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# Distributions of vascular plants in the Czech Republic. Part 15

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**Abstract:** The fifteenth part of the series on the distributions of vascular plants in the Czech Republic includes grid maps of 87 taxa in the genera *Asperugo*, *Bassia*, *Brunnera*, *Bupleurum*, *Coeloglossum*, *Cotoneaster*, *Goodyera*, *Groenlandia*, *Herminium*, *Myosoton*, *Omphalodes*, *Orchis*, *Pleurospermum*, *Potamogeton*, *Rapistrum*, *Sclerolaena*, *Sedobassia*, *Stellaria*, *Stuckenia* and *Ventenata*. These maps were produced by taxonomic experts based on examined herbarium specimens, literature and field records. The paper encompasses both native and alien taxa, representing diverse ecological groups, from terrestrial herbs inhabiting dry grasslands, ruderal sites and forests to submerged aquatic species and alien woody plants. It also continues the mapping of orchids, one of the most rapidly declining plant groups, with valuable implications for nature conservation. Almost half of the species covered are listed on the national Red List, including the critically threatened *Bassia prostrata*, *Groenlandia densa*, *Potamogeton coloratus* and *P. praelongus*, each now restricted to single sites, as well as *Bupleurum affine*, *B. tenuissimum*, *Goodyera repens* and *Ventenata dubia*, surviving only in few, isolated populations. Four species, namely *Bassia laniflora*, *Herminium monorchis*, *Potamogeton compressus* and *P. friesii*, are now nationally extinct. Among the alien taxa included, only *Bassia scoparia* has become invasive, while the others are mostly casual introductions or escapes. Four of the previously introduced neophytes, *Bupleurum croceum*, *Rapistrum rugosum*, *Sclerolaena tricuspis* and *Sedobassia sedoides*, are no longer recorded in the country. Particular attention is given to *Cotoneaster*, whose diversity has only recently been fully recognized and taxonomically evaluated, resulting in 22 distinguished escaped species. Spatial distributions and often also temporal dynamics of individual taxa are displayed in grid maps and documented by records included in the Pladias database and available in the Supplementary materials. Each map is accompanied by a commentary providing an analysis of distribution patterns, habitat descriptions, taxonomic notes and biological characteristics.

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

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## Introduction

The systematic mapping of vascular plant distributions in the Czech Republic, initiated in 2014, is being gradually extended by maps of additional taxa, thereby steadily improving the overall coverage of the country's flora. To date, fourteen instalments of this series have been published, containing 1,289 grid-based distribution maps (Kaplan et al. 2015, 2016a, b, 2017a, b, 2018a, b, 2019b, 2020, 2021, 2022, 2023, 2024, 2025). The present contribution adds a further 87 maps and accompanying commentaries. The continuously growing collection of distribution records, critically evaluated and sorted by taxonomic experts, provides an indispensable foundation not only for documenting the occurrence of individual taxa but also for diverse analytical studies addressing biogeographical, ecological, conservation and evolutionary questions (e.g. Axmanová et al. 2024, Klinkovská et al. 2024, Klímová et al. 2025, Lepší & Lepší 2025, Paudel et al. 2025, Urfus et al. 2025). By continuously integrating records based on newly verified herbarium specimens, field observations and other data sources, the mapping team ensures that the syntheses remain reliable and scientifically robust.

The present part of the series includes a wide range of taxa representing both native and alien species, as well as plants that are common and widespread alongside those that are rare and threatened with extinction. The genus *Bupleurum* comprises species adapted to a wide range of habitats, from dry, disturbed grasslands and field margins to saline sites, open deciduous forests and subalpine communities. Comparable ecological diversity is shown by the species of *Stellaria*, which are differentiated among wet disturbed places, sedge beds, meadows, various ruderal habitats and forest types ranging from deciduous to waterlogged coniferous stands. One of the most species-rich groups among aquatic angiosperms, the family *Potamogetonaceae*, is also fully treated here. Because of frequent misidentifications in this family, the distribution of individual species and hybrids has been reconstructed mainly from critically examined herbarium material, which altogether comprises approximately 18,000 specimens. The paper further includes the genus *Cotoneaster*, whose diversity of escaped species has only recently been fully recognized and taxonomically evaluated. The number of alien species currently known and documented in this treatment is 22, in addition to two native species. Summarizing the available knowledge of their diversity and distribution is expected to stimulate further targeted recording, thereby contributing to a more comprehensive understanding of these introduced woody plants. In addition, this contribution continues the documentation of the past and present distribution of orchids, one of the most rapidly declining groups of vascular plants. The presented distribution trends provide important insights for nature conservation and include the genera *Coeloglossum*, *Goodyera*, *Herminium* and *Orchis*.

Almost half of all species mapped in this instalment are included in the national Red List (Grulich 2012). Among the most endangered taxa, now restricted to a single or only a few sites, are *Bassia prostrata*, *Bupleurum affine*, *Groenlandia densa*, *Potamogeton coloratus* and *P. praelongus*. *Ventenata dubia* has disappeared from most of the country and survives with a greater number of populations only in a small area in western Bohemia. A pronounced decline has also been recorded particularly in *Bupleurum rotundifolium*, *B. tenuissimum*, *Coeloglossum viride*, *Goodyera repens*, *Potamogeton gramineus* and *P. perfoliatus*. Four species, namely *Bassia laniflora*, *Herminium monorchis*, *Potamogeton compressus* and *P. friesii*, have not been recorded for several decades and are almost

certainly nationally extinct. Likewise, all occurrences of *Rapistrum rugosum*, a species repeatedly introduced in the past, have vanished, as have the rare casual introductions of *Bupleurum croceum*, *Sclerolaena tricuspis* and *Sedobassia sedoides*.

## 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 and foreign collections, incl. BM, BRA, BREM, BRNL, BRNM, BRNU, CB, CBFS, CESK, CHEB, CHOM, DR, FMM, GM, GOET, HOMP, HR, JESM, KMKV, LIM, LIT, LY, MJ, MMI, MP, MSTR, MZ, NJM, OL, OLM, OMJ, OP, OSM, OSTR, OVMB, P, PL, PR, PRA, PRC, ROZ, S, SAV, SLO, SOKO, SUM, VM, VYM, W, WU, ZA and ZMT (acronyms follow NYBG 2025), 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 1997, Schönfelder 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 2,551 quadrants, of which 2,181 are completely within the borders of this country. Individual records and the whole distribution of each taxon are checked and evaluated by the author(s) 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 Supplementary materials S1–S87. 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 (https://www.jpl.nasa.gov/missions/shuttle-radar-topography-mission-srtm/, the version provided by https://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 distinctions provide important information and where 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. 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

*Asperugo procumbens* (Fig. 1)

*Asperugo procumbens* is an annual, short-lived herb whose continuous range extends from the Iberian Peninsula to Lake Baikal in southern Russia. It sporadically reaches further into northern Africa, northern Scandinavia, the Middle East, the Caucasus Mts, central Asia and the Russian Far East. The species is considered to have originated in the mountains of eastern Europe and western Asia; however, assessing the exact extent of its native distribution is difficult (Hultén 1968, Hultén & Fries 1986). It has also been introduced into North America and the Southern Cone region of South America (Hultén & Fries 1986, Zuloaga et al. 2025). In the Czech Republic *A. procumbens* usually grows in waste places, spoil heaps, compost piles, dumps, road ditches and nitrophilous fringes of shrub and *Robinia pseudoacacia* groves, also as a weed in ornamental plant beds. It thrives in ruderal habitats with rather dry, nutrient-rich loamy soils, particularly in the lowlands and adjacent warm hilly areas. In Bohemia it is primarily found in the middle and lower Ohře river basin, České středohoří Mts and in the broader vicinity of Prague. It is also locally common in lowlands in southern Moravia and in the vicinity of the city of Olomouc in central Moravia. Occurrences outside these areas tend to be temporary. It is very rare at high elevations, with the highest occurrence recorded at 730 m near the town of Výsluní in the Krušné hory Mts. The species reaches its growth optimum in late spring, when it can form extensive stands in suitable habitats. After fruiting, it dries out quickly. Due to its short growing season, occurrence in uninteresting habitats and the transient

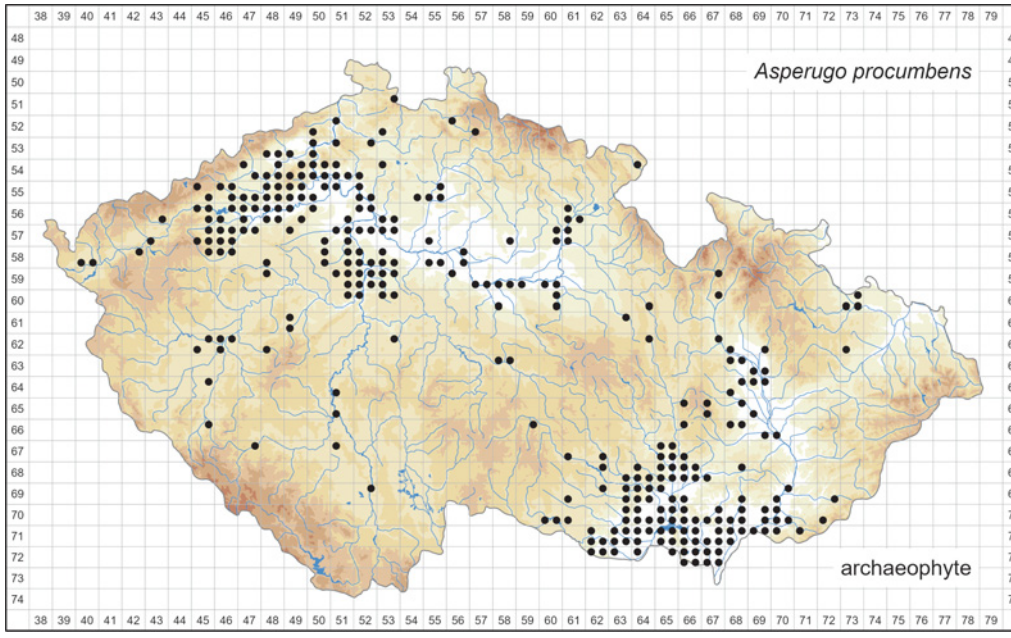



**Fig. 1.** Distribution of *Asperugo procumbens* in the Czech Republic (306 occupied quadrants). Prepared by Pavel Dřevojan & Jan Prančl.

nature of its populations, it can frequently be overlooked. *Asperugo procumbens* is classified as an archaeophyte in the Czech flora (Pyšek et al. 2022) and is considered vulnerable (Grulich 2012).

*Bassia laniflora* (Fig. 2)

The continuous range of *Bassia laniflora* extends from eastern Poland through Ukraine to the Caucasus Mts, southern Russia and central Asia. A significant outpost is located in the Pannonian Basin, with other isolated occurrences in western and central Europe, e.g. in north-eastern Spain, southern France and south-eastern Germany, and in the east in China and southern Siberia. It has been recorded as introduced in the Baltic countries (Meusel et al. 1965, Uotila 2011+, Eliáš et al. 2016, POWO 2025). In the Czech Republic the species was found only in southern Moravia, where it reached the northern limit of its local Pannonian range. It occurred in the area between the towns of Hodonín, Kyjov and Uherský Ostroh, and also at an isolated site near the village of Zaječí. It grew in areas with aeolian sands, particularly on sandy dunes, in open-canopy sandy pine forests as well as on sandy pastures and along the edges of sandy fields, at elevations of ~160–200 m. This annual species disappeared for reasons that are not entirely clear, but its decline is primarily associated with the loss of open sandy habitats, e.g. due to their afforestation with *Pinus sylvestris*. *Bassia laniflora* was last recorded in this country in 1962, between the town of Hodonín and the village of Mutěnice. It is classified as missing (Grulich 2012).

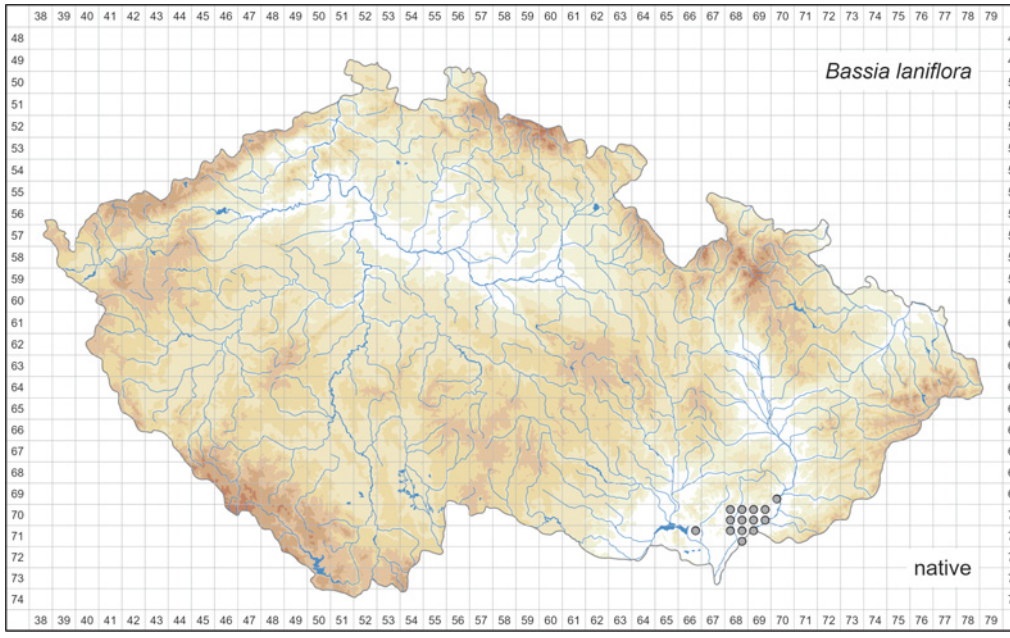



**Fig. 2.** Distribution of *Bassia laniflora* in the Czech Republic: ● pre-2000 records only (14 quadrants). Prepared by Jan Prančl.

*Bassia prostrata* (Fig. 3)

The extensive range of *Bassia prostrata* extends from south-western Europe, Morocco and Algeria in the west through the Caucasus Mts, the Middle East and central Asia, reaching as far as China and eastern Siberia in the east. In Europe, it occurs continuously in the eastern part of the Iberian Peninsula and southern France, in the Pannonian Basin, along the western coast of the Black Sea, in Crimea and in the catchments of the Don and Volga rivers in European Russia, being rare elsewhere. It has been introduced into the eastern United States (Jalas & Suominen 1980, Uotila 2011+, POWO 2025, USDA, NRCS 2025). According to some sources, two subspecies are recognized (subsp. *prostrata* and subsp. *grisea*), of which only the typical subspecies occurs in Europe. In the Czech Republic *B. prostrata* is known only from warm areas of southern Moravia, where it reaches the northern limit of its range. It has been recorded in two separate areas. The first includes several sites in the vicinity of the town of Újezd u Brna, south-east of the city of Brno. At present, it persists at only a single site on a south-facing slope in a railway cut on the northern edge of the town; all other occurrences disappeared by 1912. The second area was located in the surroundings of the town of Znojmo, where the species was recorded at three sites, most recently in 1917. In the 1990s, the species was experimentally introduced at two sites in this area, but it has since disappeared from both (Němec & Němcová 2011). The ecological characteristics of the earlier sites are not known in detail; the species occurred on dry slopes with open vegetation, along field and vineyard margins, in pastures and at the edges of saline habitats. In the Czech Republic it grew mostly on loess (including the only extant population) and only rarely on sandy substrates, which

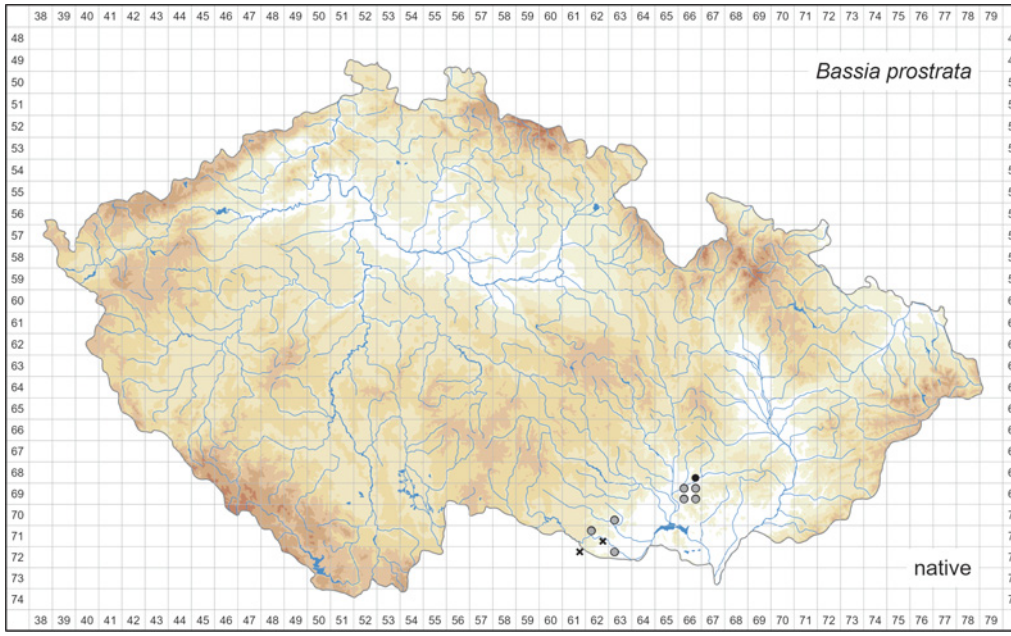



**Fig. 3.** Distribution of *Bassia prostrata* in the Czech Republic: ● at least one record in 2000–2025 (1 quadrant), ◍ pre-2000 records only (7 quadrants), × deliberate introductions only (2 quadrants). Prepared by Jan Prančl.

are characteristic of the core areas of its range. The reasons for the species' disappearance from most localities remain unclear; possible explanations include conversion to arable land as well as the abandonment of traditional land use and subsequent successional changes. *Bassia prostrata* is classified as critically threatened (Grulich 2012).

*Bassia scoparia* (Figs 4–5)

The presumed native range of *Bassia scoparia* includes subtropical and temperate parts of Eurasia, extending from south-eastern Europe in the west to the Russian Far East, China and Japan in the east; however, the exact limits of its distribution remain unclear. Today the species occurs worldwide, including most of Europe, northern and southern Africa, extensive areas of North America, the southern half of South America, western Australia (where it was successfully eradicated) and New Zealand. It is considered an invasive species in many parts of its secondary range (Dodd & Randall 2002, Uotila 2011+, Kumar et al. 2018, POWO 2025). *Bassia scoparia* is an extremely polymorphic complex of annual plants, comprising several taxa that are often recognized at the species or subspecies level. However, a recent study using molecular markers supports a broader circumscription, in which such taxa are recognized at most as varieties (Sukhorukov et al. 2025). The species' variation has also been influenced by long-term ornamental cultivation and subsequent escapes of cultivated genotypes. The best-known and widely cultivated ornamental morphotype, the cultivar 'Trichophylla', originated from plants collected in Pennsylvania and was introduced into cultivation in Europe in the early 20th century (the correct orthography of the basionym under which this morphotype was taxonomically

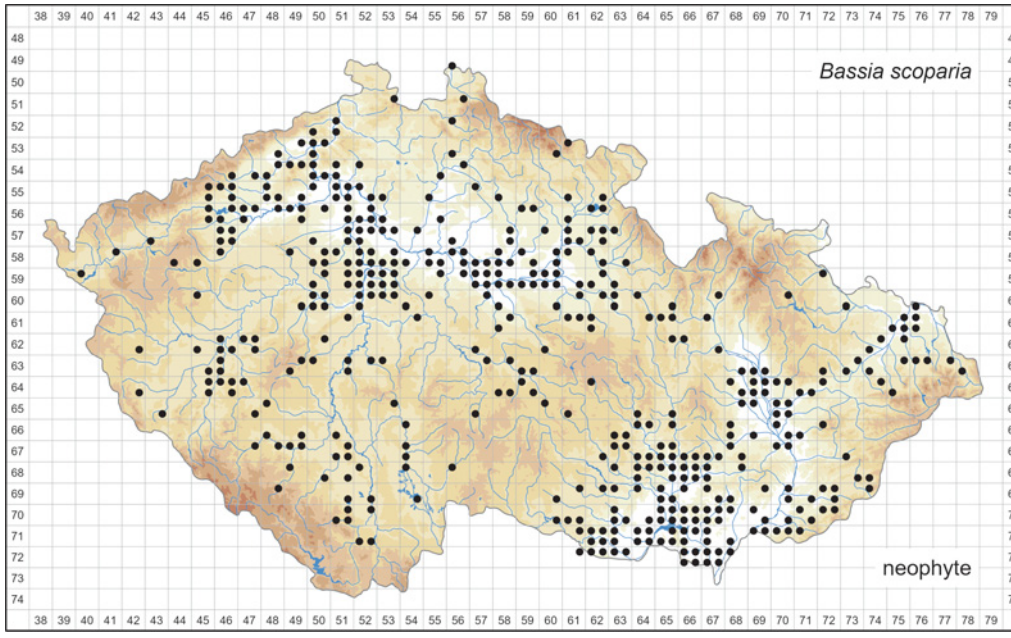



**Fig. 4.** Distribution of *Bassia scoparia* in the Czech Republic (458 occupied quadrants). Prepared by Jan Prančl.

described is *Kochia trichophila*, not "*trichophylla*"; Sukhorukov et al. 2025). In the Czech Republic two subspecies have traditionally been recognized: subsp. *scoparia* (also including cultivar 'Trichophylla') and subsp. *densiflora* (Tomšovic 1990). However, there is a continuous morphological transition between them, suggesting that such variation reflects phenotypic and phenological plasticity rather than true genetic differentiation. Therefore, subspecies are not distinguished in this treatment, and the map provided here includes all records of the species (Fig. 4). Additionally, escaped plants of the cultivar 'Trichophylla' are mapped separately (Fig. 5), although it should be noted that this morphotype represents only a fraction of the variation within cultivated plants. Consequently, not all plants escaped from cultivation but only clearly identifiable morphotypes were recognized under this name.

In this country, *Bassia scoparia* was first recorded in the second decade of the 19th century in Prague (Presl & Presl 1819). Until recently, it spread mainly by two pathways: via rail transport and from ornamental cultivation. It has been found at railway yards, on ruderal and wasteland sites, rubbish dumps, soil heaps, along streets and roads, and less often at field margins. The species grows on dry anthropogenic soils with variable nutrient content. It is probably incapable of forming a long-term soil seed bank (Friesen et al. 2009). In recent years, it has spread rapidly along heavily trafficked roads treated with deicing salt in winter, especially on motorway verges. It was first recorded at several sites along the motorway network across the country in 2005, although it had likely been spreading there for several years prior. In the Czech Republic the species occurs mainly in warm areas, being most frequent in densely populated lowlands. It reaches its elevational

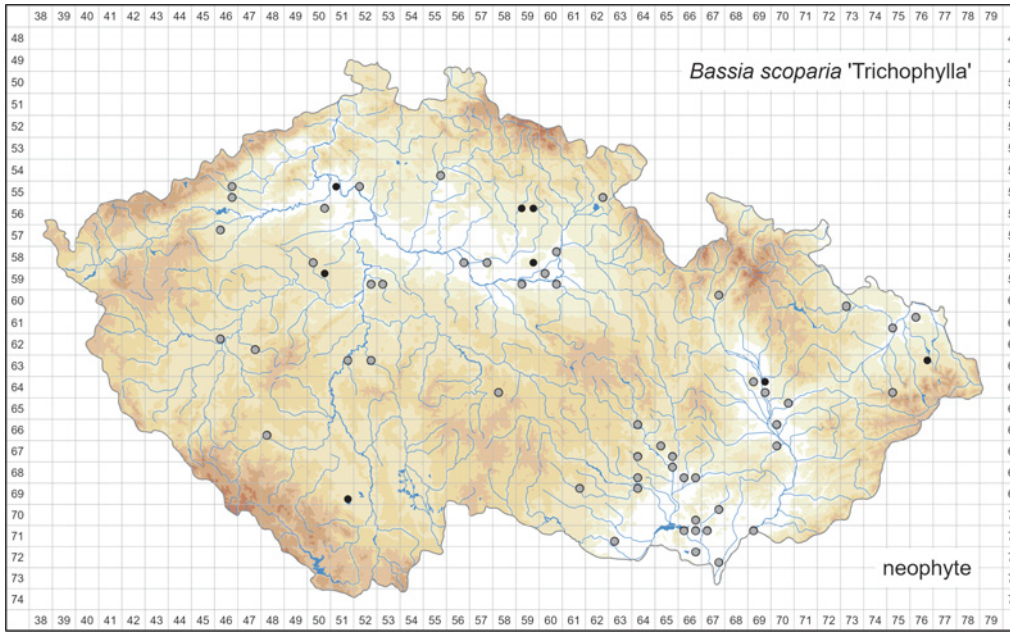



**Fig. 5.** Distribution of *Bassia scoparia* 'Trichophylla' in the Czech Republic: ● at least one record in 2000–2025 (8 quadrants), ● pre-2000 records only (51 quadrants). Prepared by Jan Prančl.

maximum at 705 m near the village of Křimov in north-western Bohemia. Due to the species' recent rapid spread, the distribution map is inevitably incomplete. *Bassia scoparia* (including subsp. *scoparia* and subsp. *densiflora*) is classified as an invasive neophyte (Pyšek et al. 2022).

*Bassia scoparia* 'Trichophylla' was first found escaped in this country in 1913 near the village of Rohatec in southern Moravia. It escapes occasionally and transiently from garden waste in settlements, on ruderal sites, rubbish dumps and along roadsides. Recently, its records have been declining, probably due to the decreasing popularity of this annual. It is classified as a casual neophyte (Pyšek et al. 2022).

*Brunnera macrophylla* (Fig. 6)

*Brunnera macrophylla* is native to the mountain forests of the Caucasus (including both the Greater and Lesser Caucasus), from where it extends only marginally into north-eastern Turkey (Grossgeim 1967). It is widely cultivated as an ornamental groundcover in numerous cultivars. Their origin is uncertain, as many show morphological transitions to the similar Siberian species *B. sibirica* (Holub 1970). Cultivars sometimes escape from cultivation, having been recorded as casual aliens in much of central Europe, the United Kingdom, Norway and Italy, as well as in the eastern United States, eastern China and New Zealand (Valdés & Raab-Straube 2011+, POWO 2025). In the Czech Republic the species is mainly found as an escape in parks, cemeteries, on the edges of urban forests and along roads and streets in cities, towns and villages, often in pavement joints and asphalt cracks. In this country the first documented escape from cultivation dates to 1943,

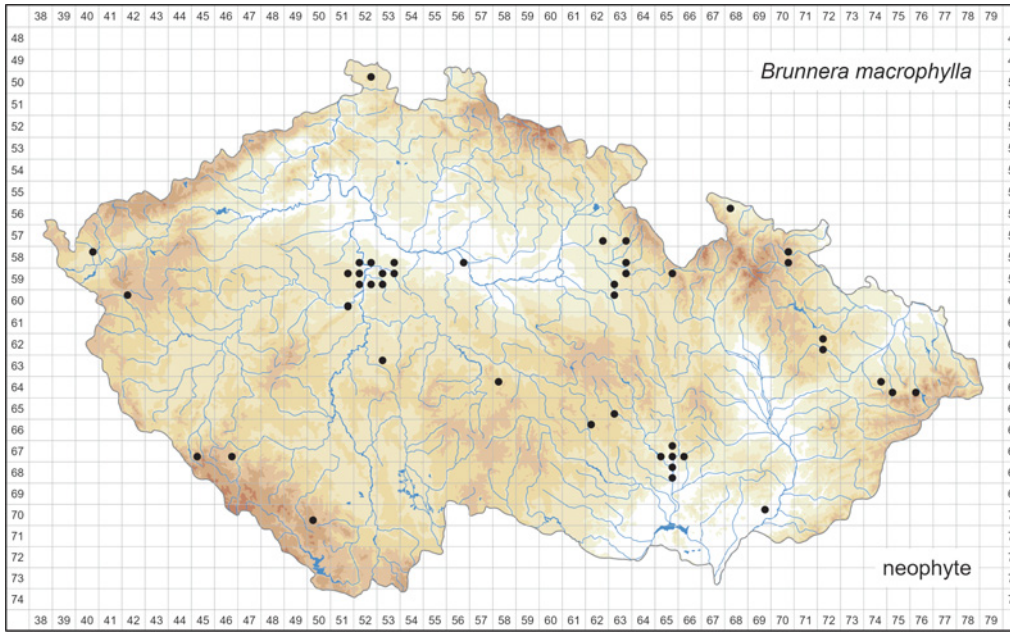



**Fig. 6.** Distribution of *Brunnera macrophylla* in the Czech Republic (44 occupied quadrants). Prepared by Jan Prančl.

when it was collected on Petřín hill in Prague; however, the specimen was misidentified by the collector as *Lindelofia longiflora*. The first recognized and published case of escape occurred in 1966 in the town of Dobřichovice in central Bohemia (Holub 1970). Until recently, *B. macrophylla* was only rarely found growing outside cultivation in the Czech Republic, but after 2000 the number of occurrences has increased significantly, likely due to its more frequent cultivation. The sites are scattered throughout the country, being most frequent in Prague and Brno. Locally, the species is capable of forming small stands, but usually only one or a few individuals are found at a given site. It is classified as a casual neophyte (Pyšek et al. 2022).

*Bupleurum affine* (Fig. 7)

*Bupleurum affine* is native to central and south-eastern Europe, reaching southern Moravia and southern Slovakia in the north-west, northern Greece in the south and south-western Ukraine and Crimea in the south-east. Isolated primary occurrences exist in the Rhône valley in France and in central Bohemia in the Czech Republic. In Asia the species occurs in the Caucasus, Transcaucasia and Anatolia (Meusel et al. 1978, Snogerup & Snogerup 2001, POWO 2025). In the Czech Republic *B. affine* occurs in ruderal, sometimes disturbed dry grasslands, at margins of arable fields and on fallow land. The soils are slightly basic to slightly acidic, but always permeable. In this country *B. affine* occurs mainly in southern Moravia, at the south-eastern edge of the Českomoravská vrchovina highlands between the towns of Znojmo in the south-west and Moravský Krumlov in the north-east. This occurrence was not discovered until 1884 (M. Osterauer in Oborny

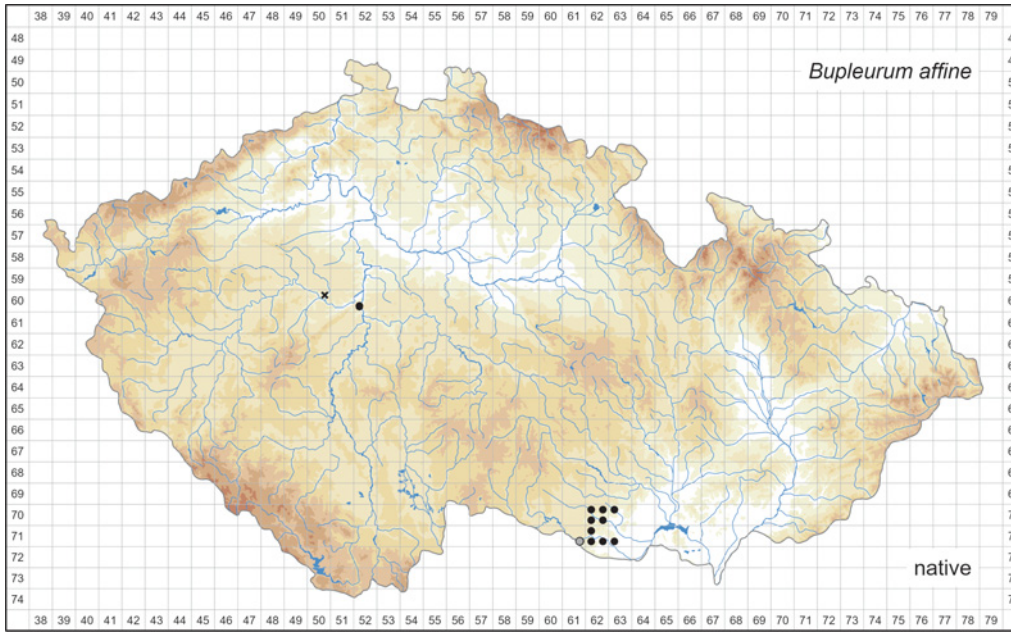



**Fig. 7.** Distribution of *Bupleurum affine* in the Czech Republic: ● at least one record in 2000–2025 (10 quadrants), ◍ pre-2000 records only (1 quadrant), × deliberate introductions only (1 quadrant). Prepared by Pavel Dřevojan & Jiří Danihelka.

1886); however, given the species' inconspicuous habit and relatively late flowering time, there is no reason to consider it secondary. *Bupleurum affine* has been recorded there altogether at ~20 localities; since 2000, its occurrence has been confirmed at 13 sites, but usually in small numbers (up to a few dozen individuals; Dřevojan et al. 2011). An isolated occurrence has existed in central Bohemia on Homole hill above the village of Vrané nad Vltavou south of Prague. This occurrence was discovered in 1881 and repeatedly confirmed until recently. All these presumably native occurrences are situated in hilly areas at elevations of 220–350 m. In addition, *B. affine* was recorded in 1997 on Doutnáč hill east of the town of Beroun in the Český kras karst area (Čeřovský 1999). This occurrence has not been confirmed since and was most likely secondary, resulting from deliberate sowing. Records from the surroundings of the towns of Nymburk, Kopidlno and Nový Bydžov in east-central and eastern Bohemia are either doubtful or clearly erroneous due to misidentification. *Bupleurum affine* is classified as critically threatened due to its rarity and decline (Grulich 2012).

Snogerup & Snogerup (2001) discovered a herbarium specimen of *Bupleurum pachnospermum* allegedly collected near the town of Znojmo (A. Oborny 1885 PR), i.e. at one of the known sites of *B. affine*. This species is native to south-eastern Europe, extending northwards to the surroundings of Budapest and the southern slopes of the Mátra Mts in northern Hungary. *Bupleurum pachnospermum* was initially accepted as a native species of the Czech flora (Hadinec 2002b) but was later reclassified as a casual neophyte (Pyšek et al. 2022). Although we examined all available herbarium specimens of the genus *Bupleurum* collected in the Czech Republic, no additional specimens of *B. pachnospermum* were found. Therefore, we suggest that this record resulted from careless handling of unmounted herbarium specimens and that the plant was, in fact, collected elsewhere. Consequently, we refrained from producing a distribution map for this species.

*Bupleurum croceum* (Fig. 8)

*Bupleurum croceum* is native to north-western and inner Anatolia, extending eastwards as far as the Syrian desert and Iran. In Europe its native range is confined to Turkey, while casual secondary occurrences have been recorded in Finland, Sweden, Germany and the Czech Republic (Snogerup & Snogerup 2001). In its native range it grows in dry open habitats and as a weed in grain fields. Secondary occurrences in northern and western Europe have mostly been recorded in harbours and mills (Snogerup & Snogerup 2001). The only record of *B. croceum* in the Czech Republic dates to 1943 when a single plant was found in a potato field in the village of Kaznějov in western Bohemia. The specimen was initially misidentified as *B. rotundifolium* and only decades later revised to *B. croceum* (Snogerup & Snogerup 2001, Hadinec 2002a). *Bupleurum croceum* is considered a casual neophyte (Pyšek et al. 2022).

*Bupleurum falcatum* (Fig. 9)

*Bupleurum falcatum* is native to Europe from the Pyrenees in the west as far as the Ural Mts in the east, reaching central Germany, southern Poland, central Ukraine and southern central Russia in the north, as well as southern central Italy and the central part of the Balkan Peninsula in the south. In Asia it is found in the Caucasus Mts and Transcaucasia

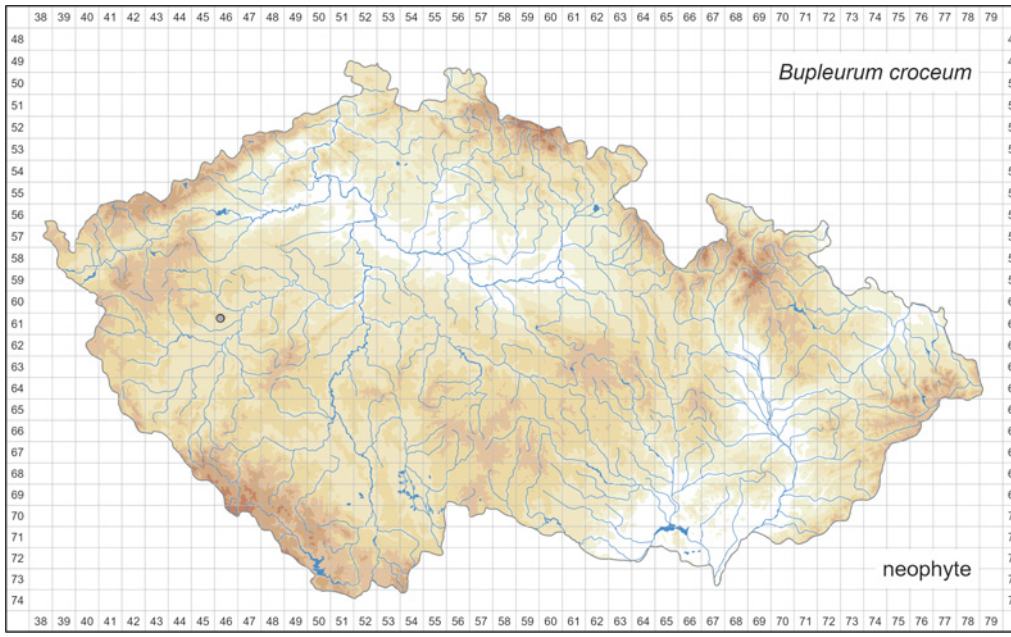



**Fig. 8.** Distribution of *Bupleurum croceum* in the Czech Republic: ◍ pre-2000 records only (1 quadrant). Prepared by Jiří Danihelka & Pavel Dřevojan.

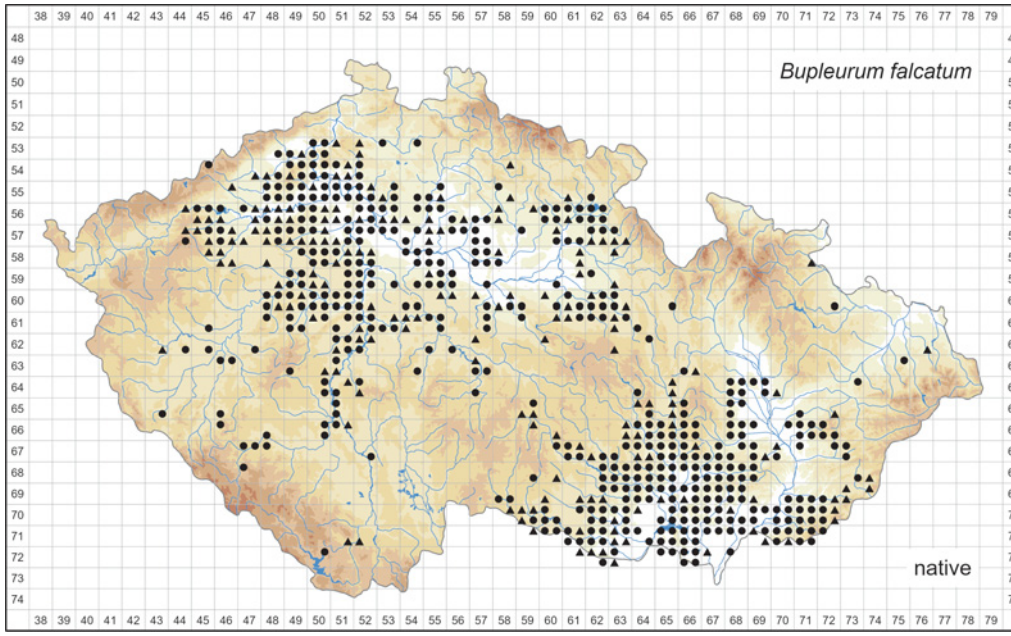



**Fig. 9.** Distribution of *Bupleurum falcatum* in the Czech Republic: ● occurrence documented by herbarium specimens (445 quadrants), ▲ occurrence based on other records (185 quadrants). Prepared by Jiří Danihelka, Radka Hluštíková & Pavel Dřevojan.

(Meusel et al. 1978, Hand 2011+, POWO 2025). While its status in the British Isles (England) is uncertain, the occurrences in Denmark and Sweden are secondary (Hand 2011+, POWO 2025). *Bupleurum falcatum* is a highly variable species. Tetraploid populations found in Slovakia, Hungary and Romania are sometimes separated as subsp. *dilatatum*. An endemic subspecies, subsp. *corsicum*, is confined to Corsica. *Bupleurum exaltatum*, found in southern Europe and western Asia, is sometimes included in *B. falcatum* as subsp. *cernuum* (e.g. Reduron 2007, Hand 2011+). *Bupleurum polyphyllum* and *B. persicum*, occurring in Anatolia, Transcaucasia, the Caucasus Mts and further eastwards, are also sometimes classified as subspecies of *B. falcatum* (e.g. Hand 2011+, but see POWO 2025). In the Czech Republic *B. falcatum* grows mainly on rather dry, sunny to moderately shaded slopes (usually in their lower part), in shrubby rocky steppes, forest fringes, scrub, and open thermophilous oak forests. The soils are usually loamy, nutrient-rich, and often developed over loess, other calcareous substrates and less frequently over basic igneous rocks. In areas with rather cool climates, it occurs almost exclusively on limestone. In this country *B. falcatum* occurs in areas with warm climates in north-western, central and eastern Bohemia, as well as in central and southern Moravia. The scattered occurrences in western and southern Bohemia, and western and north-eastern Moravia are mainly on outcrops of base-rich rocks, but some of them represent accidental introductions. *Bupleurum falcatum* occurs mainly in hilly areas up to elevations of 500 m. It reaches its elevational maximum in the Bílé Karpaty Mts on Mikulčin vrch hill at ~700 m, but a secondary occurrence was recorded at 815 m near the village of Jindřichova Ves in the Krušné hory Mts in north-western Bohemia.

*Bupleurum longifolium* (Figs 10–11)

*Bupleurum longifolium* is a European species with a discontinuous distribution, extending from the Western Alps in the west, including some outposts in the Massif Central Mts, to the Southern Carpathians in the east; northwards, it reaches central Germany and northern Poland, whereas southwards it reaches the Dinarid Mts in Bosnia and Herzegovina and Serbia, and the Stara Planina Mts in Bulgaria (Meusel et al. 1978). The eastern European and Siberian *B. aureum* is sometimes considered conspecific (e.g. Hand 2011+). Traditionally, two morphological and ecological entities are recognized within *B. longifolium* (but see Reduron 2007): the lowland to hilly populations are classified as subsp. *longifolium*, while the montane to subalpine populations are separated as subsp. *vapincense*. In the Czech Republic these populations are morphologically and geographically well separated (Šourková 1970, Šourková & Hrouda 1997), although transitional populations exist in some other parts of the species' range.

In the Czech Republic *Bupleurum longifolium* subsp. *longifolium* usually grows in open oak, hornbeam-oak and beech forests, forest clearings and fringes, rarely in openings of fir forests and secondary spruce stands. It requires rather deep soils, moderately rich in nutrients, mostly developed on base-rich substrates such as limestones, marlstones and basic igneous rocks. *Bupleurum longifolium* subsp. *longifolium* occurs in hilly areas with warm to moderately warm climates in north-western, central and eastern Bohemia, with an outpost near the city of Plzeň in western Bohemia (no more extant), as well as along the south-eastern margin of the Českomoravská vrchovina highlands and in the southern part of the Moravský kras karst area in Moravia (Fig. 10). Most of the occurrences are at

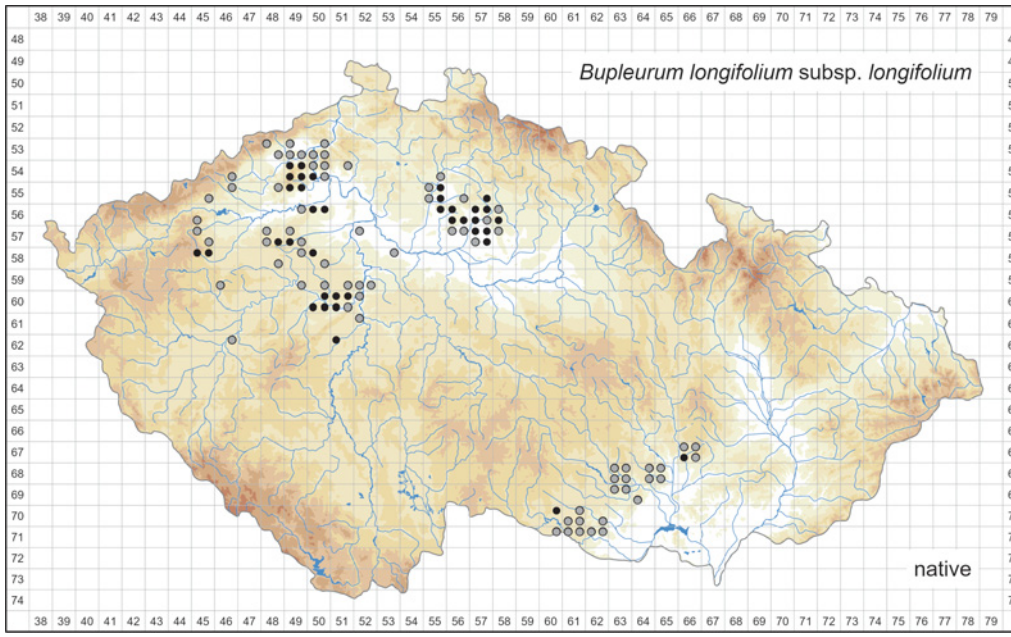



**Fig. 10.** Distribution of *Bupleurum longifolium* subsp. *longifolium* in the Czech Republic: ● at least one record in 2000–2025 (37 quadrants), ◍ pre-2000 records only (72 quadrants). Prepared by Jiří Danihelka, Radka Hluštíková & Pavel Dřevojan.

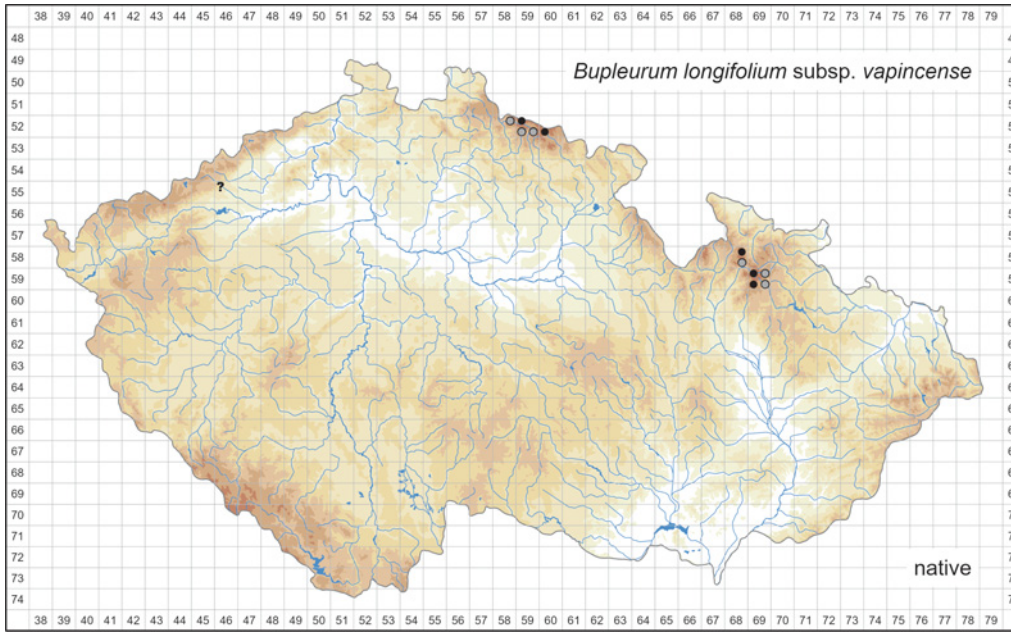



**Fig. 11.** Distribution of *Bupleurum longifolium* subsp. *vapincense* in the Czech Republic: ● at least one record in 2000–2025 (5 quadrants), ◍ pre-2000 records only (6 quadrants). Prepared by Jiří Danihelka, Radka Hluštíková & Pavel Dřevojan.

elevations of 200–500 m, with the elevational maximum at 700–800 m on Mt Milešovka in the České středohoří Mts. This subspecies has declined rather strongly, notably due to general eutrophication of the landscape and changes in the management of forest, specifically the shift from coppicing to high forest. With only two sites recorded since 2000, one of which harboured three populations, the decline has been particularly pronounced in Moravia. Therefore, it is classified as endangered due to its rarity and decline (Grulich 2012).

*Bupleurum longifolium* subsp. *vapincense* grows in mountain tall-forb communities, open stands of *Pinus mugo*, more rarely subalpine grasslands, mainly in glacial cirques. The soils are moderately rich in nutrients, usually developed on rocks containing calcareous veins, slightly acidic to basic, well supplied with water. In this country *B. longifolium* subsp. *vapincense* occurs mainly in the subalpine belt of the Krkonoše and Hrubý Jeseník Mts (Fig. 11), with elevational maxima at ~1,400 m in both mountain ranges. However, there are also records from stream banks at lower elevations, from 950 m upwards, e.g. in the Obří důl valley in the Krkonoše Mts. The populations of this subspecies usually consist of small numbers of individuals, and there may have been some decline, as already noted by Šourková (1970). This subspecies is classified as critically threatened due to its rarity (Grulich 2012).

*Bupleurum rotundifolium* (Fig. 12)

*Bupleurum rotundifolium* occurs in Europe from the central part of the Iberian Peninsula in the west as far as the western coast of the Caspian Sea in the east; northwards it reaches northern England, central Germany, southern Poland, central Ukraine and the southernmost parts of Russia. It is present in most of the European Mediterranean area apart from southernmost Italy, the Peloponnese, Corsica, Sicily and Crete. The Asian part of its range includes northern Anatolia, Transcaucasia and north-western Iran (Meusel et al. 1978). In the northern part of the described range, the species is usually considered an archaeophyte. Records from north of this range refer to accidental introductions or escapes from cultivation. *Bupleurum rotundifolium* has been introduced to various parts of the world, including western Siberia, eastern Asia, North America, southern Africa, Australia and New Zealand (Meusel et al. 1978, POWO 2025). In the Czech Republic this species grows as a weed in arable fields (mainly in winter cereals) and vineyards, on fallow land, and less frequently in disturbed places in dry grasslands and on roadsides, rarely also on wastelands and along railways, generally in open vegetation. The soils are usually loamy, moderately rich in nutrients, calcareous and rather dry. In this country *B. rotundifolium* occurs mainly in hilly landscapes with warm climates, i.e. in north-western, central and eastern Bohemia, as well as in central and southern Moravia. Remaining occurrences scattered elsewhere represent for the most part accidental introductions with grain and recently also escapes from cultivation, as *B. rotundifolium* is sometimes cultivated as an ornamental and used in dried flower bouquets. The species has strongly declined due to changes in agricultural techniques (see also Šourková 1981), and recent records exist from only 49 quadrants of the mapping grid. *Bupleurum rotundifolium* is considered an archaeophyte (Pyšek et al. 2022) and is classified as critically threatened due to its strong decline (Grulich 2012). As *Bupleurum rotundifolium* is easy to cultivate, its ex situ conservation is not difficult. In situ conservation on arable land, in

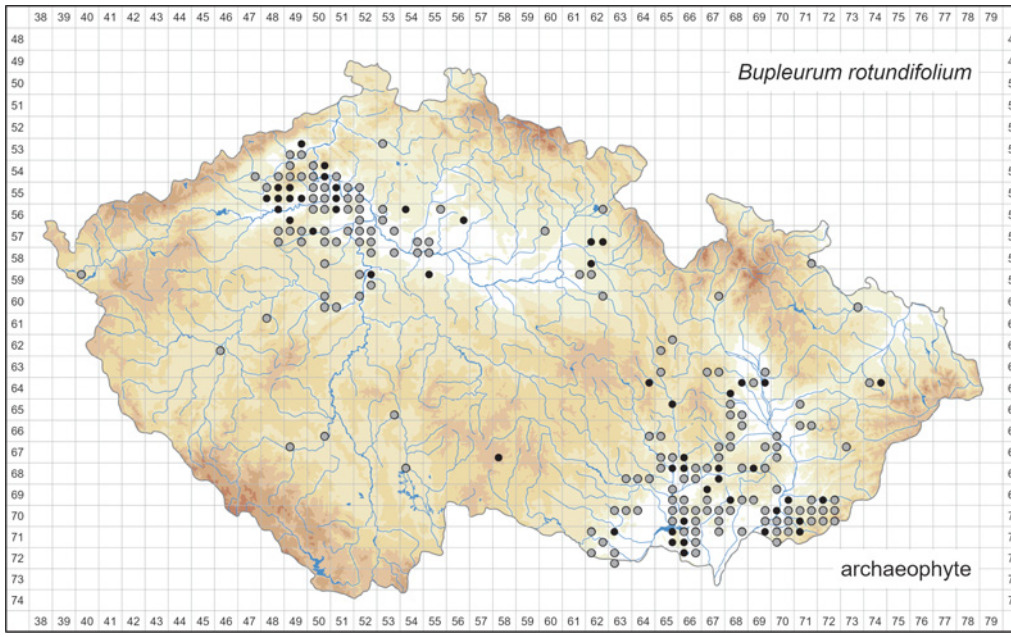



**Fig. 12.** Distribution of *Bupleurum rotundifolium* in the Czech Republic: ● at least one record in 2000–2025 (49 quadrants), ◍ pre-2000 records only (156 quadrants). Prepared by Jiří Danihelka, Radka Hluštíková & Pavel Dřevojan.

contrast, would require a set of coordinated measures, including reduced fertilization, exclusion of herbicides and a predominance of winter cereals.

*Bupleurum subovatum* (Fig. 13)

*Bupleurum subovatum* is native to the Mediterranean area, the Caucasus Mts and south-western Asia. It has been introduced to ruderal sites in Great Britain, Denmark, Sweden and Germany, but all these secondary occurrences turned out to be casual (Snogerup & Snogerup 2001). In its native range it occurs in fields, vineyards, garrigue, open forests, usually on limestone (Snogerup & Snogerup 2001). In the Czech Republic *B. subovatum* has been recorded only twice (Danihelka & Dřevojan 2025). The earliest record dates to 1948, when the species was collected in an arable field near the village of Česká north of the city of Brno in southern Moravia. It was probably introduced as a contaminant of a forage seed mixture, reportedly originating from the Balkan Peninsula. The second record is from 2017, when a single plant was collected in the village of Nedabyle, south of the city of České Budějovice in southern Bohemia. It occurred as a weed in a vegetable bed in a private garden, probably introduced as a contaminant of vegetable seed. Based on these two records, *B. subovatum* should be considered a casual neophyte in the Czech flora.

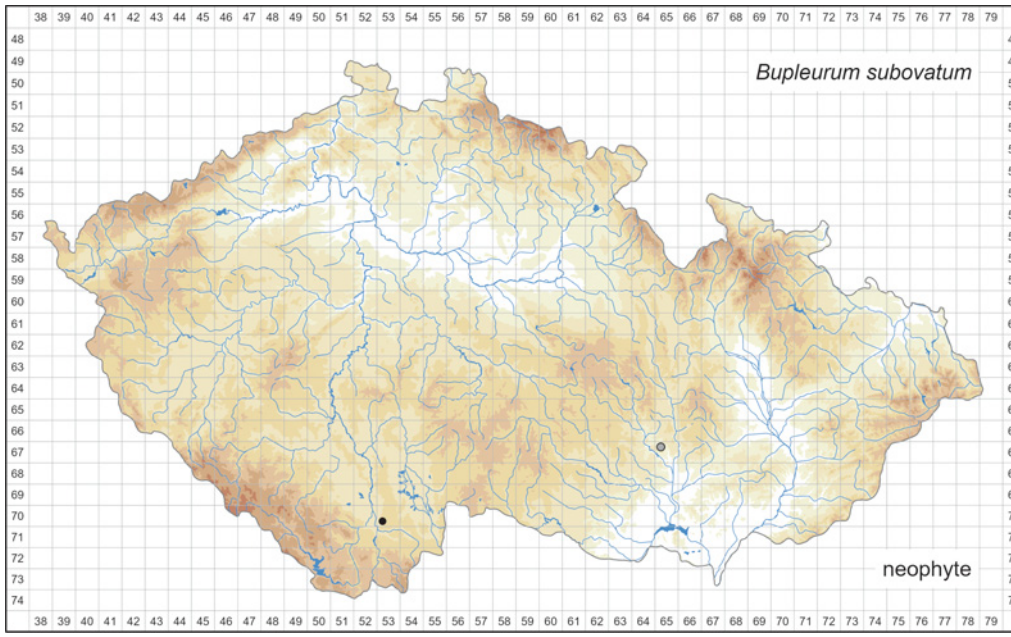



**Fig. 13.** Distribution of *Bupleurum subovatum* in the Czech Republic: ● at least one record in 2000–2025 (1 quadrant), ◍ pre-2000 records only (1 quadrant). Prepared by Jiří Danihelka & Pavel Dřevojan.

*Bupleurum tenuissimum* (Fig. 14)

*Bupleurum tenuissimum* is native to the western Mediterranean area, the Atlantic parts of Europe from Spain to Denmark, including Great Britain (southern England), the western Baltic area, central Germany and the Pannonian region, with scattered occurrences extending eastwards as far as southern Ukraine (Meusel et al. 1978, Snogerup & Snogerup 2001). In the Czech Republic *B. tenuissimum* grows in various types of saline grasslands, most frequently pastures, usually in shallow depressions. Rarely, it occurs on slopes with springs of strongly mineralized (saline) water. As a competitively weak species, it requires regular disturbances, mainly by grazing. The soils are usually solonchaks, wet in the spring but usually drying out in summer, moderately rich in nutrients and rich in calcium. In this country *B. tenuissimum* is present in both areas with the occurrences of the halophytic flora, i.e. in north-western Bohemia, within a small area between the towns of Most, Podbořany and Chomutov, as well as in southern Moravia, south-west to south-east of the city of Brno. In north-western Bohemia it has been recorded at approximately seven sites, with recent records from three of them. In southern Moravia the number of sites was substantially higher (for detailed information see Danihelka et al. 2022), but recent records exist from only four sites. These occurrences are situated within a narrow elevation range of 160–260 m. In addition, *B. tenuissimum* was recorded at three remote sites. In 1925 it was found by S. Staněk at two places in pastures north of the village of Podolí in south-eastern Moravia (herbarium specimens not seen). This occurrence may be considered native, as the distance from the closest documented populations, near

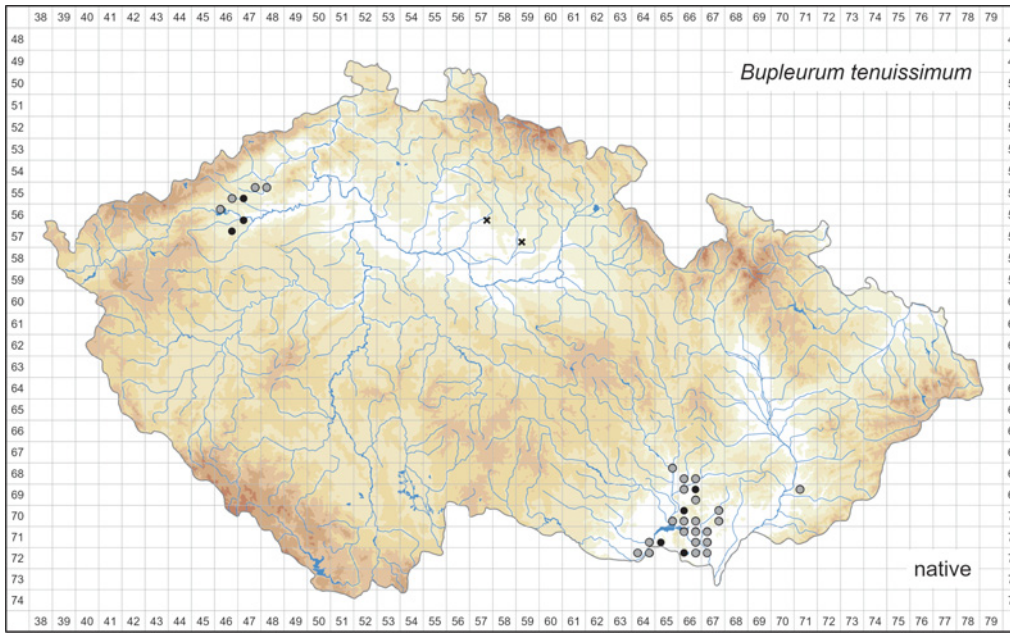



**Fig. 14.** Distribution of *Bupleurum tenuissimum* in the Czech Republic: ● native, at least one record in 2000–2025 (7 quadrants), ◍ native, pre-2000 records only (25 quadrants), × alien only (2 quadrants). Prepared by Jiří Danihelka & Pavel Dřevojan.

the town of Čejč, is about 40 km, and other halophytes occurred even within shorter distances. In contrast, the two records by E. Baudyš from eastern Bohemia (near the town of Kopidlno in 1911, published as *B. affine* var. *virgatum*, and east of the town of Nový Bydžov in 1918; Baudyš 1919) probably refer to secondary occurrences. This is true for two reasons: first, both sites are remote from other localities of this species, and second, both are situated next to a road. Accidental introductions, e.g. with hay transported by military cavalry rather than with grain seed, are the most plausible explanation. Still, the population east of Nový Bydžov was reportedly abundant, and the subhalophytic *Trifolium fragiferum* co-occurred. *Bupleurum tenuissimum* strongly declined, and many populations have disappeared. The two main causes, usually combined, were large-scale draining and cessation of grazing. The remaining undrained but abandoned sites have usually turned into reed beds. Most of the surviving populations consist of only small numbers of individuals and depend on regular conservation management. Consequently, *B. tenuissimum* is classified as critically threatened (Grulich 2012).

*Coeloglossum viride* (Fig. 15)

*Coeloglossum viride* is distributed in the temperate to subarctic zones of the Northern Hemisphere. In Europe it occurs from northernmost Scandinavia to the Mediterranean area, though in the south it is restricted to mountainous areas. Its distribution extends continuously from eastern Europe to central Siberia, where it breaks up into many rather small, disjunct areas across central and eastern Asia, including eastern Siberia, China and

Japan. A relatively large but isolated area of occurrence is found in the Caucasus Mts, Crimea and Anatolia. In North America it mainly occurs south of the Great Lakes, with scattered occurrences extending westwards as far as the Alaska and Aleutian Islands (Eccarius 2016, Kreutz 2024, Kühn et al. 2024). Most populations of *C. viride* in the Czech Republic are found in the montane and subalpine belts, where they inhabit oligotrophic grasslands, low-intensity pastures and meadows, as well as species-rich herbaceous vegetation in glacial cirques. However, the species was also recorded at lower elevations, particularly in hilly areas, where it found suitable habitats in unfertilized meadows and oligotrophic grasslands on moderately dry soils. It has only rarely been found in lowlands and in forests. These habitat preferences are reflected in the overall distribution pattern of the species in the Czech Republic, where it has been recorded in most mountain ranges along the country's border, as well as in the České středohoří Mts, Brdy Mts and the Českomoravská vrchovina highlands. Elsewhere it is rare or absent. *Coeloglossum viride* is sensitive to meadow fertilization, intensive grazing, eutrophication and afforestation. Consequently, it vanished from most of its sites at the low and middle elevations during the second half of the 20th century, and now persists mainly in the mountains. Even there, its populations are scarce and usually consist of only a few individuals. *Coeloglossum viride* is therefore classified as endangered species in the Czech Republic (Grulich 2012).

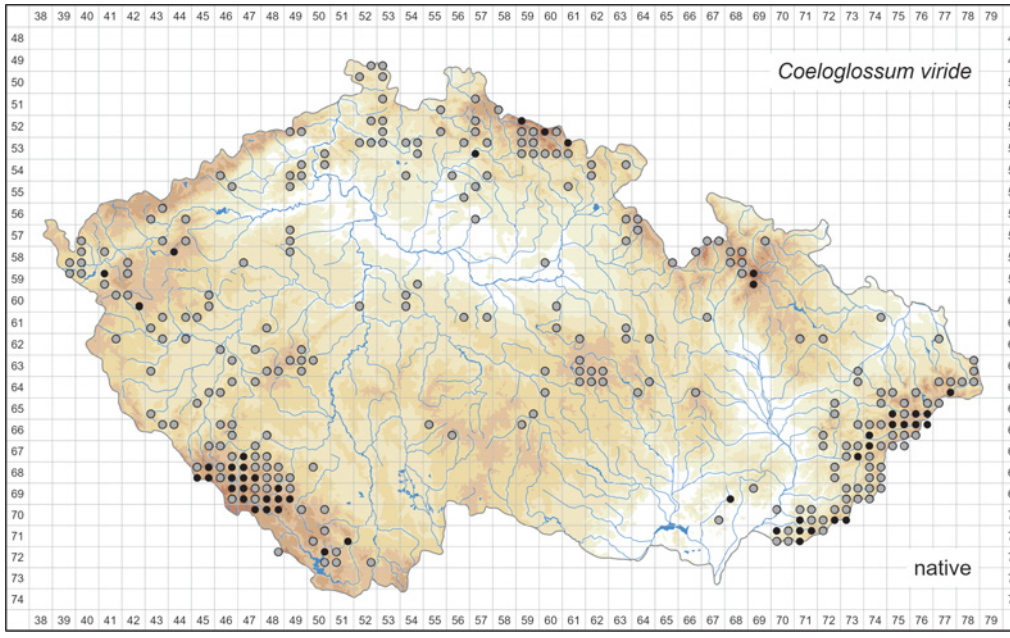



**Fig. 15.** Distribution of *Coeloglossum viride* in the Czech Republic: ● at least one record in 2000–2025 (49 quadrants), ● pre-2000 records only (243 quadrants). Prepared by Vojtěch Taraška.

*Cotoneaster*

The following series of maps offers a comprehensive overview of 24 species of the genus *Cotoneaster*, which are either native to or have escaped from cultivation in the Czech Republic. This dataset builds on a preliminary checklist of and key to cotoneasters recorded in this country (Velebil et al. 2024). Of the 24 species, two are native, while the remaining 22 are considered escapes. According to the monograph by Fryer & Hylmö (2009), these species are classified into two subgenera and 14 series. In *Cotoneaster* subgen. *Cotoneaster*, members of nine series are presented here: ser. *Horizontales* (*C. ascendens*, *C. divaricatus*, *C. hjelmqvistii* and *C. horizontalis*), ser. *Nitentes* (*C. nitens*), ser. *Acutifolii* (*C. acutifolius* and *C. villosulus*), ser. *Bullati* (*C. bullatus*), ser. *Dielsianii* (*C. dielsianus* and *C. splendens*), ser. *Zabelioides* (*C. fangianus*, *C. kitaibelii*, *C. svenhedinii* and *C. zabelii*), ser. *Tomentosi* (*C. tomentosus*), ser. *Cotoneaster* (*C. integerrimus*) and ser. *Melanocarpi* (*C. laxiflorus*). In *Cotoneaster* subgen. *Chaenopetalum*, members of five series are mapped: ser. *Salicifolii* (*C. salicifolius*), ser. *Hissarici* (*C. subacutus*), ser. *Multiflori* (*C. magnificus*, *C. multiflorus* and *C. veitchii*), ser. *Hebephylli* (*C. monopyrenus*) and ser. *Radicantes* (*C. dammeri*). All these species are tetraploid, except for *C. dammeri* and *C. salicifolius*, which are diploid, and *C. tomentosus*, which is pentaploid (Fryer & Hylmö 2009, and personal unpubl. data). The ploidy level of *C. monopyrenus* is not yet known.

Cotoneasters are generally light-demanding species that prefer open habitats such as rocks, rocky slopes, forest steppes, thermophilous and open-canopy pine, oak and hornbeam forests, as well as ravine forests and their fringes. In addition to semi-natural to natural vegetation, they may also be found in sunlit tree plantations and their clearings. Closed canopy, which currently prevails in Czech woodlands, is unfavourable for the long-term survival and regular reproduction of these species. The encroachment of woody plants into open, rocky and steppe habitats, combined with increasingly hot and dry summers, poses a significant threat to native species.

Non-native species are used in landscape design and are chiefly valued as drought-tolerant shrubs especially for groundcover plantings of various sizes, in small groups of individuals or as solitary specimens in both public parks and private gardens. Some species, particularly *C. dammeri* and *C. salicifolius* (as well as the still only cultivated *C.* ×*suecicus*), are planted in large areas around industrial estates and department stores, and along roads. Many species are also popular for their autumn foliage and fruit colouration. Cotoneasters spread spontaneously in the surroundings of cultivated plants, primarily via bird dispersal. Escaped individuals thrive mainly in various types of scrub and at ruderal sites, but they are also found in grasslands, on rocky slopes, in forest fringes, on old walls and in cracks in pavement joints, both within settlements and in the surrounding landscape. Three species (*C. monopyrenus*, *C. subacutus* and *C. tomentosus*) have so far been recorded at only a single site: the ruderal scrub around the Mendel University Botanical Garden and Arboretum in the city of Brno. This area harbours a high diversity of escaped exotic woody plants, including cotoneasters, and the number of discovered escaped species is likely to increase in the future.

The distribution maps of the species are based solely on examined herbarium specimens and field records by the authors and botanists with good knowledge of the genus. Only records explicitly referring to escaped plants have been included in the map for non-native species.

*Cotoneaster acutifolius* (Fig. 16)

In earlier literature and in horticultural practice, *Cotoneaster acutifolius* is usually referred to as *C. lucidus*. It is native to the Chinese provinces from Qinghai, Tibet and Gansu in the west to Anhui in the east, and from Nei Mongol in the north to Yunnan in the south. Its range also extends to southern Siberia (around Lake Baikal), northern Mongolia and Taiwan. In its native range, it grows on slopes and in foothills in open-canopy forests and their fringes, in thickets, mountain valleys and gorges, and in grasslands at elevations of 1,000–3,700 m (Lu & Brach 2003). Along with the typical taxon, three other varieties are recognized, one of which is identical to *C. villosulus* as treated below. *Cotoneaster acutifolius* has been introduced to Canada, the northern United States and Europe. In Europe it has been reported as a neophyte abundant in the southern half of Scandinavia and in the Baltic countries, with additional records from the United Kingdom, Germany, Poland, the Czech Republic, Austria, Ukraine and the European part of Russia (Kurtto et al. 2013, POWO 2025). In Europe this species has been cultivated since 1840 (under the name *C. lucidus*; *C. acutifolius* s. str. reported since 1883), and in the Czech Republic since 1909, when it was first planted in the Konopiště chateau park, central Bohemia (Pejchal et al. 2021). However, this species was apparently grown in the Czech Republic earlier, as herbarium specimens indicate that it was first documented as escaped in 1909 in the village of Sebranice near the town of Polička, eastern Bohemia. This is much earlier than reported in the latest catalogue of alien plants of the Czech Republic (Pyšek et al. 2022). It is cultivated as an ornamental plant in private gardens, parks and botanical gardens (Koblížek 2006), from where it escapes into the surrounding

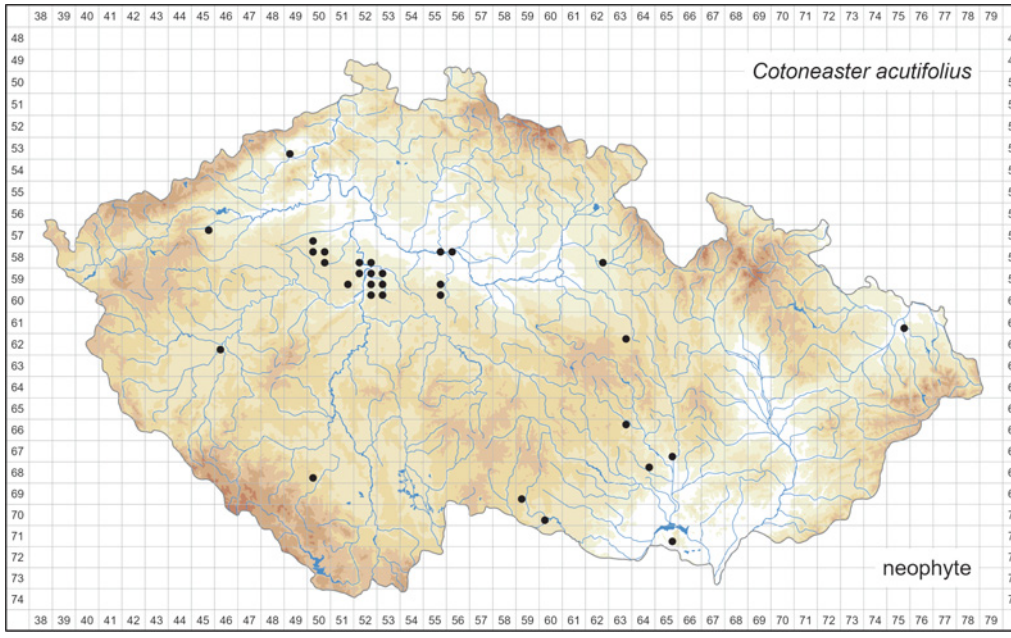



**Fig. 16.** Distribution of *Cotoneaster acutifolius* in the Czech Republic (31 occupied quadrants). Prepared by Jiří Velebil & Radomír Řepka.

landscape. So far, it has mainly been recorded in towns and cities or in their vicinities. Escaped plants thrive in various types of scrub, at ruderal sites, on rocky slopes and in abandoned quarries. It is scattered in Bohemia and has also rarely been found in Moravia. The species is classified as a casual neophyte (Pyšek et al. 2022).

*Cotoneaster ascendens* (Fig. 17)

*Cotoneaster ascendens* was described based on a cultivated plant originating from a collection made by E. H. Wilson in 1907 (Flinck & Hylmö 1966, Fryer & Hylmö 2009). It was collected in Fang County in the western part of Hubei Province, central China, at an elevation of about 2,300 m (Sargent 1912). Its distribution in the wild remains unknown. Although native to China, this taxon is not listed in the Flora of China (Lu & Brach 2003), nor is it included in the synonymy of any related species. In Europe *C. ascendens* is known to have escaped from cultivation in Ireland, the United Kingdom, Norway, Belgium and the Czech Republic (Kurtto et al. 2013, POWO 2025). This species has been cultivated in the Czech Republic since the early 20th century. The earliest herbarium specimen from cultivation dates back to 1944 and comes from the city of Hradec Králové (Velebil et al. 2025). This species is widely used in landscape design, primarily in private gardens and cemeteries, as a low-growing groundcover shrub. Based on herbarium specimens, it was first recorded as having escaped in the village of Zdounky, central Moravia, in 2000. Escaped individuals are found on rocky slopes, in thermophilous shrub communities, ruderal forest fringes and abandoned grasslands as well as in pavement joints. Most of the records are from Moravia, with additional ones from the cities of Prague and

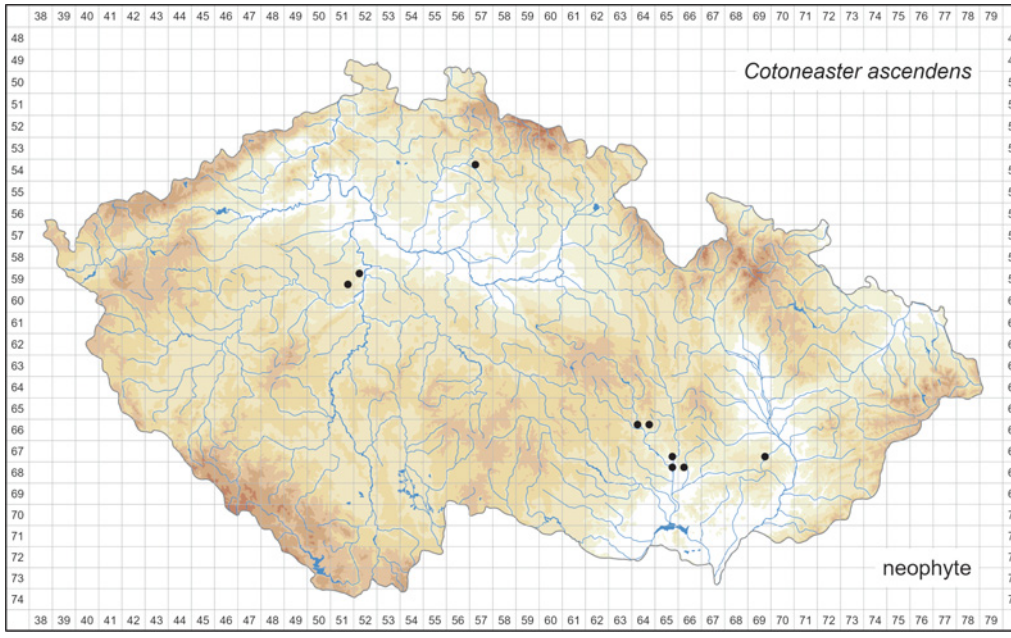



**Fig. 17.** Distribution of *Cotoneaster ascendens* in the Czech Republic (9 occupied quadrants). Prepared by Jiří Velebil & Radomír Řepka.

Turnov in central and northern Bohemia. The species has been proposed for classification as a casual neophyte (Velebil et al. 2024), because it is not included in the latest catalogue of alien plants of the Czech Republic (Pyšek et al. 2022).

*Cotoneaster bullatus* (Fig. 18)

*Cotoneaster bullatus* is endemic to the Chinese provinces of Tibet, Yunnan, Sichuan and Hubei, extending from west to east. It grows on slopes, in sparse forests and thickets, along river banks, in mountain forests and valleys at elevations of 900–3,200 m. In addition to the typical taxon, two other varieties are recognized (Lu & Brach 2003). In Europe *C. bullatus* has been cultivated since 1897 and is now the most commonly naturalized species in the United Kingdom and along the coasts of southern Scandinavia (Denmark, Norway, Sweden). Elsewhere in Europe it has mainly been recorded in Switzerland, with a few records from the Netherlands, Germany and Austria (Kurtto et al. 2013). In the Czech Republic the species has been planted since 1908, when it was first recorded in the Průhonice chateau park, central Bohemia (Pejchal et al. 2021). It is a large shrub, which is rarely grown in parks and gardens and only occasionally escapes cultivation. To date, it has only been found at four sites in the wild in this country. The first was discovered in 2001 at a grassy ruderal site at the margin of the Prague-Libeň railway yard. The remaining three localities are situated in scrub and along forest roads in the town of Kladno and were only discovered recently, between 2022 and 2023. This species is classified as a casual neophyte (Pyšek et al. 2022).

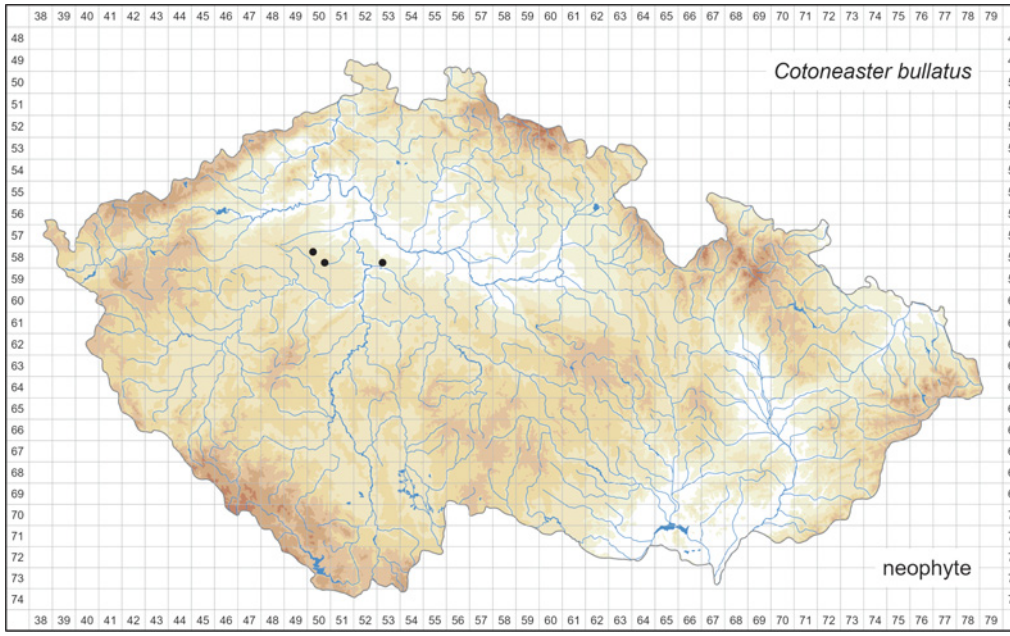



**Fig. 18.** Distribution of *Cotoneaster bullatus* in the Czech Republic (3 occupied quadrants). Prepared by Jiří Velebil & Radomír Řepka.

*Cotoneaster dammeri* (Fig. 19)

*Cotoneaster dammeri* is native to the Chinese provinces of Tibet, Gansu, Yunnan, Sichuan, Guizhou and Hubei. In its primary range, it grows on rocks and in sparse mixed forests in mountainous areas at elevations of 1,300–4,100 m (Lu & Brach 2003). In Europe it has most frequently been recorded as an escape in the United Kingdom and Switzerland, and less frequently in Germany and Norway (Kurtto et al. 2013). *Cotoneaster dammeri* has been cultivated in Europe since 1900, and in the Czech Republic since 1909, when it was first planted in the Průhonice chateau park, central Bohemia (Pejchal et al. 2021). It is a low, prostrate shrub, grown in gardens and parks, often used as a groundcover species or lawn substitute (Koblížek 2006). It rarely escapes from cultivation. The only known case of escape into the wild is from the Kamenná Nature Monument west of the town of Frýdek-Místek, north-eastern Moravia, where it was found in 2024. The other escapes were recorded in the cities of Brno and Kladno where the plants grow in pavement joints and in open gravel sites. The species is here proposed for classification as a casual neophyte.

*Cotoneaster dielsianus* (Fig. 20)

*Cotoneaster dielsianus* is believed to be native to the Chinese provinces of Tibet, Gansu, Yunnan, Sichuan, Guizhou and Hubei (Lu & Brach 2003), although Fryer & Hylmö (2009) list only Hubei and Sichuan. In its native range, it grows in grasslands and thickets in river valleys at elevations of 1,000–3,600 m (Lu & Brach 2003). Escape records have

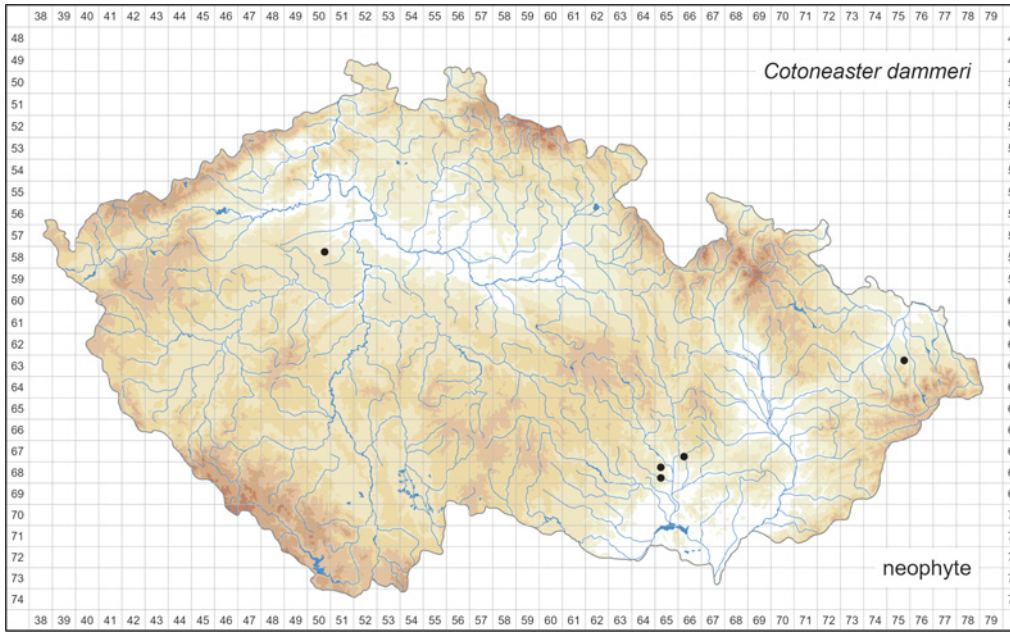



**Fig. 19.** Distribution of *Cotoneaster dammeri* in the Czech Republic (5 occupied quadrants). Prepared by Jiří Velebil, Martin Sedlák & Radomír Řepka.

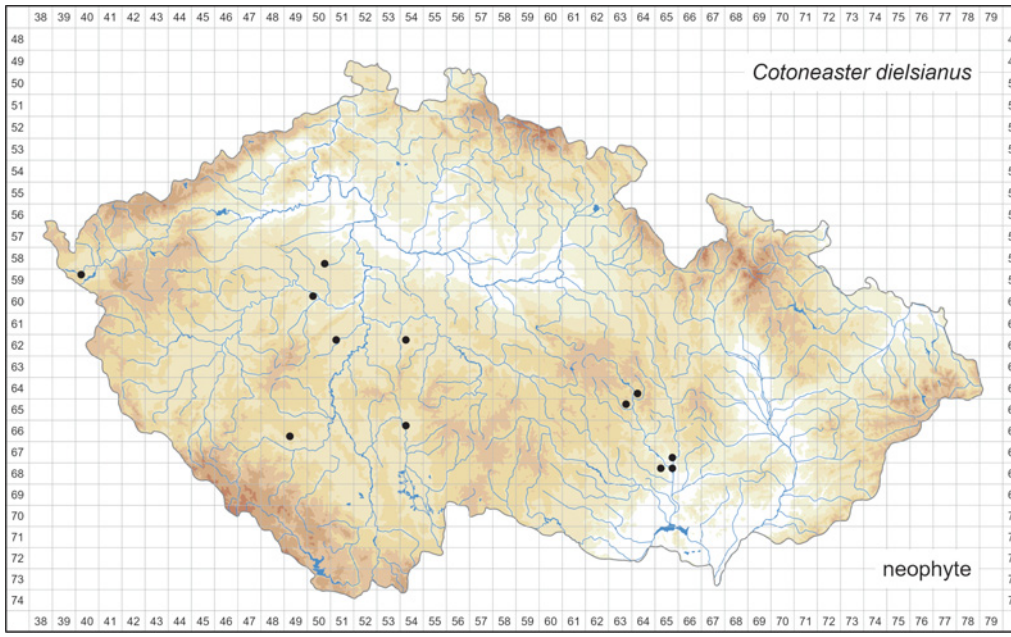



**Fig. 20.** Distribution of *Cotoneaster dielsianus* in the Czech Republic (12 occupied quadrants). Prepared by Jiří Velebil & Radomír Řepka.

been reported from numerous countries in western, northern, central and south-western Europe as well as from New Zealand, the Canadian province of British Columbia and the USA states of Oregon and Washington (POWO 2025). In Europe *C. dielsianus* has been cultivated since 1900, and in the Czech Republic since 1910, when it was first planted in the Průhonice chateau park, central Bohemia (Pejchal et al. 2021). This species is occasionally used in landscape design and is valued as a shrub suitable for hedges and mixed plantings in both public parks and private gardens. Based on herbarium specimens, it was first recorded as escaped in the village of Zadní Zborovice, southern Bohemia, in 2010. The number of escaped individuals recorded in the Czech Republic is low. They are found in various types of scrub and at ruderal sites, and less frequently on rocks and in forest fringes. Nevertheless, escaped populations can be successful; dense stands of this species exist on rocks in semi-natural habitats near the village of Švařec, western Moravia. *Cotoneaster dielsianus* is classified as a casual neophyte (Pyšek et al. 2022). However, this report is probably based on a misidentification of *C. kitaibelii* in Pyšek et al. (2012), see below.

*Cotoneaster divaricatus* (Fig. 21)

*Cotoneaster divaricatus* is distributed across the temperate regions of China. Its range extends from Xinjiang in the north and west, to Zhejiang in the east and to Yunnan in the south. In its native range, it grows on rocky slopes, in gorges and light forests, as well as in scrub. It occurs at elevations ranging from 1,600 m to approximately 3,400 m (Lu & Brach 2003). Escape occurrences of *C. divaricatus* are known from numerous countries of western,

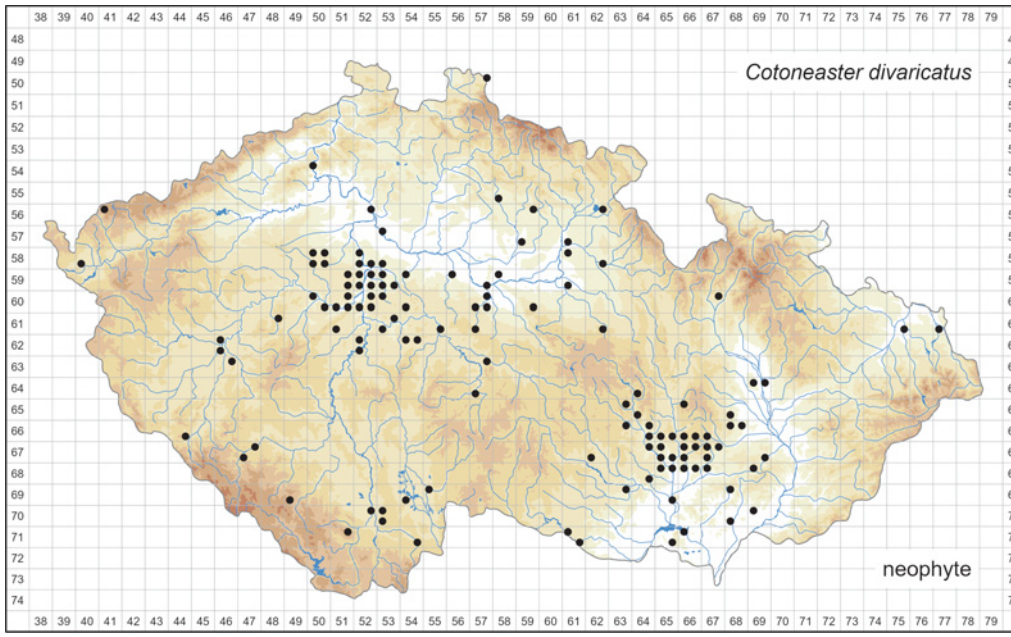



**Fig. 21.** Distribution of *Cotoneaster divaricatus* in the Czech Republic (124 occupied quadrants). Prepared by Jiří Velebil, Martin Sedlák & Radomír Řepka.

northern, central and south-western Europe. It has also been found in Canada, the USA, Kenya and New Zealand (Kurtto et al. 2013, POWO 2025). In Europe this species has been cultivated since 1904, and in the Czech Republic since 1914, when it was first planted in the Průhonice chateau park near Prague, central Bohemia (Pejchal et al. 2021). This species is frequently used in landscape design. It is planted either as solitary specimens or in groups, in both public parks and private gardens, and is valued for its ruby-coloured fruits and colourful autumn leaves. Based on herbarium specimens, it was first recorded as an escape in the city of Brno, southern Moravia, in 1970. Between 1970 and 2010, twenty finds of escaped plants were documented. Many other reported escapes originate from the past 15 years only. Escaped plants occur in various types of scrub and at ruderal sites, as well as in pavement joints, on old walls, rocky slopes and in wood fringes. It is a species that tolerates more shading than any other cotoneaster. Most of the recent records are from towns and cities, chiefly Prague and Brno, and their surroundings, situated at elevations of 250–350 m, with the highest elevation being 700 m in the village of Bublava, Krušné hory Mts. The species is classified as a naturalised neophyte (Pyšek et al. 2022).

*Cotoneaster fangianus* (Fig. 22)

*Cotoneaster fangianus* is native to the south-western Chinese province of Hubei, where it is found on riverbanks at elevations of 1,300–1,400 m (Lu & Brach 2003). In Europe *C. fangianus* is known as an escape in Belgium, the Czech Republic and the United Kingdom, in other parts of the world in Oregon, USA (POWO 2025). In central Europe and Scandinavia, *C. fangianus* is often cultivated in mixed plantings with *C. zabelii*. However, these

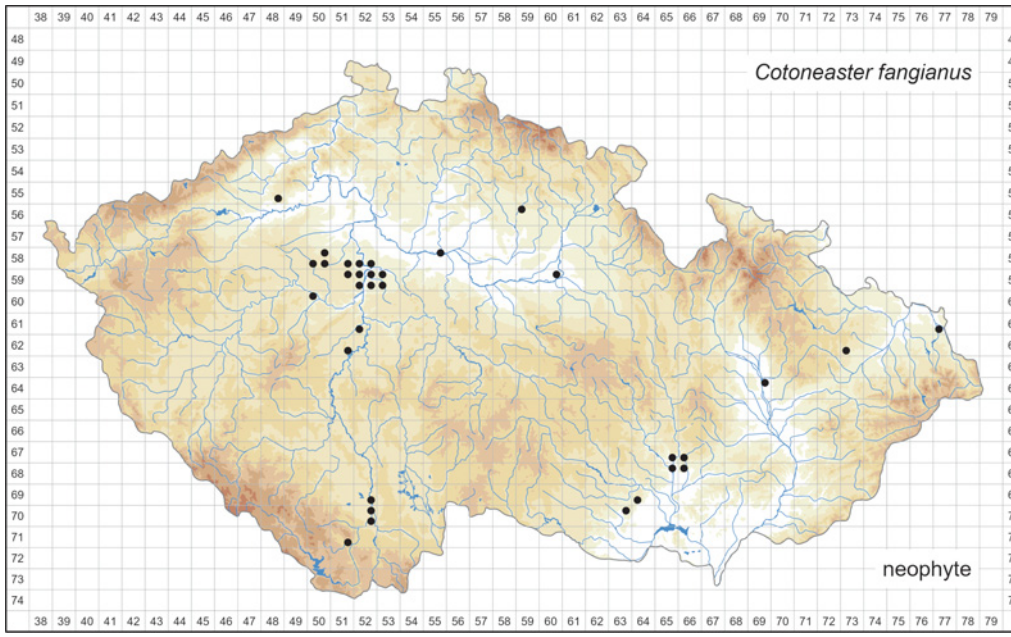



**Fig. 22.** Distribution of *Cotoneaster fangianus* in the Czech Republic (33 occupied quadrants). Prepared by Jiří Velebil & Radomír Řepka.

species are frequently not distinguished from one another in cultivation and are often reported under erroneous names (Fryer & Hylmö 2009). *Cotoneaster fangianus* is also sometimes confused with several other species, particularly *C. kitaibelii*. It has probably been cultivated for a long time, but precise information on its introduction is lacking. In the Czech Republic *C. fangianus* is used in landscape design, either as solitary individuals or in small groups, predominantly in public parks. It is valued for its autumn colour, arched branches, greyish green tomentose leaves, and ruby-coloured fruits. It was first recorded as an escape in the city of Brno in 1970, based on a herbarium specimen. Escaped plants mainly occur at various ruderal sites and in shrub communities. They can also be found on rocks and rocky slopes, and in light woods and their fringes. Today, it is mostly found as an escape in Prague and the surrounding area. Other finds are scattered across Bohemia and southern Moravia. The species has been proposed for classification as a casual neophyte (Velebil et al. 2024), because it is not included in the latest catalogue of alien plants of the Czech Republic (Pyšek et al. 2022).

*Cotoneaster hjelmqvistii* (Fig. 23)

*Cotoneaster hjelmqvistii* was described based on a plant cultivated in Sweden. The earliest record of its cultivation dates back to 1940 in the USA (Flinck & Hylmö 1991), yet its natural range remains unknown. Fryer & Hylmö (2009) suppose that its native range is in Gansu Province in China. Despite probably being endemic to China, the species is not mentioned in Flora of China (Lu & Brach 2003). In Europe *C. hjelmqvistii* is reported to have been cultivated since 1943 (Fryer & Hylmö 2009). Today, it is known as an escape

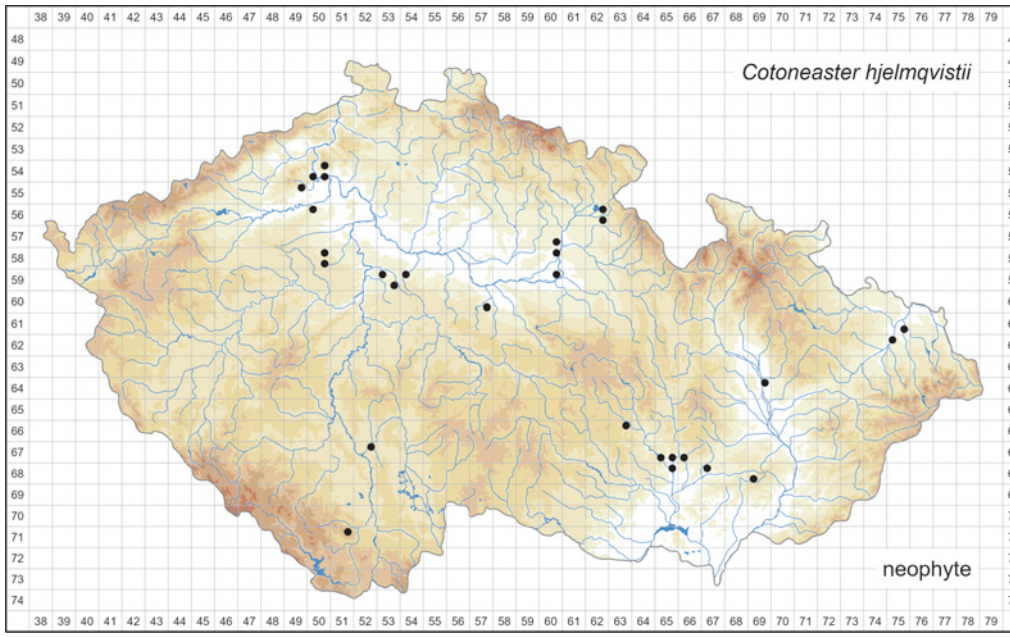



**Fig. 23.** Distribution of *Cotoneaster hjelmqvistii* in the Czech Republic (28 occupied quadrants). Prepared by Jiří Velebil & Radomír Řepka.

in the USA state of Oregon and in numerous countries of western, northern, central and southern Europe (POWO 2025). In the Czech Republic *C. hjelmqvistii* is used in landscape design, chiefly valued for its tolerance to drought, vigorous growth and brilliant autumn leaf colour, usually planted in small groups or in groundcover formations. It was first recorded as an escape in the village of Střílky, central Moravia, in 1987, based on herbarium specimens, which is 29 years earlier than the record reported in the latest catalogue of alien plants of the Czech Republic (Pyšek et al. 2022). It spreads spontaneously in pavement joints, various types of scrub and at ruderal sites. Most of the recent records are from towns, rarely scattered throughout the country with no apparent relation to specific habitats. It is probably overlooked or confused with similar species, such as *C. horizontalis*. The species is classified as a casual neophyte (Pyšek et al. 2022).

*Cotoneaster horizontalis* (Fig. 24)

The native range of *Cotoneaster horizontalis* includes the Chinese provinces of Sichuan and Gansu, as well as Taiwan, where it grows at elevations of 1,500–3,500 m (Lu & Brach 2003). It has been reported as an escape in numerous European countries, in western and eastern North America, Argentina and New Zealand (POWO 2025). However, records of *C. horizontalis* in botanical databases are highly unreliable due to past misidentifications and confusion with related or similar species. In Europe *C. horizontalis* has been cultivated since 1885, and in the Czech Republic since 1909, when it was first planted in the Průhonice chateau park, central Bohemia (Pejchal et al. 2021). It is commonly used as groundcover and for covering walls, where it is typically planted at the top so that its

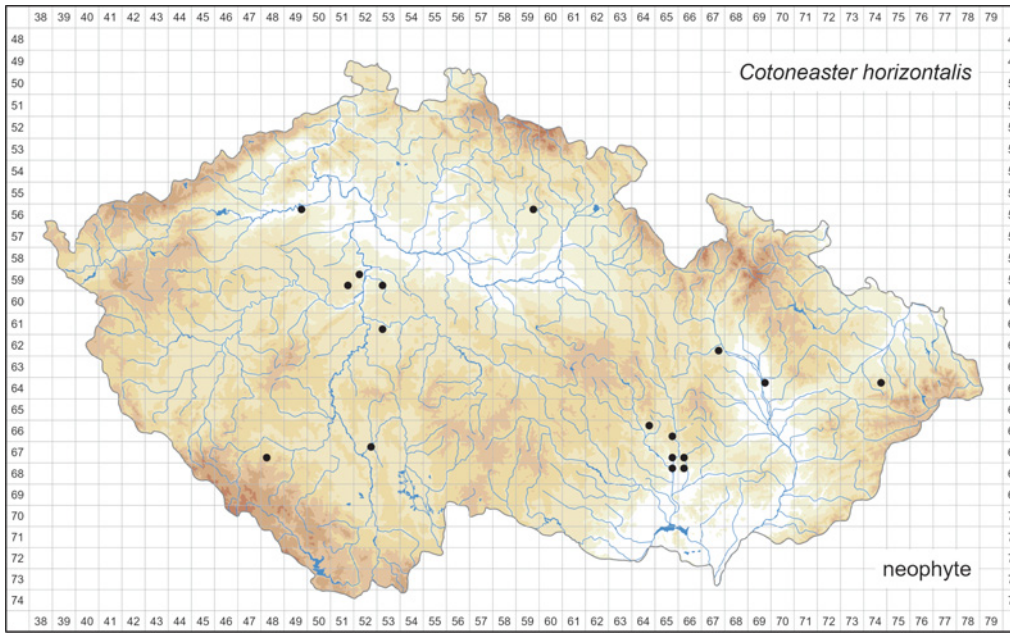



**Fig. 24.** Distribution of *Cotoneaster horizontalis* in the Czech Republic (17 occupied quadrants). Prepared by Jiří Velebil & Radomír Řepka.

branches cascade downward, in both private gardens and public parks. Based on herbarium specimens, it was first recorded as an escape on Hořice hill near the village of Soběšice, south-western Bohemia, in 1956, which is 30 years earlier than the record reported in the last catalogue of alien plants of the Czech Republic (Pyšek et al. 2022). During field surveys and based on a study of herbarium specimens, it was found that this species has often been confused with (listed in descending order of frequency of occurrence) *C. divaricatus*, *C. ascendens*, *C. nitens*, *C. fangianus*, *C. dielsianus* and *C. dammeri*. Escaped plants occur on rocks, rocky slopes, in thermophilous shrub communities, ruderal forest fringes as well as in pavement joints and abandoned quarries. Most of the recent records come from the city of Brno and its surroundings. The remaining occurrences are scattered across central, southern and eastern Bohemia, with only three sites in northern Moravia. The species is classified as a casual neophyte (Pyšek et al. 2022).

*Cotoneaster integerrimus* (Fig. 25)

*Cotoneaster integerrimus* is defined here in accordance with the classification by Kurtto et al. (2013), who identified four distinct microspecies within the *C. integerrimus* group (predominantly the Scandinavian *C. kullensis* and *C. scandinavicus*, the French *C. raboutensis* and the widespread *C. integerrimus* s. str.). Hrabětová-Uhrová (1962) described several infraspecific taxa from the former Czechoslovakia under the nomenclatorially invalid designation *C. alaunicus*. According to Kurtto et al. (2013), these are now considered synonyms of *C. integerrimus*. The *C. integerrimus* group is taxonomically challenging (e.g. Macková et al. 2020). Investigations using modern biosystematic methods will

likely refine the existing knowledge in this area. *Cotoneaster integerrimus* s. str. is distributed from western Europe (Pyrenees, eastern France, Belgium) through central Europe to Romania and the Balkan Peninsula. It is also found in Italy and Corsica. Isolated occurrences are in eastern Ukraine and in southern and central Russia. To the east it further extends to the Caucasus Mts, central Asia, China and the Asian part of Russia, and it also occurs in Turkey (Meusel et al. 1965, Kurtto et al. 2013). In the Czech Republic *C. integerrimus* occurs at open sites on rocky slopes of river valleys and in rocky steppes, often serving as refugial sites for species that prefer sunny conditions. It tolerates both extremely sunny habitats and light shade and is common in the fringes of thermophilous oak forests, in scrub and on calcareous and siliceous rocks, often on dry stony soils well supplied with nutrients (Kovanda 1992). It is found mainly in the warm, hilly areas of north-western and central Bohemia, extending through the rocky valley of the Vltava river into southern Bohemia, and in south-western to central Moravia, in a wide belt from the Dyje river valley upstream the town of Znojmo in the south-west to the village of Javoříčko in the north-east. Scarce isolated occurrences are in western and southern Bohemia and on the limestone ridge of the Pavlovské vrchy hills in southern Moravia. It reaches its elevational maximum on Mt Milešovka in the České středohoří Mts at 800 m. Although it is not cultivated as an ornamental plant, it is often confused with cultivated and escaped alien species. As a heliophilous shrub, it is particularly threatened by the encroachment of competitively strong woody plants, especially due to eutrophication and the abandonment of traditional landscape management practices. For these reasons, it is classified as lower risk – near threatened (Grulich 2012).

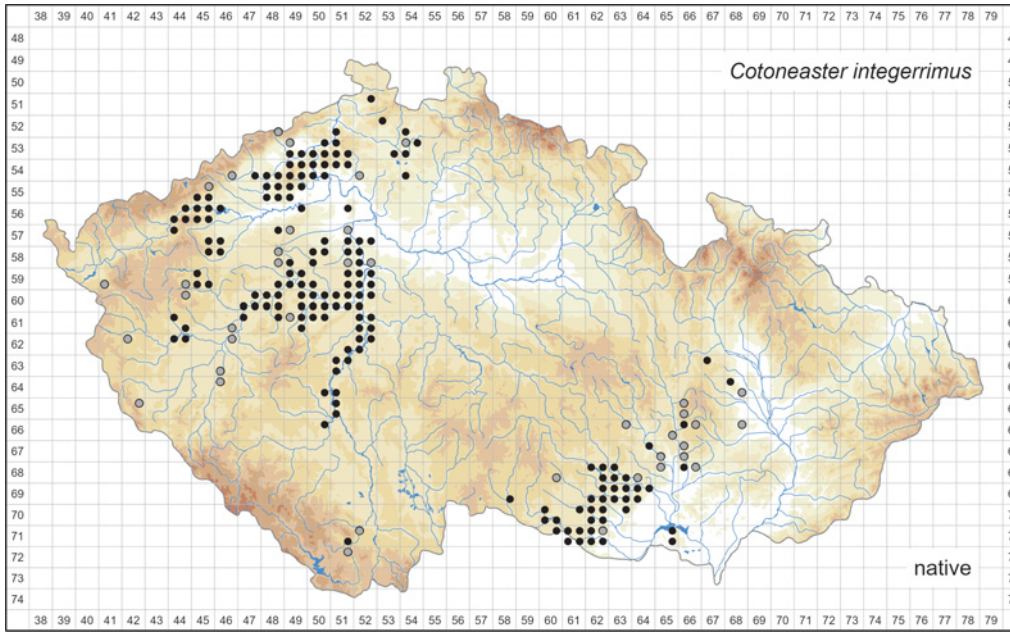



**Fig. 25.** Distribution of *Cotoneaster integerrimus* in the Czech Republic: ● at least one record in 2000–2025 (168 quadrants), ● pre-2000 records only (39 quadrants). Prepared by Radomír Řepka & Jiří Velebil.

*Cotoneaster kitaibelii* (Fig. 26)

*Cotoneaster kitaibelii* is native to the Chinese province of Sichuan and probably also to some neighbouring provinces such as Hubei, from where E. H. Wilson is thought to have introduced the species into cultivation. It has long been grown under the designation *C. kitaibelii* hort., but it was not formally described until 2009, when it was given the same epithet (Fryer & Hylmö 2009). There are probably no known escape records outside the Czech Republic. In this country the species has been cultivated for a long time in the Průhonice chateau park, central Bohemia, where many escaped individuals have been known since 2012. However, when the second edition of the Catalogue of alien plants of the Czech Republic was published (Pyšek et al. 2012), these records were likely confused with *C. dielsianus*. *Cotoneaster kitaibelii* is occasionally used in landscape design, either as solitary individuals or in small groups, mainly in public parks. However, it is usually confused with several other species, including *C. fangianus* and *C. zabelii*. Recently, new sites with escaped plants have been discovered at several locations in Prague and central Bohemia, and on the northern outskirts of the city of Plzeň and the town of Cheb in western Bohemia. The escaped individuals are recorded on rocks and rocky slopes, in forest fringes and in various types of shrub vegetation. The species has been proposed for classification as a casual neophyte (Velebil et al. 2024), because it is not included in the latest catalogue of alien plants of the Czech Republic (Pyšek et al. 2022).

*Cotoneaster laxiflorus* (Fig. 27)

*Cotoneaster laxiflorus* has a disjunct distribution in Europe. In central Europe it occurs from Moravia and Lower Austria in the west through southern Poland, Slovakia and Hungary to Ukraine in the east, extending south-eastward to Serbia, North Macedonia, Romania, Moldova and Bulgaria. In the northern half of Europe it is abundant in southern Scandinavia, the Baltic countries and Belarus, extending further into the subarctic part of north-western European Russia. It is also widespread in southern European Russia, from where it extends eastwards into the mountainous areas of Central Asia, China and Mongolia. It also occurs in Turkey and the Caucasus Mts (Kurtto et al. 2013). In the Czech Republic *C. laxiflorus* reaches the westernmost limit of its central-European distribution. It typically grows on rocky sun-exposed outcrops of limestone and other basic bedrock, in southern Moravia also on nutrient-rich siliceous rocks, mostly on dry, stony soils. The species is mainly found in south-western and western Moravia, along a broad strip of hard rock formations stretching from the surroundings of the town of Znojmo in the south-west to the town of Moravská Třebová in the north. It is mainly found in the deep river valleys of south-western Moravia, from where it extends north of the city of Brno into the valleys of the Svratka, Křetínka, Svitava and Punkva rivers and reaches the Drahanská vrchovina highlands. It is also rarely found on the limestone ridge of the Pavlovské vrchy hills in southern Moravia, with an isolated occurrence is on a limestone outcrop near the town of Vsetín in eastern Moravia. The elevational maximum of the species is reached on the Valova skála rock near Vsetín, at 530 m a.s.l. Populations of *C. laxiflorus* are small, usually comprising only a few individuals. It is threatened by the encroachment of competitively stronger woody plants, mainly due to eutrophication and the abandonment of traditional landscape management practices. The species is classified as endangered in the Czech Republic (Grulich 2012).

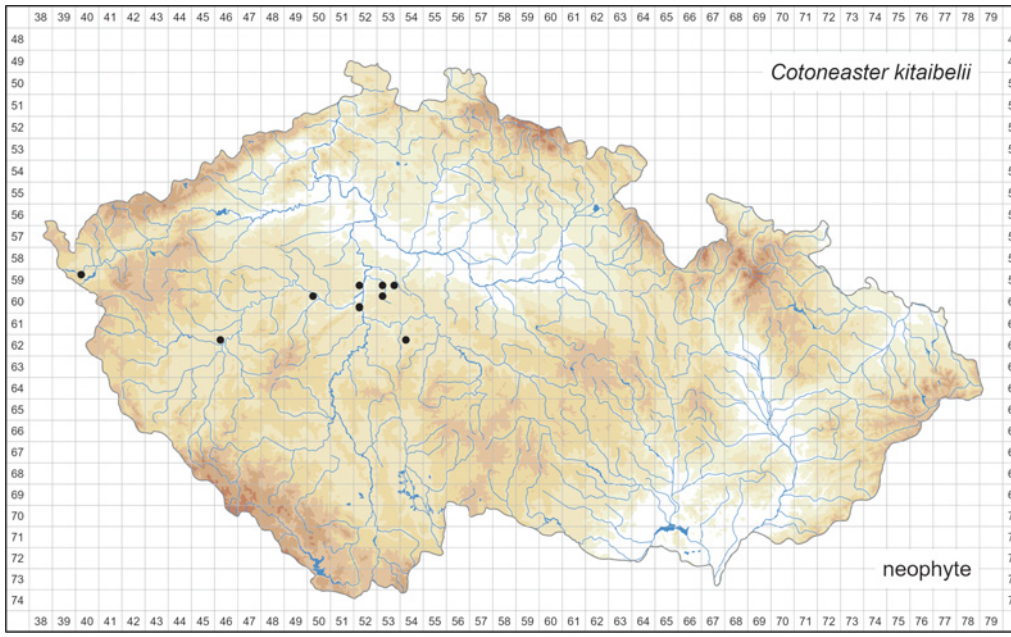



**Fig. 26.** Distribution of *Cotoneaster kitaibelii* in the Czech Republic (9 occupied quadrants). Prepared by Jiří Velebil & Radomír Řepka.

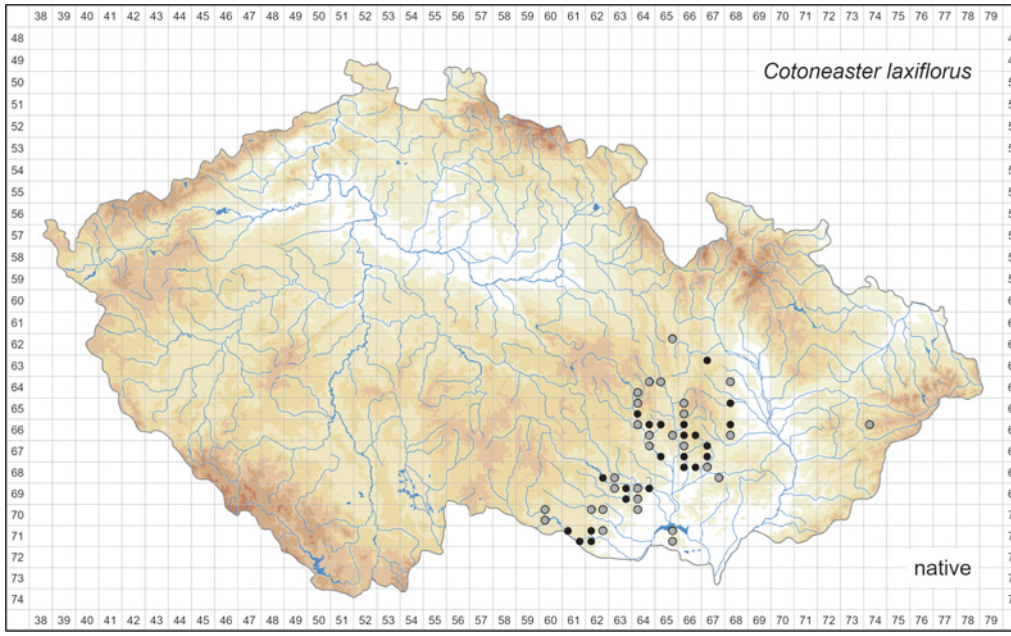



**Fig. 27.** Distribution of *Cotoneaster laxiflorus* in the Czech Republic: ● at least one record in 2000–2025 (23 quadrants), ● pre-2000 records only (29 quadrants). Prepared by Radomír Řepka & Jiří Velebil.

*Cotoneaster magnificus* (Fig. 28)

*Cotoneaster magnificus* is native to the Chinese province of Sichuan. It is commonly planted in Canada and the USA (Fryer & Hylmö 2009). In Europe it is most often grown in botanical gardens while plantings in parks are rather rare. The species is not known to have escaped elsewhere except for the record presented here. In the Czech Republic several individuals were found in 2023 escaped in ruderal scrub in the surroundings of the Mendel University Botanical Garden and Arboretum in the city of Brno as well as in a stone quarry in the Brno's city district of Líšeň. The number of records in Brno will probably increase but more detailed research is required. The species has been proposed for classification as a casual neophyte (Velebil et al. 2024).

*Cotoneaster monopyrenus* (Fig. 29)

*Cotoneaster monopyrenus* is native to the Chinese province of Yunnan (Fryer & Hylmö 2009). In Flora of China (Lu & Brach 2003) it is listed as a synonym of *C. hebephyllus*. The species is known as an escape from the United Kingdom, the Czech Republic and the USA state of Washington (Kurtto et al. 2013, POWO 2025). It is rarely cultivated in botanical gardens, usually under the name *C. hebephyllus* (or *C. hebephyllus* var. *monopyrenus*). In the Czech Republic it was found escaped only once, in the vicinity of the Mendel University Botanical Garden and Arboretum in the city of Brno, in 2023. The species has been proposed for classification as a casual neophyte (Velebil et al. 2024).

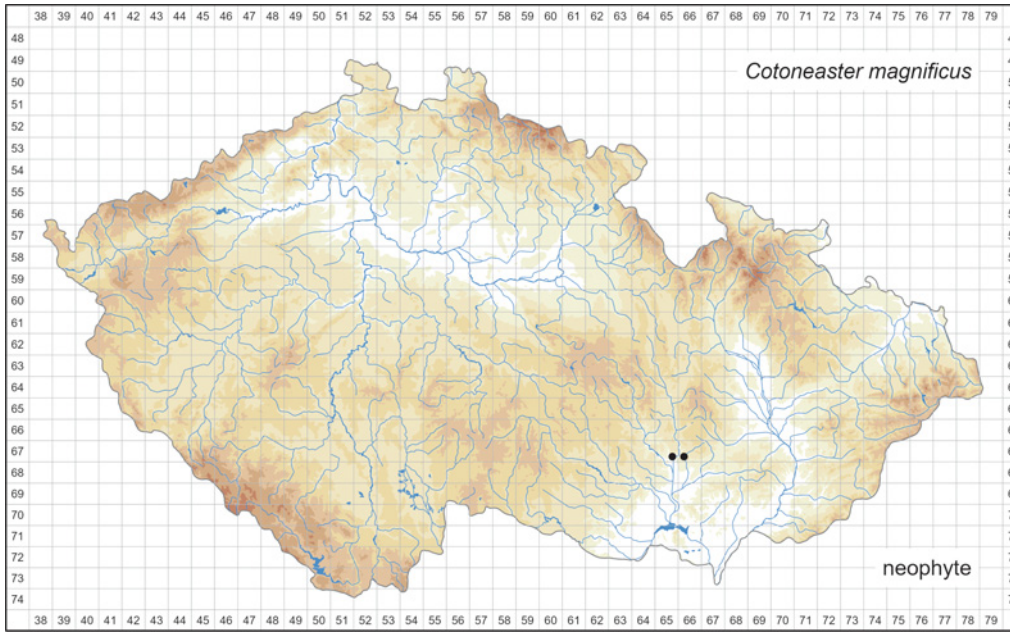



**Fig. 28.** Distribution of *Cotoneaster magnificus* in the Czech Republic (2 occupied quadrants). Prepared by Jiří Velebil, Martin Sedlák & Radomír Řepka.

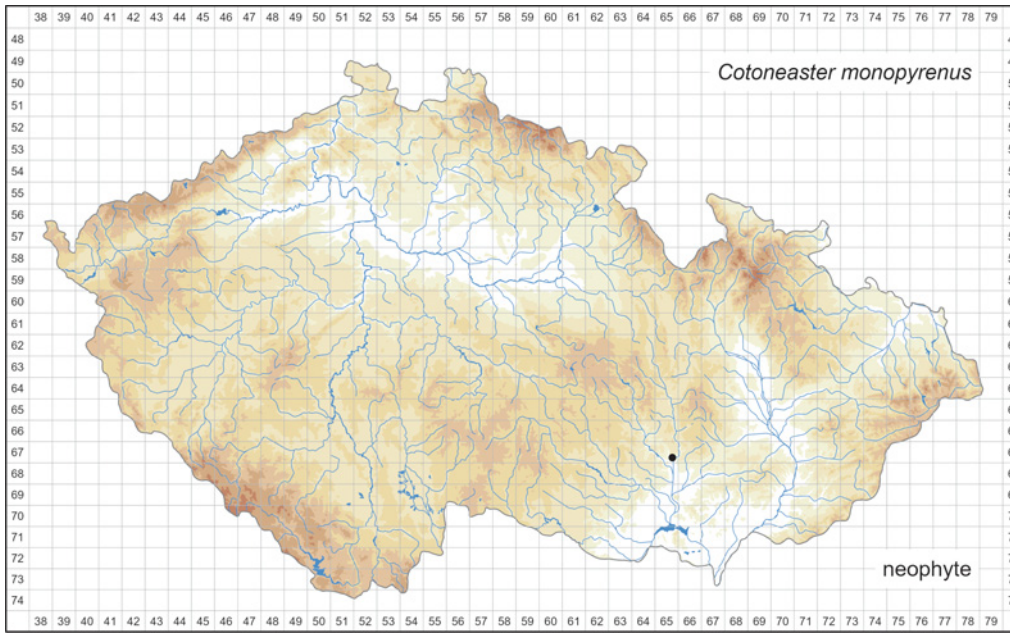



**Fig. 29.** Distribution of *Cotoneaster monopyrenus* in the Czech Republic (1 occupied quadrant). Prepared by Jiří Velebil, Martin Sedlák & Radomír Řepka.

*Cotoneaster multiflorus* (Fig. 30)

*Cotoneaster multiflorus* is a robust shrub allegedly native to mountainous areas in Turkey, the Caucasus Mts, central Asia, Altai Mts in Russia, north-western and northern China and the Korean Peninsula (Lu & Brach 2003). Surprisingly, Fryer & Hylmö (2009) only mention Kazakhstan, likely due to a different taxonomic treatment. In its native range it grows in river valleys and dense mixed forests on slopes, in forest fringes and thickets, and along streams at elevations of 1,200–3,500 m (Lu & Brach 2003). In Europe *C. multiflorus* has repeatedly escaped from cultivation in southern Sweden, rarely also in the United Kingdom, Norway, Denmark, Germany, the Czech Republic and Bulgaria. Outside Europe it has escaped in the USA states of Illinois and Iowa (Dickoré & Kasperek 2010, Kurtto et al. 2013, POWO 2025). In Europe *C. multiflorus* has been cultivated since 1837, and in the Czech Republic since 1909, when it was first planted in the Konopiště chateau park, central Bohemia (Pejchal et al. 2021). The species is occasionally used in landscape design, predominantly as solitary individuals, usually in public parks. It is valued for its abundant flowering and red fruits. Based on herbarium specimens, it was first documented as an escape on Přední hora hill at the village of Ostopovice, southern Moravia, in 2013. Approximately 20 additional escaped occurrences have since been found in southern and central Moravia, mainly around the city of Brno. At some sites it even forms monodominant stands, as mature shrubs fruit very abundantly and seedlings can establish near the mother plants in fairly shaded forests and former orchards. The species is classified as a casual neophyte (Pyšek et al. 2022).

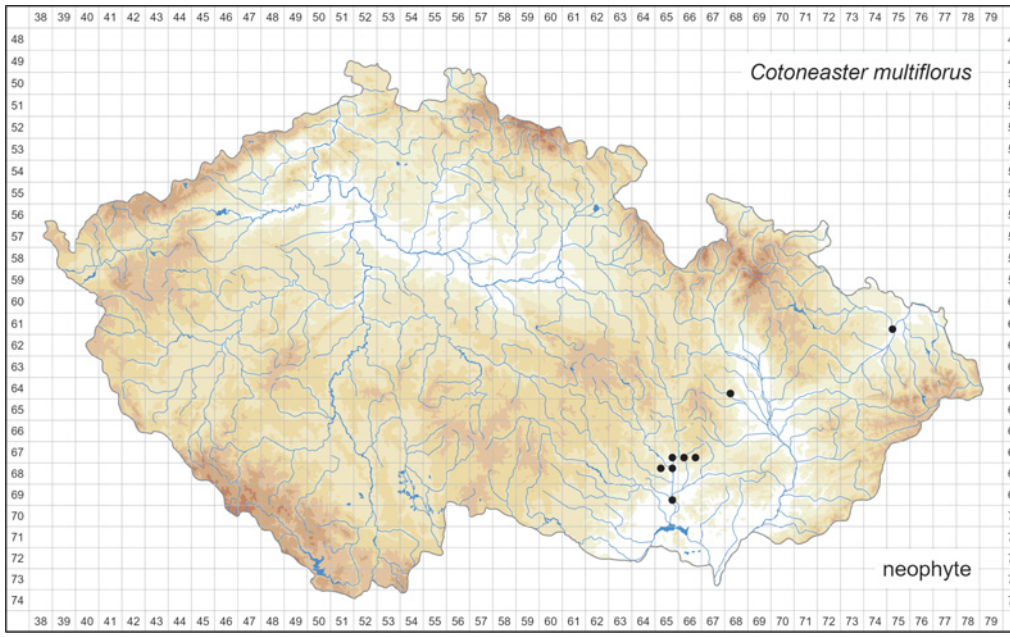



**Fig. 30.** Distribution of *Cotoneaster multiflorus* in the Czech Republic (8 occupied quadrants). Prepared by Jiří Velebil, Martin Sedlák & Radomír Řepka.

*Cotoneaster nitens* (Fig. 31)

*Cotoneaster nitens* is native to China, where it occurs in the provinces of Gansu and Sichuan (Fryer & Hylmö 2009). In its native range it grows on open slopes, river banks and in mixed forests at elevations of 1,900–3,000 m (Lu & Brach 2003). It has been recorded as an escape in North America (Oregon and Washington in the north-western USA) and Europe, including Ireland, the United Kingdom, Germany, the Czech Republic, Austria and Hungary (Dickoré & Kasperek 2010, Kurtto et al. 2013, POWO 2025). In the USA *C. nitens* has been cultivated since 1910, and in the Czech Republic since 1922, when it was first planted in the Průhonice chateau park, central Bohemia (Pejchal et al. 2021). The species is used in landscape design, either as a solitary individual or in small groups, in public parks and in botanical gardens. It is valued for its glossy leaves, attractive autumn colouration and gracefully arched branches, which lend it a distinctive appearance. Based on herbarium specimens, it was first recorded as an escape in the valley of the Vltava river near the village of Cholín, central Bohemia, in 1996. Escaped plants occur particularly on rocks and rocky slopes, in woods open-canopy forests and their fringes, and in various shrub communities. Most of the recent records are from Prague and its surroundings. Additional individual escapes have been reported from the town of Kutná Hora, central Bohemia, and the city of Brno, southern Moravia. The species has been proposed for classification as a casual neophyte (Velebil et al. 2024), because it is not included in the latest catalogue of alien plants of the Czech Republic (Pyšek et al. 2022).

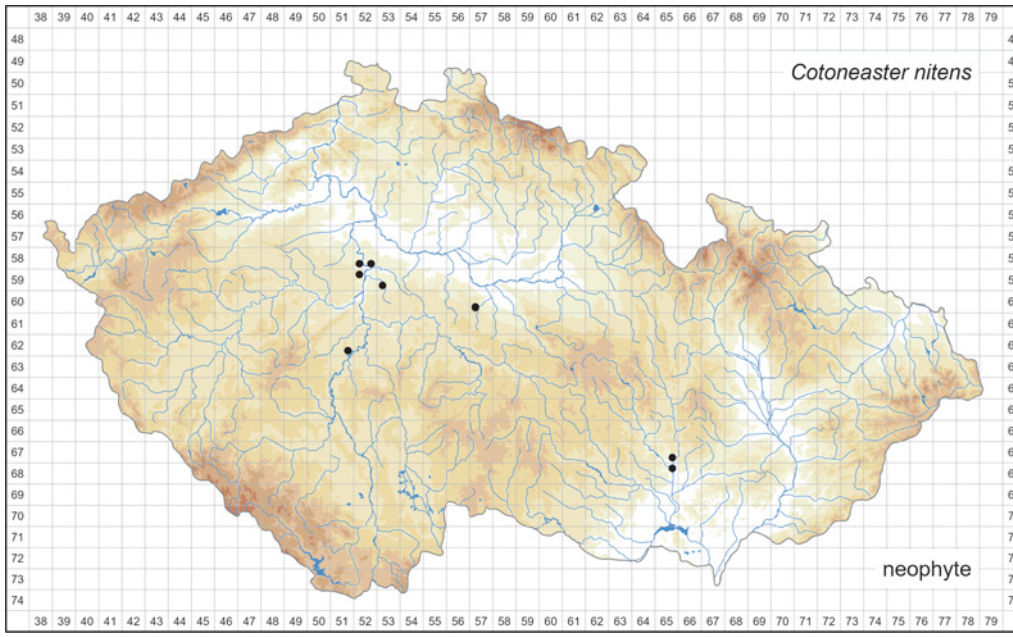



**Fig. 31.** Distribution of *Cotoneaster nitens* in the Czech Republic (8 occupied quadrants). Prepared by Jiří Velebil & Radomír Řepka.

*Cotoneaster salicifolius* (Fig. 32)

*Cotoneaster salicifolius* is native to the mountainous areas of the Chinese provinces of Yunnan, Sichuan, Guizhou, Hubei and Hunan, where it grows in mixed forests, on slopes and in open places at elevations of 400–3,000 m (Lu & Brach 2003). However, Fryer & Hylmö (2009) only list the Chinese provinces of Sichuan and Tibet as its native range. It has been cultivated for a relatively long time in Europe and other parts of the world with a temperate climate and is mostly used as a groundcover plant in landscape design. It is among the most widely cultivated *Cotoneaster* species in some European countries. It has been recorded as an escape in numerous countries of western, northern, central and southern Europe as well as in the USA state of Washington and the Canadian province of British Columbia (Kurtto et al. 2013, POWO 2025). In the Czech Republic it has been cultivated since 1914, when it was first planted in the Průhonice chateau park, central Bohemia (Pejchal et al. 2021). It has rarely escaped, so far being found only in the village of Průhonice (2023), in the town of Pardubice (2024) and the city of Plzeň (2024), all in pavement joints. The species has been proposed for classification as a casual neophyte (Velebil et al. 2024).

*Cotoneaster splendens* (Fig. 33)

*Cotoneaster splendens* is a member of the *Cotoneaster* ser. *Dielsianii* (Fryer & Hylmö 2009). In Flora of China it is included in the closely related *C. dielsianus* (Lu & Brach 2003), a classification also adopted by Dickoré & Kasperek (2010). *Cotoneaster splendens* is native to the mountains of Sichuan Province in China, where it was first collected by H. Smith in 1934 at elevations of 2,900–3,200 m (Fryer & Hylmö 2009). In Europe this

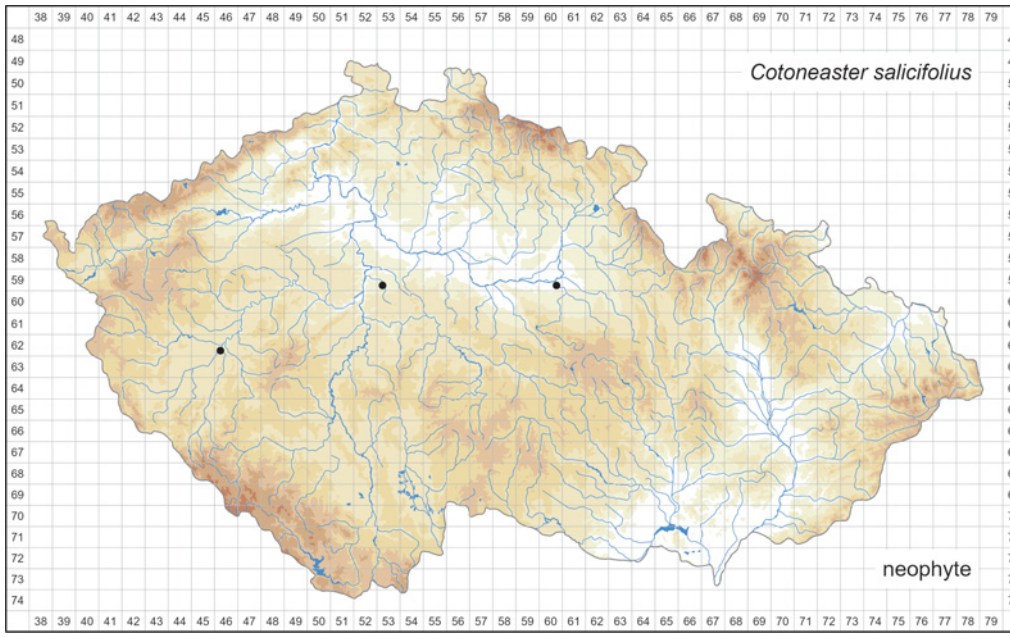



**Fig. 32.** Distribution of *Cotoneaster salicifolius* in the Czech Republic (3 occupied quadrants). Prepared by Jiří Velebil, Martin Sedlák & Radomír Řepka.

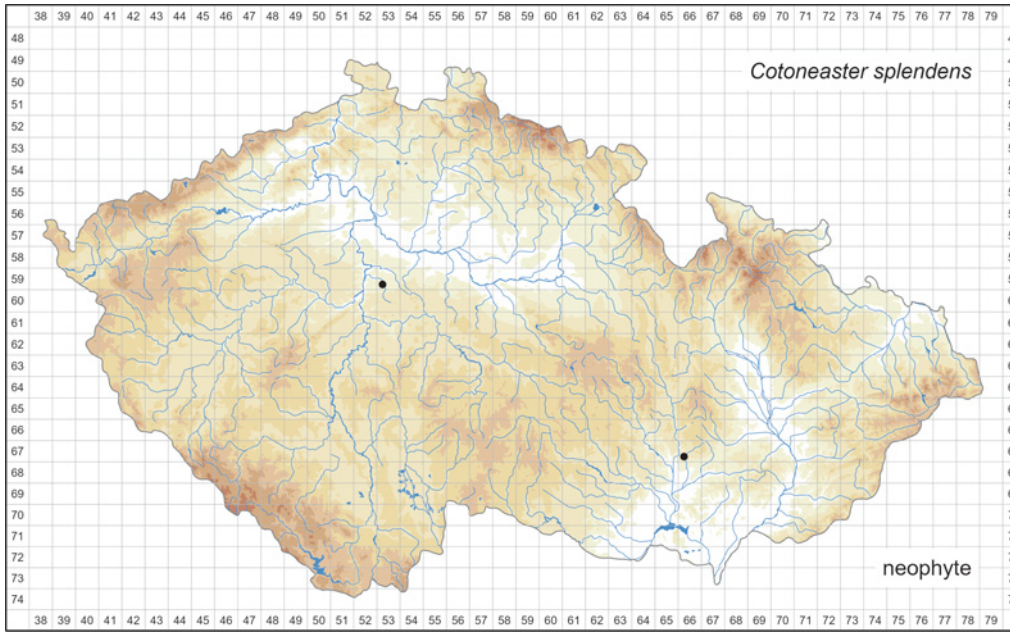



**Fig. 33.** Distribution of *Cotoneaster splendens* in the Czech Republic (2 occupied quadrants). Prepared by Jiří Velebil & Radomír Řepka.

species was first introduced to the United Kingdom, where it was cultivated under the name *C.* ×*sabrina* hort. It was later introduced to Scandinavia and some European botanical gardens. *Cotoneaster splendens* has been reported as an escape in the United Kingdom, for the first time in 1981 (Clement & Foster 1994, Kurtto et al. 2013), and in the Czech Republic (POWO 2025). In the Czech Republic *C. splendens* is rarely cultivated and currently mostly confined to botanical gardens. It is reliably frost-resistant, tolerates shade and can be used as solitary specimens or in small groups. It has been found escaped in just a few places. The first of these is in the city of Brno, southern Moravia, where it was recorded in 2021 after it had spread in scrub along a dirt road from plants cultivated in a nearby cemetery. The other sites are in the village of Průhonice, central Bohemia, where it has frequently escaped in the area of the Dendrological Garden and its surroundings, and the adjacent village of Křeslice, where seedlings grow in a *Ligustrum vulgare* hedge. The species is classified as a casual neophyte (Pyšek et al. 2022).

*Cotoneaster subacutus* (Fig. 34)

*Cotoneaster subacutus* is native to Kazakhstan, Kyrgyzstan and Tajikistan (Fryer & Hylmö 2009). Very little is known about its ecology in its native range. It appears to be a light-demanding species, growing in open habitats without competition from other woody plants. In this country it is only rarely cultivated in botanical gardens. It was found escaped in scrub in the vicinity of the Mendel University Botanical Garden and Arboretum in the city of Brno, in 2023. *Cotoneaster subacutus* has been proposed for classification as a casual neophyte (Velebil et al. 2024).

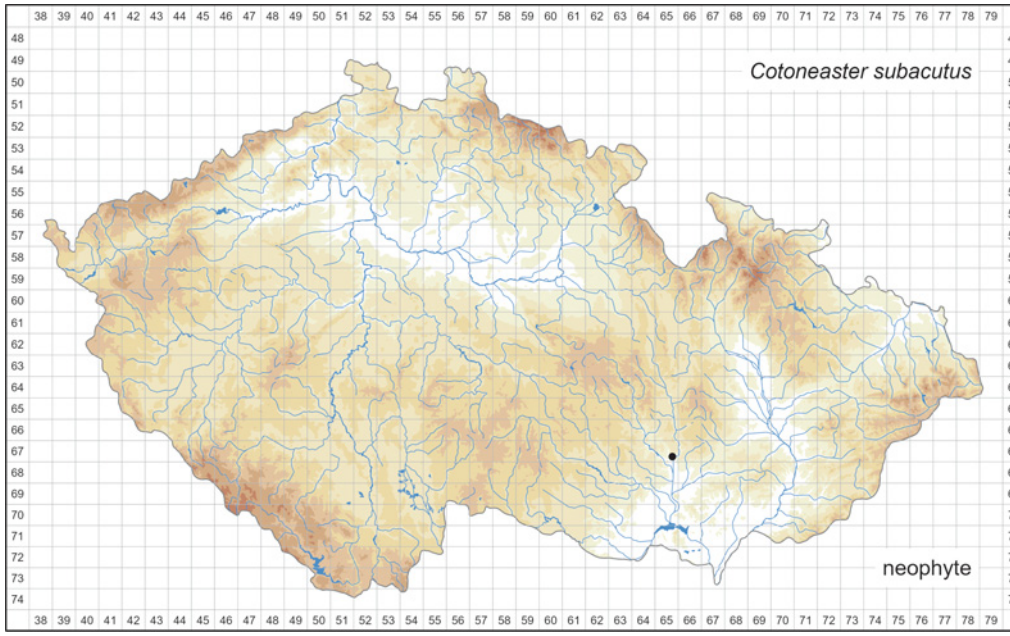



**Fig. 34.** Distribution of *Cotoneaster subacutus* in the Czech Republic (1 occupied quadrant). Prepared by Jiří Velebil, Martin Sedlák & Radomír Řepka.

*Cotoneaster svenhedinii* (Fig. 35)

The native range of *Cotoneaster svenhedinii* is the Chinese province of Gansu (Fryer & Hylmö 2009). This species is likely cultivated only in botanical gardens. It is planted as solitary individuals or in small groups and it is valued for its arched slender branches, greyish-green tomentose leaves and ruby-coloured fruits. Until recently, no records of escaped plants had been reported. However, in 2024, escaped individuals were found in scrub along a motorway in Průhonice, central Bohemia, close to the southern margin of the Dendrological Garden, where many specimens of this species are cultivated. The earliest plants grown in the garden were obtained from the arboretum in the town of Jablunkov, where they were propagated from seeds acquired in 1998 through the Index seminum seed exchange from the National Botanic Gardens in Dublin. Escaped plants of *C. svenhedinii* were also found on the banks of the Lomná river in the Jablunkov arboretum area. The species is here proposed for classification as a casual neophyte.

*Cotoneaster tomentosus* (Fig. 36)

*Cotoneaster tomentosus* is native to the Mediterranean area, central Europe and southwestern Asia. In Europe its range extends from Spain in the west to Bulgaria in the east, and to Poland in the north. Outside Europe it is found in two isolated locations: the North Caucasus Mts and Anatolia (Kurtto et al. 2013). Within its primary range it predominantly grows on calcareous rocks and rocky slopes, in forest-steppes and along the edges of open-canopy forests. There are no credible records of its cultivation in public parks or

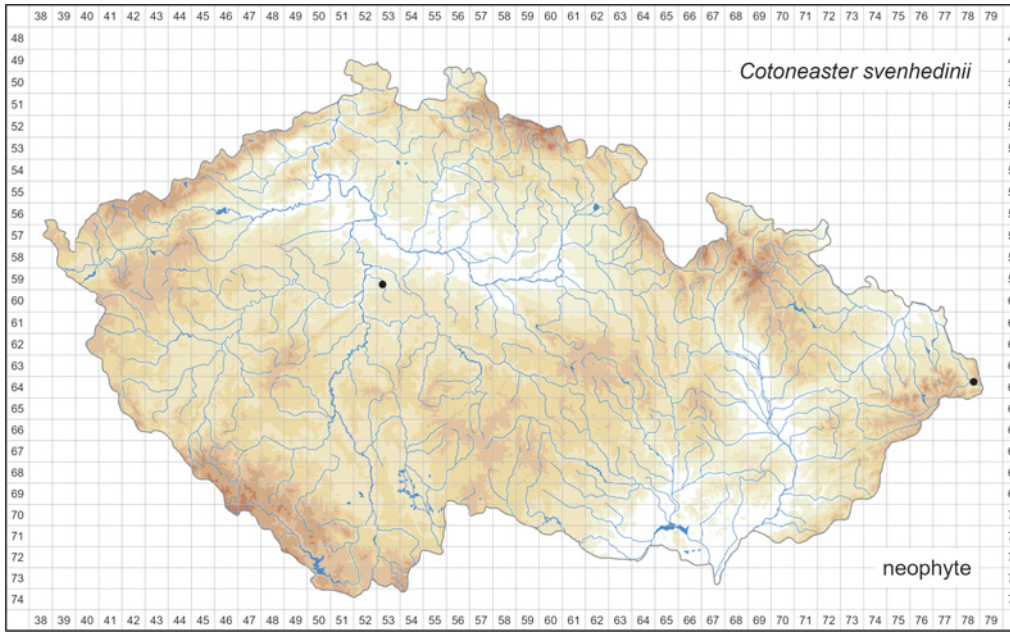



**Fig. 35.** Distribution of *Cotoneaster svenhedinii* in the Czech Republic (2 occupied quadrants). Prepared by Jiří Velebil & Radomír Řepka.

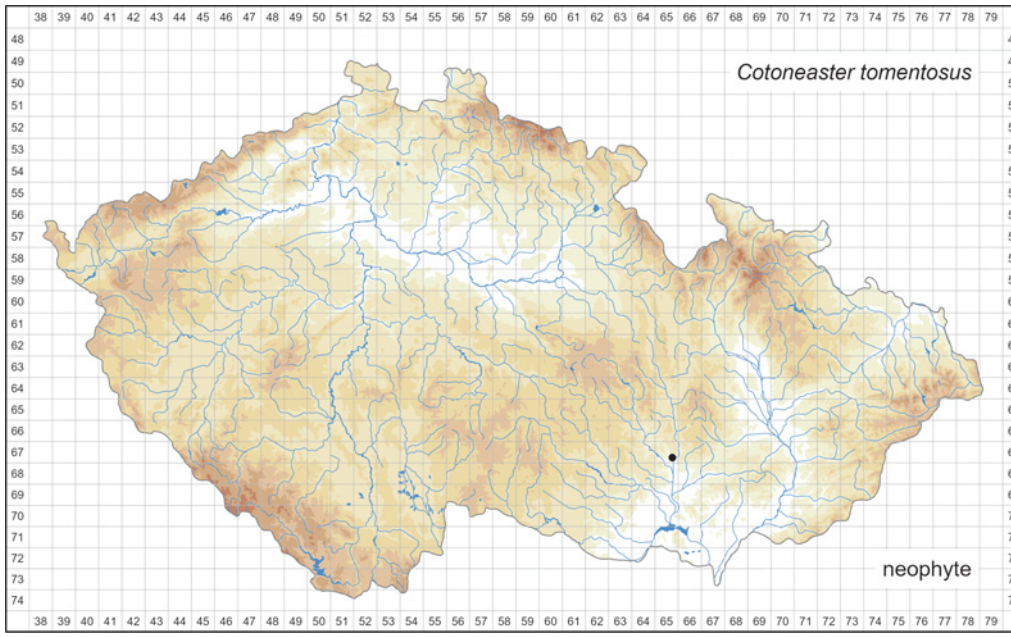



**Fig. 36.** Distribution of *Cotoneaster tomentosus* in the Czech Republic (1 occupied quadrant). Prepared by Jiří Velebil, Martin Sedlák & Radomír Řepka.

private gardens, though it is probably rarely planted in botanical gardens. In the Czech Republic *C. tomentosus* is cultivated only in the Dendrological Garden in Průhonice and the Mendel University Botanical Garden and Arboretum in the city of Brno. The only known record of escaped plants comes from the surrounding scrubland of the latter garden, where it was found in 2023, along with many other escaped alien species. The species has been proposed for classification as a casual neophyte (Velebil et al. 2024).

*Cotoneaster veitchii* (Fig. 37)

Lu & Brach (2003) considered *Cotoneaster veitchii* conspecific with *C. silvestrii*, which is native to the Chinese provinces of Gansu, Shaanxi, Hubei, Henan, Jiangxi, Anhui and Jiangsu, extending from west to east. However, Fryer & Hylmö (2009) consider the native range of *C. veitchii* to be only Hubei and Shaanxi. It is usually found in mixed forests at elevations of 500–2,600 m. It forms attractive large shrubs, and its cultivation is popular in central Europe, where it is sometimes used as a street tree when grafted onto *Crataegus* rootstock (Fryer & Hylmö 2009). Escape occurrences are only known from the Czech Republic (POWO 2025), where it has been found mainly in cities and towns (Prague, Brno, Ostrava, Průhonice), usually near fruit-bearing cultivated specimens. Escaped plants are most abundant in the Průhonice Dendrological Garden and its surroundings, particularly near its perimeter fence. They grow in open-canopy woods and their fringes, in various shrub communities and ruderal places in the Czech Republic. Based on herbarium specimens, it was first recorded as an escape in Průhonice, central Bohemia, in 2019. The species has been proposed for classification as a casual neophyte (Velebil et al. 2024).

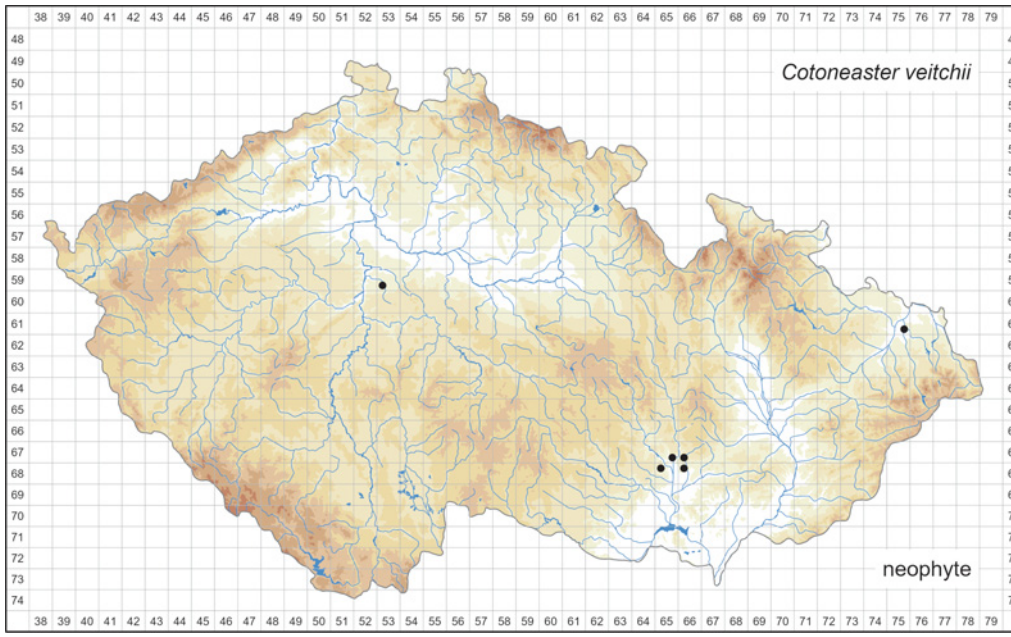



**Fig. 37.** Distribution of *Cotoneaster veitchii* in the Czech Republic (6 occupied quadrants). Prepared by Jiří Velebil, Martin Sedlák & Radomír Řepka.

*Cotoneaster villosulus* (Fig. 38)

*Cotoneaster villosulus* is considered a variety of *C. acutifolius* in the Flora of China (Lu & Brach 2003). Its native range includes the Chinese provinces of Tibet, Gansu, Sichuan, Shaanxi, Hubei, Hebei and Anhui, as well as Taiwan (Lu & Brach 2003), although Fryer & Hylmö (2009) mention only Hubei. In its native range it occurs in mountain valleys, on grassy slopes, in thickets and along forest fringes at elevations of 1,000–2,200 m (Lu & Brach 2003). In Europe the species is mainly cultivated in western areas, where it has also escaped. It has been recorded as a neophyte in the United Kingdom and the southern parts of Scandinavia (Norway and Sweden), and rarely in Belgium, Germany and the Czech Republic. It has also escaped in the USA state of Washington (Kurtto et al. 2013, POWO 2025). In the Czech Republic several occurrences of escaped plants have been discovered only recently. These are mainly found in towns and their surroundings, in open-canopy woods and their fringes, various ruderal shrub communities, abandoned quarries and on stream banks. Based on herbarium specimens, *C. villosulus* was first recorded escaped in the town of Nedvědice, western Moravia, in 1993. Further records come from Prague, the city of Brno, southern Moravia, and from the town of Sázava in central Bohemia. The species has been proposed for classification as a casual neophyte (Velebil et al. 2024), because it is not included in the latest catalogue of alien plants of the Czech Republic (Pyšek et al. 2022).

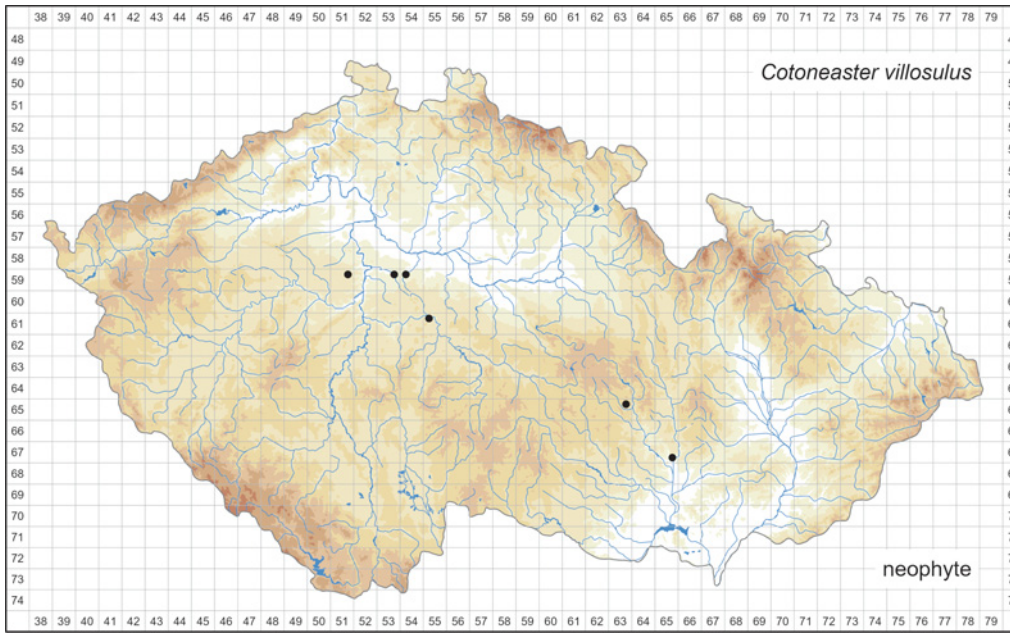



**Fig. 38.** Distribution of *Cotoneaster villosulus* in the Czech Republic (6 occupied quadrants). Prepared by Jiří Velebil, Martin Sedlák & Radomír Řepka.

*Cotoneaster zabelii* (Fig. 39)

*Cotoneaster zabelii* is allegedly native to the Chinese provinces of Qinghai, Gansu, Inner Mongolia, Ningxia, Shaanxi, Hubei, Hunan, Shanxi, Henan, Hebei, Jiangxi and Shandong (Lu & Brach 2003), although Fryer & Hylmö (2009) mention only Shaanxi. In its native range it grows in calcareous mountainous areas, particularly in shaded river valley thickets at elevations of 800–2,500 m (Lu & Brach 2003). The species was introduced to the United Kingdom in 1907 (Fryer & Hylmö 2009) and was being sold by Polish nurseries as early as 1930 (Jerzak 2007). Escape records in Europe have been published for the United Kingdom, Belgium, Germany, the Czech Republic and Hungary (POWO 2025). In the Czech Republic *C. zabelii* is not commonly cultivated and is often confused with other members of *Cotoneaster* ser. *Zabelioides*, especially *C. fangianus*. So far, only one record of escaped *C. zabelii* is known in the Czech Republic: it was found in the village of Černvír, in western Moravia, in 2005 (Čáp 2007), where it grows in the semi-shaded undergrowth of *Pinus sylvestris* and *Juniperus* ×*pfitzeriana*. The species is classified as a casual neophyte (Pyšek et al. 2022).

*Goodyera repens* (Fig. 40)

*Goodyera repens* is distributed across the temperate and boreal zones of the Northern Hemisphere. It occurs in most of Europe, except for its Atlantic and Mediterranean areas. In Asia its range includes Siberia, the Caucasus Mts, the Himalayas, the Tian Shan Mts and the Russian Far East. In North America the species occurs predominantly in Canada and Alaska (Delforge 2006, Kreutz 2024, Kühn et al. 2024). In the Czech Republic

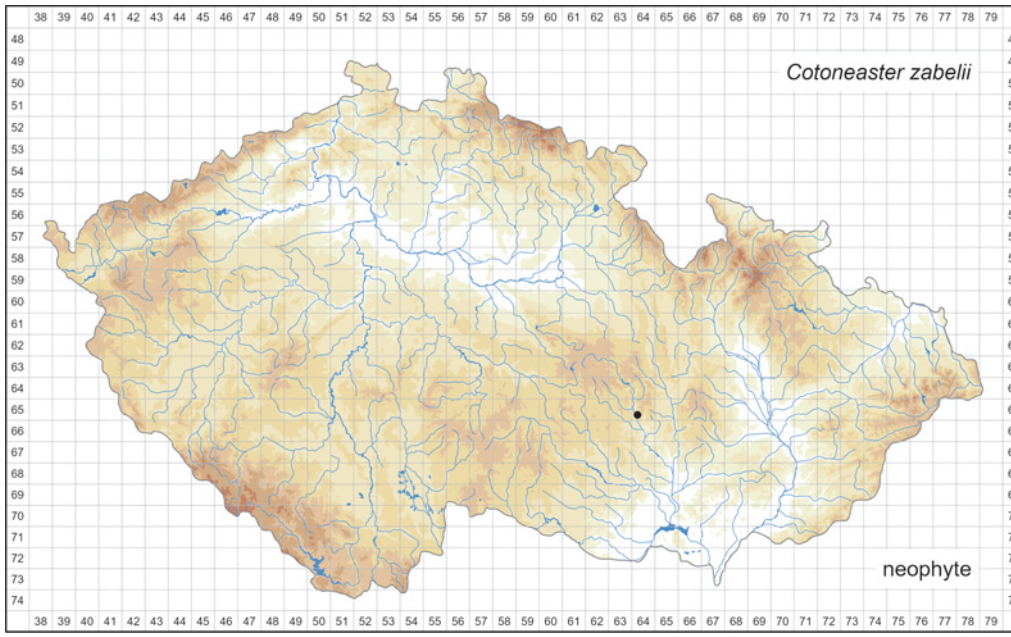



**Fig. 39.** Distribution of *Cotoneaster zabelii* in the Czech Republic (1 occupied quadrant). Prepared by Jiří Velebil & Radomír Řepka.

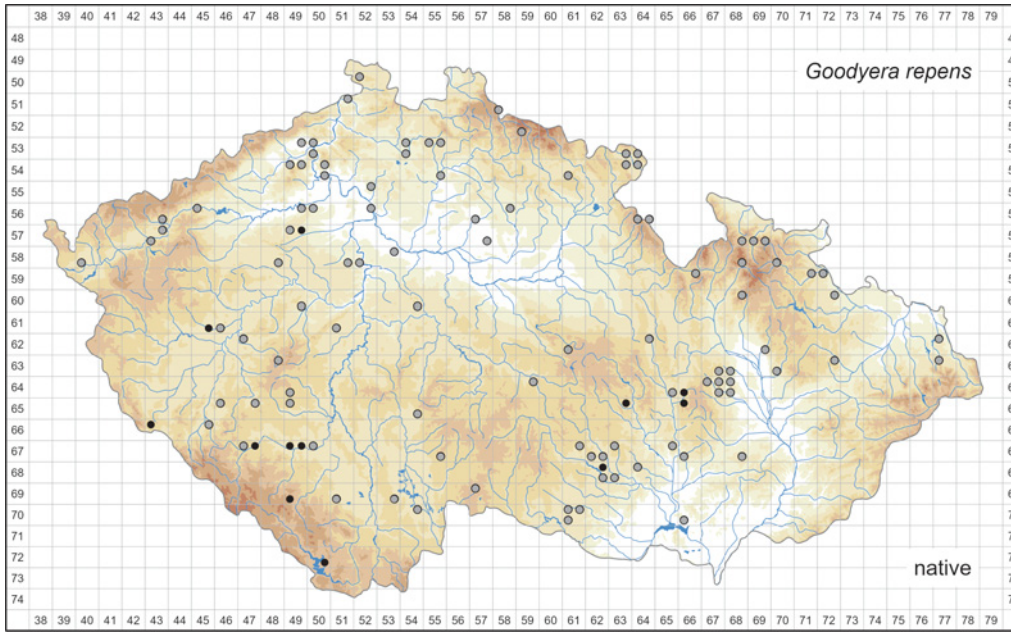



**Fig. 40.** Distribution of *Goodyera repens* in the Czech Republic: ● at least one record in 2000–2025 (12 quadrants), ● pre-2000 records only (99 quadrants). Prepared by Vojtěch Taraška.

*G. repens* mainly grows in shaded pine and spruce forests at middle elevations, including artificial coniferous plantations. It prefers moist parts with a sparse herb layer, usually dominated by mosses. While often found on calcareous bedrock, it is indifferent to soil reaction, growing on acidic to slightly basic soils. In the past, the species used to be widespread across the Czech Republic with the exception of the Carpathians, though it was always rare and limited to small, isolated populations. In many cases it was recorded only once, and its populations usually did not persist for a long time. *Goodyera repens* vanished from most of its former sites due to overall eutrophication and changes in forest management, including large-scale clear-cutting, drainage, and subsequent shifts in forest herb composition. By the end of the 20th century, only two viable populations were known in the country (Mandák & Procházka 2000). In the subsequent years, the species has been rediscovered at several of its earlier sites, and some new populations have also been found. Since 2000, it has been recorded at 15 localities, most of which are concentrated in the foothills of the Šumava Mts and along the eastern margin of the Českomoravská vrchovina highlands and in the adjacent part of the Drahanská vrchovina highlands. Despite that, *G. repens* remains extremely rare in the Czech Republic and is accordingly classified as critically endangered (Grulich 2012).

*Groenlandia densa* (Fig. 41)

*Groenlandia densa* is mainly distributed in western, central and southern Europe, extending northwards to the British Isles, southern Norway, southern Sweden, northern Poland and north-western Lithuania, and eastwards to south-western Slovakia, Romania and the

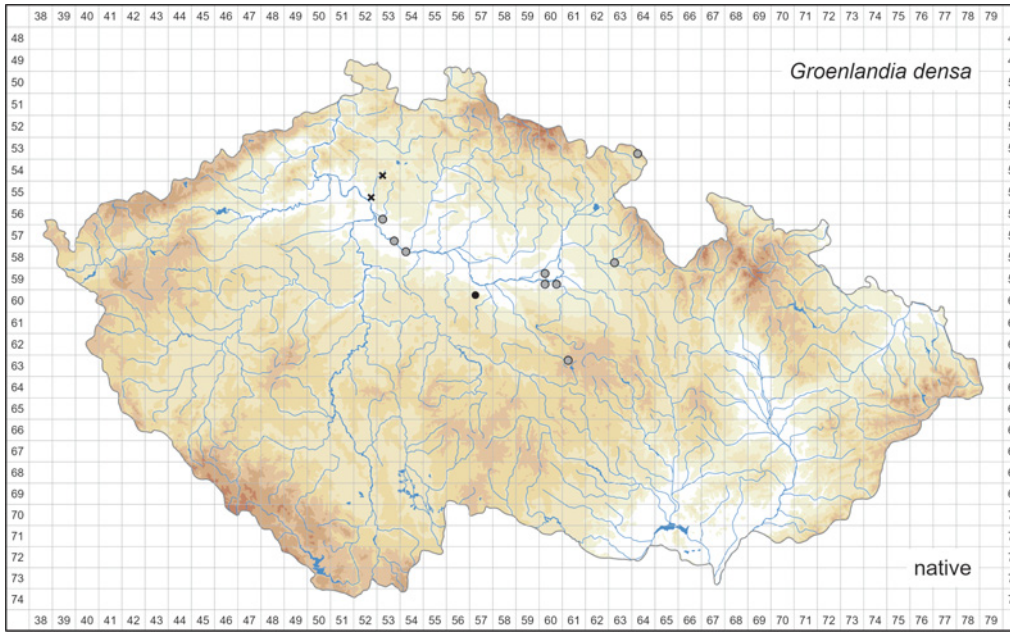



**Fig. 41.** Distribution of *Groenlandia densa* in the Czech Republic: ● at least one record in 2000–2025 (1 quadrant), ● pre-2000 records only (9 quadrants), × deliberate introductions only (2 quadrants). Prepared by Zdeněk Kaplan.

European part of Turkey. It is absent from most of the Mediterranean islands including the Balearic Islands, Corsica, Sardinia and Crete. In south-western Asia the species occurs in Turkey, Syria, Armenia and north-western Iran. In Africa it is confined to Morocco, Algeria and Tunisia (Meusel et al. 1965, Hultén & Fries 1986, Kaplan 2010b, Kaplan unpubl.). In the Czech Republic *G. densa* grows in ponds and meadow ditches with oligotrophic to mesotrophic, calcium-rich, clear, cold, shallow, standing or slowly running water, and a clayey bottom with a thin layer of organic mud. It has been recorded at about nine sites in central and eastern Bohemia. Most of these populations have since vanished, probably due to eutrophication and changes in land use. The only extant population is found at the village of Hořany near the city of Kutná Hora. The species is therefore classified as critically threatened (Grulich 2012). During the past two decades it has been introduced for conservation purposes into artificial pools in the Křivoklátsko Protected Landscape Area.

*Herminium monorchis* (Fig. 42)

The distribution of *Herminium monorchis* stretches from Europe through southern Siberia as far as the Korean Peninsula and Japan. In addition, it occurs in a vast area of China from the Himalayas to the Pacific coast. Isolated occurrences are in the Great Caucasus Mts. The species' distribution in Europe is rather patchy and uneven. It appears to be quite common in the Alps and their foothills, in Germany, on both sides of the English Channel and in southern Scandinavia, but it is rare or absent elsewhere (Delforge 2006, Kreutz 2024, Kühn et al. 2024). *Herminium monorchis* prefers sunny habitats on calcare-

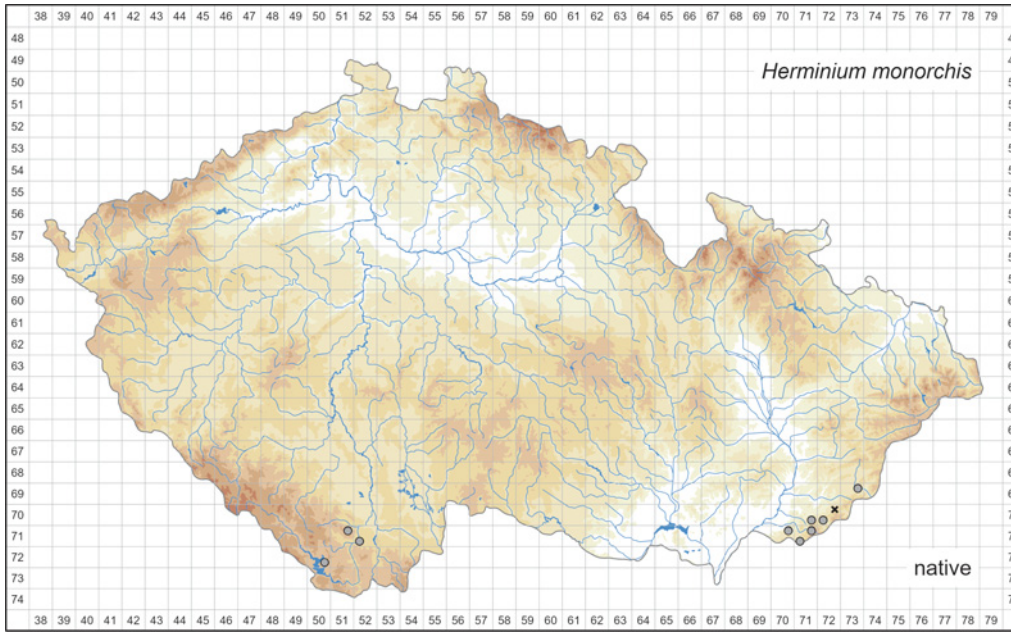



**Fig. 42.** Distribution of *Herminium monorchis* in the Czech Republic: ● native, pre-2000 records only (9 quadrants), × deliberate introductions only (1 quadrant). Prepared by Vojtěch Taraška.

ous, nutrient-poor soils. It is largely indifferent to soil moisture, avoiding only extremely dry or waterlogged substrates. It is found in calcareous fens, oligotrophic meadows, low-intensity pastures and semi-dry grasslands from lowlands up to the alpine belt. Outside central Europe, it also grows in dune slacks (Delforge 2006). It is a poor competitor, extremely sensitive to eutrophication and environmental changes. As a result, it vanished from many sites during the 20th century, mainly due to drainage, fertilization, intensive agriculture, afforestation and direct habitat destruction. This was also the case in the Czech Republic, where the species vanished in the second half of the 20th century. Even before then, it had always been extremely rare, confined to just two areas. It occurred near the town of Český Krumlov in southern Bohemia, with the last record in 1951. It was somewhat more frequent in the Bílé Karpaty Mts in south-eastern Moravia, where the last record documented by a herbarium specimen dates to 1956; this was also the last confirmed record of the species in the entire Czech Republic. Jatiová & Šmiták (1996) refer to an even later collection from 1961, but this specimen was not found during recent herbarium research. Two additional past occurrences are cited in the literature (e.g. Jatiová & Šmiták 1996, Procházka 2010, Průša 2019), namely in the Hostýnské vrchy and Jeseníky Mts. The Hostýnské vrchy report, first mentioned by Potůček (1969), lacks details or reference and should be considered uncertain. The Jeseníky record, first published by Jatiová & Šmiták (1996), is based on misinterpretation of a herbarium label. Although *H. monorchis* is currently considered nationally extinct (Grulich 2012) in the Czech Republic, a new occurrence was recently found in the Bílé Karpaty Mts. The origin of these plants is unknown. The nearest extant populations are found in western Slovakia (e.g. Ruček 2019) and Lower Austria (Schratt-Ehrendorfer et al. 2022), and these could have served as a source for long-distance dispersal. However, deliberate introduction is more likely, given numerous documented cases of orchid replanting in Moravia in recent years (Kaplan et al. 2024).

*Myosoton aquaticum* (Fig. 43)

*Myosoton aquaticum*, in recent taxonomic treatments usually included in the genus *Stellaria* (e.g. POWO 2025), is native to the temperate zone of Eurasia. Its range extends from the Pyrenees (apart from some outposts along the coast of northern Portugal) in the west to eastern China, the Korean Peninsula and Japan in the east, reaching as far north as the 63rd parallel. In Europe it is generally rare in the Mediterranean area and absent from some Mediterranean islands. It has been introduced into India, Thailand, Sumatra and North America (Jalas & Suominen 1983, Marhold 2011+, POWO 2025). In the Czech Republic *M. aquaticum* occurs in riverine reed vegetation, nitrophilous fringes, willow galleries, alluvial forests and clearings in them, edges and seasonally exposed bottoms of fishponds, ditches and other disturbed mesic to humid sites, including various ruderal and subruderal habitats in and around settlements. The species grows on nutrient-rich, particularly nitrogen-rich soils, ranging from slightly acidic to slightly basic, and from moist to wet. In the Czech Republic *M. aquaticum* is almost continuously distributed from the lowlands up to the low mountains, being absent only from the highest elevations of the mountains surrounding the country and from highlands with acidic rocks and nutrient-poor soils. Some of the distribution gaps on the map can be partly attributed to under-recording, particularly in agricultural landscapes in southern Moravia that are less attractive to botanists.

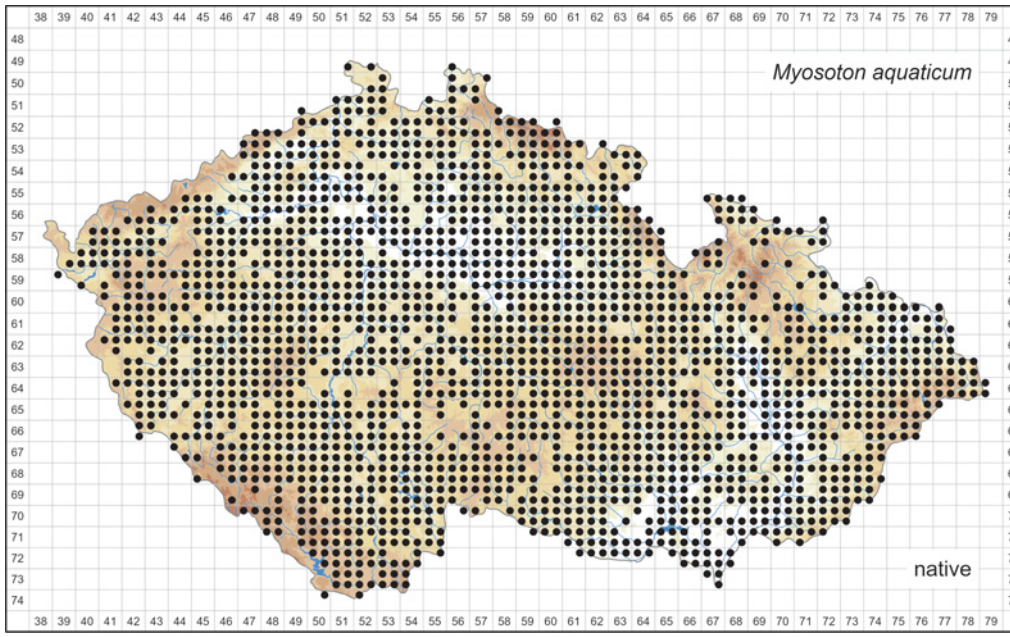



**Fig. 43.** Distribution of *Myosoton aquaticum* in the Czech Republic (1,987 occupied quadrants). Prepared by Jiří Danihelka & Zdeněk Kaplan.

While most occurrences of *M. aquaticum* are found at elevations below 700 m, the species reaches its upper elevational limits in the Malá kotlina glacial cirque in the Hrubý Jeseník Mts at ~1,200 m and near the village of Modrava in the Šumava Mts at ~1,137 m. However, some occurrences at high elevations are secondary and sometimes only temporary.

*Omphalodes scorpioides* (Fig. 44)

*Omphalodes scorpioides*, recently often classified in the monotypic genus *Memoremea* (e.g. POWO 2025), occurs in temperate parts of central and eastern Europe, extending from central Germany and Bavaria in the west through Poland and Ukraine as far as the Volga river and the Southern Ural in European Russia in the north-east. Southwards it reaches with isolated occurrences into northern Croatia, Romania, Crimea and Georgia (Meusel et al. 1978, Martynenko et al. 2008, Valdés & Raab-Straube 2011+). It is an early-flowering, myrmecochorous species with a life cycle intermediate between annual and biennial (Vörös et al. 2025). In the Czech Republic *O. scorpioides* grows in deciduous woodland habitats generally associated with the valleys of larger watercourses, particularly in floodplain and ravine forests. It prefers moderately dry to moist, neutral to basic, loose soils that are rich in nutrients and humus. In this country the species occurs mainly in the lowlands and adjacent river valleys. In Bohemia it occurs mainly in the Labe river basin and the successive valleys of its tributaries Vltava, Berounka and Otava, being rare elsewhere. The highest density of localities occurs in south-western and southernmost Moravia, while in the eastern and north-eastern parts of the Czech Republic only

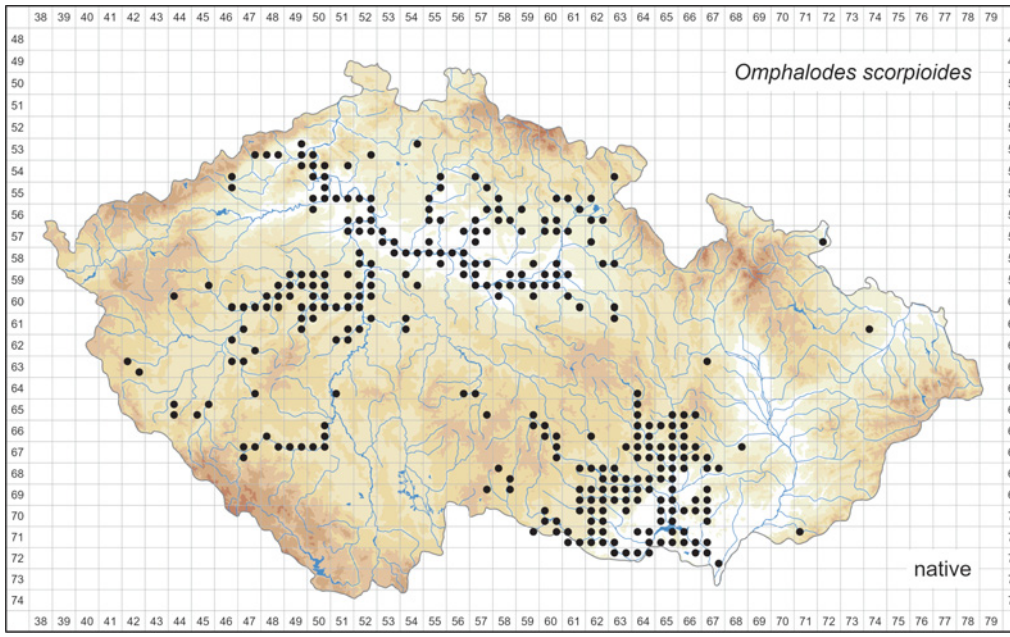



**Fig. 44.** Distribution of *Omphalodes scorpioides* in the Czech Republic (305 occupied quadrants). Prepared by Jan Prančl.

sporadic occurrences have been recorded. Isolated sites (e.g. in the foothills of the Český les hills in western Bohemia) are often found below hilltops with ruins of medieval castles; therefore, a secondary origin of such sites cannot be ruled out. At one of these localities, below the Přimda castle in western Bohemia, the species reaches its elevational maximum of 805 m. *Omphalodes scorpioides* is classified as lower risk – near threatened in this country (Grulich 2012).

*Omphalodes verna* (Fig. 45)

The small native range of *Omphalodes verna* includes the northern half of Italy, southernmost Austria, Slovenia and Croatia, with its distribution centre in the westernmost part of the Dinaric Alps, where it grows mainly in Illyrian beech forests. Some outposts are also reported from Montenegro, Albania and Romania (Meusel et al. 1978, Brus 2010). It is widely cultivated as an ornamental plant and occasionally escapes from cultivation, being reported as introduced from across central Europe, Switzerland, the United Kingdom, Norway, Sweden and Ukraine, as well as from Québec (Valdés & Raab-Straube 2011+, POWO 2025). In the Czech Republic *O. verna* escapes from cultivation particularly in parks, cemeteries, around garden allotments and cottage settlements. Although it may occasionally form local stands, usually only a few individuals are found escaped. The first indisputable escape in this country dates to 1897, when it was collected near the town of Kosmonosy in central Bohemia. There are also three earlier collections of the species (the oldest from 1856 from the vicinity of the town of Ledeč nad Sázavou in the Českomoravská vrchovina highlands), but it is not clear whether these plants were

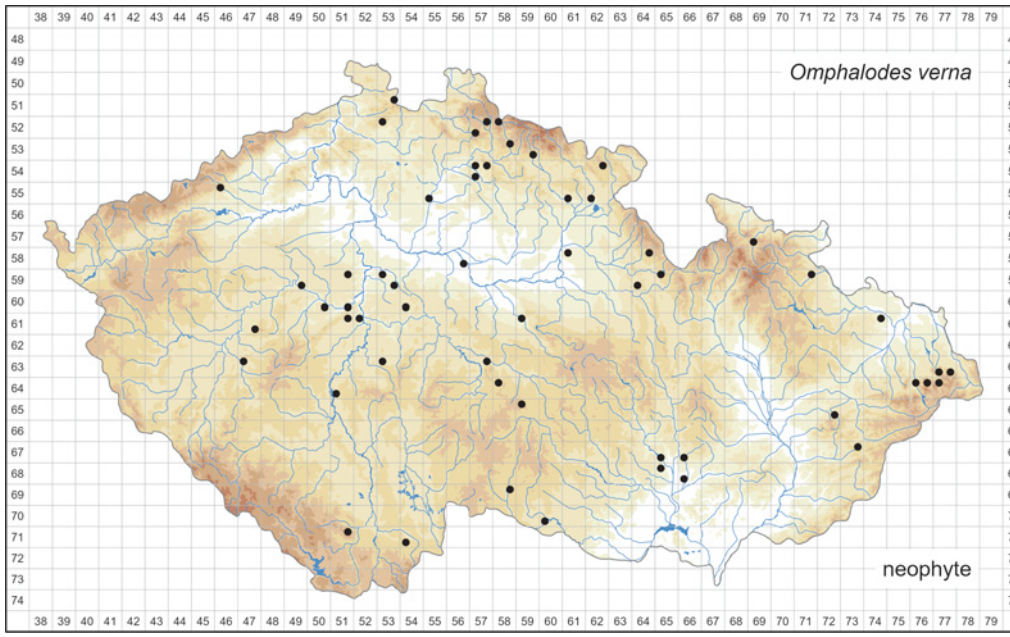



**Fig. 45.** Distribution of *Omphalodes verna* in the Czech Republic (55 occupied quadrants). Prepared by Jan Prančl.

escaped or cultivated. The species is currently not a common alien in the Czech Republic; however, the number of occurrences has recently increased, likely due to its more frequent cultivation. It is classified as a casual neophyte (Pyšek et al. 2022).

*Orchis mascula* (Figs 46–48)

The *Orchis mascula* group comprises several taxa often merged into a single species, *O. mascula*, though they are sometimes treated as separate species. Members of this group occur in western and southern Europe, the Caucasus Mts and the Middle East, reaching their northern limits along the Atlantic coast of Scandinavia and the southern coast of the Baltic Sea. Additionally, they have been reported to occur in northern Africa and the southern Ural Mts (Delforge 2006, Kreutz 2024, Kühn et al. 2024). Most of this range likely pertains to *O. mascula* subsp. *mascula* (Kühn et al. 2024), though assessing the distribution of individual taxa is difficult due to overlapping morphological variation and unresolved taxonomy. In the Czech Republic two representatives of the group are usually recognized at the subspecies level, namely subsp. *mascula* and subsp. *speciosa* (e.g. Kaplan 2019a, Průša 2019). A number of morphological characters are used to distinguish between them (Kubát 2010, Kaplan 2019a), yet individual plants often display intermediate features. The overlaps in morphological characters likely contribute to frequent misidentifications and complicate the identification of herbarium specimens. In western Europe both subspecies appear to be well differentiated, with the latter sometimes treated as a distinct species, *O. ovalis* (e.g. Delforge 2006, Dusak & Prat 2010, Kreutz 2024). In contrast, a broad zone of clinal transition exists between them in central

Europe, including the Czech Republic. The distribution maps of both subspecies were thus accompanied by a map of the species *O. mascula* (Fig. 46), encompassing all records assigned to particular subspecies, as well as additional records related to plants of unknown or uncertain infraspecific identity.

*Orchis mascula* subsp. *mascula* is distributed in Atlantic Europe, the western Mediterranean area and the western part of central Europe (Kreutz 2024, Kühn et al. 2024), but it may also occur in the Balkan Peninsula and elsewhere. In the Czech Republic it grows in semi-open broad-leaved forests, dry to mesophilous grasslands and low-intensity pastures. It has traditionally been reported from north-western Bohemia (Fig. 47), namely the Doupovské hory and the Krušné hory Mts (e.g. Kubát 2010, Průša 2019). However, local populations include individuals morphologically corresponding to both subsp. *mascula* and subsp. *speciosa*, as well as continuous transitional morphotypes (see also Průša 2025). Some plants exhibit characters typical of subsp. *mascula*, including leaves marked with large, dark brownish-red spots (similar to those of *O. provincialis* or *Dactylorhiza majalis*), which only exceptionally occur in subsp. *speciosa*. In this study, such populations were thus assigned to subsp. *mascula*, although their taxonomic identity remains unclear and warrants further study. About ten populations of this subspecies have been observed in recent years in the Czech Republic, where it is classified as critically endangered (Grulich 2012). Occasional reports of subsp. *mascula* have also come from other parts of the country. Some populations of *O. mascula* in northern and south-western Bohemia (mainly České středohoří Mts and Krkonoše Mts) may have experienced gene introgression from subsp. *mascula*, but most herbarium specimens from these

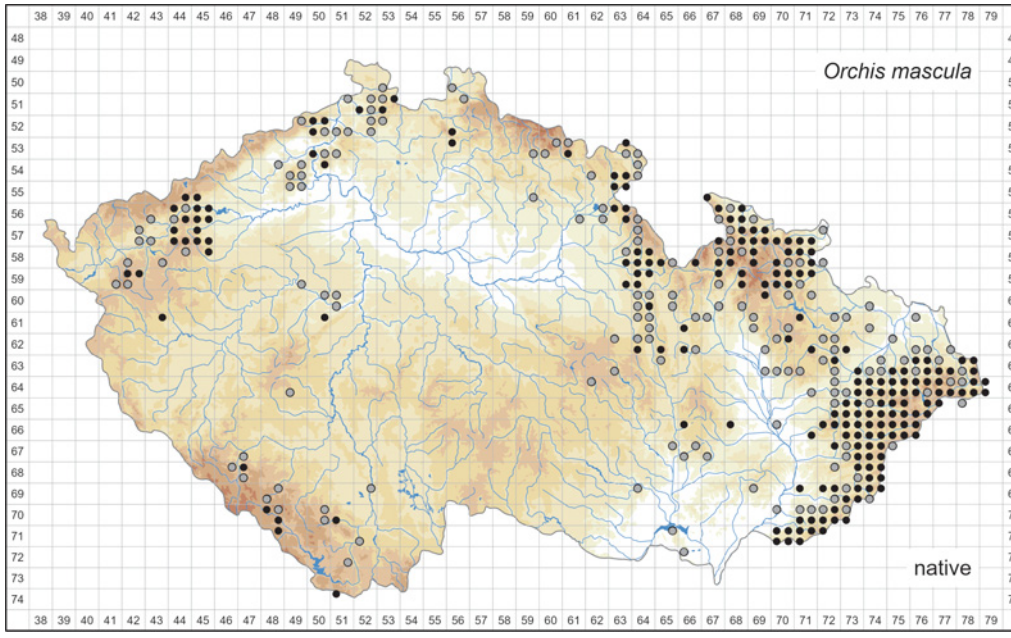



**Fig. 46.** Distribution of *Orchis mascula* in the Czech Republic: ● at least one record in 2000–2025 (203 quadrants), ● pre-2000 records only (163 quadrants). Prepared by Vojtěch Taraška.

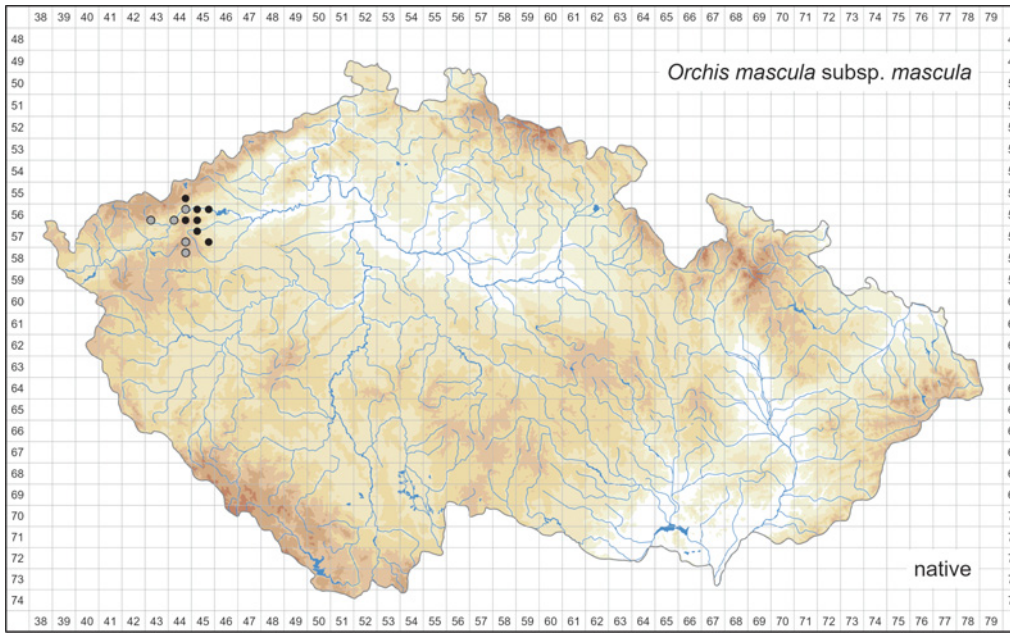



**Fig. 47.** Distribution of *Orchis mascula* subsp. *mascula* in the Czech Republic: ● at least one record in 2000–2025 (7 quadrants), ● pre-2000 records only (5 quadrants). Prepared by Vojtěch Taraška.

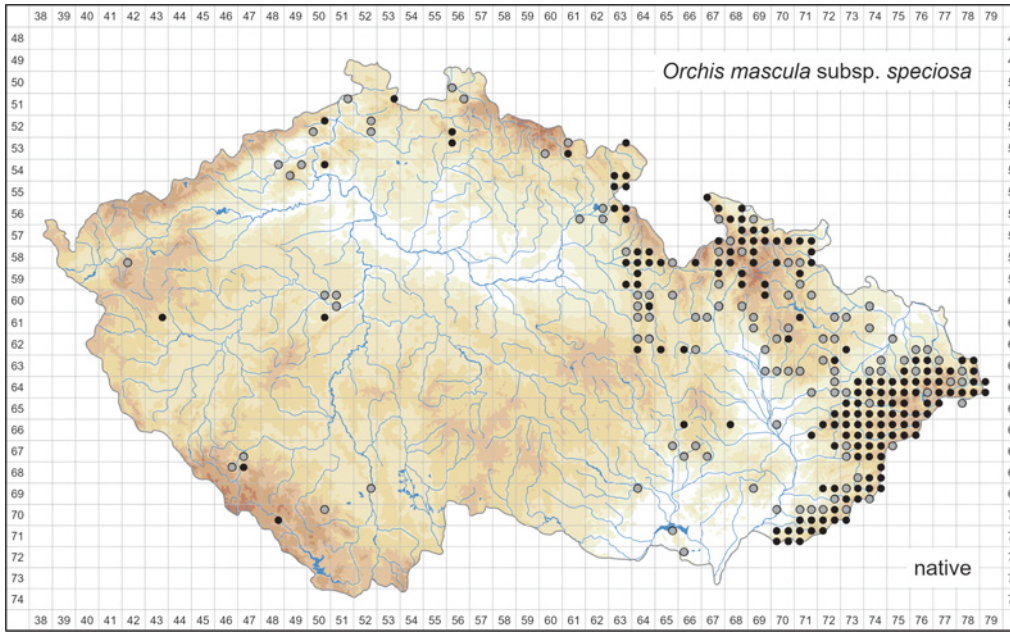



**Fig. 48.** Distribution of *Orchis mascula* subsp. *speciosa* in the Czech Republic: ● at least one record in 2000–2025 (162 quadrants), ● pre-2000 records only (105 quadrants). Prepared by Vojtěch Taraška.

areas can be unequivocally identified as subsp. *speciosa* and have been mapped accordingly. In contrast, records of subsp. *mascula* from Moravia and Silesia are almost certainly erroneous, likely resulting from an underestimation of the individual variation within subsp. *speciosa*.

*Orchis mascula* subsp. *speciosa* is known from a rather restricted area, including the Alps, Carpathians and adjacent parts of central Europe, extending into the northern Balkan Peninsula (Kreutz 2024, Kühn et al. 2024). It usually grows from middle elevations up to the alpine belt. In the Czech Republic this subspecies occupies a wide range of habitats, including broad-leaved forests, forest-steppes, dry to mesophilous meadows and low-intensity pastures. It prefers fresh soils with a neutral to slightly acidic reaction. This subspecies is rather common in the eastern (Carpathian) part of the country, while its frequency gradually decreases westwards (Fig. 48). It is locally scattered in the foothills of the Hrubý Jeseník, Rychlebské hory and Orlické hory Mts. Several populations have also been recorded from other parts of Bohemia, particularly the České středohoří Mts and Český kras karst area. However, it is now very rare in the western half of the Czech Republic, where most of its former occurrences disappeared. The subspecies is therefore classified as endangered (Grulich 2012).

*Orchis militaris* (Fig. 49)

*Orchis militaris* is a Euro-Siberian species. It is widespread in western and central Europe, extending to northern Spain, southern England, southern Sweden and southern Finland. It also occurs in the Mediterranean area, where it is restricted to the mountains

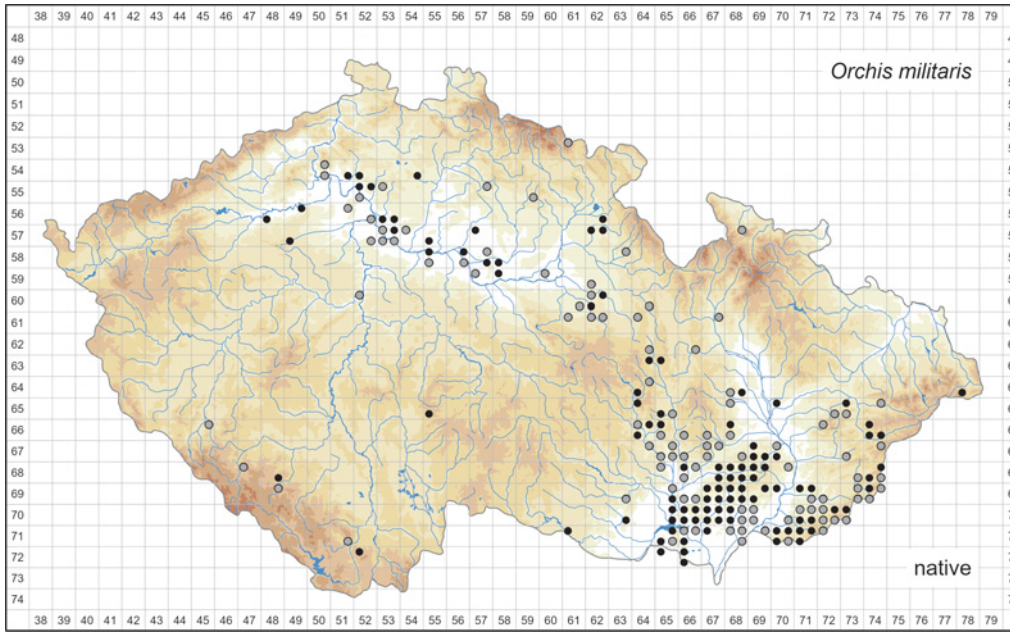



**Fig. 49.** Distribution of *Orchis militaris* in the Czech Republic: ● at least one record in 2000–2025 (104 quadrants), ● pre-2000 records only (98 quadrants). Prepared by Vojtěch Taraška.

and rare in the southernmost parts. The species' distribution stretches further through Ukraine, European Russia and southern Siberia, reaching Mongolia and China in the east. A somewhat isolated area of occurrence is in the Caucasus and Crimea (Delforge 2006, Kreutz 2024, Kühn et al. 2024). In the Czech Republic *O. militaris* occupies a variety of habitats, including open woodlands, scrub, dry grasslands, mesophilous meadows, and even dry patches within fens. It prefers moderately dry soils and basic, nutrient-poor substrates. Most of its occurrences in the Czech Republic are concentrated in areas with warm climates. The species is rarer in Bohemia, where it occurs particularly in its central and eastern parts, mainly in the Labe river basin. Several populations have also been recorded in limestone areas in southern Bohemia. Noteworthy past records exist from the Rýchory ridge in the Krkonoše Mts at elevations of almost 1,000 m. *Orchis militaris* is markedly more common in Moravia, particularly in its south-eastern part, including the Bílé Karpaty Mts and the hilly landscapes between the towns of Mikulov and Kroměříž. Additional occurrences are scattered along the eastern margin of the Českomoravská vrchovina highlands, in the Drahanská vrchovina highlands, the Hostýnské vrchy Mts and elsewhere. In recent decades, *O. militaris* has vanished from many of its earlier sites due to landscape changes, including fen drainage, inappropriate meadow management, afforestation, eutrophication and succession on abandoned grasslands. Extant populations are often small and spatially restricted, which makes them vulnerable to any habitat changes. The species is thus classified as endangered (Grulich 2012).

*Orchis pallens* (Fig. 50)

*Orchis pallens* occurs in the southern part of Europe, including the northern Iberian Peninsula, most of the Apennine and Balkan Peninsulas, the Alps and the Carpathian Mts. Its range extends eastwards to Crimea, the Caucasus Mts and Anatolia. The northern limit of its distribution passes through Germany, Poland and the Czech Republic (Delforge 2006, Kreutz 2024, Kühn et al. 2024). In the Czech Republic the species is usually confined to open woodlands, mainly beech, oak-hornbeam and ravine forests, but it can also be found in mesic meadows. It prefers fresh, base-rich, calcareous soils. The main area of its occurrence in the country is in the Carpathian Mts. It is most frequent in the Bílé Karpaty Mts, Středomoravské Karpaty Mts, Hostýnské vrchy Mts and their northern foothills, while only a few occurrences are known in the Moravskoslezské Beskydy Mts. The species is very rare in other parts of the Czech Republic, with only several isolated localities in non-Carpathian parts of Moravia, and in eastern, southern and western Bohemia. In woodland habitats *O. pallens* is threatened by inappropriate forest management such as large-area clear-cutting and changes in tree species composition. In meadows the main threats include afforestation, application of fertilizers and intensive grazing. The species vanished from many of its historical sites, and many of its populations declined in size over recent decades. It is thus classified as endangered (Grulich 2012).

*Orchis purpurea* (Fig. 51)

*Orchis purpurea* is distributed from the Mediterranean area in the south to central Europe in the north, and from the Atlantic coast in the west to the European Black Sea coast and western Anatolia in the east. The northern limit of its continuous distribution passes through the Czech Republic. Isolated outposts are found in Denmark, Algeria and Crimea

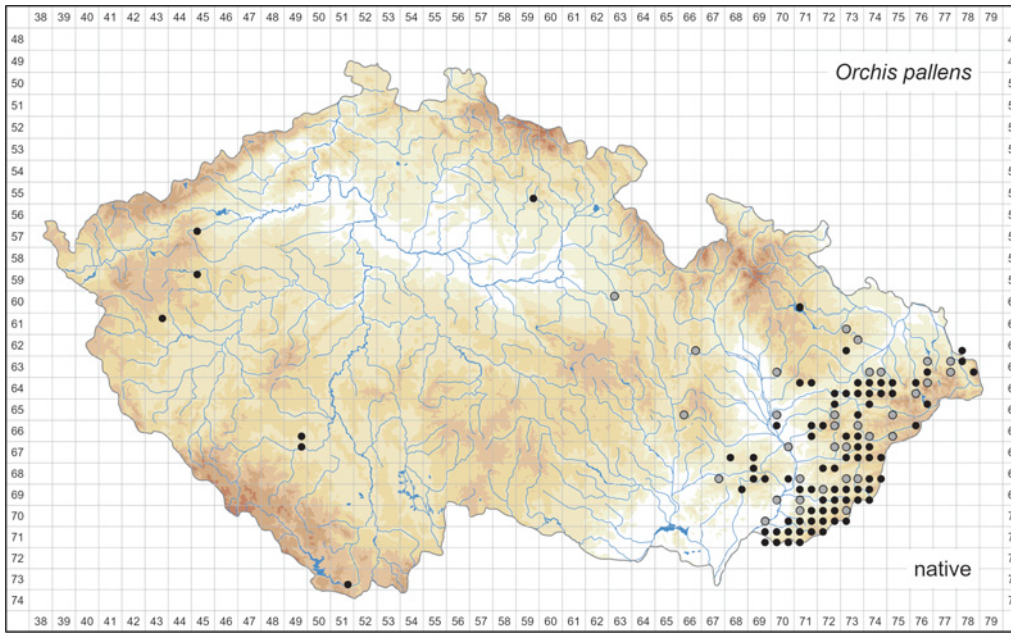



**Fig. 50.** Distribution of *Orchis pallens* in the Czech Republic: ● at least one record in 2000–2025 (84 quadrants), ● pre-2000 records only (33 quadrants). Prepared by Vojtěch Taraška.

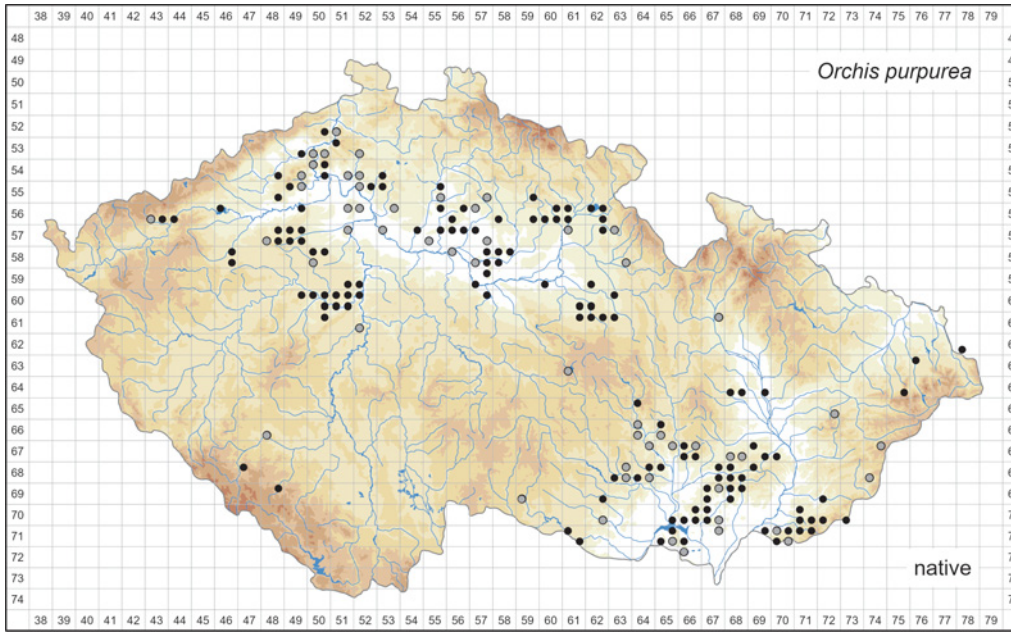



**Fig. 51.** Distribution of *Orchis purpurea* in the Czech Republic: ● at least one record in 2000–2025 (129 quadrants), ● pre-2000 records only (55 quadrants). Prepared by Vojtěch Taraška.

(Delforge 2006, Kreutz 2024, Kühn et al. 2024). Records from the Caucasus Mts and eastern Anatolia refer to the similar *O. caucasica*, which is sometimes classified as *O. purpurea* subsp. *caucasica* (e.g. Kühn et al. 2024). In the Czech Republic *O. purpurea* usually occurs in open thermophilous oak forests and forest-steppe vegetation, less frequently also in mesic deciduous forests and dry grasslands. The species prefers semi-shaded sites and moderately dry, humus-rich, calcareous soils. Its localities are concentrated in warm areas of the country, excluding lowland floodplains and large deforested areas with prevailing arable land. *Orchis purpurea* has been recorded in central and eastern Bohemia, the České středohoří Mts in north-western Bohemia and the Český kras karst area. Several isolated sites are known in southern Bohemia, where it grows on limestone, and in western Bohemia, where it usually occurs on volcanic bedrock. In Moravia the species is mainly reported from the hilly area around the city of Brno, extending north-west toward the town of Tišnov, in the Středomoravské Karpaty Mts, on the hills around the town of Mikulov and in the south-western half of the Bílé Karpaty Mts. Several populations are known near the city of Olomouc and in the foothills of the Moravskoslezské Beskydy Mts, where the species had not been recorded until recently. It remains unclear whether these populations originated from spontaneous spread or from deliberate planting. Although *O. purpurea* still occurs across the area of its past distribution in the Czech Republic, many of its populations have declined or become extirpated in recent decades due to inappropriate landscape management, habitat loss and, possibly, other environmental changes. It is thus classified as endangered in this country (Grulich 2012).

*Pleurospermum austriacum* (Fig. 52)

*Pleurospermum austriacum* is a European, predominantly montane species. Its distribution centre is situated in the Alps, Carpathians and the mountains of the Balkan Peninsula, where it extends to Montenegro, southern Serbia, northernmost North Macedonia and western Bulgaria (Vitosha). The northern half of the species' distribution consists of small outposts in the lower mountains, hilly areas or even lowlands, including the southern half of Germany, the Czech Republic, Poland (north to Pomerania) and Belarus up to Minsk; rare occurrences are also known from Estonia and south-eastern Sweden. Such sites are considered relics from the Late Glacial or the Preboreal (Hadač et al. 1967, Markowski & Chojnacki 1987, Hand 2011+, Teofilovski 2019). *Pleurospermum austriacum* is a monocarpic perennial growing almost exclusively on basic bedrock. In the Czech Republic the occurrences of the species at elevations above 1,000 m are limited to a few localities in the Krkonoše and Hrubý Jeseník Mts. It grows there mainly on debris cones, rock outcrops and slope subalpine grasslands, mostly in glacial cirques. Recently, its occurrence has been confirmed at only five sites in the Krkonoše Mts and three in the Hrubý Jeseník Mts. Most of the occurrences in this country are of a dealpine nature. At lower elevations, the species is known from various habitats, including humus-rich open-canopy forests and their fringes, rock outcrops and stream banks in forest valleys and ravines, landslide areas. In rather warm areas it usually grows on north-facing slopes. In this country the species is most frequent in the Bílé Karpaty Mts in south-eastern Moravia. Localities in the valley of the Jizera river and its tributary Kamenice in northern Bohemia, as well as around the town of Jeseník in northern Moravia, are probably related

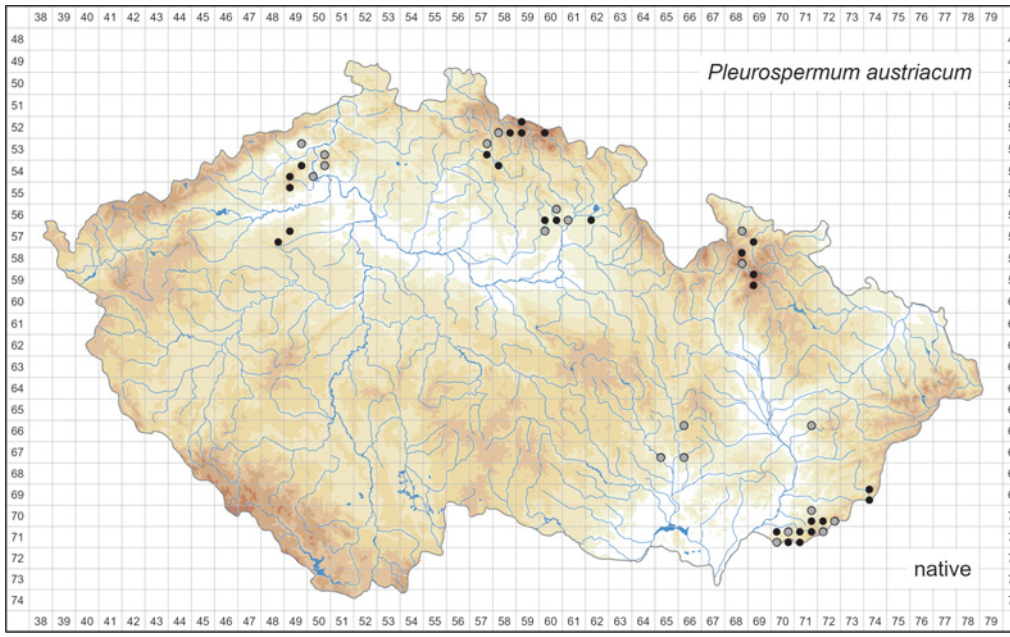



**Fig. 52.** Distribution of *Pleurospermum austriacum* in the Czech Republic: ● at least one record in 2000–2025 (27 quadrants), ● pre-2000 records only (20 quadrants). Prepared by Jan Prančl.

to the occurrences in the Krkonoše and Hrubý Jeseník Mts. Scattered occurrences are known in the České středohoří Mts, the Džbán hills and around the town of Jaroměř in eastern Bohemia; in the past, also around the city of Brno and near the village of Jankovice in eastern Moravia. The elevations range between 270 and ~1,350 m. *Pleurospermum austriacum* is classified as endangered (Grulich 2012). It is threatened by forestry practices leading to the retreat of open-canopy forests as well as by climate change and associated successional changes; in the Hrubý Jeseník Mts it suffers from grazing by introduced chamois (Bureš 2022). Many populations consist of only a few individuals, which often remain sterile; such populations have poor prospects, as the species propagates exclusively through sexual reproduction and most seeds are unable to germinate for more than 1–2 years after their formation (Markowski & Chojnacki 1987).

*Potamogeton acutifolius* (Fig. 53)

*Potamogeton acutifolius* is most frequent in western-central Europe. Its range extends westwards to the southern half of England and central France, northwards to central Sweden, southwards to northern Italy, Croatia, Serbia and Romania, and eastwards, with highly disjunct occurrences, to the central part of European Russia. A single isolated outpost is in north-western Anatolia (Hultén & Fries 1986, Kaplan 2010b, Aykurt et al. 2016). Records from more eastern Asian territories (e.g. in Altay, POWO 2025) are erroneous. In the Czech Republic *P. acutifolius* mainly occurs in fishponds and rarely in irrigation ditches, oxbow lakes, wetland pools and clay pit ponds, in mesotrophic to slightly eutrophic, mineral-rich water over sandy, clayey or muddy bottoms, sometimes with

a thin layer of sapropel. The species often appears as a component of pioneer vegetation in newly established or restored wetlands and following fishpond desilting or summer drainage. However, it rapidly disappears during subsequent succession, sedimentation, eutrophication, increased water turbidity, the spread of more competitive macrophytes or introduction of fish stock (Šumberová & Hrivnák 2011). Most records of *P. acutifolius* in this country come from fishpond landscapes in south-western, southern and eastern Bohemia. Scattered occurrences have also been reported from north-central Bohemia and north-eastern Moravia and adjacent Silesia. Elsewhere it is rare or absent, particularly in the mountains and large areas in western and south-central Bohemia and in most of Moravia. From the peak of fishpond construction in the 15th and 16th centuries until the intensification of fishpond management in the second half of the 20th century, this species was probably more common than today, and its occurrence at individual sites may have been more persistent. However, numerous populations in fishponds have been extirpated due to eutrophication, silting, increased water turbidity and the elimination of regular summer drainage. Some observations from recent decades refer only to individual plants or temporary occurrences limited to a single growing season. Natural occurrences in oxbow lakes along the middle courses of the Labe and Morava rivers disappeared long ago, probably due to disruption of regular flood dynamics following the channelization of these rivers in the first half of the 20th century. *Potamogeton acutifolius* is therefore classified as vulnerable (Grulich 2012). Because of occasional misidentifications of broad-leaved specimens of *P. berchtoldii* as *P. acutifolius*, the map is based mainly on examined herbarium specimens.

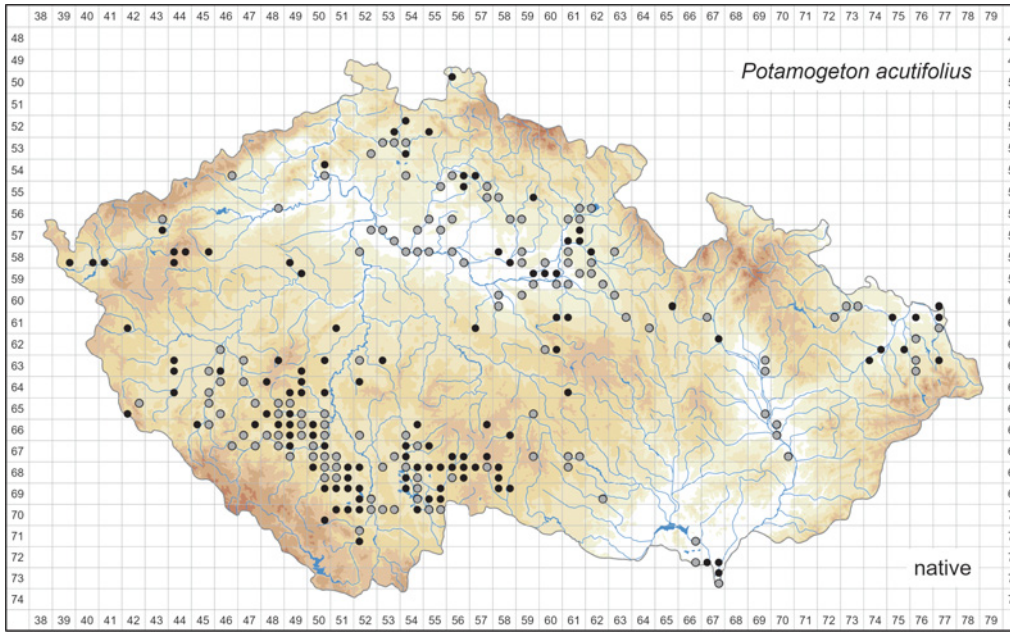



**Fig. 53.** Distribution of *Potamogeton acutifolius* in the Czech Republic: ● at least one record in 2000–2025 (115 quadrants), ● pre-2000 records only (130 quadrants). Prepared by Zdeněk Kaplan.

*Potamogeton alpinus* (Fig. 54)

*Potamogeton alpinus* is distributed mainly in boreal and temperate zones in Eurasia and North America, being confined to mountains in the southern parts of its range. In Europe its range extends northwards to Iceland and northern Scandinavia, and southwards to the southern foothills of the Alps, northern Slovakia, northern Ukraine and the central part of European Russia, with outposts in the eastern Pyrenees and mountains of the Balkan Peninsula. In Asia the species extends approximately between 50°N and 70°N through Siberia as far as the Russian Far East, southwards to central Asia, north-eastern China, the Korean Peninsula and Japan, with outposts in the Caucasus Mts (Hultén & Fries 1986, Kaplan 2010b, Kaplan unpubl.). In North America the species is distributed from the Aleutian Islands and Alaska in the west to Labrador and Newfoundland in the east, and to approximately 40°N in the south, and it also occurs in south-western Greenland (Haynes & Hellquist 2000). In the Czech Republic *P. alpinus* occurs in clear-water ponds, pools in wetlands, shallow pools in abandoned sand pits, peat-cutting pools, oxbow lakes, drainage ditches and montane and submontane streams. It grows in oligotrophic to mesotrophic or dystrophic, mineral-poor, clear, cold, standing or running waters, often with a gravelly or stony bottom, sometimes covered with a layer of peat or sapropelic mud, in sunny or semi-shaded places. The species has been recorded mainly at middle elevations and in low mountains in western and northern Bohemia, in the Šumava Mts, in the Českomoravská vrchovina highlands and locally also in eastern Bohemia. In the past, there were also numerous populations in south-western Bohemia and the fishpond basins in southern Bohemia, where the species has already disappeared. Elsewhere in Bohemia

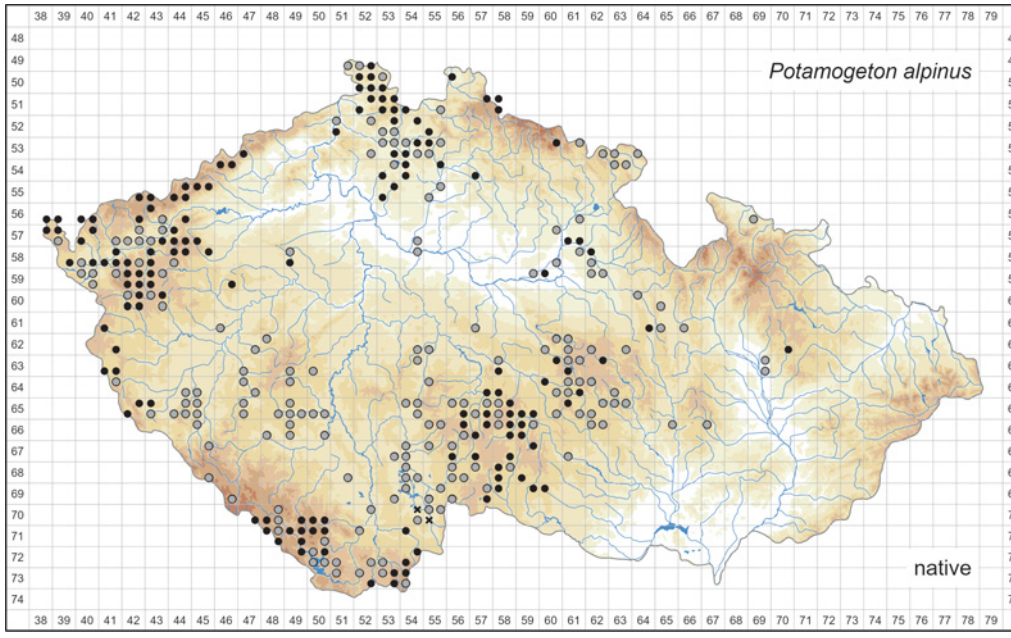



**Fig. 54.** Distribution of *Potamogeton alpinus* in the Czech Republic: ● at least one record in 2000–2025 (149 quadrants), ● pre-2000 records only (179 quadrants), × deliberate introductions only (2 quadrants). Prepared by Zdeněk Kaplan.

as well as in Moravia it has always been rare or absent. *Potamogeton alpinus* has declined due to eutrophication, intensification of fishpond management and increased water turbidity, and has been extirpated from most sites in lowlands as well as large areas at middle elevations. It is therefore classified as endangered (Grulich 2012). The map is based mainly on examined herbarium specimens.

*Potamogeton berchtoldii* (Fig. 55)

*Potamogeton berchtoldii* is distributed across the boreal and temperate zones of the Northern Hemisphere. It is widespread in Europe except for the southern Iberian Peninsula, southern Greece and most of the Mediterranean islands including the Balearic Islands, Malta and Crete. In Asia it mainly occurs in southern Siberia, extending northwards to 63°N (rarely beyond the Polar Circle), eastwards to Chukotka and Kamchatka, and southwards to central Asia, Mongolia, China and Japan; outposts are found in Turkey, Lebanon, the Caucasus Mts, Iran, Iraq, Afghanistan, northern India and Bhutan (Hultén & Fries 1986, Kashina 1988, Kaplan 2010b, Kaplan unpubl.). In North America the species is distributed across most of Canada and the USA, being rare in or absent from their central and southern parts, and only rarely extending southwards to northern Mexico (Haynes & Hellquist 2000 as *P. pusillus* subsp. *tenuissimus*, Kaplan unpubl.). Records from South America are erroneous. In the Czech Republic *P. berchtoldii* grows in ponds, shallow pools in wetlands including those in peaty sand pits and abandoned stone quarries, in meadow ditches, streams and rivers. It prefers mesotrophic to slightly dystrophic, acidic, calcium-poor, cold, standing or running waters on a sandy or gravelly

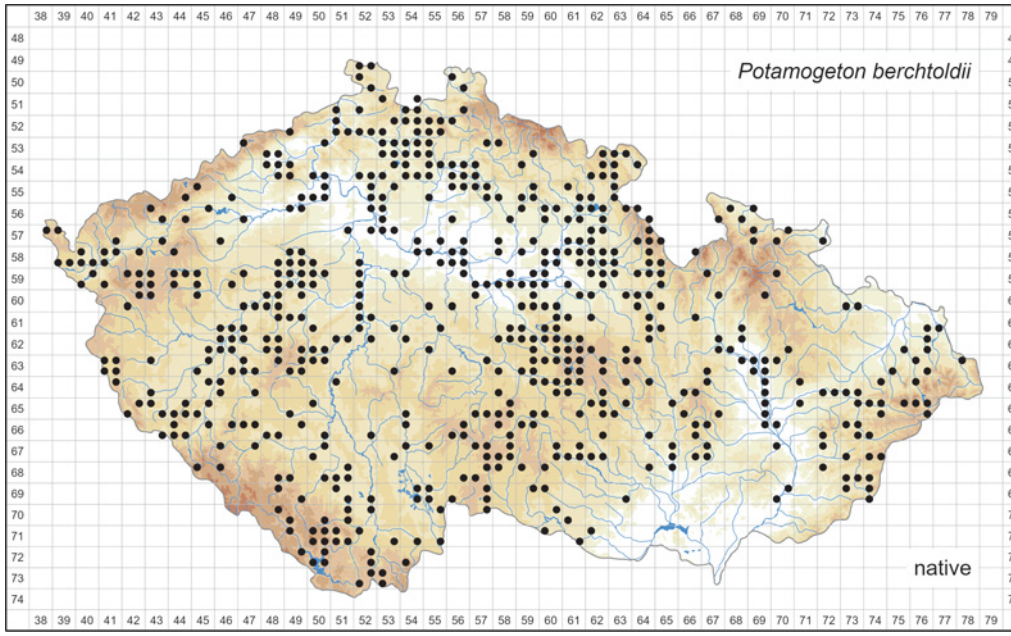



**Fig. 55.** Distribution of *Potamogeton berchtoldii* in the Czech Republic (607 occupied quadrants). Prepared by Zdeněk Kaplan.

bottom often covered with sapropelic mud, while avoiding calcium-rich, turbid, warm waters. The species is mostly found in sunny places but tolerates semi-shaded habitats and is therefore able to grow in forest brooks, pools and ponds. *Potamogeton berchtoldii* is scattered across Bohemia, being most frequent at middle elevations in landscapes on acidic bedrock with numerous ponds and large forest patches with wetlands. In contrast, it is rare in or absent from areas with mineral-rich soils, as evidenced by its absence in most of southern Moravia. It is also absent from high mountains that lack suitable habitats. Due to frequent confusion, mainly with the similar *P. pusillus*, the map is based exclusively on examined herbarium specimens.

*Potamogeton coloratus* (Fig. 56)

*Potamogeton coloratus* occurs mainly in western Europe, particularly in the British Isles, northern France, Belgium, the Netherlands, Germany and Switzerland, extending eastwards to southernmost Sweden, Denmark, the Czech Republic and north-western Hungary. In the Mediterranean area it is scattered to rare in the Iberian, Italian and Balkan Peninsulas, the Balearic Islands, Corsica, Sardinia, Cyprus and western Anatolia. Isolated outposts occur on the Swedish island of Gotland, in southern Azerbaijan, in north-eastern Morocco and northern Algeria (Hultén & Fries 1986, Kaplan 2010b, Kaplan unpubl.). In the Czech Republic *P. coloratus* grows in pools and ditches in calcareous fens with clear, mesotrophic water and mineral-rich, basic, organic substrate. It has been recorded at only four lowland sites in the middle Labe river basin in central Bohemia. At three of these sites, the species was extirpated more than a century ago. The population at its last locality, the

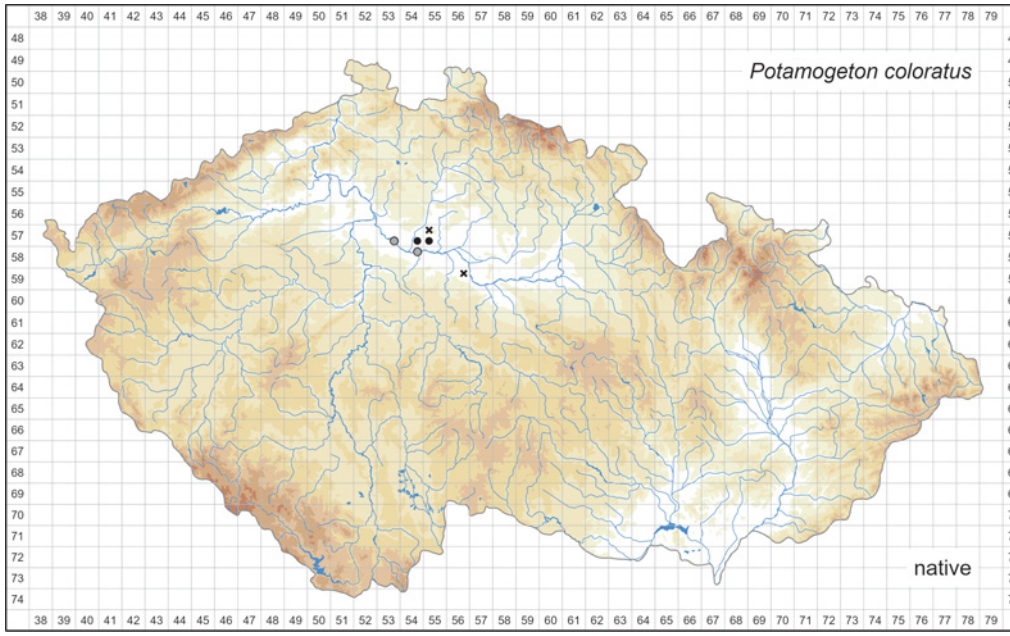



**Fig. 56.** Distribution of *Potamogeton coloratus* in the Czech Republic: ● at least one record in 2000–2025 (2 quadrants), ◍ pre-2000 records only (2 quadrants), × deliberate introductions only (2 quadrants). Prepared by Zdeněk Kaplan.

Hrabanovská černava fen, gradually declined due to habitat degradation, including progressive eutrophication from surrounding agriculture, an altered water regime, the accumulation of toxic substrate and accelerated succession. The species was last observed there in 1977 and subsequently classified as missing (Holub et al. 1979) or nationally extinct in this country (Holub & Procházka 2000). However, the population was successfully restored in 2008 from the local dormant soil seed bank in a nature conservation project that included desilting the pool where the species had last grown and establishing a new pool nearby (Kaplan et al. 2014). At present, the species thrives in several artificial pools within the Hrabanovská černava National Nature Reserve. *Potamogeton coloratus* is currently classified as critically threatened because of its rarity (Grulich 2012). In 2011–2022 it was introduced for conservation purposes into four newly established shallow pools in the wider vicinity of this reserve, all located in the middle Labe river basin.

*Potamogeton compressus* (Fig. 57)

*Potamogeton compressus* is distributed in the boreal and temperate zones in Eurasia. In Europe it occurs mainly in its northern half, excluding Iceland, Ireland and Svalbard; its southern limit runs through France, Switzerland, Austria, northern Slovakia, northern Ukraine and the central part of European Russia. In Asia its range continues east of the Ural Mts in southern Siberia approximately between 50°N and 63°N, extending eastwards as far as the Kamchatka Peninsula, with outposts in China and Japan (Hultén & Fries 1986 as *P. zosterifolius* subsp. *zosterifolius*, Kashina 1988, Kaplan 2010b, Kaplan unpubl.). In North America *P. compressus* is replaced by a similar vicariant species,

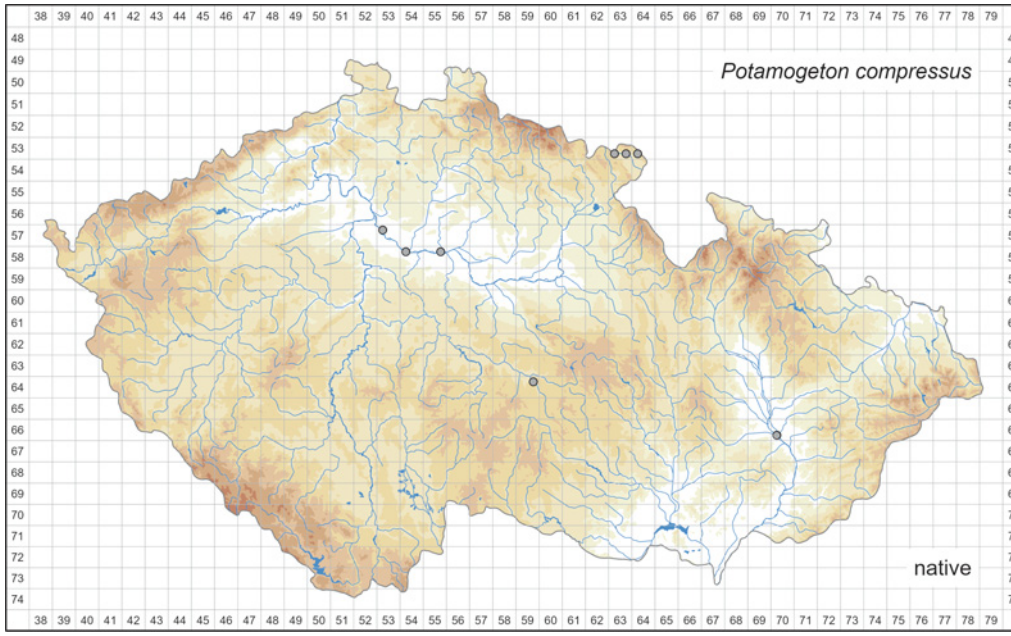



**Fig. 57.** Distribution of *Potamogeton compressus* in the Czech Republic: ● pre-2000 records only (8 quadrants). Prepared by Zdeněk Kaplan.

*P. zosteriformis* (Kaplan & Marhold 2012). In the Czech Republic *P. compressus* has been recorded in ponds, oxbow lakes and meadow ditches. It was documented at a dozen sites in central and eastern Bohemia, where it was last observed in 1953, and at the town of Kroměříž in central Moravia, sometime in the late 19th century. It is therefore classified as nationally extinct (Grulich 2012). Because of the difficult delimitation of *P. compressus* from *P. acutifolius*, particularly in a vegetative state, the map is based solely on examined herbarium specimens.

*Potamogeton crispus* (Fig. 58)

*Potamogeton crispus* is native to temperate and subtropical regions of the Old World, but its distribution is markedly uneven. It is most frequent in Europe, extending northwards to 62°N. In Asia it is much less common, occurring mainly in southern Siberia and extending southwards to Israel, Iraq, Iran, Pakistan, India, Bangladesh, Thailand, Laos, southern China and Taiwan, and eastwards as far as Japan and Primorsky Krai in the Russian Far East. The species is rare in Africa, being found mainly in its northern and southern parts. In Australia it occurs predominantly along the south-eastern and eastern coasts (Meusel et al. 1965, Hultén & Fries 1986, Kaplan unpubl.). *Potamogeton crispus* has been introduced into and become widely naturalized in New Zealand and North America, whereas only rare and temporary introductions have been recorded in South America, namely in Colombia and Argentina (Haynes & Hellquist 2000, Haynes & Holm-Nielsen 2003). In the Czech Republic *P. crispus* occurs in a wide range of aquatic habitats including fishponds, village ponds, shallow water reservoirs, lakes in abandoned quarries and

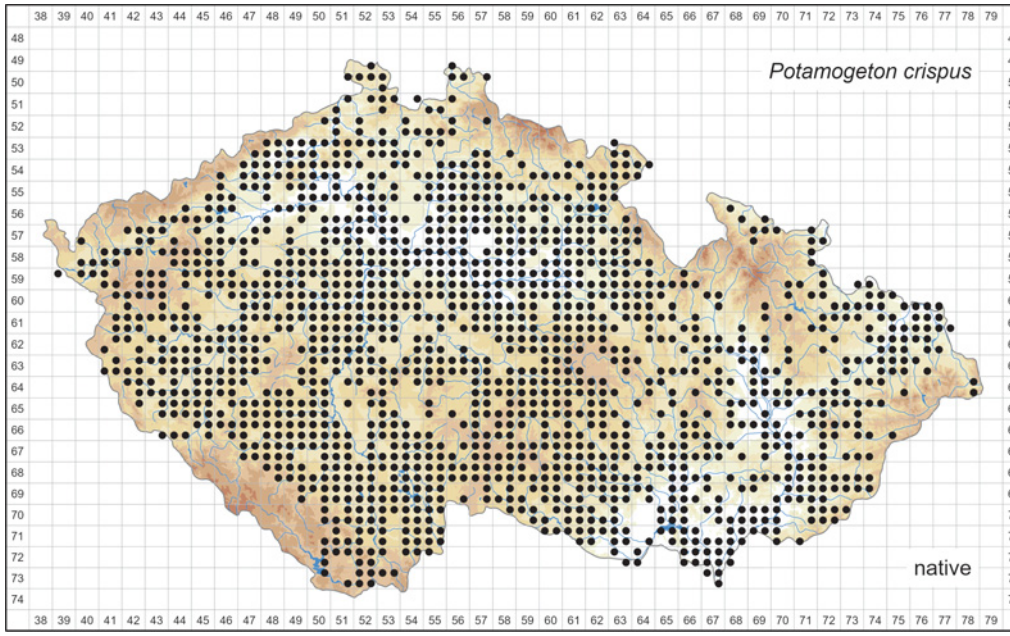



**Fig. 58.** Distribution of *Potamogeton crispus* in the Czech Republic (1,506 occupied quadrants). Prepared by Zdeněk Kaplan.

sand pits, clay pit ponds, irrigation ditches, millraces, streams, lower and middle courses of rivers, and oxbow lakes. It grows in mesotrophic to eutrophic, standing to fast-running waters on clayey, sandy or gravelly substrate often covered with a thick layer of organic mud. The species tolerates hypertrophic, turbid and polluted water as well as algal bloom (Šumberová 2011a). Under optimal conditions it can form large dense stands. *Potamogeton crispus* is widespread across this country except in the mountains and in small areas without suitable habitats.

*Potamogeton friesii* (Fig. 59)

*Potamogeton friesii* has a widely uneven and disjunct distribution in the boreal-temperate regions of the Northern Hemisphere. It is mainly distributed in northern-central Europe, southern Fennoscandia and the British Isles, although even there it is not frequent; rare occurrences reach northern Scandinavia and the northern part of European Russia, the southern limit of distribution runs through the Alps, southern Poland, northern Ukraine and the central part of European Russia; further south there are only rare, isolated populations in Montenegro and eastern Romania. In Asia it is found in southern Siberia, approximately between 50°N and 65°N, and in Kamchatka (Hultén & Fries 1986, Kashina 1988, Kaplan 2010b, Kaplan unpubl.). In North America the species is distributed in western Canada and along the border between Canada and the USA (Haynes & Hellquist 2000). In the Czech Republic *P. friesii* grew in ponds, shallow water reservoirs and oxbow lakes with mesotrophic, clear, cold, standing waters and a clayey or gravelly bottom with a shallow layer of mud. It was found in early successional stages of aquatic habitats with

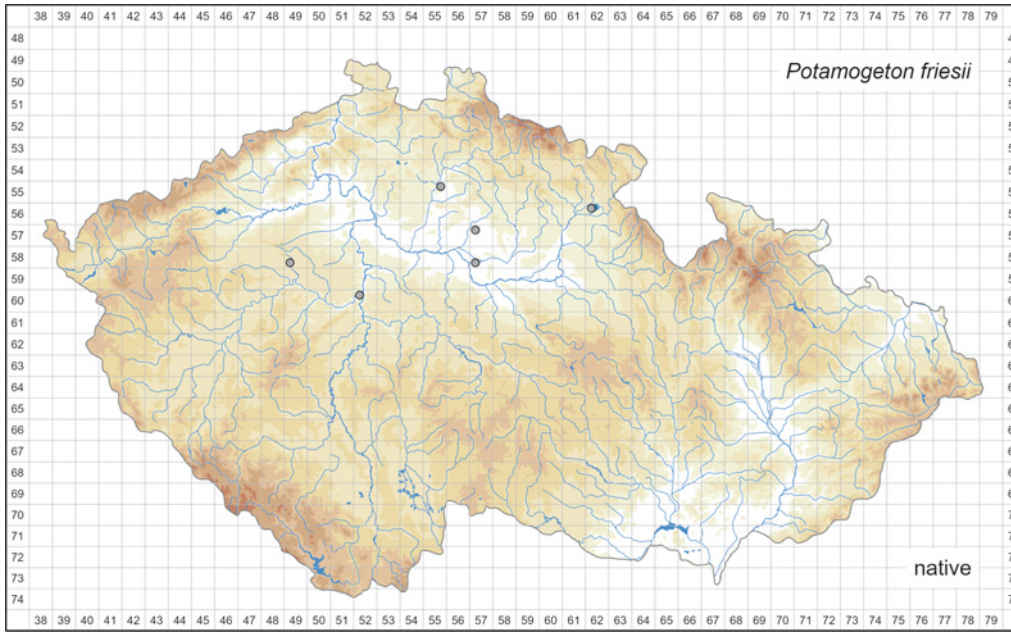



**Fig. 59.** Distribution of *Potamogeton friesii* in the Czech Republic: ◍ pre-2000 records only (6 quadrants). Prepared by Zdeněk Kaplan.

clear water, and most if not all occurrences in this country were temporary. The species has been documented at only six sites in central and eastern Bohemia, and it was last observed in 1989. It is therefore classified as missing in this country (Grulich 2012). Because of occasional confusion with other linear-leaved *Potamogeton* species, the map is based solely on examined herbarium specimens.

*Potamogeton gramineus* (Fig. 60)

*Potamogeton gramineus* is distributed mainly in the boreal and temperate zones of the Northern Hemisphere, with an uneven distribution. It occurs across most of Europe from Iceland and northern Fennoscandia in the north almost continuously to central France, the Alps, Hungary, southern Ukraine and the central part of European Russia in the south. However, it is markedly rare in southern Europe including the Iberian, Italian and Balkan Peninsulas. In Asia it is found approximately between 45°N and the Polar Circle mainly in Siberia (rarely up to 73°N) and in adjacent areas including northern Kazakhstan and northern Mongolia, extending eastwards as far as the Kamchatka Peninsula and the Kuril Islands. Disjunct occurrences are found in more southern regions between Anatolia and the Caucasus Mts in the west through central Asia and China as far as northern Japan (Hultén & Fries 1986, Kashina 1988, Kaplan unpubl.). In North America the species is widespread from Alaska in the west to Newfoundland and Labrador in the east, extending southwards to approximately 34°N, and also occurs in southern Greenland (Haynes & Hellquist 2000). In the Czech Republic *P. gramineus* is almost entirely restricted to low-stocked or abandoned fishponds with mesotrophic to slightly eutrophic, clear, shallow

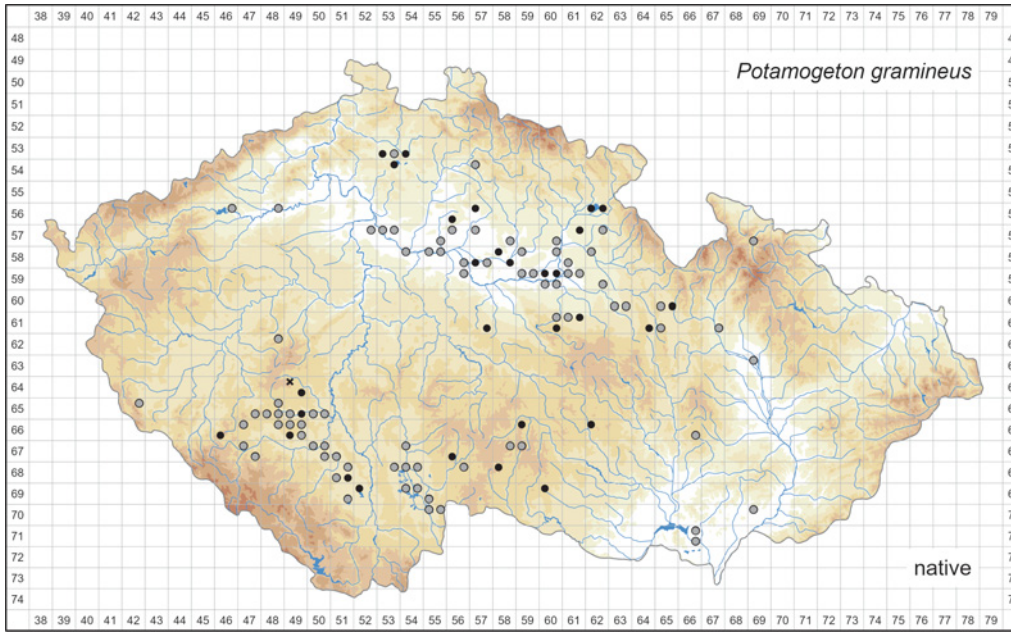



**Fig. 60.** Distribution of *Potamogeton gramineus* in the Czech Republic: ● at least one record in 2000–2025 (29 quadrants), ● pre-2000 records only (78 quadrants), × deliberate introductions only (1 quadrant). Prepared by Zdeněk Kaplan.

water and a muddy bottom. It prefers early successional stages when enough nutrients are available but the water is not yet turbid or affected by massive algal development. In advanced stages of terrestrialization, with eutrophication, the accumulation of sapropelic mud or other organic silts on the bottom and the spread of more competitive macrophytes, it usually disappears. This species may temporarily emerge from the soil seed bank in ponds filled after desilting but then disappears after the fish stock is introduced. Rarely it has been recorded in other water reservoirs, pools in wetlands, oxbow lakes and rivers. It is well adapted to periodic fluctuations in water level and tolerates exposure of the bottom as long as the substrate remains wet. Most of the occurrences in this country are confined to fishpond landscapes in southern Bohemia and the middle and eastern parts of the Labe river basin and in the adjacent hilly areas; about a dozen sites have been recorded in the Českomoravská vrchovina highlands. Elsewhere in Bohemia it has been rare or absent. In Moravia only several occurrences have been recorded, all of which have been extirpated. Both genotypes identified in *P. gramineus* (Kaplan & Fehrer 2006, 2007, 2011, Aykurt et al. 2020) occur in the Czech Republic. The more widespread genotype 1 is also more frequent in this country, whereas genotype 2, confined to central and southern Europe and Anatolia, has been detected mainly in eastern Bohemia, with a few isolated sites elsewhere. The species has markedly declined during the second half of the 20th century due to changes in fishpond management, particularly its intensification, excessive fertilization of fishponds, elimination of regular summer drainage and destruction of shallow littorals. In addition, some observations from recent decades refer to small populations or only temporary occurrences. *Potamogeton gramineus* is therefore classified as critically threatened (Grulich 2012). The species thrives in shallow pools dug out in reed stands or other wetlands, as well as in desilted ponds left without fish stocks, and a few populations have recently been restored in this way as part of conservation measures. Because of occasional misidentifications, the map is based almost exclusively on examined herbarium specimens.

*Potamogeton lucens* (Fig. 61)

*Potamogeton lucens* is mainly distributed in the temperate zone of Europe and the western half of Asia. In Europe it is absent from the northernmost regions, most of the Iberian Peninsula and some other parts of the Mediterranean area. In Asia it is scattered to rare in the western and middle parts of southern Siberia, while additional markedly disjunct occurrences are found from south-western Asia and the Caucasus Mts in the west through central Asia, northern India to China, the Amur river basin in Russia, and Japan. Particularly isolated outposts are in the Philippines and the Mariana Islands. In Africa *P. lucens* is documented only from several sites in the northernmost and eastern parts of the continent (Meusel et al. 1965, Hultén & Fries 1986, Kashina 1988, Kaplan unpubl.). Records from other parts of Africa are erroneous, generally based on misidentifications of *P. schweinfurthii*, whereas those from the Americas refer to *P. illinoensis*. In the Czech Republic *P. lucens* occurs mainly in fishponds, less frequently in other shallow water reservoirs, flooded sand pits and oxbow lakes, and only rarely in lowland rivers. It is mostly found in mesotrophic to slightly eutrophic, mineral-rich, clear waters with a clayey to gravelly bottom, often covered with a layer of organic mud. The species primarily occurs in fishpond landscapes of southern, northern and eastern Bohemia, and in north-eastern

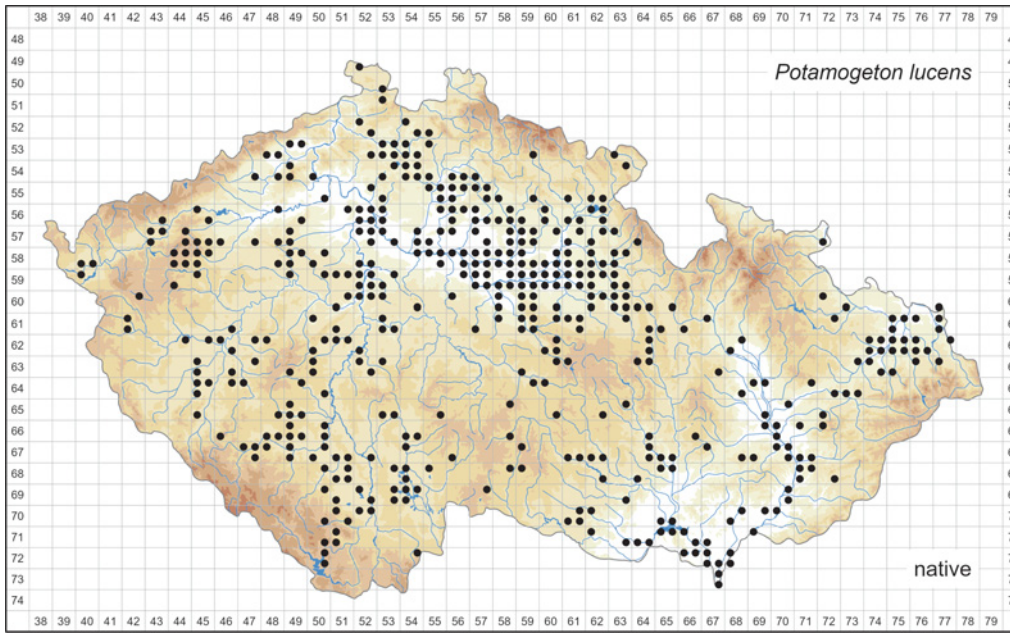



**Fig. 61.** Distribution of *Potamogeton lucens* in the Czech Republic (470 occupied quadrants). Prepared by Zdeněk Kaplan.

Moravia. Additional groups of localities are in some parts of western and central Bohemia, and southern Moravia, while isolated populations are scattered elsewhere except in the mountains. Numerous populations have disappeared, mainly due to intensification of fishpond management and increase in water turbidity, and *P. lucens* is therefore classified as vulnerable (Grulich 2012).

*Potamogeton natans* (Fig. 62)

*Potamogeton natans* is mainly distributed in the boreal and temperate zones of the Northern Hemisphere. It is widespread in Europe, being absent only from Svalbard in the north, and from the southern half of Spain, southern Greece and most of the Mediterranean islands in the south. In Asia it occurs mainly in southern Siberia, extending eastwards as far as the Kamchatka Peninsula and southwards to Afghanistan, northern India, Nepal, Mongolia, China, the Korean Peninsula and Japan; the species also occurs in south-western Asia from Turkey through Armenia to Azerbaijan, where its occurrences are linked to the distribution in south-eastern Europe (Hultén & Fries 1986, Kaplan 2010b, Kaplan unpubl.). In Africa the occurrence of *P. natans* is reliably documented from the Atlas Mts in Morocco, whereas numerous other records from this continent are based on misidentifications of other species, mainly *P. nodosus* and *P. richardii* (Kaplan unpubl.). In North America it occurs from Alaska in the west through southern Canada as far as Newfoundland in the east, extending southwards across much of the USA to north-western Mexico (Haynes & Hellquist 2000). In the Czech Republic *P. natans* represents a sub-Boreal geoelement (Kaplan 2017). It occurs in fishponds, pools in wetlands, lakes in clay and

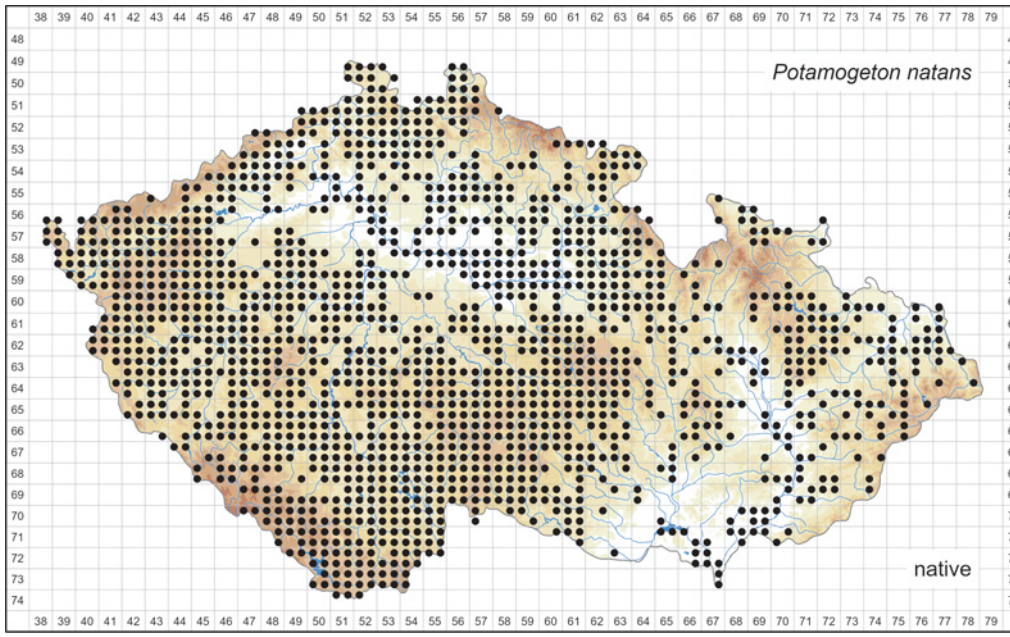



**Fig. 62.** Distribution of *Potamogeton natans* in the Czech Republic (1,552 occupied quadrants). Prepared by Zdeněk Kaplan.

sand pits, wetlands in abandoned quarries, oxbow lakes, irrigation ditches, peat-cutting pools, streams and lower and middle courses of rivers. It is most frequent in mesotrophic to eutrophic waters with muddy bottoms, but also tolerates dystrophic water over peat substrate as well as water bodies on clayey, sandy and gravelly substrates, often with admixed undecomposed organic detritus. The species prefers sunny sites but tolerates semi-shaded places, which is why its stands belong to the most frequent aquatic vegetation in forest ponds (Šumberová 2011b). Under favourable conditions it forms extensive monodominant stands. It is adapted to significant drops in water levels and survives summer drainage of fishponds in terrestrial forms with shortened stems, unless the substrate dries out completely. *Potamogeton natans* is widespread in this country, although its frequency across the landscape is uneven, being most common in fishpond landscapes. In contrast, it is rare in or absent from high mountains and locally from dry and agricultural lowland landscapes in north-western and central Bohemia and particularly in southern Moravia.

*Potamogeton nodosus* (Fig. 63)

*Potamogeton nodosus* is a widespread species with a markedly uneven and disjunct distribution. It occurs in southern and central Europe, extending northwards to southern England, the Netherlands, northern Germany, northern Poland, Lithuania and the central part of European Russia. Eastwards it extends through south-western Asia, central Asia, India as far as southern China and Thailand, with markedly disjunct occurrences further south-east, reaching as far as New Caledonia (Hultén & Fries 1986, Kaplan 2010b, Kaplan

unpubl.). In Africa it is most frequent along the Mediterranean coast in the north and along the coasts and in large inland river deltas in the south; in contrast, this species is absent from the zone of tropical rain forests (Kaplan & Symoens 2005). In North America *P. nodosus* is distributed in southernmost Canada, in most of the USA and in Mexico, extending southwards through Central America and the Caribbean region as far as Venezuela (Haynes & Hellquist 2000, Haynes & Holm-Nielsen 2003). More often than any other *Potamogeton* species *P. nodosus* is recorded from islands; it has been documented on most islands that lie within the range of the species and have suitable aquatic habitats (Kaplan unpubl.). Natural occurrences of *P. nodosus* in the Czech Republic are restricted to lowland rivers and streams, and adjacent oxbow lakes. Secondary occurrences are found mainly in lakes in abandoned sand and gravel pits in early stages of terrestrialization, occasionally also in irrigation channels, coal-mining subsidence ponds, coal pit lakes and wetland depressions on arable land. In contrast to the majority of *Potamogeton* species, *P. nodosus* only rarely grows in fishponds in this country, probably because it avoids turbid standing water and deep anaerobic, sapropelic mud. It prefers mesotrophic, mineral-rich, clear, standing to fast-running waters with a sandy, gravelly or stony bottom, often covered with a thin layer of mud; however, in streams and rivers it can also tolerate eutrophic conditions, as flowing water can reduce the negative effects of high trophic levels. Most of its occurrences are in the floodplains of the two largest lowland Czech rivers, Labe and Morava, and numerous sites have also been recorded in Vltava and Lužnice rivers in southern Bohemia. Another high concentration of records is in the Ostravská pánev basin in Silesia. Elsewhere the species is rare, occurring mostly in secondary habitats,

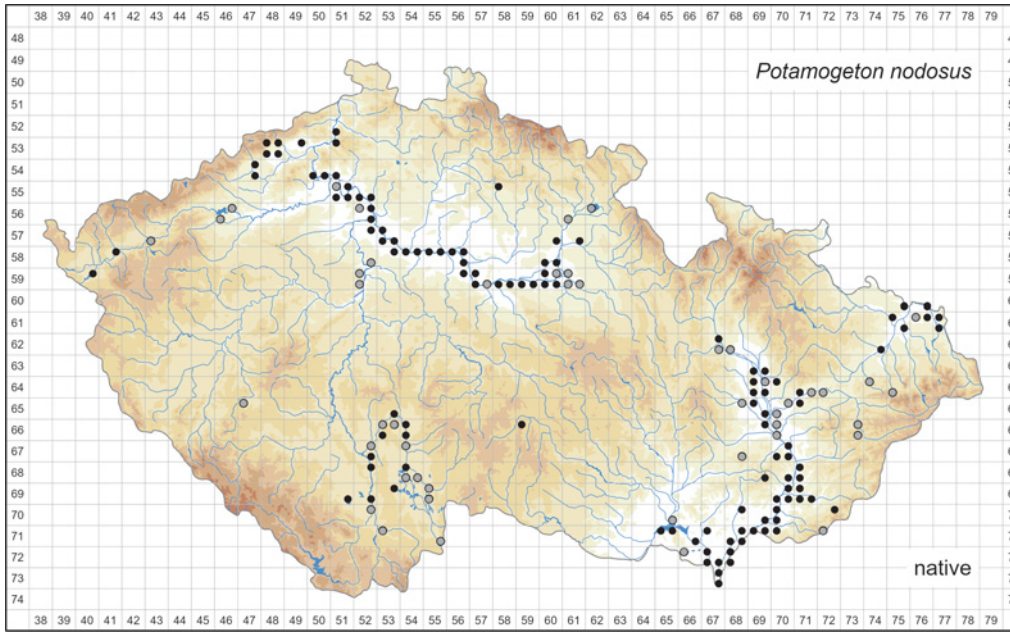



**Fig. 63.** Distribution of *Potamogeton nodosus* in the Czech Republic: ● at least one record in 2000–2025 (114 quadrants), ● pre-2000 records only (46 quadrants). Prepared by Zdeněk Kaplan.

or absent. The stands in rivers are threatened by river regulation, eutrophication and increased water turbidity, and they are also damaged by intensive shipping. However, it regenerates well when shipping is restricted. In addition, it rapidly colonizes new suitable aquatic habitats in floodplains along these rivers. Although many populations have disappeared, *P. nodosus* persists in most of the area of its former distribution. It is classified as vulnerable (Grulich 2012). Because of frequent misidentifications of running-water forms of *P. natans* as *P. nodosus* (or "*P. fluitans*" in the past), the map is based mainly on examined herbarium specimens, finds documented by photographs, and records from botanists familiar with this species.

*Potamogeton obtusifolius* (Fig. 64)

*Potamogeton obtusifolius* has a highly uneven distribution in the boreal and temperate zones of the Northern Hemisphere. It is most frequent in north-central Europe, southern Fennoscandia and the British Isles; scattered occurrences reach northern Scandinavia, whereas the southern limit of its distribution runs through France and the Alps. Further east, its range is markedly patchy, continuing approximately between 50°N and 63°N across central European Russia, northern Kazakhstan and southern Siberia as far as the Amur river basin, with rare occurrences further east to the Magadan Oblast, the Kamchatka Peninsula and northern Japan, and southwards to Mongolia and northern China (Hultén & Fries 1986, Kaplan 2010b, Kaplan unpubl.). In North America the species is found mainly in its eastern part, in regions along the border between Canada and the USA, with rare, markedly isolated occurrences, it reaches as far west as Washington

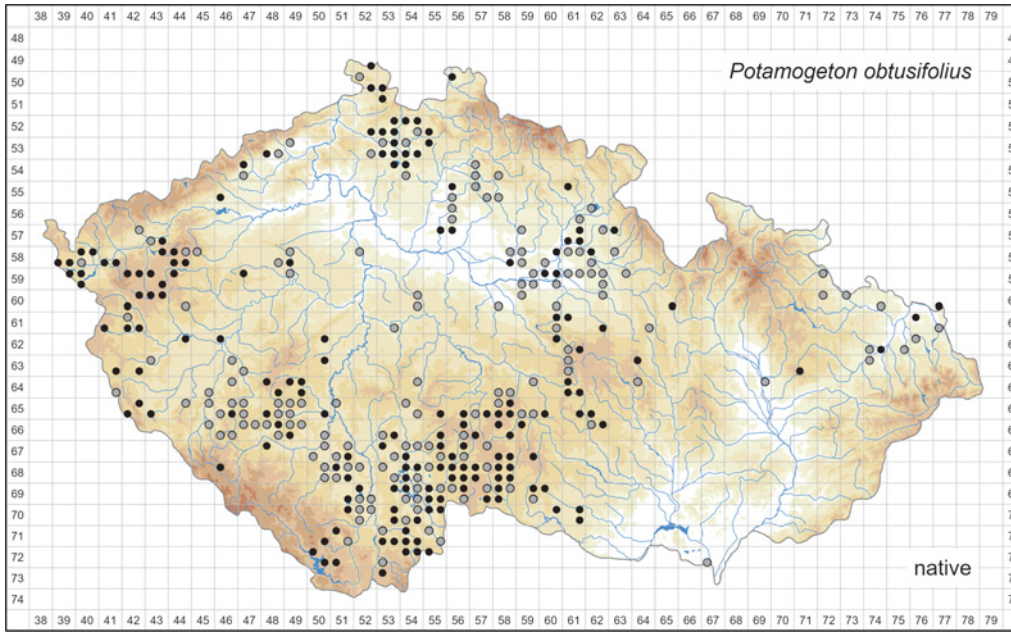



**Fig. 64.** Distribution of *Potamogeton obtusifolius* in the Czech Republic: ● at least one record in 2000–2025 (177 quadrants), ● pre-2000 records only (158 quadrants). Prepared by Zdeněk Kaplan.

and Alaska (Haynes & Hellquist 2000). In the Czech Republic *P. obtusifolius* occurs mainly in low-stocked or abandoned fishponds, and seldom in wetland pools, meadow ditches, oxbow lakes, backwater river channels, peaty sand pit ponds and peat-cutting pools. It prefers mesotrophic to slightly eutrophic or slightly dystrophic, mineral-poor, acidic, clear, cold, standing waters over a sandy to clayey bottom with a layer of organic mud or peat. The species tolerates semi-shaded places, which allows it to occupy small forest ponds. Some records represent only temporary occurrences in restored wetlands or following fishpond desilting or summer drainage, with the species vanishing as fish-stock pressure on submerged macrophytes gradually increases. In this country *P. obtusifolius* is mainly distributed in fishpond landscapes at middle elevations in western, south-western, southern, northern and eastern Bohemia, elsewhere it is rare or absent, particularly in warm lowlands with mineral-rich soils such as in north-western and central Bohemia. In Moravia it has always been rare, with groups of sites in the Moravian part of the Českomoravská vrchovina highlands and in north-eastern Moravia and adjacent Silesia. The species was probably more frequent than it is today during the period of low-intensity fishpond management. After its intensification in the second half of the 20th century, *P. obtusifolius* has declined due to increased water turbidity, high fish-stock density, elimination of regular summer drainage and eutrophication followed by the spread of more competitive macrophytes, and is therefore classified as vulnerable (Grulich 2012). Because of occasional misidentifications of plane-leaved spring or running-water forms of *P. crispus* as *P. obtusifolius*, the map is based mainly on examined herbarium specimens, with several additional records documented by photographs or from botanists familiar with this species.

*Potamogeton perfoliatus* (Fig. 65)

*Potamogeton perfoliatus* has a markedly disjunct range with an uneven frequency of occurrence. It is most frequent in Europe, where it is distributed across most of the continent (including Iceland and the Faroe Islands) except for dry, warm Mediterranean areas; however, it is rare in the southern part of European Russia. In Asia it is widespread but considerably less frequent and exhibits a widely patchy distribution, being most frequent in southern Siberia, extending northwards to approximately 70°N, eastwards to the Russian Far East and Japan, and southwards to Saudi Arabia, southern India and southern China. In Africa it is very rare in its northern part. Markedly isolated outposts are found in Madagascar, northern Sumatra and temperate Australia (Hultén & Fries 1986, Kaplan 2010b, Kaplan unpubl.). In North America this species occurs only in its eastern parts, mainly within the triangle between Ontario, Labrador and Virginia (Haynes & Hellquist 2000). Additional isolated outposts exist in eastern Cuba and south-western Guatemala (Haynes & Holm-Nielsen 2003). In the Czech Republic *P. perfoliatus* is native to the middle and lower courses of rivers, streams and backwater channels, secondary occurrences are found in sand pit lakes in early stages of terrestrialization, and more rarely in clear-water fishponds, water reservoirs and coal pit lakes. It primarily occurs in mesotrophic, clear, cold, standing to fast-running waters with sandy, gravelly and stony bottoms. It avoids sites where the mineral substrate is covered with a thick layer of organic mud. The species is most frequent in the Labe river, although it does not form extensive stands anywhere along the course. Numerous occurrences have also been recorded in the

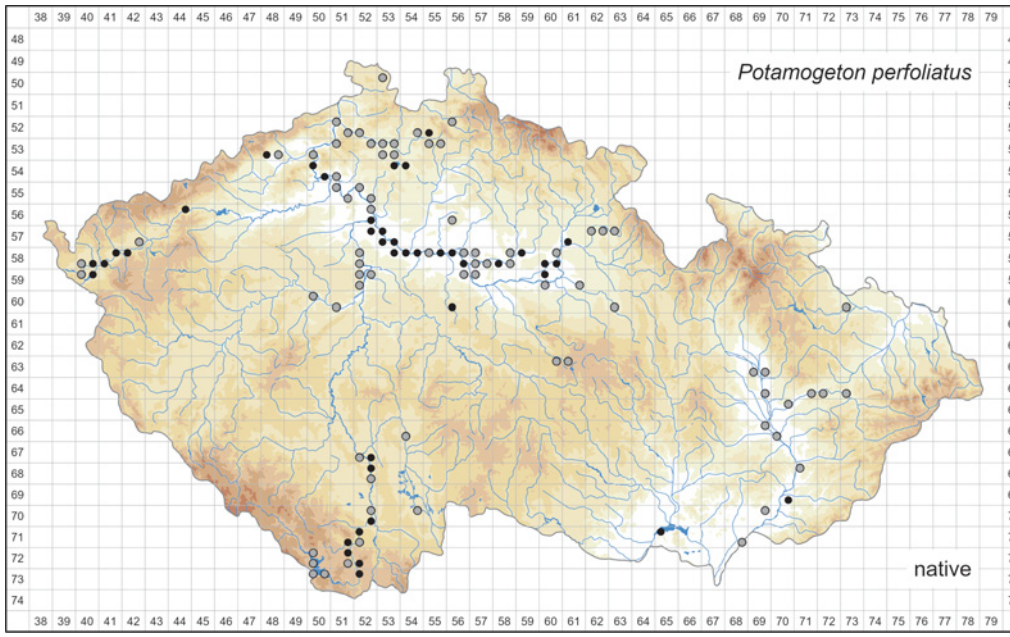



**Fig. 65.** Distribution of *Potamogeton perfoliatus* in the Czech Republic: ● at least one record in 2000–2025 (40 quadrants), ● pre-2000 records only (75 quadrants). Prepared by Zdeněk Kaplan.

Ohře and Vltava rivers, in the lower stretch of the Cidlina river, and in the Robečský potok stream and in the downstream section of the Ploučnice river. However, the species has declined and disappeared from some stretches of the watercourses and has been entirely extirpated from the Cidlina and Ploučnice rivers. Elsewhere in Bohemia there were only isolated and mostly temporary occurrences. In Moravia there have been only scattered, temporary occurrences, mainly along the Morava and Bečva rivers. *Potamogeton perfoliatus* has declined due to water eutrophication and pollution, and has vanished from fishponds because of the intensification of fishpond management and increased water turbidity. Consequently, it is classified as endangered (Grulich 2012).

*Potamogeton polygonifolius* (Fig. 66)

*Potamogeton polygonifolius* is distributed mainly in Atlantic western Europe from Portugal and Spain through France, the Benelux countries and the British Isles to the Faroe Islands, south-western Norway and southern Sweden. It becomes progressively less common towards the east, reaching the eastern limits of its distribution in southern Finland, eastern Poland, the western Czech Republic, Austria and Italy. In Africa it is confined to northern Morocco, Algeria and Tunisia. Remote outposts are found on the islands of the Azores and Madeira (Kaplan 2010b, Kaplan unpubl.). All records from more eastern territories as far as China and Japan are erroneous, based on misidentifications of mainly *P. nodosus*, *P. distinctus* and *P. fryeri* (Wiegleb & Kaplan 1998, Kaplan unpubl.). It has been introduced into the easternmost parts of North America, where it now occurs in Nova Scotia, Saint Pierre and Miquelon, and Newfoundland (Haynes & Hellquist

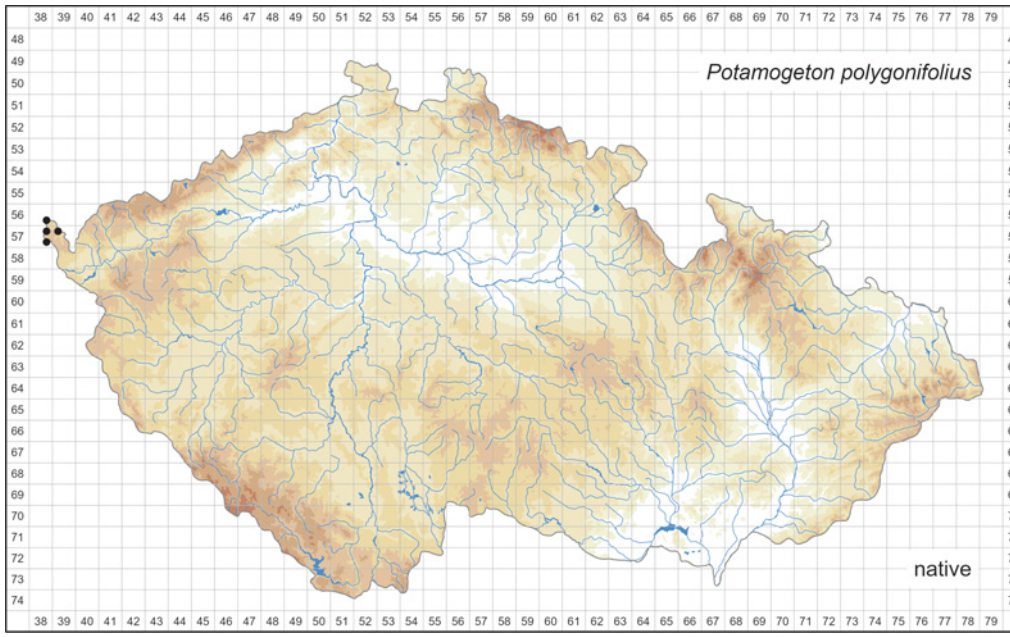



**Fig. 66.** Distribution of *Potamogeton polygonifolius* in the Czech Republic (4 occupied quadrants). Prepared by Zdeněk Kaplan.

2000). In the Czech Republic *P. polygonifolius* is found in small pristine submontane streams, shallow bog hollows and low hummocks in poor fens, small pools in bog meadows and shallows at the edges of clear-water ponds. It grows either emerged on wet *Sphagnum* stands or partially to completely submerged in standing or running, oligotrophic to dystrophic, mineral-poor, acidic, clear, cold waters with peaty or gravelly bottoms. The species prefers sunny places but also tolerates semi-shaded wetland habitats in forests. As a sub-Atlantic geoelement (Kaplan 2017), *P. polygonifolius* reaches only the westernmost Bohemia in this country, where it occurs in and along five streams and in or at several ponds in a submontane landscape in the Ašský výběžek salient north-west of the town of Aš. Because of this rarity, it is classified as critically threatened (Grulich 2012).

*Potamogeton praelongus* (Fig. 67)

*Potamogeton praelongus* is distributed in the boreal and temperate zones of the Northern Hemisphere, with the range often being disjunct. In Europe it mainly occurs in its northern half, extending southwards to the British Isles, the eastern Pyrenees, the Alps, Montenegro, southern Ukraine and the central part of European Russia at approximately 54°N. In Asia it occurs mainly in Siberia approximately between 52°N and the Polar Circle, extending eastwards as far as Chukotka, the Kamchatka Peninsula, the Kuril Islands and northern Japan; isolated outposts are found in Turkey, the Caucasus Mts, the Pamir Mts, Mongolia and China (Hultén & Fries 1986, Kaplan 2010b, Kaplan unpubl.). In North America the species is found in southern Canada and the northern USA from Alaska and

California in the west to Newfoundland and New Jersey in the east; there are also isolated outposts along the western and eastern coasts of Greenland and in Mexico (Haynes & Hellquist 2000). In the Czech Republic *P. praelongus* is native to middle courses of rivers and their backwater channels and oxbow lakes, and was once recorded also in a flow-through fishpond. The species grows in oligotrophic to mesotrophic, clear, cold, standing or running waters over muddy to clayey-sandy bottoms, sometimes covered with a layer of sapropelic mud. In this country *P. praelongus* has always been rare, recorded at only about two dozen sites in Bohemia, including the Vltava, Otava, Orlice and Ploučnice rivers, as well as a pond on the Ploužnický potok stream. The species has been extirpated from most of these sites due to water eutrophication and pollution, the introduction of non-native herbivorous fish (grass carp; see Rydlo 1995) as well as river regulation and the consequent destruction of suitable microhabitats and restriction of the formation of new ones. Only a single native population has survived to date, in a backwater channel of the Orlice river east of the city of Hradec Králové in eastern Bohemia. *Potamogeton praelongus* is therefore classified as critically threatened (Grulich 2012). In 2001–2023 it was introduced within the framework of a rescue programme into several newly formed shallow alluvial pools as well as into already existing water bodies with suitable conditions (Prausová et al. 2011, 2017). However, at most of these sites the species persisted only over several years. Because of frequent misidentifications of *P. alpinus* as *P. praelongus* in the 19th century, the map is based only on examined herbarium specimens.

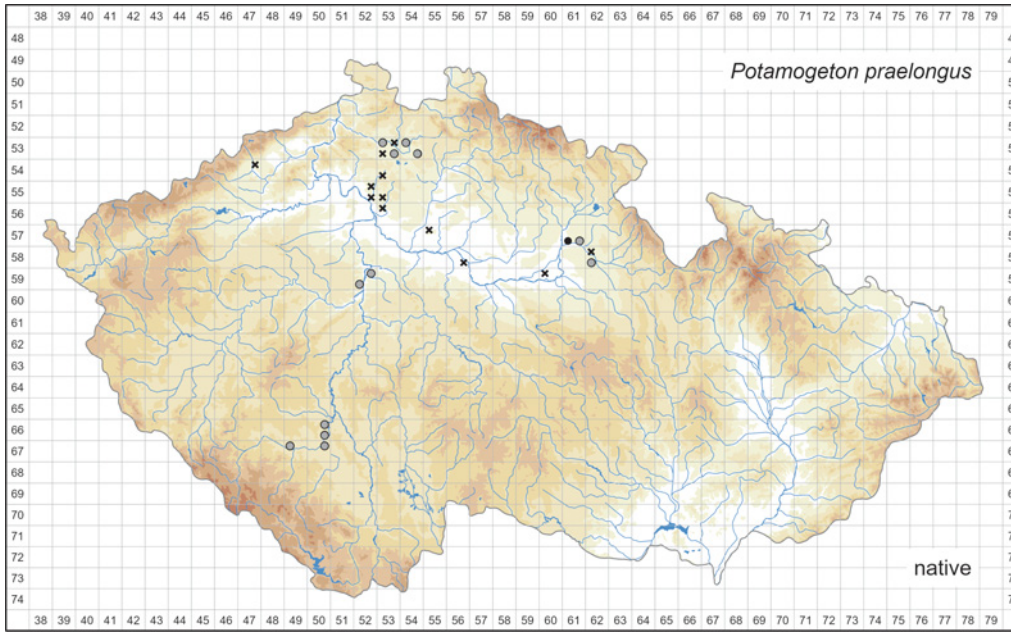



**Fig. 67.** Distribution of *Potamogeton praelongus* in the Czech Republic: ● at least one record in 2000–2025 (1 quadrant), ◍ pre-2000 records only (12 quadrants), × deliberate introductions only (12 quadrants). Prepared by Zdeněk Kaplan.

*Potamogeton pusillus* (Fig. 68)

*Potamogeton pusillus* is distributed in the boreal and temperate zones in the Northern Hemisphere, extending into the Southern Hemisphere in Africa. In Europe it is widespread across almost the entire continent, being absent only from the northernmost Arctic regions and some parts of the Mediterranean area. In Asia it extends northwards to 50°N, southwards to Yemen, Pakistan, northern India, Nepal, Bhutan, China, Taiwan and the Korean Peninsula, and eastwards to Kamchatka and Japan; an outpost occurs on the island of Luzon in the Philippines. Its distribution in Africa is markedly uneven, as the species is absent from the zone of tropical rainforests. In Macaronesia it occurs on the Azores, Madeira, the Canary Islands and Cape Verde (Hultén & Fries 1986, Kashina 1988, Kaplan 2010b, Kaplan unpubl.). In North America it is most frequent in the USA, extending northwards to southern Canada, with outposts in western Canada, and southwards to northern Mexico (Haynes & Hellquist 2000 as *P. pusillus* subsp. *pusillus*, Kaplan unpubl.). Records from South America are erroneous. In the Czech Republic *P. pusillus* occurs in fishponds, fish storage ponds, shallow water reservoirs, wetland pools, lakes in abandoned sand pits, clay pit ponds, streams, rivers and oxbow lakes. It is mostly found in mesotrophic to eutrophic, mineral-rich, shallow, standing or slowly running waters with clayey, muddy to sandy substrates. It avoids dystrophic water and peaty substrates. The species tolerates increased salinity and can therefore grow in slightly brackish water. *Potamogeton pusillus* is most frequent in fishpond landscapes in south-western, southern and eastern Bohemia and in north-eastern Moravia and adjacent Silesia. Elsewhere it is scattered to rare, avoiding mountains, cold areas with acidic bedrock and peaty substrates,

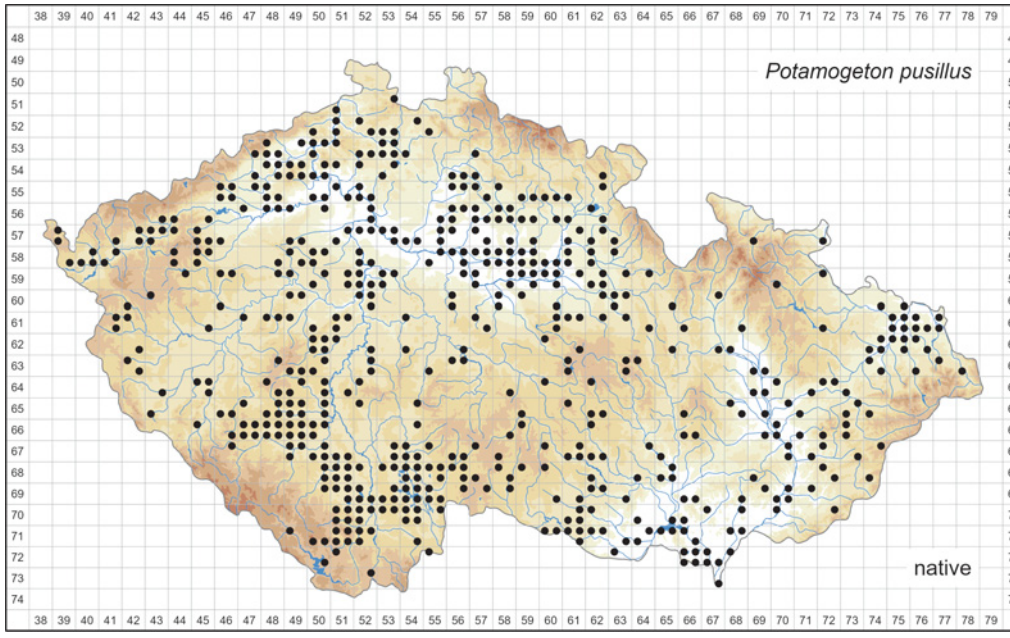



**Fig. 68.** Distribution of *Potamogeton pusillus* in the Czech Republic (562 occupied quadrants). Prepared by Zdeněk Kaplan.

and large forest patches lacking suitable habitats. Because of frequent confusion, mainly with the similar *P. berchtoldii*, the map is based solely on examined herbarium specimens.

*Potamogeton trichoides* (Fig. 69)

*Potamogeton trichoides* is generally a European species, distributed northwards to southern Scotland, Denmark and southern Sweden; it is rare in some parts of southern Europe and apparently absent from the south-eastern part of European Russia. Elsewhere it is rare. In Asia it occurs with markedly disjunct populations in its south-western part, in Armenia, Azerbaijan, Kazakhstan, south-western Siberia and northern India. In Africa the species has a largely patchy distribution along the Mediterranean coast and in eastern and southern Africa (Meusel et al. 1965, Hultén & Fries 1986, Kaplan 2010b, Kaplan unpubl.). Numerous records from other areas are erroneous. In the Czech Republic *P. trichoides* is mainly found in fishponds, less frequently in other water reservoirs, lowland rivers and irrigation ditches, rarely also in oxbow lakes, fish storage ponds and lakes in abandoned sand and clay pits. It grows in mesotrophic to eutrophic, often calcium-rich, standing or slowly running waters with clayey to sandy bottoms covered with a thin layer of organic mud. The species has mainly been recorded in fishpond landscapes in southwestern, southern and eastern Bohemia, with scattered occurrences elsewhere in Bohemia, but it is rare in or absent from the mountains and parts of mainly northern and southeastern Bohemia. In Moravia it is almost confined to the eastern part of the Česko-moravská vrchovina highlands and the floodplains of the Dyje, Morava and Odra rivers.

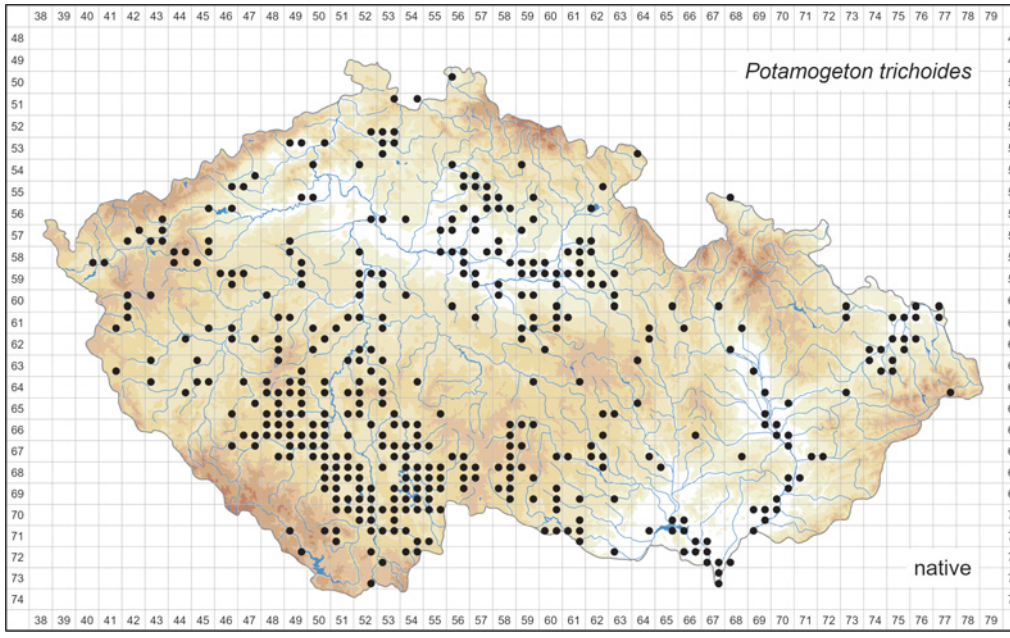



**Fig. 69.** Distribution of *Potamogeton trichoides* in the Czech Republic (413 occupied quadrants). Prepared by Zdeněk Kaplan.

In the second half of the 20th century, *P. trichoides* slightly declined due to eutrophication and the intensification of fishpond management, and is therefore classified as vulnerable (Grulich 2012). Because of occasional misidentifications of other linear-leaved *Potamogeton* species as well as of *Stuckenia pectinata* as *P. trichoides*, the map is based almost exclusively on examined herbarium specimens, supplemented by several records from botanists familiar with this species.

*Potamogeton ×angustifolius* (Fig. 70)

Of the 13 interspecific *Potamogeton* hybrids detected to date in the Czech Republic (Kaplan 2010a, 2019b, and unpubl.), only the two most frequent ones are mapped here. *Potamogeton ×angustifolius*, a hybrid of *P. gramineus* × *P. lucens*, is one of the most frequent hybrids in the genus and the only European hybrid capable of producing well-developed fruit (Preston 1995, Kaplan 2010a). It has been detected in numerous European countries (Kaplan unpubl.) and in Asia, where it has been documented mainly in Siberia (Bobrov et al. 2025) and Turkey (Aykurt et al. 2020). In the Czech Republic it has mostly been found at sites where its parental species co-occur, with its distribution largely mirroring that of the rarer one, *P. gramineus*: most of the records of *P. ×angustifolius* come from fishpond landscapes in southern Bohemia and the middle and eastern parts of the Labe river basin, as well as in the adjacent hilly areas. Most of its occurrences were only temporary. Because of its fertility and, therefore, its potential to maintain self-sustaining populations and spread to new locations, this rare taxon has been included in the Red List and classified as critically threatened (Grulich 2012).

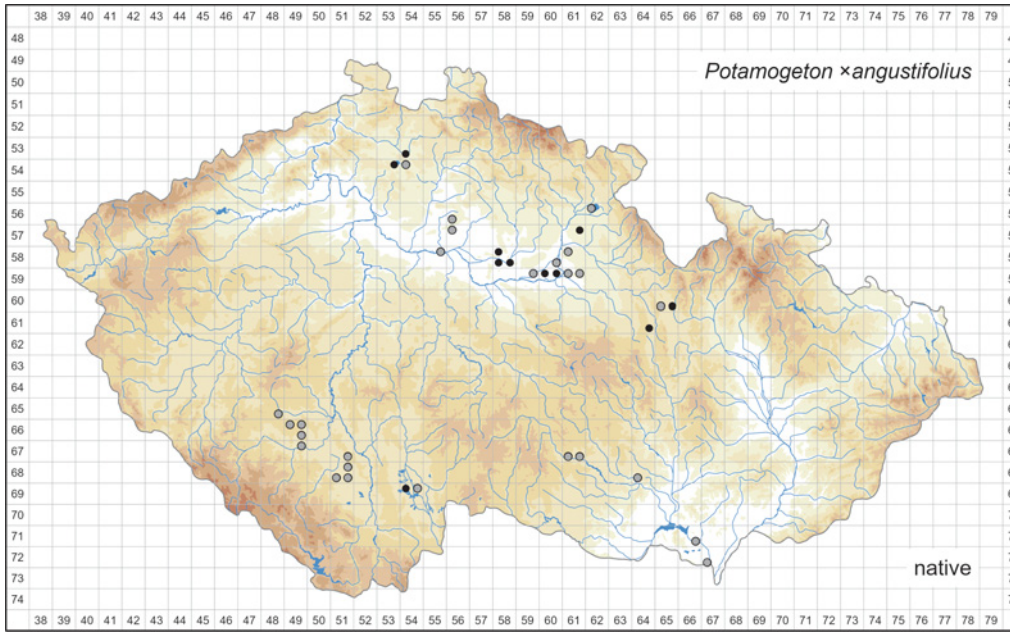



**Fig. 70.** Distribution of *Potamogeton ×angustifolius* in the Czech Republic: ● at least one record in 2000–2025 (11 quadrants), ● pre-2000 records only (26 quadrants). Prepared by Zdeněk Kaplan.

*Potamogeton ×fluitans* (Fig. 71)

Although the name "*Potamogeton fluitans*" was in the past widely used for several taxa, in its strict sense it refers to the hybrid *P. lucens* × *P. natans* (Kaplan 2005). It has been recorded in several countries in the northern half of Europe (Kaplan 2001, 2005). Despite both parental species frequently co-occurring at sites in the Czech Republic, the morphologically conspicuous *P. ×fluitans* has been recorded at only 15 sites. This is probably because hybrid plants usually persist only for a few years, typically disappearing before they can be recorded. Most of these occurrences were in recently desilted or summer-drained fishponds, which allowed the germination of hybrid seeds preserved in the soil seed bank and the temporary establishment of hybrid plants. In established populations of the parental species, interspecific pollen transfer and fertilization do occur and hybrid seeds are produced; however, these populations are maintained mainly through vegetative reproduction, whereas seedlings arising from seed (including hybrid ones) rarely establish because they are outcompeted by faster-growing, vegetatively propagating plants (Kaplan et al. 2002). This situation changes following disturbance, such as desilting or summer drainage, which creates open microsites and reduces competition, thereby enabling germination and short-term establishment of hybrid plants. However, the resulting mixed-species community is often soon suppressed by overly intensive fish farming. Due to the frequent past misapplication of the name "*P. fluitans*" to the unrelated but similar *P. nodosus*, the map is based almost exclusively on examined herbarium specimens, with a single record documented by photographs.

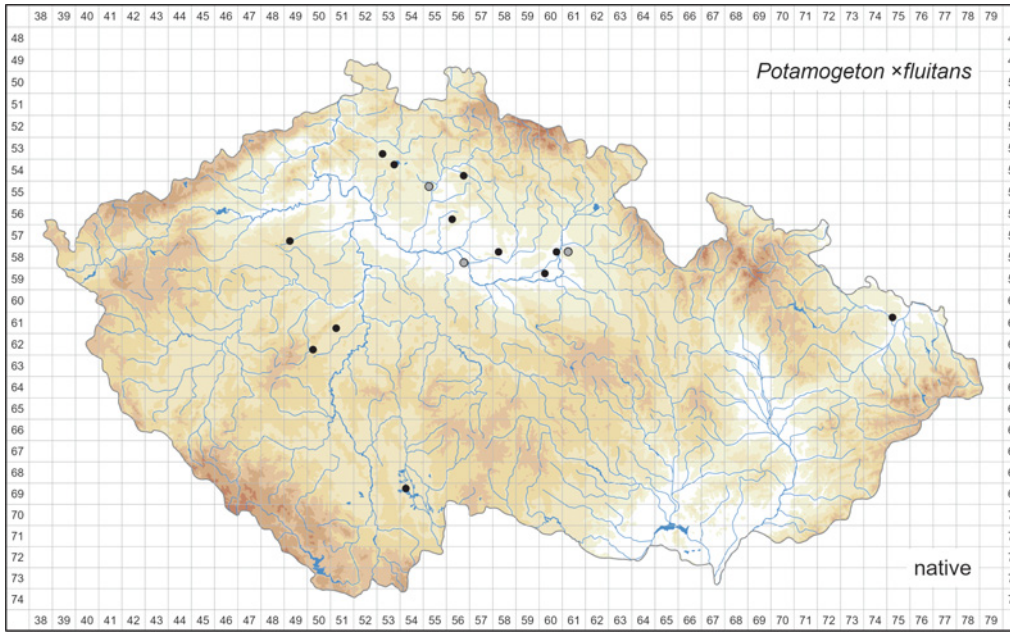



**Fig. 71.** Distribution of *Potamogeton ×fluitans* in the Czech Republic: ● at least one record in 2000–2025 (12 quadrants), ● pre-2000 records only (3 quadrants). Prepared by Zdeněk Kaplan.

*Rapistrum perenne* (Fig. 72)

*Rapistrum perenne* is a European species with a mainly Pontic-Pannonian distribution. Its native range is centred in the Pannonian basin, southern Romania and Bulgaria, the western Black Sea area and the southern half of Ukraine. Outside this core area, it extends westwards into the lowlands of Bohemia and central Germany, as well as into Slovenia and north-eastern Italy. To the east isolated occurrences reach as far as the Volga river in Russia. However, in some parts of its range it remains unclear whether it is truly native or rather an archaeophyte (cf. Csiky et al. 2023). It has also been recorded as introduced in the United Kingdom, France, Switzerland, elsewhere in central Europe, Belarus, the Baltic countries and Sweden (Meusel et al. 1965, POWO 2025). *Rapistrum perenne* is a tumbleweed growing in steppes and dry grasslands, often at sites subject to occasional disturbance. It also occurs along dirt roads and in the margins of vineyards and arable fields, where its native status may be questionable. Occasional introductions have been recorded on railway embankments and at ruderal sites. *Rapistrum perenne* prefers neutral to basic, sandy-loamy to loamy soils rather rich in nutrients. In the Czech Republic it is confined to the warmest areas of the country, occurring in hilly landscapes rich in steppe vegetation, while being rare in or absent from the flat lowlands. Its native range is restricted to two separate areas: southern Moravia and the warmest parts of Bohemia, including north-western Bohemia, Prague and the territory in its north-western surroundings. Occurrences recorded elsewhere are of secondary origin. *Rapistrum perenne* reaches its elevational maximum at ~460 m in the Pavlovské vrchy hills in southern Moravia. It is threatened by the abandonment of traditional management in dry grasslands, their conversion to arable land and by the intensification of

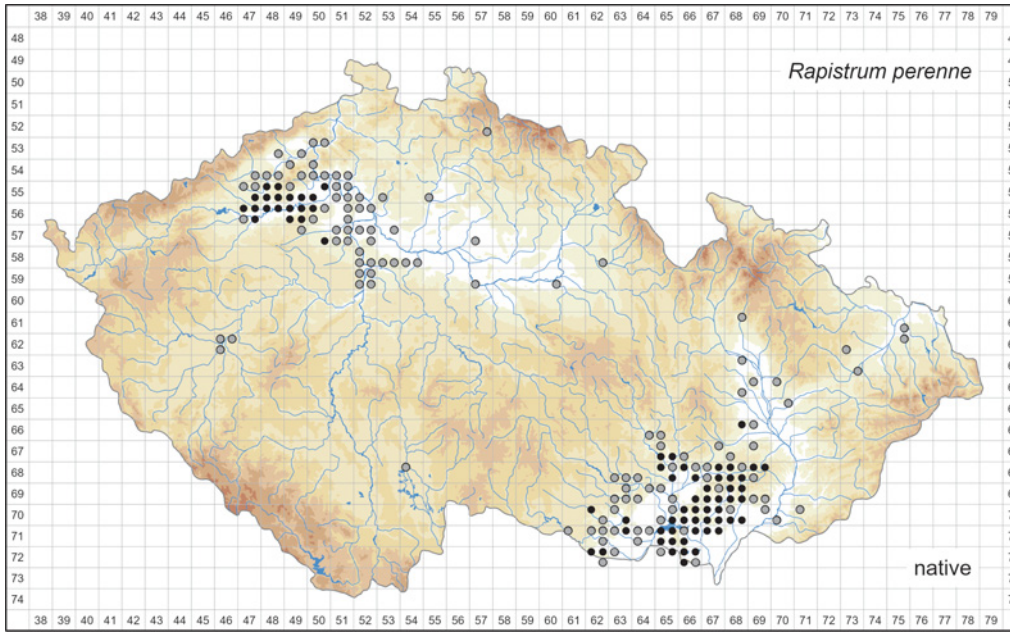



**Fig. 72.** Distribution of *Rapistrum perenne* in the Czech Republic: ● at least one record in 2000–2025 (70 quadrants), ● pre-2000 records only (118 quadrants). Prepared by Jan Prančl.

agriculture as well as successional changes driven by landscape eutrophication and climate change. Its decline may also be partly linked to a significant decrease in wild rabbit populations within steppe vegetation. The decline is more pronounced in Bohemia, where it was recently recorded only in the southern part of the České středohoří Mts and its vicinity, elsewhere only rarely on Humenský vrch hill south of the town of Lovosice and near the village of Jemníky close to the town of Slaný. It is classified as vulnerable (Grulich 2012).

*Rapistrum rugosum* (Fig.73)

*Rapistrum rugosum* is a species with a distribution centred around the Mediterranean region. Its native range includes all of southern Europe, the Middle East, the Caucasus and central Asia eastwards to Kyrgyzstan, as well as northern Africa, Ethiopia and Eritrea. However, the exact delimitation of the native distribution is often uncertain. It has been introduced elsewhere, including most European countries, many parts of the Americas, southern Africa, Pakistan, eastern Asia, Australia and New Zealand; in some areas it is considered a troublesome invasive weed (Meusel et al. 1965, Simmons 2005, Manalil et al. 2018, POWO 2025). According to some sources, three subspecies are distinguished based on fruit characters, of which two have been reported from the Czech Republic: subsp. *rugosum* and subsp. *orientale* (Smejkal 1992). However, a study of herbarium specimens revealed that the morphological characters of both subspecies overlap considerably, and a substantial portion of specimens cannot be reliably assigned to either; therefore, subspecies are not distinguished in this treatment. In this country *R. rugosum* was first collected in 1850 by Ph. M. Opiz in Dejvice (now part of the city of Prague), but no further information

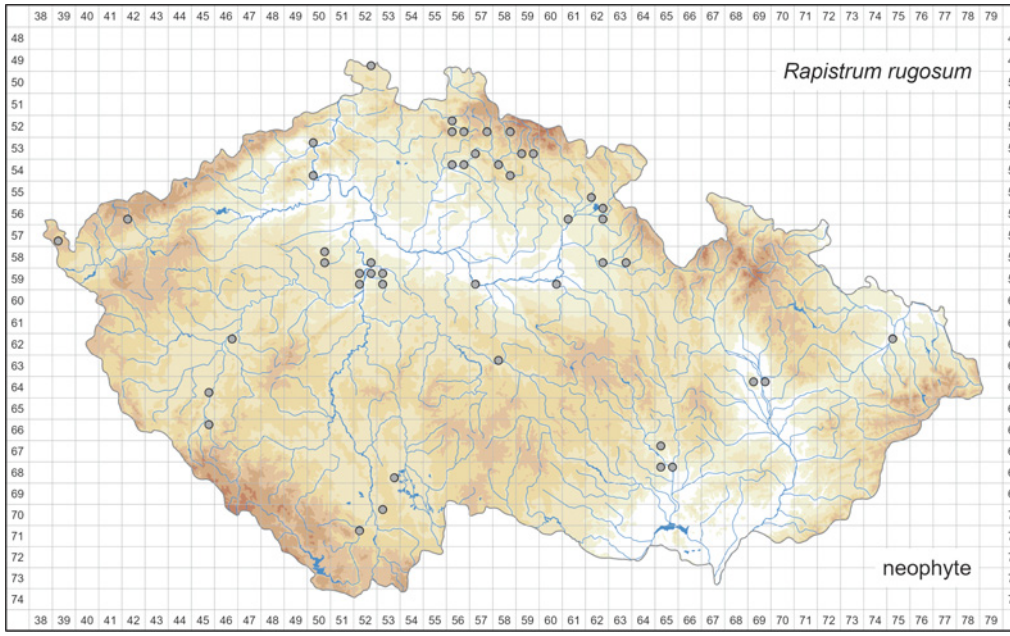



**Fig. 73.** Distribution of *Rapistrum rugosum* in the Czech Republic: ● pre-2000 records only (46 quadrants). Prepared by Jan Prančl.

is available for this record. The first unequivocal cases of escape date to 1926, when the species was found at two sites in Prague: at the Smíchov railway station and near the Břevnov district. *Rapistrum rugosum* has been introduced mainly with imported grain and seed, and less frequently with cotton and iron ore. Most records are from railway stations, transshipment yards, food-processing factory grounds, ruderal sites and arable fields. The species was recorded mainly in warm and moderately warm areas, reaching its elevational maximum at ~610 m in the settlement of Lesík west of the town of Nejdek in western Bohemia. A large number of records exists from Prague, northern and north-eastern Bohemia. The occurrences consisted of only a small number of individuals and lasted only a single growing season in almost all cases. Most finds date from the period 1926–1970; later, the species was recorded only sporadically, with the last documented occurrence in 1997 in the town of Kolín in central Bohemia. *Rapistrum rugosum* (including subsp. *orientale* and subsp. *rugosum*) is classified as a casual neophyte (Pyšek et al. 2022).

*Sclerolaena tricuspis* (Fig. 74)

*Sclerolaena tricuspis* is native to the eastern half of Australia, including South Australia, Queensland, New South Wales and Victoria (Wilson 1984). In its native range it occurs in chenopod shrublands in arid and semi-arid regions. The Czech Republic is the only country where the species has so far been recorded as an alien. It was observed between 1958 and 1961 in the city of Brno, on the grounds of a former wool-processing factory, growing in strawberry beds fertilized with waste from the sorting of imported wool (Dvořák & Kühn 1966). It is classified as a casual neophyte (Pyšek et al. 2022).

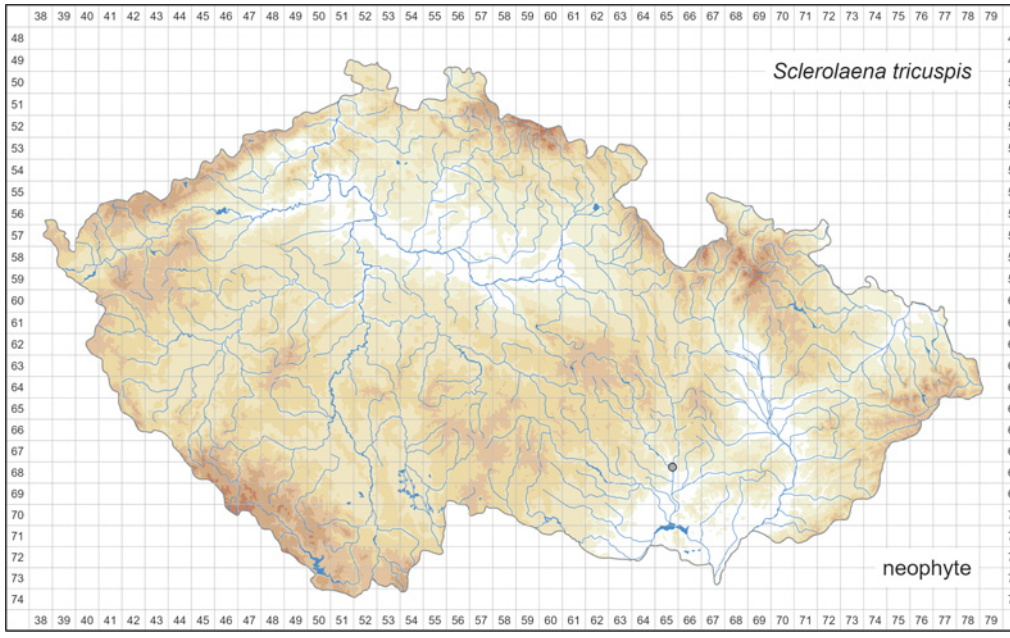



**Fig. 74.** Distribution of *Sclerolaena tricuspis* in the Czech Republic: ● pre-2000 records only (1 quadrant). Prepared by Jan Prančl.

*Sedobassia sedoides* (Fig. 75)

*Sedobassia sedoides* is a Eurasian species, distributed from Hungary and the countries of the former Yugoslavia in the west across Ukraine, the Caucasus Mts, south-western European Russia, western Siberia and central Asia to China and Mongolia in the east. Within its native range, it usually grows as a pioneer species at disturbed places in arid and saline habitats. It has also been recorded as introduced in the Czech Republic, Slovakia, Poland, Latvia, Estonia and Finland (Uotila 2011+, Eliáš & Dítě 2013, POWO 2025). In the Czech Republic *S. sedoides* was observed between 1960 and 1966 at two sites used for iron ore storage in the city of Ostrava, northern Moravia (Kilián & Krkavec 1961). It has been introduced there with iron ore imported from southern Ukraine. *Sedobassia sedoides* is classified as a casual neophyte (Pyšek et al. 2022).

*Stellaria alsine* (Fig. 76)

*Stellaria alsine*, as circumscribed here, is native to Europe, western Siberia, Transcaucasia and north-western Africa. It has been introduced into South America and the Azores. A closely related species, *S. undulata* (sometimes considered conspecific), occurs in eastern Asia and North America. In Europe *S. alsine* is distributed continuously in the western and northern parts of the continent in areas with Atlantic climates, while being confined to the mountain regions in the south. It is almost absent from the Mediterranean islands and the Peloponnese (Meusel et al. 1965, Jalas & Suominen 1983, POWO 2025). In the Czech Republic *S. alsine* grows mainly along streams, around springs, in wet places

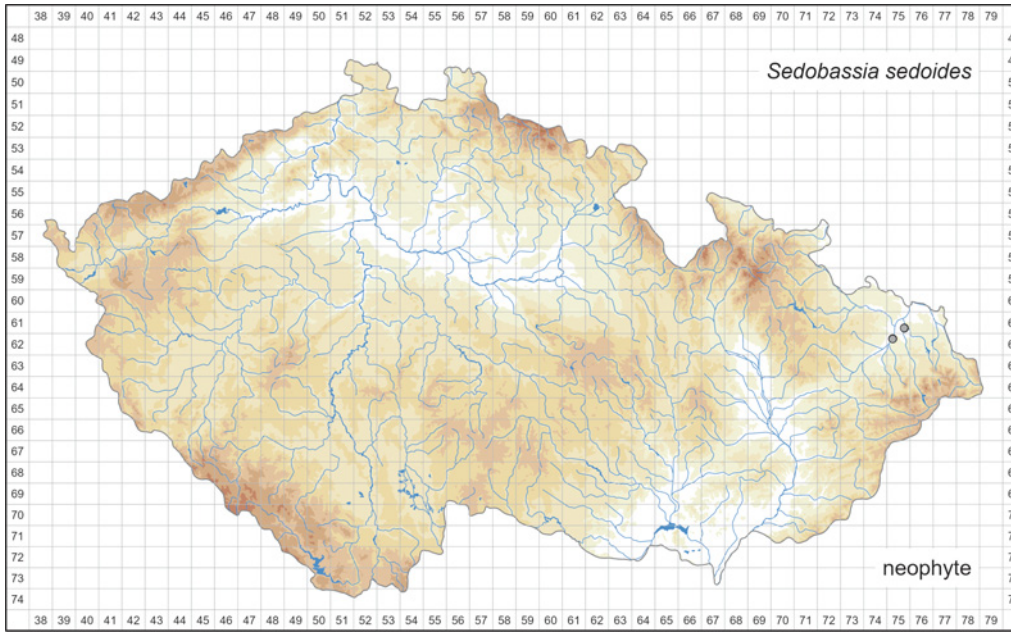



**Fig. 75.** Distribution of *Sedobassia sedoides* in the Czech Republic: ● pre-2000 records only (2 quadrants). Prepared by Jan Prančl.

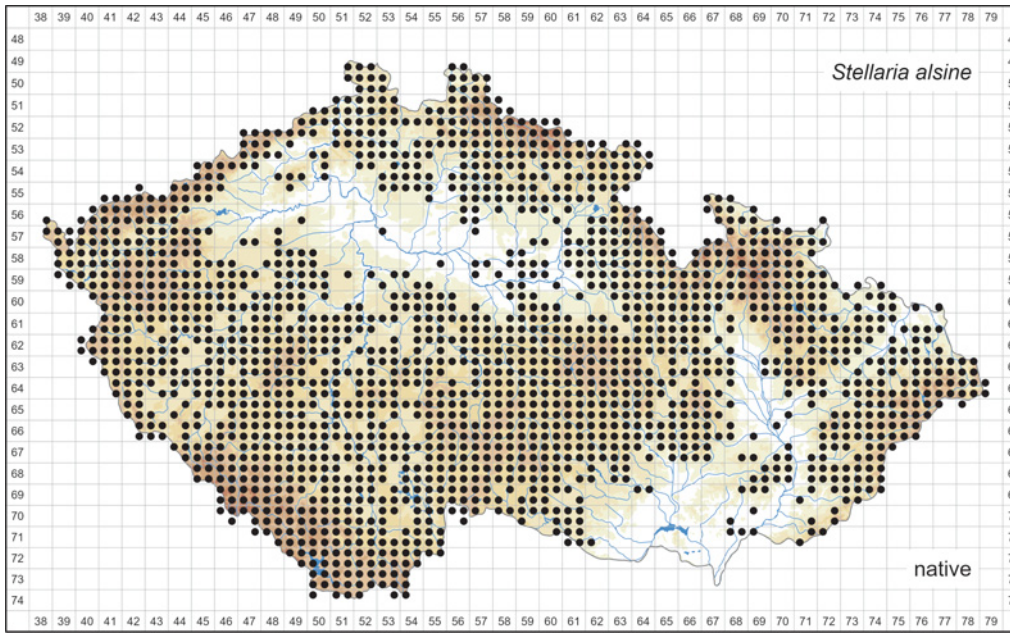



**Fig. 76.** Distribution of *Stellaria alsine* in the Czech Republic (1,791 occupied quadrants). Prepared by Jiří Danihelka & Zdeněk Kaplan.

of meadows, in meadow ditches, wet forest paths and bottoms of drained fishponds. The soils are usually nutrient-poor, acidic to moderately acidic and wet. In this country *S. alsine* is a widespread species almost continuously distributed at middle and high elevations in areas with rather cold and humid climates. In contrast, it is absent from north-western, central and eastern Bohemia, as well as from central and southern Moravia, i.e. areas with relatively warm, dry climates, often with nutrient-rich and sometimes basic soils, dominated by arable land. It reaches its elevational maximum at ~1,600 m at the summit of Mt Sněžka in the Krkonoše Mts.

*Stellaria graminea* (Fig. 77)

*Stellaria graminea* is native to the temperate zone of Eurasia, except for the Russian Far East, eastern China and Japan. It has been introduced into North America (the USA and Canada), where it is widespread in both the eastern and western parts of the continent. In Europe it is absent only from the southern part of the Iberian Peninsula, the Peloponnese, Corsica, Sicily and Crete (Jalas & Suominen 1983, POWO 2025). In the Czech Republic *S. graminea* occurs mainly in various types of meadows and mesic pastures, including submontane acidophilous grasslands with *Nardus*, in tall mesic and xeric scrub and many other open vegetation types, which are sometimes disturbed. The soils are usually moderately rich in nutrients, moderately acidic and fresh, neither permanently wet nor very dry. In this country *S. graminea* is widespread and often locally common. It is absent only from north-western and partly also from central Bohemia, as well as from southern and central Moravia, all of which are dry and warm areas with a large proportion of arable

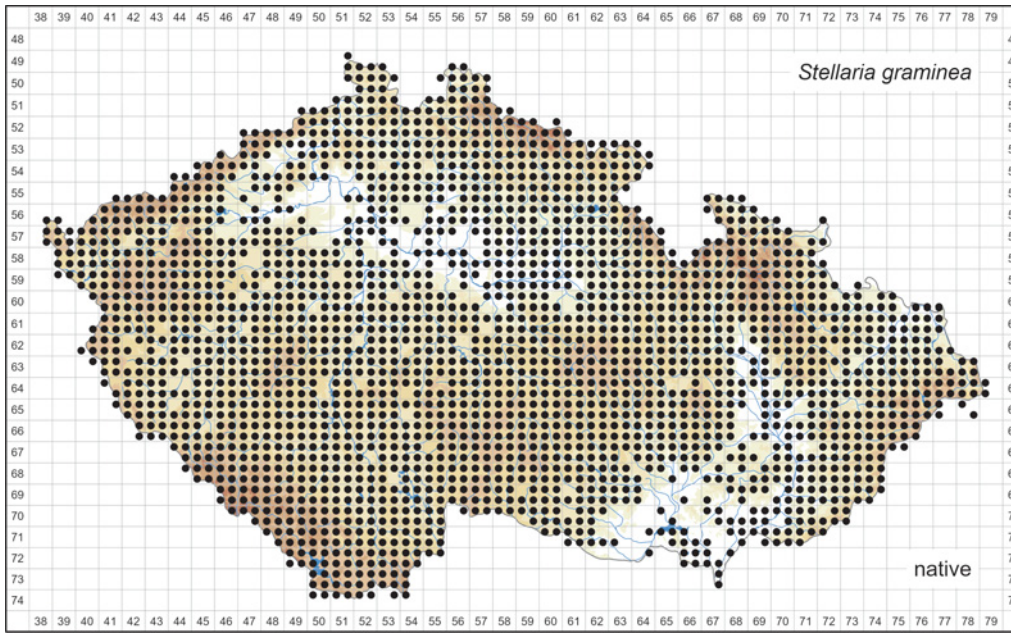



**Fig. 77.** Distribution of *Stellaria graminea* in the Czech Republic (2,239 occupied quadrants). Prepared by Jiří Danihelka & Zdeněk Kaplan.

land. Still, some gaps in the distribution map are probably due to under-recording rather than true absences. *Stellaria graminea* reaches its upper elevational limits at ~1,550 m on Mt Sněžka in the Krkonoše Mts and at ~1,490 m on Mt Praděd in the Hrubý Jeseník Mts.

*Stellaria holostea* (Fig. 78)

*Stellaria holostea*, in the latest literature often separated into the genus *Rabelera* (e.g. POWO 2025), is native to Europe, western Siberia (as far as the foothills of the Altai Mts), northern Anatolia, the Caucasus Mts, Transcaucasia, north-western Iran and north-western Africa. It has been introduced into the south-western USA. In Europe it is absent from most of Fennoscandia in the north and from the southern Iberian Peninsula, the Peloponnese and the Mediterranean islands in the south (Meusel et al. 1965, Jalas & Suominen 1983, POWO 2025). In the Czech Republic *S. holostea* grows in various types of deciduous forests, tall mesic scrub and thermophilous forest fringes, rarely also in other habitats such as forest clearings, margins of mesophilous meadows and herbaceous fringes of lowland rivers. The soils are usually moderately nutrient-rich, moderately acidic to slightly basic and fresh. *Stellaria holostea* is widespread in the Czech Republic but absent from the high mountain ranges surrounding the country, from areas at middle elevations with acidic, nutrient-poor soils and extensive spruce plantations, and from lowlands with prevailing arable land and lacking seminatural forests. Most occurrences of *S. holostea* are below 600 m, with upper elevational limits at ~825 m near the village of Prášily in the Šumava Mts and at ~810 m near the village of Hojná Voda in the Novohradské hory Mts, both in southern Bohemia. However, the occurrence at the latter site may be secondary, as assumed by the collector.

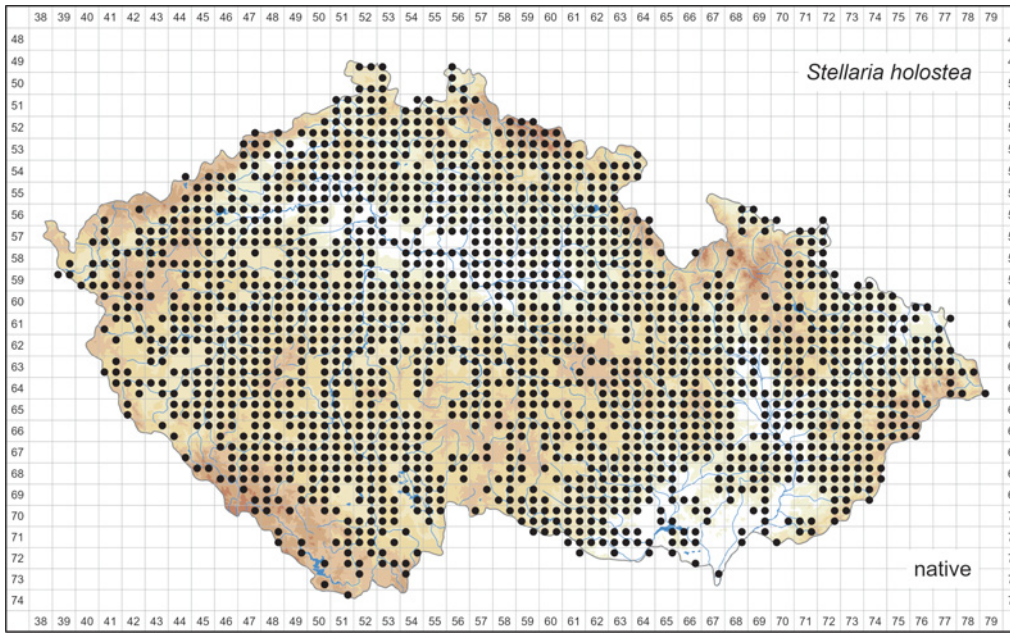



**Fig. 78.** Distribution of *Stellaria holostea* in the Czech Republic (1,803 occupied quadrants). Prepared by Jiří Danihelka & Zdeněk Kaplan.

*Stellaria longifolia* (Fig. 79)

*Stellaria longifolia* is a circumboreal species native to Eurasia and North America. However, it is absent from western Europe, including the British Isles, and its distribution in central Europe is discontinuous, confined to mountains and middle elevations, and to lowland landscapes with fishponds, peatland meadows and peatbogs. The occurrences in Bohemia are at the western regional distribution limit (Meusel et al. 1965, Jalas & Suominen 1983, POWO 2025). In the Czech Republic *S. longifolia* occurs in the undergrowth of alder carrs, peatland birch forests and acidophilous spruce forests, less frequently in acidic moss-rich fens and peatland meadows. The soils are usually nutrient-poor, acidic and well-moistened. The distribution of *S. longifolia* in the Czech Republic is discontinuous, confined to several areas in northern (surroundings of the town of Mimoň), western (Slavkovský les and Český les Mts), central (Brdy Mts), southern (southern part of the Šumava Mts and the fishpond landscapes around the town of Třeboň) Bohemia, as well as in the Žďárské vrchy hills and Hrubý Jeseník Mts in Moravia. In addition, it is found at a few places in eastern Bohemia. The species reaches its elevational minimum at ~250 m near the town of Týniště nad Orlicí in eastern Bohemia and its elevational maximum at ~1,100 m on Mt Boubín south of the town of Volary in southern Bohemia. *Stellaria longifolia* is classified as vulnerable (Grulich 2012).

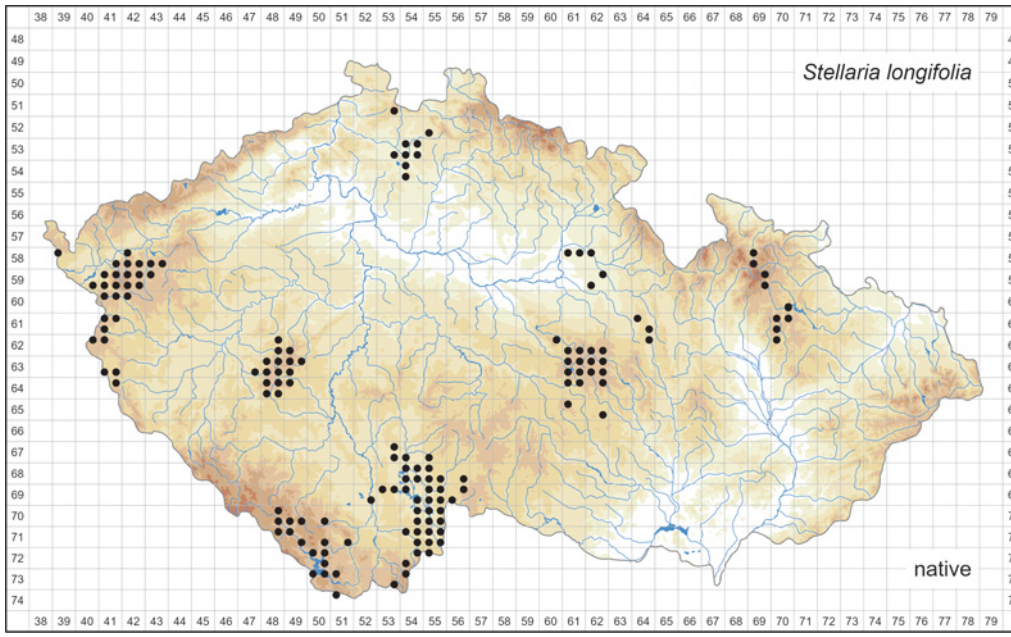



**Fig. 79.** Distribution of *Stellaria longifolia* in the Czech Republic (146 occupied quadrants). Prepared by Jiří Danihelka & Zdeněk Kaplan.

*Stellaria media* (Fig. 80)

*Stellaria media* is probably native to temperate western Eurasia and northernmost Africa, but it has now spread across most of the world, having been introduced to other parts of Eurasia and Africa as well as to Australia, New Zealand and the Americas. It is generally absent only from arctic regions and very dry areas, while in the tropics its occurrence is restricted to mountains (Turkington et al. 1980, Jalas & Suominen 1983, Hultén & Fries 1986, Morton 2005, POWO 2025). The species is ranked as the eighth most widely distributed naturalized plants in the world (Pyšek et al. 2017). In the Czech Republic *S. media* occupies a wide range of habitats. It frequently occurs as a weed in arable fields, gardens, streetside lawns and flower beds in public spaces but it is also present in numerous other ruderal sites, including soil heaps, along roads and paths, in pavement crevices, at the bases of walls, at railway stations, on waste ground, in the yards of agricultural and industrial facilities, on fallow land and in other frequently or recently disturbed places. It also occurs in seminatural and natural habitats such as open-canopy forests, beneath scrub, on disturbed sites in moist meadows and on banks of watercourses. The species thrives in both sunny and semi-shaded places and prefers fresh, loose, loamy to clayey soils that are slightly acidic to slightly basic, and rich in humus and nutrients. *Stellaria media* is widespread across the country but in the highest mountain elevations it occurs only due to introductions along roads and near huts and hotels. The elevational maximum is at 1,603 m on the summit of Mt Sněžka in the Krkonoše Mts. Probably all gaps on the map are due to a lack of records rather than true absences.

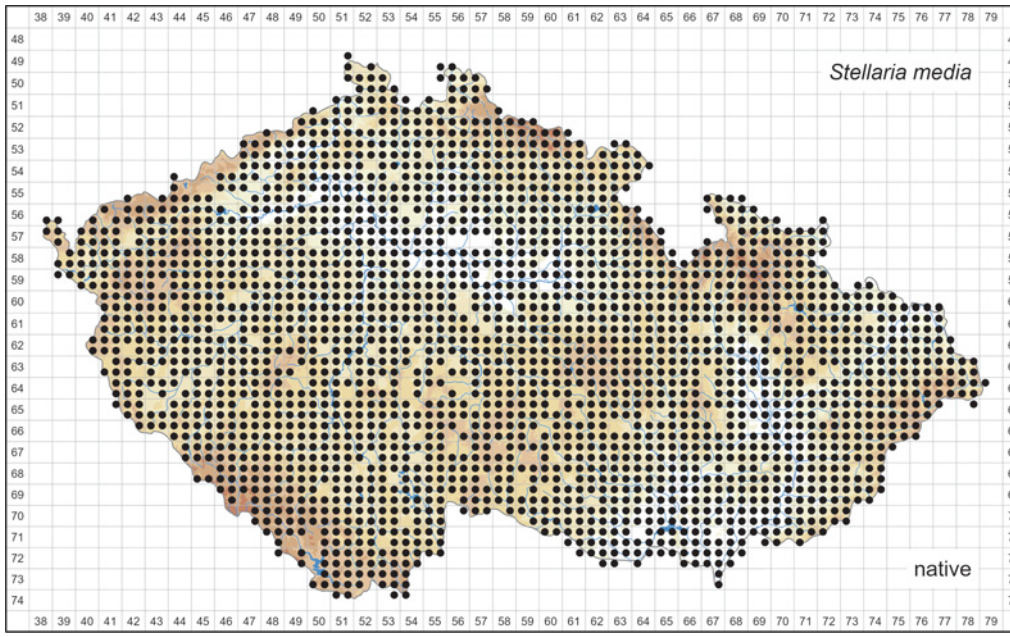



**Fig. 80.** Distribution of *Stellaria media* in the Czech Republic (2,272 occupied quadrants). Prepared by Zdeněk Kaplan.

*Stellaria neglecta* (Fig. 81)

The distribution of *Stellaria neglecta* is imperfectly known due to confusion with *S. cupaniana*, *S. media* and *S. ruderalis*. It is certainly native to Europe, being recorded in its western, central and southern parts, extending northwards to Scotland and southern Sweden and eastwards to Crimea and the Balkan Peninsula. It has also been reported from south-western Asia, the Caucasus, central Asia, China and Japan as well as from northernmost Africa (Jalas & Suominen 1983, Hultén & Fries 1986, Chen & Rabeler 2001), as casual from New Zealand (Howell & Sawyer 2006) and as naturalized and currently spreading in the USA (Morton 2005). Some of these records are probably attributable to misidentification of similar species. In the Czech Republic *S. neglecta* occurs in natural and semi-natural forest habitats, mainly in floodplain and ash-alder alluvial forests, and less frequently in hornbeam-oak and other types of forests, where it grows predominantly along paths and roads, on banks of streams, in open-canopy patches and openings, and occasionally in forest fringes and disturbed sites in adjacent wet floodplain meadows. The species is mostly found in semi-shaded places and prefers fresh to wet, loamy to clayey soils rich in humus and nutrients. As its name aptly expresses, *S. neglecta* has long been overlooked also in this country. Until the late 20th century it was recorded from only a dozen sites in central Bohemia (Dvořáková 1990). A targeted search in suitable habitats by several experts familiar with this species has recently resulted in its discovery at dozens of new sites in this area, mainly in the lower Berounka and Vltava river valleys, middle Labe river basin and lower Pšovka stream valley. In addition, the species has been discovered in the Morava river basin in central Moravia (Trávníček & Hroneš

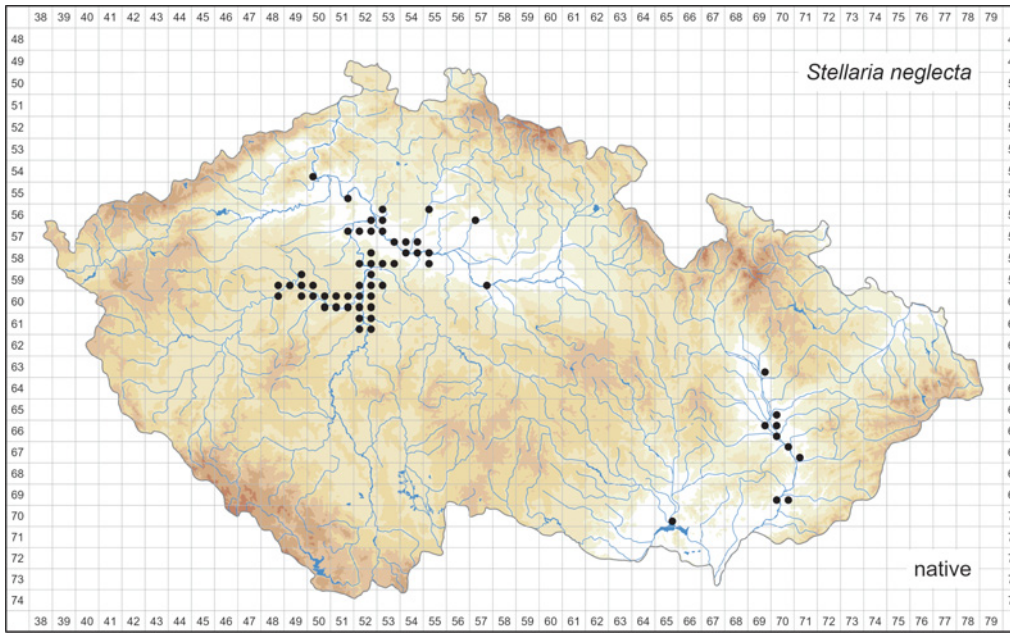



**Fig. 81.** Distribution of *Stellaria neglecta* in the Czech Republic (60 occupied quadrants). Prepared by Zdeněk Kaplan.

2021). Finally, additional specimens have been discovered in herbaria, previously mostly preserved misidentified or unidentified. Up to now about two hundred sites have been documented, and more are likely to be discovered through further targeted field survey. Nevertheless, the species remains geographically restricted because of its ecological specialization. *Stellaria neglecta* is classified as vulnerable (Grulich 2012).

*Stellaria nemorum* (Fig. 82)

*Stellaria nemorum* is native to Europe, the Caucasus Mts, Transcaucasia and Anatolia. In Europe it occurs in Great Britain, the northern part of the Iberian Peninsula and almost continuously from western France as far as the Ural Mts. However, it is absent from the southernmost parts of the Mediterranean area, including the Mediterranean islands of Corsica, Sicily and Crete. In Asia it is replaced by the very similar and closely related *S. bungeana* (Meusel et al. 1965, Jalas & Suominen 1983, POWO 2025). It has been introduced into Mexico, Honduras, Bolivia and Peru in the Americas (POWO 2025). *Stellaria nemorum* is a variable species. Some populations from the Mediterranean area, western Europe and Sweden are separated as subsp. *montana*, but the populations found in the Czech Republic represent the typical subspecies. In the Czech Republic *S. nemorum* grows mainly in alluvial forests, ravine forests, herb-rich beech forests, willow galleries on river banks, lowland to montane soft-water springs, *Petasites* fringes of montane brooks and subalpine tall-forb and tall-grass vegetation. The soils are usually moderately rich or rich in nutrients, moderately acidic and well-moistened. In the Czech Republic *S. nemorum* is widespread and occurs from the lowlands up to the high mountains. It is

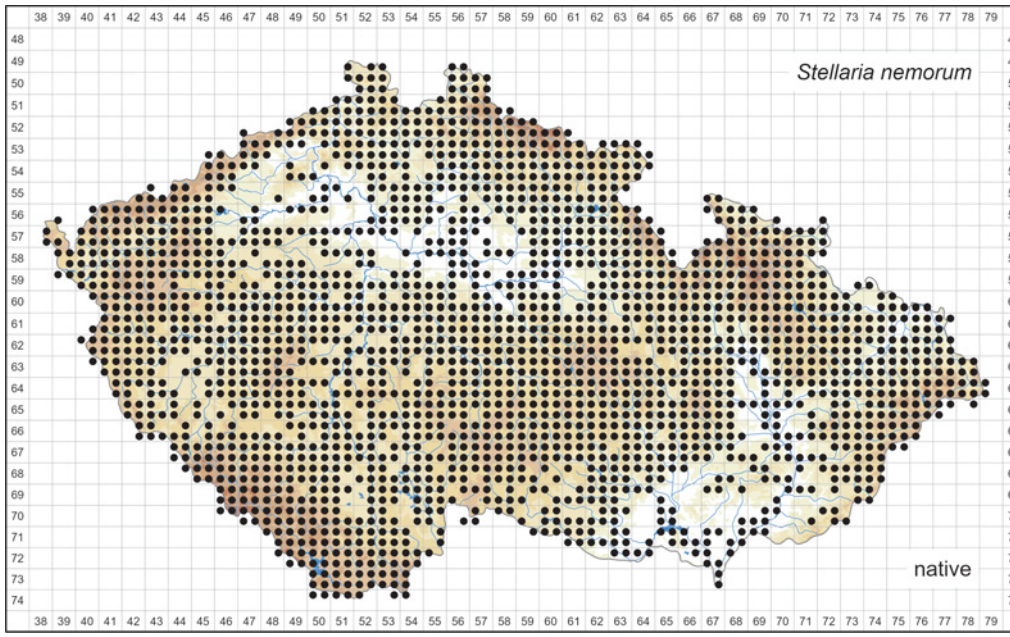



**Fig. 82.** Distribution of *Stellaria nemorum* in the Czech Republic (2,057 occupied quadrants). Prepared by Jiří Danihelka & Zdeněk Kaplan.

rather common and continuously distributed at middle elevations, but locally absent from or rare in warm, dry lowland landscapes from north-western to eastern Bohemia as well as in central and southern Moravia. It reaches its upper elevational limits at ~1,490 m on Mt Luční hora in the Krkonoše Mts and at ~1,445 m on Mt Vysoká hole in the Hrubý Jeseník Mts. The distribution map is based mainly on literature and field records. Considering the number of *Myosoton aquaticum* specimens misidentified as *S. nemorum* that we have seen in herbaria, some of the literature records from the lowlands may be erroneous.

*Stellaria pallida* (Fig. 83)

The distribution of *Stellaria pallida* is imperfectly known because it is often not distinguished from the similar but more widespread *S. media*. It is native to southern Europe, extending into south-western and central Asia and along the Mediterranean coast of northern Africa, with secondary occurrences in Europe reaching as far as north as the British Isles and southern Sweden (Jalas & Suominen 1983, Hultén & Fries 1986). It has also been reported from China (Chen & Rabeler 2001) and as introduced from Japan, southern Africa, southern Australia, North America and southern South America (Miura & Kusanagi 1996, Morton 2005, Hügin 2012, Miller & West 2012, POWO 2025). It has recently been sometimes treated under the name *S. apetala* (e.g. Hügin et al. 2015, Wittig 2019, POWO 2025), following the neotypification of this name (Hügin 2012). In the Czech Republic *S. pallida* is most widespread in frequently mown urban lawns, where it colonizes open patches. It is less frequent in other types of disturbed and dry grasslands, in railway yards, road verges, on trampled ground along walking paths, in pavement

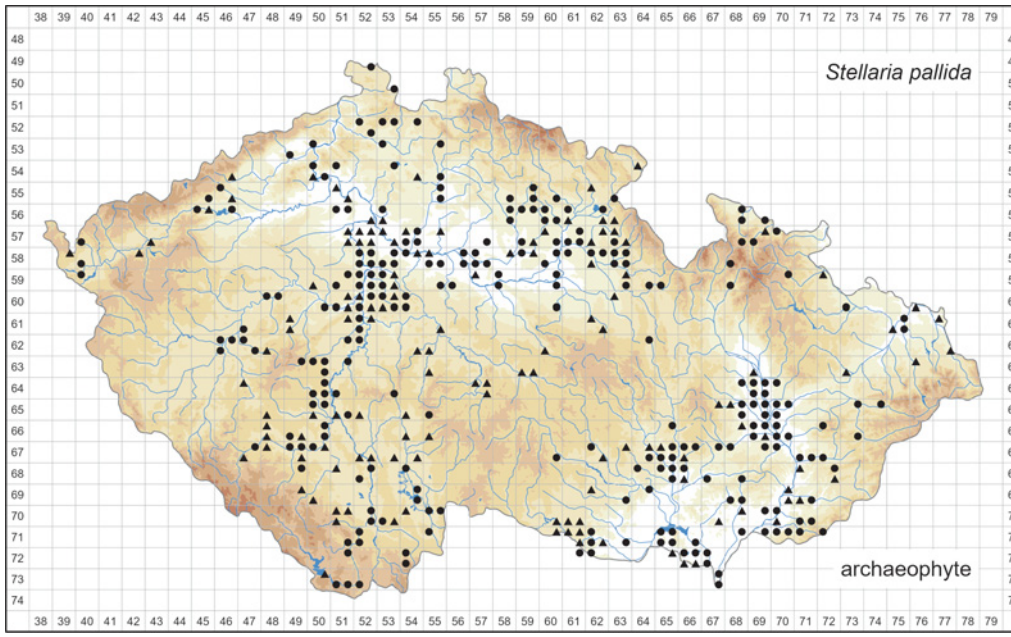



**Fig. 83.** Distribution of *Stellaria pallida* in the Czech Republic: ● occurrence documented by herbarium specimens (263 quadrants), ▲ occurrence based on other records (134 quadrants). Prepared by Zdeněk Kaplan.

joints, at the bases of walls, in flower beds, on soil heaps, and only rarely at the edges of pine and oak forests. It grows on permeable, drought-prone, loamy to sandy soils that are poor to moderately rich in nutrients. Until recently this species was known only from the warm, southernmost Moravia and from about a dozen of sites in central and eastern Bohemia (Dvořáková 1990). However, it may have been overlooked by botanists, partly owing to its short spring life cycle. Over the past two decades it has spread and been recorded at numerous new sites, including areas where it had not previously been observed. At present *S. pallida* is documented from lowlands and hilly areas in most parts of the country. However, the frequency of known occurrences is highly uneven, reflecting differences in recording effort. The species is most frequent in urban lawns in cities, particularly in Prague, Plzeň, Hradec Králové, Brno and Olomouc, where its seeds are likely dispersed through shared mowing equipment. In the Czech flora it is considered to be an invasive archaeophyte (Pyšek et al. 2022).

*Stellaria palustris* (Fig. 84)

*Stellaria palustris* is native to Europe, western Siberia, Mongolia, China and Japan. In Europe, it is absent from its southernmost parts, including the Iberian Peninsula, Corsica, Sicily, Crete and the southern part of the Balkan Peninsula (Jalas & Suominen 1983, POWO 2025). In the Czech Republic *S. palustris* occurs mainly in tall-sedge beds, acidic moss-rich fens and peatland meadows, transitional mires, alluvial meadows of lowland rivers and wet *Cirsium* meadows, rarely also in alder carrs. The soils are usually nutrient-poor to moderately nutrient-rich, moderately acidic to slightly basic, wet and poorly

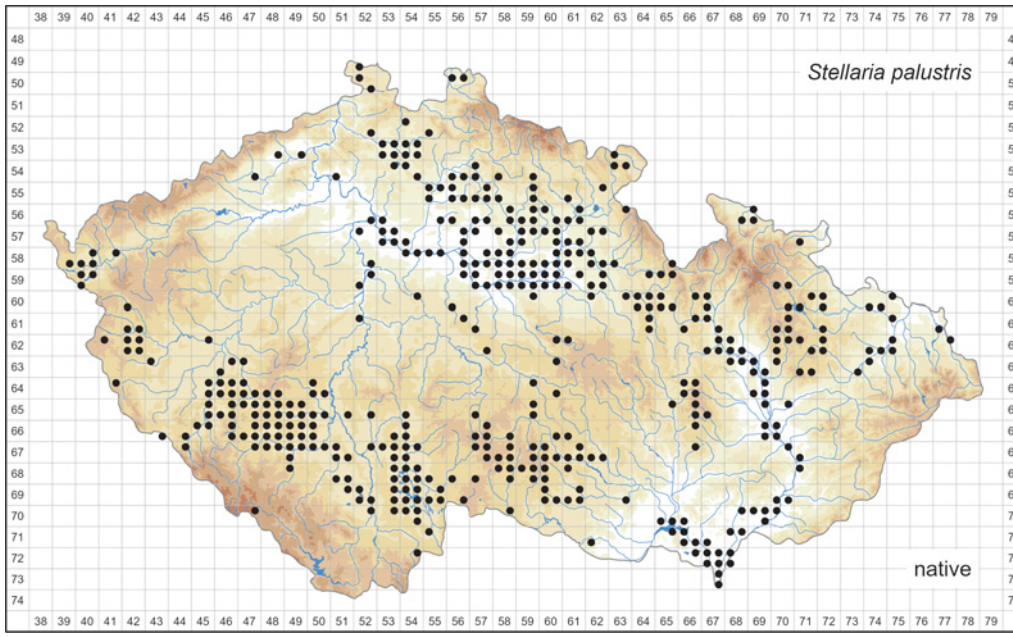



**Fig. 84.** Distribution of *Stellaria palustris* in the Czech Republic (438 occupied quadrants). Prepared by Jiří Danihelka & Zdeněk Kaplan.

aerated. In the Czech Republic *S. palustris* occurs in the basins and alluvia of lowland rivers, such as in the middle and eastern parts of the Labe river in Bohemia, along the Dyje and Morava rivers in Moravia, as well as in fishpond landscapes in northern, south-western and southern Bohemia, and in the Českomoravská vrchovina highlands. Additional occurrences are scattered across some other parts of the country. Most of the occurrences are in lowlands and hilly landscape up to elevations of ~600 m. The species reaches its elevational maximum of ~655 m near the village of Hory west of the town of Třebíč in the Českomoravská vrchovina highlands. In contrast, it is absent from or rare in high mountains, large parts of north-western and south-central Bohemia and the Carpathian part of Moravia. *Stellaria palustris* is classified as endangered due to its rarity and assumed decline (Grulich 2012). The map is based mainly on herbarium specimens because numerous specimens of *S. graminea* in herbaria were originally misidentified as *S. palustris*. Consequently, some undocumented records may be erroneous.

*Stellaria ruderalis* (Fig. 85)

*Stellaria ruderalis* is a recently described species (Lepší et al. 2019). It was first distinguished in the Czech Republic and subsequently recorded also in Slovakia, Austria, Hungary, Slovenia, Croatia, Serbia, Italy and Greece (Lepší et al. 2019). Since then it has also been reported from additional European countries including Germany (Bomble 2020, Rätzel et al. 2020, Wünsche 2024), Ukraine (Novikov et al. 2020) and Spain (Sáez 2020) as well as from Tunisia (El Mokni et al. 2023) and the Caucasus Mts (Novák et al. 2025). In the Czech Republic *S. ruderalis* grows mainly in disturbed ruderal or semi-ruderal

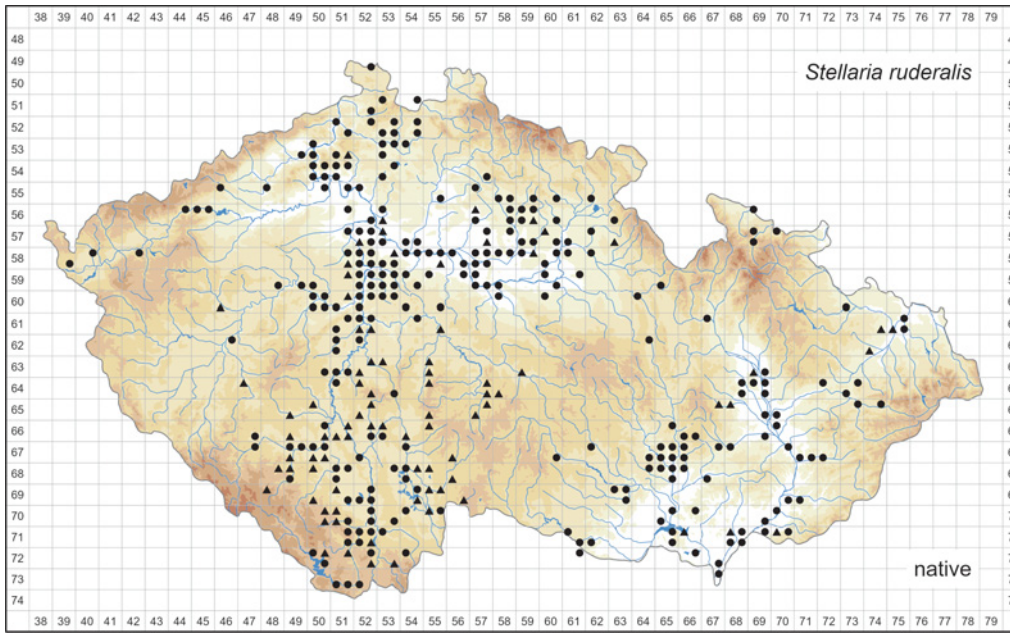



**Fig. 85.** Distribution of *Stellaria ruderalis* in the Czech Republic: ● occurrence documented by herbarium specimens (263 quadrants), ▲ occurrence based on other records (84 quadrants). Prepared by Zdeněk Kaplan.

sites such as urban lawns, bare patches under scrub and trees in settlements and along roads, in roadsides, railway yards, at the bases of walls, and as a weed in flower beds. It has also been recorded in semi-natural to natural habitats, including along forest roads and paths, on river banks and rarely in open-canopy deciduous forests. The species prefers fresh to moist, loose, loamy soils rich in humus and nutrients. We have not recorded it as a weed in arable fields, which is one of the principal habitats of the similar *S. media*. As *S. ruderalis* has only recently been distinguished, its distribution remains insufficiently known and the map is consequently markedly incomplete. Most records are from areas where the species has been specifically sought by taxonomic experts. However, it is probably widespread in lowlands and hilly areas in this country.

*Stuckenia pectinata* (Fig. 86)

*Stuckenia pectinata* is a cosmopolitan species, being absent only from arctic regions, high mountains, tropical rainforests and extremely dry areas without water bodies. It is most frequent in the sub-boreal and temperate zones of the Northern Hemisphere. It is widespread across Europe except Iceland, Svalbard and northern inland Scandinavia (Hultén & Fries 1986). In Asia it is distributed in southern Siberia northwards to 68°N (rarely extending beyond the Polar Circle), eastwards to Chukotka, Kamchatka and Japan, and southwards to Oman, Sri Lanka, Myanmar and Taiwan; outposts occur in the Philippines and on the islands of Sumatra, Bali and Sulawesi (Kaplan 2008). In Africa it is scattered mainly in its northernmost and southern parts and along the Great Rift Valley; in contrast, it is rare in or absent from West Africa, most of the Sahara Desert and from the

zone of tropical rainforests (Meusel et al. 1965, Kaplan unpubl.). In North America *S. pectinata* occurs in western Canada and from southern Canada southwards through the USA to Mexico (Haynes & Hellquist 2000). Its distribution in Central and South America is highly disjunct and poorly known due to unclear delimitation from *S. striata*; reliable herbarium vouchers come from Guatemala, Bolivia and Argentina (Kaplan unpubl.). In the Czech Republic *S. pectinata* grows in a wide range of aquatic habitats, including fishponds, fish storage ponds, shallow water reservoirs, middle and lower courses of rivers, streams, irrigation ditches, canals, oxbow lakes, wetland pools, lakes in abandoned sand, coal and clay pits, wetlands in abandoned stone quarries and coal-mining subsidence ponds. It occupies mainly mesotrophic to eutrophic, mineral-rich, standing or running waters over clayey, sandy and gravelly substrates, often with a layer of organic mud, but avoids dystrophic waters. The species tolerates increased turbidity and is also able to withstand salinity and may therefore occur in brackish waters. It is also one of the few species that can thrive even in hypertrophic waters, provided they are flowing. *Stuckenia pectinata* is widespread in this country, but with an uneven, patchy distribution. Its populations are concentrated mainly in fishpond areas and rivers and their floodplains in lowlands and at middle elevations. In contrast, the species is rare in or absent from the mountains, cold areas with acidic bedrock and peaty substrates, and dry and large forested areas lacking suitable habitats. It may have been less frequent in the past but expanded as a result of eutrophication and liming of fishponds in the second half of the 20th century (Šumberová 2011c).

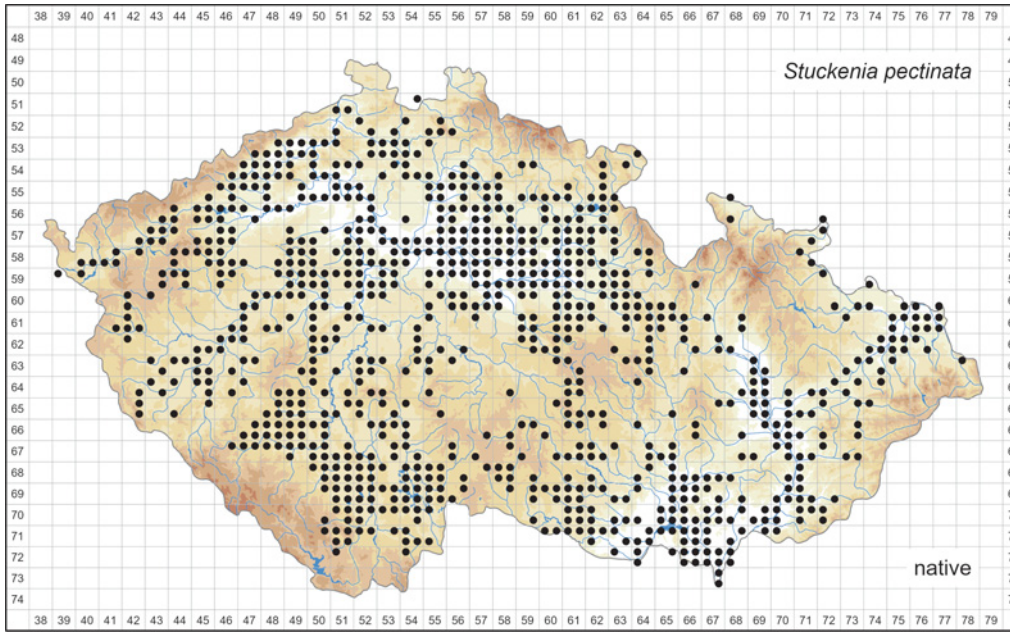



**Fig. 86.** Distribution of *Stuckenia pectinata* in the Czech Republic (898 occupied quadrants). Prepared by Zdeněk Kaplan.

*Ventenata dubia* (Fig. 87)

*Ventenata dubia* is predominantly a European species with several mutually isolated distribution areas across the continent. The centre of the species' distribution lies in the Pannonian basin and adjacent areas of south-eastern Europe, extending as far south as Albania and northern Greece, and further east into Romania, Bulgaria, southern Ukraine and Crimea. Other larger distribution areas occur in central and southern France, central Germany and Bohemia. Rare occurrences are also known from numerous outposts on the Iberian Peninsula, in Italy and Sardinia, the Caucasus, Anatolia and northern Africa. The species has been introduced to the British Isles, as well as to extensive areas of the United States and Canada (particularly in the western part of the continent), where it is invasive (Meusel et al. 1965, Alomran et al. 2019, POWO 2025). *Ventenata dubia* is an annual grass with low competitive ability, probably incapable of forming a long-term soil seed bank (Innes 2022). In the Czech Republic it grows in disturbed dry grasslands, stony slopes, along dirt roads, in arable field margins and on fallow land, mainly in moderately warm hilly areas. It occurs on shallow, stony or sandy, often compacted soils that are generally nutrient-poor, most frequently on acidic bedrock or on basalt. In this country the species has been recorded scattered from north-western and western Bohemia, the broader area of the Vltava river valley south of Prague, south-western Moravia and Drahanská vrchovina highlands in central Moravia, elsewhere only sporadically. The elevational maximum recorded is ~770 m near the settlement of Bražec in the Doupovské hory Mts. The species has probably never been common in the territory of the Czech Republic but may have been overlooked due to its inconspicuous appearance. Its populations have

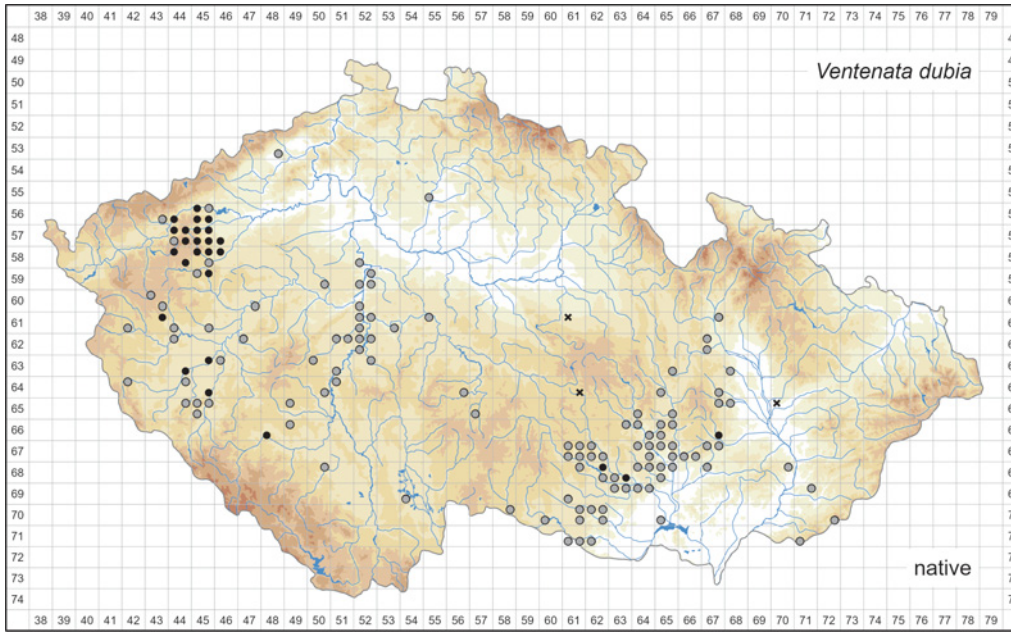



**Fig. 87.** Distribution of *Ventenata dubia* in the Czech Republic: ● at least one record in 2000–2025 (26 quadrants), ◍ pre-2000 records only (112 quadrants), × alien only (3 quadrants). Prepared by Jan Prančl.

since strongly declined because of the abandonment of traditional management in dry grasslands, eutrophication of countryside and agricultural intensification. Since 2000, a larger number of sites has been recorded only in the Doupovské hory Mts and their foothills. Elsewhere *V. dubia* was found only at five localities in western and south-western Bohemia and at three localities in south-western and central Moravia. Consequently, it is classified as critically threatened (Grulich 2012). The threat facing the species in the Czech Republic contrasts with the situation in the Pannonian basin in Slovakia and Hungary, where it appears to be expanding (Eliáš 2022, Dudáš et al. 2024).

## Supplementary materials

**Data S1–S87.** Records used for producing maps.

Supplementary materials are available at https://www.preslia.cz.

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## Rozšíření cévnatých rostlin v České republice. Část 15

Patnáctá část ze série prací o rozšíření cévnatých rostlin v České republice obsahuje síťové mapy a komentáře k 87 taxonům rodů *Asperugo*, *Bassia*, *Brunnera*, *Bupleurum*, *Coeloglossum*, *Cotoneaster*, *Goodyera*, *Groenlandia*, *Herminium*, *Myosoton*, *Omphalodes*, *Orchis*, *Pleurospermum*, *Potamogeton*, *Rapistrum*, *Sclerolaena*, *Sedobassia*, *Stellaria*, *Stuckenia* a *Ventenata*. Základem jsou údaje získané excerpcí herbářů a literatury, terénní zápisy a databázové údaje, které prověřili taxonomičtí experti. Mezi mapovanými rostlinami jsou jak druhy původní, tak nepůvodní, a zastoupena je široká škála ekologických skupin, od bylin rostoucích v suchých trávnících, na ruderálních stanovištích a v lesích až po ponořené vodní druhy a nepůvodní zplaňující dřeviny. V této části seriálu také pokračuje mapování orchidejí, které patří k nejrychleji ustupujícím skupinám rostlin, a získané poznatky tak poskytují cenné podklady pro ochranu přírody. Téměř polovina zde zpracovaných druhů je uvedena v národním červeném seznamu. Příkladem jsou kriticky ohrožené taxony *Bassia prostrata*, *Groenlandia densa*, *Potamogeton coloratus* a *P. praelongus*, z nichž každý se dnes nachází na své poslední lokalitě v České republice, a dále *Bupleurum affine*, *B. tenuissimum* a *Goodyera repens*, které přežívají již jen v několika nepočetných izolovaných populacích. Čtyři druhy, jmenovitě *Bassia laniflora*, *Herminium monorchis*, *Potamogeton compressus* a *P. friesii*, u nás nebyly po desetiletí pozorovány a patří tak mezi druhy vyhynulé. Z nepůvodních druhů se stala invazní pouze *Bassia scoparia*, ostatní jsou převážně náhodně zavlečené nebo zplaňující druhy. Čtyři dříve zavlečené neofyty, *Bupleurum croceum*, *Rapistrum rugosum*, *Sclerolaena tricuspis* a *Sedobassia sedoides*, již v České republice nerostou. Zvláštní pozornost je věnována rodu *Cotoneaster*, jehož diverzita u nás byla teprve nedávno plně rozpoznána a taxonomicky vyhodnocena, přičemž bylo rozlišeno 22 zplaňujících druhů. Rozšíření jednotlivých taxonů je znázorněno na síťových mapách a podloženo záznamy uloženými v databázi Pladias a v přílohách tohoto článku. U nejvíce ustupujících druhů je odlišeno stáří výskytu v jednotlivých kvadrantech pomocí různých symbolů. 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.

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