosotis stricta* +.

Holco-Galeopsietum Hilbig 1967
Neotypus ab auctore designatus (personal communication 17.12.1998). – Grossbreitenbach (Thüringer Wald, Germany), not far from the village, alt. 700 m, winter rye, total cover 100%, weed cover 50%, rel. area 50 m^2, Braun-Blanquet scale, 25 August 1961. – *Apera spica-venti* 2, **Holcus mollis* 2, *Mentha arvensis* 2, *Stellaria media* 2, **Galeopsis tetrahit* 1, *Lapsana communis* 1, *Polygonum persicaria* 1, *Vicia cracca* 1, *V. sativa* 1, *Viola arvensis* 1, **Alchemilla vulgaris* +, *Anthemis arvensis* +, *Capsella bursa-pastoris* +, *Fallopia convolvulus* +, *Galium aparine* +, *Myosotis arvensis* +, *Odontites rubra* +, *Poa annua* +, **Rumex acetosella* +, *R. crispus* +, *Scleranthus annuus* +, *Vicia hirsuta* +.

Panico-Chenopodietum polyspermi Tx. 1937
Neotypus ex opere H. Vollrath (1967, Table 1/suppl., rel.32) **designatus.** – Rottau (SWW of Passau, Bayern, Germany), alluvion of the Rott River not far from the village, potatoes, total cover 80%, weed cover 60%, rel. area 200 m^2, Braun-Blanquet scale, 19 June 1958. – **Chenopodium polyspermum* 3, *Galeopsis tetrahit* 2, *Sonchus asper* 2, *Stellaria media* 2, *Capsella bursa-pastoris* 1, *Chenopodium album* 1, *Cirsium arvense* 1, **Erysimum cheiranthoides* 1, *Galium aparine* 1, *Lithospermum arvense* 1, *Poa trivialis* 1, *Polygonum aviculare* agg. 1, *P. convolvulus* 1, *P. tomentosum* 1, *Rumex crispus* 1, *Sonchus oleraceus* 1, *Spergula arvensis* 1, *Thlaspi arvense* 1, *Triticum aestivum* 1, *Vicia hirsuta* 1, *Agropyron repens* +, *Anagallis arvensis* +, *Anthemis arvensis* +, *Arenaria serpyllifolia* +, *Avena sativa* +, *Echinochloa crus-galli* +, *Equisetum arvense* +, *Geranium dissectum* +, *Matricaria chamomilla* +, *Myosotis arvensis* +, **Oxalis stricta* +, *Plantago major* subsp. *intermedia* +, *Polygonum hydropiper* +, *Ranunculus repens* +, *Taraxacum officinale* +, *Veronica hederifolia* +, *V. persica* +, *Viola arvensis* +.

Supplementum (two selected lectotypes):

Veronicetum hederifolio-triphylli Slavnić 1951 (p. 92–93, Table 3, rel. 6). – *Veronica triphyllos* 2.3, *V. hederifolia* 2.3, *Stellaria media* 2.3, *Arabidopsis thaliana* 2.2, *Holosteum umbellatum* 1.3, *Vicia hirsuta* 1.3, *Lamium amplexicaule* 1.2, *Polygonum aviculare* 1.2, *Senecio vulgaris* 1.2, *Centaurea cyanus* +.2, *Chenopodium album* +.2, *Convolvulus arvensis* +.2, *Cynodon dactylon* +.2, *Gagea villosa* +.2, *Geranium pusillum* +.2, *Lamium purpureum* +.2, *Papaver dubium* +.2, *P. rhoeas* +.2, *Polycnemum arvense* +.2, *Scleranthus annuus* +.2, *Thlaspi arvense* +.2, *Vogelia paniculata* +.2, *Cirsium arvense* +, *Ornithogalum refractum* +. – Northern Serbia (no exact locality), winter rye, cover 80%, light alluvial soils, relevé area 100 m^2, combined Braun-Blanquet scale, spring 1944

Stachyo annuae-Setarietum pumilae Felföldy 1942 (p. 131, Table 20, rel. 3). – *Setaria glauca* 3, *Stachys annua* 3, *Euphorbia falcata* 2–3, *Consolida regalis* 2, *Kickxia elatine* 2, *Ajuga chamaepitys* 1–2, *Anagallis arvensis* 1–2, *Medicago lupulina* 1–2, *Nigella arvensis* 1–2, *Cerinthe minor* 1, *Chenopodium album* 1, *Cirsium arvense* 1, *Convolvulus arvensis* 1, *Diplotaxis muralis* 1, *Erigeron canadensis* 1, *Melampyrum barbatum* 1, *Polygonum aviculare* 1, *P. convolvulus* 1, *Sideritis montana* 1, *Thymelaea passerina* 1, *Vicia pannonica* 1, *Rubus caesius* +. – Western Hungary, Tihany, stubble stand, Braun-Blanquet scale, 28. 8. 1942.