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PROPOSAL OF SLOVAK NAMES FOR PHYLOGENETIC CLASSIFICATION OF LYCOPODIOPHYTES, MONILOPHYTES AND GYMNOSPERMS

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Abstract

Systematic classification of lycophytes, ferns and gymnosperms has been affected by phylogenetic studies, calling for new equivalents in regional languages. There miss equivalents in Slovak. We propose new Slovak names for type genera, subfamilies, families and orders of latest phylogenetic system.

Key words: Slovak names of vascular plant families and orders, phylogenetic classification, ferns, ginkgoes, cycads, conifers and gnetophytes

Introduction

In the last years, the systematic classification of vascular plants has undergone many changes. Efforts to transform morphological system to a phylogenetic one concern not only Angiosperms, but also the classification of Gymnosperms, Ferns (Monilophytes) and Lycophytes were amended. The categories of class and subclass are replaced by phylogenetic groups and clades, therefore it is necessary to adjust the local botanical nomenclature in each country.

The publication with Slovak botanical nomenclature of vascular plants by Červenka et al. (1986) and the checklist of Marhold, Hindák (1998) state only half of systematic categories of Lycophytes, Ferns and Gymnosperms accepted in recent phylogenetic classification according to Christenhusz et al. (2011a, 2011b, 2014). The study of Lu et al. (2014) indicates other necessary changes in classification of conifers (pinophytes and cupressophytes), which, based on the lack of information about the phylogeny of gnetophytes, were not resolved in the system of Christenhusz et al. 2011. Therefore, in the design of new Slovak equivalents for systematic categories we anticipate the future amendments in phylogenetic clades of gnepines (pinophytes and gnetophytes) and cupressophytes, from the perspective of phylogenetic trees of Wu and Chaw (2014) and Lu et al. (2014).

Material and Methods

We proposed Slovak equivalents of latin names with several estabilished criteria in accordance with Slovak national botanical nomenclature of vascular plants in relation to scientific nomenclature (Kliment et al. 2008). Slovak names should be as close to the originals, but that should be ease to pronounce in Slovak language. If it was in some cases an impossible requirement, we tried to find native equivalent according to etymology of species name. Another possibility was the prioritization of existing regional names in foreign languages. A part of equivalents was given names from morphological traits

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or ecological peculiarities. The classification follows the systems of Christenhusz (2011b, 2014) except paraphyletic merged clade Pinidae+Cupressidae that we split into two clades according to Wu and Chaw (2014) and Lu et al. (2014).

Results and discussion

- We have proposed new denominations for orders, families and subfamilies according to valid genera names in Slovak language.
- We have proposed Slovak equivalents for 24 type genera and corresponding denominations for systematic categories.
- We have made one change for the family *Schizeaceae*, from "schízeovité" to "rozklankovité" (see below 2b).

1. New denominations derivated from existing valid names

– Subfamilies: Asplenioideae Link – **slezinníkovaté** (*Asplenium* L. – slezinník); Athyrioideae B.K.Nayar – **papradkovaté** (*Athyrium* Roth – papradka); Blechnoideae Hook. – **rebrovkovaté** (*Blechnum* L. – rebrovka); Ceratopteridoideae R.M.Tryon – **rohovinovcovaté** (*Ceratopteris* Brongniart – rohovinovec); Cibotioideae Nayer – **cibóciovaté** (*Cibotium* Kaulfuss – cibócium); Cryptogrammoideae S.Linds. – **kučeravcovaté** (*Cryptogramma* R.Br. – kučeravec); Culcitoideae Christenh. – **kulcitovaté** (*Culcita* C.Presl – kulcita); Cyatheoideae Endl. – **cyateovaté** (*Cyathea* J.E.Smith – cyatea); Cystopteridoideae Ching & Z.R.Wang – **pľuzgiernikovaté** (*Cystopteris* Bernh. – pľuzgiernik); Dicksonioideae Link – **diksóniovaté** (*Dicsonia* L'Hér. – diksónia); Dryopteridoideae Link – **papraďovaté** (*Dryopteris* Adans. – papraď); Lygodioideae Christenh. – **popínavcovaté** (*Lygodium* Sw. – popínavec); Marattioideae C.Presl – **maratiovaté** (*Marattia* Sw. – maratia); Polypodioideae B.K.Nayar – **sladičovaté** (*Polypodium* L. – sladič); Pteridoideae C.Chr. – **krídelnicovaté** (*Pteris* L. – krídelnia); Thelypteridoideae C.F.Reed – **papradníkovaté** (*Thelypteris* Schmidel – papradník); Woodsioideae Schmakov – **vudsiovaté** (*Woodsia* R.Br. – vudsia).

2a. New names – only phonetic changes of the scientific names

– Families: Lindsaeaceae C.Presl – **lindseovité** (*Lindsaea* Dryand. Ex Sm. – **lindsea**); Matoniaceae C.Presl – **matoniovité** (*Matonia* R.Br. ex Wall. – **matónia**); Zamiaceae Horan. – **zamiovité** (*Zamia* L. – **zamia**).

– Subfamilies: Danaeoideae J.Williams – **daneovaté** (*Danaea* Sm. – **danea**); Davallioideae Hook – **davaliovaté** (*Davallia* (L.) Sm. – **davália**); Loxsomatoideae Christenh. – **loxomovaté** (*Loxsoma cunninghamii* F.Br. Ex A.Cunn. – **loxoma Cunninghamova**); Metaxyoideae B.K.Nayar – **metaxyovaté** (*Metaxya* C.Presl. – **metaxya**); Oleandroideae Crabbe, Jermy & Mickel – **oleandrovaté** (*Oleandra* Cav. – **oleandra**); Tectarioideae B.K.Nayar – **tektáriovaté** (*Tectaria* Cav. – **tektária**).

2b. New names – translated etymological meaning of the scientific names

– Order: Schizaeales Schimp. – **rozklankokotvaré**.

– Families: Cystodiaceae J.R.Croft – **pľuzgierčekovité** (*Cystodium sorbifolium* (Sm.) J.Sm. – **pľuzgierček jarabinolistý**); Dipteridaceae Seward & E.Dale – **dvojkrídelnicovité** (*Dipteris* Reinw. – **dvojkrídelnica**); Lonchitidaceae C.Presl – **kopijovkovité** (*Lonchitis* L. – **kopijovka**); Schizaeaceae Kaulf. – **rozklankovité**, schízeovité (*Schizaea* Sm. – **rozklanka**, schízea).

– Subfamilies: Didymochlaenoideae Christenh. – **dvojplášťovkovaté** (*Didymochlaena truncatula* (Sw.) J.Sm. – **dvojplášťovka useknutá**); Diplaziopsidoideae Christenh. – **dipláziovcovaté** (*Diplaziopsis* C.Chr. – **dipláziovec**); Lomariopsidoideae Crabbe, Jermy & Mickel – **lomáriovcovaté** (*Lomariopsis* Alston – **lomáriovec**); Schizaeoideae Lindl. – **rozklankovaté**; Thyrsopteridoideae B.K.Nayar – **metlinatkovaté** (*Thyrsopteris elegans* Kuntze – **metlinatka nádherná**); Vittarioideae Link – **pruhovkovaté** (*Vittaria* Sm. – **pruhovka**).

2c. New names – adapted from the foreign equivalent names

– Subfamilies: *Anemioideae* C.Presl – **tykadlovkovaté** (*Anemia* Sw. – **tykadlovka**).

2d. *New names – designed from morphological similarities and ecological peculiarities*

– Families: Saccolomataceae Doweld – **pľuzgiernicovité** (*Saccoloma* Kaulf. – **pľuzgiernica**).
– Subfamilies: Plagiogyrioideae Christenh. – **rebrovkovcovaté** (*Plagiogyria* (Kuntze) Mett. – **rebrovkovec**); Cheilanthoideae W.C.Shieh – **šupinatcovaté** (*Cheilanthes* Sw. – **šupinatec**); Rhachidosoroideae M.L.Wang & Y.T.Hsieh – **papradkovec** (*Rhachidosorus* Ching – **papradkovec**); Hypodematioideae Christenh – **skalovcovaté** (*Hypodematium* Kunze – **skalovec**).

3. Slovak equivalents for phylogenetic clades

Lycopodiidae Bek. – plavúne, **lycopodiidová** [pron. lykopodyidová] **(vývojová) vetva**; Equisetidae Warm. – prasličky, **equisetidová** [pron. ekvisetydová] **(vývojová) vetva**; Ophioglossidae Klinge – hadivky, **ophioglossidová** [pron. ofioglosidová] **(vývojová) vetva**; Marattiidae Klinge – **marátie**, **marattiidová** [pron. maratyidová] **(vývojová) vetva**; Polypodiidae Cronquist, Takht. & Zimmerm. – sladiče, **polypodiidová** [pron. polypodyidová] **(vývojová) vetva**; Eupolypods I – **pravé sladiče I**; Eupolypods II – **pravé sladiče II**; Cycadidae Pax in K.A.E.Prantl – cykasy, **cycadidová** [pron. cykadydová] **(vývojová) vetva**; Ginkgoideae Engl. in H.G.A. Engler & K.A.E. Prantl – ginká, **ginkgoidová (vývojová) vetva**; Pinidae Cronquist, Takht. & Zimmerm. – **pinidy**, **pinidová (vývojová) vetva**; Gnetidae Pax in K.A.E. Prantl – **gnetidy**, **gnetidová (vývojová) vetva**; Cupressidae Doweld – **cupressidy**, **cupressidová** [pron. kupresidy, kupresidová] **(vývojová) vetva**.

Conclusion

We created 17 Slovak equivalents for subfamilies based on existing type genera. We proposed 24 Slovak names for type genera of latest phylogenetic system according to Christenhusz (2011b, 2014) (see Appendix 1, Appendix 2). We also bring equivalents for phylogenetic clades of divisions Lycopodiophyta, Monilophyta and Gymnospermae.

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Appendix 1. Phylogenetic system of lycopodiophytes, ferns and gymnosperms in Slovak language according to classification of Christenhusz et al. (2011a, 2011b, 2014) except cupressids classified according to Wu and Chaw (2014) and Lu et al. (2014)

PLAVÚŇORASTY

Lycopodiidová vetva

Lycopodiales (plavúňotvaré)
Lycopodiaceae (plavúňovité)

Isoetales (šidlatkotvaré)
Isoetaceae (šidlatkovité)

Selaginellales (plavúnkotvaré)
Sellaginellaceae (plavúnkovité)

PAPRAĎORASTY

Equisetidová vetva

Equisetales (prasličkotvaré)
Equisetaceae (prasličkovité)

Ophioglossidová vetva

Ophioglossales (hadivkotvaré)
Ophioglossaceae (hadivkovité)

Psilotales (prútovkotvaré)
Psilotaceae (prútovkovité)

Marratiidová vetva

Marattiales (maratiotvaré)
Marattiaceae (maratiovité)
- Danaeoideae (daneovaté)
- Marattioideae (maratiovaté)

Polypodiidová vetva

Osmundales (osmundotvaré)
Osmundaceae (osmundovité)

Hymenophyllales (blanolistníkotvaré)
Hymenophyllaceae (blanolistníkovité)

Gleicheniales (glejchéniotvaré)
Gleicheniaceae (glejchéniovité)
Dipteridaceae (dvojkrídelnicovité)
Matoniaceae (matóniovité)

Schizaeales (vejárovkotvaré)
Schizaeaceae (vejárovkovité)
- Lygodioideae (popínavcovaté)
- Schizaeoideae (vejárovkovaté)
- Anemioideae (tykadlovkovaté)

Salviniales (salvíniotvaré)
Marsileaceae (marsileovité)
Salviniaceae (salvíniovité)

Cyatheales (cyateotvaré)
Cyatheaceae (cyateovité)
- Thyrsopteridoideae (metlinatkovaté)
- Loxsomatoideae (loxomovaté)
- Culcitoideae (kulcitovaté)
- Plagiogyrioideae (rebrovkovcovaté)
- Cibotioideae (cibóciovaté)
- Cyatheoideae (cyateovaté)
- Dicksonioideae (diksóniovaté)
- Metaxyoideae (metaxyovaté)

Polypodiales (sladičotvaré)
Cystodiaceae (pľuzgierčekovité)
Lonchitidaceae (kopijovkovité)
Lindsaeaceae (lindseovité)
Saccolomataceae (pľuzgiernicovité)
Dennstaedtiaceae (denštedtiovité)
Pteridaceae (krídelnicovité)
- Cryptogrammoideae (kučeravcovaté)
- Ceratopteridoideae (rohovinovcovaté)
- Pteridoideae (krídelnicovaté)
- Cheilanthoideae (šupinatcovaté)
- Vittarioideae (pruhovkovaté)

Aspleniaceae (slezinníkovité)
- Cystopteridoideae (pľuzgiernikovaté)
- Rhachidosoroideae (papradkovcovaté)
- Diplaziopsidoideae (dipláziovcovaté)
- Asplenioideae (slezinníkovaté)
- Thelypteridoideae (papradníkovaté)
- Woodsioideae (vudsiovaté)
- Athyrioideae (papradkovaté)
- Blechnoideae (rebrovkovaté)

Polypodiaceae (sladičovité)
- Didymochlaenoideae (dvojvojplášťovkovaté)
- Hypodematioideae (skalovcovaté)
- Dryopteridoideae (papraďovaté)
- Lomariopsidoideae (lomáriovcovaté)
- Tectarioideae (tektáriovaté)
- Oleandroideae (oleandrovaté)
- Davallioideae (daváliovaté)
- Polypodioideae (sladičovaté)

NAHOSEMENNÉ RASTLINY

Cycadidová vetva

Cycadales (cykasotvaré)
Cycadaceae (cykasovité)
Zamiaceae (zamiovité)

Ginkgoidová vetva

Ginkgoales (ginkotvaré)
Ginkgoaceae (ginkovité)

Pinidová vetva

Pinales (borovicotvaré)
Pinaceae (borovicovité)

Gnetidová vetva

Welwitschiales (velvíčiotvaré)
Welwitschiaceae (velvíčiovité)

Gnetales (lianivcotvaré)
Gnetaceae (lianivcovité)

Ephedrales (chvojníkotvaré)
Ephedraceae (chvojníkovité)

Cupressidová vetva

Araucariales (araukáriotvaré)
Araucariaceae (araukáriovité)
Podocarpaceae (nohovcovité)

Cupressales (cyprusotvaré)
Sciadopityaceae (dáždnikovcovité)
Cupressaceae (cyprusovité)
Taxaceae (tisovité)

Appendix 2. Alphabetic list of Slovak equivalents for vascular plant subfamilies, families and orders

A
araukáriotvaré
Araukáriovité

B
blanolistníkotvaré
blanolistníkovité
borovicotvaré
borovicovité

C
cibóciovaté
cyateotvaré
cyateovaté
cyateovité
cykasotvaré
cykasovité
cyprusotvaré
cyprusovité

D
daneovaté
daváliovaté
dáždnikovcovité
denštedtiovité
diksóniovaté
dipláziovcovaté
dvojkrídelnicovité
dvojplášťovkovaté

G
ginkotvaré
ginkovité
glejchéniotvaré
glejchéniovité

H
hadivkotvaré
hadivkovité

CH
chvojníkotvaré
chvojníkovité

K
kopijovkovité
krídelnicovaté
krídelnicovité
kučeravcovaté
kulcitovaté

L
lianivcovité
lindseovité
lomáriovcovaté
loxomovaté

M
maratiotvaré
maratiovaté
maratiovité
marsileovité
matóniovité
metaxyovaté
metlinatkovaté
nohovcovité

O
oleandrovaté
osmundotvaré
osmundovité

P
papradkovaté
papradkovcovaté
papradníkovaté
papraďovaté
plavúnkotvaré
plavúnkovité
plavúňotvaré
plavúňovité
pľuzgierčekovité
pľuzgiernicovité
pľuzgiernikovaté
popínavcovaté
prasličkotvaré
prasličkovité
pruhovkovaté
prútovkotvaré
prútovkovité

R
rebrovkovaté
rebrovkovcovaté
rohovinovcovaté
rozklankotvaré
rozklankovaté
rozklankovité

S
salvíniotvaré
salvíniovité
skalovcovaté
sladičotvaré
sladičovaté
sladičovité
slezinníkovaté
slezinníkovité

Š
šidlatkotvaré
šidlatkovité
šupinatcovaté

T
tektáriovaté
tisovité
tykadlovkovaté

V
velvíčiotvaré
velvíčiovité
vudsiovaté

Z
zamiovité

Abstrakt

Systematická klasifikácia plavúňorastov, papraďorastov a nahosemenných rastlín bola čiastočne zmenená na základe fylogenetických štúdii, čo si niekedy vyžaduje zmeny v regionálnom názvosloví. Je potrebných doplniť slovenské ekvivalenty. Navrhujeme slovenské mená typových rodov, podčeľadí, čeľadí a radov v zhode s najnovším fylogenetickým systémom.

Michal Hrabovský, Eva Zahradníková, Karol Mičieta: Návrh slovenských mien pre fylogenetickú klasifikáciu plavúňorastov, papraďorastov a nahosemenných rastlín.

PROPOSAL OF SLOVAK NAMES FOR ANGIOSPERM PHYLOGENY GROUP CLASSIFICATION OF FLOWERING PLANTS: APG IV.

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Abstract

Changes in systematic classification of plants could call for new equivalents in regional languages. Therefore we propose new Slovak names for type genera, families and orders of flowering plants based on the new systematic APG IV classification.

Key words: Slovak names of vascular plant families and orders, phylogenetic classification

Introduction

The systematic classification of flowering plants has undergone many changes in the last 30 years. The recent classification takes phylogeny into account rather than morfology. Accordingly, the integrated system by Cronquist (1981) was replaced by the system of Angiosperm Phylogeny Group (APG) in 1998, which was subsequently modified in 2003 (APG II), 2009 (APG III) and 2016 (APG IV). The aims of APG is to set plant families as monophyletic clades, but the lack of information still causes problems in establishing a unified permanent classification. Thus, in the newest version from 2016, there are still paraphyletic groups which should be changed in the future.

The publication with Slovak botanical nomenclature of vascular plants by Červenka et al. (1986) lists less than half of the families accepted in APG IV classification. We think that plant names in native language are easier to remember and learn for wider public and, therefore, we propose new Slovak names for more than two hunders vascular plant families. We hope such advances can contribute to public education of botany.

Material and Methods

We proposed Slovak equivalents of Latin names with several estabilished criteria in accordance with Slovak national botanical nomenclature of vascular plants in relation to scientific nomenclature (Kliment et al. 2008). Slovak names should be as close to the original as possible, but should be easy to pronounce in Slovak language. If that was an impossible requirement in some cases, we tried to find the Slovak equivalent according to the etymology of species' name. Another possibility was the prioritization of indigenous names, exact translation of English or German names or the adoption of equivalents from other Slavic nations, specifically from Czech, Polish, Croatian or Russian. A part of equivalents were named based on morphological traits and/or peculiarities, or similarity in appearance to another genus with a valid Slovak name. The classification follows the APG IV system (2016). Our study follows the basic publ cation of Slovak botanical nomenclature (Červenka et al. 1986).

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Results and discussion

- We have made 16 new denominations for families and two for orders according to valid genera names in Slovak language.
- We have proposed new names for 201 type genera, 201 families and 13 orders.
- We made the change of valid equivalents for 2 families.
- We have updated Slovak equivalents for phylogenetic clades of APG II according to Mártonfi (2006) to APG IV.

1. New denominations derivated from existing names

– Orders: Gunnerales Takht. ex Reveal – **gunerotvaré**; Picramniales Doweld – **pikramniotvaré**.

– Families: Alstroemeriaceae Dumort. – **alstreméniovité** (*Alstroemeria* L. – alstreméria); Asphodelaceae Juss. – **asfodelovité** (*Asphodelus* L.– asfodel); Calceolariaceae Olmstead – **papučkovité** (*Calceolaria* L. – papučka); Calophyllaceae J.Agardh – **krásnolistovité** (*Calophyllum* L. – krásnolist); Drosophyllaceae Chrtek et al. – **rosičkovcovité** (*Drosophyllum* Link. – rosičkovec); Gelsemiaceae L.Struwe & V.A.Albert – **jazmínovcovité** (*Gelsemium* Juss. – jazmínovec); Gunneraceae Meisn. – **gunerovité** (*Gunerra* L. – gunera); Heliconiaceae Vines – **helikóniovité** (*Heliconia* L. – helikónia); Montiaceae Raf. – **zdrojovkovité** (*Montia* L. – zdrojovka); Muntingiaceae C.Bayer et al. – **muntingiovité** (*Muntingia calabura* L. – muntingia kalaburová); Nartheciaceae Fr. ex Bjurzon – **kostilomkovité** (*Narthecium* Huds. – kostilomka); Nothofagaceae Kuprian. – **pabukovité** (*Nothofagus* Blume – pabuk); Paulowniaceae Nakai – **paulovniovité** (*Paulownia* Siebold & Zucc. – paulovnia); Picramniaceae Fernando & Quinn – **pikramniovité** (*Picramnia* Sw. – pikramnia); Quillajaceae D.Don – **kvilájovité** (*Quillaja* Molina – kvilája); Tofieldiaceae Takht. – **kosatkovité** (*Tofieldia* Huds. – kosatka).

2a. New names – only phonetic changes of the scientific names

– Orders: Amb orellales Melikyan et al. – **amborelotvaré**; Austrobaileyales Takht. ex Reveal – **austrobejliotvaré**; Bruniales Dumort. – **bruniotvaré**; Escalloniales Link – **eskalóniotvaré**; Garryales Mart. – **garyotvaré**; Huerteales Doweld – **huertotvaré**; Icacinales Tiegh – **ikacinotvaré**; Metteniusales Takht. – **meteniusotvaré**; Petrosaviales Takht. – **petrosáviotvaré**; Vahliales Doweld – **váliotvaré**.

– Families: Achariaceae Harms – **acháriovité** (*Acharia tragodes* Thunb. – **achária capia**); Akaniaceae Stapf – **akániovité** (*Akania bidwillii* (R.Hogg) Mabb. – **akánia Bidwillova**); Alzateaceae S.A.Graham – **alzateovité** (*Alzatea verticillata* Ruiz & Pav. – **alzatea praslenatá**); Amborellaceae Pichon – **amborelovité** (*Amborella trichopoda* Baill – **amborela novokaledónska**); Asteliaceae Dumort. – **astéliovité** (*Astelia* Banks & Sol. ex R.Br. – **astélia**); Austrobaileyaceae Croizat – **austrobejliovité** (*Austrobaileya scandens* C.T.White – **austrobejlia popínavá**); Barbeuiaceae Nakai – **barbojovité** (*Barbeuia madagascariensis* Steud. – **barboja madagaskárska**); Barbeyaceae Rendle – **barbejovité** (*Barbeya oleoides* Schweinf. – **barbeja olivová**); Biebersteiniaceae Schnizl. – **bíberštajniovité** (*Biebersteinia* Stephan – **bíberštajnia**); Boryaceae M.W.Chase et al. – **boriovité** (*Borya* Labill. – **boria**); Blandfordiaceae R.Dahlgren & Clifford – **blandfordiovité** (*Blandfordia* Sm. – **blandfordia**); Bonnetiaceae L.Beauvis. ex Nakai – **bonéciovité** (*Bonnetia* Mart. in Mart. & Zucc. – **bonécia**); Bruniaceae R.Br. ex DC. – **bruniovité** (*Brunia* Lam. – **brunia**); Burmanniaceae Blume – **burmaniovité** (*Burmannia* L. – **burmania**); Calyceraceae R.Br. ex Rich. – **kalycerovité** (*Calycera* Cav. – **kalycera**); Carlemanniaceae Airy Shaw – **karlemaniovité** (*Carlemannia* Benth. – **karlemania**); Centroplacaceae Doweld & Reveal – **centroplakovité** (*Centroplacus* Pierre – **centroplak**); Clethraceae Klotzsch – **kletrovité** (*Clethra* L. – **kletra**); Columelliaceae D.Don – **kolumeliovité** (*Columellia* Ruíz & Pavón – **kolumelia**); Corsiaceae Becc. – **korziovité** (*Corsia* Becc. – **korzia**); Costaceae Nakai – **kostusovité** (*Costus* L. – **kostus**); Crypteroniaceae A.DC. – **krypteróniovité** (*Crypteronia* Blume – **krypterónia**); Cunoniaceae R.Br. – **kunóniovité** (*Cunonia* L. – **kunónia**); Curtisiaceae Takht. – **kurtíziovité** (*Curtisia dentata* (Burm.f.) C.A.Sm. – **kurtízia zúbkatá**); Cyrillaceae Lindl. – **cyrilovité** (*Cyrilla racemiflora* L. – **cyrila močiarna**); Degeneriaceae I.W.Bailey & A.C.Sm. – **degeneriovité** (*Degeneria* I.W. Bailey & A.C. Sm. – **degenéria**); Dirachmaceae Hutch – **dirachmovité** (*Dirachma* Schweinf. ex Balf.f. – **dirachma**); Escalloniaceae R.Br. ex Dumort. – **eskalóniovité** (*Escallonia* Mutis ex L.f. – **eskalónia**); Euphroniaceae Marc.-Berti – **eufróniovité** (*Euphronia* Mart. & Zucc. – **eufrónia**); Frankeniaceae Desv. – **frankéniovité** (*Frankenia* L.

– **frankénia**); Francoaceae A.Juss. – **frankoovité** (*Francoa* Cav. – **frankoa)**; Garryaceae Lindl. – **garyovité** (*Garrya* Douglas ex Lindl. – **garya**); Gerrardinaceae M.H.Alford – **gerardínovité** (*Gerrardina* Oliv. – **gerardína**); Gisekiaceae Nakai – **gizekiovité** (*Gisekia* Casar. – **gizekia**); Gomortegaceae Reiche – **gomortegovité** (*Gomortega keule* (Molina) Baillon – **gomortega keulová**); Goodeniaceae R.Br. – **gudéniovité** (*Goodenia* Sm. – **gudénia**); Goupiaceae Miers – **kopiovité** (*Goupia* Aubl. – **kopia**); Griseliniaceae Takht. – **griselíniovité** (*Griselinia* G.Forst – **griselínia**); Grubbiaceae Endl. ex Meisn. – **grubiovité** (*Grubbia* P.J.Bergius – **grubia**); Guamatelaceae S.H.Oh & D.Potter – **guamatelovité** (*Guamatela tuerckheimii* Donn.Sm. – **guamatela Türckheimova**); Hanguanaceae Airy Shaw – **hanguanovité** (*Hanguana* Blume – **hanguana**); Hernandiaceae Blume – **hernandiovité** (*Hernandia* L. – **hernandia**); Huaceae A.Chev. – **huovité** (*Hua gabonii* Pierre ex De Wild – **hua gabonská**); Humiriaceae A.Juss. – **humíriovité** (*Humiria* Aubl. – **humíria**); Icacinaceae Miers – **ikacinovité** (*Icacina* A.Juss – **ikacina**); Iteaceae J.Agardh – **iteovité** (*Itea* L. – **itea**); Kewaceae Christenh. – **kewovité** (*Kewa* Christenh. – **kewa**); Kirkiaceae Takht. – **kirkiovité** (*Kirkia* Oliv. – **kirkia**); Lacistemataceae Mart. – **lacistemovité** (*Lacistema* Sw. – **lacistema**); Lanariaceae H.Huber ex R.Dahlgren – **lanáriovité** (*Lanaria lanata* Aiton – **lanária vlnatá**); Lowiaceae Ridl. – **orchidantovité** (*Orchidantha* N.E.Br., syn. *Lowia* Scort, – **orchidanta**); Macarthuriaceae Christenh. – **mekartúriovité** (*Macarthuria* Hugel ex Endl. – **mekartúria**); Martyniaceae Horan. – **martyniovité** (*Martynia annua* L. – **martynia ročná**); Maundiaceae Nakai – **mondiovité** (*Maundia triglochinoides* F.Muell. – **mondia baričková**); Mayacaceae Kunth – **majakovité** (*Mayaca* Aubl. – **majaka**); Metteniusaceae H.Karst. ex Schnizl. – **meteniusovité** (*Metteniusa* H.Karsten – **meteniusa**); Montiniaceae Nakai – **montíniovité** (*Montinia* Thunb. – **montínia**); Nitrariaceae Lindl. – **nitráriovité** (*Nitraria* L. – **nitrária**); Olacaceae R.Br. – **olaxovité** (*Olax* L. – **olax**); Opiliaceae Valeton – **opíliovité** (*Opilia* Roxb. – **opília**); Penaeaceae Sweet ex Guill. – **peneovité** (*Penaea* L. – **penea**); Pennantiaceae J.Agardh – **penanciovité** (*Pennantia* J.R.Forst. & G.Forst. – **penancia**); Pentaphylacaceae Engl. – **pentafylaxovité** (*Pentaphylax euryoides* Gardner & Champion – **pentafylax strapcovitý**); Peraceae Klotzsch – **perovité** (*Pera* Mutis – **pera**); Petermanniaceae Hutch – **petermaniovité** (*Petermannia cirrosa* F.Muell. – **petermánia úponkatá**); Petiveriaceae C.Agardh – **petivériovité** (*Petiveria* L. – **petivéria**); Petrosaviaceae Hutch. – **petrosáviovité** (*Petrosavia* Becc. – **petrosávia**); Phellinaceae Takht. – **felinovité** (*Phelline* Labill. – **felina**); Philesiaceae Dumort. – **filéziovité** (*Philesia magellanica* J.F.Gmel. – **filézia čílska**); Physenaceae Takht. – **fyzenovité** (*Physena* Noronha ex Thou. – **fyzena**); Posidoniaceae Vines – **posidóniovité** (*Posidonia* Hutch. – **posidónia**); Putranjivaceae Meisn. – **putrandživovité** (*Putranjiva* Wall. – **putrandživa**); Rapateaceae Dumort. – **rapateovité** (*Rapatea* Aubl. – **rapatea**); Roridulaceae Martinov – **roridulovité** (*Roridula* L. – **roridula**); Sabiaceae Blume – **sabiovité** (*Sabia* Colebr. – **sabia**); Salvadoraceae Lindl. – **salvadorovité** (*Salvadora* L. – **salvadora**); Schlegeliaceae Reveal – **šlegeliovité** (*Schlegelia* Miq. – **šlegelia**); Siparunaceae Schodde – **siparunovité** (*Siparuna* Aublet – **siparuna**); Sladeniaceae Airy Shaw – **sladéniovité** (*Sladenia* Kurz – **sladénia**); Strasburgeriaceae Tiegh. – **štrasburgériovité** (*Strasburgeria robusta* (Vieill. ex Panch. & Sebert) Guillaumin – **štrasburgéria mohutná**); Surianaceae Arn. – **surianovité** (*Suriana maritima* L. – **suriana prímorská**); Stemonaceae Caruel – **stemonovité** (*Stemona* Lour. – **stemona**); Stilbaceae Kunth – **stilbovité** (*Stilbe* P.J.Bergius – **stilba**); Talinaceae Doweld – **talinovité** (*Talinum* Adans – **talina**); Tapisciaceae Takht. – **tapisciovité** (*Tapiscia* Oliv. – **tapiscia**); Thomandersiaceae Sreem – **tomandersiovité** (*Thomandersia* Baill. – **tomandersia**); Thurniaceae Engl. – **turniovité** (*Thurnia* Hook.f. – **turnia**); Torricelliaceae Hu – **toričeliovité** (*Torricellia* DC. – **toričelia**); Tovariaceae Pax – **tovariovité** (*Tovaria* Ruiz & Pav. – **továria**); Trigoniaceae A.Juss. – **trigóniovité** (*Trigonia* Aubl. – **trigónia**); Trimeniaceae Gibbs – **trimeniovité** (*Trimenia* Seem. – **triménia**); Vahliaceae Dandy – **váliovité** (*Vahlia* Thunb. – **vália**); Velloziaceae J.Agardh – **velóciovité** (*Vellozia* Vand. – **velócia**); Xeronemataceae M.W.Chase et al. – **xeronemovité** (*Xeronema* Brongn. & Gris – **xeroném**a).

2b. New names – (partially) translated etymological meaning of the scientific names

– Orders: Berberidopsidales Doweld – **dráčovcotvaré**.

– Families: Achatocarpaceae Heimerl – **achátovníkovité** (*Achatocarpus* Triana – **achátovník**); Aextoxicaceae Engl. & Gilg – **kozotravovité** (*Aextoxicon punctatum* Ruiz & Pav. – **kozotrav bodkovaný**); Argophyllaceae Takht. – **striebrolistovité** (*Argophyllum* J.R.Forst. & G.Forst. – **striebrolist**); Anacampserotaceae Eggli & Nyffeler – **rozchodničkovité** (*Anacampseros* L. – **rozchodnička**); Ancistrocladaceae Planch. ex Walp. – **háčikovcovité** (*Ancistrocladus* Wall. – **háčikovec**); Anisophylleaceae Ridl. – **rôznolistovité** (*Anisophyllum* R.Br. ex Sabine – **rôznolist**); Asteropeiaceae Takht. ex Reveal & Hoogland – **hviezdovníkovité**

(*Asteropeia* Thouars – **hviezdovník**); Atherospermataceae R.Br. – **ostiplodovité** (*Atherosperma moschatum* Labill. – **ostiplod pyžmový**); Balanopaceae Benth. & Hook.f. – **žaluďovníkovité** (*Balanops* Baill. – **žaluďovník**); Balanophoraceae Rich. – **žaluďovcovité** (*Balanophorus* J.R.Forst. & G.Forst. – **žaluďovec**); Berberidopsidaceae Takht. – **dráčovcovité** (*Berberidopsis* Hook.f. – **dráčovec**); Cardiopteridaceae Blume – **krídlačovité** (*Cardiopteris* Wall. ex Royle – **krídlač**); Ctenolophonaceae Exell & Mendonca – **hrebenatcovité** (*Ctenolophon* Oliv. – **hrebenatec**); Daphniphyllaceae Mull.Arg. – **pavavrínovité** (*Daphniphyllum* Blume – **pavavrín**); Dasypogonaceae Dumort. – **hustoštetovité** (*Dasypogon* R.Br. – **hustoštet**); Dioncophyllaceae Airy Shaw – **dvojháčikovité** (*Dioncophyllum tholloni* Baill. – **dvojháčik Thollonov**); Eriocaulaceae Martinov – **páperčekovité** (*Eriocaulon* L. – **páperček**); Flagellariaceae Dumort. – **bičovníkovité** (*Flagellaria* L. – **bičovec**); Halophytaceae S.Sorianok – **slanorastovité** (*Halophytum ameghinoi* (Speg.) Speg. – **slanorast argentínsky**); Hydatellaceae U.Hamann – **vodniatkovité** (*Trithuria* J.D.Hooker, syn. *Hydatella* Diels, – **vodniatka**); Hydroleaceae R.Br. – **vodičkovité** (*Hydrolea* L. – **vodička**); Limnanthaceae R.Br. – **mokraďkovité** (*Limnanthus* R.Br. – **mokraďka**); Lophiocarpaceae Doweld & Reveal – **hranoplodovité** (*Lophiocarpus* Turcz. – **hranoplod**); Lophopyxidaceae H.Pfeiff. – **hranovcovité** (*Lophopyxis maingayi* Hook. – **hranovec malajský**); Microteaceae Schaferhoff & Borsch – **drobnicovité** (*Microtea* Sw. – **drobnica**); Mitrastemonaceae Makino – **mitričkovité** (*Mitrastemon* Makino – **mitrička**); Oncothecaceae Kobuski ex Airy Shaw – **nádorovkovité** (*Oncotheca* Baill. – **nádorovka**); Penthoraceae Rydb. ex Britton – **päťrožcovité** (*Penthora* L. – **päťrožec**); Peridiscaceae Kuhlm. – **obterčovité** (*Peridiscus lucidus* Benth. – **obterč lesklý**); Phyllonomaceae Small – **listorodkovité** (*Phyllonoma* Willd. ex Roem. & Schult – **listorodka**); Plocospermataceae Hutch. – **chocholnatkovité** (*Plocosperma buxifolium* Benth. – **chocholnatka krušpánolistá**); Podostemaceae Rich. ex Kunth **– nohonitcovité** (*Podostemum* Michx. – **nohonitec**); Restionaceae R.Br. – **lanovcovité** (*Restio* Rottb. – **lanovec**); Rhabdodendraceae Prance – **tyčovcovité** (*Rhabdodendron* Gilg & Pilg. – **tyčovec**); Ripogonaceae Conran & Clifford – **prútovníkovité** (*Ripogonum* J.R.Forst. & G.Forst. – **prútovník**); Sarcolaenaceae Caruel – **rúchovkovité** (*Sarcolaena* Thouars – **rúchovka**); Setchellanthaceae Iltis – **sečelkovité** (*Setchellanthus caeruleus* Brandegee – **sečelka belasá**); Sphaerosepalaceae Bullock – **palcátovcovité** (*Rhopalocarpus* Bojer, syn. *Sphaerosepalum* Baker, – **palcátovec**); Sphenocleaceae T.Baskerv. – **klinovcovité** (*Sphenoclea* Gaertn. – **klinovec**); Stachyuraceae J.Agardh – **klasnatcovité** (*Stachyurus* Siebold & Zucc. – **klasnatec**); Stegnospermataceae Nakai – **mieškovkovité** (*Stegnosperma* Benth. – **mieškovka**); Tetracarpaeaceae Nakai – **štvorplodovité** (*Tetracarpaea tasmannica* Hook. – **štvorplod tasmánsky**); Xyridaceae C.Agardh – **žilietkovité** (*Xyris* L. – **žilietka**).

2c. New names – adapted from the foreign equivalent names

– Orders: Paracryphiales Takht. ex Reveal – **pažidelníkotvaré**.

– Families: Alseuosmiaceae Airy Shaw – **toropapovité** (*Alseuosmia* A.Cunn. – **toropapa**); Bataceae Mart. ex Perleb – **slaničkovité** (*Batis* L. – **slanička**); Byblidaceae Domin – **dúhovkovité** (*Byblis* Salisb. – **dúhovka**); Caryocaraceae Voigt – **pekeovité** (*Caryocar* F.Allam ex L. – **pekea**); Circaeasteraceae Hutch. – **čarovkovité** (*Circaeaster agrestis* Maxim. – **čarovka poľná**); Cleomaceae Bercht. & J.Presl – **pavúčnicovité** (*Cleome* L. – **pavúčnica**); Corynocarpaceae Engl. – **karakovité** (*Corynocarpus* J. R. Forst. & G. Forst. – **karaka**); Cynomoriaceae Endl. ex Lindl. – **hubkovité** (*Cynomorium coccineum* L. – **hubka šarlátová**); Cytinaceae A.Rich. – **ozorinovité** (*Cytinus* L. – **ozorina**); Dichapetalaceae Baill. – **jedolistovité** (*Dichapetalum* Thouars – **jedolist**); Doryanthaceae R.Dahlgren & Clifford – **oštepovcovité** (*Doryanthes* Correra – **oštepovec**); Eupteleaceae K.Wilh. – **krídlovníkovité** (*Euptelea* Siebold & Zucc. – **krídlovník**); Himantandraceae Diels – **agarovité** (*Galbulimima* F.M.Bailey, syn. *Himantandra* F.Muell. ex Diels, – **agara**); Hypoxidaceae R.Br. – **hviezdičkovité** (*Hypoxis* L. – **hviezdička**); Irvingiaceae Exell & Mendonca – **mangovcovité** (*Irvingia* Hoof.f. – **mangovec**); Ixonanthaceae Planch. ex Miq. – **amonangovité** (*Ixonathes* Jack – **amonang**); Koeberliniaceae Engl. – **tŕňovcovité** (*Koeberlinia spinosa* Zucc. – **tŕňovec mexický**); Mazaceae Reveal – **pyskáčovité** (*Mazus* Lour. – **pyskáč**); Molluginaceae Bartl. – **kobercovkovité** (*Mollugo* L. – **kobercovka**); Neuradaceae Kostel. – **gombičkovité** (*Neurada procumbens* L. – **gombička rozprestretá**); Paracryphiaceae Airy Shaw – **pažidelníkovité** (*Paracryphia alticola* (Schltr.) Steenis – **pažidelník novokaledónsky**); Pentadiplandraceae Hutch. & Dalziel – **zábudlivkovité** (*Pentadiplandra brazzeana* Bail. – **zábudlivka sladká**); Philydraceae Link – **žabienkovité** (*Philydrum lanuginosum* Banks ex Gaertn. – **žabienka huňatá**); Phrymaceae Schauer – **čarodejovité** (*Phryma leptostachya* L. – **čarodeja tenkoklasá**); Pittosporaceae R.Br. – **syrovníkovité** (*Pittosporum* Banks ex Sol. – **syrovník**); Sarcobataceae Behnke – **slanokrovité** (*Sarcobatus*

Nees. – **slanoker**); Simmondsiaceae Tiegh. – **jojobovité** (*Simmondsia chinensis* (Link) C. K. Schneid. – **jojoba kalifornská**); Symplocaceae Desf. – **sladolistovité** (*Symplocos* Jacq. – **sladolist**); Stemonuraceae Karehed – **urandrovité** (*Stemonurus* Blume – **urandra**); Tecophilaeaceae Leyb. – **šafránovcovité** (*Tecophilaea* Bertero ex Colla – **šafránovec**); Tetrameristaceae Hutch. – **punakovité** (*Tetramerista* Miq. – **punak**).

2d. New names – designed from morphological, ecological and ethnobotanical peculiarities

– Order: Crossosomatales Takht. ex Reveal – **kamenicotvaré**.

– Families: Aphanopetalaceae Doweld – **plamienkovcovité** (*Aphanopetalum* Endl. – **plamienkovec**); Aphloiaceae Takht. – **čajovníkovcovité** (*Aphloia theiformis* Benn. – **čajovníkovec africký**); Apodanthaceae Tiegh. ex Takht. – **podkôrovníkovité** (*Apodanthus casearіae* Poit. – **podkôrovník kazeáriový**); Campynemataceae Dumort. – **zelienkovité** (*Campynema* Labill. – **zelienka**); Connaraceae R.Br. – **škeblovcovité** (*Connarus* L. – **škeblovec**); Crossosomataceae Engl. – **kamenicovité** (*Crossosoma* Nutt. – **kamenica**); Cymodoceaceae Vines – **stuhovkovité** (*Cymodocea* K.D.Koenig – **stuhovka**); Dipentodontaceae Merr. – **paokolíkovcovité** (*Dipentodon sinicus* Dunn – **paokolíkovec čínsky**); Ecdeiocoleaceae D.W.Cutler & Airy Shaw – **paostricovité** (*Ecdeiocolea* F. Muell. – **paostrica**); Emblingiaceae Airy Shaw – **papučkovkovité** (*Emblingia calceoliflora* F.Muell. – **papučkovka kríčkovitá**); Eupomatiaceae Orb. – **viečkovkovité** (*Eupomatia* R.Br – **viečkovka**); Geissolomataceae A.DC. – **listovkovité** (*Geissoloma marginatum* (L.) Juss – **listovka lemovaná**); Gyrostemonaceae A.Juss. – **kruhokvetovité** (*Gyrostemon* Desf. – **kruhokvet**); Helwingiaceae Decne. – **listoplodkovité** (*Helwingia* Willd. – **listoplodka**); Hydrostachyaceae Engl. – **vodopádnikovité** (*Hydrostachys* Thouars – **vodopádnik**); Ixioliriaceae Nakai – **ľalinkovité** (*Ixiolirion* Ryba ex Herb. – **ľalinka**); Joinvilleaceae Toml. & A.C.Sm. – **patrstinovité** (*Joinvillea* Gaudich – **patrstina**); Lepidobotryaceae J.Leonard **– šišticovcovité** (*Lepidobotrys staudtii* Engl. – **šišticovec kamerunský**); Limeaceae Shipunov ex Reveal – **čistikrvovité** (*Limeum* L. – **čistikrv**); Marcgraviaceae Bercht. & J.Presl – **netopierovkovité** (*Marcgravia* L. – **netopierovka**); Misodendraceae J.Agardh – **vlasatcovité** (*Misodendron* Banks ex DC. – **vlasatec**); Myodocarpaceae Doweld – **okolíkatcovité** (*Myodocarpus* Brongn. & Gris – **okolíkatec**); Myrothamnaceae Nied. – **oživcovité** (*Myrothamnus* Welw. – **oživec**); Pentaphragmataceae J.Agardh – **húseničníkovité** (*Pentaphragma* Wall. ex G.Don – **húseničník**); Petenaeaceae Christenh. et al. – **lipovcovité** (*Petenaea cordata* Lundell – **lipovec huňatý**); Picrodendraceae Small – **paorechovité** (*Picrodendron baccatum* (L.) Krug & Urb – **paorech horký**); Rousseaceae DC – **gekónovníkovité** (*Roussea simplex* Sm. – **gekónovník maurícijský**); Schoepfiaceae Blume – **brusnicovcovité** (*Schoepfia* Schreb. – **brusnicovec**); Stylidiaceae R.Br. – **peľostrelkovité** (*Stylidium* Sw. – **peľostrelka**); Tetramelaceae Airy Shaw – **korenatcovité** (*Tetrameles nudiflora* R.Br. – **korenatec nahokvetý**); Ticodendraceae Gomez-Laur. & L.D.Gomez – **jelšovcovité** (*Ticodendron incognitum* Gómez-Laur. & L.D.Gómez – **jelšovec nepoznaný**); Triuridaceae Gardner – **polypkovité** (*Triuris* Miers – **polypka**); Vochysiaceae A.St.-Hil. – **aurovníkovité** (*Vochysia* Aubl. – **aurovník**).

3. Featured changes of nonestablished existing names

– Families: Saururaceae Rich. ex T.Lestib. – **jaštercovité**, saururovité (*Saururus* L. – **jašterec**); Rhizophoraceae Pers. – **koreňovníkovité**, koreňovcovité (*Rhizophora* L. – **koreňovník**).

4. Slovak equivalents for phylogenetic clades

Magnoliids (Magnoliidae) – **magnoliidy**, **magnoliidová (vývojová) vetva**; Monocots (Monocotidae) – **jednoklíčnolistové rastliny**; Commelinids (Commelinidae) – **commelinidy** [pron. komelinidy], **commelinidová** [pron. komelinidová] **(vývojová) vetva**; Eudicots (Eudicotidae) – **pravé dvojklíčnolistové rastliny,** trikolpátne; Superrosids – **superrosidy**; Rosids (Rosidae) – **rosidy**, **rosidová (vývojová) vetva**; Fabids (Fabidae) – **fabidy**, **fabidová (vývojová) vetva**, pravé rosidy I.; nitrogen-fixing clade – **(vývojová) vetva rastlín viažucich dusík, N_2 vetva**; COM-clade – **(vývojová) vetva Celastrales-Oxalidales-Malpighiales, COM vetva**; Malvids (Malvidae) – **malvidy**, **malvidová (vývojová) vetva**, pravé rosidy II.; Superasterids – **superasteridy**; Asterids – **asteridy**, **asteridová (vývojová) vetva**; Lamiids – **lamiidy**, **lamiidová (vývojová) vetva**; Campanulids – **campanulidy** [pron. kampanulidy], **campanulidová** [pron. kampanulidová] **(vývojová) vetva**.

Appendix 1. Phylogenetic system of Angiosperms in Slovak language according to APG IV classification

(bazálne vetvy krytosemenných rastlín)

Amborellales (amborelotvaré)
Amborellaceae (amborelovité)

Nymphaeales (leknotvaré)
Hydatellaceae (vodniatkovité)
Cabombaceae (kabombovité)
Nymphaeaceae (leknovité)

Austrobaileyales (austrobejliotvaré)
Austrobaileyaceae (austrobejliovité)
Trimeniaceae (trimeniovité)
Schisandraceae (schizandrovité)

Magnoliidová vetva

Canellales (kanelotvaré)
Canellaceae (kanelovité)
Winteraceae (winterovité)

Piperales (pieprotvaré)
Saururaceae (jaštercovité)
Piperaceae (pieprovité)
Aristolochiaceae (vlkovcovité)

Magnoliales (magnóliotvaré)
Myristicaceae (muškátovníkovité)
Magnoliaceae (magnóliovité)
Degeneriaceae (degeneriovité)
Himantandraceae (agarovité)
Eupomatiaceae (viečkovkovité)
Annonaceae (anonovité)

Laurales (vavrínotvaré)
Calycanthaceae (kalykantovité)
Siparunaceae (siparunovité)
Gomortegaceae (gomortegovité)
Atherospermataceae (ostiplodovité)
Hernandiaceae (hernandiovité)
Monimiaceae (monímiovité)
Lauraceae (vavrínovité)

(nezávislá nezaradená vetva)

Chloranthales (zelenokvetotvaré)
Chloranthaceae (zelenokvetovité)

JEDNOKLÍČNOLISTOVÉ RASTLINY

Acorales (puškvorcotvaré)
Acoraceae (puškvorcovité)

Alismatales (žabníkotvaré)
Araceae (áronovité)
Tofieldiaceae (kosatkovité)
Alismataceae (žabníkovité)
Butomaceae (okrasovité)
Hydrocharitaceae (vodniankovité)
Scheuchzeriaceae (blatnicovité)
Aponogetonaceae (klasovníkovité)
Juncaginaceae (baričkovité)
Maundiaceae (baricovité)
Zosteraceae (zosterovité)
Potamogetonaceae (červenavcovité)
Posidoniaceae (posidóniovité)
Ruppiaceae (štíhličkovité)
Cymodoceaceae (stuhovkovité)

Petrosaviales (petrosáviotvaré)
Petrosaviaceae (petrosáviovité)

Dioscoreales (dioskoreotvaré)
Nartheciaceae (kostilomkovité)
Burmanniaceae (burmaniovité)
Dioscoreaceae (dioskoreovité)

Pandanales (pandanotvaré)
Triuridaceae (polypkovité)
Velloziaceae (velóciovité)
Stemonaceae (stemonovité)
Cyclanthaceae (cyklantovité)
Pandanaceae (pandanovité)

Liliales (ľaliotvaré)
Campynemataceae (zelienkovité)
Corsiaceae (korziovité)
Melanthiaceae (kýchavicovité)
Petermanniaceae (petermaniovité)
Alstroemeriaceae (alstrémériovité)
Colchicaceae (jesienkovité)
Philesiaceae (filéziovité)
Ripogonaceae (prútovníkovité)
Smilacaceae (smilaxovité)
Liliaceae (ľaliovité)

Asparagales (asparágotvaré)
Orchidaceae (vstavačovité)
Boryaceae (boriovité)
Blandfordiaceae (blandfordiovité)
Asteliaceae (astéliovité)
Lanariaceae (lanáriovité)
Hypoxidaceae (hviezdičkovité)
Doryanthaceae (oštepovcovité)
Ixioliriaceae (ľalinkovité)
Tecophilaeaceae (šafránovcovité)
Iridaceae (kosatcovité)
Xeronemataceae (xeronemovité)
Asphodelaceae (asfodelovité)
Amaryllidaceae (amarylkovité)
Asparagaceae (asparágovité)

Commelinidová vetva

Arecales (arekotvaré)
Dasypogonaceae (hustoštetovité)
Arecaceae (arekovité)

Commelinales (podenkotvaré)
Hanguanaceae (hanguanovité)
Commelinaceae (podenkovité)
Philydraceae (žabienkovité)
Pontederiaceae (pontedériovité)
Haemodoraceae (hemodórovité)

Zingiberales (ďumbierotvaré)
Strelitziaceae (strelíciovité)
Lowiaceae (orchidantovité)
Heliconiaceae (helikóniovité)
Musaceae (banánovníkovité)
Cannaceae (kanovité)
Marantaceae (marantovité)
Costaceae (kostusovité)
Zingiberaceae (ďumbierovité)

Poales (lipnicotvaré)
Typhaceae (pálkovité)
Bromeliaceae (broméliovité)
Rapateaceae (rapateovité)
Xyridaceae (žilietkovité)
Eriocaulaceae (páperčekovité)
Mayacaceae (majakovité)
Thurniaceae (turniovité)
Juncaceae (sitinovité)
Cyperaceae (šachorovité)
Restionaceae (lanovcovité)
Flagellariaceae (bičovníkovité)
Joinvilleaceae (patrstinovité)
Ecdeiocoleaceae (paostricovité)
Poaceae (lipnicovité)

(pravdepodobná sesterská vetva pravých dvojklíčnolistových rastlín)

Ceratophyllales (rožkatcotvaré)
Ceratophyllaceae (rožkatcovité)

PRAVÉ DVOJKLÍČKOVÉ RASTLINY

Ranunculales (iskerníkotvaré)
Eupteleaceae (krídlovníkovité)
Papaveraceae (makovité)
Circaeasteraceae (čarovkovité)
Lardizabalaceae (lardizabalovité)
Menispermaceae (mesiačikovité)
Berberidaceae (dráčovité)
Ranunculaceae (iskerníkovité)

Proteales (proteotvaré)
Sabiaceae (sabiovité)
Nelumbonaceae (lotosovité)
Platanaceae (platanovité)
Proteaceae (proteovité)

Trochodendrales (kolesovcotvaré)
Trochodendraceae (kolesovcovité)

Buxales (krušpánotvaré)
Buxaceae (krušpánovité)

Jadrové pravé

Gunnerales (gunerotvaré)
Myrothamnaceae (oživcovité)
Gunneraceae (gunerovité)

Dilleniales (diléniotvaré)
Dilleniaceae (diléniovité)

Superrosidy

Saxifragales (lomikameňotvaré)
Peridiscaceae (obterčovité)
Paeoniaceae (pivonkovité)
Altingiaceae (altingiovité)
Hamamelidaceae (hamamelovité)
Cercidiphyllaceae (cercidovníkovité)
Daphniphyllaceae (pavavrínovité)
Iteaceae (iteovité)
Grossulariaceae (egrešovité)
Saxifragaceae (lomikameňovité)
Crassulaceae (tučnolistovité)
Aphanopetalaceae (plamienkovcovité)
Tetracarpaeaceae (štvorplodovité)
Penthoraceae (päťrožcovité)
Haloragaceae (zrnulkovité)
Cynomoriaceae (hubkovité)

Rosidová vetva

Vitales (viničotvaré)
Vitaceae (viničovité)

Fabidová vetva

Zygophyllales (jarmovcotvaré)
Krameriaceae (krameriovité)
Zygophyllaceae (jarmovcovité)

Vetva rastlín viažucich dusík

Fabales (bôbotvaré)
Quillajaceae (kvilájovité)
Fabaceae (bôbovité)
Surianaceae (surianovité)
Polygalaceae (horčinkovité)

Rosales (ružotvaré)
Rosaceae (ružovité)
Barbeyaceae (barbejovité)
Dirachmaceae (dirachmovité)
Elaeagnaceae (hlošinovité)
Rhamnaceae (rešetliakovité)
Ulmaceae (brestovité)
Cannabaceae (konopovité)
Moraceae (morušovité)
Urticaceae (pŕhľavovité)

Fagales (bukotvaré)
Nothofagaceae (pabukovité)
Fagaceae (bukovité)
Myricaceae (vresnovité)
Juglandaceae (orechovité)
Casuarinaceae (prasličníkovité)
Ticodendraceae (jelšovcovité)
Betulaceae (brezovité)

Cucurbitales (tekvicotvaré)
Apodanthaceae (podkôrovníkovité)
Anisophylleaceae (rôznolistovité)
Corynocarpaceae (karakovité)
Coriariaceae (garbiarnikovité)
Cucurbitaceae (tekvicovité)
Tetramelaceae (korenatcovité)

Datiscaceae (pakonopovité)
Begoniaceae (begóniovité)

Vetva Celastrales-Oxalidales-Malpighiales (COM)

Celastrales (bršlencotvaré)
Lepidobotryaceae (šišticovcovité)
Celastraceae (bršlencovité)

Oxalidales (kysličkotvaré)
Huaceae (huovité)
Connaraceae (škebľovcovité)
Oxalidaceae (kysličkovité)
Cunoniaceae (kunóniovité)
Elaeocarpaceae (olejníkovité)
Cephalotaceae (cefalotovité)
Brunelliaceae (brunéliovité)

Malpighiales (malpígioptvaré)
Pandaceae (pandovité)
Irvingiaceae (mangovcovité)
Ctenolophonaceae (hrebenatcovité)
Rhizophoraceae (koreňovníkovité)
Erythroxylaceae (kokaínovníkovité)
Ochnaceae (ochnovité)
Bonnetiaceae (bonéciovité)
Clusiaceae (klúziovité)
Calophyllaceae (krásnolistovité)
Podostemaceae (nohonitcovité)
Hypericaceae (ľubovníkovité)
Caryocaraceae (pekeovité)
Lophopyxidaceae (hranovcovité)
Putranjivaceae (putrandživovité)
Centroplacaceae (centroplakovité)
Elatinaceae (elatinkovité)
Malpighiaceae (malpigiovité)
Balanopaceae (žaľudovníkovité)
Trigoniaceae (trigóniovité)
Dichapetalaceae (jedolistovité)
Euphroniaceae (eufróniovité)
Chrysobalanaceae (zlatoplodovité)
Humiriaceae (humíriovité)
Achariaceae (achárioviteé)
Violaceae (fialkovité)
Goupiaceae (kopiovité)
Passifloraceae (mučenkovité)
Lacistemataceae (lacistemovité)
Salicaceae (vŕbovité)
Peraceae (perovité)
Rafflesiaceae (rafléziovité)
Euphorbiaceae (prýštecovité)
Linaceae (ľanovité)
Ixonanthaceae (amonangovité)
Picrodendraceae (paorechovité)
Phyllanthaceae (fylantovité)

Malvidová vetva

Geraniales (pakostotvaré)
Geraniaceae (pakostovité)
Francoaceae (frankoovité)

Myrtales (myrtotvaré)
Combretaceae (kombretovité)
Lythraceae (vrbicovité)
Onagraceae (pupalkovité)
Vochysiaceae (aurovníkovité)
Myrtaceae (myrtovité)
Melastomataceae (čiernoústcovité)
Crypteroniaceae (krypteróniovité)
Alzateaceae (alzateovité)
Penaeaceae (peneovité)

Crossosomatales (kamenicotvaré)
Aphloiaceae (čajovníkovcovité)
Geissolomataceae (listovkovité)
Strasburgeriaceae (štrasburgériovité)
Staphyleaceae (klokočovité)
Guamatelaceae (guamatelovité)
Stachyuraceae (klasnatcovité)
Crossosomataceae (kamenicovité)

Picramniales (pikramniotvaré)
Picramniaceae (pikramniovité)

Huerteales (huerteotvaré)
Gerrardinaceae (gerardínovité)
Petenaeaceae (lipovcovité)
Tapisciaceae (tapisciovité)
Dipentodontaceae (paokolíkovcovité)

Sapindales (mydlovníkotvaré)
Biebersteiniaceae (bíberštajniovité)
Nitrariaceae (nitráriovité)
Kirkiaceae (kirkiovité)
Burseraceae (burzerovité)
Anacardiaceae (obličkovcovité)
Sapindaceae (mydlovníkovité)
Rutaceae (rutovité)
Simaroubaceae (simarubovité)
Meliaceae (meliovité)

Malvales (slezotvaré)
Cytinaceae (ozorinovité)
Muntingiaceae (muntingiovité)
Neuradaceae (gombičkovité)
Malvaceae (slezovité)
Sphaerosepalaceae (palcátovcovité)
Thymelaeaceae (vrabcovníkovité)
Bixaceae (bixovité)
Cistaceae (cistovité)
Sarcolaenaceae (rúchovkovité)
Dipterocarpaceae (dvojkrídlačovité)

Brassicales (kapustotvaré)
Akaniaceae (akániovité)
Tropaeolaceae (kapucínkovité)
Moringaceae (moringovité)
Caricaceae (papájovité)
Limnanthaceae (mokraďkovité)

Setchellanthaceae (sečelkovité)
Koeberliniaceae (tŕňovcovité)
Bataceae (slaničkovité)
Salvadoraceae (salvadorovité)
Emblingiaceae (papučkovkovité)
Tovariaceae (tovariovité)
Pentadiplandraceae (zábudlivkovité)
Gyrostemonaceae (kruhokvetovité)
Resedaceae (rezedovité)
Capparaceae (kaparovité)
Cleomaceae (pavúčnicovité)
Brassicaceae (kapustovité)

Superasteridy

Berberidopsidales (dráčovcotvaré)
Aextoxicaceae (kozotravovité)
Berberidopsidaceae (dráčovcovité)

Santalales (santalotvaré)
Olacaceae (olaxovité)
Opiliaceae (opíliovité)
Balanophoraceae (žaľuďovcovité)
Santalaceae (santalovité)
Misodendraceae (vlasatcovité)
Schoepfiaceae (brusnicovcovité)
Loranthaceae (imelovcovité)

Caryophyllales (klinčekotvaré)
Frankeniaceae (frankéniovité)
Tamaricaceae (tamariškovité)
Plumbaginaceae (olovníkovité)
Polygonaceae (stavikrvovité)
Droseraceae (rosičkovité)
Nepenthaceae (krčiažnikovité)
Drosophyllaceae (rosičkovcovité)
Dioncophyllaceae (dvojháčikovité)
Ancistrocladaceae (háčikovcovité)
Rhabdodendraceae (tyčovcovité)
Simmondsiaceae (jojobovité)
Physenaceae (fyzenovité)
Asteropeiaceae (hviezdovníkovité)
Macarthuriaceae (mekartúriovité)
Microteaceae (drobnicovité)
Caryophyllaceae (klinčekovité)
Achatocarpaceae (achátovníkovité)
Amaranthaceae (láskavcovité)
Stegnospermataceae (mieškovkovité)
Limeaceae (čistikrvovité)
Lophiocarpaceae (hranoplodovité)
Kewaceae (kewovité)
Barbeuiaceae (barbojovité)
Gisekiaceae (gizekiovité)
Aizoaceae (poludňovkovité)
Phytolaccaceae (líčidlovité)
Petiveriaceae (petivériovité)
Sarcobataceae (slanokrovité)
Nyctaginaceae (nocovkovité)
Molluginaceae (kobercovkovité)
Montiaceae (zdrojovkovité)
Didiereaceae (didiereovité)
Basellaceae (bazelovité)
Halophytaceae (slanorastovité)
Talinaceae (talinovité)
Portulacaceae (portulakovité)
Anacampserotaceae (rozchodničkovité)
Cactaceae (kaktusovité)

Asteridová vetva

Cornales (drieňotvaré)
Nyssaceae (nysovité)
Hydrostachyaceae (vodopádnikovité)
Hydrangeaceae (hortenziovité)
Loasaceae (loazovité)
Curtisiaceae (kurtíziovité)
Grubbiaceae (grubiovité)
Cornaceae (drieňovité)

Ericales (vresovcotvaré)
Balsaminaceae (netýkavkovité)
Marcgraviaceae (netopierovkovité)
Tetrameristaceae (punakovité)
Fouquieriaceae (fukiériovité)
Polemoniaceae (vojnovkovité)
Lecythidaceae (hrncovníkovité)
Sladeniaceae (sladéniovité)
Pentaphylacaceae (pentafylaxovité)
Sapotaceae (sapotovité)
Ebenaceae (ebenovníkovité)
Primulaceae (prvosienkovité)
Theaceae (čajovníkovité)
Symplocaceae (sladolistovité)
Diapensiaceae (diapenziovité)
Styracaceae (styraxovité)
Sarraceniaceae (saracéniovité)
Roridulaceae (roridulovité)
Actinidiaceae (aktinídiovité)
Clethraceae (kletrovité)
Cyrillaceae (cyrilovité)
Ericaceae (vresovcovité)
Mitrastemonaceae (mitričkovité)

Lamiidová vetva

Icacinales (ikacinotvaré)
Oncothecaceae (nádorovkovité)
Icacinaceae (ikacinovité)

Metteniusales (meteniusotvaré)
Metteniusaceae (meteniusovité)

Garryales (garyotvaré)
Eucommiaceae (eukómiovité)
Garryaceae (garyovité)

Gentianales (horcotvaré)
Rubiaceae (marenovité)
Gentianaceae (horcovité)
Loganiaceae (loganiovité)

Gelsemiaceae (jazmínovcovité)
Apocynaceae (zimozeleňovité)
Boraginales (borákotvaré)
Boraginaceae (borákovité)
Vahliales (váliotvaré)
Vahliaceae (váliovité)
Solanales (ľuľkotvaré)
Convolvulaceae (pupencovité)
Solanaceae (ľuľkovité)
Montiniaceae (montíniovité)
Sphenocleaceae (klinovcovité)
Hydroleaceae (vodičkovité)
Lamiales (hluchavkotvaré)
Plocospermataceae (chocholnatkovité)
Carlemanniaceae (karlemaniovité)
Oleaceae (olivovité)
Tetrachondraceae (štvorhrankovité)
Calceolariaceae (papučkovité)
Gesneriaceae (gesnériovité)
Plantaginaceae (skorocelovité)
Scrophulariaceae (krtičníkovité)
Stilbaceae (stilbovité)
Linderniaceae (linderniovité)
Byblidaceae (dúhovkovité)
Martyniaceae (martyniovité)
Pedaliaceae (sezamovité)
Acanthaceae (akantovité)
Bignoniaceae (bignóniovité)
Lentibulariaceae (bublinatkovité)
Schlegeliaceae (šlegeliovité)
Thomandersiaceae (tomandersiovité)
Verbenaceae (železníkovité)
Lamiaceae (hluchavkovité)
Mazaceae (pyskáčovité)
Phrymaceae (čarodejovité)
Paulowniaceae (paulovniovité)
Orobanchaceae (zárazovité)

Campanulidová vetva
Aquifoliales (cezmínotvaré)
Stemonuraceae (urandrovité)
Cardiopteridaceae (krídlačovité)
Phyllonomaceae (listorodkovité)
Helwingiaceae (listoplodkovité)
Aquifoliaceae (cezmínovité)
Asterales (astrotvaré)
Rousseaceae (gekónovníkovité)
Campanulaceae (zvončekovité)
Pentaphragmataceae (húseničníkovité)
Stylidiaceae (peľostrelkovité)
Alseuosmiaceae (toropapovité)
Phellinaceae (felinovité)
Argophyllaceae (striebrolistovité)
Menyanthaceae (vachtovité)
Goodeniaceae (gudéniovité)
Calyceraceae (kalycerovité)
Asteraceae (astrovité)
Escalloniales (eskalóniotvaré)
Escalloniaceae (eskalóniovité)
Bruniales (bruniotvaré)
Columelliaceae (kolumeliovité)
Bruniaceae (bruniovité)
Paracryphiales (pažidelníkotvaré)
Paracryphiaceae (pažidelníkovité)
Dipsacales (štetkotvaré)
Adoxaceae (pyžmovkovité)
Caprifoliaceae (zemolezovité)
Apiales (mrkvotvaré)
Pennantiaceae (penanciovité)
Torricelliaceae (toričeliovité)
Griseliniaceae (griselíniovité)
Pittosporaceae (syrovníkovité)
Araliaceae (aralkovité)
Myodocarpaceae (okolíkatcovité)

Appendix 2. Alphabetic list of Slovak equivalents for vascular plant families and order

A

agarovité
achániovité
achátovníkovité
akániovité
akantovité
aktinídiovité
alstrémériovité
altingiovité
alzateovité
amarylkovité
amborelotvaré
amborelovité
amonangovité
anonovité
aralkovité
arekotvaré
arekovité
áronovité
asfodelovité
asparágotvaré
asparágovité
astéliovité
astrotvaré
astrovité
aurovníkovité
austrobejliotvaré
austrobejliovité

B

banánovníkovité
barbejovité
barbojovité
baricovité
baričkovité
bazelovité
begóniovité
bíberštajniovité
bičovníkovité
bignóniovité
bixovité
blandfordiovité
blatnicovité
bonéciovité
borákotvaré
borákovité
boriovité
bôbotvaré
bôbovité
brestovité
brezovité
broméliovité

bršlencotvaré
bršlencovité
brunéliovité
bruniotvaré
bruniovité
brusnicovcovité
bublinatkovité
bukotvaré
bukovité
burmaniovité
burzerovité

C

cefalotovité
centroplakovité
cercidovníkovité
cezmínotvaré
cezmínovité
cistovité
cyklantovité
cyrilovité
čajovníkovcovité
čajovníkovité
čarodejovité
čarovkovité
červenavcovité
čiernoústcovité
čistikrvovité

D

degeneriovité
diapenziovité
didiereovité
diléniotvaré
diléniovité
dioskoreotvaré
dioskoreovité
dirachmovité
dráčovcotvaré
dráčovcovité
dráčovité
drieňotvaré
drieňovité
drobnicovité
dúhovkovité
ďumbierotvaré
ďumbierovité
dvojháčikovité
dvojkrídlačovité

E

ebenovníkovité
egrešovité
elatinkovité
eskalóniotvaré
eskalóniovité
eufróniovité
eukómiovité

F

felinovité
fialkovité
filéziovité
frankéniovité
frankoovité
fukiériovité
fylantovité
fyzenovité

G

garbiarnikovité
garyotvaré
garyovité
gekónovníkovité
gerardínovité
gesnériovité
gizekiovité
gombičkovité
gomortegovité
griselíniovité
grubiovité
guamatelovité
gudéniovité
gunerotvaré
gunerovité

H

háčikovcovité
hamamelovité
hanguanovité
helikóniovité
hemodórovité
hernandiovité
hlošinovité
hluchavkotvaré
hluchavkovité
horcotvaré
horcovité
horčinkovité
hortenziovité
hranoplodovité
hranovcovité
hrebenatcovité
hrncovníkovité
hubkovité
huerteotvaré
humíriovité
huovité
húseničníkovité
hustoštetovité
hviezdičkovité
hviezdovníkovité

CH

chocholnatkovité

I

ikacinotvaré
ikacinovité
imelovcovité
iskerníkotvaré
iskerníkovité
iteovité

J

jarmovcotvaré
jarmovcovité
jaštercovité
jazmínovcovité
jedolistovité
jelšovcovité
jesienkovité
jojobovité

K

kabombovité
kaktusovité
kalycerovité
kalykantovité
kamenicotvaré
kamenicovité
kanelotvaré
kanelovité
kanovité
kaparovité
kapucínkovité
kapustotvaré
kapustovité
karakovité
karlemaniovité
kewovité
kirkiovité
klasnatcovité
klasovníkovité
kletrovité
klinčekotvaré
klinčekovité
klinovcovité
klokočovité
klúziovité
kobercovkovité
kokaínovníkovité
kolesovcotvaré
kolesovcovité
kolumeliovité
kombretovité
konopovité
kopiovité
korenatcovité
koreňovníkovité
korziovité
kosatcovité
kosatkovité
kostilomkovité
kostusovité
kozotravovité
krameriovité
krásnolistovité
krčiažnikovité
krídlačovité
krídlovníkovité
krtičníkovité
kruhokvetovité
krušpánotvaré
krušpánovité
krypteróniovité
kunóniovité
kurtíziovité
kvilájovité
kýchavicovité
kysličkotvaré
kysličkovité

L

lacistemovité
ľalinkovité
ľaliotvaré
ľaliovité
lanáriovité
lanovcovité
ľanovité
lardizabalovité
láskavcovité
leknotvaré
leknovité
líčidlovité
linderniovité
lipnicotvaré
lipnicovité
lipovcovité
listoplodkovité
listorodkovité
listovkovité
loazovité
loganiovité
lomikameňotvaré

lomikameňovité
lotosovité
ľubovníkovité
ľuľkotvaré
ľuľkovité

M

magnóliotvaré
magnóliovité
majakovité
makovité
malpígioptvaré
malpigiovité
mangovcovité
marantovité
marenovité
martyniovité
mekartúriovité
meliovité
mesiačikovité
meteniusotvaré
meteniusovité
mieškovkovité
mitričkovité
mokraďkovité
monímiovité
montíniovité
moringovité
morušovité
mrkvotvaré
mrkvovité
mučenkovité
muntingiovité
muškátovníkovité
mydlovníkotvaré
mydlovníkovité
myrtotvaré
myrtovité

N

nádorovkovité
netopierovkovité
netýkavkovité
nitráriovité
nocovkovité
nohonitcovité
nysovité

O

obličkovcovité
obterčovité
ochnovité
okolíkatcovité
okrasovité
olaxovité
olejníkovité
olivovité
olovníkovité
opíliovité
orechovité
orchidantovité
ostiplodovité
oštepovcovité
ozorinovité
oživcovité

P

pabukovité
pakonopovité
pakostotvaré
pakostovité
palcátovcovité
pálkovité
pandanotvaré
pandanovité
pandovité
paokolíkovcovité
paorechovité
paostricovité
papájovité
páperčekovité
papučkovité
papučkovkovité
patrstinovité
paulovniovité
pavavrínovité
pavúčnicovité
pažidelníkotvaré
pažidelníkovité
päťrožcovité
pekeovité
peľostrelkovité
penanciovité
peneovité
pentafylaxovité
perovité
petermaniovité
petivériovité
petrosáviotvaré
petrosáviovité
pieprotvaré
pieprovité
pikramniotvaré
pikramniovité
pivonkovité
plamienkovcovité
platanovité
podenkotvaré
podenkovité
podkôrovníkovité
poludňovkovité
polypkovité
pontedériovité
portulakovité
posidóniovité
prasličníkovité
pŕhľavovité
proteotvaré
proteovité
prútovníkovité
prvosienkovité
prýštecovité
punakovité
pupalkovité
pupencovité
puškvorcotvaré
puškvorcovité
putrandživovité
pyskáčovité
pyžmovkovité

R

rafléziovité
rapateovité
rešetliakovité
rezedovité
roridulovité
rosičkovcovité
rosičkovité
rozchodničkovité
rožkatcotvaré
rožkatcovité
rôznolistovité
rúchovkovité
rutovité
ružotvaré
ružovité

S

sabiovité
salvadorovité
santalotvaré
santalovité
sapotovité
saracéniovité
sečelkovité
sezamovité
schizandrovité
simarubovité
siparunovité
sitinovité
skorocelovité
sladéniovité
sladolistovité
slaničkovité
slanokrovité
slanorastovité
slezotvaré
slezovité
smilaxovité
stavikrvovité
stemonovité
stilbovité
strelíciovité
striebrolistovité
stuhovkovité
styraxovité
surianovité
syrovníkovité
šafránovcovité
šachorovité
šišticovcovité
škebľovcovité
šlegeliovité
štetkotvaré
štíhličkovité
štrasburgériovité
štvorhrankovité
štvorplodovité

T

talinovité
tamariškovité
tapisciovité
tekvicotvaré
tekvicovité
tomandersiovité
toričeliovité
toropapovité
tovariovité
trigóniovité
trimeniovité
tŕňovcovité
tučnolistovité
turniovité
tyčovcovité
urandrovité

V

vachtovité
váliotvaré
váliovité
vavrínotvaré
vavrínovité
velóciovité
viečkovkovité

viničovité
vlasatcovité
vlkovcovité
vodičkovité
vodniankovité
vodniatkovité
vodopádnikovité
vojnovkovité
vrabcovníkovité
vrbicovité
vŕbovité
vresnovité
vresovcotvaré
vresovcovité
vstavačovité

W

winterovité

X

xeronemovité

Z

zábudlivkovité
zárazovité
zdrojovkovité
zelenokvetotvaré
zelenokvetovité
zelienkovité
zemolezovité
zimozeleňovité
zlatoplodovité
zosterovité
zrnulkovité
zvončekovité
žabienkovité
žabníkotvaré
žabníkovité
žaľuďovcovité
žaľudovníkovité
železníkovité
žilietkovité

Conclusion

Altogether we proposed 201 Slovak names for type genera of the latest phylogenetic system APG IV (see Appendix 1, Appendix 2): 95 (47%) of them are based on phonetic pronunciation of scientific names, 42 (21%) are based on the meaning of scientific name, 31 (15%) were taken from foreign languages and 33 (17%) of them were designed from morphological, ecological or ethnobotanical peculiarities. Sexteen Slovak equivalents for families and two for orders were created based on existing type genera. Two equivalents for type genera were proposed to be changed: from phonetic transcription to etymological meaning in *Saururus* L – "jašterec" (older name was "saururus") and due to the same Slovak equivalent with *Rhizopogon* Fr. (Basidiomycota) in *Rhizophora* L. – "koreňovník" (older name was "koreňovec").

Acknowledgements

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Abstrakt

Zmeny v systematickej klasifikácii vyšších rastlín si niekedy vyžadujú nové ekvivalenty v regionálnych jazykoch. Preto sme navrhli nové mená v slovenčine pre typové rody, čeľade a rady najnovšieho fylogenetického systému APG IV.

Michal Hrabovský, Eva Zahradníková, Karol Mičieta: Návrh slovenských mien pre APG IV klasifikáciu vyšších rastlín.

LITTLE-KNOWN RUDERAL PLANT COMMUNITIES RECORDED IN BRATISLAVA

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Abstract

This paper is focused on ruderal plant communities, which are poorly documented in the Slovakia and there is not enough information about them. We inform about *Aristolochia clematitis* community [*Artemisietea vulgaris*], *Geranium pusillum* community [*Stellarietea mediae*], *Poa bulbosa* community [*Sisymbrion officinalis*], *Saponaria officinalis* community [*Convolvulo arvensis-Agropyrion repentis*] and *Trifolium arvense* community [*Artemisietea vulgaris*] and their species composition and the occurrence in Bratislava.

Key words: phytocoenology, city, southwestern Slovakia, synanthropic vegetation, urban ecology

Introduction

Synanthropic vegetation is vegetation growing on areas affected by various human activities. Synantropic vegetation includes ruderal vegetation, which can be found at irregularly disturbed areas in the vicinity of human settlements, at construction sites, along roads and railways in towns and villages or in the vicinity of mining areas and segetal vegetation, which consists of weed communities of relativelly regularly cultivated lands (Jarolímek et al. 1997). This article deals with ruderal plant communities. Research focused on ruderal vegetation is very important. Ruderal communities can be very interesting for a perceptive botanist. They consist of populations of species admirably adapted to the unique environmental conditions that are result of various human activities (e.g. building construction activities, transport etc.). Populations of ruderals species are adapted to conditions on the areas affected by human activities such as trampling, mowing etc. or contaminated by various substances coming from municipal and building construction waste. Soil, water and air contamination strongly affect organisms existing in this environment (Jarolímek 1994, Jarolímek et al. 1997). The other important reason for evaluation of ruderal vegetation is the fact, that it consists of numerous alien and invasive taxa (Simonová, Lososová 2008, Medvecká et al. 2009a).

Although many syntaxonomists deal with ruderal vegetation research, some of ruderal communities are overlooked by them or they are not well documented yet. The aim of this study is to provide information about species composition and structure of these ruderal communities and inform about their occurrence in the area of Bratislava. As a capital of Slovak Republic, Bratislava has built-up extensive transport network and provides wide spectrum of other ruderal habitats (Hrnčiarová et al. 2006, Feráková, Jarolímek 2011). This enhances possibility for a various new ruderal communities to be recently found in the area. Jarolímek (1983) focused on the research of ruderal vegetation of the whole area of Bratislava. Other studies of the ruderal communities concern only some city districts (Májovský 1957, Jarolímek 1986). Information about several rare and interesting ruderal communities of Bratislava provide Jarolímek, Valachovič (2016) and Valachovič (2016).

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Material and Methods

The article refers about several ruderal communities, which were recorded as a part of the research carried out in the area of Bratislava. Phytosociological data of ruderal communities were sampled in the years 2011–2014 using the methods of Zürich-Montpellier school (Braun-Blanquet 1964). Modified Braun-Blanquet cover-abundance scale, extended by 2a, 2b and 2m values was used (Barkman et al. 1964). All (308) relevés recorded in Bratislava were stored into TURBOWIN database (Hennekens, Schaminée 2001), imported and edited in JUICE programme (Tichý 2002) and analysed by the numerical classification using a SYN-TAX 2000 programme (Podani 2001). Based on the results of the analysis smaller groups of relevés were created (majority of the groups responded to phytosociological classes) and subsequently analysed again. According to the results of this numerical analysis relevés were divided into associations and communities. Dendrograms resulting from the numerical classification provides Rendeková (2016). Relevés of the ruderal communities presented in this article were evaluated as a part of the described numerical analysis and they were classified according to the method described by Kopecký, Hejný (1974).

Relevés of *Geranium pusillum* community [*Stellarietea mediae*] recorded on five localities are presented in phytocoenological table (Tab. 1) created in JUICE programme (Tichý 2002). Relevés in the table are ordered according to the results of numerical classification. Taxa in relevés are arranged according to their affiliation to phytocoenological units and by the decreasing frequency. Cover-abundance values 2a and 2b are used in the abbreviated forms a and b. Localities and other relevés data are presented below the table. Relevés of ruderal communities recorded on one or two localities only are not presented in tables but listed separately.

Nomenclature of taxa was used according to the Checklist of non-vascular and vascular plants of Slovakia (Marhold, Hindák 1998), nomenclature of syntaxa and communities follows Jarolímek, Šibík (2008). Name of taxon *Rubus fruticosus* agg. which is not included in the Checklist of non-vascular and vascular plants of Slovakia (Marhold, Hindák 1998) is presented in the publication of Kubát (2010). Taxa presented in the paper as a diagnostic, characteristic and constant, are classified into these categories according to Jarolímek et al. (1997) and Jarolímek, Šibík (2008).

Results and Discussion

Class *Stellarietea mediae* R. Tx. et al. ex von Rochow 1951

***Geranium pusillum* community [*Stellarietea mediae*]**

Geranium pusillum community occupied smaller trampled areas (2–4 m²) of Bratislava city, such as edges of pavements and roads and consisted of plants with reduced height. Stands were relatively poor in species (11–15 taxa in relevé). All these characteristics are a result of disturbance by trampling. Relevés were recorded in spring period during their phenological optimum time.

The archaeophyte *Geranium pusillum* dominated in the species composition. Dominant taxon is a characteristic species of the class *Stellarietea mediae* and stands were abundant to the other diagnostic, characteristic and constant taxa of this class (*Capsella bursa-pastoris*, *Hordeum murinum*, *Trifolium campestre*, *Veronica arvensis*, *V. persica*). Also taxa of the class *Polygono arenastri-Poetea annuae* (*Poa annua*, *Polygonum arenastrum*) and taxa of the class *Molinio-Arrhenatheretea* (*Achillea millefolium* agg., *Lolium perenne*, *Plantago lanceolata*, *Taraxacum* sect. *Ruderalia*, *Trifolium pratense*, *T. repens*) were present (Tab. 1).

Stands with dominance of *Geranium pusillum* were not found in Bratislava during the research carried out by Jarolímek (1983) thirty years ago. *Geranium pusillum* community [*Stellarietea mediae*] is documented only by a few relevés from Slovakia (Jarolímek et al. 1997). Our relevés from Bratislava are floristically similar to these relevés. Differences can be found in comparison to colder region of Horná Orava (Medvecká et al. 2009b), where species *Hordeum murinum*, *Polygonum arenastrum* and *Trifolium campestre* were not present.

Tab. 1. Relevés of *Geranium pusillum* community [*Stellarietea mediae*] from Bratislava(2011–2013)

Relevé no.	**1**	**2**	**3**	**4**	**5**
E_1:					
Dominant taxon					
Geranium pusillum	4	4	5	5	4
Diagnostic, characteristic, constant taxa of class *Stellarietea mediae*					
Capsella bursa-pastoris	1	+	+	+	3
Hordeum murinum	+	.	+	+	+
Trifolium campestre	.	+	+	+	.
Bromus hordeaceus	1	.	.	.	+
Atriplex patula	+	.	.	.	.
Veronica persica	+	.	.	.	.
Lamium purpureum	.	+	.	.	.
Vicia hirsuta	.	+	.	.	.
Veronica arvensis	.	.	+	.	.
Stellaria media	.	.	.	+	.
Vicia angustifolia	.	r	.	.	.
Diagnostic, characteristic, constant taxa of class *Polygono arenastri-Poetea annuae*					
Poa annua	.	.	1	+	+
Polygonum arenastrum	1	.	.	+	.
Diagnostic, characteristic, constant taxa of class *Artemisietea vulgaris*					
Convolvulus arvensis	.	.	+	+	.
Medicago lupulina	+	.	.	.	.
Ballota nigra	.	+	.	.	.
Daucus carota	.	+	.	.	.
Stenactis annua	.	r	.	.	.
Diagnostic, characteristic, constant taxa of class *Molinio-Arrhenatheretea*					
Taraxacum sect. *Ruderalia*	1	1	+	+	+
Plantago lanceolata	+	a	.	+	b
Lolium perenne	.	+	+	+	+
Trifolium repens	.	+	.	1	+
Achillea millefolium agg.	+	.	+	+	.
Trifolium pratense	1	.	.	.	r
Plantago major	a	.	.	.	.
Poa pratensis	+	.	.	.	.
Other taxa					
Erodium cicutarium	.	.	1	.	1
Bellis perennis	+	.	+	.	.
Cirsium arvense	.	1	.	.	.
Poa compressa	.	+	.	.	.
Cerastium arvense	.	.	r	.	.
Glechoma hederacea	.	.	r	.	.
E_0:					
Brachythecium albicans	.	.	.	b	.

Localities and the other information of relevés no. 1 – 5:

Relevé 1. Malé Karpaty Mts., Bratislava, Karlova Ves district, 200 m from the department store Centrum, edge of sidewalk in the park, N 48°09'40.20", E 17°03'01.40", ± 6 m, altitude: 209 m, slope: 5°, aspect: S (180°), relevé area: 2.00 m², total cover: 75%, E_1: 75%, E_0: 0%, height of herb layer: 15–40 cm, soil type: loamy + admixture of sand, 16.5.2011, A. Rendeková, J. Podroužková Medvecká

Relevé 2. Malé Karpaty Mts., Bratislava, Devín district, 300 m from the Devín Castle, edge of bike path, N 48°10'33.60", E 16°58'43.10", ± 8 m, altitude: 143 m, slope: 0°, relevé area: 3.00 m², total cover: 85%, E_1: 85%, E_0: 0%, height of herb layer: 10–20 cm, soil type: loamy + admixture of sand, 24.5.2013, A. Rendeková

Relevé 3. Malé Karpaty Mts., Bratislava, Kramáre district, Stromová street, edge of sidewalk near the house no. 50, N 48°10'02.70", E 17°05'37.40", ± 13 m, altitude: 240 m, slope: 4°, aspect: SSE (160°), relevé area: 4.00 m², total cover: 95%, E_1: 95%, E_0: 0%, height of herb layer: 5–10 cm, soil type: loamy + admixture of sand, 26.5.2013, A. Rendeková

Relevé 4. Malé Karpaty Mts., Bratislava, Karlova Ves district, edge of sidewalk at the crossroad of Karloveská street and Segnerova street, N 48°09'13.60", E 17°03'33.90", ± 6 m, altitude: 160 m, slope: 0°, relevé area: 3.00 m², total cover: 85%, E_1: 85%, E_0: 20%, height of herb layer: 4–16 cm, soil type: loamy, 23.5.2013, A. Rendeková

Relevé 5. Malé Karpaty Mts., Bratislava, Karlova Ves district, edge of road at the crossroad of Karloveská street and Kempelenova street, N 48°09'23.00", E 17°03'13.10", ± 6 m, altitude: 180 m, slope: 0°, relevé area: 3.00 m², total cover: 95%, E_1: 95%, E_0: 0%, height of herb layer: 4–45 cm, soil type: loamy + admixture of sand, 22.5.2013, A. Rendeková

Alliance *Sisymbrion officinalis* R. Tx. et al. in R. Tx. 1950

***Poa bulbosa* community [*Sisymbrion officinalis*]**

The stands with dominance of *Poa bulbosa* were found on the edges of roads and other areas of Bratislava which have higher proportion of skeleton in the soil. Their phenological optimum was in the spring months. Total cover was 60–90%. Dominant species, *Poa bulbosa*, was accompanied by therophytes which germinated at spring time (e.g. *Erophila verna*). Diagnostic, characteristic and constant taxa of the class *Stellarietea mediae* (*Bromus tectorum*, *Capsella bursa-pastoris*, *Hordeum murinum*, *Lamium purpureum*, *Papaver rhoeas*, *Sisymbrium loeselii*, *Stellaria media*, *Trifolium campestre*, *Veronica arvensis*, *Vicia angustifolia*) occured in the species composition too. Taxa such as *Bromus hordeaceus*, *Erodium cicutarium*, *Medicago lupulina*, *M. sativa* and *Plantago lanceolata* were also present. Based on the presence of therophytes, diagnostic species of the class *Stellarietea mediae* and numerical analysis results, we classify *Poa bulbosa* community from Bratislava into the alliance *Sisymbrion officinalis* belonging to the class *Stellarietea mediae*.

The *Poa bulbosa* community [*Sisymbrion officinalis*] has not been documented at other parts of Slovakia yet (Jarolímek et al. 1997). Communities with dominance of *Poa bulbosa*, which belong to the class *Sedo-Scleranthetea* Br.-Bl. 1955, were recorded in the other regions of the country, but this vegetation differs from the communities from Bratislava, as the stands in Bratislava lack the diagnostic species of the class *Sedo-Scleranthetea* and are abundant to diagnostic taxa of other phytosociological classes. Eliáš (1981) reports occurrence of stands dominanted by *Poa bulbosa* from railway stations in the Western Slovakia. Author classifies the stands as the association *Veronico vernae-Poetum bulbosae* Moravec 1967. Species composition of our relevés from Bratislava differs from those of relevés from railway stations. Stands from Bratislava miss taxa *Arenaria serpyllifolia*, *Medicago minima*, *Sedum sexangulare*, *Veronica verna* which were recorded in the stands by Eliáš (1981). On the other hand, stands in the railway stations do not contain taxa *Bromus hordeaceus*, *Medicago lupulina* and *M. sativa*, which are present in Bratislava.

Relevé 6. Podunajská rovina Flatland, Bratislava, Ružinov district, abandoned area among buildings at the crossroad of Ružinovská street and Bajkalská street, N 48°09'21.20", E 17°08'53.60", ± 10 m, altitude: 140 m, slope: 0°, relevé area: 12.00 m², total cover: 60 %, E_1: 60%, E_0: 0%, height of herb layer: 15 cm, soil type: sandy, 14.5.2013, A. Rendeková

E_1: *Poa bulbosa* 4, *Plantago lanceolata* 1, *Polygonum arenstrum* 1, *Veronica arvensis* 1, *Anchusa officinalis* +, *Bromus hordeaceus* +, *Capsella bursa-pastoris* +, *Erodium cicutarium* +, *Erophila verna* +, *Hordeum murinum* +, *Lolium perenne* +, *Medicago sativa* +, *Rhinanthus minor* +, *Sisymbrium loeselii* +, *Taraxacum* sect. *Ruderalia* r, *Medicago lupulina* r, *Vicia angustifolia* r

Relevé 7. Podunajská rovina Flatland, Bratislava, Petržalka district, 400 m from the road Viedenská cesta, 20 m from the bike path Dunajská cyklistická cesta, edge of the road, N 48°08'09.80", E 17°06'01.10", ± 10 m, altitude: 130 m, slope: 0°, relevé area: 14.00 m², total cover: 90 %, E_1: 90%, E_0: 1%, height of herb layer: 20–60 cm, soil type: loamy + admixture of sand, 14.5.2013, A. Rendeková

E_1: *Poa bulbosa* 5, *Bromus tectorum* 1, *Medicago sativa* 1, *Plantago lanceolata* 1, *Bromus hordeceus* +, *Capsella bursa-pastoris* +, *Erodium cicutarium* +, *Hordeum murinum* +, *Lamium purpureum* +, *Medicago lupulina* +, *Papaver rhoeas* +, *Stellaria media* +, *Trifolium campestre* +, *Valerianella locusta* +, *Vicia angustifolia* +, *Viola arvensis* +, *Achillea millefolium* agg. r, *Dactylis glomerata* r, *Lathyrus tuberosus* r, *Onobrychis viciifolia* r
E_0: *Brachythecium albicans* +

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

***Aristolochia clematitis* community [*Artemisietea vulgaris*]**

The only one stand, being dominated by *Aristolochia clematitis*, was recorded in Bratislava at road edge in the Devínska Nová Ves district. The community was documented by one relevé from Bratislava, but very small stands with dominance of *Aristolochia clematitis* were found in more localities, e.g. in the proximity of gardens near the railway station Bratislava-Vinohrady. Stands from the other parts of Bratislava were not documented by relevés, because they were too small (less than 2 m²). The recorded stand from Devínska Nová Ves district was compact, one-layered and about a half a meter high.

Jarolímek et al. (1997) reports about *Aristolochia clematitis* communities classified within the class *Galio-Urticetea* from Slovakia. But species composition of the stand recorded in Bratislava was very different from those of the stands found in other parts of the country. It lacked diagnostic taxa of the class *Galio-Urticetea* and was abundant to characteristic taxa of the class *Artemisietea vulgaris* and syntaxa of this class (e.g. *Artemisia vulgaris*, *Ballota nigra*, *Carduus acanthoides*, *Elytrigia repens*, *Silene latifolia* subsp. *alba*). Furthermore, only dominant taxon and taxa of this class (*Ballota nigra*, *Elytrigia repens*) reached significant cover-abundance values. As a result of listed facts we classify the relevé from Bratislava into the class *Artemisietea vulgaris*. In the past, the *Aristolochia clematitis* community [*Artemisietea vulgaris*] was not recorded in Bratislava (Jarolímek 1983) and there is not mention about this community from the other parts of the country in the Synopsis of synanthropic vegetation of Slovakia (Jarolímek et al. 1997).

Relevé 8. Borská nížina Lowland, Bratislava, Devínska Nová Ves, Mlynská street, edge of the road, N 48°13'05.90", E 16°58'17.30", ± 6 m, altitude: 140 m, slope: 0°, relevé area: 6.00 m², total cover: 100%, E_1: 100%, E_0: 0%, height of herb layer: 56 cm, soil type: loamy, 26.6.2013, A. Rendeková
E_1: *Aristolochia clematitis* 5, *Ballota nigra* a, *Elytrigia repens* a, *Arrhenatherum elatius* +, *Convolvulus arvensis* +, *Lactuca serriola* +, *Papaver rhoeas* +, *Silene latifolia* subsp. *alba* +, *Vicia hirsuta* +, *Artemisia vulgaris* r, *Bromus sterilis* r, *Carduus acanthoides* r, *Chenopodium album* r, *Stenactis annua* r, *Tripleurospermum inodorum* r

***Saponaria officinalis* community [*Convolvulo arvensis-Agropyrion repentis*]**

Stands of *Saponaria officinalis* community [*Convolvulo arvensis-Agropyrion repentis*] were found on abandoned areas of the city near the railways and abandoned vineyards. They were formed by one-layer of approximately 90 cm high plants. In these species-poor stands (12 – 16 taxa in relevé), *Saponaria officinalis* dominated and taxa *Arrhenatherum elatius*, *Elytrigia repens*, *Rubus fruticosus* agg. reached relativelly high cover. Except *Arrhenatherum elatius* and *Elytrigia repens* stands comprised other species from the family *Poaceae* (*Bromus inermis*, *Calamagrostis epigejos*) and other characteristic taxa of the alliance *Convolvulo arvensis-Agropyrion repentis* (*Falcaria vulgaris*) and class *Artemisietea vulgaris* (*Artemisia vulgaris*, *Ballota nigra*, *Carduus acanthoides*, *Cichorium intybus*, *Tanacetum vulgare*). Species *Clematis vitalba* was present in one stand too.

There is no sufficient information about *Saponaria officinalis* phytocoenoses and their occurrence in Slovakia so far. The *Saponaria officinalis* community can be relatively abundant in some regions of the country, but it has been probably overlooked by syntaxonomists, because it is documented only by a few relevés from Borská nížina Lowland, Bukovské vrchy Mts. and Žitavská pahorkatina Upland (Jarolímek et al. 1997). Relevés from Bratislava floristically resemble relevés from the other parts of Slovakia.

Relevé 9. Malé Karpaty Mts., Bratislava, Rača district, 50 m from Alstrova street, 20 m from the abandoned vineyards, N 48°12'19.10", E 17°08'34.70", ± 8 m, altitude: 182 m, slope: 0°, relevé area: 11.00 m², total cover: 99%, E_1: 99%, E_0: 0%, height of herb layer: 90 cm, soil type: loamy, 2.8.2013, A. Rendeková
E_1: *Saponaria officinalis* 5, *Elytrigia repens* b, *Rubus fruticosus* agg. b, *Clematis vitalba* 1, *Achillea millefolium* agg. +, *Arrhenatherum elatius* +, *Artemisia vulgaris* +, *Calamagrostis epigejos* +, *Cichorium intybus* +, *Gallium aparine* +, *Tanacetum vulgare* +, *Urtica dioica* +, *Fallopia dumetorum* r, *Lactuca serriola* r, *Papaver rhoeas* r, *Rumex crispus* r

Relevé 10. Podunajská rovina Flatland, Bratislava, Rača district, Žabí majer, abandoned area near the railway, N 48°12'01.40", E 17°09'02.80", ± 7 m, altitude: 136 m, slope: 0°, relevé area: 12.00 m², total cover: 99%, E_1: 99%, E_0: 0%, height of herb layer: 90 cm, soil type: loamy + admixture of sand, 6.7.2013, A. Rendeková
E_1: *Saponaria officinalis* 5, *Elytrigia repens* 3, *Arrhenatherum elatius* b, *Rubus fruticosus* agg. a, *Bromus inermis* 1, *Ballota nigra* +, *Cirsium arvense* +, *Falcaria vulgaris* +, *Urtica dioica* +, *Cichorium intybus* r, *Hypericum perforatum* r, *Silene latifolia* subsp. *alba* r

Trifolium arvense community [*Artemisietea vulgaris*]

The only one recorded stand of *Trifolium arvense* community [*Artemisietea vulgaris*] occupied abandoned ruderal locality of xerothermic character with sandy soil in Kramáre district. The stand had a total cover of 80 % and was 28 cm high. In the species composition, *Trifolium arvense* dominated. The majority of species which formed the stand belonged to the diagnostic and characteristic taxa of the class *Artemisetea vulgaris* (*Ambrosia artemisiifolia*, *Artemisia vulgaris*, *Berteroa incana*, *Carduus acanthoides*, *Cichorium intybus*, *Daucus carota*, *Echium vulgare*, *Stenactis annua*). Species *Plantago lanceolata* occured here with relatively high cover-abundance values.

In the Synopsis of synanthropic vegetation of Slovakia (Jarolímek et al. 1997), *Trifolium arvense* community is not syntaxonomically classified so far. Based on species composition and locality conditions, the recorded stand from Bratislava belongs to the class *Artemisietea vulgaris*.

Relevé 11. Malé Karpaty Mts., Bratislava, Kramáre district, Pod Krásnou hôrkou street, abandoned area 260 m from the hospital, N 48°10'11.50", E 17°05'24.10", ± 5 m, altitude: 255 m, slope: 10°, aspect: SSE (148°), relevé area: 20.00 m², total cover: 80%, E_1: 80%, E_0: 0%, height of herb layer: 28 cm, soil type: sandy, 6.8.2012, A. Rendeková
E_1: *Trifolium arvense* 4, *Plantago lanceolata* a, *Stenactis annua* 1, *Achillea millefolium* agg. +, *Ambrosia artemisiifolia* +, *Berteroa incana* +, *Carduus acanthoides* +, *Cichorium intybus* +, *Daucus carota* +, *Echium vulgare* +, *Genista tinctoria* +, *Hypericum perforatum* +, *Lathyrus tuberosus* +, *Lotus corniculatus* +, *Medicago sativa* +, *Tanacetum vulgare* +, *Arrhenatherum elatius* r, *Artemisia vulgaris* r, *Chondrilla juncea* r, *Convolvulus arvensis* r, *Linaria genistifolia* r, *Potentilla reptans* r, *Tragopogon orientalis* r

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Abstrakt

V príspevku sa zaoberáme ruderálnymi rastlinnými spoločenstvami, o ktorých je zo Slovenska k dispozícii zatiaľ len veľmi málo fytocenologických údajov. Poskytujeme informácie o spoločenstve s *Aristolochia clematitis* [*Artemisietea vulgaris*], spoločenstve s *Geranium pusillum* [*Stellarietea mediae*], spoločenstve s *Poa bulbosa* [*Sisymbrion officinalis*], spoločenstve so *Saponaria officinalis* [*Convolvulo arvensis-Agropyrion repentis*] a spoločenstve s *Trifolium arvense* [*Artemisietea vulgaris*] a o ich druhovom zložení a výskyte na území mesta Bratislava.

Alena Rendeková: Málo známe ruderálne rastlinné spoločenstvá v Bratislave

OVERVIEW OF RUDERAL PLANT COMMUNITIES OF MALACKY CITY

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Abstract

The paper summarises the results of research on ruderal vegetation of Malacky city from the years 2014 and 2015. Phytoceonological tables and localities of relevés are presented. Twenty eight ruderal communities were recorded. They belonged to phytosociological classes *Polygono arenastri-Poetea annuae*, *Stellarietea mediae*, *Artemisietea vulgaris*, *Galio-Urticetea* and *Molinio-Arrhenatheretea*. Rare association *Asparago-Chondrilletum juncei*, association *Sambucetum ebuli* dominated by expansive species *Sambucus ebulus* and communities of invasive neophytes *Conyza canadensis*, *Helianthus* and *Solidago gigantea* were recorded in Malacky in 2014 and 2015. None of the above-mentioned ruderal communities occured in Malacky 50 years ago.

Key words: phytosociology, southwestern Slovakia, synanthropic vegetation, syntaxonomy

Introduction

Ruderal vegetation is formed by plant communities whose establishment and development depends on various human activities. Ruderal vegetation can be found in the vicinity of dwellings, roadsides, disturbed lands etc. It is very viable, heterogenous and dynamic type of vegetation (Jarolímek et al. 1997), which is of interest to many researchers. The publication Plant communities of Slovakia 2 (Jarolímek et al. 1997) provides synopsis of synanthropic vegetation for whole area of Slovakia. There are studies which refer about ruderal vegetation of some parts of Slovakia, e.g. Drienčanský kras (Jarolímek, Kliment 2000), Horná Orava region (Medvecká et al. 2009, 2010), Liptovská kotlina Basin (Hilbert 1981), north-eastern Slovakia (Jarolímek, Zaliberová 1995, Zaliberová, Jarolímek 1995) or some Slovak cities, e.g. Bratislava (Jarolímek 1983, Rendeková 2016), Trnava (Eliáš 1979). In the year 1972 vegetation of Malacky was elaborated by Krippelová, but there is no recent study of this type of vegetation from this area, which was the reason to carry out the recent survey and present its results in this paper.

Malacky city is located in the southwest of Slovak Republic, Central Europe. The city is situated 160 metres above sea level, in the area with warm, slightly humid climate, with mild winters. The character of the city is influenced by the impact of river Morava with its inflows Rudava and Malina. Phytogeographically the city belongs to the Pannonian area (Eupannonicum). There is a large spectrum of ruderal habitats in Malacky, such as the vicinity of various industrial parks, railway and highway etc. (Macejka, Marek 2009, Macejka 2015).

Material and Methods

For the synthesis 93 phytocoenological relevés of ruderal vegetation made by the author in 2014 and 2015 were used. The study area was defined by borders of Malacky city. The relevés were performed according to the methodology of Zürich-Montpellier school (Braun-Blanquet 1964). Modified Braun-Blanquet cover-abundance scale, extended by 2a, 2b and 2m values was used (Barkman et al. 1964).

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Relevés were stored in TURBOWIN, database programme for storing of phytosociological data (Hennekens, Schaminée 2001) and subsequently edited in JUICE programme (Tichý 2002).

Afterwards they were analysed using the numerical classification in the SYN-TAX 2000 programme (Podani 2001). Data were not transformed. According to the results of numerical analysis, data were classified into various phytosociological classes of ruderal vegetation. The classes *Stellarietea mediae* and *Artemisietea vulgaris*, which consisted of large number of relevés were subsequently analysed again using the same procedure. Outliers from communities recorded only by a one relevé, were excluded from the analysis. A beta-flexible method (β= -0.25) in combination with Ružička's coefficient and Group Average method in combination with Wishart's index proved to be the most effective linkage methods and distance measures and these parameters were used in most of the analyses. Resulsts of these analyses are shown in the dendrograms in the Fig. 1–2. Dendrograms were created in the SYN-TAX 2000 programme (Podani 2001). According to the results of numerical analyses and representation of diagnostic, characteristic and constant taxa, relevés were classified into various ruderal communities. Diagnostic, characteristic and constant taxa were determined according to publications of Jarolímek et al. (1997) and Jarolímek, Šibík (2008).

Phytocoenological tables (Tabs. 1–5) were created in JUICE programme (Tichý 2002). Relevés in columns in the tables are sorted according to the results of numerical classification. In the case of syntaxa recorded by more than four relevés, total values of frequency of taxa (%) are listed in the last column of each syntaxon. Cover-abundance values 2a and 2b are given in abbreviated forms (a, b). Taxa are arranged by the affiliation to phytocoenological units and by the decreasing frequency. Taxa found only in one relevé are presented below the tables. Behind the each taxon listed here, we present number in bracket, which represents number of relevés in which taxon was recorded. Number or sign behind the bracket indicates its cover-abundance value. Localities and other data of relevés are listed below each table too.

Nomenclature of syntaxa follows the publication of Jarolímek, Šibík (2008). Scientific names of taxa follow Marhold, Hindák (1998), except the taxon *Rubus fruticosus* agg., which is presented in the work of Kubát (2010).

Results and Discussion

Results of the numerical classification

Class *Stellarietea mediae*

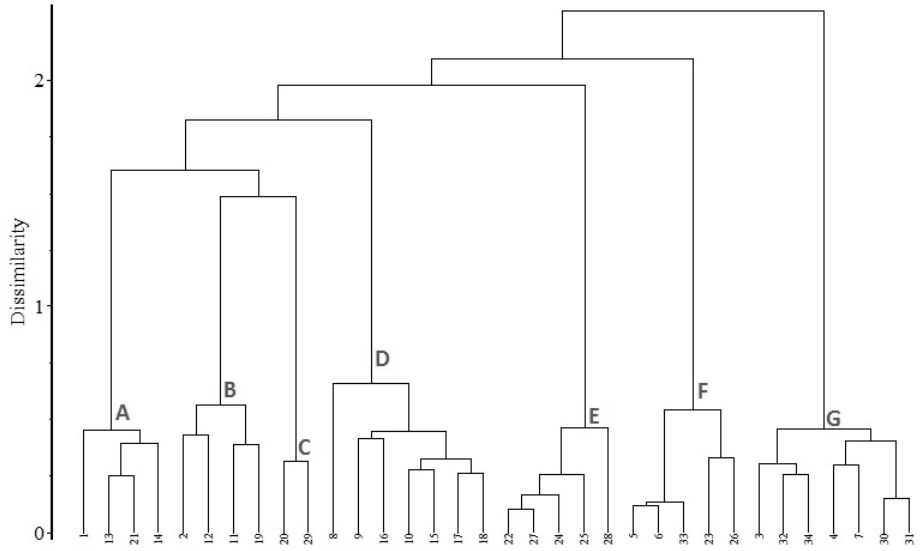

Fig. 1. Dendrogram of the numerical classification of the ruderal communities of the class *Stellarietea mediae* in Malacky. The ß-flexible method (ß = -0,25) and Ružička's coefficient were used. Explanation: A – association Linario vulgaris-Brometum tectorum, B – Geranium pusillum community [Stellarietea mediae], C – association *Hordeetum murini*, D – association *Brometum sterilis*, E – association *Lolio-Cynodontetum dactyli*, F – association *Polygono-Portulacetum oleraceae*, G – *Conyza canadensis* community [*Stellarietea mediae*]

Results of the numerical classification analysis of the relevés from the class *Stellarietea mediae* are shown in the dendrogram in the Fig. 1.

In the dendrogram, cluster G is separated at the highest level of dissimilarity. Cluster G comprises relevés of the *Conyza canadensis* community. Relevés of the cluter G differ from the relevés of the other clusters in higher frequency of occurrence of species *Galinsoga parviflora*, *Lactuca serriola*, *Plantago major*, *Setaria pumila*, *Trifolium repens* and diagnostic and characteristic species of the class *Artemisietea vulgaris* and its syntaxa (*Ambrosia artemisiifolia*, *Artemisia vulgaris*, *Stenactis annua*, *Tanacetum vulgare*) (Tab. 2), which could cause separation of the cluster G.

In the dendrogram, cluster F is separated at the lower level of dissimilarity than cluster G, but it is separated at the hihger level of dissimilarity than other clusters. Cluster F consists of the relevés of the association *Polygono-Portulacetum oleraceae*. In the relevés belonging to the cluster F, species *Polygonum arenastrum* reaches the hundred per cent frequency. In the relevés belonging to the majority of other clusters, this species is represented only rarely and with lower cover-abundance values than in the relevés of the cluster F. In the relevés of the cluster F, diagnostic, characteristic and constant taxa of the order *Eragrostietalia* (*Echinochloa crus-galli* and *Eragrostis minor*) are represented. These species occur only rarely in the relevés of the majority of the other clusters (Tab. 2).

In the dendrogram, cluster F is separated at the lower level of dissimilarity than cluster G, but it is separated at the hihger level of dissimilarity than other clusters. Cluster F consists of the relevés of the association *Polygono-Portulacetum oleraceae*. In the relevés belonging to the cluster F, species *Polygonum arenastrum* reaches the hundred per cent frequency. In the relevés belonging to the majority of other clusters, this species is represented only rarely and with lower cover-abundance values than in the relevés of the cluster F. In the relevés of the cluster F, diagnostic, characteristic and constant taxa of the order *Eragrostietalia* (*Echinochloa crus-galli* and *Eragrostis minor*) are represented. These species occur only rarely in the relevés of the majority of the other clusters (Tab. 2).

In the dendrogram, cluster E is separated at the lower level of dissimilarity than cluster F, but it is separated at the higher level of dissimilarity than other clusters. Relevés of the association *Lolio-Cynodontetum dactyli* belong to the cluster E. Diagnotic, characteristic and constant taxa of the alliance *Sisymbrion officinalis* (*Capsella bursa-pastoris*, *Bromus sterilis*, *Hordeum murinum*, *Lactuca serriola*) reach lower frequency of the occurence in relevés of the cluster E than in the relevés of the clusters A, B, C and D. Frequency of occurrence of some taxa of the class *Molinio-Arrhenatheretea* (e.g. *Achillea millefolium* agg. and *Lolium perenne*) is higher in the relevés of the cluster E than in the relevés of the other clusters (Tab. 2). These facts cloud cause the separation of the cluster E.

At the lower level of dissimilarity than clusters E, F, G, clusters A, B, C and D are separated. In the relevés of the clusters A, B, C and D, diagnotic, characteristic and constant taxa of the alliance *Sisymbrion officinalis* (*Capsella bursa-pastoris*, *Bromus sterilis* and *Hordeum murinum*) are represented with higher frequency and cover-abundance values than in the relevés of the clusters E, F and G (Tab. 2).

Cluster D is separated at the higher level of the dissimilarity than clusters A, B and C. It includes relevés of the association *Brometum sterilis*. Relevés of the cluster D comprise species *Alliaria petiolata*, *Dactylis glomerata*, *Galium aparine* and *Veronica sublobata*, which are not presented in the relevés belonging to the clusters A, B and C (Tab. 2). This is a probable reason of the separation of the cluster D.

At the lower level of dissimilarity than clusters D, E, F, and G, clusters A, B, and C are separated. Grouping of these clusters is by the syntaxonomic classification of the relevés to the associations and communities. Cluster A comprises relevés of the association *Linario vulgaris-Brometum tectorum*, cluster B comprises relevés of the *Geranium pusillum* community and cluster C includes relevés of the association *Hordeetum murini*.

Class *Artemisietea vulgaris*

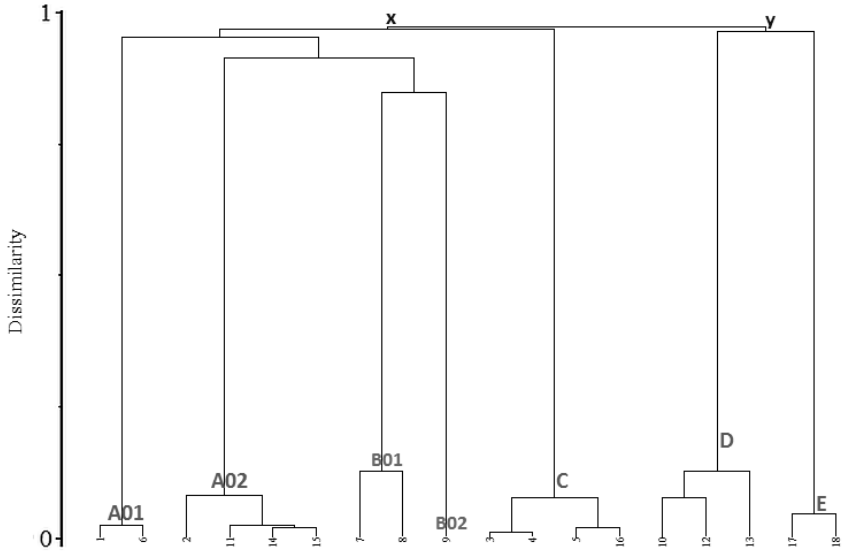

Fig. 2. Dendrogram of the numerical classification of the ruderal communities of the class *Artemisietea vulgaris* in Malacky. The Group Average method and Wishart's index were used. Explanation: x – alliance *Dauco-Melilotion*, y – alliance *Convolvulo arvensis-Agropyrion repentis*, A01 – association *Tanaceto-Artemisietum vulgaris*, relevés dominated by *Artemisia vulgaris*, A02 – association *Tanaceto-Artemisietum vulgaris*, relevés dominated by *Tanacetum vulgare*, B01 – association *Echio-Melilotetum*, relevés dominated by *Echium vulgare*, B02 – association *Echio-Melilotetum*, relevé dominated by *Melilotus officinalis*, C – association *Odontito-Ambrosietum artemisiifoliae*, D – association *Falcario vulgaris-Agropyretum repentis*, E – *Saponaria officinalis* community [*Convolvulo arvensis-Agropyrion repentis*]

Dendrogram in the Fig. 2 shows the results of the numerical classifications analysis of the relevés from the class *Artemisietea vulgaris*.

Two main groups, (x and y), are distinguished in the dendrogram in the Fig. 2 at the highest level of dissimilarity. Group x consists of the relevés from the alliance *Dauco-Melilotion*, group y consists of the relevés from the alliance *Convolvulo arvensis-Agropyrion repentis*. Characteristic species of the alliance *Dauco-Melilotion* (*Ambrosia artemisiifolia*, *Daucus carota*, *Melilotus officinalis* and *Stenactis annua*) and diagnostic and characteristic species of the class *Stellarietea mediae* and its syntaxa (*Conyza canadensis*, *Lactuca serriola* and *Setaria pumila*) are more frequent in the relevés belonging to the group x than in the relevés of the group y. In the relevés belonging to the group y, diagnostic and characteristic species of the alliance *Convolvulo arvensis-Agropyrion repentis* (*Elytrigia repens* and *Falcaria vulgaris*) are more frequent (Tab. 3).

Five smaller clusters (A01, A02, B01, B02, C), are distinguished within the group x. Cluster C is separated at the higher of dissimilarity than other clusters. Clusters A01, A02, B01, B02 are separated at the lower level of dissimilarity. Cluster C includes relevés of the association *Odontito-Ambrosietum artemisiifoliae*. In the relevés belonging to the cluster C, species *Polygonum arenastrum*, *Chenopodium strictum* and *Setaria pumila* are represented quite frequently. These species are represented only with a low frequency or they are not represented at all in the relevés of the other clusters. Frequency of the occurrence of diagnostic and constant taxa of the class *Molinio-Arrhenatheretea* and its syntaxa (*Achillea millefolium* agg., *Arrhenatherum elatius*, *Dactylis glomerata*, *Lolium perenne*, *Plantago lanceolata*, *Plantago major*, *Taraxacum* sect. *Ruderalia*, *Trifolium pratense*) in the relevés of the cluster C is lower than in the relevés of the other clusters (Tab. 3). These facts could cause the separation of the cluster C.

Cluster A01 comprises relevés of the association *Tanaceto-Artemisietum vulgaris* dominated by species *Artemisia vulgaris*, cluster A02 comprises relevés of the association *Tanaceto-Artemisietum vulgaris* dominated by species *Tanacetum vulgare*. Relevés of clusters A01 and A02 differ not only in dominance of species, but also in the representation of the other species. Relevés of the cluster A02 miss species *Ballota nigra*, which is represented in the relevés of the cluster A01. Species *Calamagrostis epigejos* and *Cirsium arvense* occur in the relevés of the cluster A02, although they do not occur in the relevés of the cluster A01 (Tab. 3).

Relevés of the association *Echio-Melilotetum* dominated by species *Echium vulgare* belong to the cluster B01, relevé of the association *Echio-Melilotetum* dominated by *Melilotus officinalis* belongs to the cluster B02.

Group y consist of the clusters D and E. Cluster D includes relevés of the association *Falcario vulgaris-Agropyretum repentis*, cluster E includes relevés of the *Saponaria officinalis* community [*Convolvulo arvensis-Agropyrion repentis*].

The list of recorded ruderal communities and their classification within higher syntaxa:

Class *Polygono arenastri-Poetea annuae* Rivas-Martínez 1975 corr. Rivas-Martínez et al. 1991
- Order *Polygono arenastri-Poetalia annuae* R. Tx. in Géhu et al. 1972 corr. Rivas-Martínez et al. 1991
  - Alliance *Matricario matricarioidis-Polygonion arenastri* Rivas-Martínez 1975 corr. Rivas-Martínez et al. 1991
    - Association *Matricario-Polygonetum arenastri* T. Müller in Oberd. 1971
    - Association *Poetum annuae* Felföldy1942

Class *Stellarietea mediae* R. Tx. et al. ex von Rochow 1951
- Order *Sisymbrietalia* J. Tx. in Lohmeyer et al. 1962
  - Alliance *Sisymbrion officinalis* R. Tx. et al. in R. Tx. 1950
    - Association *Brometum sterilis* Görs 1966
    - Association *Hordeetum murini* Libbert 1933
    - Association *Linario vulgaris-Brometum tectorum* Knapp 1961
- Order *Eragrostietalia* J. Tx. ex Poli 1966
  - Alliance *Eragrostio-Polygonion arenastri* Couderc et Izco ex Čarni et Mucina 1997
    - Association *Lolio-Cynodontetum dactyli* Jarolímek et al. 1997
    - Association *Polygono-Portulacetum oleraceae* Eliáš 1986

Not more closely classified communities of the class *Stellarietea mediae*:
- *Conyza canadensis* community [*Stellarietea mediae*]
- *Geranium pusillum* community [*Stellarietea mediae*]

Class *Artemisietea vulgaris* Lohmeyer et al. ex von Rochow 1951
- Order *Onopordetalia* Br.-Bl. et R. Tx. ex Klika et Hadač 1944
  - Alliance *Dauco-Melilotion* Görs 1966
    - Association *Berteroetum incanae* Sissingh et Tideman in Sissingh 1950
    - Association *Echio-Melilotetum* R. Tx. 1947
    - Association *Odontito-Ambrosietum artemisiifoliae* Jarolímek et al. 1997
    - Association *Tanaceto-Artemisietum vulgaris* Sissingh 1950
    - *Stenactis annua* community [*Dauco-Melilotion*]
    - *Pastinaca sativa* community [*Dauco-Melilotion*]
- Order *Agropyretalia repentis* Oberd. Et al. 1967
  - Alliance *Convolvulo arvensis-Agropyrion repentis* Görs 1966
    - Association *Asparago-Chondrilletum juncei* Passarge 1978
    - Association *Falcario vulgaris-Agropyretum repentis* Th. Müller et Görs 1969 *Saponaria officinalis* community [*Convolvulo arvensis-Agropyrion repentis*]

Not more closely classified communities of the class *Artemisietea vulgaris*:
- *Calamagrostis epigejos* community [*Artemisietea vulgaris*]
- *Cirsium arvense* community [*Artemisietea vulgaris*]
- *Solidago gigantea* community [*Artemisietea vulgaris*]
- *Trifolium arvense* community [*Artemisietea vulgaris*]

Class *Galio-Urticetea* Passarge ex Kopecký 1969
- Order *Lamio albi-Chenopodietalia boni-henrici* Kopecký 1969
  - Alliance *Galio-Alliarion* (Oberd. 1957) Lohmeyer et Oberd. in Oberd. et al. 1967
    - Association *Geo urbani-Chelidonietum maji* Jarolímek et al. 1997
    - Association *Sambucetum ebuli* Felföldy 1942
    - Association *Veronico sublobatae-Alliarietum petiolatae* Jarolímek et al. 1997

Order *Convolvuletalia sepium* R. Tx. 1950
Alliance *Senecionion fluviatilis* R. Tx. 1950
Helianthus tuberosus community [*Senecionion fluviatilis*]
Solidago gigantea community [*Senecionion fluviatilis*]

Class *Molinio-Arrhenatheretea* R. Tx. 1937
Order *Arrhenatheretalia* R. Tx. 1931
Alliance *Cynosurion cristati* R.Tx. 1947
Association *Lolietum perennis* Gams 1927

Ruderal vegetation of Malacky in the years 2014–2015 constituted of 17 ruderal associations and 11 ruderal communities, which belonged to the five phytosociological classes: *Polygono arenastri-Poetea annuae*, *Stellarietea mediae*, *Artemisietea vulgaris*, *Galio-Urticetea* and *Molinio-Arrhenatheretea* (Tabs. 1–5).

Tab. 1. Relevés of communities of the class *Polygono arenastri-Poetea annuae* from Malacky (2014–2015)

A – Association *Matricario-Polygonetum arenastri*, B – Association *Poetum annuae*

Community	**A**																	F	**B**
Relevé no.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	(%)	**18**
E_1:																			
Dominant taxa of communities of class *Polygono arenastri-Poetea annuae*																			
Polygonum arenastrum *	5	4	4	5	4	4	5	5	5	4	5	5	4	4	4	4	4	100	1
Poa annua *	.	.	r	.	.	+	.	.	.	.	.	.	.	.	.	.	.	12	4
Diagnostic, characteristic, constant taxa of class *Polygono arenastri-Poetea annuae*																			
Plantago major	+	a	a	a	+	a	+	+	.	+	.	+	+	1	.	.	+	76	a
Lolium perenne	1	1	+	+	.	+	1	+	1	+	.	+	.	.	.	+	+	71	.
Diagnostic, characteristic, constant taxa of class *Molinio-Arrhenatheretea*																			
Plantago lanceolata	a	+	.	1	1	+	+	+	a	r	1	a	+	+	b	1	1	94	r
Achillea millefolium agg.	+	r	.	+	.	.	+	1	1	+	+	.	+	+	+	+	+	76	.
Taraxacum sect. *Ruderalia*	.	+	.	1	+	r	a	r	.	+	+	.	+	.	.	.	.	53	.
Trifolium repens	.	.	.	.	+	+	1	.	+	.	.	.	+	.	.	1	+	41	1
Trifolium pratense	.	r	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	18	.
Plantago media	.	.	r	.	.	.	.	.	.	.	.	.	.	.	.	.	.	6	a
Other taxa																			
Conyza canadensis	r	.	r	.	+	r	+	1	1	+	+	+	+	.	+	+	+	82	.
Portulaca oleracea	.	.	.	.	r	.	r	r	.	r	.	r	r	.	+	.	r	47	.
Ambrosia artemisiifolia	+	.	1	.	+	.	.	.	.	.	+	.	+	.	.	r	.	35	.
Capsella bursa-pastoris	.	1	.	.	.	r	.	.	+	.	.	.	.	.	.	.	.	18	1
Cynodon dactylon	.	r	.	r	.	.	.	.	.	r	.	.	.	.	.	.	r	24	.
Digitaria sanguinalis	.	.	.	.	r	.	r	+	.	.	.	.	.	.	r	.	.	24	.
Lactuca serriola	.	.	.	.	.	.	.	.	+	.	+	r	.	.	.	r	.	24	.
Berteroa incana	.	.	.	.	.	.	.	.	.	.	+	+	r	.	r	.	.	24	.
Eragrostis minor	1	.	.	.	r	.	.	.	.	.	.	.	.	.	.	.	+	18	.
Erodium cicutarium	+	.	.	.	+	.	.	.	.	.	.	.	.	.	+	.	.	18	.
Artemisia vulgaris	.	.	.	.	.	.	.	.	.	+	r	r	.	.	.	.	.	18	.
Trifolium arvense	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	r	.	12	.
Senecio vulgaris	.	.	.	.	+	.	.	.	.	r	.	.	.	.	.	.	.	12	.
Convolvulus arvensis	.	.	.	.	.	r	.	.	.	.	.	.	.	r	.	.	.	12	.

Explanation: * – taxon also belongs to diagnostic taxa of class *Polygono arenastri-Poetea annuae*

Taxa found only in one relevé: E_1: *Ballota nigra* (8): r; *Bassia scoparia* (8): r; *Galinsoga parviflora* (5): r; *Lotus corniculatus* (13): r; *Matricaria discoidea* (2): +; *Medicago lupulina* (17): r; *Parthenocissus quinquefolia* (3): r; *Stenactis annua* (1): r

Localities and the other information of relevés from Tab. 1:

Association *Matricario-Polygonetum arenastri*:

Relevé 1. Borská nížina Lowland, Malacky, Pezinská street, edge of road, N 48°25'49.20", E 17°01'47.80", ± 6 m, altitude: 166 m, slope: 0°, relevé area: 10.00 m², total cover: 96%, E_1: 96%, E_0: 0%, height of herb layer: 10 cm, soil type: loamy + admixture of sand and gravel, 28.8.2014, A. Rendeková

Relevé 2. Borská nížina Lowland, Malacky, 100 m from Partizánska street, abandoned area near the parking lot, N 48°26'12.60", E 17°01'25.20", ± 6 m, altitude: 160 m, slope: 0°, relevé area: 6.00 m², total cover: 80%, E_1: 80%, E_0: 0%, height of herb layer: 10 cm, soil type: loamy + admixture of sand and gravel, 16.7.2015, A. Rendeková

Relevé 3. Borská nížina Lowland, Malacky, Továrenská street, 46 m from the building of construction company Krystav, edge of road, N 48°25'43.10", E 17°01'23.20", ± 12 m, altitude: 169 m, slope: 0°, relevé area: 4.00 m², total cover: 80%, E_1: 80%, E_0: 0%, height of herb layer: 2–4 cm, soil type: loamy + admixture of sand and gravel, 6.8.2015, A. Rendeková

Relevé 4. Borská nížina Lowland, Malacky, Gen. M. R. Štefánika street, 20 m form the house no. 42, edge of road, N 48°25'47.90", E 17°01'11.60", ± 10 m, altitude: 160 m, slope: 0°, relevé area: 4.00 m², total cover: 98%, E_1: 98%, E_0: 0%, height of herb layer: 4–10 cm, soil type: sandy + admixture of gravel, 28.7.2015, A. Rendeková

Relevé 5. Borská nížina Lowland, Malacky, Nádražná street, abandoned area next to the house fence, N 48°25'51.60", E 17°01'11.20", ± 6 m, altitude: 165 m, slope: 0°, relevé area: 6.00 m², total cover: 80%, E_1: 80%, E_0: 0%, height of herb layer: 2–10–20 cm, soil type: loamy + admixture of sand and gravel, 2.9.2015, A. Rendeková

Relevé 6. Borská nížina Lowland, Malacky, Dielenská street, 40 m from the house no. 10, edge of road, N 48°25'40.20", E 17°01'22.60", ± 20 m, altitude: 162 m, slope: 0°, relevé area: 3.00 m², total cover: 80%, E_1: 80%, E_0: 0%, height of herb layer: 10–20 cm, soil type: loamy + admixture of sand, 20.8.2015, A. Rendeková

Relevé 7. Borská nížina Lowland, Malacky, Štefana Čulena street, 10 m from the house no. 19, edge of pavement, N 48°25'56.20", E 17°01'17.10", ± 8 m, altitude: 166 m, slope: 0°, relevé area: 4.00 m², total cover: 98%, E_1: 98%, E_0: 0%, height of herb layer: 10–20 cm, soil type: loamy + admixture of sand and gravel, 26.7.2015, A. Rendeková

Relevé 8. Borská nížina Lowland, Malacky, Jilemnického streer, 100 m from the bus station, edge of road, N 48°26'01.40", E 17°01'17.10", ± 20 m, altitude: 166 m, slope: 0°, relevé area: 8.00 m², total cover: 90%, E_1: 90%, E_0: 0%, height of herb layer: 10–20 cm, soil type: sandy + admixture of gravel, 26.7.2015, A. Rendeková

Relevé 9. Borská nížina Lowland, Malacky, 400 m from the street Jánošíkova, 300 m from the street Pri Maline, area of the beaten path, N 48°25'41.40", E 17°00'53.10", ± 8 m, altitude: 164 m, slope: 0°, relevé area: 6.00 m², total cover: 100%, E_1: 100%, E_0: 0%, height of herb layer: 10–20 cm, soil type: sandy, 30.8.2015, A. Rendeková

Relevé 10. Borská nížina Lowland, Malacky, Jánošíkova street, edge of road, N 48°25'44.20", E 17°00'53.40", ± 8 m, altitude: 162 m, slope: 0°, relevé area: 4.00 m², total cover: 80%, E_1: 80%, E_0: 0%, height of herb layer: 2–10– 20 cm, soil type: sandy + admixture of gravel, 6.9.2015, A. Rendeková

Relevé 11. Borská nížina Lowland, Malacky, 160 m from the Ľ. Fullu street, trampled area near the houses, N 48°25'33.30", E 17°00'55.70", ± 8 m, altitude: 166 m, slope: 0°, relevé area: 6.00 m², total cover: 85%, E_1: 85%, E_0: 0%, height of herb layer: 10–20 cm, soil type: sandy, 6.9.2015, A. Rendeková

Relevé 12. Borská nížina Lowland, Malacky, Štúrova street, 20 m from the Malina stream, edge of road, N 48°25'26.70", E 17°00'50.70", ± 6 m, altitude: 165 m, slope: 0°, relevé area: 10.00 m², total cover: 100%, E_1: 100%, E_0: 0%, height of herb layer: 10–20 cm, soil type: sandy, 26.8.2015, A. Rendeková

Relevé 13. Borská nížina Lowland, Malacky, L. Novomeského street, edge of pavement, N 48°25'41.40", E 17°01'04.50", ± 10 m, altitude: 160 m, slope: 0°, relevé area: 4.00 m², total cover: 80%, E_1: 80%, E_0: 0%, height of herb layer: 4–10 cm, soil type: sandy + admixture of gravel, 26.8.2015, A. Rendeková

Relevé 14. Borská nížina Lowland, Malacky, Ľudovíta Zúbka street, 10 m from the house no. 4, edge of pavement, N 48°26'04.80", E 17°01'18.50", ± 8 m, altitude: 165 m, slope: 0°, relevé area: 4.00 m², total cover: 80%, E_1: 80%, E_0: 0%, height of herb layer: 10–20 cm, soil type: loamy + admixture of sand and gravel, 24.8.2015, A. Rendeková

Relevé 15. Borská nížina Lowland, Malacky, 60 m from the railway station, egde of railway track, N 48°27'44.60", E 17°02'22.60", ± 18 m, altitude: 166 m, slope: 0°, relevé area: 4.00 m², total cover: 80%, E_1: 80%, E_0: 0%, height of herb layer: 10–20 cm, soil type: sandy + admixture of gravel, 30.8.2015, A. Rendeková

Relevé 16. Borská nížina Lowland, Malacky, Ota Kožucha street, 10 m from the parking lot, N 48°25'40.00", E 17°01'44.60", ± 18 m, altitude: 166 m, slope: 0°, relevé area: 3.00 m², total cover: 80%, E_1: 80%, E_0: 0%, height of herb layer: 10–20 cm, soil type: loamy + admixture of gravel, 20.7.2014, A. Rendeková

Relevé 17. Borská nížina Lowland, Malacky, end of town in direction to Senica, 200 m from Oslobodenia street, abandoned area 20 m from the dump, N 48°26'48.00", E 17°01'28.40", ± 20 m, altitude: 158 m, slope: 0°, relevé area: 3.00 m², total cover: 80%, E_1: 80%, E_0: 0%, height of herb layer: 10–20 cm, soil type: loamy + admixture of sand, 2.8.2014, A. Rendeková

Association *Poetum annuae*:

Relevé 18. Borská nížina Lowland, Malacky, Dielenská street, 6 m from the house no. 10, edge of road, N 48°25'52.10", E 17°01'27.10", ± 6 m, altitude: 162 m, slope: 0°, relevé area: 2.00 m², total cover: 80%, E_1: 80%, E_0: 0%, height of herb layer: 10–20 cm, soil type: loamy, 2.8.2015, A. Rendeková

Tab. 2. Relevés of communities of the class *Stellarietea mediae* from Malacky (2014 – 2015)

A – Association *Linario vulgaris-Brometum tectorum*, B – *Geranium pusillum* community [*Stellarietea mediae*], C – Association *Hordeetum murini* , D – Association *Brometum sterilis*, E – Association *Lolio-Cynodontetum dactyli*, F – Association *Polygono-Portulacetum oleraceae*, G – *Conyza canadensis* community [*Stellarietea mediae*]

Community	A				B				C		D							F	E					F	F						F	G							F
Relevé no.	1	13	21	14	2	12	11	19	20	29	8	9	16	10	15	17	18	%	22	27	24	25	28	%	5	6	33	23	26	%	3	32	34	4	7	30	31	%
E_1:																																						
Dominant taxa of communities of class *Stellarietea mediae*																																						
Bromus tectorum	5	5	5	5	.	.	.	.	1	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	r	.	20	.	.	.	.	.	.	.	.
Geranium pusillum	.	.	.	.	5	5	4	4	.	.	.	1	.	1	.	.	.	29	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Hordeum murinum *	.	1	.	r	r	a	+	.	5	4	.	+	.	.	.	.	.	14	.	r	r	.	.	40	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Bromus sterilis *	+	.	.	r	r	r	+	+	+	+	5	5	5	5	5	5	5	100	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Cynodon dactylon *	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5	5	5	5	4	100	.	.	r	.	.	20	.	+	.	.	.	.	.	14
Portulaca oleracea *	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	+	.	+	60	4	4	4	4	5	100	.	+	+	+	+	+	1	86
Conyza canadensis *	.	.	.	.	.	.	.	.	r	1	.	.	.	.	.	.	.	.	+	+	r	1	a	100	1	1	1	+	+	100	4	4	4	4	4	4	4	100
Diagnostic, characteristic, constant taxa of class *Stellarietea mediae*																																						
Capsella bursa-pastoris	a	1	+	1	+	b	a	a	.	r	.	a	b	a	a	+	+	86	.	.	.	.	.	.	.	.	.	r	.	20	.	r	.	.	.	.	.	14
Lactuca serriola	1	.	.	.	.	.	+	.	+	+	.	b	.	.	.	.	.	14	.	.	.	+	.	20	.	.	.	r	+	40	a	a	1	1	+	.	r	86
Senecio vulgaris	+	.	+	+	.	.	.	.	.	.	.	.	.	.	.	.	r	14	.	.	.	.	+	20	.	.	+	+	.	40	.	+	.	+	.	+	+	57
Stellaria media	.	.	.	1	3	+	+	.	.	r	3	.	.	1	1	+	1	71	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Vicia angustifolia	.	r	r	.	.	.	.	.	r	+	+	.	+	.	+	+	a	71	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Vicia hirsuta	.	.	a	3	.	.	b	.	.	+	.	+	+	.	.	.	1	43	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Lamium purpureum	.	.	.	.	.	.	r	1	.	.	b	a	.	+	+	a	.	71	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Setaria pumila	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	r	+	.	.	+	60	1	.	r	+	+	.	.	57
Amaranthus retroflexus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	r	.	r	1	60	.	.	+	+	r	.	.	43
Digitaria sanguinalis	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	40	.	.	+	+	.	+	r	57
Viola arvensis	+	.	.	.	.	.	r	+	.	.	+	+	.	.	.	.	.	29	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Eragrostis minor	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	.	.	40	.	.	.	+	+	.	+	43
Echinochloa crus-galli	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	r	20	.	+	+	.	.	40	.	.	.	+	.	.	.	14
Galinsoga parviflora	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	20	.	.	.	+	.	r	+	43
Sonchus oleraceus	+	.	.	.	r	.	.	.	.	.	.	.	.	.	.	.	r	14	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Veronica persica	.	+	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Viola tricolor	.	.	r	r	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Descurainia sophia	.	.	.	.	.	.	.	.	+	r	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Diagnostic, characteristic, constant taxa of class *Artemisietea vulgaris*																																						
Convolvulus arvensis	1	.	.	.	.	+	.	.	.	.	+	.	+	+	.	.	+	57	+	r	a	.	.	60	.	.	.	.	.	.	.	.	.	+	.	.	r	29
Artemisia vulgaris	r	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	14	.	.	.	.	r	20	.	.	r	.	.	20	+	+	+	.	+	.	.	57
Stenactis annua	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	r	+	1	+	.	.	71
Ballota nigra	.	.	.	.	r	.	.	.	.	.	+	.	.	.	.	.	+	29	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	r	r	29
Tanacetum vulgare	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	14	.	.	.	.	.	.	.	.	.	.	.	.	r	r	+	.	+	.	.	57
Ambrosia artemisiifolia	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	r	20	a	.	1	r	.	.	+	57
Echium vulgare	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	r	.	20	.	.	.	.	.	.	1	+	r	.	.	.	.	43
Reseda lutea	r	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	1	.	.	29
Medicago sativa	.	.	.	.	.	r	.	.	.	.	.	.	.	.	a	.	.	14	.	.	r	.	.	20	.	.	.	.	.	.	.	.	.	.	.	.	.	.

Community	A				B				C		D							F	E					F	F	F							G							F
Relevé no.	1	13	21	14	2	12	11	19	20	29	8	9	16	10	15	17	18	%	22	27	24	25	28	%	5	6	33	23	26	%	3	32	34	4	7	30	31	%
Elytrigia repens	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	14
Silene latifolia subsp. *alba*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	r	.	.	.	29
Medicago lupulina	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	29
Diagnostic, characteristic, constant taxa of class *Galio-Urticetea*																																						
Urtica dioica	r	.	.	.	.	.	.	.	.	.	.	r	.	+	+	.	.	43	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Chelidonium majus	.	r	.	.	.	.	.	.	.	.	.	r	.	.	.	r	.	29	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Glechoma hederacea	.	.	r	.	.	.	.	r	.	.	.	.	a	.	.	.	.	14	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Alliaria petiolata	.	.	.	.	.	.	.	.	.	.	r	.	.	r	.	.	r	43	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Galium aparine	.	.	.	.	.	.	.	.	.	.	.	r	.	.	r	+	.	43	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Veronica sublobata	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	+	+	43	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Veronica hederifolia	.	r	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Rubus caesius	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	r	14	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	14
Diagnostic, characteristic, constant taxa of classes *Polygono arenastri-Poetea annuae* and *Molinio-Arrhenatheretea*																																						
Plantago lanceolata	.	1	+	+	.	+	.	b	.	1	b	.	+	.	.	.	+	43	1	1	+	+	1	100	+	.	+	.	.	40	1	1	+	1	1	+	1	100
Achillea millefolium agg.	.	.	.	.	.	+	.	+	.	.	1	.	r	.	+	.	.	43	+	1	r	r	+	100	+	+	+	.	.	60	+	+	+	+	+	.	.	71
Taraxacum sect. *Ruderalia*	.	+	1	r	1	+	+	+	.	.	+	+	1	+	+	.	+	86	1	+	.	.	+	60	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Polygonum arenastrum	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	+	.	.	+	40	b	b	b	+	+	100	+	1	1	+	+	1	1	100
Lolium perenne	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	+	+	+	1	100	+	.	+	+	.	60	+	+	+	+	+	.	.	71
Trifolium repens	.	.	.	.	+	.	+	+	.	.	.	.	r	.	.	.	.	14	r	.	.	.	.	20	.	.	.	.	.	.	+	r	+	+	+	.	+	86
Plantago major	.	.	.	.	.	.	.	r	.	.	.	.	.	.	.	.	.	.	.	+	.	.	r	40	.	.	.	.	.	.	.	.	.	+	+	+	+	57
Poa annua	.	.	.	.	.	r	+	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Dactylis glomerata	.	.	.	.	.	.	.	.	.	.	1	.	+	.	.	.	.	29	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	14
Trifolium pratense	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	r	.	.	.	+	.	.	29
Lotus corniculatus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	r	.	r	.	.	.	29
Other taxa																																						
Erodium cicutarium	1	.	.	+	.	.	r	.	.	.	.	+	+	.	.	.	.	29	.	.	.	+	.	20	.	.	.	.	.	.	.	.	.	.	.	.	+	14
Geranium pyrenaicum	r	.	.	.	+	.	.	.	r	.	b	.	.	.	b	a	a	57	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Bromus hordeaceus	.	.	+	.	.	.	+	.	+	+	.	.	.	.	.	.	+	14	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Poa angustifolia	.	+	.	.	.	.	.	.	.	.	.	.	+	.	.	+	.	29	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Petrorhagia prolifera	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	r	.	20	.	.	.	.	.	.	+	.	r	.	.	.	.	29
Portulaca grandiflora	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	20	.	.	.	.	r	.	.	14
Parthenocissus quinquefolia	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	20	.	.	r	.	.	.	.	14
Trifolium arvense	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	1	.	.	.	.	29
Negundo aceroides (juv.)	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	r	.	r	.	.	.	29

Explanation: * – taxon also belongs to diagnostic, characteristic, constant taxa of class *Stellarietea mediae* and its syntaxa

Taxa found only in one relevé:

E_1: *Anchusa officinalis* (26): r; *Arrhenatherum elatius* (1): +; *Bassia scoparia* (30): r; *Bellis perennis* (16): r; *Berteroa incana* (3): +; *Lithospermum arvense* (1): a; *Carduus acanthoides* (7): r; *Chenopodium album* (26): r; *Chenopodium hybridum* (7): 1; *Chenopodium polyspermum* (7): +; *Chenopodium strictum* (34): r; *Chondrilla juncea* (3): r; *Commelina communis* (5): r; *Epilobium collinum* (7): r; *Fallopia dumetorum* (7): +; *Geranium robertianum* (23): r; *Medicago falcata* (3): +; *Mercurialis annua* (4): +; *Ornithogalum umbellatum* (8): r; *Panicum miliaceum* (4): +; *Papaver rhoeas* (1): +; *Petrorhagia saxifraga* (25): r; *Poa pratensis* (10): +; *Populus alba* (juv.) (7): r; *Rosa canina* agg. (juv.) (13): r; *Solanum nigrum* (26): r; *Sonchus arvensis* (8): r; *Syringa vulgaris* (juv.) (13): r; *Valerianella locusta* (16): r; *Viola* ×*wittrockiana* (21): r

E_0: *Brachythecium salebrosum* (25): a

Localities and the other information of relevés from Tab. 2:

Association *Linario vulgaris-Brometum tectorum*:

Relevé 1. Borská nížina Lowland, Malacky, Dielenská street, 40 m from the Pezinská street, edge of road, N 48°26'01.40", E 17°01'25.10", ± 8 m, altitude: 162 m, slope: 0°, relevé area: 12.00 m², total cover: 90%, E_1: 90%, E_0: 0%, height of herb layer: 40–80 cm, soil type: loamy + admixture of sand, 16.5.2015, A. Rendeková

Relevé 13. Borská nížina Lowland, Malacky, Hurbanova street, 10 m from the house no. 54, edge of road, N 48°26'36.40", E 17°01'48.60", ± 6 m, altitude: 158 m, slope: 0°, relevé area: 6.00 m², total cover: 98%, E_1: 98%, E_0: 0%, height of herb layer: 40 cm, soil type: loamy, 28.4.2015, A. Rendeková

Relevé 21. Borská nížina Lowland, Malacky, 200 m from the Pezinská street, 20 m from the house no. 15, pile of loam and gravel, N 48°25'57.20", E 17°01'59.40", ± 8 m, altitude: 168 m, slope: 40°, aspect: –, relevé area: 8.00 m², total cover: 99%, E_1: 99%, E_0: 0%, height of herb layer: 25 cm, soil type: loamy + admixture of gravel, 30.4.2015, A. Rendeková

Relevé 14. Borská nížina Lowland, Malacky, abandoned area 200 m from the railway station, N 48°25'49.70", E 17°01'20.40", ± 10 m, altitude: 166 m, slope: 0°, relevé area: 12.00 m², total cover: 98%, E1: 98%, E0: 0%, height of herb layer: 30–45 cm, soil type: loamy + admixture of gravel, 6.5.2015, A. Rendeková

***Geranium pusillum* community [*Stellarietea mediae*]:**

Relevé 2. Borská nížina Lowland, Malacky, Dielenská street, abandoned area near the building, N 48°25'51.60", E 17°01'28.30", ± 12 m, altitude: 160 m, slope: 0°, relevé area: 2.80 m², total cover: 90%, E1: 90%, E0: 0%, height of herb layer: 10–20 cm, soil type: loamy + admixture of sand, 16.5.2015, A. Rendeková

Relevé 12. Borská nížina Lowland, Malacky, Malé námestie street, 10 m from the house no. 28, edge of pavement, N 48°26'20.20", E 17°01'01.30", ± 20 m, altitude: 156 m, slope: 0°, relevé area: 4.00 m², total cover: 98%, E_1: 98%, E_0: 0%, height of herb layer: 10–40 cm, soil type: loamy, 6.5.2015, A. Rendeková

Relevé 11. Borská nížina Lowland, Malacky, end of Jozefa Kubinu street, 160 m from the gardening area, edge of dusty road, N 48°26'47.80", E 17°01'12.90", ± 16 m, altitude: 156 m, slope: 0°, relevé area: 2.50 m², total cover: 80%, E1: 80%, E0: 0%, height of herb layer: 10 cm, soil type: loamy + admixture of sand, 6.5.2015, A. Rendeková

Relevé 19. Borská nížina Lowland, Malacky, Sasinkova street, trampled area 20 m from the road, N 48°26'19.00", E 17°01'13.00", ± 20 m, altitude: 160 m, slope: 0°, relevé area: 4.00 m², total cover: 85%, E_1: 85%, E_0: 0%, height of herb layer: 12 cm, soil type: loamy, 6.5.2015, A. Rendeková

Association *Hordeetum murini*:

Relevé 20. Borská nížina Lowland, Malacky, Továrenská street, 40 m from the building of construction company Krystav, 20 m from the railway track, edge of road, N 48°25'43.10", E 17°01'24.00", ± 8 m, altitude: 169 m, slope: 0°, relevé area: 4.00 m², total cover: 80%, E_1: 80%, E_0: 0%, height of herb layer: 45 cm, soil type: loamy + admixture of gravel, 16.5.2015, A. Rendeková

Relevé 29. Borská nížina Lowland, Malacky, 200 m from the railway station, edge of the pavement, N 48°26'02.60", E 17°01'22.40", ± 20 m, altitude: 166 m, slope: 0°, relevé area: 4.00 m², total cover: 80%, E_1: 80%, E_0: 0%, height of herb layer: 10–30 cm, soil type: loamy, 18.5.2015, A. Rendeková

Association *Brometum sterilis*:

Relevé 8. Borská nížina Lowland, Malacky, Oslobodenia street, 10 m from the house no. 2, edge of road, N 48°26'39.00", E 17°01'28.60", ± 6 m, altitude: 162 m, slope: 0°, relevé area: 10.00 m², total cover: 99%, E_1: 99%, E_0: 0%, height of herb layer: 40 cm, soil type: loamy, 30.4.2015, A. Rendeková

Relevé 9. Borská nížina Lowland, Malacky, Jozefa Kubinu street, abandoned area between houses no. 64 and no. 68, N 48°26'46.00", E 17°01'12.20", ± 20 m, altitude: 157 m, slope: 0°, relevé area: 5.00 m², total cover: 95%, E_1: 95%, E_0: 0%, height of herb layer: 40 cm, soil type: loamy + admixture of sand, 4.5.2015, A. Rendeková

Relevé 16. Borská nížina Lowland, Malacky, end of town in direction to Pezinok, 200 m from Pezinská street, abandoned area near the gas station, N 48°26'01.80", E 17°01'50.40", ± 8 m, altitude: 162 m, slope: 0°, relevé area: 12.00 m², total cover: 99%, E_1: 99%, E_0: 0%, height of herb layer: 40–65 cm, soil type: loamy, 30.4.2015, A. Rendeková

Relevé 10. Borská nížina Lowland, Malacky, Sasinkova street, 20 m from Malé námestie street, abandoned area area near the house, N 48°26'19.00", E 17°01'13.20", ± 20 m, altitude: 156 m, slope: 0°, relevé area: 6.00 m², total cover: 99%, E_1: 99%, E_0: 0%, height of herb layer: 45–60 cm, soil type: loamy, 4.5.2015, A. Rendeková

Relevé 15. Borská nížina Lowland, Malacky, Lesná street, area next to the fence of abandoned house no. 22, N 48°26'34.90", E 17°01'47.60", ± 8 m, altitude: 160 m, slope: 5°, aspect: NNW (338°), relevé area: 16.00 m², total cover: 95%, E_1: 95%, E_0: 0%, height of herb layer: 40 cm, soil type: loamy + admixture of sand, 30.4.2015, A. Rendeková

Relevé 17. Borská nížina Lowland, Malacky, gardening area 200 m from Boženy Němcovej street, edge of fence, N 48°26'48.00", E 17°01'56.20", ± 12 m, altitude: 168 m, slope: 0°, relevé area: 6.00 m², total cover: 95%, E_1: 95%, E_0: 0%, height of herb layer: 40 cm, soil type: loamy, 30.4.2015, A. Rendeková

Relevé 18. Borská nížina Lowland, Malacky, railway station, edge of disused railway track, N 48°25'54.30", E 17°01'21.00", ± 12 m, altitude: 165 m, slope: 0°, relevé area: 6.00 m², total cover: 95%, E_1: 95%, E_0: 0%, height of herb layer: 45–60 cm, soil type: loamy + admixture of gravel + pieces of wood, brick and glass, 4.5.2015, A. Rendeková

Association *Lolio-Cynodontetum dactyli*:

Relevé 22. Borská nížina Lowland, Malacky, Pezinská street, 10 m from the house no. 36, edge of pavement, N 48°25'57.60", E 17°01'36.40", ± 6 m, altitude: 164 m, slope: 0°, relevé area: 6.00 m², total cover: 90%, E_1: 90%, E_0: 0%, height of herb layer: 10–20 cm, soil type: loamy + admixture of gravel, 6.8.2015, A. Rendeková

Relevé 27. Borská nížina Lowland, Malacky, Gen. M. R. Štefánika street, 25 from the house no. 48, edge of road, N 48°25'48.90", E 17°01'11.30", ± 6 m, altitude: 160 m, slope: 0°, relevé area: 6.00 m², total cover: 90%, E_1: 90%, E_0: 0%, height of herb layer: 10 cm, soil type: sandy + admixture of gravel, 30.8.2015, A. Rendeková

Relevé 24. Borská nížina Lowland, Malacky, railway station, N 48°25'55.40", E 17°01'22.00", ± 6 m, altitude: 166 m, slope: 0°, relevé area: 3.00 m², total cover: 90%, E_1: 90%, E_0: 0%, height of herb layer: 10 cm, soil type: loamy + admixture of gravel, 6.8.2015, A. Rendeková

Relevé 25. Borská nížina Lowland, Malacky, Továrenská street, 200 m from sewage treatment plant, 100 m from railway track, area near the parking lot, N 48°25'25.30", E 17°01'20.00", ± 6 m, altitude: 169 m, slope: 0°, relevé area: 3.00 m², total cover: 95%, E_1: 95%, E_0: 10%, height of herb layer: 10 cm, soil type: loamy, 8.8.2015, A. Rendeková

Relevé 28. Borská nížina Lowland, Malacky, Jánošíkova street, edge of road, N 48°25'42.90", E 17°00'52.50", ± 8 m, altitude: 161 m, slope: 0°, relevé area: 4.00 m², total cover: 85%, E_1: 85%, E_0: 0%, height of herb layer: 10 cm, soil type: sandy + admixture of gravel, 16.9.2015, A. Rendeková

Association *Polygono-Portulacetum oleraceae*:

Relevé 5. Borská nížina Lowland, Malacky, railway station, N 48°26'01.60", E 17°01'20.20", ± 10 m, altitude: 166 m, slope: 0°, relevé area: 3.00 m², total cover: 80%, E_1: 80%, E_0: 0%, height of herb layer: 2–10 cm, soil type: loamy + admixture of sand, 1.9.2014, A. Rendeková

Relevé 6. Borská nížina Lowland, Malacky, end of town in direction to Senica, 200 m from Oslobodenia street, dump, N 48°26'51.40", E 17°01'30.30", ± 10 m, altitude: 160 m, slope: 0°, relevé area: 3.00 m², total cover: 65%, E_1: 65%, E_0: 0%, height of herb layer: 2–10 cm, soil type: loamy + admixture of sand and gravel, 20.9.2014, A. Rendeková

Relevé 33. Borská nížina Lowland, Malacky, Jánošíkova street, abandoned area in front of a family house, N 48°25'43.60", E 17°00'52.80", ± 20 m, altitude: 160 m, slope: 0°, relevé area: 3.00 m², total cover: 80%, E_1: 80%, E_0: 0%, height of herb layer: 2–10 cm, soil type: sandy, 24.8.2015, A. Rendeková

Relevé 23. Borská nížina Lowland, Malacky, 40 m from Pezinská street, edge of railway track, N 48°26'05.40", E 17°01'24.20", ± 10 m, altitude: 164 m, slope: 0°, relevé area: 2.00 m², total cover: 80%, E_1: 80%, E_0: 0%, height of herb layer: 4–10 cm, soil type: loamy + admixture of sand, 2.8.2015, A. Rendeková

Relevé 26. Borská nížina Lowland, Malacky, Továrenská street, 60 m from the building of construction company Krystav, edge of railway track, N 48°25'42.20", E 17°01'22.40", ± 8 m, altitude: 169 m, slope: 0°, relevé area: 3.00 m², total cover: 80%, E_1: 80%, E_0: 0%, height of herb layer: 4–25 cm, soil type: sandy + admixture of gravel, 6.8.2015, A. Rendeková

***Conyza canadensis* community [*Stellarietea mediae*]:**

Relevé 3. Borská nížina Lowland, Malacky, Ota Kožucha street, area near the parking lot, N 48°25'48.40", E 17°01'48.30", ± 8 m, altitude: 166 m, slope: 0°, relevé area: 20.00 m², total cover: 88%, E_1: 88%, E_0: 0%, height of herb layer: 85–165 cm, soil type: loamy + admixture of sand and gravel, 4.9.2014, A. Rendeková

Relevé 32. Borská nížina Lowland, Malacky, abandoned area 100 m from Jánošíkova street, 400 m from Pri Maline street, N 48°25'40.00", E 17°00'48.20", ± 20 m, altitude: 164 m, slope: 0°, relevé area: 10.00 m², total cover: 80%, E_1: 80%, E_0: 0%, height of herb layer: 45–80 cm, soil type: sandy, 1.9.2015, A. Rendeková

Relevé 34. Borská nížina Lowland, Malacky, Továrenská street, 300 m from the building of construction company Krystav, abandoned area in front of house, N 48°25'48.20", E 17°01'20.60", ± 20 m, altitude: 169 m, slope: 0°, relevé area: 9.00 m², total cover: 65%, E_1: 65%, E_0: 0%, height of herb layer: 40–80 cm, soil type: sandy + admixture of gravel, 24.8.2015, A. Rendeková

Relevé 4. Borská nížina Lowland, Malacky, railway station, edge of railway track, N 48°26'02.90", E 17°01'23.40", ± 6 m, altitude: 166 m, slope: 0°, relevé area: 25.00 m², total cover: 70%, E_1: 70%, E_0: 0%, height of herb layer: 45–80 cm, soil type: loamy + admixture of sand and gravel, 1.9.2014, A. Rendeková

Relevé 7. Borská nížina Lowland, Malacky, end of town in direction to Senica, 210 m from Oslobodenia street, dump, N 48°26'50.80", E 17°01'31.50", ± 6 m, altitude: 158 m, slope: 0°, relevé area: 20.00 m², total cover: 75%, E_1: 75%, E_0: 0%, height of herb layer: 45–100 cm, soil type: loamy + admixture of sand and gravel + pieces of brick, 24.8.2014, A. Rendeková

Relevé 30. Borská nížina Lowland, Malacky, Jilemnického street, abandoned area 60 m from the bus station, N 48°26'01.20", E 17°01'16.40", ± 20 m, altitude: 166 m, slope: 0°, relevé area: 8.00 m², total cover: 65%, E_1: 65%, E_0: 0%, height of herb layer: 40–80 cm, soil type: sandy + admixture of gravel, 20.8.2015, A. Rendeková

Relevé 31. Borská nížina Lowland, Malacky, Nádražná street, abandoned area in front of house, N 48°25'49.60", E 17°01'10.20", ± 20 m, altitude: 165 m, slope: 0°, relevé area: 6.00 m², total cover: 65%, E_1: 65%, E_0: 0%, height of herb layer: 40–75 cm, soil type: sandy + admixture of gravel, 20.8.2015, A. Rendeková

Tab. 3. Relevés of communities of the class *Artemisietea vulgaris* from Malacky (2014 – 2015)

A01 – Association *Tanaceto-Artemisietum vulgaris*, relevés dominated by *Artemisia vulgaris* , A02 – Association *Tanaceto-Artemisietum vulgaris*, relevés dominated by *Tanacetum vulgare*, B01 – Association *Echio-Melilotetum*, relevés dominated by *Echium vulgare*, B02 – Association *Echio-Melilotetum*, relevé dominated by *Melilotus officinalis*, C – Association *Odontito-Ambrosietum artemisiifoliae*, D – Association *Falcario vulgaris-Agropyretum repentis*, E – *Saponaria officinalis* community [*Convolvulo arvensis-Agropyrion repentis*], F – Association *Berteroetum incanae*, G – *Pastinaca sativa* community [*Dauco-Melilotion*], H – *Stenactis annua* community [*Dauco-Melilotion*], I – Association *Asparago-Chonrilletum juncei*, J – *Calamagrostis epigejos* community [*Artemisietea vulgaris*], K – *Cirsium arvense* community [*Artemisietea vulgaris*], L – *Solidago gigantea* community [*Artemisietea vulgaris*], M – *Trifolium arvense* community [*Artemisietea vulgaris*]

Community	**A01**		**A02**				**F (%)**	**B_{01}**		**B_{02}**	**C**				**F**	**G**	**H**	**D**			**E**		**I**	**J**	**K**	**L**	**M**
Relevé no.	**1**	**6**	**2**	**11**	**14**	**15**		**7**	**8**	**9**	**3**	**4**	**5**	**16**	**19**	**20**	**21**	**10**	**12**	**13**	**17**	**18**	**22**	**23**	**24**	**25**	**26**
E_1:																											
Dominant taxa of communities of alliance *Dauco-Melilotion*																											
Artemisia vulgaris *D-M	5	5	1	a	1	1	100	.	1	+	1	1	+	1	.	1	+	.	+	a	+	+	+	a	+	+	+
Tanacetum vulgare *D-M	+	.	5	4	4	4	83	b	+	.	+	.	.	+	.	.	r	.	+	+	+	+	+	1	1	1	a
Echium vulgare *D-M	1	.	1	.	1	+	67	4	4	b	.	+	.	r	r	1	+	.	r	.	+	r	+	.	.	r	+
Melilotus officinalis *D-M	+	.	.	.	+	.	33	.	.	4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+
Ambrosia artemisiifolia *D-M	+	.	+	.	+	.	50	.	+	.	5	5	4	4	.	.	r	.	.	.	.	.	.	.	r	.	+
Berteroa incana	.	.	.	.	.	.	.	.	+	.	+	.	.	.	4	.	.	.	.	.	.	.	.	.	.	.	.
Pastinaca sativa	.	1	.	.	.	.	17	.	.	r	.	.	1	.	.	4	.	r	.	.	.	.	.	.	.	.	.
Stenactis annua *D-M	1	+	1	1	1	+	100	.	r	+	+	.	.	+	+	1	4	.	.	.	.	.	.	+	+	r	1
Diagnostic, characteristic, constant taxa of alliance *Dauco-Melilotion*																											
Daucus carota	1	.	1	1	1	1	83	a	r	3	.	1	1	1	.	b	1	+	.	r	.	.	.	+	.	+	+
Carduus acanthoides	+	r	+	+	r	.	83	.	+	+	.	r	.	.	.	+	.	1	+	.	+	.	r	r	r	.	.
Cichorium intybus	.	.	.	.	r	.	17	1	.	.	.	.	1	+	.	+	1	+	+	r	.	.	+	.	.	.	.
Melilotus albus	+	.	.	.	+	.	33	.	.	.	.	.	.	+	.	.	b	.	.	.	.	.	.	.	.	.	r
Medicago sativa	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	r	.	.	.	r	.	.	.	.
Odontites vulgaris	.	.	r	.	.	.	17	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Dominant taxa of communities of alliance *Convolvulo arvensis-Agropyrion repentis*																											
Falcaria vulgaris *Ca-Ar	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	4	4	5	r	.	a	r	.	.	.
Saponaria officinalis	.	.	.	.	r	.	17	.	.	.	.	.	.	.	.	.	.	.	+	+	4	4	+	.	1	.	.
Chondrilla juncea	.	r	.	.	+	.	33	.	.	r	.	.	+	r	.	.	.	.	b	+	r	.	3	.	.	.	1
Diagnostic, characteristic, constant taxa of alliance *Convolvulo arvensis-Agropyrion repentis*																											
Elytrigia repens	1	.	.	1	1	.	50	r	b	.	.	.	.	.	+	.	.	.	1	a	a	b	1	+	b	.	.
Convolvulus arvensis	.	.	.	+	.	.	17	.	.	a	.	.	+	.	a	r	.	.	.	.	.	.	.	+	.	.	.
Dominant taxa of not more closely classified communities of class *Artemisietea vulgaris*																											
Calamagrostis epigejos	.	.	.	a	1	a	50	.	.	.	.	.	.	.	.	.	.	.	+	+	+	.	+	4	.	b	+
Cirsium arvense	.	.	1	.	+	.	33	1	r	.	.	.	.	+	.	.	r	.	+	.	+	+	+	.	4	.	.
Solidago gigantea	.	.	.	.	.	1	17	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5	.
Trifolium arvense	.	.	.	+	+	.	33	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	+	.	.	5
Diagnostic, characteristic, constant taxa of class *Artemisietea vulgaris*																											
Silene latifolia subsp. *alba*	.	.	.	.	.	r	17	.	.	r	.	.	.	.	.	.	.	r	r	.	.	.	r	.	.	r	.
Ballota nigra	1	a	.	.	.	.	33	.	.	+	.	.	.	.	.	.	.	.	.	+	+	.	.	.	.	.	.
Medicago lupulina	.	.	.	.	.	.	.	.	.	.	+	.	.	.	a	.	.	.	.	.	.	.	.	.	.	.	.
Artemisia absinthium	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	+	.	.	.	.
Diagnostic, characteristic, constant taxa of class *Stellarietea mediae*																											
Conyza canadensis	1	+	.	r	+	r	83	.	.	+	+	r	+	.	+	r	r	.	.	.	.	.	.	r	.	.	+
Lactuca serriola	+	+	.	r	+	+	83	+	1	.	.	.	+	.	.	.	.	.	.	.	r	r	.	r	+	+	+
Hordeum murinum	.	+	.	.	.	.	17	+	.	.	.	.	.	.	+	r	.	.	.	.	.	.	.	.	.	.	.

Community	A01		A02				F (%)	B_{01}		B_{02}	C				F	G	H	D			E		I	J	K	L	M
Relevé no.	1	6	2	11	14	15		7	8	9	3	4	5	16	19	20	21	10	12	13	17	18	22	23	24	25	26
Setaria pumila	.	.	+	.	.	.	17	.	.	.	+	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Bromus sterilis	.	.	.	.	.	.	.	.	.	+	.	.	.	.	+	.	+	.	.	.	.	.	.	.	.	.	.
Cynodon dactylon	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	1
Linaria vulgaris	r	.	+	.	.	.	33	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Trifolium campestre	.	.	.	.	+	.	17	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
Chenopodium strictum	.	.	.	.	.	.	.	.	.	.	.	+	r	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Diagnostic, characteristic, constant taxa of class *Molinio-Arrhenatheretea*																											
Achillea millefolium agg.	+	+	1	1	+	+	100	.	+	+	.	+	.	.	.	.	+	r	+	+	+	.	+	+	.	+	.
Arrhenatherum elatius	.	.	+	r	+	+	67	+	+	.	.	.	.	.	.	+	.	1	1	b	a	+	a	r	.	+	.
Plantago lanceolata	.	.	+	.	+	r	50	.	+	+	.	.	+	.	1	1	1	1	.	.	+	+	.	.	r	.	1
Lolium perenne	.	+	.	+	+	+	67	+	.	+	.	.	+	.	+	.	+	+	.	.	.	.	.	+	.	.	+
Trifolium pratense	+	.	.	r	.	.	33	.	+	.	+	.	.	.	+	.	.	.	.	.	.	.	.	+	.	.	.
Dactylis glomerata	.	.	.	+	.	.	17	+	r	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.
Plantago major	.	r	.	.	.	.	17	.	.	r	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.
Taraxacum sect. *Ruderalia*	.	.	+	.	.	r	33	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Other taxa																											
Apera spica-venti	.	.	.	+	r	.	33	.	+	.	.	.	.	.	.	.	.	.	.	.	.	+	.	+	+	.	+
Negundo aceroides (juv.)	1	r	r	.	.	1	67	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	1	.
Rubus caesius	.	.	.	.	.	.	.	r	1	.	r	.	r	.	.	.	.	.	.	.	.	a	.	.	1	.	.
Urtica dioica	+	a	.	1	.	.	50	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.
Hypericum perforatum	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	+	.	.	.	r	r	.	.	+	.	.
Humulus lupulus	+	a	.	+	.	.	50	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.
Helianthus tuberosus	.	.	.	r	.	.	17	.	r	.	.	.	.	.	.	.	.	.	.	.	.	.	.	r	.	.	.
Polygonum arenastrum	.	.	.	.	.	.	.	.	.	.	1	1	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Parthenocissus quinquefolia	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	+	.	.	.	.	.	.	.	.	.	.	.
Petrorhagia prolifera	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	+
Acosta rhenana	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	r	.	.	.	r	.	.	.	.
E_0:																											
Ceratodon purpureus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	a	.	.	.	.	.	.	.	.	.	+

Explanation: $^{*D-M}$ – taxon also belongs to diagnostic, characteristic, constant taxa of alliance *Dauco-Melilotion*, $^{*Ca-Ar}$ – taxon also belongs to diagnostic, characteristic, constant taxa of alliance *Convolvulo arvensis-Agropyrion repentis*

Taxa found only in one relevé:
E_1: *Ailanthus* altissima (juv.)(24): r; *Anchusa officinalis* (16): r; *Arctium lappa* (11): r; *Arctium minus* (6): r; *Bromus hordeaceus* (19): 1; *Bromus tectorum* (19): 1; *Calystegia sepium* (1): r; *Capsella bursa-pastoris* (19): r; *Chelidonium majus* (5): r; *Chenopodium polyspermum* (3): r; *Consolida regalis* (8): +; *Digitaria sanguinalis* (3): +; *Echinochloa crus-galli* (3): +; *Eryngium campestre* (13): +; *Fallopia dumetorum* (3): +; *Galinsoga parviflora* (5): +; *Onopordum acanthium* (1): +; *Panicum miliaceum* (3): r; *Papaver rhoeas* (8): + ; *Phragmites australis* (1): +; *Picris hieracioides* (2): r; *Populus alba* (juv.) (26): +; *Populus nigra* (juv.) (26): +; *Portulaca oleracea* (5): +; *Reseda lutea* (9): 1; *Rosa canina* agg. (juv.) (20): +; *Rumex obtusifolius* (6): r; *Senecio vulgaris* (5): +; *Solanum nigrum* (5): r; *Trifolium repens* (21): +; *Tripleurospermum perforatum* (4): +
E_0: *Brachythecium rutabulum* (11): +

Localities and the other information of relevés from Tab. 3:

Association *Tanaceto-Artemisietum vulgaris*:

Relevé 1. Borská nížina Lowland, Malacky, Pezinská street, abandoned area 100 m from Hypermarket Tesco builing, N 48°25'51.00", E 17°01'46.70", ± 6 m, altitude: 166 m, slope: 0°, relevé area: 24.00 m², total cover: 98%, E_1: 98%, E_0: 0%, height of herb layer: 50–160 cm, soil type: loamy, 28.8.2014, A. Rendeková

Relevé 6. Borská nížina Lowland, Malacky, Pezinská street, abandond area near the old house, N 48°26'02.40", E 17°01'28.60", ± 4 m, altitude: 168 m, slope: 0°, relevé area: 24.00 m², total cover: 99%, E_1: 99%, E_0: 0%, height of herb layer: 60–165 cm, soil type: loamy + admixture of sand + pieces of brick, 28.8.2014, A. Rendeková

Relevé 2. Borská nížina Lowland, Malacky, end of town in direction to Pezinok, 220 m from Pezinská street, abandoned area near the gas station, N 48°25'09.70", E 17°01'52.30", ± 4 m, altitude: 164 m, slope: 0°, relevé area: 24.00 m², total cover: 96%, E_1: 96%, E_0: 0%, height of herb layer: 50–100 cm, soil type: loamy, 6.9.2014, A. Rendeková

Relevé 11. Borská nížina Lowland, Malacky, Dielenská street, 20 m from the house no. 6, abandoned area, N 48°25'54.00", E 17°01'26.50", ± 4 m, altitude: 162 m, slope: 0°, relevé area: 26.00 m², total cover: 85%, E_1: 85%, E_0: 1%, height of herb layer: 50–85–120 cm, soil type: loamy + admixture of sand, 2.8.2015, A. Rendeková

Relevé 14. Borská nížina Lowland, Malacky, Továrenská street, 260 m from sewage treatment plant, N 48°25'26.00", E 17°01'22.60", ± 20 m, altitude: 169 m, slope: 0°, relevé area: 20.00 m², total cover: 80%, E_1: 80%, E_0: 0%, height of herb layer: 45–85 cm, soil type: loamy + admixture of sand, 6.8.2015, A. Rendeková

Relevé 15. Borská nížina Lowland, Malacky, 400 m from Jánošíkova street, 360 m from Malina stream, 60 m from family houses, abandoned area, N 48°25'38.60", E 17°00'58.40", ± 20 m, altitude: 164 m, slope: 0°, relevé area: 20.00 m², total cover: 85%, E_1: 85%, E_0: 0%, height of herb layer: 40–85 cm, soil type: loamy, 26.8.2015, A. Rendeková

Association *Echio-Melilotetum*:

Relevé 7. Borská nížina Lowland, Malacky, crossroad of Záhradná street and Stromová street, abandoned area among family houses, N 48°26'04.00", E 17°02'09.90", ± 20 m, altitude: 164 m, slope: 0°, relevé area: 10.00 m², total cover: 85%, E_1: 85%, E_0: 0%, height of herb layer: 45–80–120 cm, soil type: loamy, 20.6.2015, A. Rendeková

Relevé 8. Borská nížina Lowland, Malacky, Cesta mládeže street, abandoned area between the houses and industrial building, N 48°25'58.80", E 17°00'20.40", ± 6 m, altitude: 158 m, slope: 0°, relevé area: 10.00 m², total cover: 85%, E_1: 85%, E_0: 0%, height of herb layer: 45–85 cm, soil type: loamy + admixture of sand + gravel, 20.6.2015, A. Rendeková

Relevé 9. Borská nížina Lowland, Malacky, Dielenská street, 60 m from Pezinská street, edge of road, N 48°26'01.90", E 17°01'24.90", ± 12 m, altitude: 163 m, slope: 0°, relevé area: 10.00 m², total cover: 85%, E_1: 85%, E_0: 0%, height of herb layer: 40–65 cm, soil type: loamy + admixture of sand + gravel, 25.6.2015, A. Rendeková

Association *Odontito-Ambrosietum artemisiifoliae*:

Relevé 3. Borská nížina Lowland, Malacky, end of town in direction to Senica, 220 m from Oslobodenia street, dump, N 48°26'49.70", E 17°01'34.90", ± 10 m, altitude: 158 m, slope: 0°, relevé area: 16.00 m², total cover: 85%, E_1: 85%, E_0: 0%, height of herb layer: 40–80 cm, soil type: loamy + admixture of sand, 26.8.2014, A. Rendeková

Relevé 4. Borská nížina Lowland, Malacky, end of town in direction to Pezinok, 180 m from Pezinská street, abandoned area near the gas station, N 48°26'01.10", 17°01'52.80", ± 8 m, altitude: 164 m, slope: 0°, relevé area: 20.00 m², total cover: 90%, E_1: 90%, E_0: 0%, height of herb layer: 40–85 cm, soil type: loamy + admixture of sand + gravel, 26.8.2014, A. Rendeková

Relevé 5. Borská nížina Lowland, Malacky, railway station, edge of disused railway track, N 48°25'53.40", E 17°01'21.00", ± 8, altitude: 164 m, slope: 0°, relevé area: 18.00 m², total cover: 85%, E_1: 85%, E_0: 0%, height of herb layer: 45 cm, soil type: loamy + admixture of sand + gravel, 6.9.2014, A. Rendeková

Relevé 16. Borská nížina Lowland, Malacky, Továrenská street, 60 m from the building of construction company Krystav, abandoned area 40 m from the railway track, N 48°25'42.00", E 17°01'22.60", ± 20 m, altitude: 169 m, slope: 0°, relevé area: 10.00 m², total cover: 80%, E_1: 80%, E_0: 0%, height of herb layer: 65 cm, soil type: sandy, 24.8.2015, A. Rendeková

Association *Berteroetum incanae*:

Relevé 19. Borská nížina Lowland, Malacky, Duklianskych hrdinov street, 100 m from Rakárenská street, abandoned area area in front of a family house, N 48°26'28.00", E 17°02'14.60", ± 8 m, altitude: 164 m, slope: 0°, relevé area: 9.00 m², total cover: 80%, E_1: 80%, E_0: 0%, height of herb layer: 25–65 cm, soil type: loamy + admixture of sand, 20.6.2015, A. Rendeková

Pastinaca sativa community [Dauco-Melilotion]:

Relevé 20. Borská nížina Lowland, Malacky, 20 m from the crossroad of Pezinská street and Dielenská street, edge of railway track, N 48°26'03.60", E 17°01'24.90", ± 6 m, altitude: 164 m, slope: 0°, relevé area: 8.00 m², total cover: 85%, E_1: 85%, E_0: 0%, height of herb layer: 40–80 cm, soil type: loamy + admixture of sand, 16.7.2015, A. Rendeková

***Stenactis annua* community [*Dauco-Melilotion*]:**

Relevé 21. Borská nížina Lowland, Malacky, Továrenská street, gaps in concrete on the edge of abandoned concrete area among houses, N 48°25'31.40", E 17°01'22.60", ± 12 m, altitude: 168 m, slope: 0°, relevé area: 13.00 m², total cover: 70%, E_1: 65%, E_0: 12%, height of herb layer: 40–65–100 cm, soil type: loamy, 25.6.2015, A. Rendeková

Association *Falcario vulgaris-Agropyretum repentis*:

Relevé 10. Borská nížina Lowland, Malacky, 200 m from Partizánska street, 200 m from Pezinská street, edge of railway track, N 48°26'08.90", E 17°01'24.80", ± 8 m, altitude: 162 m, slope: 0°, relevé area: 4.00 m², total cover: 80%, E_1: 80%, E_0: 0%, height of herb layer: 45 cm, soil type: loamy + admixture of sand, 6.7.2015, A. Rendeková

Relevé 12. Borská nížina Lowland, Malacky, Továrenská street, 160 m from sewage treatment plant, edge of road, N 48°25'27.40", E 17°01'20.00", ± 6 m, altitude: 168 m, slope: 0°, relevé area: 4.00 m², total cover: 80%, E_1: 80%, E_0: 0%, height of herb layer: 45–80 cm, soil type: loamy + admixture of sand + gravel, 16.7.2015, A. Rendeková

Relevé 13. Borská nížina Lowland, Malacky, Továrenská street, 260 m from zinc works, edge of railway track, N 48°25'24.80", E 17°01'19.00", ± 6 m, altitude: 169 m, slope: 0°, relevé area: 6.00 m², total cover: 100%, E_1: 100%, E_0: 0%, height of herb layer: 80 cm, soil type: loamy + admixture of sand, 26.7.2015, A. Rendeková

***Saponaria officinalis* community [*Convolvulo arvensis-Agropyrion repentis*]:**

Relevé 17. Borská nížina Lowland, Malacky, Továrenská street, 300 m from sewage treatment plant, 200 m from Malina stream, edge of road, N 48°25'26.80", E 17°01'21.60", ± 20 m, altitude: 169 m, slope: 0°, relevé area: 6.00 m², total cover: 80%, E1: 80%, E_0: 0%, height of herb layer: 60 cm, soil type: sandy, 28.7.2015, A. Rendeková

Relevé 18. Borská nížina Lowland, Malacky, Cesta mládeže street, abandoned area among houses, N 48°25'56.80", E 17°00'18.00", ± 20 m, altitude: 160 m, slope: 0°, relevé area: 10.00 m², total cover: 85%, E_1: 85%, E_0: 0%, height of herb layer: 80 cm, soil type: loamy, 16.7.2015, A. Rendeková

Association *Asparago-Chonrilletum juncei*:

Relevé 22. Borská nížina Lowland, Malacky, Továrenská street, 100 m from Malina stream, edge of road, N 48°25'27.40", E 17°01'20.00", ± 6 m, altitude: 169 m, slope: 0°, relevé area: 8.00 m², total cover: 80%, E_1: 80%, E_0: 0%, height of herb layer: 45–85 cm, soil type: sandy + admixture of gravel, 26.7.2015, A. Rendeková

***Calamagrostis epigejos* community [*Artemisietea vulgaris*]:**

Relevé 23. Borská nížina Lowland, Malacky, Dielenská street, abandoned area among family houses, N 48°25'40.00", E 17°01'26.20", ± 16 m, altitude: 162 m, slope: 0°, relevé area: 14.00 m², total cover: 90%, E_1: 90%, E_0: 0%, height of herb layer: 40–120 cm, soil type: loamy + admixture of sand, 4.8.2015, A. Rendeková

***Cirsium arvense* community [*Artemisietea vulgaris*]:**

Relevé 24. Borská nížina Lowland, Malacky, Cesta mládeže street, abandoned area in front of industrial builings, N 48°25'58.80", E 17°00'18.90", ± 8 m, altitude: 160 m, slope: 0°, relevé area: 20.00 m², total cover: 80%, E_1: 80%, E_0: 0%, height of herb layer: 65–90 cm, soil type: loamy, 20.6.2015, A. Rendeková

***Solidago gigantea* community [*Artemisietea vulgaris*]:**

Relevé 25. Borská nížina Lowland, Malacky, 250 m from Jánošíkova street, 400 m from Malina stream, abandoned area in front of family houses, N 48°25'39.80", E 17°00'59.60", ± 6 m, altitude: 164 m, slope: 0°, relevé area: 20.00 m², total cover: 99%, E_1: 99%, E_0: 0%, height of herb layer: 90 cm, soil type: loamy, 6.9.2015, A. Rendeková

***Trifolium arvense* community [*Artemisietea vulgaris*]:**

Relevé 26. Borská nížina Lowland, Malacky, Továrenská street, abandoned area 140 m from sewage treatment plant, N 48°25'26.70", E 17°01'23.40", ± 6 m, altitude: 169 m, slope: 0°, relevé area: 20.00 m², total cover: 80%, E_1: 80%, E_0: 1%, height of herb layer: 40–65 cm, soil type: sandy + admixture of gravel, 26.7.2015, A. Rendeková

Tab. 4. Relevés of communities of the class *Galio-Urticetea* from Malacky (2014 – 2015)

A – Association *Geo urbani-Chelidonietum mají*, B – Association *Veronico sublobatae-Alliarietum petiolatae*, C – Association *Sambucetum ebuli*, D – *Helianthus tuberosus* community [*Senecionion fluviatilis*] E – *Solidago gigantea* community [*Senecionion fluviatilis*]

Community	**A**						**F**	**B**	**C**	**D**	**E**
Relevé no.	**1**	**2**	**3**	**4**	**5**	**6**	**(%)**	**7**	**8**	**9**	**10**
E_1:											
Dominant taxa of communities of class *Galio-Urticetea*											
Chelidonium majus *	5	5	5	4	5	5	100	r	.	.	.
Alliaria petiolata *	r	+	.	.	r	.	50	4	.	.	.
Sambucus ebulus *	.	.	.	.	.	.	.	.	5	.	.
Helianthus tuberosus	.	.	.	.	.	.	.	.	.	5	.
Solidago gigantea	.	.	.	.	.	.	.	.	.	+	5
Diagnostic, characteristic, constant taxa of class *Galio-Urticetea*											
Urtica dioica	a	b	b	a	a	.	83	+	+	.	.
Rubus caesius	+	r	.	+	.	.	50	a	b	+	a
Galium aparine	1	a	.	3	b	.	67	3	r	.	.
Veronica hederifolia	.	+	.	3	1	1	67	a	.	.	.
Humulus lupulus	1	.	.	1	a	.	50	.	.	.	.
Calystegia sepium	.	.	.	r	.	.	17	.	.	r	r
Veronica sublobata	.	+	.	.	.	.	17	3	.	.	.
Aster novi-belgii agg.	.	.	.	.	.	.	.	.	.	+	+

Community	A						F (%)	B	C	D	E
Relevé no.	1	2	3	4	5	6		7	8	9	10
Other taxa											
Taraxacum sect. *Ruderalia*	.	+	+	+	.	+	67	+	.	.	.
Bromus sterilis	b	+	.	1	.	.	50	+	.	.	.
Parthenocissus quinquefolia	1	r	.	.	.	.	33	r	a	.	.
Stellaria media	.	b	b	.	.	+	50	+	.	.	.
Ballota nigra	.	+	+	.	a	.	50	a	.	.	.
Lactuca serriola	r	.	r	.	.	.	33	.	.	.	.
Bromus tectorum	.	+	.	.	.	+	33	.	.	.	.
Vicia angustifolia	.	+	.	.	.	.	17	1	.	.	.
Sonchus oleraceus	.	r	r	.	.	.	33	.	.	.	.
Lamium purpureum	.	.	1	.	.	+	33	.	.	.	.
Dactylis glomerata	.	.	.	.	+	.	17	.	r	.	.

Explanation: * – taxon also belongs to diagnostic, characteristic, constant taxa of class *Galio-Urticetea* and its syntaxa

Taxa found only in one relevé:
E_1: *Achillea millefolium* agg. (6): +; *Anthriscus cerefolium* (5): +; *Arrhenatherum elatius* (8): +; *Artemisia vulgaris* (10): +; *Calamagrostis epigejos* (9): 1; *Capsella bursa-pastoris* (3): r; *Convolvulus arvensis* (2): +; *Elytrigia repens* (8): +; *Fallopia dumetorum* (10): r; *Geranium pyrenaicum* (2): +; *Phragmites australis* (10): +; *Rosa canina* agg. (juv.) (6): 1; *Rubus fruticosus* agg. (8): +; *Senecio vulgaris* (2): +; *Swida sanguinea* (juv.)(3): r; *Symphytum officinale* (2): r; *Syringa vulgaris* (juv.) (6): a; *Veronica persica* (6): + E_2: *Ailanthus altissima* (8): 1; *Swida sanguinea* (3): 4; *Syringa vulgaris* (6): a

Localities and the other information of relevés from Tab. 4:

Association *Geo urbani-Chelidonietum maji*:

Relevé 1. Borská nížina Lowland, Malacky, Dielenská street, 20 m from industrial building, abandoned area next to the fence of warehouse, N 48°25'52.20", E 17°01'28.20", ± 10 m, altitude: 161 m, slope: 0°, relevé area: 12.00 m², total cover: 98%, E_1: 98%, E_2: 0%, E_0: 0%, height of herb layer: 40–65–80 cm, height of shrub layer: 0 m, soil type: loamy, 16.5.2015, A. Rendeková

Relevé 2. Borská nížina Lowland, Malacky, abandoned area 100 m from railway station, N 48°25'53.10", E 17°01'20.80", ± 10 m, altitude: 165 m, slope: 0°, relevé area: 8.00 m², total cover: 98%, E_1: 98%, E_2: 0%, E_0: 0%, height of herb layer: 40–100 cm, height of shrub layer: 0 m, soil type: loamy + admixture of gravel, 1.5.2015, A. Rendeková

Relevé 3. Borská nížina Lowland, Malacky, Oslobodenia street, 400 m from railway track, edge of house fence next to the abandoned house no. 10, N 48°26'37.90", E 17°01'27.30", ± 6 m, altitude: 164 m, slope: 0°, relevé area: 6.00 m², total cover: 100%, E_1: 100%, E_2: 60%, E_0: 0%, height of herb layer: 40–80 cm, height of shrub layer: 2.0 m, soil type: loamy, 28.4.2015, A. Rendeková

Relevé 4. Borská nížina Lowland, Malacky, gardening area 200 m from Boženy Němcovej street, edge of road, N 48°26'45.60", E 17°01'54.90", ± 10 m, altitude: 168 m, slope: 0°, relevé area: 18.00 m², total cover: 98%, E_1: 98%, E_2: 0%, E_0: 0%, height of herb layer: 10–40–85 cm, height of shrub layer: 0 m, soil type: loamy, 28.4.2015, A. Rendeková

Relevé 5. Borská nížina Lowland, Malacky, end of town in direction to Kúty, 400 m from Oslobodenia street, edge of railway track, N 48°26'51.00", E 17°01'26.10", ± 2 m, altitude: 162 m, slope: 30°, aspect: W (269°), relevé area: 10.00 m², total cover: 98%, E_1: 98%, E_2: 0%, E_0: 0%, height of herb layer: 40–85 cm, height of shrub layer: 0 m, soil type: loamy, 28.4.2015, A. Rendeková

Relevé 6. Borská nížina Lowland, Malacky, Boženy Němcovej street, opposite the house no.1, edge of house fence, N 48°26'36.70", E 17°01'48.20", ± 8 m, altitude: 158 m, slope: 4°, aspect: SWW (248°), relevé area: 6.00 m², total cover: 98%, E_1: 96%, E_2: 10%, E_0: 0%, height of herb layer: 25–80 cm, height of shrub layer: 2.5 m, soil type: loamy + admixture of gravel, 28.4.2015, A. Rendeková

Association *Veronico sublobatae-Alliarietum petiolatae*:

Relevé 7. Borská nížina Lowland, Malacky, abandoned area 60 m from railway station, N 48°25'49.00", E 17°01'24.00", ± 25 m, altitude: 166 m, slope: 0°, relevé area: 6.00 m², total cover: 96%, E_1: 96%, E_2: 0%, E_0: 0%, height of herb layer: 10–25–45 cm–120 cm, height of shrub layer: 0 m, soil type: loamy + admixture of gravel, 6.4.2015, A. Rendeková

Association *Sambucetum ebuli*:

Relevé 8. Borská nížina Lowland, Malacky, 200 m from Dubovského street, 60 m from the gardening area, edge of road, N 48°26'19.40", E 17°02'21.10", ± 20 m, altitude: 164 m, slope: 0°, relevé area: 18.00 m², total cover: 100%, E_1: 100%, E_2: 5%, E_0: 0%, height of herb layer: 45–140 cm, height of shrub layer: 2.0 m, soil type: loamy, 2.8.2015, A. Rendeková

***Helianthus tuberosus* community [*Senecionion fluviatilis*]:**

Relevé 9. Borská nížina Lowland, Malacky, end of town in direction to Senica, 180 m from Oslobodenia street, dump, N 48°26'51.40", E 17°01'31.50", ± 9 m, altitude: 160 m, slope: 0°, relevé area: 18.00 m², total cover: 80%, E_1: 80%, E_2: 0%, E_0: 0%, height of herb layer: 165 cm, height of shrub layer: 0 m, soil type: loamy + admixture of sand, 20.9.2014, A. Rendeková

***Solidago gigantea* community [*Senecionion fluviatilis*]:**

Relevé 10. Borská nížina Lowland, Malacky, end of town in direction to Senica, 190 m from Oslobodenia street, dump, N 48°26'51.80", E 17°01'30.30", ± 10 m, altitude: 158 m, slope: 0°, relevé area: 20.00 m², total cover: 98%, E_1: 98%, E_0: 0%, height of herb layer: 45–160 cm, height of shrub layer: 0 m, soil type: loamy, 20.9.2014, A. Rendeková

Tab. 5. Relevés of communities of the class *Molinio-Arrhenatheretea* from Malacky (2014 – 2015)

Association *Lolietum perennis*

Relevé no.	**1**	**2**	**3**	**4**	**5**	**F (%)**
E_1:						
Dominant taxa of communities of class *Molinio-Arrhenatheretea*						
Lolium perenne	5	5	5	5	5	100
Diagnostic, characteristic, constant taxa of class *Molinio-Arrhenatheretea*						
Plantago lanceolata	a	a	a	1	1	100
Achillea millefolium agg.	1	+	r	+	+	100
Taraxacum sect. *Ruderalia*	.	1	.	1	+	60
Plantago major	.	.	b	1	1	60
Trifolium repen	.	+	.	+	.	40
Diagnostic, characteristic, constant taxa of class *Polygono arenastri-Poetea annuae*						
Polygonum arenastrum	+	.	r	1	+	80
Other taxa						
Hordeum murinum	+	r	r	r	.	80
Convolvulus arvensis	.	.	1	r	r	60
Potentilla argentea	1	+	.	.	.	40
Cynodon dactylon	+	.	.	r	.	40
Cichorium intybus	r	.	+	.	.	40

Taxa found only in one relevé:

E_1: *Anchusa officinalis* (1): r; *Arrhenatherum elatius* (3): +; *Artemisia vulgaris* (1): +; *Berteroa incana* (1): r; *Poa angustifolia* (2): r; *Tanacetum vulgare* (1): r;

Localities and the other information of relevés from Tab. 5:

Relevé 1. Borská nížina Lowland, Malacky, 200 m from Pri Maline street, 10 m from Malina stream, area of the beaten path, N 48°25'25.90", E 17°00'48.10", ± 6 m, altitude: 166 m, slope: 0°, relevé area: 12.00 m², total cover: 80%, E_1: 80%, E_0: 0%, height of herb layer: 25 cm, soil type: loamy + admixture of sand, 25.6.2015, A. Rendeková

Relevé 2. Borská nížina Lowland, Malacky, Štúrova street, in front of house no. 91, edge of pavement, N 48°25'31.10", E 17°01'04.80", ± 10 m, altitude: 165 m, slope: 0°, relevé area: 6.00 m², total cover: 95%, E_1: 95%, E_0: 0%, height of herb layer: 30 cm, soil type: loamy + admixture of sand, 26.6.2015, A. Rendeková

Relevé 3. Borská nížina Lowland, Malacky, 260 m from Partizánska street, 60 m from Pezinská street, area of the beaten path, N 48°26'09.10", E 17°01'26.80", ± 8 m, altitude: 163 m, slope: 0°, relevé area: 4.00 m², total cover: 95%, E_1: 95%, E_0: 0%, height of herb layer: 30 cm, soil type: loamy + admixture of sand, 6.7.2015, A. Rendeková

Relevé 4. Borská nížina Lowland, Malacky, Gen. M. R. Štefánika street, 2 m from the house no. 46, edge of pavement, N 48°25'48.00", E 17°01'10.50", ± 18 m, altitude: 160 m, slope: 0°, relevé area: 6.00 m², total cover: 85%, E_1: 85%, E_0: 0%, height of herb layer: 25 cm, soil type: loamy + admixture of sand, 25.6.2015, A. Rendeková

Relevé 5. Borská nížina Lowland, Malacky, Dielenská street, 20 m from the house no. 10, edge of pavement, N 48°25'53.00", E 17°01'27.20", ± 6 m, altitude: 162 m, slope: 0°, relevé area: 3.00 m², total cover: 90%, E_1: 90%, E_0: 0%, height of herb layer: 40 cm, soil type: loamy + admixture of sand, 16.7.2015, A. Rendeková

Ruderal vegetation of Malacky consists of similar associations and communities like ruderal vegetation in southern parts of Slovakia (Jarolímek 1997). It is different from that in the colder areas of Slovakia (e.g. Horná Orava). It lacks some ruderal communities growing in the more humid areas and in higher heights above sea level, such as some associations of the class *Galio-Urticetea* (e.g. *Geranio phaei-Urticetum dioicae, Rumicetum alpini*) and communitites of the class *Epilobietea angustifolii.* On the other hand, ruderal vegetation of Malacky contains thermophilous associations such as *Hordeetum murini*, *Lolio-Cynodontetum dactyli*, *Polygono-Portulacetum oleraceae* (Tab. 2), which were not found in the Horná Orava (Medvecká et al. 2009, 2010). Ruderal vegetation of Malacky differs also from the eastern part of Slovakia, becasuse it misses e.g. association *Convolvulo-Epilobietum hirsuti*, which is spread mailny in the eastern Slovakia (Jarolímek, Zaliberová 2001).

Rare association *Asparago-Chondrilletum juncei* was found in 2015 in Malacky in Továrenská street in the area with sandy substrate and xerotermic character (Tab. 3). Several communities, which are not yet syntaxonomically classified in the Synopsis of synanthropic vegetation of Slovakia (Jarolímek et al. 1997), were recorded: *Cirsium arvense* community [*Artemisietea vulgaris*], *Pastinaca sativa* community [*Dauco-Melilotion*] and *Trifolium arvense* community [*Artemisietea vulgaris*] (Tab. 3). Also some ruderal communities which are not sufficiently documented in Slovakia occurred in the study area: *Geranium pusillum* community [*Stellarietea mediae*] (Tab. 2) and *Saponaria officinalis* community [*Convolvulo arvensis-Agropyrion repentis*] (Tab. 3).

Results of the recent survey revealed, that ruderal vegetation of Malacky consisted of several communities dominated by alien plants. Association *Polygono-Portulacetum oleraceae* formed by archaeophyte *Portulaca oleracea* was relatively abundant in the study area. One stand of this association contained neophytic relative congener *Portulaca grandiflora* (Tab. 2). Ruderal communities dominated by invasive neophyte *Conyza canadensis* (Tab. 2) occupied numerous localities. Neophytic vegetation of the association *Odontito-Ambrosietum artemisiifoliae* (Tab. 2), *Helianthus tuberosus* community [*Senecionion fluviatilis*], *Solidago gigantea* community [*Senecionion fluviatilis*] (Tab. 4) and *Stenactis annua* community [*Dauco-Melilotion*] (Tab. 3) occurred in Malacky in the year 2014 too. None of the above-mentioned ruderal communities dominated by alien plants was recorded in the study area in the past (Krippelová 1972). The fact that these communities are dominated by invasive species could cause their absence in the area in the past and presence in the years 2014 – 2015. Either recently recorded association *Sambucetum ebuli* (Tab. 4), did not occured in Malacky 50 years ago (Krippelová 1972). Expansive species *Sambucus ebulus* dominates in the asociation, which can be probable reason, why the association was not present in the area in the past, but has been recorded in the recent period (Tab. 4).

Species composition of ruderal vegetation of Malacky is similar to that in the other parts of Slovakia with warm climate (Jarolímek et al. 1997). Differences can be found compared to the more humid and colder areas of the country (Hilbert 1981, Jarolímek, Zaliberová 1995, Zaliberová, Jarolímek 1995, Jarolímek et al. 1997, Medvecká et al. 2009, 2010).

Compared to the ruderal vegetation of the class *Polygono arenastri-Poetea annuae* in Horná Orava (Medvecká et al. 2009) and north-eastern Slovakia (Jarolímek, Zaliberová 1995), some of the species growing mostly in the humid soils (e.g. *Agrostis stolonifera*, *Ranunculus repens*, *Rumex obtusifolius*, *Veronica chamaedrys*) were absent in the vegetation of this class in Malacky, but on the other hand, several thermophilic species such as *Cynodon dactylon*, *Digitaria sanguinalis* and *Portulaca oleracea* were more abundant (Tab. 1).

Ruderal vegetation of the class *Stellarietea mediae* of Malacky floristically resembles ruderal vegetation of the other parts of Slovakia (Tab. 2, Jarolímek et al. 1997). Species composition of vegetation of the class *Artemisietea vulgaris* in Malacky (Tab. 3) does not differ from those recorded in the other parts of South Slovakia (Jarolímek et al. 1997). Differences can be found between species composition of vegetation of the class *Artemisietea vulgaris* of Malacky and northern parts of Slovakia (Hilbert 1981,

Zaliberová, Jarolímek 1995, Jarolímek et al. 1997, Medvecká et al. 2009), where hygrophylic species *Alchemilla vulgaris, Aegopodium podagriaria, Angelica sylvestris, Petasites hybridus, Salix fragilis* and species *Rubus idaeus* are common. None of these species were recorded in vegetation of the class *Artemisietea vulgaris* in Malacky (Tab. 3). Species composition of ruderal vegetation of the class *Galio-Urticetea* (Tab. 4) is similar to that recorded in the other warmer areas of Slovakia (Jarolímek et al. 1997). When compared to more humid and mountainous areas of Slovakia (Zaliberová, Jarolímek 1995, Jarolímek et al. 1997, Medvecká et al. 2010), it lacks few hygrophylic species and forest species (e.g. *Agrostis stolonifera, Campanula trachelium, Scrophularia nodosa*).

In comparison to the past (Krippelová 1972), we have also recorded remarkable changes in the species composition of ruderal vegetation of Malacky. In the years 2014 – 2015 archaeophyte *Portulaca oleracea* and invasive neophytes *Ambrosia artemisiifolia* and *Stenactis annua* were present in vegetation of the class *Polygono arenastri-Poetea annuae* (Tab. 1), although none of them occured in this type of vegetation fifty years ago (Krippelová 1972).

Compared to the past, some changes have occured also in the ruderal communities of the class *Stellarietea mediae*. The frequency of occurrence of archaeophyte *Portulaca oleracea* and invasive neophyte *Conyza canadensis* increased (Tab. 2, Krippelová 1972). Species *Conyza candensis* also achieved higher cover-abundance values (Tab. 2) than in the past (Krippelová 1972). Many neophytes (e.g. *Ambrosia artemisiifolia, Bassia scoparia, Chenopodium strictum, Commelina communis, Geranium pyrenaicum, Portulaca grandiflora, Stenactis annua, Viola ×wittrockiana*) were recorded in the vegetation of the class *Stellarietea mediae* only at present (Tab. 2).

There are some differences between past and present in the species composition of the class *Artemisietea vulgaris* too (Tab. 3, Krippelová 1972). In comparison to the past (Krippelová 1972), neophyte *Conyza canadensis* is more frequent and invasive neophytes *Ambrosia artemisiifolia, Negundo aceroides* and *Solidago gigantea* are present nowadays (Tab. 3).

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Abstrakt

V príspevku sumarizujeme výsledky výskumu ruderálnej vegetácie mesta Malacky z rokov 2014 a 2015. Uvádzame fytocenologické tabuľky a zoznam lokalít zaznamenaných zápisov. Celkovo sme zaznamenali 28 ruderálnych spoločenstiev, ktoré patria do fytocenologických tried *Polygono arenastri-Poetea annuae, Stellarietea mediae, Artemisietea vulgaris, Galio-Urticetea* a *Molinio-Arrhenatheretea*. V súčasnosti sa v ruderálnej vegetácii Malaciek vyskytuje aj vzácna asociácia *Asparago-Chondrilletum juncei*, ako aj asociácia *Sambucetum ebuli*, v ktorej dominuje expanzívny druh *Smabucus ebulus* a spoločenstvá inváznych neofytov *Conyza canadensis, Helianthus* a *Solidago gigantea*. Žiadne z uvedených spoločenstiev v Malackách nebolo zistené počas výskumu spred päťdesiatich rokov.

Alena Rendeková: Prehľad ruderálnych rastlinných spoločenstiev mesta Malacky

LET'S GO TO THE FIELD
BOTANICAL EXCURSION 1

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Abstract

This is the first of the series of papers on botanical excursions organized regularly by the Department of Botany. In this volume, we introduce the excursion for students of the first school year of the bachelor study. It is focused on bryophytes and fungi (less algae and myxomycetes) and takes place in the area of the Devínska Kobyla Mts. We demonstrate only such organisms that are relatively easily determinable in the field. Altogether, we present 44 taxa from five different habitats, but most of them from the oak-hornbeam forests (*Carici pilosae-Carpinetum betuli*).

Key words: Slovakia, Devínska Kobyla Mts., Bratislava, fungi, bryophytes, *Carici pilosae-Carpineum betuli*

Introduction

Excursions, fieldwork, field courses and other field elements are fundamental components of education in biology. The field education aims at offering students the opportunity to apply theoretical knowledge, methods and techniques, get knowledge of current research, develop observation skills, practicing both individual work and team work, experience unfamiliar places, make new discoveries, get new impressions, perspectives and ideas (Anonymus 1). It is important to study living organisms in their environment.

As plants are group of a specific topic, we talk about botanical excursions. Historically, such excursions include, except for plants, also algae, bryophytes, fungi (including lichenized fungi) and myxomycetes.

Botanical excursions are part of the curriculum for students of biological study programmes. Recently (following the last accreditation and recognition of studies of the Comenius University in Bratislava, Faculty of Natural Sciences), our Department of Botany organises five fieldwork subjects for students of the study programmes Biology, Systematic biology, Teacher preparation of biology, Paleobiology and Botany: Fieldwork from botany, Fieldwork from botany 1 (non-vascular plants), Fieldwork from botany 2 (vascular plants), Field excursion from botany (these all for bachelor study), and Botany field practice (for master study). The field courses usually take five days in the summer term, in May and June. Most of excursions are provided in the Bratislava City and its surroundings.

The Bratislava City falls within four phytogeographical units (Podunajská nížina Lowland, Devínska Kobyla Mts., Malé Karpaty Mts. and Záhorská nížina Lowland) (Feráková, Jarolímek 2011) and offers various habitats suitable for field excursions, e.g. floodplain areas along the Danube River in the Podunajská nížina Lowland, xerothermic vegetation in the Devínska Kobyla Mts., beech forests at the territory of Malé Karpaty Mts., and anthropogenic stands close to the human habitations in the Záhorská nížina Lowland. From a bryological and mycological point of view, there are several studies from the area of Bratislava (e.g. Janovicová, Kubinská 2003; Janovicová et al. 2003, Mišíková, Kubinská 2010; Mišíková, Jurčišinová 2013; Janitor 1996a, 1996b, Janitor 1997a, 1997b).

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This is the first of the series of papers on botanical excursions organized regularly by the Department of Botany. We introduce the excursion for students of the first school year of the bachelor study. It is focused on mosses and fungi (less algae and myxomycetes) and takes place in the area of the Devínska Kobyla Mts. Overall, 578 cyanobacteria and algae, 477 fungi, 137 lichens, 150 bryophytes and 1570 species of vascular plants have been recorded in the phytogeographical unit of Devínska Kobyla Mts. (Feráková, Kocianová 1997; Feráková, Jarolímek 2011). The bibliography of published records of macrofungi from the Devínska Kobyla Mts. was processed by Ripková, Ďuriška (2009). Ďuriška (2010) and Ďuriška et al. (2012) contributed also by own collections of macrofungi from the field survey in the Fialková dolina Nature Reserve (Devínska Kobyla Mts.).

We hope that our paper, as well as the following ones, will be helpful to other lecturers and students. So, let's go to the field!

Material and Methods

The finds of algae, bryophytes, fungi and myxomycetes demonstrated during the excursion are documented by the specimens deposited in the SLO herbarium (Herbarium of the Department of Botany, Faculty of Natural Sciences, Comenius University in Bratislava). The nomenclature of algae follows Hindák, Hindáková (1998), of bryophytes Kubinská, Janovicová (1998), of non-lichenized fungi and myxomycetes Kirk (2017), of lichenized fungi Guttová et al. (2013) of vascular plants Marhold (1998). The nomenclature of the forest community is based on Boublík et al. (2013). The work by Kalina, Váňa (2010) was used to classify the organisms into the system. The altitude values and geographic coordinates were taken from the Anonymus (2). The map was created using Anonymus (2).

Botanical excursion

The excursion starts at 8 a.m. Our meeting point is in Dúbravka (Bratislava IV administrative district) at the Alexyho Street bus stop (48°11'08.4"N 17°02'17.0"E, 231 m a.s.l.). After a quick greeting, we move quicker along the yellow marked tourist path leading behind the Lidl shopping centre. Passing the ornamental, less useful gardens in the front of houses, we name some of commonly grown plants, e.g. *Hydrangea* sp., *Juglans regia*, *Juniperus communis*, *Persica vulgaris*, *Picea pungens*, *Platycladus orientalis*, *Rosmarinus officinalis*, *Rosa canina* and others.

The first stop at the Koprivnická Street (48°11'07.3"N 17°01'43.0"E, 246 m a.s.l.) is situated near an abandoned garden behind a fence. At this place we inform students about the target groups of organisms and the selected fieldwork area (Fig. 1). We also instruct them about their individual and team work during the excursion. Then we focus students attention to the abandoned garden in which grows some peach trees infected by ***Taphrina deformans*** (Ascomycota, Taphrinales). This fungus causes a disease called peach leaf curl. It is a common springtime disease of peach, nectarine, almond and related ornamental species in unsprayed orchards. *Taphrina deformans* can infect leaves, fruit and young twigs. Infected leaves become distorted, puckered and thickened, initially with a distinct reddish or purple coloration. As infection progresses, affected leaves turn grey and have a powdery appearance as a result of the production of fungal spores on the leaf surface. Finally, these leaves turn yellow to brown and fall down (Anonymus 3). In this garden, there are also some plants of *Vitis vinifera*, a possible host of ***Plasmopara viticola*** pathogen (Oomycota, Peronosporales). Common symptoms include necrosis of the stem or shoot, discoloration including brown spotting (lesions) and yellowish-green tips of the leaves. Grapes may exhibit sporangia and sporangiophores, appearing as whitish coat on the outer surface (Anonymus 4). Almost opposite the first stop, there is a hedgerow of *Rosa* sp. In May, we can observe a "powder" on the plant surfaces, such as leaves, shoots, flowers and buds. They are white conidia of the fungus ***Podosphaera pannosa*** (Ascomycota, Erysiphales), a plant pathogen causing a powdery mildew on members of the family *Rosaceae* (Paulech 1995).

At the K Horánskej studni Street, there is a local park – **the second stop** of our excursion (48°11'07.1"N 17°01'33.4"E, 255 m a.s.l.). There are some climbing frames for children and recently also a woman statue carved out of the dead tree trunk. Reading the lyrics at the foot of this wooden statue, the woman

is Anička changed into maple tree (according to the ballade "Mati diovča sháňa…" by Ján Kollár). We do not know what caused the death of that tree, but it could be the fungus ***Laetiporus sulphureus*** (Basidiomycota, Polyporales), basidiomata of which can be seen on the neighbouring trunk of *Robinia pseudoacacia*. *Laetiporus sulphureus* is one of the most spectacular and easily identifiable bracket fungi. It forms large tiered clusters of fan-shaped basidiomata which are almost yellow-orange and edible when young. Basidiomata of ***Phellinus tuberculosus*** (Basidiomycota, Hymenochaetales) can be seen on the other tree of the park – on the trunk of *Cerasus* sp. in height about two meters above the ground. When we fasten our eyes from the tree-top on ground, we can find ***Coprinellus disseminatus*** (Basidiomycota, Agaricales). As its epithet indicates, basidiomata look like to be disseminated. They grow often in dense clusters on dead hardwood or on soil by dead trees. Parachute-like caps are very little, yellowish grey and deeply pleated. The fairly crowded gills are grey-brown to black, and the slender, fragile stems are off-white.

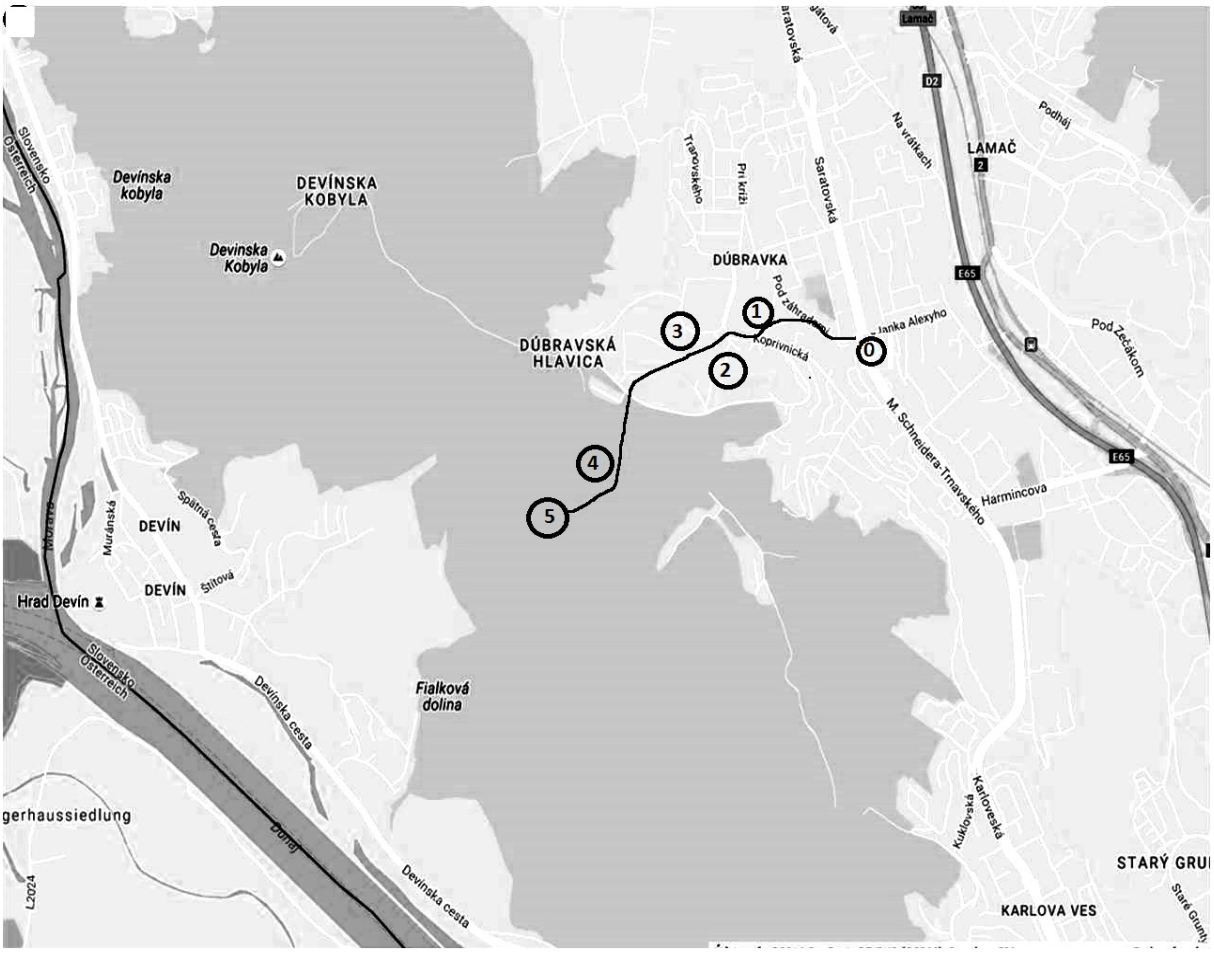

Fig. 1. The excursion trace: 0 – meeting point; 1 – the 1st stop at the Koprivnická Street; 2 – the 2nd stop at the K Horánskej studni Street; 3 – the 3rd stop near the church of St. Cosmas and Damian; 4 – the 4th stop in the oak-hornbeam forests; 5 – the 5th stop at the meadow.

Some other trees in the park are the objects for observation of lichens and mosses. With its distinct yellow-orange coloration of thalli, it is impossible to overlook the lichen ***Xanthoria parietina*** (Ascomycota, Lecanoromycetes). The thallus is foliose, lacking isidia or soredia; orange apothecia are usually present. It grows very commonly on nutrient-enriched bark of tree trunks and branches and stonework. Its accompanying lichens are ***Physcia adscendens*** and ***P. tenella*** (Ascomycota, Lecanoromycetes) with grey, foliose thalli. On the bark of standing trunk of *Robinia pseudoacacia*, there can be seen an epiphytic moss ***Orthotrichum diaphanum*** (Bryophyta, Bryopsida). Thalli with immersed capsules grow on the east side of the trunk, which does not correspond with a general idea that mosses grow on

the north side of trees. It is a good example that a preference of a compass point is influenced by many ecological factors like substrate declination, saturation and others. Not far from the park is a building ground with poor naked soil. There grow tens of thalli of ***Marchantia polymorpha*** (Marchantiophyta, Marchantiopsida). This easily recognizable species is the only frondose liverwort which can be observed during the excursion.

To reach **the third stop** of the excursion, we have to step up the stairs to the church of St. Cosmas and Damian (48°11'05.1"N 17°01'30.7"E, 278 m a.s.l.). The church was built in the year 1720 as a filial church of the parish Devín. The tower, ending with onion-shaped roof covered with shingles, was constructed in 1766. From 1807, the church served as a parish church in Dúbravka (Anonymus 5). The walls of the church are colonized by lichens ***Physcia* spp.**, ***Lecanora dispersa*** and ***Candelariella* sp**. (Ascomycota, Lecanoromycetes).

Close to the church lies the cemetery where is buried Gustáv Husák (* 10.01.1913 † 18.11.1991), a native from Dúbravka district and a former president of Czechoslovakia. The cemetery is surrounded by trees of *Tilia cordata*, and on almost the whole area inside, there grow trees of *Acer platanoides*, *A. campestre*, *Cupressus sempervirens*, *Taxus baccata* and *Chamaecyparis* sp. Several authors evaluated cemeteries as significant habitats for mosses (Bryophyta, Bryopsida) in rural and urban environment (e.g. Fudali 2005, Mišíková, Jurčišinová 2013). Suitable microclimatic conditions and various substrates allow the growth of a number of epiphytes (e.g. ***Orthotrichum affine***), epilithes (***Rhynchostegium murale***, ***Tortula muralis***) and terrestrial species (***Hypnum cupressiforme***, ***Plagiomnium cuspidatum*** and ***P. undulatum***) (Bryophyta, Bryopsida).

From time to time, we can find a fungus of the genus ***Daldinia*** (Ascomycota, Xylariales) in the cemetery. Its ball-shaped black stromata grow on stump of the cut down self-sown woody plant of cf. *Acer* sp. When the spores are mature they are spread across the surface, forming a black powder that coats everything nearby. Stromata cut in half reveal concentric dark and white bands. The ecological role of *Daldinia* is important, as stromata serve as refuges to many arthropodes, and the fungi contribute to the degradation of vegetable organic matter (Yuyama et al. 2013; Evans, Kibby 2004).

The fourth stop of our excursion is situated about 1.5 km southwards of the church (48°10'33.7"N 17°01'01.5"E, 358 m a.s.l.). It is the oak-hornbeam forest of the association *Carici pilosae-Carpinetum betuli*. The tree layer is dominated by *Carpinus betulus*, in some parts of the area also by *Quercus dalechampii* (species of *Q. petraea* agg.). *Tilia cordata* and *Acer campestre* are represented frequently. The tree layer also comprises *Acer platanoides*, *Tilia platyphyllos*, *Fraxinus excelsior* and *Cerasus avium*. In major part of the area, shrub layer is not much preserved. It contains *Sambucus nigra*, *Crataegus monogyna*, *Euonymus verrucosus*, *Viburnum lantana*, *Lonicera xylosteum*, *Corylus avellana*, *Cornus mas*, *Ulmus glabra* and juveniles of *Tilia cordata* and *Acer campestre*. Spring aspect of the herb layer is very significant. It is formed by *Corydalis cava*, *C. pumila*, *Ficaria bulbifera* and *Anemone ranunculoides*. Species *Hepatica nobilis*, *Pulmonaria officinalis* and *Lathyrus vernus* flower here in early spring. In May, flowering *Allium ursinum* cover large area and an invasive species *Impatiens parviflora* also often reaches the high cover in springtime. Summer aspect of the herb layer is dominated by *Melica uniflora*, *Carex pilosa* and/or *Galium odoratum*. Species *Hedera helix*, *Poa nemoralis*, *Viola reichenbachiana*, *Convallaria majalis*, *Dactylis polygama*, *Polygonatum multiflorum*, *Symphytum tuberosum*, *Hieracium murorum* and *Melittis melissophyllum* are regularly represented in the herb layer too.

Forest road leading to the fourth stop of our excursion passes through the similar oak-hornbeam forest with fungi characteristic for this habitat, such as ***Daedalea quercina*** (Basidiomycota, Polyporales). It is easily identifiable by its corky consistency and the pores, which are so elongated and irregular that they look like thick and tough gills. ***Ganoderma lucidum*** (Basidiomycota, Polyporales), unusual and attractive in appearance, is highly appreciated in Asia for medicinal purposes. The surface of its kidney-shaped cap and lateral stipe is shiny, as if lacquered. Both, *D. quercina* and *G. lucidum* grow on wood of broadleaved trees, especially oaks. ***Gymnopus dryophilus*** (Basidiomycota, Agaricales), other common fungus of this oak-hornbeam forest, grows on fallen leaves.

Acrocarpous terrestrial mosses ***Polytrichum formosum*** and ***Atrichum undulatum*** (Bryophyta, Polytrichopsida) are the typical representatives of forest bryophytes. They are very common on the shaded

soil. The pleurocarpous moss ***Hypnum cupressiforme*** (Bryophyta, Bryopsida) grows on various substrates, e.g. tree trunks, dead wood, rocks. Green colour of the tree bark is caused by aerophytic green algae (Chlorophyta) – most frequently of the genus ***Pleurococcus***. Grey to green-grey leprose thallus of lichen ***Lepraria*** sp. (Ascomycota, Lecanoromycetes) occurs often on the trunk basis of oaks.

It is about 11 a.m. when we are at the fourth stop. Till lunch time we have spare time for individual field work. Students set out into the forest with a view to collect the species that have not been demonstrated during the excursion or are of specific student interest.

After about one hour of collecting, we meet all together at the last, **the fifth stop** of our excursion. It is a nearby meadow southward with a nice view of Hainburger Berge Mts. (48°10'31.9"N 17°00'56.3"E, 337 m a.s.l.). The parasitic fungus ***Uromyces pisi-sativi*** (Basidiomycota, Uredinales) grows on this meadow. We can observe its aecidia on lower part of leaves of *Tithymalus cyparissias*. It is interesting to compare the morphologically changed habitus of infected and uninfected plants.

We spread out the material collected by students and altogether describe and identify it. It is an opportunity to touch, smell and to taste the bryological and mycological objects. To be easier learnt, we can couple morphologically similar, though mostly unrelated fungi, e.g. ***Megacollybia platyphylla*** and ***Pluteus cervinus*** (Basidiomycota, Agaricales) – while they both have brownish cap and stem with brown fibres on its white background, they differ in characters of gills. Gills of *M. platyphylla* are widely spaced, adnate, white cream; gills of *P. cervinus* are more crowded, free, cream, later deep pinkish brown. *Megacollybia platyphylla* has also distinctive white rhizomorphs emerging from its stem base. Both species are lignicolous. ***Kuehneromyces mutabilis*** and ***Hypholoma fasciculare*** (Basidiomycota, Agaricales) – it is easy to notice them from a distance as growing in small to large clumps on rotten trunks or stumps of broadleaved tree. Close-up view reveals some differences. The dark brown stem of *K. mutabilis* is distinctly scaly up to a membranous ring at the top, gills are ochre to brown; it is a tasty edible species. On the other hand, stem of *H. fasciculare* is yellow, at the base darker, fibrous, with only a ring-zone becoming brownish with fallen spores, the gills are yellow-green when young, becoming brown with age, the flesh is very bitter and can cause severe stomach upset. ***Schizophyllum commune*** and ***Crepidotus variabilis*** (Basidiomycota, Agaricales) – both species have crepidotoid habitus of basidiomata, characterized by stipe absent or lateral. They have similar whitish caps, but distinctly different gills: they are pinkish grey and longitudinally split (the two sides curling inwards in dry weather) in *S. commune*, but pinkish to brown and not split in *C. variabilis*. ***Hymenochaete rubiginosa*** (Basidiomycota, Hymenochaetales) and ***Stereum hirsutum*** (Basidiomycota, Russulales) – these resupinate to semiresupinate brackets grow on old stumps, trunks and branches of broadleaved trees. Basidiomata of both species are smooth to rugose at their spore-bearing underside and concentrically zoned at the upper surface. The prevailing colour of basidiomata of *H. rubiginosa* is brown to black-brown, but yellow-orange to grey-beige in *S. hirsutum*. ***Polyporus squamosus*** and ***P. badius*** (Basidiomycota, Polyporales) – as said by epithet, *P. squamosus* has cap covered by dark brown scales. The cap of *P. badius* is smooth and red-brown. The number and shape of pores are also the useful characters to distinguish them: pores of *P. squamosus* are honeycomb-like and 1–2 per mm, while pores of *P. badius* are rounded and 5–8 per mm; ***Lycogala epidendrum*** (Myxomycota, Liceales) and ***Hypoxylon fragiforme*** (Ascomycota, Xylariales) – to distinguish these species, it is enough to press their sporocarps: young aethalia of *L. epidendrum* are soft and pink, filled with liquid plasma; they become grey-brown and fragile during the spore maturation. Perithecial stromata of *H. fragiforme* are hard, red-brown to black. While *L. epidendrum* prefers strongly rotten wood of both coniferous and broadleaved trees, *H. fragiforme* grows on freshly dead barked trunks and branches of deciduous trees, especially *Fagus sylvatica*. ***Peziza phyllogena*** (Ascomycota, Pezizales) and ***Auricularia auricula-judae*** (Basidiomycota, Auriculariales) – playing the role of witches, we use to close apothecia of *Peziza phyllogena* (or of some other operculate ascomycetes) into a plastic box. When we open the box and temperature suddenly changes, smoke can be seen rising above the apothecia. Of course, it is not a smoke, but mass of spores which were released from the asci directly into the air. *Peziza phyllogena* grows on strongly rotten wood of broadleaved trees, seemingly on soil. *Auricularia auricula-judae* is a distinctly ear-shaped fungus (we can compare basidiomata with the human ears). Velvety red-brown on the upper side, the inside of the "ear" is somewhat paler and often deeply veined. When fresh, basidiomata have cartilaginous consistency which changes into a crispy one in dry weather

(swelling up again after rain). *Auricularia auricula-judae* grows on standing and fallen broadleaved trees, especially of *Sambucus nigra*.

The excursion is finished with an examination. We choose ten samples of the fungi, bryophytes, algae and myxomycetes that have been demonstrated during our excursion. Students are tasked to name and classify them and describe their distinctive characters. After a concluding evaluation of our excursion we discuss about its advantages and disadvantages with students. Coming back, it is possible to walk the same path or to set contrariwise towards for the Danube River and search for other botanically interesting places within the Bratislava City.

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Abstrakt

Toto je prvý zo série článkov o botanických exkurziách, ktoré pravidelne organizuje naša Katedra botaniky. V tomto čísle predstavujeme exkurziu pre študentov prvého ročníka bakalárskeho stupňa štúdia. Je zameraná na machorasty a huby (menej riasy a slizovky) a koná sa na území Devínskej Kobyly. Demonštrujeme len také organizmy, ktoré sa dajú relatívne ľahko určiť priamo v teréne. Celkovo prezentujeme 44 taxónov z piatich rôznych stanovíšť, ale väčšinu z nich z dubovo-hrabových lesov (*Carici pilosae-Carpinetum betuli*).

Soňa Jančovičová, Ján Miškovic, Katarína Mišíková: Poďme spolu do terénu. Botanická exkurzia 1

RADIOACTIVELY STIMULATED MUTAGENESIS FOR A HIGHER CROP YIELD – PAST AND PRESENT EXAMPLES FROM SLOVAKIA

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Growing importance of experimental mutagenesis induced by radiation was stressed by "International Symposium on Induced Mutation in Plants" organized in August 2008 by IAEA in the UN complex in Vienna where we had for a first time a possibility to present our contribution (Murín, Mičieta 2008). However, the history of this type of research in former Czechoslovakia is dated back to 50s and 60s of the previous century. The first experiments with barley treated by radiation for a better breeding started in 1955 (Peška et al. 1980) and later reported in Proceedings of the conference focused to the role of radiation for the breeding processes that included, apart of general contributions (2×), practical results from wheat (4×), beans (3×), rye (2×), barley, oat, soya, rape, hop and also cherries, apples, roses, strawberries and grass (Peška et al. 1980). These experiments were very popular at that time (radiation was counted for this purpose as more suitable than chemo-mutagenes) and led to several practical outcomes. Breeders in former Czechoslovakia were able to increase the cereal harvest up to 14–47% with radiation, and in addition a better resistance of new varieties to diseases. For breeding of new mutants, characterized by a shorter stalk of 15–20 cm, cobalt ^{60}Co was used.

As it is described in Šeliga (2006): "Irradiation of fruit trees resulted in a shorter maturation time, changes in shape and color of the fruits. There are great opportunities of the stimulating radiation in the cultivation of flowers, where various new colors and unusual shapes of flowers are reachable. Irradiation offered new mutants of cereals with a stronger stalk, resistance to lodging and especially better characteristics of flour. Yields per hectare were also increased. It is similar to experiments with rice, which mutants mature earlier and are more resistant. Remarkable results have been obtained, for example after irradiation of potatoes, where the new varieties were obtained."

Seeds of different crops were irradiated in the past to increase seed germination. A treatment with ionizing radiation is advantageous as the irradiated plant material does not produce harmful substances and does not radiate itself. Very interesting results were reported in last years also with indirect effect of irradiation of particular agricultural species. Technology described by Tóth (2004) used the same method but in more sophisticated way when irradiation was not aimed to the crop species (sugar beet, *Beta vulgaris*) but to the helping species (Swedish turnip or mustard, *Sinapis alba*) that are actually irradiated to strengthen a germination rate of the crop species. Irradiated seeds of Swedish turnip or mustard were then sowed into the seed trench above the seeds of sugar beet in the defined distance. It is recommended to sow 10–12 kg / ha of irradiated seeds of Swedish turnip or mustard in the same row where the seeds of sugar beet are located. In this manner one meter of sugar beet row with an average of 6 seeds will get other 45–55 irradiated seeds of Swedish turnip or mustard. Irradiated seeds germinate simultaneously with beet seeds and help them to get the beet germs effectively to the soil surface. Time of germination of irradiated Swedish turnip or mustard seeds is practically identical to the germination time of beet seeds. The effectiveness of this support is evident especially in extreme climate-soil conditions.

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Plants originating from irradiated Swedish turnip or mustard are developing only until the cotyledon stage. As a result of the targeted irradiation, seed germination capacity is maintained, but growth cone and other tissues are damaged so much, that the plants will not develop. On the contrary, sugar beet plants grow further, develop and lift-up without changes. Irradiated Swedish turnip or mustard are thus not a concurrence to a sugar beet crop and depending on weather conditions end their development in the cotyledon stage, a week or two after their germination. Only complete sugar beet crop remains. Advantages of this technology are especially in increasing the number of emerged plants of sugar beet by 10–30% in comparison to the adverse conditions. Young plants of sugar beet also have stimulated root growth.

We would also like to mention a recent series of experiments by Gajdošová et al. (2004, 2007), Múdry, Gajdošová (2010) and Hricová et al. (2010, 2011a,b) with *Amaranthus* species. In the first mentioned report Gajdošová et al. (2004) followed the attempts of previous authors (e.g. Slabbert et al. 2003, Gómez et al. 2006) in genetic improvement of under-utilized and neglected crops like *Amaranthus* through irradiation and related techniques.

Gajdošová et al. (2007) and later Múdry, Gajdošová (2010) reported their aim to map two species – *Amaranthus cruentus* L. (genotype Ficha) and genotype K-433 (*A. hypochondriacus* L. x *A. hybridus* L.) to improve their lines by mutagenesis stimulated by gamma rays. Resulting lines are characterized by a good seed quality and quantity, suitable for food production. For the mapping the basis of enzymes present (ACP, ADH, CAT, DIA, GLU, GOT, IDH, MDH, PGD, PGI and PGM) they used polymorphism horizontal starch gel electrophoresis. All genotypes possessed the same polymorphism, with the exception of the lines derived by mutagenesis from genotype K-433. These lines differ from others genotypes in PGM polymorphism. The results support the idea of interspecies sensitivity of amaranths to mutagenesis by means of enzyme polymorphism. Gamma rays mutagenesis is one of the ways which may change enzyme polymorphism in amaranth species, too.

Gajdošová et al. (2007), Hricová et al. (2010) and Kečkešová et al. (2010) compared amaranth mutant lines obtained by radiation mutagenesis with controls of some biochemical traits. Three lines C26/2, C82/1, C236/1 and line D54/1 were found to be most promising because of high coefficient of nutritive quality. Oxalic acid was lowest in D282/1 followed by C236/1. Considering overall nutritional values, line C236/1 is most promising genotype that could be used in breeding programmes.

During the years 1998–2010, twelve generations of mutant lines with their untreated counterparts were established by Hricová et al. (2011a). The phenological observations were performed during all vegetation periods, and selection of desired traits was done starting in the M2 generation. The negative plants (plants with weak seedling growth, non-uniform flowering and seed maturation, with abundant leafiness in the inflorescence area, low size of seeds, etc.) were removed and only plants with positive traits were collected. The WTS was recorded and statistically evaluated. Finally, 3 mutant lines of *A. cruentus* and 1 line of hybrid K-433 with significantly increased WTS were selected with an obvious tendency to stabilization of this trait when compared to untreated controls and to the samples of the previous generations.

Finally Hricová et al. (2011b) continued the experiments with induced mutagenesis by experimental irradiation with promising results in nutrition improvements of amaranths. This time it was again the mutant line C82/1 that showed higher yields of albumins and globulins with optimal rate of essential amino acids.

The above mentioned experiments of authors from Institute of Plant Genetics and Biotechnology (Slovak Academy of Sciences, Nitra) and Faculty of Biotechnology and Food Sciences (Slovak Agriculture University, Nitra) are in frame of world-wide attempts to introduce *Amaranthus* and other rare crop plant species into the regular production thanks to the radiation-induced mutation techniques (e.g. see Matsukura et al. 2007; Gomez-Pando, Eguiluz-de la Barra 2013; Gomez-Pando 2014).

However, our experience from field studies showed a different picture in terms of plant's response to the irradiation. It is well known from the Chernobyl case that plants are able not only to resist high radiation doses, but after years they may develop a significant adaptability to it (Klubicová et al. 2010). We reported similar findings for wild plant species after more than 30 years of radiation contamination caused by nuclear accident in NPP Jaslovské Bohunice, Slovakia (Murín, Mičieta 2009; Mičieta, Murín 2014).

There were also attempts in the past to experiment with hormesis, but later abandoned due to following difficulties (prof. J. Lipka, in litteris):

1. technical difficulties to obtain a homogenously irradiated set of seeds
2. technical difficulties with finding and optimal dose
3. a remarkable radio-resistance caused very probably by adaptation.

Furthermore, information about experiments with new mutants obtained by irradiation and their practical use were in the past (before 1989) kept inside the "communists block of countries" and even inside of this circle results were not widely published. Moreover, these "successful" examples might be affected by that time frequently used propaganda.

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Abstrakt

V stručnom prehľade predstavujeme minulé a súčasné príklady zo Slovenska, kedy boli vykonávané pokusy pomocou rádioaktivity zvýšiť úrodnosť konkrétnych plodín. Tieto pokusy začali už v 50. rokoch a trvajú dodnes s nejednoznačnou úspešnosťou.

Gustáv Murín, Karol Mičieta: Rádioaktívne stimulovaná mutagenéza za účelom vyššej úrody – minulé a súčasné príklady zo Slovenska

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