Distributions of vascular plants in the Czech Republic. Part 10

Rozšíření cévnatých rostlin v České republice. Část 10

Zdeněk Kaplan[1,2], Jiří Danihelka[1,3], Pavel Dřevojan[3], Radomír Řepka[4], Petr Koutecký[5], Vít Grulich[3] & Jan Wild[1]

[1]*Czech Academy of Sciences, Institute of Botany, Zámek 1, CZ-252 43 Průhonice, Czech Republic, e-mail: kaplan@ibot.cas.cz, danihel@sci.muni.cz, wild@ibot.cas.cz;* [2]*Department of Botany, Faculty of Science, Charles University, Benátská 2, CZ-128 01 Prague, Czech Republic;* [3]*Department of Botany and Zoology, Faculty of Science, Masaryk University, Kotlářská 2, CZ-611 37 Brno, Czech Republic, e-mail: pavel.drevojan@seznam.cz, grulich@sci.muni.cz;* [4]*Department of Forest Botany, Dendrology and Geobiocenology, Faculty of Forestry and Wood Technology, Mendel University, Zemědělská 3, CZ-613 00 Brno, Czech Republic, e-mail: repka@mendelu.cz;* [5]*Department of Botany, Faculty of Science, University of South Bohemia, Branišovská 1760, CZ-370 05 České Budějovice, Czech Republic, e-mail: kouta@prf.jcu.cz*

Kaplan Z., Danihelka J., Dřevojan P., Řepka R., Koutecký P., Grulich V. & Wild J. (2021) Distributions of vascular plants in the Czech Republic. Part 10. – Preslia 93: 255–304.

The 10th part of the series on the distributions of vascular plants in the Czech Republic includes grid maps of 44 taxa in the genera *Carex*, *Colchicum*, *Cytisus*, *Draba*, *Dracocephalum*, *Jurinea*, *Klasea*, *Lactuca*, *Onopordum*, *Petrorhagia*, *Serratula*, *Silybum* and *Xanthium*. These maps were produced by taxonomic experts based on examined herbarium specimens, literature and field records. Both native and alien species are represented. Particular attention was paid to critically threatened species. *Carex macroura* has been documented in the Czech Republic from only two populations in northern Bohemia. The nearest populations in its core range in Russia are separated by a gap of about 2,500 km. *Dracocephalum austriacum* has been recorded at about 14 sites, with the majority of populations confined to the karst area of Český kras in central Bohemia. About 25 populations of *Jurinea cyanoides* were known in the past in the Labe river basin in central Bohemia. Of these, only one population has survived but it is declining despite intensive conservation management. The facultative halophyte *Lactuca saligna* has been recorded at more than a hundred sites in the past but was observed at only nine sites in 2020. In contrast, the previously rare *Draba muralis* and *D. nemorosa* have spread along railways during the past decades. Several neophytes, including *Dracocephalum thymiflorum* and *Lactuca tatarica*, have accidentally been introduced with grain or iron ore from the former USSR during the second half of the 20th century. Some archaeophytes, such as *Lactuca serriola* and *Onopordum acanthium*, are naturalized and widespread in this country, others, such as *Xanthium strumarium*, used to be established and rather frequent in the past but have declined sharply due to changes in land use. Two species are reported here as new for the Czech flora. *Carex agastachys* was identified as a result of examination of herbarium specimens formerly assigned to *C. pendula*; it is distributed mainly in the Carpathian part of this country. The Mediterranean species *Petrorhagia dubia* is reported here as a new alien species in the Czech Republic, identified based on revision of a herbarium specimen collected in 1934 in the city of Brno. In contrast, examination of herbarium specimens of *Xanthium* revealed that *X. orientale* was reported erroneously from the Czech Republic, based on misidentification of *X. saccharatum*. Spatial distributions and often also temporal dynamics of individual taxa are shown in maps and documented by records included in the Pladias database and available in electronic appendices. The maps are accompanied by comments that include additional information on the distribution, habitats, taxonomy and biology of the taxa.

doi: 10.23855/preslia.2021.255

Keywords: alien species, central Europe, chorology, Czech Republic, distribution atlas, distribution patterns, endangered species, endemic, flora, grid maps, herbaria, phytogeography, plant records, vascular plants

Introduction

Since the plant occurrence module within the Pladias database (Wild et al. 2019, Chytrý et al. 2021) was launched and mapping of plant distributions in the Czech Republic was initiated in 2014, grid-based distribution maps of 861 vascular plants have been produced and published (Kaplan et al. 2015, 2016a, b, 2017a, b, 2018a, b, 2019b, 2020). New occurrence records are continuously collected from herbarium specimens, which are examined by a team of taxonomic experts, and together with unpublished field data and the records extracted from the literature they are imported to the database. All these records are critically evaluated and sorted in the data management module. Maps for a further 44 taxa were finished by the end of January 2021 and are included in this paper.

Both native and alien species are represented in this tenth part of the mapping series. Detailed analysis of distribution and decline is particularly important for the critically threatened species included. These comprise species that are rare (*Carex macroura*, *Dracocephalum austriacum*, and until recently also *Draba nemorosa*) or have experienced considerable decline and now have small population sizes and are on the verge of extirpation in this country (*Jurinea cyanoides* and *Lactuca saligna*). Four additional species are classified as endangered (*Carex alba*, *Draba muralis*, *Jurinea mollis* and *Klasea lycopifolia*) and seven as vulnerable (*Carex ornithopoda*, *C. rhizina*, *C. supina*, *Cytisus procumbens*, *Lactuca perennis*, *L. quercina* and *L. viminea*).

The diversity of the alien flora has changed as well. While some archaeophytes, such as *Lactuca serriola* and *Onopordum acanthium*, are naturalized and widespread in this country, others, such as *Xanthium strumarium*, had been established and rather frequent in the past but have strongly declined during the second half of the 20th century due to intensification of agriculture and changes in the management of public places in villages. Neophytes have various modes of introduction. For example, *Dracocephalum thymiflorum* and *Lactuca tatarica* have accidentally been introduced with grain or iron ore from the former USSR, while *Dracocephalum moldavica* and *Lactuca virosa* used to be grown and occasionally escaped from cultivation.

Besides collecting plant distribution records and preparation of maps, the taxonomic diversity has also been re-evaluated, resulting in new discoveries in four genera, with three of the species mapped in this paper have only recently been discovered in the Czech Republic. The recent taxonomic revision of *Carex* sect. *Rhynchocystis* (Míguez et al. 2018) prompted a re-evaluation of the Czech material. The previous concept of *C. pendula* was found to have comprised two species in this country, *C. agastachys* and *C. pendula* s. str., with the former being considerably more frequent than the latter. *Dracocephalum parviflorum* was recognized in previously misidentified herbarium material (Danihelka 2019a). The Mediterranean species *Petrorhagia dubia* is in this paper for the first time reported as a casual neophyte of the Czech flora. In contrast, the examination of herbarium specimens revealed that *Xanthium orientale* was reported erroneously from the Czech Republic, based on misidentified plants of *X. saccharatum*.

Materials and methods

Taxonomic scope

The following groups of vascular plants are mapped: native taxa, naturalized aliens, most casuals and certain hybrids. Distribution maps are produced for species and subspecies, and in exceptional cases also for varieties or infrageneric taxa (e.g. sections). Plants of species groups that are difficult to assign to species may be mapped as species aggregates. Field crops and plants deliberately cultivated in gardens and parks are not included in the mapping project. Nomenclature, taxonomic concepts and delimitation of species aggregates mostly follow Kaplan et al. (2019a), with differences indicated where necessary. For taxa not included in that source, a taxonomic reference is given. Publication of maps does not follow any alphabetical or systematic order, but mainly the maps resulting from recent revisions are included.

Data sources

All relevant floristic data sources are used. Major national herbaria and some local collections, incl. BRNL, BRNM, BRNU, CB, CBFS, CESK, CHEB, CHOM, FMM, GM, HOMP, HR, KHMS, LIM, LIT, MJ, MMI, MP, MZ, NJM, OL, OLM, OMJ, OMP, OP, OSM, OVMB, PL, PR, PRA, PRC, ROZ, SOB, SOKO, SUM, VM, VYM and ZMT (acronyms follow Thiers 2021), were consulted as the main sources of taxonomically examined records. Most records for maps of common and easy-to-identify taxa came from the Pladias database (Wild et al. 2019, Chytrý et al. 2021), which has integrated data from five large national databases, several regional projects and unpublished field records from the maps' authors and regional contributors.

Mapping procedure

All records used for mapping are entered into the Pladias database and geographically sorted according to the traditionally used CEBA (Central European Basic Area) grid template (Niklfeld 1999) divided into quadrants of 5 × 3 arc minutes (corresponding to approximately 5.5 × 5.9 km). The territory of the Czech Republic is covered by 2551 quadrants, of which 2181 are completely within the borders of this country. Individual records and the whole distribution of each taxon are checked and evaluated by the author of a particular map in a web-based mapping interface of the Pladias database. Maps of taxonomically critical groups are based solely or mainly on herbarium specimens examined by taxonomic experts; these cases are indicated in the text accompanying the particular map. Maps of all other taxa are based on records from databases, literature and herbaria, which were scrutinized by the authors of the respective maps. Records used for producing maps are listed in Electronic Appendices 1–44. In selected maps, native versus introduced occurrences are distinguished, and corresponding records in the database classified accordingly. Draft distribution maps and the background records are released in a web-based review process for scrutiny by field botanists, regional collaborators and members of the Czech Botanical Society. Their comments and additional records are collected in the database and returned to the responsible specialists for consideration before producing the distribution maps.

Final maps and comments

The treatment of each taxon consists of a grid distribution map and accompanying text; the maps' authors, indicated in the figure captions, also had major roles in writing the first drafts of the texts for the subject taxa. Maps are displayed using a spherical Mercator projection (EPSG:3857) in which meridians and parallels appear as straight lines, and the fields of the mapping grid are thus displayed as squares. The background relief was derived from SRTM data (http://www2.jpl.nasa.gov/srtm/, the version provided by http://srtm.csi.cgiar.org) and the river network was adapted from data provided by CENIA (www.cenia.cz). When appropriate, different symbols are used on the maps to distinguish between the following alternative attribute states: (1) recent versus old records, (2) native occurrences versus introductions, and (3) records based on examined herbarium specimens versus all other records. These classifications of records are used only for those taxa where such distinction provides important information and the amount and quality of records are sufficient. The mapping symbols used to indicate the different attributes of the records in particular grid cells are shown in Table 1. Symbols specific to individual maps are explained in their captions. To save space, rare taxa of the genera *Carex*, *Draba*, *Dracocephalum*, *Lactuca* and *Petrorhagia* with distinct distributions are shown in maps in groups of two, with symbols and annotations of individual taxa on the maps distinguished using different colours. In the caption for each map, the counts of occupied quadrants are indicated according to the symbols used in the map; uncertain occurrences are not included in the counts. The accompanying text includes the accepted scientific name, a brief outline of the total distribution, information on habitats occupied by the species and a description of its distribution in the Czech Republic. Where appropriate, comments on taxonomy, biology and details of the spatial and temporal dynamics of the distribution are given.

Table 1. – The symbols used in the distribution maps to indicate the different attributes of occurrence in particular grid cells.

Attribute distinguished	Symbol	Attribute state
None	●	All records
Time	●	Recent occurrence (at least one record since 2000)
	◍	Old occurrence (all records before 2000, or demonstrably extirpated from all localities after 2000, or all records undated)
Origin	●	Native (at least one record)
	×	Alien
Source of data	●	Examined herbarium specimen (at least one record)
	▲	All other
All	?	Only record(s) uncertain regarding identification and/or locality

Distribution maps and comments

Carex alba (Fig. 1)

Carex alba is a Eurasian species whose distribution consists of two major parts. The European part is discontinuous: the occurrences are concentrated in the Pyrenees, the Alps, the Carpathians and in the mountains of the Balkan Peninsula. The Asian part of its range extends from central Siberia to Mongolia, north-western China and Kyrgyzstan. Outposts are in the northern part of European Russia, in the Ural Mts, the Caucasus Mts and western Siberia (Meusel et al. 1965, Egorova 1999). The similar and closely related *C. ussuriensis* is distributed in the Far East (Egorova 1999). In the Czech Republic *C. alba* is found in shrub communities and open-canopy forests, predominantly on basic substrates such as basic sandstone, limestone, tufa formations, and rarely also serpentine, usually in semi-shady habitats. It is very rare in this country: it is known from one site in south-western Bohemia (near the town of Sušice), one site in south-western Moravia (near the village of Hrotovice), one site in southern Moravia (near the town of Kyjov) and about a dozen sites (with rather small populations) in the Bílé Karpaty Mts in south-eastern Moravia (Grulich et Řepka 1998). These sites are at elevations 350–600 m. *Carex alba* is classified as endangered due to its rarity (Grulich 2012).

Carex digitata (Figs 2–4)

Carex digitata is a European and West Siberian species. Its more or less continuous range extends from France in the west across central Europe to the Balkan Peninsula, towards the south extending to northern Greece and Istanbul. In northern Europe it occurs in Denmark and Scandinavia (crossing the Arctic Circle these); in eastern Europe it is found in the Baltic countries, Belarus, Ukraine (incl. Crimea) and European Russia up to the Ural Mts. Outposts are in the Pyrenees and England. In Asia *C. digitata* is found in western Siberia, the Caucasus Mts, Transcaucasia, Turkey and northern Iran. In the Far East it is replaced by the closely related *C. quadriflora* (Meusel et al. 1965, Hultén & Fries 1986, Egorova 1999). *Carex digitata* is a rather polymorphic species. Scandinavian botanists (Fristedt 1857, Harmaja 1986, Niordson 1990) have observed differentiation in several morphological features, based on which *C. digitata* var. *pallens* was described. Their results were applied to the populations in central Europe by Holub (1991) and Tyler (2003). Plants with the characters of *C. digitata* var. *pallens* occur within the species' range without a clear geographical pattern. They have been recorded in central and northern Sweden, central and southern Finland and the adjacent Saint Petersburg region in Russia (Harmaja 1986, Niordson 1990), in Poland (Szeląg 2001), the Czech Republic, Slovakia (Holub 1991), Slovenia and Montenegro (Harmaja 1990, Holub 1991). The full extent of the distribution of var. *pallens* is poorly known, but it seems to occur through almost the entire range of the species.

Although some authors distinguish *C. digitata* var. *pallens* as the separate species *C. pallidula*, for taxonomic, geographical and ecological reasons we have adopted the rank of variety. In the Czech Republic plants corresponding to both varieties sometimes co-occur, mainly in central and south-western Bohemia. Other plants cannot be clearly assigned to one of the varieties as they combine characters of both (mainly the colour of the bracts under female spikelets and the shape of the perigynium beak). Such transitions

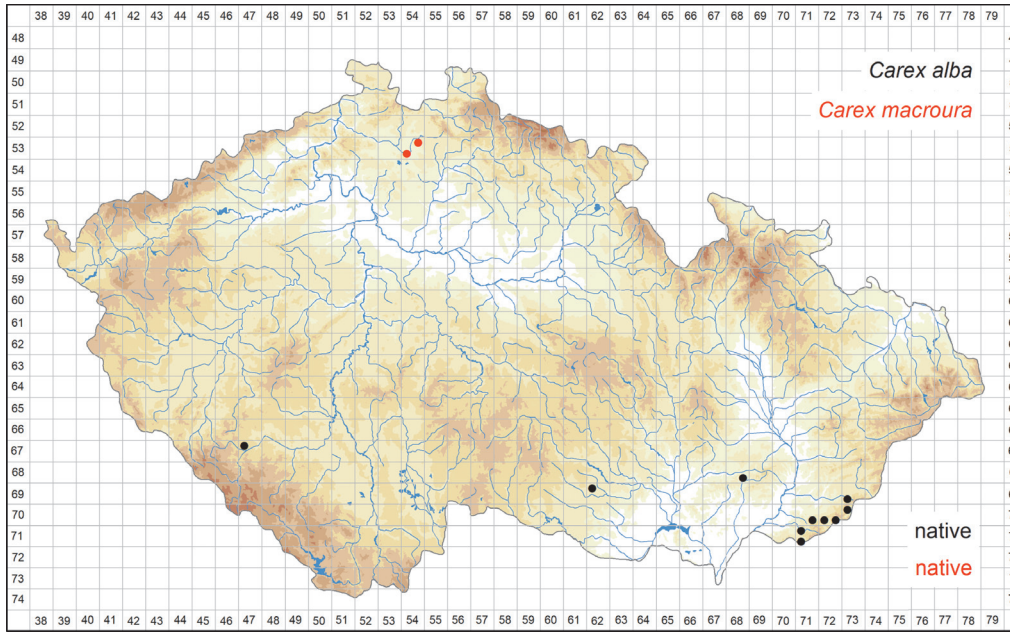


Fig. 1. – Distribution of *Carex alba* (10 occupied quadrants) and *C. macroura* (2 occupied quadrants) in the Czech Republic. Prepared by Vít Grulich & Radomír Řepka.

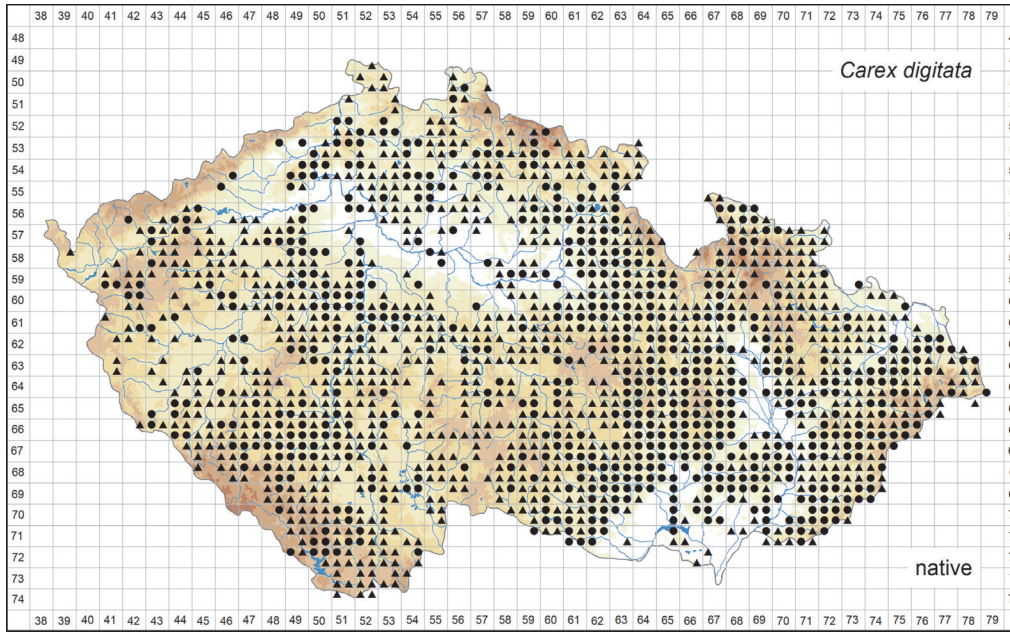


Fig. 2. – Distribution of *Carex digitata* in the Czech Republic: ● occurrence documented by herbarium specimens (628 quadrants), ▲ occurrence based on other records (965 quadrants). Prepared by Radomír Řepka & Vít Grulich.

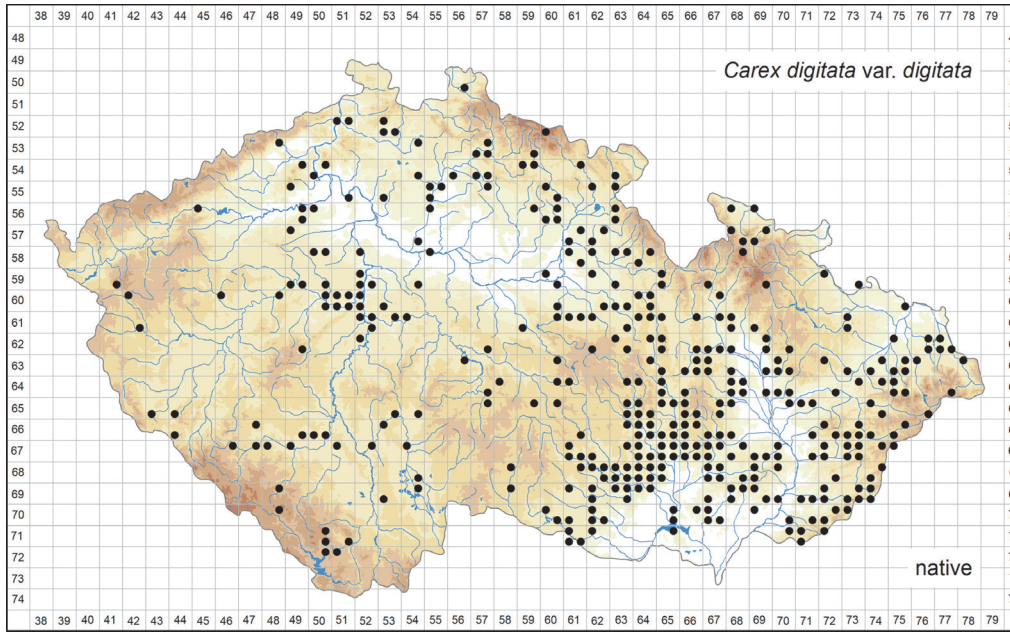


Fig. 3. – Distribution of *Carex digitata* var. *digitata* in the Czech Republic (384 occupied quadrants). Prepared by Radomír Řepka & Vít Grulich.

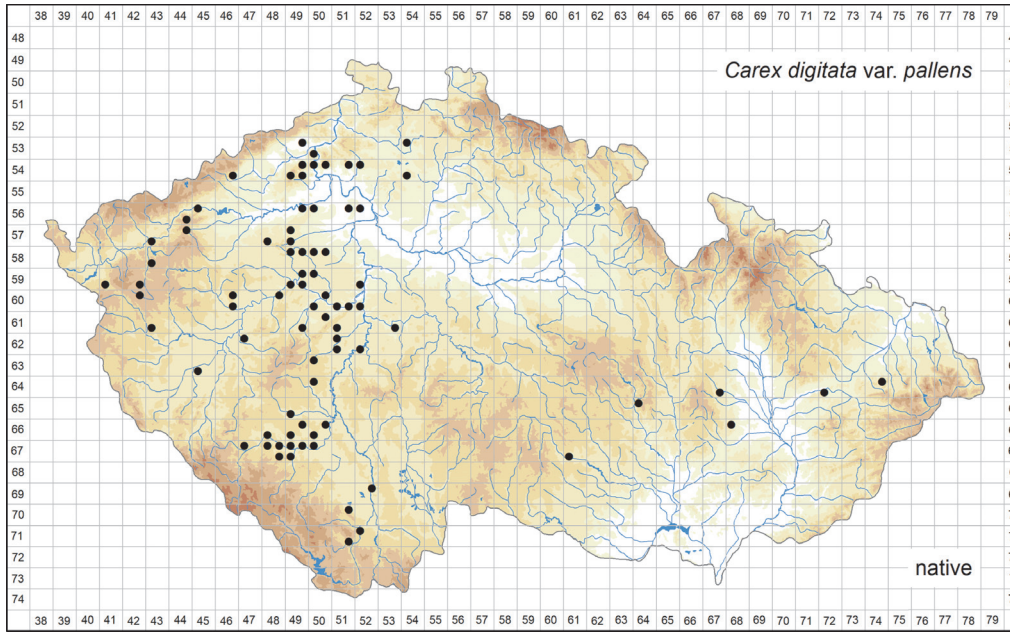


Fig. 4. – Distribution of *Carex digitata* var. *pallens* in the Czech Republic (80 occupied quadrants). Prepared by Radomír Řepka & Vít Grulich.

were recorded at about 140 sites throughout this country. They co-occur with one or the other variety, rarely with both varieties together. Their taxonomy requires a more detailed study.

In the Czech Republic *C. digitata* grows most often in oak-hornbeam and beech forests, sometimes in mixed or coniferous forests, and rarely also in shrub communities, forest fringes and on rocky slopes. It is found on mineral-rich or basic bedrock, less frequently on acidic igneous rocks on loamy, sometimes stony soils rich in humus. *Carex digitata* is widespread in the hills and foothills throughout this country (Fig. 2), reaching its elevational maximum at about 1100 m in the Krkonoše Mts. It is absent or rare in the floodplain areas of the lowlands (as it does not tolerate high groundwater levels and flooding) and in deforested areas with prevailing arable land. It rarely occurs in the Šumava, Krkonoše and Hrubý Jeseník Mts, mostly on basic bedrock, but is absent from other mountain ranges in this country. *Carex digitata* seems to be rare in western Bohemia, which may also be an artefact of the absence of records, and in many places of the Českomoravská vrchovina highlands, where deciduous forests have been converted to Norway spruce plantations. *Carex digitata* var. *digitata* is probably widespread and at least locally common in the Czech Republic. However, it is a little-collected taxon and, consequently, the distribution map of this variety (Fig. 3), based solely on examined herbarium specimens, is far from representative.

In the Czech Republic *C. digitata* var. *pallens* has a narrower ecological niche than var. *digitata*, with its occurrence more tightly associated with calcareous or base-rich bedrock (basalt, limestone, marlite, marlstone, serpentine) and non-forest habitats such as dry grasslands. It is scattered mainly in the western half of Bohemia, west of the Vltava river. Its occurrences are grouped in the České středohoří Mts around the town of Děčín and the city of Ústí nad Labem, in the Džbán hills, the Český kras karst area, the Doupovské hory Mts, the Křivoklátsko area, the foothills of the Šumava Mts and along the middle section of the Vltava river valley. In Moravia, this taxon has been recorded at only six sites, three of them with limestone bedrock. Although Holub (1991) believed that this taxon avoids the Atlantic type of climate, its distribution in the Czech Republic (Fig. 4) suggests a tendency towards a sub-Atlantic climate. The distribution map of *C. digitata* var. *pallens* is based exclusively on examined herbarium specimens. The map of the entire species (Fig. 2) includes all the available literature and database records of this species as well as all herbarium records that could not be identified to varieties and data accepted for the varieties.

Carex humilis (Fig. 5)

The range of *Carex humilis* in Europe stretches from northern and eastern Spain to the Don river basin in Ukraine, with outposts in the central Volga river basin, northwards to south-western England, central Germany and southern Poland, and southwards to central Italy and northern Greece (Meusel et al. 1965). In Asia it is found in the foothills of the Caucasus Mts and in Transcaucasia, in western Siberia and the Altai Mts. The range of the similar, closely related species *C. nanella* is confined to eastern Asia (Egorova 1999). In the Czech Republic *C. humilis* occurs mainly in various types of dry grassland on stony slopes, loess or sand and in open-canopy thermophilous oak and pine forests and their fringes. It grows on both acidic and basic soils, the latter preferred at middle elevations. It

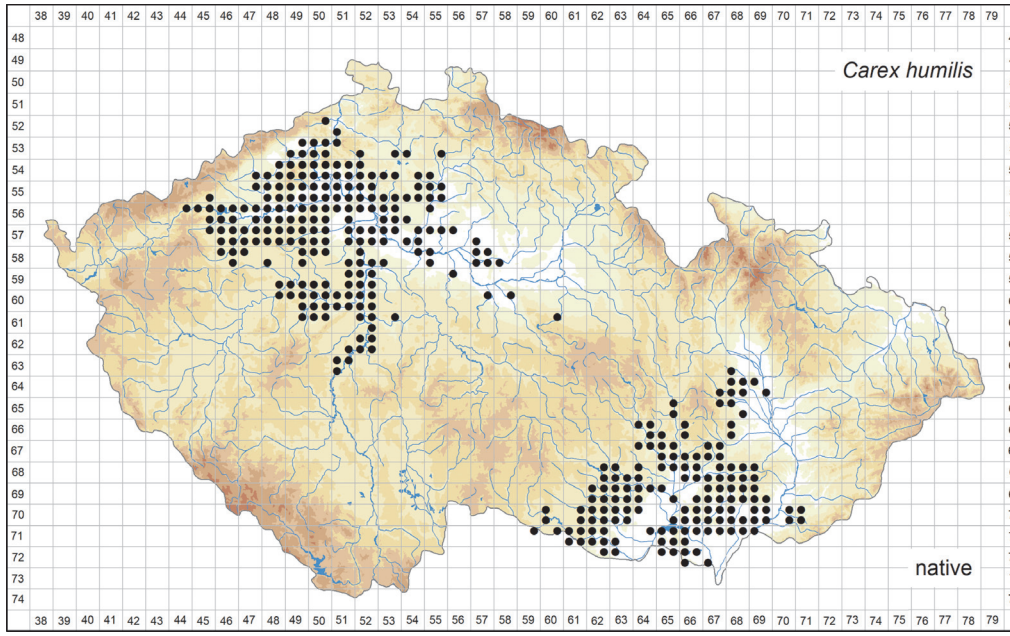


Fig. 5. – Distribution of *Carex humilis* in the Czech Republic (352 occupied quadrants). Prepared by Vít Grulich & Radomír Řepka.

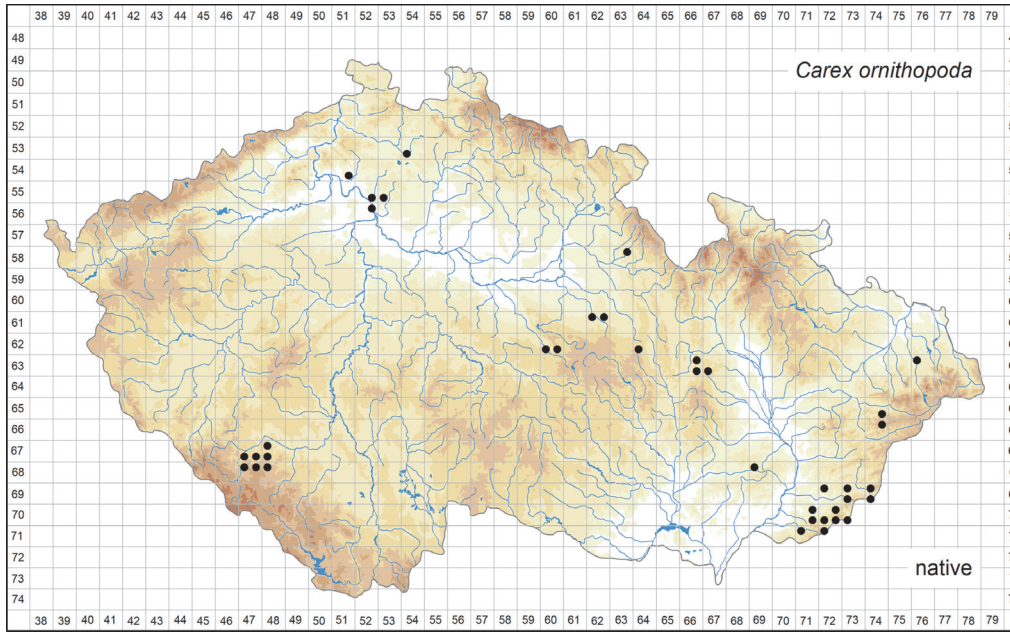


Fig. 6. – Distribution of *Carex ornithopoda* in the Czech Republic (38 occupied quadrants). Prepared by Vít Grulich & Radomír Řepka.

is found in the lowlands and hilly areas, reaching its elevational maximum at about 700 m on Mt Milešovka in the České středohoří Mts. In the Czech Republic this species occurs in the areas with rather warm, dry climates. Most of the occurrences in Bohemia are in its central and north-western parts (Toman 1970), although several populations exist in adjancent parts of northern and eastern Bohemia. In Moravia most of the occurrences are situated in its southern and central parts, northwards reaching the vicinity of the city of Olomouc. It rarely occurs also in the foothills of the westernmost part of the Bílé Karpaty Mts. *Carex humilis* is classified as of lower risk – near threatened (Grulich 2012).

Carex macroura (Fig. 1)

Carex macroura is a member of the *C. pediformis* group, which comprises about 12 taxa distributed mainly in Siberia, Mongolia and the Russian Far East (Malyshev 1990), some of them poorly morphologically delimited and in need of taxonomic revision. The continuous range of *C. macroura* is situated in easternmost Europe and Siberia, extending from the Republic of Tatarstan in the west as far as the floodplains of the Ussuri river in the Russian Far East, southwards extending to Kazakhstan, Mongolia and north-eastern China (Egorova 1999). Two very remote populations exist in central Europe in Bohemia, separated by a gap of about 2,500 km from the nearest populations in Russia. Both populations are found in northern Bohemia in the vicinity of the town of Mimoň. The occurrence in the foothills of Mt Ralsko was discovered in 1860 and is still extant. Plants from this locality were identified as *C. macroura* during the 1920s (Podpěra 1928). The other population is situated roughly 7 km from the former and was found about 30 years ago (Rychtařík 1990). Both populations occur in open-canopy stony pine forests on calcareous sandstones at elevations of 320–360 m. It is considered a critically threatened species due to its rarity (Grulich 2012).

Carex ornithopoda (Fig. 6)

Carex ornithopoda is mainly a European species, towards the south extending to northern Spain, central Italy, Albania and Bulgaria, and towards the north to England, Norway, Sweden and southern Finland and the surroundings of the city of Saint Petersburg in Russia; outside Europe it is found in Anatolia. In the southern parts of its distribution range it occurs mainly in the mountains. A large gap in distribution is situated between the central-European mountains and Scandinavia. The closely related and similar *C. ornithopodioides* is endemic to the Alps (Koopman 2011). Plants from south-western Bohemia resemble the latter species by the colour of the glumes of the female spikes, but in other characters they correspond to *C. ornithopoda*. In the Czech Republic this species prefers short grasslands or semi-shady oak or pine forests and their fringes, predominantly on calcareous bedrock such as limestone or marlstone. In this country *C. ornithopoda* is a rare species. A few populations are found in south-western Bohemia near the town of Sušice and in northern Bohemia between the towns of Litoměřice, Česká Lípa and Mělník. Isolated occurrences exist in the foothills of the Orlické hory and Železné hory Mts. In Moravia, the populations are scattered in its central and north-eastern parts, mostly in the Bílé Karpaty Mts. The occurrences of *C. ornithopoda* are situated at elevations of 230–800 m. It is classified as vulnerable because of its rarity (Grulich 2012).

Carex pendula agg. (Figs 7–9)

The taxonomy of *Carex* sect. *Rhynchocystis*, to which *C. pendula* is classified, has recently been revised by Míguez et al. (2018). It includes six species, of which three occur in Europe. While *C. microcarpa* is confined to Sardinia and Corsica, *C. agastachys* and *C. pendula* s. str. occur in central Europe and, based on the revision of herbarium specimens, also in the Czech Republic. According to Míguez et al. (2018), the name *C. pendula* is based on plants collected in England and refers to the populations found in western Europe including the Iberian Peninsula, in the Mediterranean area (incl. northern Africa and Macaronesia) eastwards to Cyprus and extending northwards to central Germany, the northern foothills of the Alps and north-western Hungary. The closely related *C. agastachys*, described from north-western Germany, is found in central and eastern Europe, the Balkan Peninsula, and to the east extending as far as to the Caucasus Mts and Iran. However, in central and south-eastern Europe the distributions of these two taxa are not sharply separated.

Both *C. agastachys* and *C. pendula* are woodland species, most often found in forest springs and on banks of forest streams, in ditches along forest roads and in wet clearings. In addition, *C. agastachys* occurs in disturbed places used for temporary storage of logs. Both species grow on wet to damp soils that are rich in bases and nutrients, most often on marlstone, claystone and sandstone.

In the Czech Republic *C. agastachys* is common in the Carpathian part of the country, while it is scattered or rare elsewhere (Fig. 8). In Moravia additional sites are found north of the city of Brno and in the Žďárské vrchy hills. A zone of occurrences stretches out from eastern Bohemia (vicinity of the town of Svitavy) towards the north-west across the foothills of the Krkonoše Mts to northern Bohemia. It rarely occurs also in the České středohoří Mts, Džbán hills, Brdy Mts and the Českomoravská vrchovina highlands. In western and southern Bohemia this species occurs scattered in the Český les and Šumava Mts. The elevational range of *C. agastachys* is 150–900 m.

Carex pendula has a substantially narrower distribution in the Czech Republic (Fig. 9). Its occurrences are concentrated in northern Bohemia (about 10 sites in the surroundings of the towns of Chřibská, Česká Kamenice and Děčín), in the Bílé Karpaty Mts at the Moravian-Slovak border (2 localities), the Hostýnské vrchy Mts (3 sites) and the Beskydy Mts (1 site) in eastern and south-eastern Moravia. Individual occurrences are documented further east in Slovakia. The elevational range of this species is 305–525 m.

Both species are grown ornamentally at garden ponds and along streams and spread rarely within the immediate vicinity as has been documented for *C. pendula* in the city of Brno, town of Lázně Bohdaneč and the village of Průhonice near Prague.

Examination of the Czech plants has shown that some of the features mentioned in Míguez et al. (2018) are not reliable for identification. For example, the roughness/smoothness of the peduncle of the lower female spikelets varies within both species and the length of the perigynium shows a larger variation than stated by the authors. Also, plants with reduced fertility have been found as well as some that combine character states of the vegetative organs of one species with the nutlet shape typical of the other species. The identification of exact variation patterns of morphological characters and the origin of sterile plants and those combining characteristics of both species require further study.

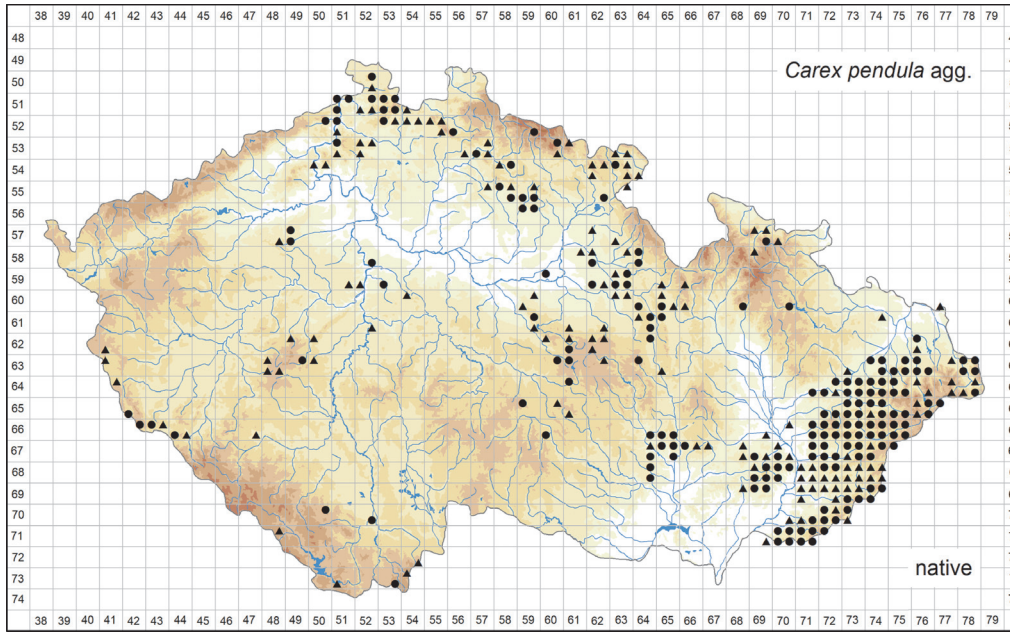


Fig. 7. – Distribution of *Carex pendula* agg. in the Czech Republic: ● occurrence documented by herbarium specimens (176 quadrants), ▲ occurrence based on other records (145 quadrants). Prepared by Radomír Řepka & Vít Grulich.

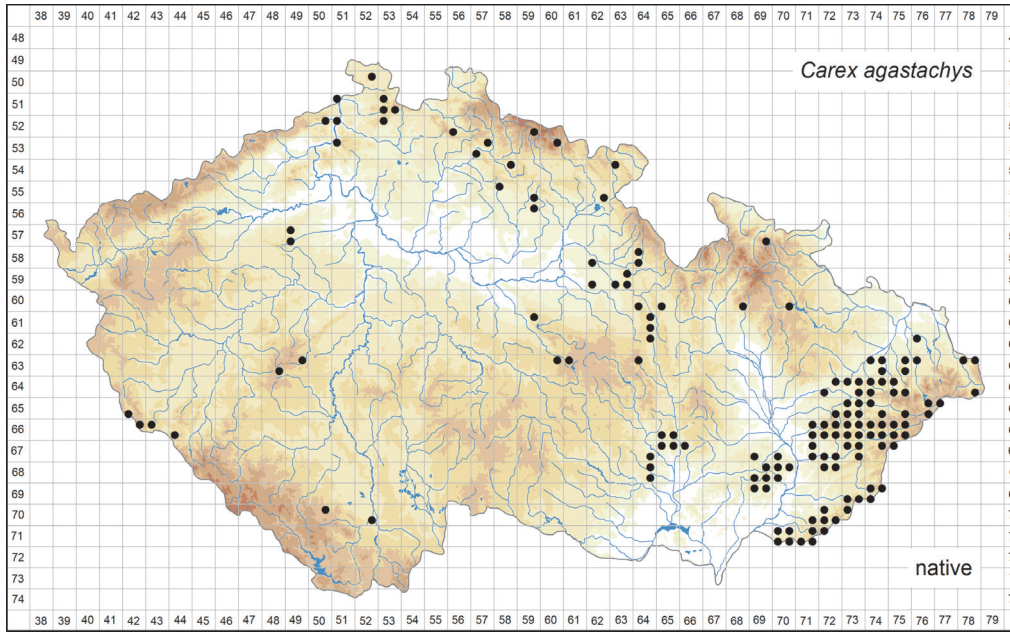


Fig. 8. – Distribution of *Carex agastachys* in the Czech Republic (146 occupied quadrants). Prepared by Radomír Řepka & Vít Grulich.

Because both species have been distinguished only recently, no literature and database records are available and their maps have to be based solely on examined herbarium specimens. The third map (Fig. 7) summarizes all records of *C. pendula* agg. in this country, including herbarium specimens that could not be assigned to species and all available literature and database records.

Carex rhizina (Fig. 10)

Carex rhizina, the other member of the *C. pediformis* group in this country, is a Eurasian species distributed from central Europe eastwards to Siberia and the Russian Far East, in northern Europe extending to southern Norway, Sweden and Finland; outposts are in the Caucasus Mts and Transcaucasia. Populations in the easternmost parts of its range are distinguished as subsp. *reventa* (Egorova 1999). In central Europe *C. rhizina* prefers hornbeam and ravine forests on various bedrock, often in stony places, on screes or between boulders, mainly in shady or semi-shady habitats that are often situated in river valleys with specific climates influenced by climatic inversions. In the Czech Republic *C. rhizina* reaches (probably as a glacial or early postglacial relict) the western limit of its range (Podpěra 1928), with nearly a hundred sites. In Bohemia this species' occurrences are scattered between the České středohoří Mts in the north southwards to the valleys of the Vltava, Otava, Lužnice and Želivka rivers, while rather remote occurrences are known near the towns of Turnov and Trutnov in north-eastern Bohemia. In Moravia, *C. rhizina* occurs mainly in the deep river valleys along the south-eastern margin of the Bohemian Massif between the valley of the Dyje river in the south up to the valley of the Třebůvka river between the towns of Olomouc and Moravská Třebová in the north. Local outposts are found in northern Moravia in the valleys of the Březná and Branná rivers. The species reaches its elevational maximum near the village of Branná in northern Moravia at 650 m. Although *C. rhizina* may resist some forestry practices, some of its occurrences have vanished, for example by construction of water reservoirs in deep water valleys. Therefore it is classified as vulnerable (Grulich 2012).

Carex supina (Fig. 11)

Carex supina is distributed in central and eastern Europe from central Germany and southern Switzerland across Ukraine and southern Russia as far as central Siberia and the western Himalaya Mts. Outposts are in the Caucasus Mts, Transcaucasia, north-eastern Turkey and north-western Iran (Meusel et al. 1965, Egorova 1999). The range of the related *C. korshinskyi* includes eastern Siberia, the Russian Far East and the Korean Peninsula (Egorova 1999). In the Czech Republic *C. supina* occurs in dry grasslands, rarely in open-canopy thermophilous oak and pine forests on hard, acidic rocks and sands, less frequently on limestone and serpentine, usually on light shallow soils in areas with warm, dry climates. In the Czech Republic the localities of *C. supina* form two separate clusters. One cluster is situated in central and north-western Bohemia, predominantly in the České středohoří Mts and along the lower stretches of the Vltava river, extending westwards to the vicinity of the town of Kadaň and the Berounka river valley, and eastwards the Výrovka river valley near the town of Kouřim. The other is found in the warmest and driest part of Moravia, mainly between the towns of Znojmo and Prostějov, while further occurrences are in the hills south of the city of Brno. The species is also common in the

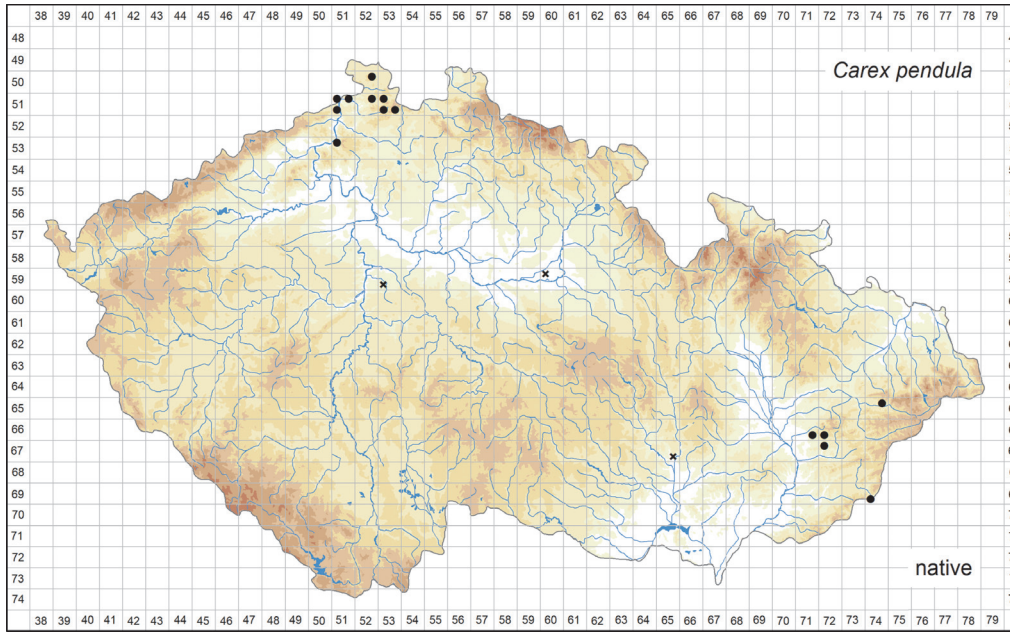


Fig. 9. – Distribution of *Carex pendula* in the Czech Republic: ● native (14 quadrants), × alien (3 quadrants). Prepared by Radomír Řepka & Vít Grulich.

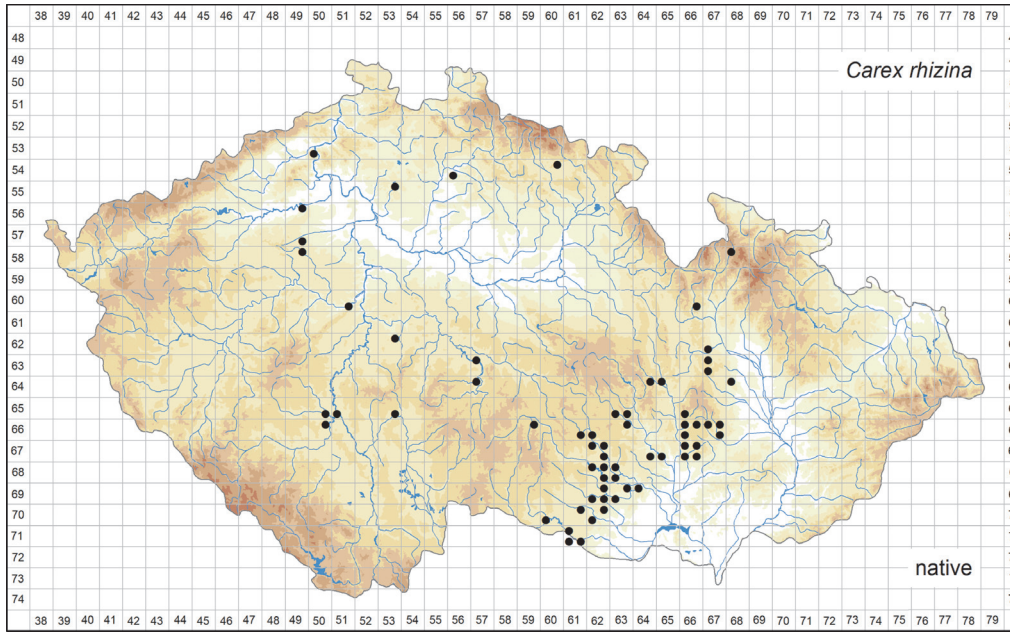


Fig. 10. – Distribution of *Carex rhizina* in the Czech Republic (63 occupied quadrants). Prepared by Vít Grulich & Radomír Řepka.

sandy area between the towns of Hodonín and Bzenec. *Carex supina* reaches its elevational maximum in this country at 550 m on Holý vrch hill near Kundratice in the České středohoří Mts. It is classified as vulnerable (Grulich 2012).

Colchicum autumnale (Fig. 12)

Colchicum autumnale is distributed in western, central and southern Europe, northwards to the British Isles, the Netherlands and south-western Poland, eastwards to western Ukraine and Romania, and southwards to the northern Iberian Peninsula, central Italy and the Balkan Peninsula (Meusel et al. 1965). In the Czech Republic *C. autumnale* grows mainly in wet meadows, semi-dry grasslands, floodplain and ash-alder forests, scrub and around forest springs. It prefers deep, humid, slightly acidic to basic soils that are rich in nutrients. It is scattered to frequent in eastern Bohemia and most of Moravia, and locally also in western, northern and central Bohemia. In contrast, it is rare in or absent from most of southern Bohemia and the adjacent Českomoravská vrchovina highlands. Some of the occurrences in southern Bohemia are suspected to be secondary as a result of past intentional introductions. *Colchicum autumnale* is also rare in or absent from the mountains and locally from dry, agricultural landscapes in northern Bohemia and southern Moravia.

Cytisus nigricans (Fig. 13)

The range of *Cytisus nigricans* extends from Switzerland and northern Italy to the Balkan Peninsula and northwards to north-eastern Germany and western Belarus. Outposts are in the central part of European Russia. It has been reported as introduced in Lithuania, Estonia (Roskov et al. 2006) and France (Tison & Foucalt 2014). *Cytisus nigricans* subsp. *nigricans* occurs mainly in the northern part of this species' range. Two other subspecies grow in southern Europe: subsp. *australis* in the northern Apennines, the foothills of the south-western Alps and through the Balkan Peninsula to the Black Sea coast, while subsp. *sericeus* is confined to south-western Romania (Meusel et al. 1965, Skalická 1969, 1995). In the Czech Republic *C. nigricans* grows mainly in forest fringes and clearings, shrub communities, understory of thermophilous forests, rocky slopes, edges of quarries and on railway embankments. It prefers sandy-loamy to loamy soils that dry out in summer. In this country *C. nigricans* occurs mainly in the hilly landscapes but it is almost absent from the Českomoravská vrchovina highlands, northern and north-eastern Moravia and adjacent parts of Silesia. Skalická (1995) regards the occurrences in northernmost Bohemia as secondary.

Cytisus procumbens (Fig. 14)

Cytisus procumbens has a discontinuous sub-Mediterranean distribution in Europe and the mountains of northern Anatolia. In central Europe it is found in the Czech Republic, Austria, south-western and southern Slovakia and northern Hungary. It extends southwards to the Balkan Peninsula; outposts are in Romania and Ukraine (Skalická 1967, 1968). In the Czech Republic *C. procumbens* grows in dry grasslands on loamy to loamy-clayey soils over base-rich bedrock such as loess, Tertiary sediments, limestone and serpentines, but in south-western Moravia also on granitoids (Skalická 1968). It tolerates

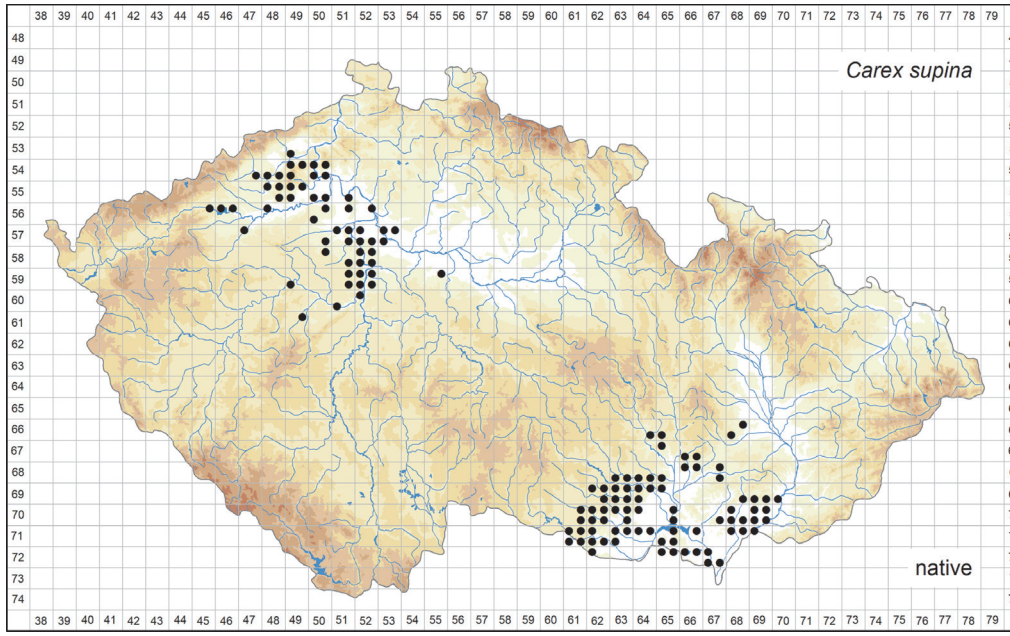


Fig. 11. – Distribution of *Carex supina* in the Czech Republic (134 occupied quadrants). Prepared by Vít Grulich & Radomír Řepka.

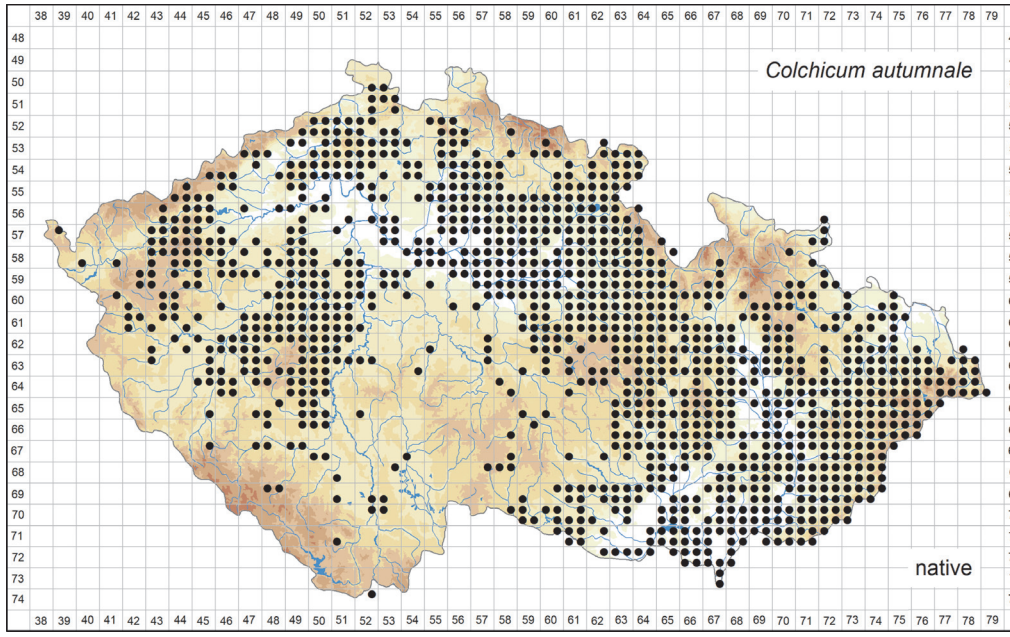


Fig. 12. – Distribution of *Colchicum autumnale* in the Czech Republic (1187 occupied quadrants). Prepared by Zdeněk Kaplan.

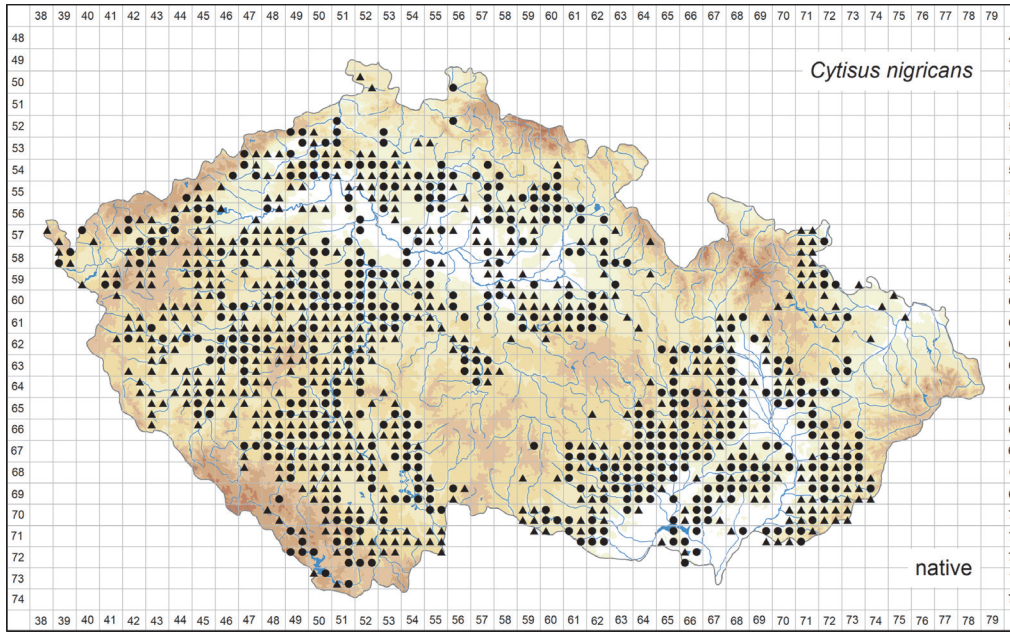


Fig. 13. – Distribution of *Cytisus nigricans* in the Czech Republic: ● occurrence documented by herbarium specimens (504 quadrants), ▲ occurrence based on other records (560 quadrants). Prepared by Radomír Řepka.

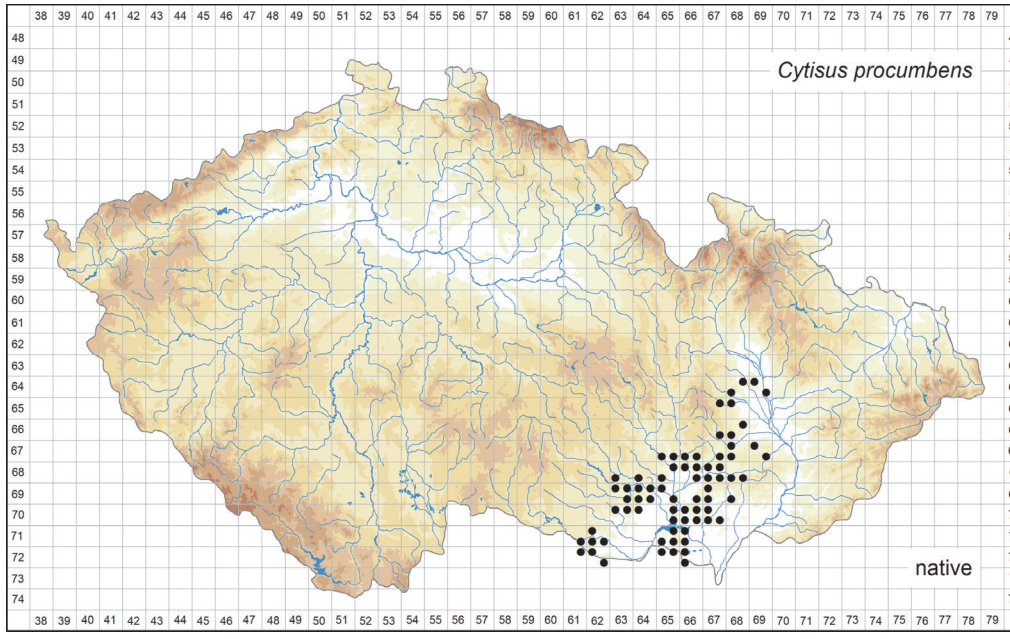


Fig. 14. – Distribution of *Cytisus procumbens* in the Czech Republic (72 occupied quadrants). Prepared by Radomír Řepka.

occasional mowing and low-intensity grazing as it is capable of regeneration. This species is distributed only in south-western, southern and central Moravia, where it reaches its north-western distribution limit. Its current distribution is confined to warm hill areas at elevations of 200–350 m. Currently, several dozen populations are known between the towns of Znojmo and Mikulov in the south and the city of Olomouc in the north. Many previously known populations have vanished. The extant occurrences are mostly in nature reserves. *Cytisus procumbens* is endangered by the abandonment of traditional management and eutrophication followed by encroachment by more competitive species. It is classified as vulnerable in the Czech Republic (Grulich 2012).

Cytisus scoparius (Fig. 15)

The native range of *Cytisus scoparius* includes western and part of central Europe, extending northwards to the British Isles and southern Scandinavia, eastwards to western Germany and northern Italy. Occurrences further east are considered as secondary. In central Europe it is classified as alien in south-eastern Germany, Poland and the Czech Republic and has also been introduced to south-eastern Europe (northwards to south-western Ukraine), India, the Atlantic part of North America, Australia and New Zealand. In most of this area it is represented by subsp. *scoparius*. The other subspecies, subsp. *maritimus*, grows on the coasts of north-western Europe and the western Mediterranean area (Meusel et al. 1965, Frodin & Heywood 1968). In the Czech Republic *C. scoparius* subsp. *scoparius* is considered a naturalized neophyte (Pyšek et al. 2012). It has been planted for various uses at many sites and subsequently has spontaneously spread to forest edges and clearings, abandoned pastures, heathlands and mining areas (quarries, sand and gravel pits). It prefers permeable, often sandy or gravelly soils, while avoiding heavy, calcareous and wet soils (Skalická 1995). Its populations outcompete many native species. *Cytisus scoparius* is distributed mainly in the western half of this country, where it is absent only from the warmest areas and agricultural and deforested landscapes. It is rarer in Moravia, being more common only at the south-eastern edge of the Bohemian Massif and in the Drahanská vrchovina highlands, while it is particularly rare in or absent from the basins of large rivers and adjacent hilly landscapes.

Draba muralis (Fig. 16)

Draba muralis is distributed in western, central and southern Europe, extending northwards to the British Isles, southern Sweden and southern Finland, and eastwards to the Caucasus and the coast of the Caspian Sea. It also occurs in Anatolia, Morocco and Algeria (Hultén & Fries 1986, Jalas et al. 1996). In the Czech Republic *D. muralis* grows on rocky slopes, screes, bare places in dry grasslands and scrub, and in man-made habitats such as road verges, railway stations and embankments, stony fallow land and abandoned quarries. It grows on shallow, permeable, often rocky soils developed over schist and igneous bedrock (while conspicuously avoiding limestone) and on man-made gravel deposits. In this country it was originally a rare species confined to the valleys of Vltava and Sázava rivers in central Bohemia, with a few sites in the České středohoří Mts in northern Bohemia and two isolated populations near Jirkov and on Úhošt hill near the town of Kadaň in north-western Bohemia. Due to its former rarity, this species was classified as endangered in the last edition of the Red List (Grulich 2012). Demonstrably secondary occurrences used to

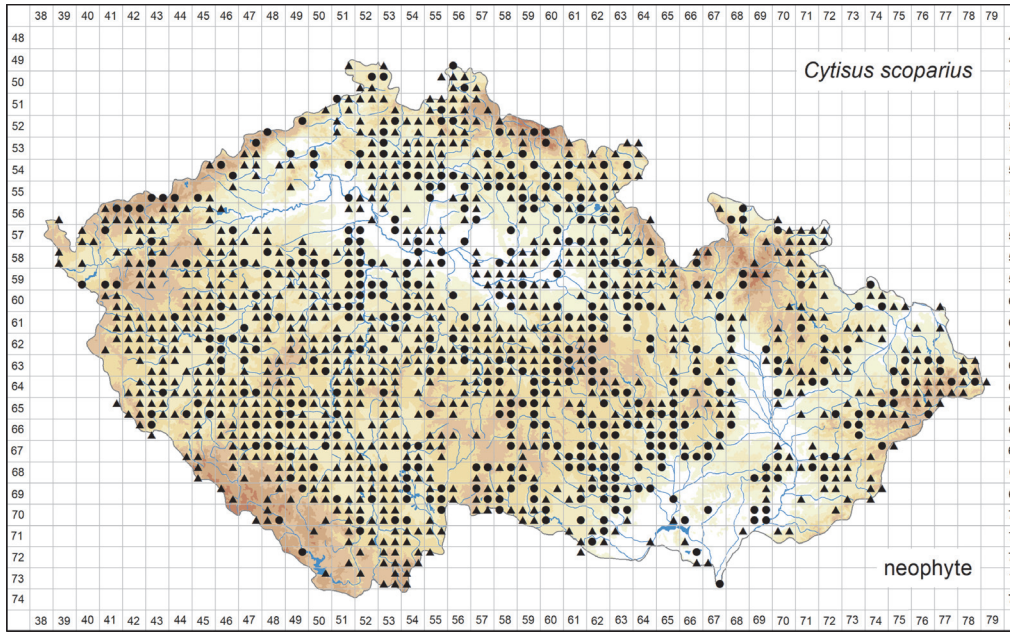


Fig. 15. – Distribution of *Cytisus scoparius* in the Czech Republic: ● occurrence documented by herbarium specimens (419 quadrants), ▲ occurrence based on other records (912 quadrants). Prepared by Radomír Řepka.

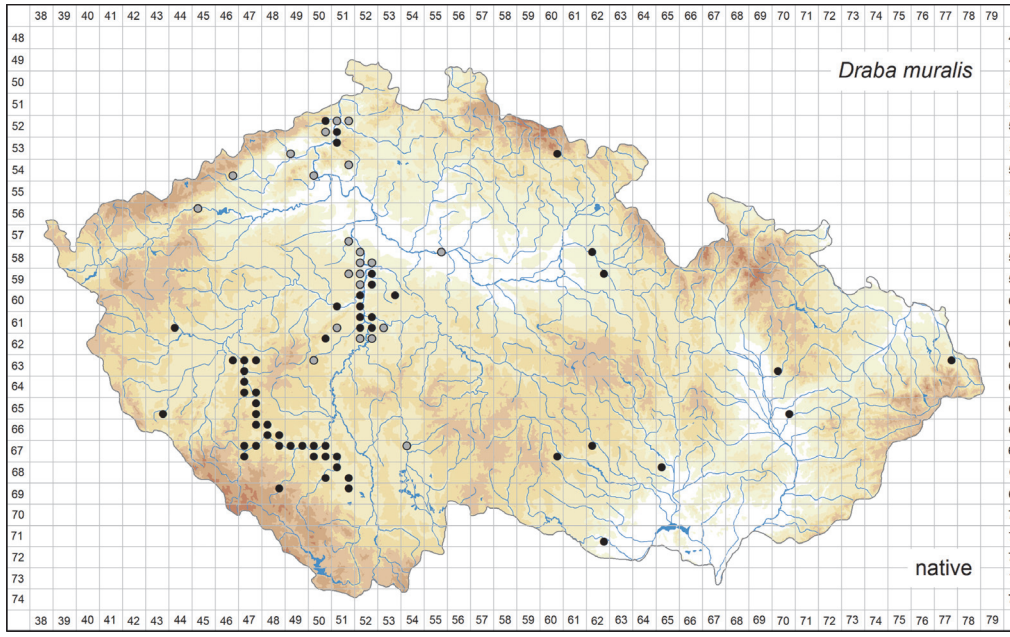


Fig. 16. – Distribution of *Draba muralis* in the Czech Republic: ● at least one record in 2000–2020 (55 quadrants), ● pre 2000 records only (22 quadrants). Prepared by Zdeněk Kaplan & Radim Paulič.

be very rare. However, in the 1990s *D. muralis* started to spread along railways and has reached all major parts of this country, although in most of them it still appears to be rare. A remarkable exception is the massive and fast colonization that has been documented in south-western Bohemia. Although the railway stations on the tracks between the cities of Plzeň and České Budějovice have been botanically surveyed regularly during the last two decades and *D. muralis* was first recorded there as late as 2009, within a single decade this species has colonized a large section of this 136 km long railway. Targeted surveys on other major railway tracks elsewhere in this country will likely reveal additional new occurrences.

Draba nemorosa (Fig. 17)

Draba nemorosa is a circumpolar species, widespread in Asia and North America, from Asia extending westwards to Europe as far as Sweden and central Europe, with outposts in the eastern Pyrenees, southern France and northern Italy, and secondary occurrences in Norway and Germany (Meusel et al. 1965, Hultén & Fries 1986, Nikiforova 1994, Jalas et al. 1996). It has also been introduced into Australia (Randall 2007). In the Czech Republic *D. nemorosa* grows in open vegetation in disturbed, mainly sandy habitats such as sand dunes, sand pits, road verges, bare places in dry grasslands, disturbed habitats along railways, rocky slopes and open-canopy forests and their edges and clearings. It prefers permeable, sandy to loamy-sandy soils. In this country *D. nemorosa* is apparently native to southern Moravia, where it has been recorded at several sites around the town of Břeclav and others between the village of Čejč and the towns of Hodonín and Veselí nad Moravou. Since the 1920s it has been found rarely as introduced on railways to Bohemia. During the past two decades several new sites have been discovered in various parts of Bohemia and in western and central Moravia, mainly on railways. *Draba nemorosa* was classified as critically threatened (Grulich 2012) because it vanished from most of its original sites in southern Moravia, before its recent spread in secondary habitats was noted.

Draba sibirica (Fig. 17)

The native range of *Draba sibirica* extends from Ukraine, European Russia and the Caucasus through Siberia and central Asia as far as Mongolia and the Russian Far East; an outpost is in north-eastern Greenland (Tolmachev 1939, Nikiforova 1994, Al-Shehbaz et al. 2010). In Europe it has been introduced into the Czech Republic, Estonia, Latvia, Lithuania and Belarus (Kuusk et al. 1993, Jalas et al. 1996, Rūrāne & Roze 2013). In its native range *D. sibirica* grows in alpine and subalpine meadows, forest clearings, dry tundra, and as a weed in arable fields. In the Czech Republic it was first found in 1963 as escaped from cultivation or accidentally introduced on fallow land at the edge of the town of Hostinné in north-eastern Bohemia (Chrtek 1978). The occurrence was only temporary, as the species was not found at the site in the following year. *Draba sibirica* is therefore classified as a casual neophyte (Pyšek et al. 2012).

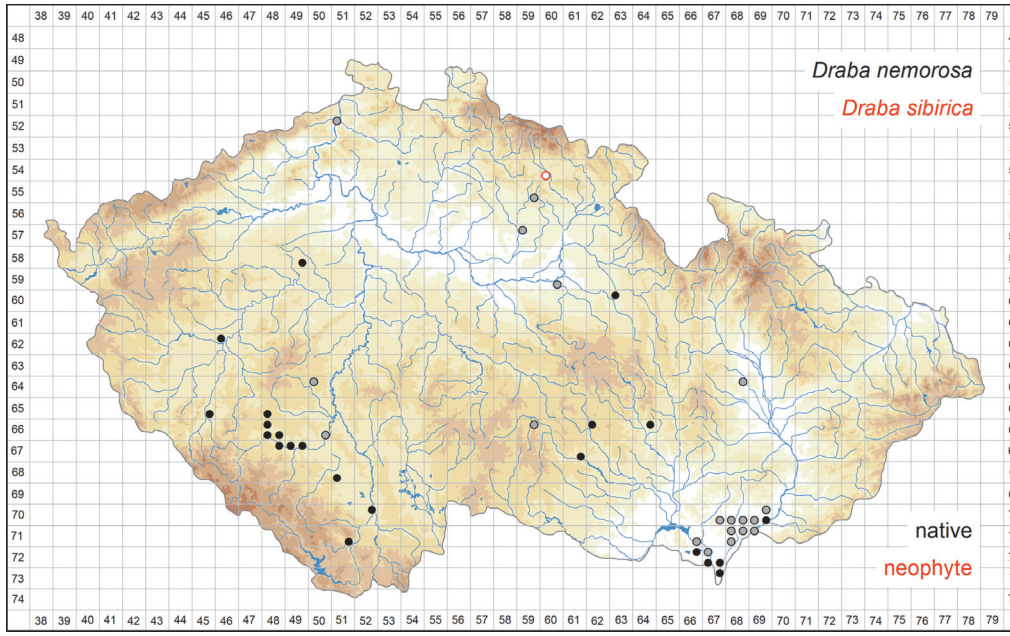


Fig. 17. – Distribution of *Draba nemorosa* (● at least one record in 2000–2020: 22 quadrants, ● pre 2000 records only: 19 quadrants) and *D. sibirica* (● pre 2000 records only: 1 quadrant) in the Czech Republic. Prepared by Zdeněk Kaplan.

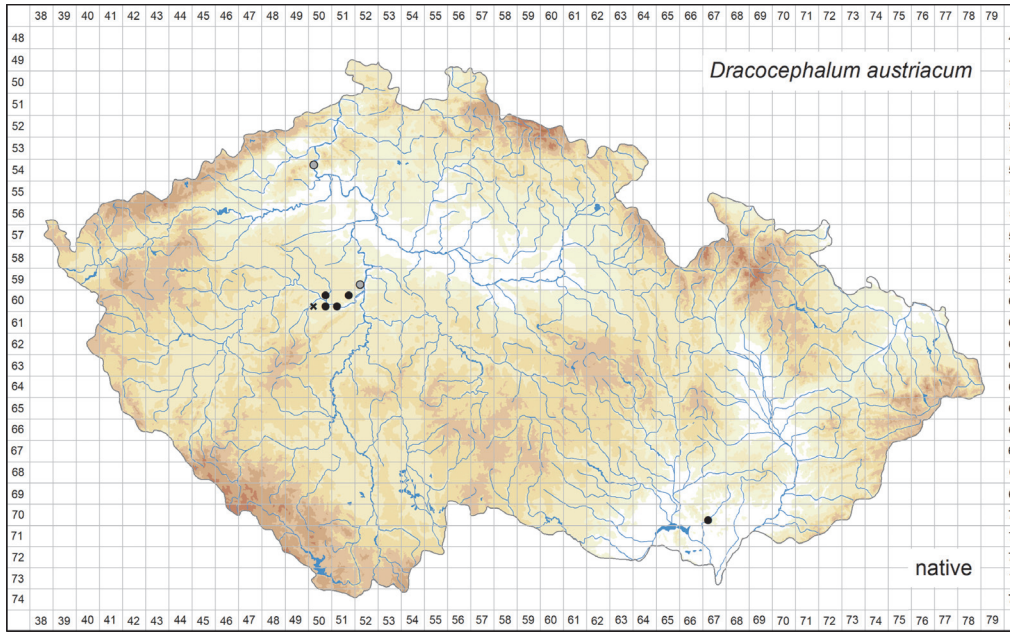


Fig. 18. – Distribution of *Dracocephalum austriacum* in the Czech Republic: ● native, at least one record in 2000–2020 (5 quadrants), ● native, pre 2000 records only (2 quadrants), × alien (1 quadrant). Prepared by Zdeněk Kaplan.

Dracocephalum austriacum (Fig. 18)

Dracocephalum austriacum has a disjunct distribution in southern and central Europe, particularly in southern France, in the foothills of the western and central Alps, the Czech Republic, eastern Austria, southern Slovakia, Hungary, Romania, western and central Ukraine and the Caucasus (Meusel et al. 1978). In the Czech Republic this species reaches the northern limit of its distribution. It grows in sunny places on rock outcrops and rocky slopes with shallow, permeable soils rich in nutrients, developed mainly over limestone, rarely over basalt and loess. Most of the occurrences of *D. austriacum* in this country are found in the karst area of Český kras in central Bohemia, where this species has been recorded at about 12 sites. Of them, 8 exist till now. Two of the populations almost vanished in the 1980s and were replanted from other local populations (Dostálek et al. 2010). At least three other recent occurrences in Český kras are secondary due to intentional planting. One native population occurred also on the basaltic hill of Deblík in the České středohoří Mts in northern Bohemia. However, the last individual was observed there in 1995. Another small population is found north of the village of Bořetice in southern Moravia. *Dracocephalum austriacum* is classified as critically threatened (Grulich 2012).

Dracocephalum moldavica (Fig. 19)

Dracocephalum moldavica is native to central Asia, southern Siberia and northern China (Shishkin 1954, Li & Hedge 1994). It has been introduced to several countries of central and eastern Europe, as well as Iran, the Korean Peninsula and several states of the central and eastern USA (Rechinger 1982, POWO 2020, USDA, NRCS 2020). In the Czech Republic *D. moldavica* is sometimes grown ornamentally and as a culinary, medicinal, aromatic and honeybee herb. It occasionally escapes from cultivation, but these occurrences are only temporary. The species is therefore classified as a casual neophyte (Pyšek et al. 2012).

Dracocephalum parviflorum (Fig. 20)

Dracocephalum parviflorum is native to North America except some southern states of the USA (USDA, NRCS 2020). It occurs there in open, usually humid habitats from middle to high elevations up to 2700 m, often as a weed (Cronquist et al. 1984). It has been introduced into several European countries, e.g. Belgium (Verloove 2006), Germany (Hand et al. 2020), Poland (Tokarska-Guzik 2012) and Austria (Janchen 1958). All records in Europe refer to casual occurrences. In the Czech Republic one specimen of *D. parviflorum* was collected in the town of Pec pod Sněžkou in the Krkonoše Mts in September 1928. The collector identified the plant as a "new form" of *Galeopsis ladanum*. The herbarium specimen, stored at PR, was re-identified as *D. parviflorum* only a short time ago (Danihelka 2019a). The way it was accidentally introduced is unknown. *Dracocephalum parviflorum* should be considered a casual neophyte in this country's flora.

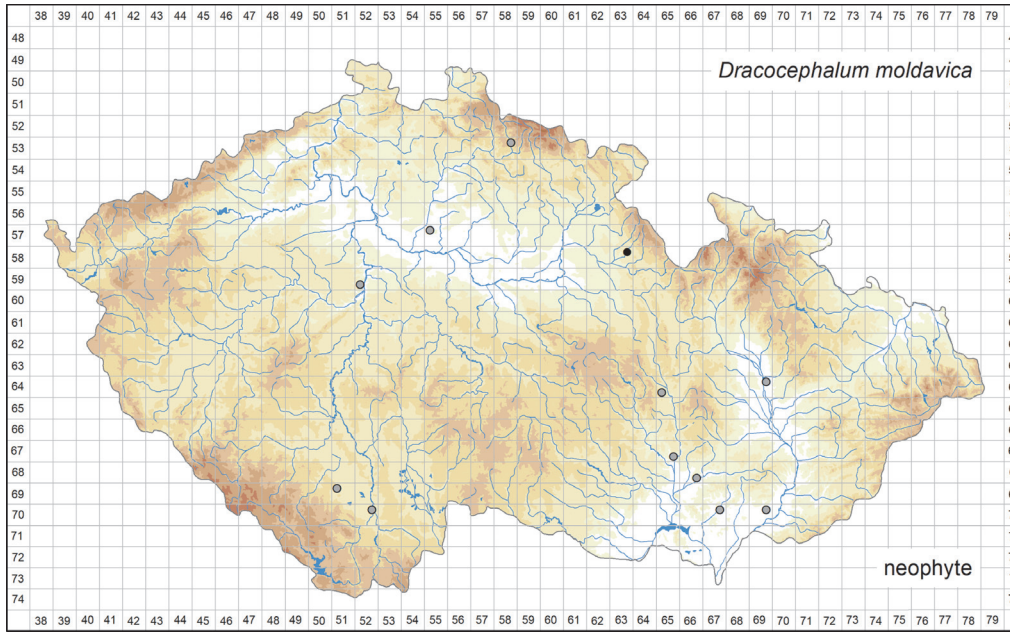


Fig. 19. – Distribution of *Dracocephalum moldavica* in the Czech Republic: ● at least one record in 2000–2020 (1 quadrant), ● pre 2000 records only (11 quadrants). Prepared by Zdeněk Kaplan.

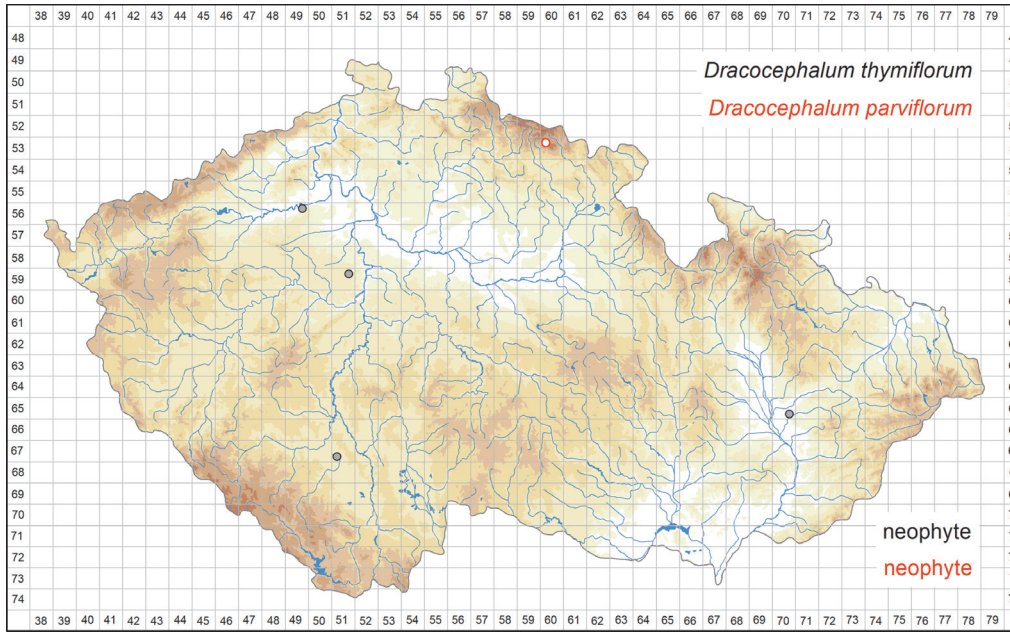


Fig. 20. – Distribution of *Dracocephalum thymiflorum* in the Czech Republic (● pre 2000 records only: 4 quadrants) and *D. parviflorum* (● pre 2000 records only: 1 quadrant) in the Czech Republic. Prepared by Zdeněk Kaplan (*D. t.*) and Jiří Danihelka (*D. p.*).

Dracocephalum thymiflorum (Fig. 20)

The native range of *Dracocephalum thymiflorum* extends from the Baltic countries, Ukraine and north-eastern Bulgaria through European Russia, the Caucasus, northern Iran to southern Siberia and central Asia (Hultén & Fries 1986). It has been introduced to several European countries including the United Kingdom, France, Denmark, Sweden, Finland, the Czech Republic and Romania, as well as to eastern Siberia, the Russian Far East and the USA (POWO 2020, USDA, NRCS 2020). In the Czech Republic *D. thymiflorum* was recorded at four railway stations and transit sheds in 1958–1968. These occurrences resulted from accidental introductions with grain from the former USSR (Hejný et al. 1973). This species is classified as a casual neophyte in the Czech Republic (Pyšek et al. 2012).

Jurinea cyanoides (Fig. 21)

Jurinea cyanoides is a continental species with its main distribution from Belarus and Ukraine in the west to the Altai Mts in the east, and outposts in sandy areas in central and northern Germany and in central and north-western Bohemia (Meusel & Jäger 1992). Minor differences between central-European plants and those from eastern Europe and Asia are reported; however, their classification as separate species (Il'in 1962) is not accepted in most floras. In contrast, populations from Kazakhstan and the easternmost part of European Russia are sometimes separated as subsp. *tenuiloba* (Kožuharov 1974). The southern limit of this species' distribution in eastern Europe runs from the northern coast of the Caspian Sea through central to western Ukraine, while it is absent from south-eastern Europe and the Pannonian Basin; it is therefore considered a Sarmatian geoelement (i.e. a continental species that migrated to central Europe north of the Carpathians; Kaplan 2017). In the Czech Republic *J. cyanoides* occurs on sand dunes of the Pleistocene age that are moderately rich in calcium. It grows in open-canopy forests (particularly pine forests), their clearings and edges, and in moderately disturbed open sandy places, including man-made habitats such as abandoned sand pits, road verges and railway cuttings. About 25 populations have been known in the Labe river basin between the towns of Poděbrady and Litoměřice. Most of them disappeared during the 20th century due to habitat destruction (sand mining, building activities, conversion to arable land and planting of dense pine cultures) or successional changes towards dense tall-herb vegetation. Generative reproduction of *J. cyanoides* in the remaining populations is strongly limited by seed-feeding insects (Klaudisová 1996). *Jurinea cyanoides* belongs among the most threatened species of the Czech flora and is classified as critically threatened (Grulich 2012). Since 2000 this species has been recorded at only two sites, but one of the populations disappeared in 2006 (Klaudisová 2011). Despite legal protection and intensive conservation management, the last extant population, which is in a railway cutting near the village of Tišice, is declining and consists of only several dozen ramets. In 2009 this species was re-introduced (using seeds originating from the Tišice population) to its former site near the village of Tuhaň; however, the number of established plants is small, and the population is dependent on a supply of seeds from ex-situ cultivation (Klaudisová 2011).

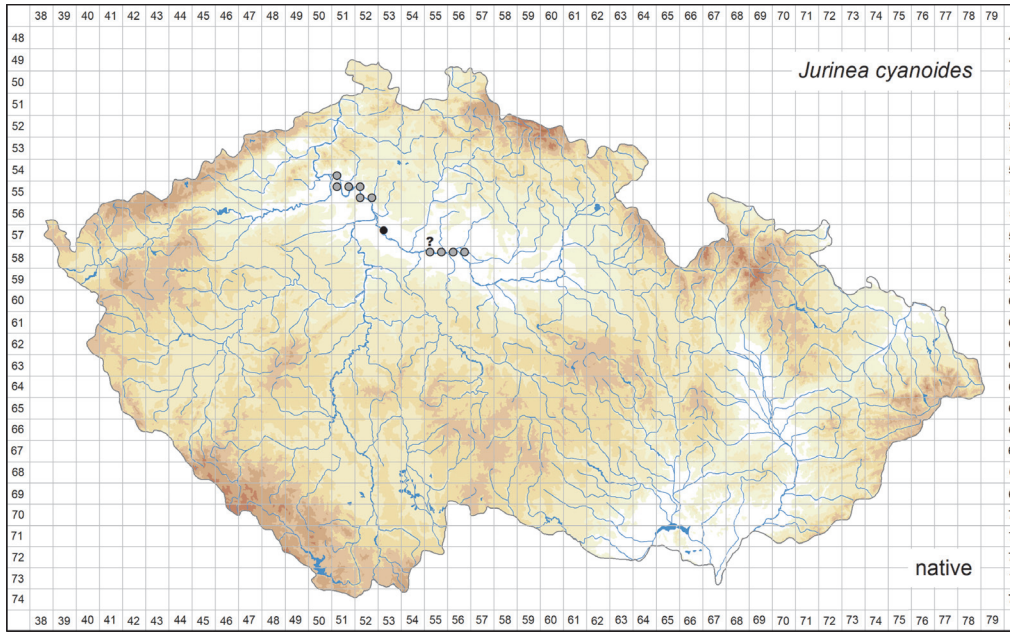


Fig. 21. – Distribution of *Jurinea cyanoides* in the Czech Republic: ● at least one record in 2000–2020 (1 quadrant), ● pre 2000 records only (10 quadrants). Prepared by Petr Koutecký.

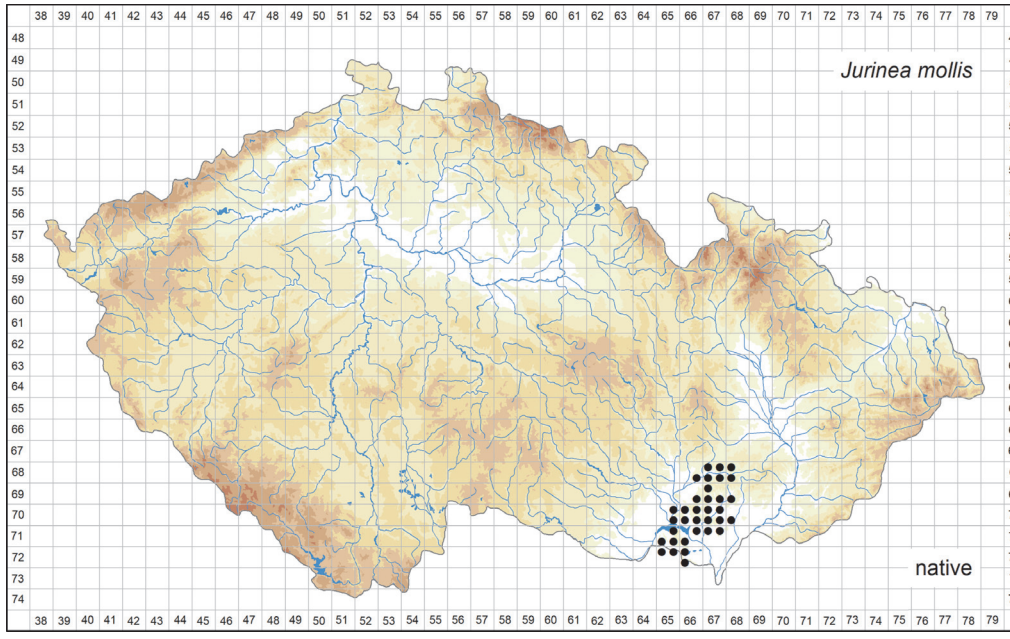


Fig. 22. – Distribution of *Jurinea mollis* in the Czech Republic (34 occupied quadrants). Prepared by Petr Koutecký.

Jurinea mollis (Fig. 22)

Jurinea mollis belongs to a taxonomically difficult group recognized as *J.* sect. *Molles* or *J.* sect. *Platycephalae*, which includes about 15–20 taxa occurring in south-eastern Europe, Anatolia, Transcaucasia, and the southern parts of Ukraine and European Russia (Meusel & Jäger 1992, Greuter 2006–2021). However, the infrageneric classification of this genus is largely artificial and is not supported by molecular data (Szukala et al. 2019), and the individual species require taxonomic revision as well. *Jurinea mollis* s. str. occurs in the Czech Republic, Austria, Slovakia and Hungary, extending southwards to northern Italy, the northern part of the Balkan Peninsula and Romania (Kožuharov 1976). Localities in the Czech Republic are at the north-western distribution limit of this species. It grows there in various types of steppe vegetation and in fringes of neighbouring thermophilous oak forests, sometimes also in adjacent ruderalized dry grasslands at margins of vineyards, on grassy slopes along roads, and in abandoned vineyards and orchards. It mainly occurs on moderately deep to deep calcium-rich soils on soft Tertiary sediments (sandstones, claystones or silts) or loess, less frequently also on rather shallow soils on limestone. In the Czech Republic *J. mollis* is found in hilly landscapes at the north-western edge of the Pannonian Basin, between the Pavlovské vrchy hills in the south and the town of Vyškov in the north. Unlike many co-occurring thermophilous species, it does not reach the south-eastern margin of the Českomoravská vrchovina highlands (where these species occur mainly on more shallow soils on hard bedrock) nor the Bílé Karpaty Mts (which are more mesophilous). Although there are still numerous extant populations (many of them in nature reserves), *J. mollis* suffered a considerable decline in the Czech Republic due to habitat destruction such as conversion to vineyards, orchards and *Robinia pseudoacacia* plantations, and abandonment and succession toward shrub communities at sites that were formerly used as low-intensity managed pastures. This species is classified as endangered in the Czech Republic (Grulich 2012).

Klasea lycopifolia (Fig. 23)

This species is classified as a member of genus *Serratula* in most of the former central European literature. However, molecular studies supported by micro-morphological characters showed that *Serratula* in the traditional broad delimitation is polyphyletic, and most of its species were re-classified to the separate genus *Klasea* (Martins & Hellwig 2005, Greuter 2006–2021). *Klasea lycopifolia* has its main distribution in the forest-steppe and meadow-steppe zones in Ukraine and the southern part of European Russia and outposts in southern Poland, Romania and the northern part of the Balkan Peninsula, Hungary, Slovakia, the Czech Republic, Austria, central Italy and south-eastern France (Meusel & Jäger 1992, Greuter 2006–2021). In the Czech Republic this species occurs only in the south-east where it grows in tall-grass steppes and other types of semi-dry grasslands on calcium-rich moderately deep to deep soils on soft flysch sediments. The most abundant populations are found in the south-eastern part of the Bílé Karpaty Mts. Other occurrences are in the hilly landscape east and north-east of the town of Hustopeče and two close populations (one possibly extinct now) have been recorded in the Dunajovické vrchy hills west of the town of Mikulov. At these sites *K. lycopifolia* grows in steppic vegetation on slopes of various aspects (mostly north- and west-facing) but avoids the driest parts. Although *K. lycopifolia* is still extant in 12 out 15 the mapping

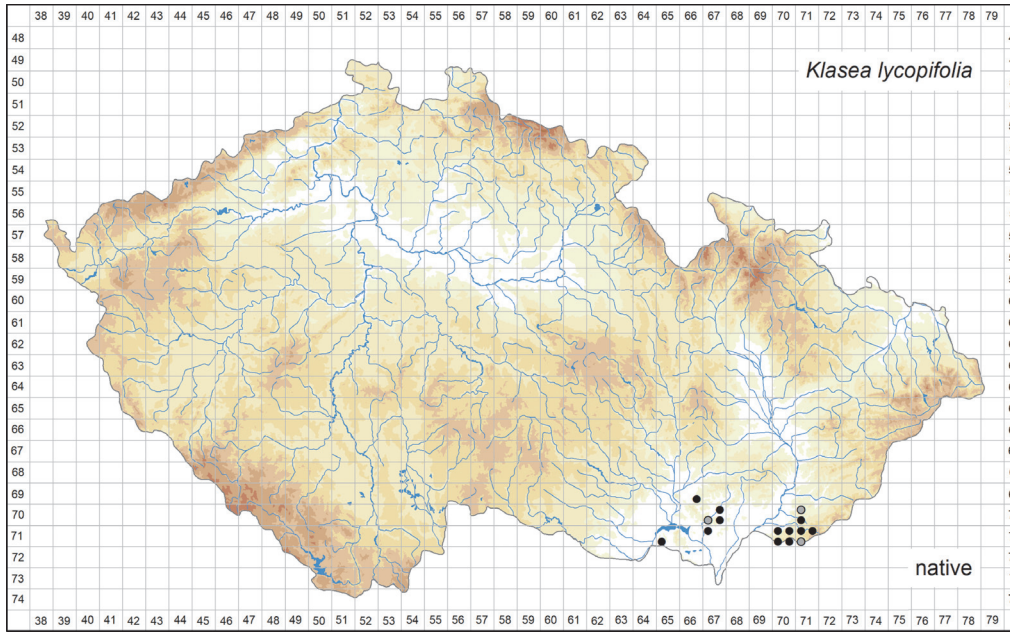


Fig. 23. – Distribution of *Klasea lycopifolia* in the Czech Republic: ● at least one record in 2000–2020 (12 quadrants), ◍ pre 2000 records only (3 quadrants). Prepared by Petr Koutecký.

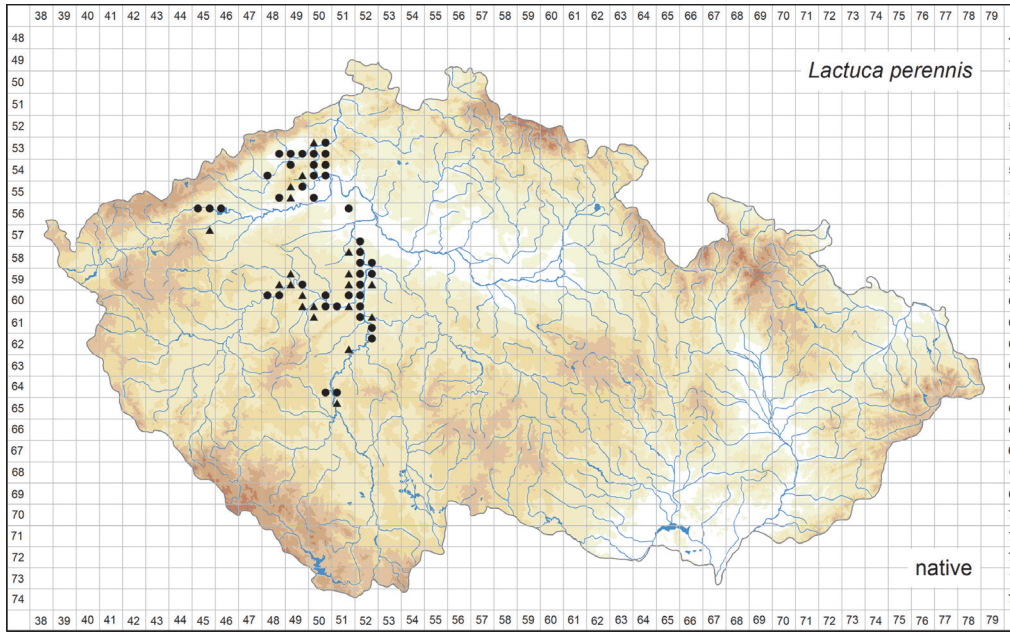


Fig. 24. – Distribution of *Lactuca perennis* in the Czech Republic: ● occurrence documented by herbarium specimens (40 quadrants), ▲ occurrence based on other records (20 quadrants). Prepared by Pavel Dřevojan.

grid cells, the number of its populations as well as the population sizes have decreased considerably, except for a few large populations in the Bílé Karpaty Mts. Some of the extant populations are limited to only a few dozen square meters and flower rarely or remain sterile. Many of the former sites have been converted to arable land (including the extensive *Stipa tirsa* dominated steppic meadows at the foothills of the Bílé Karpaty Mts near the village of Blatnička), vineyards or orchards, while the isolated small populations are threatened due to absence of mowing or grazing, which leads to overgrowing by competitive grasses and succession towards shrub communities. *Klasea lycopifolia* is classified as endangered in the Czech Republic (Grulich 2012).

Lactuca perennis (Fig. 24)

The disjunct range of *Lactuca perennis* extends from the mountains of northern Spain and France in the west to western Ukraine, Romania and the Balkan Peninsula in the east. The Czech Republic is situated at the northern limit of this species' range (Slavík 1966, Feráková 1977, Meusel & Jäger 1992). In this country *L. perennis* grows mainly on dry, south-facing rocky, shrubby and grassy slopes. It is often found on rock outcrops and screes of mineral-rich rocks in river valleys and on isolated volcanic hills, mainly on basalt, limestone, spilite or diabase, rarely on marlstone, phonolite and diorite. It prefers shallow soils in sunny, only exceptionally slightly shaded places, predominantly in rocky steppes, rarely in open-canopy thermophilous oak forests and fringes. In the Czech Republic *L. perennis* is confined to northern and central Bohemia. Most of its occurrences are situated in the Labe river valley in the České středohoří Mts and in the Vltava and Berounka river valleys near the city of Prague, along the Vltava river towards the south extending as far as to the village of Orlík nad Vltavou. It also occurs in the Křivoklát area, and there are isolated occurrences around the town of Kadaň. In the Czech Republic *L. perennis* is classified as vulnerable (Grulich 2012).

Lactuca quercina (Fig. 25)

Lactuca quercina is distributed mainly in south-eastern Europe from which it extends with isolated occurrences westwards to Germany and south-eastern France, and southwards to the Balkan Peninsula, the Caucasus, north-eastern Turkey and northern Iran. A markedly isolated outpost is on the Karlsö Islands close to Gotland in the Baltic Sea. In central Europe *L. quercina* the northern limit of its distribution is in the Czech Republic (Feráková 1970, Hultén & Fries 1986, Meusel & Jäger 1992). In this country this species grows in the undergrowth of various types of deciduous forests, mainly mesophilous forests in elevated parts of river floodplains, oak-hornbeam and thermophilous oak forests, often also in *Robinia pseudoacacia* groves. It prefers semi-dry loamy soils rich in humus and nutrients, mainly nitrogen, and often also in calcium. In the Czech Republic *L. quercina* is most frequent in southern Moravia, extending northwards to the Moravský kras karst area and to the town of Vyškov, and westwards through the valleys of the Dyje, Jihlava and Oslava rivers to the eastern edge of the Českomoravská vrchovina highlands. It is markedly rarer in Bohemia, where it occurs in the Český kras karst area and the Vltava river valley in the vicinity of Prague. From there it is scattered northwards as far as the České středohoří Mts, while isolated occurrences are found in the vicinities of the towns of Kadaň, Mladá Boleslav and Rožďalovice. *Lactuca quercina* is classified as vulnerable (Grulich 2012).

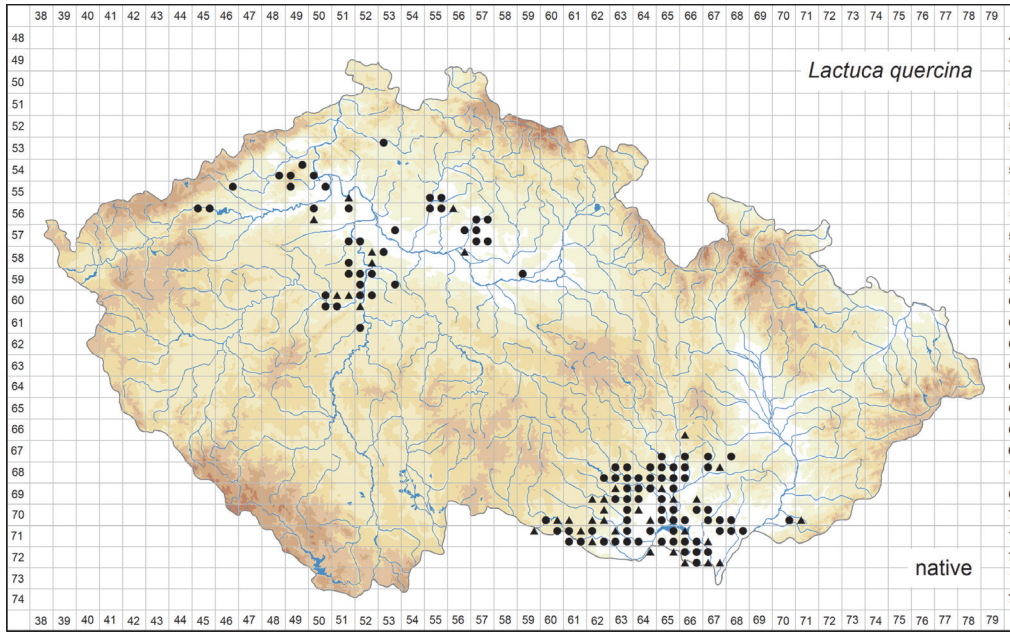


Fig. 25. – Distribution of *Lactuca quercina* in the Czech Republic: ● occurrence documented by herbarium specimens (103 quadrants), ▲ occurrence based on other records (36 quadrants). Prepared by Pavel Dřevojan.

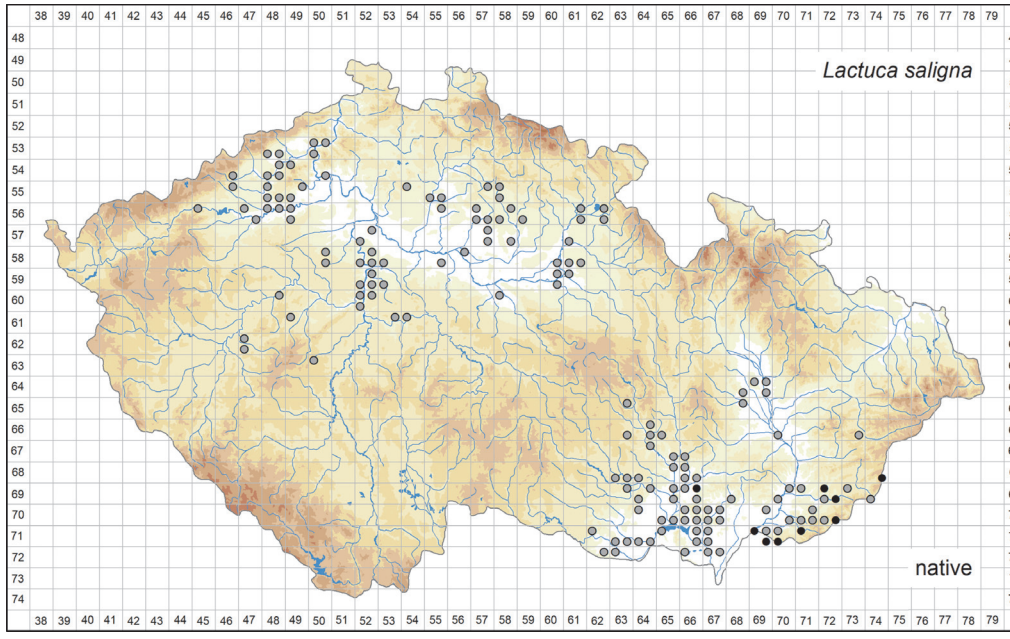


Fig. 26. – Distribution of *Lactuca saligna* in the Czech Republic: ● at least one record in 2000–2020 (9 quadrants), ● pre 2000 records only (146 quadrants). Prepared by Pavel Dřevojan.

Lactuca saligna (Fig. 26)

Lactuca saligna is widespread in southern Europe from the Iberian Peninsula to the south-western part of European Russia, northwards extending to the British Isles, the Netherlands, central Germany and southern Poland. It also occurs in northern Africa and south-western Asia (Feráková 1977, Meusel & Jäger 1992). Secondary occurrences have been reported from southern China, Australia, New Zealand, Canada, the USA and Argentina (Meusel & Jäger 1992, GCW 2020, USDA, NRCS 2020). As a facultative halophyte, *L. saligna* grew in the Czech Republic in disturbed halophytic vegetation and on serpentine outcrops. However, most finds come from secondary habitats such as road verges and ditches, pastures and ruderal places in settlements. It prefers sunny, dry to intermittently wet soils rich in nitrogen and minerals. In the past, this species was scattered in north-western, central and eastern Bohemia. In southern Moravia *L. saligna* was recorded in the valley of the Jihlava river between the towns of Mohelno and Ivančice, along the floodplains of the Dyje and Svratka rivers, in the vicinity of the city of Olomouc and in the Bílé Karpaty Mts and their foothills. For some time it had been considered extirpated in this country (Holub & Procházka 2000), but in 2006 a small population was found at the village of Nesvačilka near the city of Brno (Grulich 2007). Several new occurrences have been recently discovered in the Bílé Karpaty Mts. It is classified as critically threatened (Grulich 2012).

Lactuca sativa (Fig. 27)

Lactuca sativa is an almost globally cultivated species of leafy vegetable, which is grown in several groups of cultivars. The wild form is not known. It was suggested that *L. sativa* originated from *L. serriola* by mutations and artificial selection, possibly facilitated by simultaneous gene introgressions from related *Lactuca* species (Lindquist 1960, de Vries 1997). Indeed, *L. sativa* and *L. serriola* are genetically very similar (Koopman et al. 1998). It is believed that the domestication of *L. sativa* took place probably in the Middle East (Zeven & Zhukovsky 1975). *Lactuca sativa* requires deep, fertile soils rich in potassium and phosphorus and sufficient water supply (Feráková 1977). In the Czech Republic it is widely cultivated in greenhouses, gardens and arable fields and occasionally escapes from cultivation into waste places, landfills of agricultural waste and banks of watercourses. It is considered a casual archaeophyte (Pyšek et al. 2012). Only records explicitly referring to escaped plants were included in the map.

Lactuca serriola (Fig. 28)

Lactuca serriola naturally occurs in most of Europe except its northernmost parts, in the Canary Islands, northern Africa, south-western and central Asia and India. The origin of the occurrences in Ethiopia and the south of the Arabian Peninsula is unclear. The species has been introduced into South Africa, Australia, New Zealand, North America, Mexico and Argentina (Feráková 1977, Hultén & Fries 1986, Meusel & Jäger 1992) and most likely some other parts of the world. In the Czech Republic *L. serriola* grows in sunny or semi-shady places mostly on nutrient-rich substrates, usually on rather dry, loamy soils. It appears to be a pioneer plant growing in a wide range of open and disturbed habitats such as road verges and ditches, abandoned quarries, edges of arable fields, on waste

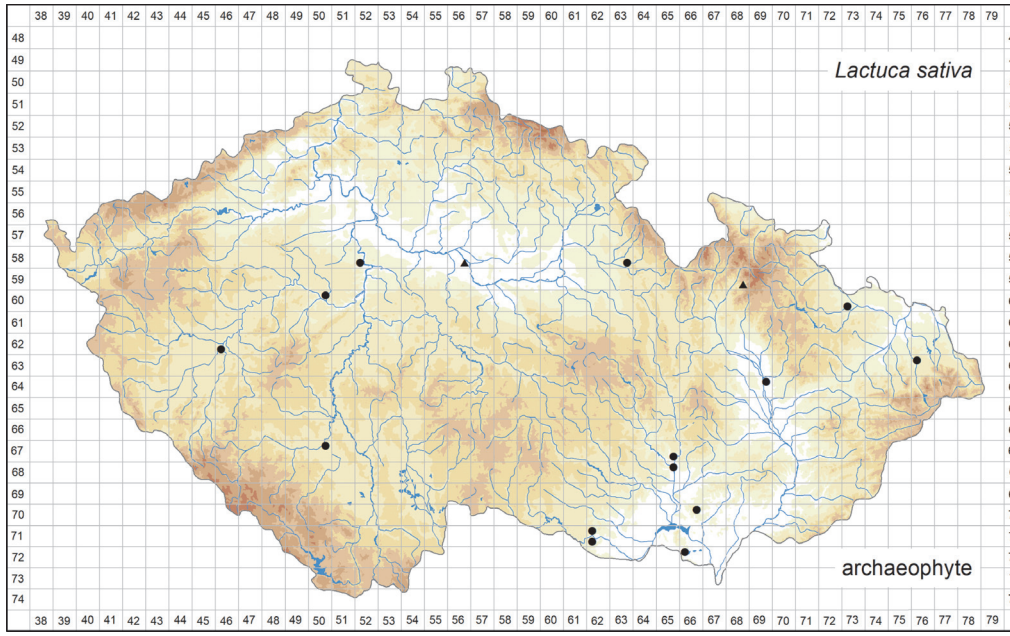


Fig. 27. – Distribution of *Lactuca sativa* in the Czech Republic: ● occurrence documented by herbarium specimens (14 quadrants), ▲ occurrence based on other records (2 quadrants). Prepared by Pavel Dřevojan.

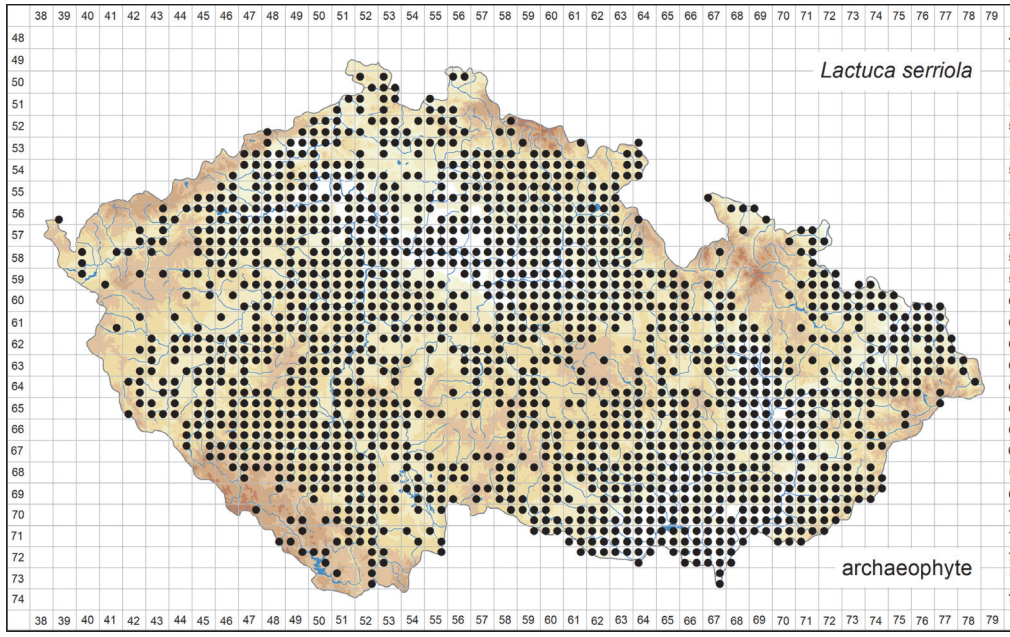


Fig. 28. – Distribution of *Lactuca serriola* in the Czech Republic (1623 occupied quadrants). Prepared by Pavel Dřevojan.

ground and in ruderalized dry grasslands and forests (especially *Robinia pseudoacacia* groves). It is rather frequent from the lowlands up to elevations of about 600 m, rarely introduced into the mountains, where it occurs only along roads and often only temporarily. The gaps on the map in the lowlands and at middle elevations are most likely due to a lack of records rather than true absences. In the Czech Republic *L. serriola* is considered a naturalized archaeophyte (Pyšek et al. 2012).

Lactuca tatarica (Fig. 29)

Lactuca tatarica is native to the area extending from the Black Sea region to northern China (Meusel & Jäger 1992, Shi & Kilian 2011). A closely related species *L. pulchella*, distributed in North America, is sometimes treated as *L. tatarica* subsp. *pulchella* (Strother 2006a). Secondary occurrences of *L. tatarica* have been recorded in many countries of western, northern and central Europe (Feráková 1977, Meusel & Jäger 1992). In the Czech Republic it was first found in the Prague's city district of Holešovice in 1957, and last found in the town of Mikulov in 1997. During this period it was recorded at less than two dozen sites, including railway stations, waste ground, soil heaps, grain warehouse yards, transit sheds, iron ore yards and fishpond dams. Almost all occurrences were due to introduction of seeds with grain or iron ore from the former USSR. *Lactuca tatarica* persisted at some localities and spread further, most often vegetatively, as it usually does not produce viable seeds in the Czech Republic (Jehlík 1998). This species is classified as a casual neophyte (Pyšek et al. 2012).

Lactuca viminea (Fig. 30)

Lactuca viminea is distributed in Europe from its southern part northwards to France, central Europe and the central part of European Russia. It also occurs in northern Africa and south-western Asia. The northern limit of the range runs through the Czech Republic (Feráková 1977, Meusel & Jäger 1992). In this country *L. viminea* grows on south-facing slopes with sparse vegetation of dry grasslands, on shallow soils on rocks and screes, usually on basic, and less often on acidic bedrock. It is only rarely found in secondary habitats. *Lactuca viminea* occurs in central Bohemia, where it is distributed in the Křivoklát area and around the city of Prague; through the valleys of the Berounka and Vltava rivers it marginally penetrates western and southern Bohemia, respectively. In northern Bohemia it is found around the town of Kadaň and in the České středohoří Mts. In Moravia it occurs mainly in its south-western part, particularly in the valleys of the Dyje, Jevišovka, Rokytná, Jihlava, Oslava, Svratka and Svitava rivers. *Lactuca viminea* has declined particularly in Bohemia and is therefore classified as vulnerable (Grulich 2012).

Lactuca virosa (Fig. 31)

Lactuca virosa is a sub-Mediterranean species distributed mainly in south-western Europe, from which it extends northwards to Scotland and eastwards to Greece. Most sites in central and south-eastern Europe are probably secondary. Populations in northern Africa are treated by some authors as *L. virosa* subsp. *cornigera* (Feráková 1977, Meusel & Jäger 1992). In the past, *L. virosa* was cultivated as a medicinal plant for its latex (Feráková 1977). Occasionally it escaped from places of cultivation but these occurrences were only

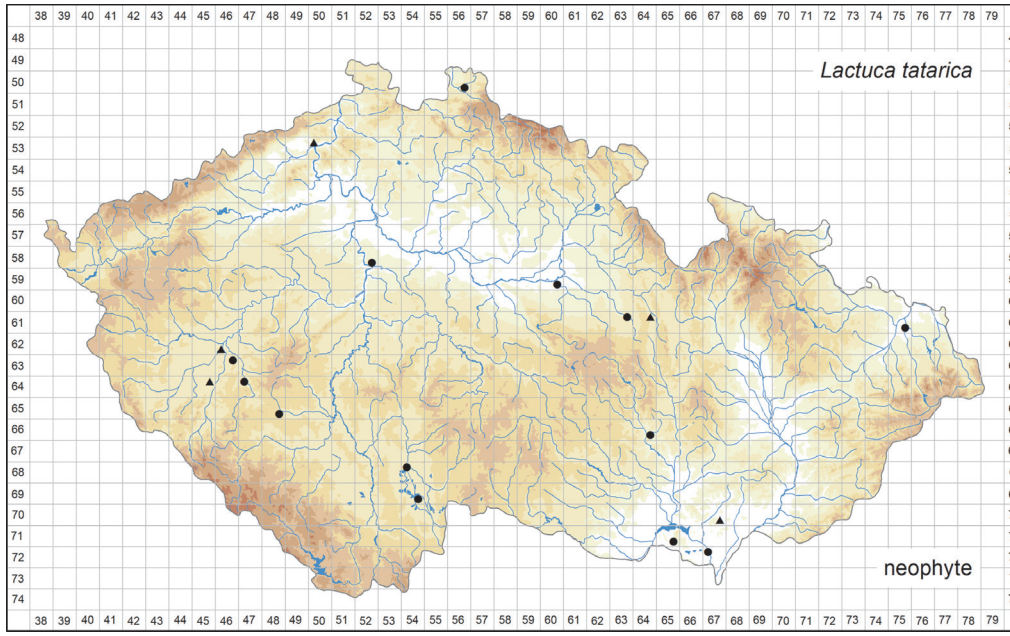


Fig. 29. – Distribution of *Lactuca tatarica* in the Czech Republic: ● occurrence documented by herbarium specimens (13 quadrants), ▲ occurrence based on other records (5 quadrants). Prepared by Pavel Dřevojan.

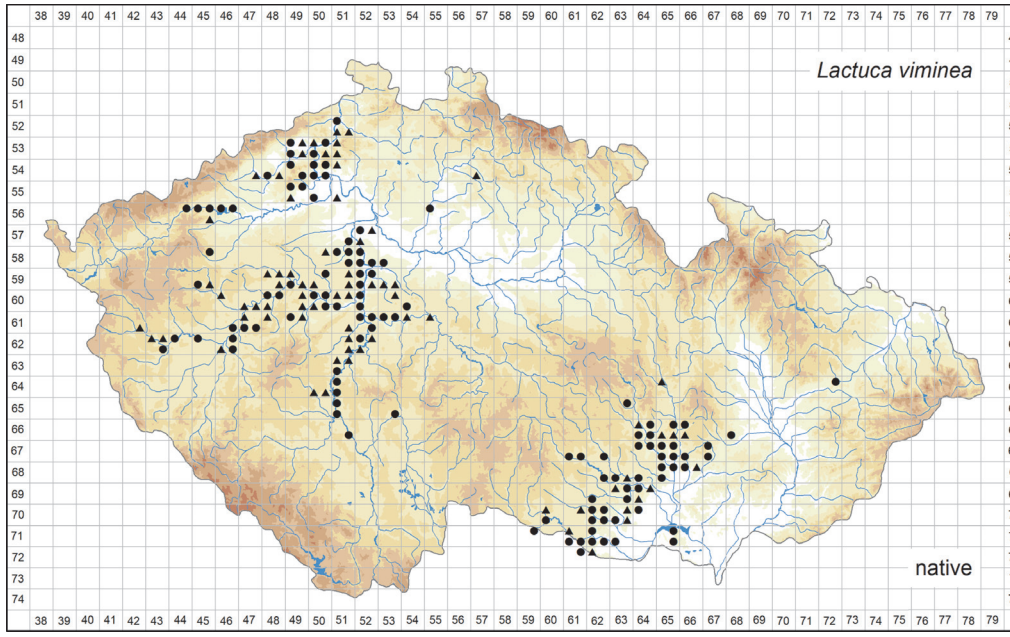


Fig. 30. – Distribution of *Lactuca viminea* in the Czech Republic: ● occurrence documented by herbarium specimens (116 quadrants), ▲ occurrence based on other records (74 quadrants). Prepared by Pavel Dřevojan.

temporary. This is the case in the Czech Republic, where it is considered a casual neophyte (Pyšek et al. 2012). Plants escaped from cultivation are documented by herbarium specimens from three sites, all from the 19th century. The earliest reported escape had been dated to 1872 (Pyšek et al. 2012), but the examination of herbarium specimens revealed an earlier escape in the town of Jirkov in north-western Bohemia in 1851. The two other records comprise one from the town of Mnichovo Hradiště in northern Bohemia and the other in the town of Hustopeče in southern Moravia. The distribution map is based on the herbarium records and includes only unambiguous occurrences outside cultivation.

Onopordum acanthium (Fig. 32)

Onopordum acanthium is distributed in much of southern, central and eastern Europe, reaching northwards to Scotland, southern Scandinavia, southern Finland, the Baltic countries and the southern part of European Russia. In Asia it occurs in eastern Anatolia, Transcaucasia, and from northern Iran it extends to southern Kazakhstan (Meusel & Jäger 1992, Hultén & Fries 1986). It has also been recorded in Algeria (Greuter 2006–2021). In central and northern Europe *O. acanthium* is an archaeophyte or a neophyte; however, due to its occurrence in man-made habitats it is impossible to precisely delimit its primary range. It has also been introduced to North America, Argentina, Australia and New Zealand (Hultén & Fries 1986). In most of the distribution area including its secondary range, the typical subspecies occurs; however, several endemic subspecies are described from Spain, France and Greece (Amaral Franco 1976a, Greuter 2006–2021). In the Czech Republic *O. acanthium* is classified as a naturalized archaeophyte (Pyšek et al. 2012). It occurs mainly in dry ruderal vegetation, such as road verges, abandoned construction sites and dump places, field margins and fallow land. Because this species is sometimes cultivated ornamentally, some occurrences are recent garden escapes, especially those in rather cold areas. *Onopordum acanthium* is rather frequent in warm parts of this country, especially in central and north-western Bohemia and southern Moravia; in these areas, gaps on the map are due to under-recording rather than true absences. It is scattered to rare in the rest of the Czech Republic and is almost entirely absent from the mountains.

Petrorhagia dubia (Fig. 31)

Petrorhagia dubia is a Mediterranean species with a discontinuous range spanning from the Iberian Peninsula in the west to the Mediterranean coast of western Asia in the east (Jalas & Suominen 1986). It has been introduced into the southern USA, South America, South Africa and Australia (Rabeler & Hartman 2005). In Europe, records of introduced plants exist from southern England (Hayling Island; Foster 2005). In its native range *P. dubia* occurs in ruderalized pastures with prevailing therophytes, usually on sandy soils (Romo 1990). In the Czech Republic *P. dubia* was collected in 1934 by V. Krist in ruderal places in Brno north of the city centre somewhere in the vicinity of the Faculty of Law building of Masaryk University. The specimen was identified as *P. prolifera*, and the record was also published under that name (see Krist 1935). It was re-identified as *P. dubia* only recently, during the revision of *Petrorhagia* specimens for this project. Here this species is reported for the first time as a casual neophyte of the Czech flora.

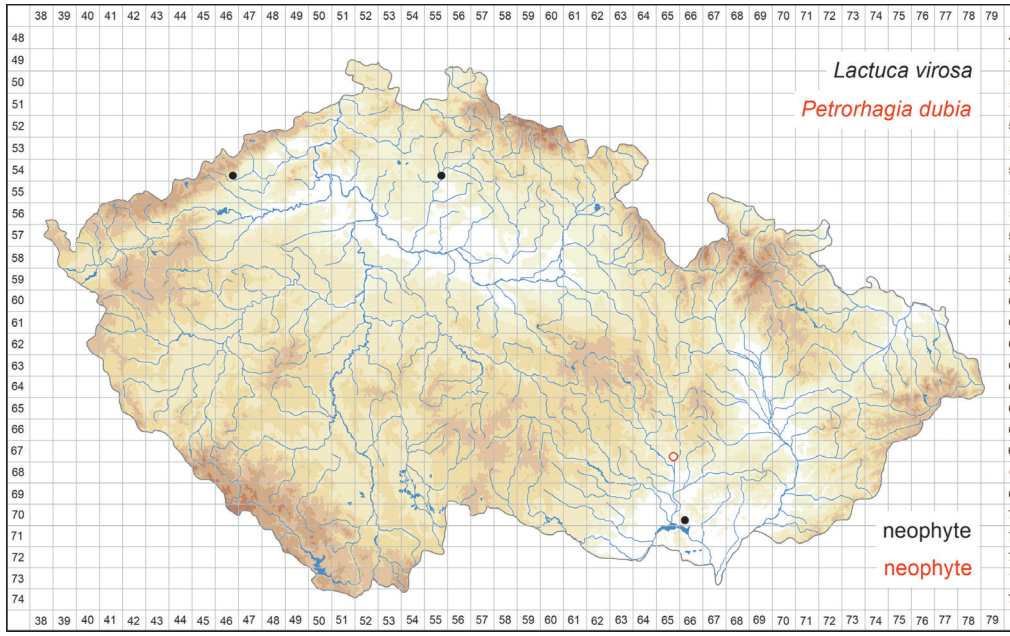


Fig. 31. – Distribution of *Lactuca virosa* (3 occupied quadrants) and *Petrorhagia dubia* (● pre 2000 records only: 1 quadrant) in the Czech Republic. Prepared by Pavel Dřevojan (*L. v.*) and Jiří Danihelka (*P. d.*).

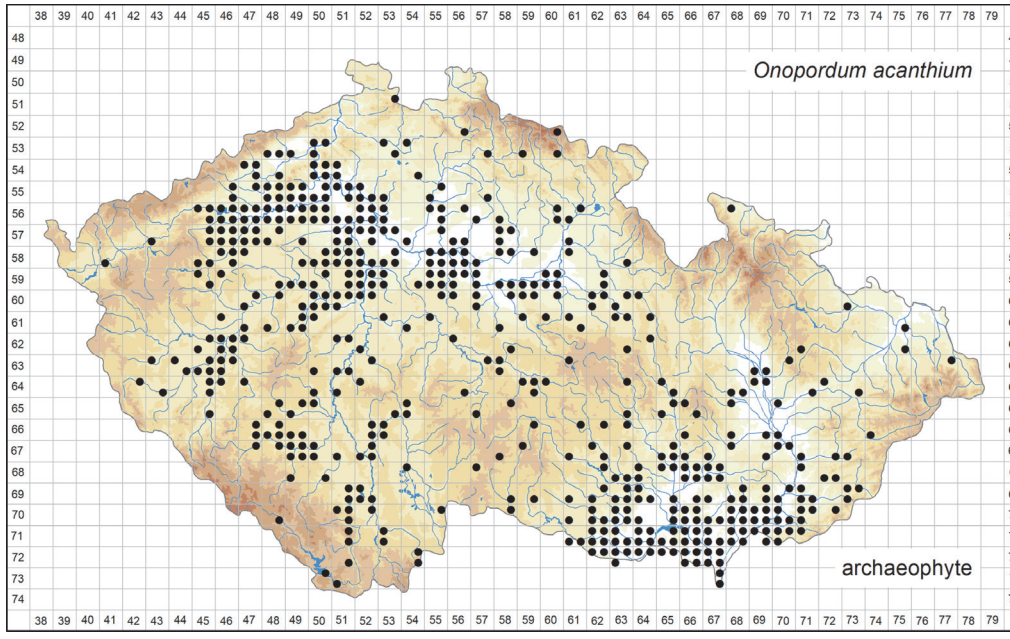


Fig. 32. – Distribution of *Onopordum acanthium* in the Czech Republic (525 occupied quadrants). Prepared by Petr Koutecký.

Petrorhagia prolifera (Fig. 33)

Petrorhagia prolifera is a predominantly European species distributed from central Spain in the west as far as southern Belarus and the Crimean Peninsula in the east; in the north it reaches eastern Denmark, southern Sweden and the island of Gotland, and in the south most of the Mediterranean area including Sardinia, Sicily and central Greece. Isolated occurrences exist in the Canary Islands and the Caucasus Mts (Meusel et al. 1965, Jalas & Suominen 1986). It has been introduced into the British Isles (Meusel et al. 1965), where it is sometimes considered as native to eastern England (Preston et al. 2002), and into North America, where it is relatively widespread in the eastern USA (Rabeler & Hartman 2005). In the Czech Republic *P. prolifera* grows in various types of dry grasslands, particularly on sands, on rock outcrops, in sparsely vegetated stone quarries, road verges, along railways and in other similar ruderal and semiruderal habitats. The soils are usually permeable, sandy or stony, rather dry, moderately acidic, rarely strongly acidic or even basic, and generally poor in nutrients. *Petrorhagia prolifera* is widespread in this country, naturally occurring in the areas with warm to moderately warm climates. Occurrences at rocky sites in the areas with moderately cold climates, e.g. along the Vltava and Jihlava river valleys, may also be considered native. Still, at some sites the status of the occurrence is uncertain. In addition, there exist numerous scattered records elsewhere, mainly from roadsides and railways, that undoubtedly refer to introduced plants. Some of these occurrences persist for a long time, e.g. those in the city of Ostrava. *Petrorhagia prolifera* is classified as of lower risk – near threatened (Grulich 2012).

Petrorhagia saxifraga (Fig. 34)

Petrorhagia saxifraga is a sub-Mediterranean species continuously distributed from south-western parts of the Mediterranean area to north-western Greece, including the islands of Corsica, Sardinia and Sicily, towards the north extending as far as Switzerland, Bavaria, northern Austria, southern Slovakia, the Danube river in Hungary, northern Serbia and north-western Bulgaria. There are scattered occurrences in the Iberian Peninsula, Romania and Moldova. This species also occurs in northern Anatolia, the Caucasus Mts, the adjacent part of European Russia and northern Iran. As an introduced species, *P. saxifraga* is scattered in western and northern Europe, including the British Isles, Poland, southern Sweden and Latvia (Meusel et al. 1965, Jalas & Suominen 1986, Preston et al. 2002). It has also been introduced into North America, where it occurs mainly in the north-eastern USA (Rabeler & Hartman 2005). In the Czech Republic *P. saxifraga* is sometimes grown as a rock-garden or border plant. Outside cultivation this species was found by the early 19th century near the town of Třeboň in southern Bohemia (Presl & Presl 1819). In the 1830s, specimens collected from the same locality were even issued by I. F. Tausch in his exsiccate series Herbarium florae bohemicae. By the turn of the 19th century, *P. saxifraga* was recorded at several localities in different parts of Bohemia. In Moravia this species was first found in 1900 in the town of Boskovice. Records of escaped plants are scattered all over the country, particularly in cities, and at least in the cities of Brno and Ostrava this species seems to be locally established. It is usually found in sunny and dry places including short grasslands that are frequently mown or disturbed by trampling, and ruderal sites with sparse vegetation cover, such as iron ore yards and heaps of slag or ash. *Petrorhagia saxifraga* is considered native to sandy habitats of south-western Slovakia and, based on

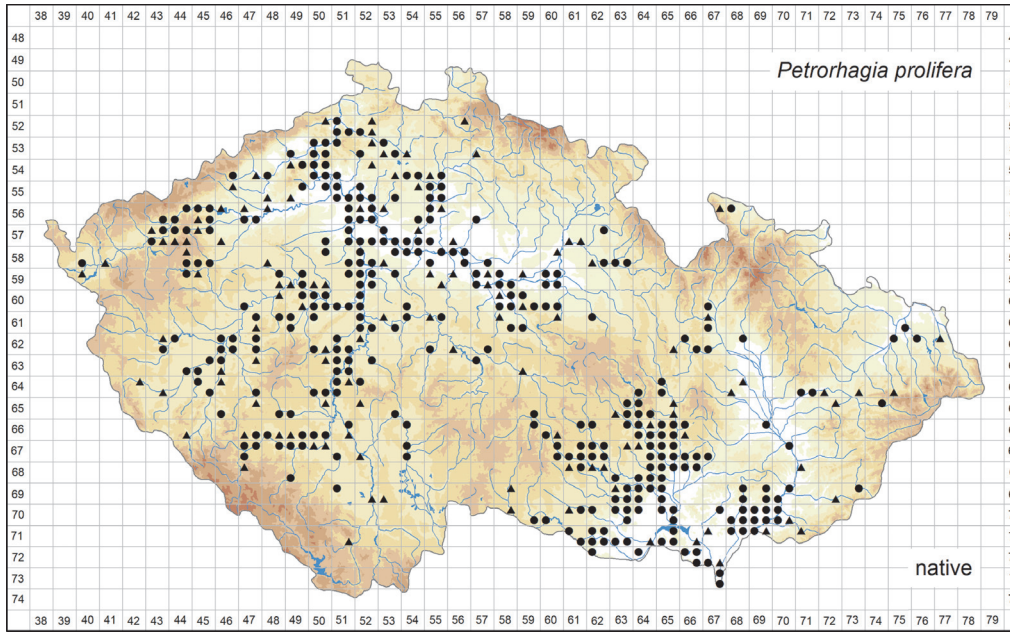


Fig. 33. – Distribution of *Petrorhagia prolifera* in the Czech Republic: ● occurrence documented by herbarium specimens (320 quadrants), ▲ occurrence based on other records (122 quadrants). Prepared by Jiří Danihelka.

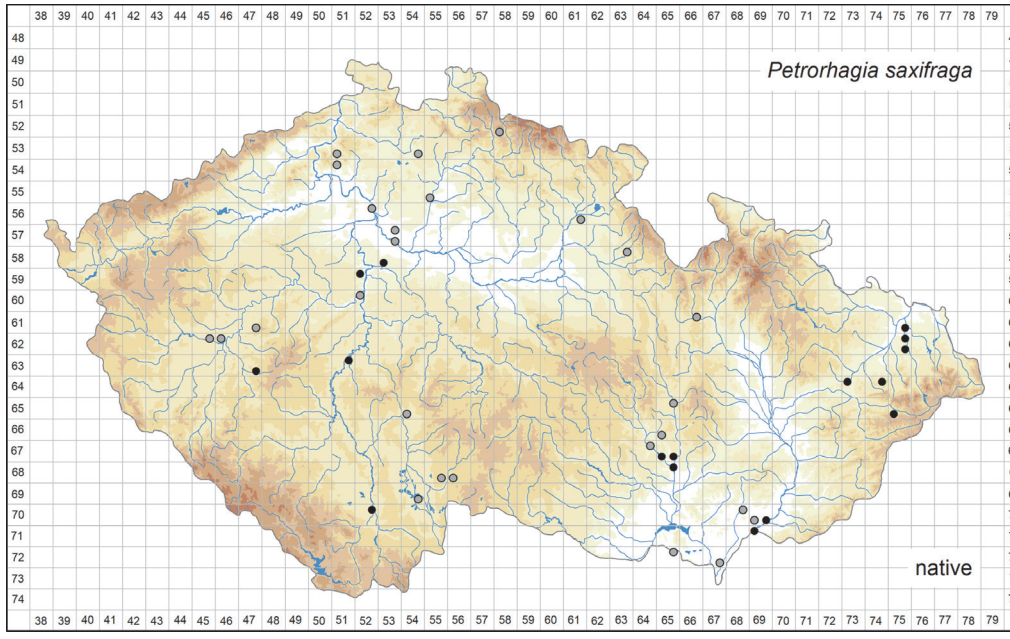


Fig. 34. – Distribution of *Petrorhagia saxifraga* in the Czech Republic: ● at least one record in 2000–2020 (16 quadrants), ● pre 2000 records only (26 quadrants). Prepared by Jiří Danihelka.

a single herbarium specimen collected in 1940 next to the town of Lanžhot in the very south-east of the Czech Republic, probably also to this country (Šourková 1990). However, all the extant occurrences originated from introduced or escaped plants. Therefore, *P. saxifraga* is classified among uncertain cases of extinct, vanished or missing taxa (Grulich 2012).

Serratula tinctoria (Fig. 35)

Serratula tinctoria is a European species that occurs from the Iberian Peninsula in the west to European Russia in the east. Towards the north it extends to the British Isles, southern Sweden and Estonia, and towards the south to northern Portugal, central Spain, Italy, Sicily and the Balkan Peninsula except for Greece, while it is absent from the areas with evergreen Mediterranean vegetation; an outpost is reported from Algeria (Meusel & Jäger 1992). It has been rarely introduced into North America (USDA, NRCS 2020). Due to conspicuous variation in stem branching, capitula size and leaf shape, numerous infraspecific taxa have been described. However, only three of them are recognized nowadays (e.g. Greuter 2006–2021), sometimes only at the variety level (e.g. Cantó 2019): subsp. *tinctoria* occurs throughout the range of the species, while the subsp. *monticola* (also referred to as subsp. *macrocephala*) is confined to the southern part of the Alps and the Pyrenees and subsp. *seoanei* to north-western Spain and Portugal. In the Czech Republic *S. tinctoria* occurs in wet, mesophilous or sub-xerophilous meadows and in thermophilous and sub-thermophilous oak and oak-hornbeam forests. The soils are acidic (but not strongly acidic) to calcareous and often intermittently wet (drying out during summer). This species is scattered in flat to hilly landscapes in warm or moderately warm parts of this country, especially in north-western, central and eastern Bohemia, central and southern Moravia, and in fishpond basins in south-western and southern Bohemia, while it is rare elsewhere. It is absent from the mountains along this country's border and some parts of north-western Moravia and the Českomoravská vrchovina highlands. It is slightly declining due to habitat destruction (especially of wet meadows) and is therefore classified as of lower risk – near threatened (Grulich 2012).

Silybum marianum (Fig. 36)

Silybum marianum is probably native to the Mediterranean area, Anatolia and Transcaucasia (Amaral Franco 1976b, Greuter 2006–2021); however, it is impossible to establish its primary range. It has been cultivated since the Ancient Period as a medicinal plant, nowadays all over the world, and its secondary occurrences are known from all continents except for Antarctica (e.g. GCW 2020). In Europe it occurs throughout the continent except for its northernmost parts (Greuter 2006–2021). In the Czech Republic *S. marianum* is classified as a casual archaeophyte (Pyšek et al. 2012). It has been recorded throughout this country except for mountains. It is often found at field margins, on fallow land and in abandoned gardens as remnants of cultivation due to seeds surviving in the soil seed bank for several years. Occasionally it is found in various types of ruderal vegetation on nutrient-rich soils, mainly in road verges and on waste ground, especially those with garden waste.

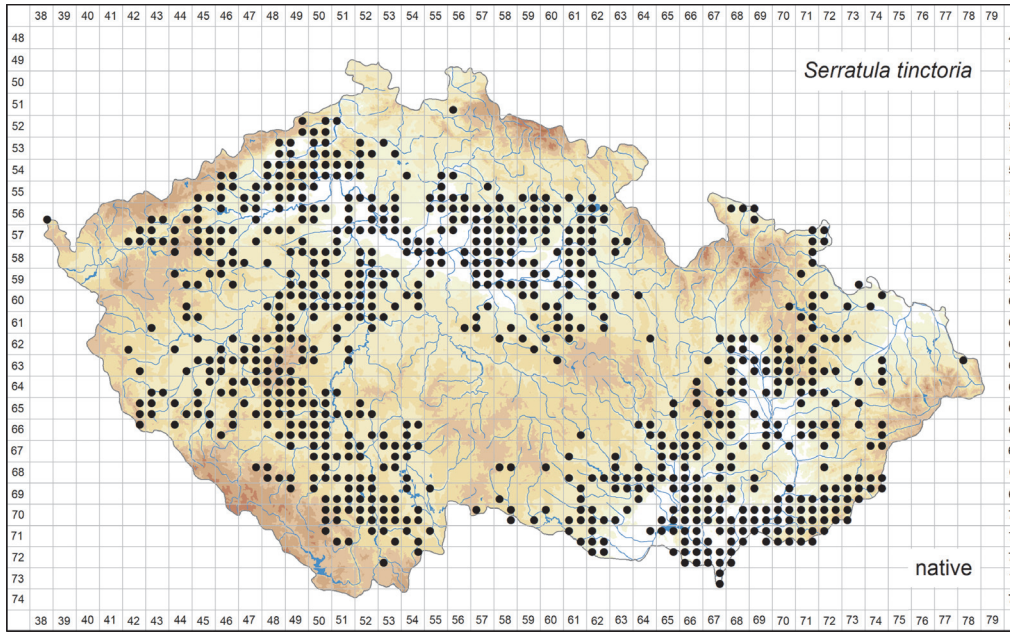


Fig. 35. – Distribution of *Serratula tinctoria* in the Czech Republic (786 occupied quadrants). Prepared by Petr Koutecký.

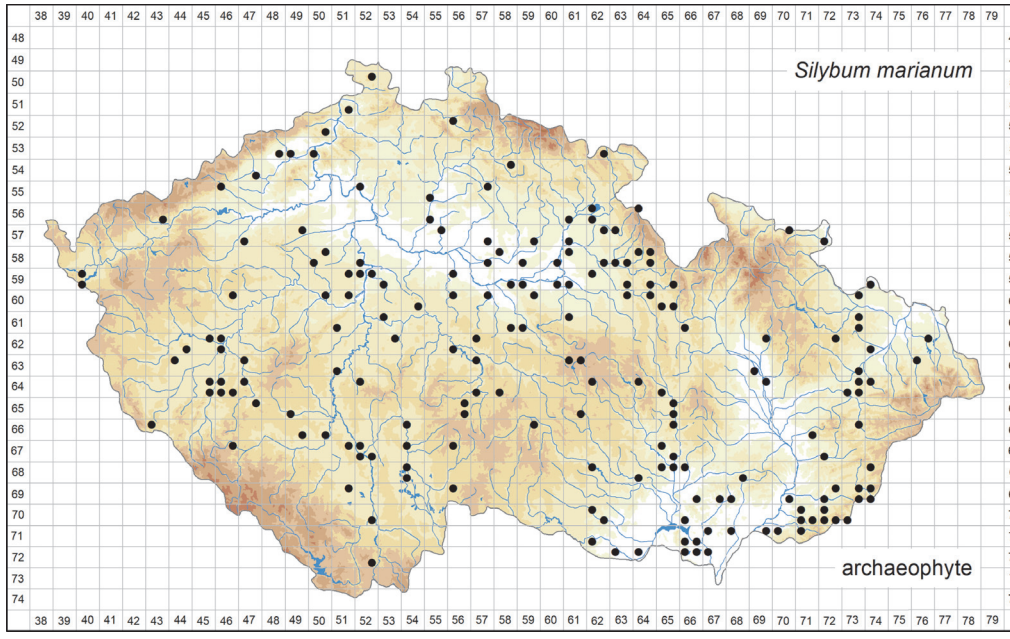


Fig. 36. – Distribution of *Silybum marianum* in the Czech Republic (188 occupied quadrants). Prepared by Petr Koutecký.

Xanthium orientale agg. (Figs 37–39)

The *Xanthium orientale* aggregate is a group of taxa native to the New World. They are morphologically and ecologically well differentiated from the Old World species of this genus, i.e. *X. strumarium* (incl. *X. brasilicum*) and other taxa reported to replace the latter species in Asia (Wagenitz 1979, Wisskirchen 1995). The morphological differences between the Old World and New World species are corroborated by a molecular taxonomic study, using two plastid and two nuclear regions (Tomasello 2018). In contrast, if European and American populations are lumped together as one species under a broadly circumscribed *X. strumarium* (e.g. Löve 1976, Strother 2006b), important phytogeographical and ecological information is lost. Here we follow the taxonomy proposed by Widder (1923) with later taxonomic and nomenclatural adjustments, as summarized by Wisskirchen (1995). For practical reasons, we accept the taxa at the species level (see Danihelka 2019b), but their treatment as subspecies (and varieties) may be more appropriate (see Greuter 2006–2021), because the morphological differences between particular taxa are subtle, limited mainly to quantitative characters of burrs. These differences are also blurred by striking environmental plasticity.

In the Czech Republic three taxa of the *X. orientale* agg. have been found. The most widespread is *X. albinum*. There are also two or three early records of *X. ripicola*. Additionally, populations that morphologically correspond to *X. saccharatum* were found in 2008 in southern Moravia. Another species, *X. orientale* (s. str.), was reported from the city of Brno by Havlíček (2004), but an examination of voucher specimens collected in 1965 has shown that they also best correspond to *X. saccharatum*. Consequently, we consider the only known record of *X. orientale* from the Czech Republic to be erroneous. Due to frequent misidentifications, all the distribution maps are based mainly on examined herbarium specimens.

Xanthium albinum (Fig. 37) is native to North America, probably to the northern USA and southern Canada (Widder 1925). In Europe it occurs in the temperate zone from France in the west as far as eastern European Russia in the east (Meusel & Jäger 1992, Wisskirchen 1995, Greuter 2006–2021). However, Greuter (2006–2021) treats *X. orientale* subsp. *riparium* as including both *X. albinum* and *X. ripicola*. Plants similar to those of *X. albinum* in its narrow sense, as adopted here, are also found in the Altai Krai and the Altai Republic in Siberia (photographs of specimens from herbarium MW available via GBIF). In the Czech Republic *X. albinum* occurs on the banks of lowland rivers, mainly on sandy or gravelly deposits, in and around sandpits, on waste ground, at railway stations and on road verges, occasionally at construction sites and recently also as a weed on arable land. Soils are often wet in the spring and rich in nutrients. In this country *X. albinum* was first collected in 1849 near the town of Děčín in northern Bohemia. It colonized the Labe river banks rapidly upstream up to the town of Mělník and some sections of the Vltava river downstream of Prague. During the 20th century this species progressed upstream along the Labe river to the town of Kolín. On the banks of the Dyje river in southern Moravia *X. albinum* was first collected in 1976. Nowadays it is almost continuously distributed downstream from the Nové Mlýny reservoirs. It also occurs along the Morava river downstream of the town of Strážnice. In north-western Bohemia this species colonized abandoned brown coal mines and spoil tips. Records elsewhere in this country represent casual introductions with building materials (mainly sand), agricultural commodities,

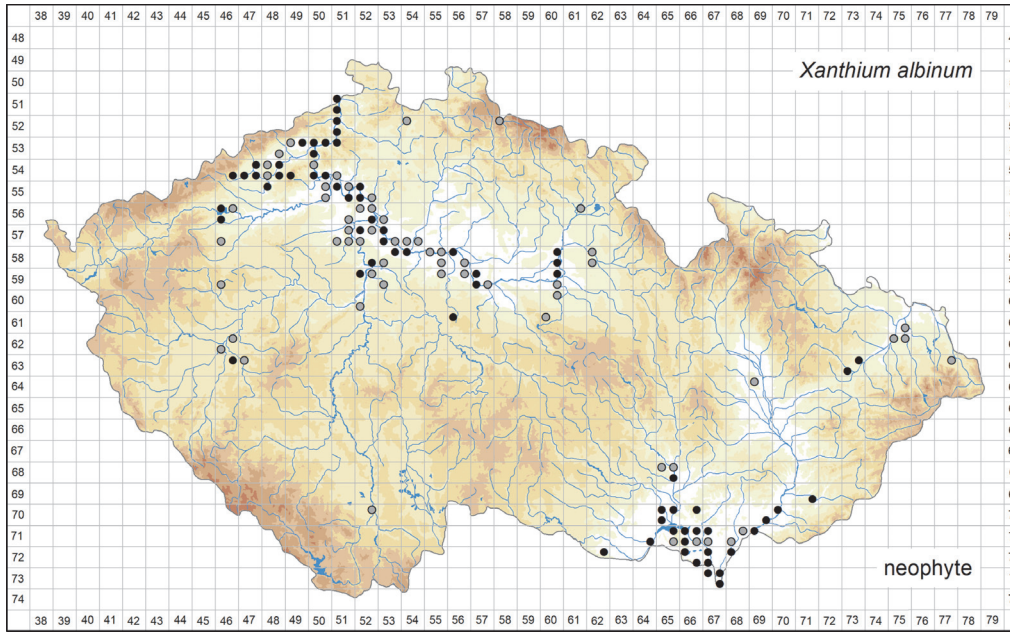


Fig. 37. – Distribution of *Xanthium albinum* in the Czech Republic: ● at least one record in 2000–2020 (67 quadrants), ◍ pre 2000 records only (60 quadrants). Prepared by Jiří Danihelka & Pavel Dřevojan.

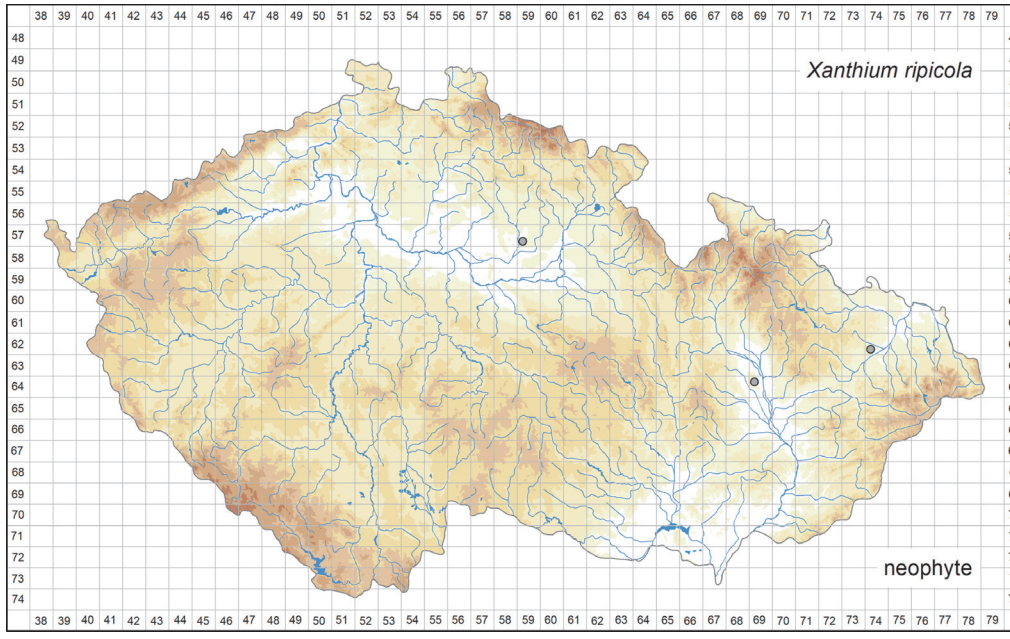


Fig. 38. – Distribution of *Xanthium ripicola* in the Czech Republic: ◍ pre 2000 records only (3 quadrants). Prepared by Jiří Danihelka & Pavel Dřevojan.

iron ore and seeds, partly from abroad. Some of the occurrences are short-lived, but sometimes a population may establish and survive for decades. *Xanthium albinum* is classified as a naturalized neophyte (Pyšek et al. 2012).

Xanthium ripicola (Fig. 38) is probably native to the same area as *X. albinum* (Widder 1925). There are three herbarium records of this taxon from the Czech Republic, spanning from 1905 to 1983. All represent casual introductions, and the species has never established sustainable populations. It is classified as a casual neophyte (Pyšek et al. 2012).

Xanthium saccharatum (Fig. 39) is native to North America from southern Canada southwards to northern Mexico (Widder 1923: map 2). It has been introduced into Europe and has become naturalized along the Mosel and Rhein rivers (Wisskirchen 1995). It also occurs in eastern Austria (U. Raabe in Niklfeld 2016) and probably in most countries of southern Europe, but neither a map nor reliable records are available. In the Czech Republic it was collected in the cities of Brno, Pardubice and Olomouc at ruderal sites between 1965 and 1983. These records represent accidental introductions. In 2008 *X. saccharatum* was found in southern Moravia in the surroundings of the town of Hrušovany nad Jevišovkou. It occurred there as a weed on arable land on the margins of sunflower and maize fields, probably having been introduced with contaminated commercial seed from abroad. Based on recent field observations, the species is locally established there. We suggest its classification as a casual neophyte.

Xanthium spinosum (Fig. 40)

Xanthium spinosum is native to South America, roughly south of the Tropic of Capricorn. It was introduced into Europe probably in the late 17th century and was first recorded in Portugal as cultivated in a botanical garden in 1689. There are reports about altogether five gardens in various parts of Europe in which this species was grown before 1700. Already in 1769 *X. spinosum* was found in the basin of the Khopyor river in southern Russia. Soon afterwards, southern Ukraine became the centre of its invasion, and the species spread rapidly all over south-eastern and central Europe (Meusel & Jäger 1992). It was dispersed locally mainly by grazing animals and over greater distances with wool for further processing. It has become naturalized in the whole Mediterranean area and central Europe, while the occurrences in northern Europe have remained casual (Meusel & Jäger 1992, Greuter 2006–2021). The species has also been introduced into North America, southern Africa, Australia and New Zealand (Meusel & Jäger 1992). In the Czech Republic *X. spinosum* occurred mainly on waste ground and other disturbed places in and around towns and villages, on pastures and road verges. It was first discovered in 1840 in the city of Brno, on the slopes below the citadel and prison on Špilberk hill (Reissek 1841), probably introduced with wool processed by prisoners. In Prague it was first found in 1844, and it was recorded in five other locations in various parts of the country by 1850, and afterwards more widely. The species' rapid spread in this country was associated with wool processing and sheep farming, and it became soon established in the warmest parts of central and northern Bohemia, and southern and central Moravia. The scattered records elsewhere, often from waste places, represent casual introduction with wool and other commodities. Numerous records from the 1960s from iron ore yards in northern Moravia and Silesia are associated with introductions with iron ore from southern

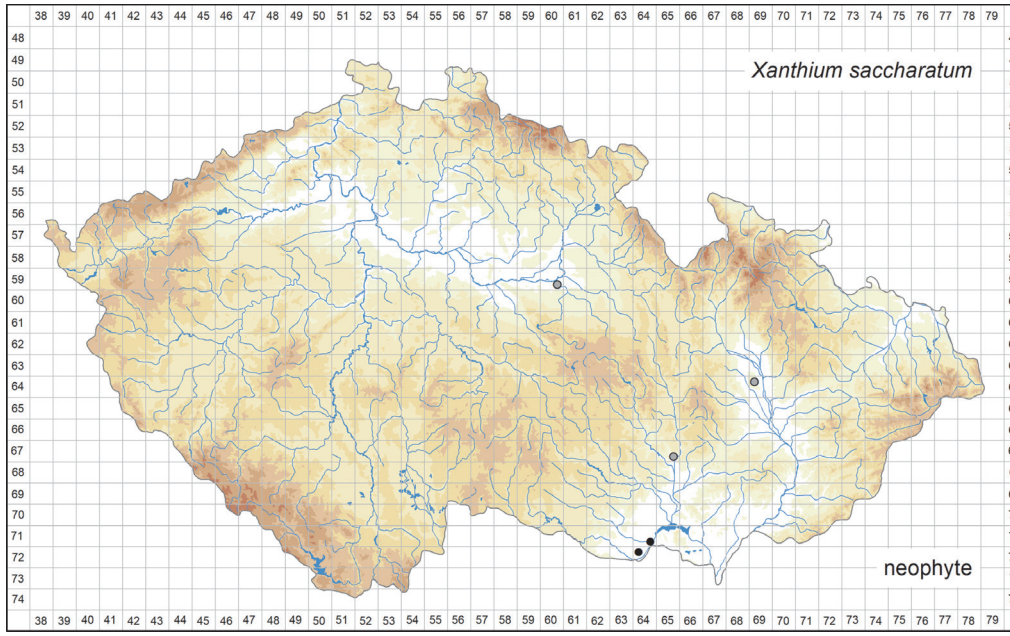


Fig. 39. – Distribution of *Xanthium saccharatum* in the Czech Republic: ● at least one record in 2000–2020 (2 quadrants), ● pre 2000 records only (3 quadrants). Prepared by Jiří Danihelka & Pavel Dřevojan.

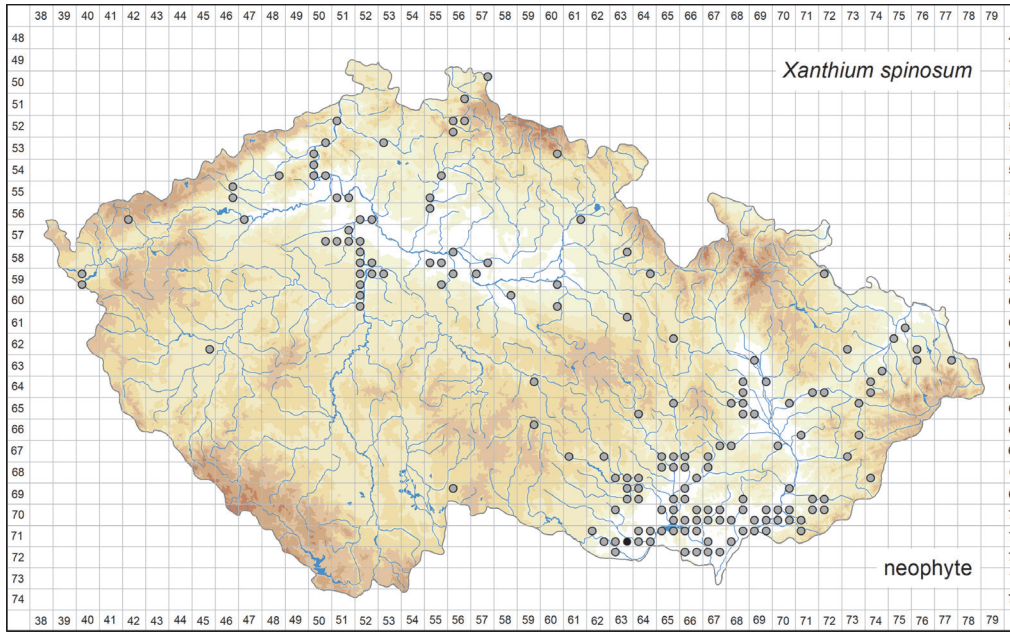


Fig. 40. – Distribution of *Xanthium spinosum* in the Czech Republic: ● at least one record in 2000–2020 (1 quadrant), ● pre 2000 records only (161 quadrants). Prepared by Jiří Danihelka & Pavel Dřevojan.

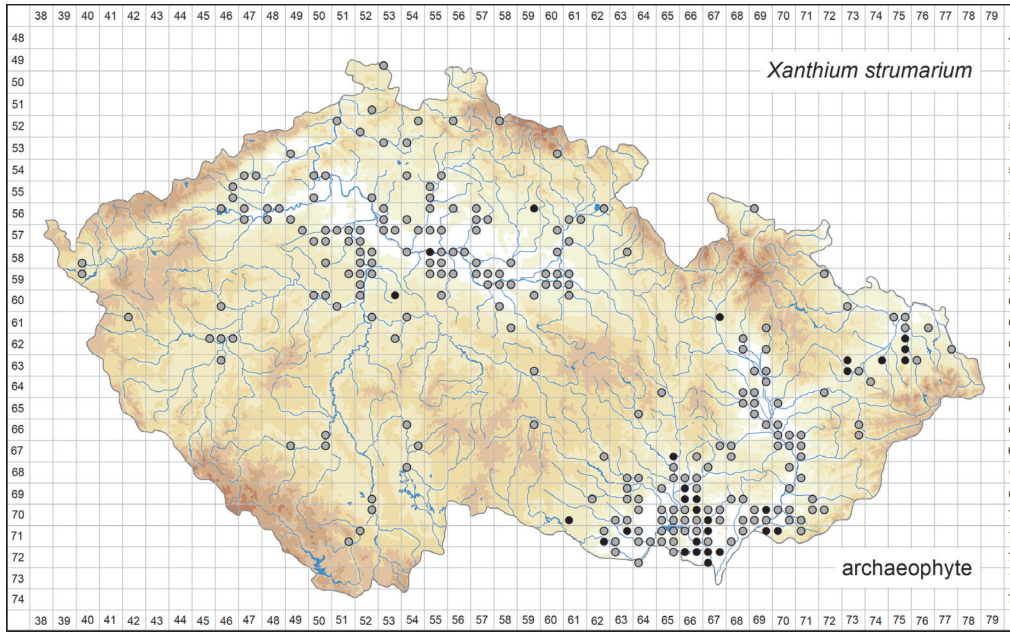


Fig. 41. – Distribution of *Xanthium strumarium* in the Czech Republic: ● at least one record in 2000–2020 (29 quadrants), ● pre 2000 records only (227 quadrants). Prepared by Jiří Danihelka & Pavel Dřevojan.

Ukraine. In the Czech Republic *X. spinosum* started to decline already in the early 20th century, not only due to continued abandonment of sheep farming, grazing and other changes in agriculture, but also due to changes in the management of public places in villages, including removal of small waste places and later also paving. The last occurrences of this species in southern Moravia disappeared during the 1970s, and *X. spinosum* was considered vanished (Havlíček 2004). However, in 2009 a small population was found near the village of Božice in southern Moravia. This once well-established species is now classified as a casual neophyte (Pyšek et al. 2012).

Xanthium strumarium (Fig. 41)

Xanthium strumarium (incl. *X. brasilicum*) is an Old World species, native probably to the Near and Middle East and to the areas around the Caspian Sea and along the European shores of the Black Sea (Opravil 1983). It occurs in Europe except for its northern parts and in the Mediterranean area. In western Siberia, south-western, southern and south-eastern Asia and in Japan it is replaced by four other taxa, which are poorly differentiated (Meusel & Jäger 1992, Wisskirchen 1995) and possibly even conspecific. *Xanthium strumarium* has been introduced into the Americas, southern Africa, Australia and New Zealand (Meusel & Jäger 1992). In the Czech Republic *X. strumarium* occurs on waste ground, in disturbed places in villages and towns, in pastures and field margins, and on road verges, rivers banks and bottoms of drained ponds. Soils are usually rich in nutrients, sometimes saline and at many of the sites wet in spring. In this country *X. strumarium* was once

rather widespread and well established in the areas with warm climates. However, it started to decline after WWI, the causes being the same as those for *X. spinosum*. In contrast to that species, it survived as a weed on arable land at several sites in southernmost Moravia. The recent records from other parts of the country refer to occurrences mainly in soya fields (due to introduction with commercial seed) or to single plants accidentally introduced, e.g. with poultry grain mixtures. *Xanthium strumarium* is classified as a casual archaeophyte (Pyšek et al. 2012) and also as critically threatened because of its strong decline (Grulich 2012). The distribution map is based mainly on examined herbarium specimens, because many published records of *X. strumarium* refer to misidentified specimens of *X. albinum*.

See www.preslia.cz for Electronic Appendices 1–44

Acknowledgements

We are grateful to all who made this study possible and helped us in any way. Field botanists collected distribution records and plant specimens for herbaria, which served as a basis for the distribution maps. Curators of the herbaria visited allowed us to study their specimens and collect records. Administrators of the integrated databases, particularly Jan Štěpánek, Milan Chytrý, Dana Holubová (née Michalcová) and Karel Chobot, as representatives of the major ones, agreed to share plant distribution records. The South-Bohemian branch of the Czech Botanical Society kindly provided records from the regional floristic database of Václav Chán. Radim Paulič helped with the preparation of the map of *Draba muralis*. Regional collaborators and field botanists, particularly Jan Prančl, David Hlisnikovský, Petr Kocián, Radim Paulič, Libor Ekrt, Petr Lepší, Vojtěch Taraška, Michal Vávra, Pavel Lustyk, Michal Ducháček, Jan Doležal, Milan Štech, Petr Hubatka, Rudolf Hlaváček, Jitka Štěpánková, Aleš Zvára, Viktor Pluhař, Luděk Čech, Kateřina Šumberová, Radek Štencl, Jan Blahovec, Karel Boublík, Václav Pošvic, Josef Komárek, Linda Trunečková, Jana Janáková, Jiří Velebil, Hana Galušková, Karel Fajmon, Michal Hájek, Kateřina Vejvodová, Lenka Bálková, Petr Filippov, Jan Košnar, Jaroslav Zámečník, Kryštof Chytrý, Martin Dančák, Věra Samková, Ester Ekrtová, Jana Tkáčiková, Jiří Brabec, Milan Kotilínek, Ondřej Hornych, Ondřej Knápek, Petr Batoušek, Martina Bartošová, Tomáš Tichý and Petr Petřík commented on early versions of maps and/or provided additional records from their areas. Josef Brůna, Hana Galušková, Anna Kladivová, Eva Koutecká, Helena Prokešová, Petra Štěpánková and Kristýna Vazačová georeferenced distribution records, computerized data, helped with the preparation of maps or provided other technical assistance. Programmers Petr Novotný and Martin Rohn produced the Pladias database and the web-based mapping interface. Kateřina Šumberová and an anonymous reviewer carefully read the manuscript and suggested numerous valuable improvements. Jonathan Rosenthal proofread the English text. ZK, JD and JW were supported by long-term research development project no. RVO 67985939 of the Czech Academy of Sciences, PD was funded by the Technology Agency of the Czech Republic project No. SS02030018 Centre for Landscape and Biodiversity (DivLand).

Souhrn

Desátá část ze série prací věnovaných rozšíření cévnatých rostlin v České republice obsahuje síťové mapy a komentáře k 44 taxonům rodů *Carex*, *Colchicum*, *Cytisus*, *Draba*, *Dracocephalum*, *Jurinea*, *Klasea*, *Lactuca*, *Onopordum*, *Petrorhagia*, *Serratula*, *Silybum* a *Xanthium*. Základem jsou údaje získané excerpcí herbářů a literatury, terénní zápisy a databázové údaje, které prověřili taxonomičtí experti. Mezi studovanými rostlinami jsou jak naše původní druhy, tak druhy nepůvodní. Zvláštní pozornost byla věnována kriticky ohroženým rostlinám. *Carex macroura* je u nás známa jen ze dvou lokalit v okolí Mimoně na Českolipsku. Česká arela je pozoruhodně izolována od hlavní části areálu druhu, která leží v jižní části Sibiře; české výskyty jsou od nejbližších lokalit v Rusku vzdáleny přibližně 2500 km. Druh *Dracocephalum austriacum* byl nalezen asi na 14 lokalitách, z nichž naprostá většina se nachází na vápencích Českého krasu. Některé z těch výskytů již zanikly, jinde přežívají jen chudé populace. Psamofyt *Jurinea cyanoides* byl v minulosti zaznamenán asi na 25 místech v Polabí. Dodneška se dochovala jediná drobná populace, kde jedinců ubývá i přes územní ochranu a řízenou péči. Fakultativní halofyt *Lactuca saligna* byl v minulosti pozorován na více než stovce lokalit v Čechách i na Moravě,

z nichž však vymizel a donedávna byl u nás považován za nezvěstný. V roce 2020 však byl překvapivě nalezen na 9 lokalitách v Bílých Karpatech, kam byl snad zavlečen ze Slovenska. Naproti tomu dříve vzácné druhy *Draba muralis* a *D. nemorosa*, u nás s geograficky velmi omezeným výskytem, se v posledních desetiletích začaly šířit podél železnic. Nejvíce těchto sekundárních lokalit je nyní známo v jihozápadních Čechách, zejména podél železniční trati mezi Plzní a Českými Budějovicemi. Lze očekávat, že se oba druhy budou šířit i nadále. Některé ze zde zpracovaných neofytů k nám byly přechodně zavlečeny v druhé polovině 20. století, a to s obilninami a železnou rudou z tehdejšího Sovětského svazu (např. *Dracocephalum thymiflorum* a *Lactuca tatarica*), jiné zplaněly ze zahrad (např. *Dracocephalum moldavica* a *Lactuca virosa*). Některé z pojednávaných archeofytů u nás zdomácněly a jsou dnes značně rozšířené (např. *Lactuca serriola* a *Onopordum acanthium*), zatímco jiné u nás byly dosti časté v minulosti, ale v důsledku intenzifikace zemědělství a urbanizace sídel později značně ustoupily a dnes jsou opět vzácné (např. *Xanthium strumarium*). Dva druhy jsou v tomto příspěvku uvedeny jako nové pro Českou republiku. *Carex agastachys* byla oddělena od šířeji pojatého druhu *C. pendula*, který je u nás ve skutečnosti velmi vzácný, zatímco většina populací patří druhu *C. agastachys*, který je nejhojnější v karpatské části Moravy. Mediterránní *Petrorhagia dubia* byla sebrána již v roce 1934 v Brně, zůstala však nerozpoznána a správně byla určena až při revizi herbářového materiálu pro tuto práci. Celkový obraz rozšíření zpracovávaných taxonů v ČR poskytují mapy; konkrétní floristické údaje zachycující frekvenci výskytu v různých oblastech a v různých obdobích, a dokumentující ústup, nebo naopak šíření některých druhů, jsou uloženy v databázi Pladias a dostupné v elektronických přílohách. Každou mapu doprovází komentář, který obsahuje nástin celkového areálu, výčet nejčastějších stanovišť a stručnou charakteristiku rozšíření v České republice, případně i doplňující informace k taxonomii, biologii, změnám v rozšíření a míře ohrožení.

References

Al-Shehbaz I. A., Windham M. D. & Elven R. (2010) *Draba*. – In: Flora of North America Editorial Committee (eds), Flora of North America north of Mexico 7: 269–347, Oxford University Press, New York & Oxford.

Amaral Franco J. (1976a) *Onopordum* L. – In: Tutin T. G., Heywood V. H., Burges N. A., Moore D. M., Valentine D. H., Walters S. M. & Webb D. A. (eds), Flora Europaea 4: 244–248, Cambridge University Press, Cambridge.

Amaral Franco J. (1976b) *Silybum* Adanson – In: Tutin T. G., Heywood V. H., Burges N. A., Moore D. M., Valentine D. H., Walters S. M. & Webb D. A. (eds), Flora Europaea 4: 249, Cambridge University Press, Cambridge.

Cantó P. (2019) *Serratula* L. – In: Benedí C., Buira A., Rico E., Crespo Villalba M. B., Quintanar A. & Aedo C. (eds), Flora Iberica 16/3: 238–243, Real Jardín Botánico & CSIC, Madrid.

Chrtek J. (1978) *Draba sibirica* – přechodně zplanělý druh v ČSSR [*Draba sibirica* – temporarily escaped species in Czechoslovakia]. – Zprávy Československé botanické společnosti 13: 161–162.

Chytrý M., Danihelka J., Kaplan Z., Wild J., Holubová D., Novotný P., Řezníčková M., Rohn M., Dřevojan P., Grulich V., Klimešová J., Lepš J., Lososová Z., Pergl J., Sádlo J., Šmarda P., Štěpánková P., Tichý L., Axmanová I., Bartušková A., Blažek P., Chrtek J. Jr., Fischer F. M., Guo W.-Y., Herben T., Janovský Z., Konečná M., Kühn I., Moravcová L., Petřík P., Pierce S., Prach K., Prokešová H., Štech M., Těšitel J., Těšitelová T., Večeřa M., Zelený D. & Pyšek P. (2021) Pladias Database of the Czech Flora and Vegetation. – Preslia 93: 1–88.

Cronquist A., Holmgren A. H., Holmgren N. H., Reveal J. L. & Holmgren P. K. (1984) Intermountain flora. Vascular plants of the Intermountain West, U.S.A. Vol. 4. – The New York Botanical Garden, Bronx, New York.

Danihelka J. (2019a) První nález včelníku drobnokvětého (*Dracocephalum parviflorum*) v České republice [The first record of *Dracocephalum parviflorum* in the Czech Republic]. – Zprávy České botanické společnosti 54: 1–7.

Danihelka J. (2019b) *Xanthium* L. – řepeň. – In: Kaplan Z., Danihelka J., Chrtek J. jun., Kirschner J., Kubát K., Štech M. & Štěpánek J. (eds), Klíč ke květeně České republiky [Key to the flora of the Czech Republic], ed. 2, p. 1000–1001, Academia, Praha.

de Vries I. M. (1997) Origin and domestication of *Lactuca sativa* L. – Genetic Resources and Crop Evolution 44: 165–174.

Dostálek T., Münzbergová Z. & Plačková I. (2010) Genetic diversity and its effect on fitness in an endangered plant species, *Dracocephalum austriacum* L. – Conservation Genetics 11: 773–783.

Egorova T. V. (1999) Osoki (*Carex* L.) Rossii i sopredel'nykh gosudarstv (v predelakh byvshego SSSR) [The sedges (*Carex* L.) of Russia and adjacent states (within the limits of the former USSR)]. – Sankt-

Peterburgskaya Gosudarstvennaya Khimiko-farmatsevticheskaya Akademiya, Sankt-Peterburg & Missouri Botanical Garden, Saint-Louis.
Feráková V. (1970) A biosystematic study of critical species of *Lactuca* sect. *Lactucopsis*. – Folia Geobotanica & Phytotaxonomica 5: 401–427.
Feráková V. (1977) The genus *Lactuca* L. in Europe. – Univerzita Komenského, Bratislava.
Foster E. J. (2005) *Petrorhagia dubia* established in S. Hants (v. c. 11). – BSBI News 100: 46.
Fristedt F. (1857) Växtgeografisk Skildring af Södra Ångermanland [= Phytogeographical outline of southern Ångermanland]. – Wahlström & c., Uppsala.
Frodin D. G. & Heywood V. H. (1968) *Cytisus* L. – In: Tutin T. G., Heywood V. H., Burges N. A., Moore D. M., Valentine D. H., Walters S. M. & Webb D. A. (eds), Flora Europaea 2: 86–90, Cambridge University Press, Cambridge.
GCW (2020) Global compendium of weeds. – AgWest, Australia & Hawaiian Ecosystems at Risk project (HEAR), USA, URL: http://www.hear.org/gcw/ (accessed 30 November 2020).
Greuter W. (2006–2021) *Compositae* (pro parte majore). – In: Greuter W. & Raab-Straube E. von (eds), *Compositae*. Euro+Med Plantbase – the information resource for Euro-Mediterranean plant diversity, URL: http://europlusmed.org/ (accessed January 2021).
Grulich V. (2007) *Lactuca saligna* L. – In: Hadinec J. & Lustyk P. (eds), Additamenta ad floram Reipublicae Bohemicae [Additions to the flora of the Czech Republic]. VI, Zprávy České botanické společnosti 42: 311–312.
Grulich V. (2012) Red List of vascular plants of the Czech Republic: 3rd edition. – Preslia 84: 631–645.
Grulich V. & Řepka R. (1998) Ostřice bílá (*Carex alba* Scop.) v České republice [*Carex alba* Scop. in the Czech Republic]. – Sborník Přírodovědného klubu v Uherském Hradišti 2 (1997): 52–56.
Hand R., Thieme M. et al. (2020) Florenliste von Deutschland (Gefäßpflanzen), begründet von Karl Peter Buttler. Version 11. – URL: http://www.kp-buttler.de (accessed 10 January 2021).
Harmaja H. (1986) *Carex pallens*, an overlooked Fennoscandian species. – Annales Botanici Fennici 23: 147–151.
Harmaja H. (1990) On the taxonomy and chorology of *Carex pallens*. – Annales Botanici Fennici 27: 79–83.
Havlíček P. (2004) *Xanthium* L. – řepeň. – In: Slavík B., Štěpánková J. & Štěpánek J. (eds), Květena České republiky [Flora of the Czech Republic] 7: 474–482, Academia, Praha.
Hejný S., Jehlík V., Kopecký K., Kropáč Z. & Lhotská M. (1973) Karanténní plevele Československa [Quarantine weeds of Czechoslovakia]. – Studie ČSAV 1973/8: 1–156.
Holub J. (1991) K nálezu *Carex pallens* v Československu [On the discovery of *Carex pallens* in Czechoslovakia]. – Zprávy Československé botanické společnosti 26: 1–18.
Holub J. & Procházka F. (2000) Red List of vascular plants of the Czech Republic – 2000. – Preslia 72: 187–230.
Hultén E. & Fries M. (1986) Atlas of North European vascular plants north of the Tropic of Cancer. Vols 1–3. – Koeltz Scientific Books, Königstein.
Il'in M. M. (1962) Nagolovatka – *Jurinea* Cass. – In: Bobrov E. G. & Czerepanov S. K. (eds), Flora SSSR [Flora of the U.S.S.R.] 27: 538–704, Izdatel'stvo Akademii nauk SSSR, Moskva & Leningrad.
Jalas J. & Suominen J. (eds) (1986) Atlas Florae Europaeae. Vol. 7. *Caryophyllaceae* (*Silenoideae*). – The Committee for Mapping the Flora of Europe & Societas Biologica Fennica Vanamo, Helsinki.
Jalas J., Suominen J. & Lampinen R. (eds) (1996) Atlas Florae Europaeae. Vol. 11. *Cruciferae* (*Ricotia* to *Raphanus*). – The Committee for Mapping the Flora of Europe & Societas Biologica Fennica Vanamo, Helsinki.
Janchen E. (1958) Catalogus florae Austriae. Vol. 1. Pteridophyten und Anthophyten (Farne und Blütenpflanzen). Fasc. 3 (*Sympetalae*). – Kommision bei Springer Verlag Wien, Wien.
Jehlík V. (ed.) (1998) Cizí expanzivní plevele České republiky a Slovenské republiky [Alien expansive weeds of the Czech Republic and the Slovak Republic]. – Academia, Praha.
Kaplan Z. (2017) Flora and phytogeography of the Czech Republic. – In: Chytrý M., Danihelka J., Kaplan Z. & Pyšek P. (eds), Flora and vegetation of the Czech Republic, p. 89–163, Springer, Cham.
Kaplan Z., Danihelka J., Chrtek J. jun., Kirschner J., Kubát K., Štech M. & Štěpánek J. (eds) (2019a) Klíč ke květeně České republiky [Key to the flora of the Czech Republic]. Ed. 2. – Academia, Praha.
Kaplan Z., Danihelka J., Chrtek J. Jr., Prančl J., Ducháček M., Ekrt L., Kirschner J., Brabec J., Zázvorka J., Trávníček B., Dřevojan P., Šumberová K., Kocián P., Wild J. & Petřík P. (2018a) Distributions of vascular plants in the Czech Republic. Part 7. – Preslia 90: 425–531.

Kaplan Z., Danihelka J., Chrtek J. Jr., Zázvorka J., Koutecký P., Ekrt L., Řepka R., Štěpánková J., Jelínek B., Grulich V., Prančl J. & Wild J. (2019b) Distributions of vascular plants in the Czech Republic. Part 8. – Preslia 91: 257–368.

Kaplan Z., Danihelka J., Ekrt L., Štech M., Řepka R., Chrtek J. Jr., Grulich V., Rotreklová O., Dřevojan P., Šumberová K. & Wild J. (2020) Distributions of vascular plants in the Czech Republic. Part 9. – Preslia 92: 255–340.

Kaplan Z., Danihelka J., Koutecký P., Šumberová K., Ekrt L., Grulich V., Řepka R., Hroudová Z., Štěpánková J., Dvořák V., Dančák M., Dřevojan P. & Wild J. (2017a) Distributions of vascular plants in the Czech Republic. Part 4. – Preslia 89: 115–201.

Kaplan Z., Danihelka J., Lepší M., Lepší P., Ekrt L., Chrtek J. Jr., Kocián J., Prančl J., Kobrlová L., Hroneš M. & Šulc V. (2016a) Distributions of vascular plants in the Czech Republic. Part 3. – Preslia 88: 459–544.

Kaplan Z., Danihelka J., Štěpánková J., Bureš P., Zázvorka J., Hroudová Z., Ducháček M., Grulich V., Řepka R., Dančák M., Prančl J., Šumberová K., Wild J. & Trávníček B. (2015) Distributions of vascular plants in the Czech Republic. Part 1. – Preslia 87: 417–500.

Kaplan Z., Danihelka J., Štěpánková J., Ekrt L., Chrtek J. Jr., Zázvorka J., Grulich V., Řepka R., Prančl J., Ducháček M., Kúr P., Šumberová K. & Brůna J. (2016b) Distributions of vascular plants in the Czech Republic. Part 2. – Preslia 88: 229–322.

Kaplan Z., Danihelka J., Šumberová K., Chrtek J. Jr., Rotreklová O., Ekrt L., Štěpánková J., Taraška V., Trávníček B., Prančl J., Ducháček M., Hroneš M., Kobrlová L., Horák D. & Wild J. (2017b) Distributions of vascular plants in the Czech Republic. Part 5. – Preslia 89: 333–439.

Kaplan Z., Koutecký P., Danihelka J., Šumberová K., Ducháček M., Štěpánková J., Ekrt L., Grulich V., Řepka R., Kubát K., Mráz P., Wild J. & Brůna J. (2018b) Distributions of vascular plants in the Czech Republic. Part 6. – Preslia 90: 235–346.

Klaudisová A. (1996) Ekobiologická studie sinokvětu chrpovitého (*Jurinea cyanoides* (L.) Reichenb.) [Ecobiological study of *Jurinea cyanoides* (L.) Reichenb.] – Příroda 6: 69–93.

Klaudisová A. (2011) Sinokvět chrpovitý (*Jurinea cyanoides*). Péče o druh a jeho lokality [*Jurinea cyanoides*. Conservation of the species and management of its sites]. – Agentura ochrany přírody a krajiny ČR, Praha.

Koopman J. (2011) The genus *Carex* L. (*Cyperaceae*) in Europe. 1. Accepted names, hybrids, synonyms, distribution, chromosome numbers. – Margraf Publishers, Weikersheim.

Koopman W. J. M., Guetta E., van de Wiel C. C. M., Vosman B. & van den Berg R. G. (1998) Phylogenetic relationships among *Lactuca* (*Asteraceae*) species and related genera based on ITS-1 DNA sequences. – American Journal of Botany 85: 1517–1530.

Kožuharov S. (1976) *Jurinea* Cass. – In: Tutin T. G., Heywood V. H., Burges N. A., Moore D. M., Valentine D. H., Walters S. M. & Webb D. A. (eds), Flora Europaea 4: 218–220, Cambridge University Press, Cambridge.

Krist V. (1935) Příspěvek k adventivní a ruderální květeně Moravy I. [An addition to the knowledge of ruderal and alien flora of Moravia]. – Sborník Klubu přírodovědeckého v Brně 17 (1934): 65–72.

Kuusk V., Rasiņš A. & Jankevičienė R. (1993) *Brassicaceae* Burnett (*Cruciferae* A. L. Juss.). – In: Laasimer L., Kuusk V., Tabaka L. & Lekavičius A. (eds), Flora of the Baltic countries 1: 300–343, Estonian Academy of Sciences, Latvian Academy of Sciences & Lithuanian Academy of Sciences, Tartu.

Li H.-W. & Hedge I. C. (1994) *Lamiaceae*. – In: Wu Z.-Y., Raven P. H. & Hong D.-Y. (eds), Flora of China 17: 50–299, Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis.

Lindquist K. (1960) On the origin of cultivated lettuce. – Hereditas 46: 319–350.

Löve D. (1976) *Xanthium*. – In: Tutin T. G., Heywood V. H., Burges N. A., Valentine D. H., Walters S. M. & Webb D. A. (eds), Flora Europaea 4: 143, Cambridge University Press, Camridge.

Malyshev L. I. (1990) *Carex* L. – In: Peshkova A. G. & Malyshev L. I. (eds), Flora Sibiri 3: 35–170, Nauka, Novosibirsk.

Martins L. & Hellwig F. H. (2005) Systematic position of the genera *Serratula* and *Klasea* within *Centaureinae* (*Cardueae*, *Asteraceae*) inferred from ETS and ITS sequence data and new combinations in *Klasea*. – Taxon 54: 632–638.

Meusel H. & Jäger E. J. (eds) (1992) Vergleichende Chorologie der zentraleuropäischen Flora. Vol. 3. – Gustav Fischer, Jena, Stuttgart & New York.

Meusel H., Jäger E., Rauschert S. & Weinert E. (1978) Vergleichende Chorologie der zentraleuropäischen Flora. Vol. 2. – Gustav Fischer, Jena.

Meusel H., Jäger E. & Weinert E. (1965) Vergleichende Chorologie der zentraleuropäischen Flora. Vol. 1. – Gustav Fischer, Jena.

Míguez M., Martín-Bravo S. & Jiménez-Mejías P. (2018) Reconciling morphology and phylogeny allows an integrative taxonomic revision of the giant sedges of *Carex* section *Rhynchocystis* (*Cyperaceae*). – Botanical Journal of the Linnean Society 188: 1–25.

Nikiforova O. D. (1994) *Draba* L. – Krupka. – In: Malyshev L. I. & Peshkova G. A. (eds), Flora Sibiri [Flora of Siberia] 7: 108–134 & 259–267, Nauka, Novosibirsk.

Niklfeld H. (1999) Mapping the flora of Austria and the Eastern Alps. – Revue valdôtaine d'histoire naturelle 51, Suppl. 51: 53–62.

Niklfeld H. (ed.) (2016) Floristische Neufunde (170–235). – Neilreichia 8: 181–238.

Niordson N. (1990) Åsstarr, *Carex pallens*, värd att uppmärksammas [*Carex pallens*, worth attention]. – Svensk Botanisk Tidskrift 84: 67–68.

Opravil E. (1983) *Xanthium strumarium* L. – ein europäischer Archäophyt? – Flora 173: 71–79.

Podpěra J. (1928) Quod momentum significet *Carex pediformis* in stepposis silvaticis Europae mediae [On the importance of *Carex pediformis* in forest steppe in central Europe]. – Spisy vydávané Přírodovědeckou fakultou Masarykovy university 101: 1–22.

POWO (2020) Plants of the World online. – Royal Botanic Gardens, Kew, URL: http://www.plantsoftheworldonline.org (accessed 29 December 2020).

Presl J. S. & Presl C. B. (1819) Flora čechica. Kwětena česká [Bohemian flora]. – Pragae.

Preston C. D., Perman D. A. & Dines T. D. (eds) (2002) New atlas of the British and Irish flora. – Oxford University Press, Oxford.

Pyšek P., Danihelka J., Sádlo J., Chrtek J. Jr., Chytrý M., Jarošík V., Kaplan Z., Krahulec F., Moravcová L., Pergl J., Štajerová K. & Tichý L. (2012) Catalogue of alien plants of the Czech Republic (2nd edition): checklist update, taxonomic diversity and invasion patterns. – Preslia 84: 155–255.

Rabeler R. K. & Hartman R. L. (2005) *Petrorhagia*. – In: Flora of North America Editorial Committee (eds), Flora of North America north of Mexico 5: 162–165, New York & Oxford, Oxford University Press.

Randall R. P. (2007) The introduced flora of Australia and its weed status. – CRC for Australian Weed Management, Adelaide.

Rechinger K. H. (1982) *Dracocephalum*. – In: Rechinger K. H. (ed.), Flora Iranica 150: 218–230, Akademische Druck- und Verlagsanstalt, Graz.

Reissek S. (1841) Beiträge zur Flora Mährens. – Flora (Regensburg) 24: 673–699.

Romo A. M. (1990) *Petrorhagia* (Ser.) Link. – In: Castroviejo S., Laínz M., López González G., Montserrat P., Muñoz Garmendia F., Paiva J. & Villar L. (eds), Flora Iberica 2: 420–426, Real Jardín Botánico, Madrid.

Roskov Y. R., Bisby F. A., Zarucchi J. L., Schrire B. D. & White R. J. (eds) (2006) ILDIS World Database of Legumes. – International Legume Database and Information Service, Reading, URL: https://www.ildis.org/ (accessed 24 March 2021).

Rūrāne I. & Roze I. (2013) Systematic studies on *Draba* L. (*Cruciferae* Juss.) in Latvia. – Acta Biologica Universitatis Daugavpiliensis 13: 95–99.

Rychtařík P. (1990) *Carex pediformis* C. A. Mey. subsp. aff. *macroura* (Meinsh.) Podp. v Hradčanských stěnách a na Vranovských skalách u Mimoně [*Carex pediformis* C. A. Mey. subsp. aff. *macroura* (Meinsh.) Podp. in the Hradčany Walls and Vranov Rocks near Mimoň]. – Severočeskou přírodou 24: 33–39.

Shi Z. & Kilian N. (2011) *Lactuca*. – In: Wu Z.-Y. & Raven P. H. (eds), Flora of China 20–21: 233–238, Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis.

Shishkin B. K. (1954) Zmeegolovnik – *Dracocephalum* L. – In: Shishkin B. K. & Yuzepchuk S. V. (eds), Flora SSSR [Flora of the U.S.S.R.] 20: 439–474, Izdatel'stvo Akademii nauk SSSR, Moskva & Leningrad.

Skalická A. (1967) Taxonomische Studie über die Arten der Gattung *Corothamnus* (W. D. J. Koch) C. B. Presl. – Preslia 39: 10–29.

Skalická A. (1968) *Corothamnus procumbens* (W. & K.) C. B. Presl, kručinkovec poléhavý, na území ČSSR [*Corothamnus procumbens* in the Czechoslovak Socialist Republic]. – Acta Musei Silesiae, ser. C, 7: 51–68.

Skalická A. (1969) Taxonomische Revision der Gattung *Lembotropis* Griseb. – Acta Universitatis Carolinae-Biologia 1968: 263–277.

Skalická A. (1995) *Sarothamnus* Wimmer – janovec. – In: Slavík B., Smejkal M., Dvořáková M. & Grulich V. (eds), Květena České republiky [Flora of the Czech Republic] 4: 332–334, Academia, Praha.

Slavík B. (1966) Pflanzengeographische Studie über die Art *Lactuca perennis* L. – Folia Geobotanica & Phytotaxonomica Bohemoslovaca 1: 26–69.

Strother J. L. (2006a) *Mulgedium*. – In: Flora of North America Editorial Committee (eds), Flora of North America north of Mexico 19: 258–259, Oxford University Press, New York & Oxford.

Strother J. L. (2006b) *Xanthium*. – In: Flora of North America Editorial Committee (eds), Flora of North America north of Mexico 21: 19–20, New York & Oxford, Oxford University Press.

Szeląg Z. (2001) *Carex pallens* (*Cyperaceae*), a species new to Poland. – Polish Botanical Journal 46: 75–77.
Szukala A., Korotkova N., Gruenstaeudl M., Sennikov A. N., Lazkov G. A., Litvinskaya S. A., Gabrielian E., Borsch T. & von Raab-Straube E. (2019) Phylogeny of the Eurasian genus *Jurinea* (*Asteraceae*: *Cardueae*): Support for a monophyletic genus concept and a first hypothesis on overall species relationships. – Taxon 68: 112–131.
Šourková M. (1990): *Petrorhagia* (Ser.) Link – hvozdíček. – In: Hejný S., Slavík B., Hrouda L. & Skalický V. (eds), Květena České republiky [Flora of the Czech Republic] 2: 198–200, Academia, Praha.
Thiers B. (2021) Index Herbariorum: A global directory of public herbaria and associated staff. – New York Botanical Garden's Virtual Herbarium, URL: http://sweetgum.nybg.org/science2/ih (accessed January 2021).
Tison J.-M. & Foucault B. de (2014) Flora gallica. Flore de France. – Biotope, Mèze.
Tokarska-Guzik B., Dajdok Z., Zając M., Zając A., Urbisz A., Danielewicz W. & Hołdyński Cz. (2012) Rośliny obcego pochodzenia w Polsce ze szczególnym uwzględnieniem gatunków inwazyjnych [Alien plants in Poland with particular reference to invasive species]. – Generalna Dyrekcja Ochrony Środowiska, Warszawa.
Tolmachev A. I. (1939) Krupka – *Draba* L. – In: Komarov V. L. (ed.), Flora SSSR [Flora of the U.S.S.R.] 8: 371–454 & 649–650, Izdatel'stvo akademii nauk SSSR, Moskva & Leningrad.
Toman M. (1970) Verbreitung von *Carex humilis* Leyss. in Böhmen. – Botanische Jahrbücher für Systematik, Pflanzengeschichte und Pflanzengeographie 90: 414–424.
Tomasello S. (2018) How many names for a beloved genus? – Coalescent-based species delimitation in *Xanthium* L. (*Ambrosiinae*, *Asteraceae*). – Molecular Phylogenetics and Evolution 127: 135–145.
Tyler T. (2003) Allozyme variation in *Carex* sect. *Digitatae* – evidence of introgression, genetic distinctiveness and evolution of taxa. – Plant Systematics and Evolution 237: 219–231.
USDA, NRCS (2020) The PLANTS Database. – National Plant Data Team, Greensboro, USA, URL: http://plants.usda.gov (accessed December 2020).
Verloove F. (2006) Catalogue of neophytes in Belgium (1800–2005). – Scripta Botanica Belgica 39: 1–89.
Wagenitz G. (1979) *Xanthium*. – In: Conert H. J., Hamann U., Schultze-Motel W. & Wagenitz G. (eds), Gustav Hegi, Illustrierte Flora von Mitteleuropa, ed. 2, 6/3: 265–277, Paul Parey, Berlin & Hamburg.
Widder F. J. (1923) Die Arten der Gattung *Xanthium*. Beiträge zu einer Monographie. – Repertorium specierum novarum regni vegetabilis, Beihefte 20: 1–221.
Widder F. J. (1925) Übersicht über die bisher in Europa beobachteten *Xanthium*-Arten und Bastarde. – Repertorium specierum novarum regni vegetabilis 21: 273–305.
Wisskirchen R. (1995) Verbreitung und Ökologie von Flußufer-Pioniergesellschaften (*Chenopodion rubri*) im mittleren und westlichen Europa. – Disserationes Botanicae 236: 1–376.
Wild J., Kaplan Z., Danihelka J., Petřík P., Chytrý M., Novotný P., Rohn M., Šulc V., Brůna J., Chobot K., Ekrt L., Holubová D., Knollová I., Kocián P., Štech M., Štěpánek J. & Zouhar V. (2019) Plant distribution data for the Czech Republic integrated in the Pladias database. – Preslia 91: 1–24.
Zeven A. C. & Zhukovsky P. M. (1975) Dictionary of cultivated plants and their centres of diversity. Excluding ornamentals, forest trees and lower plants. – Centre for Agricultural Publishing and Documentation, Wageningen.

Received 29 January 2021
Revision received 19 June 2021
Accepted 22 June 2021