**Achillea ptarmica (Asteraceae), a scarce and less known species of the Slovak flora**


Abstract: The distribution of *Achillea ptarmica* in Slovakia was studied using herbarium specimens deposited in 22 public herbaria. The herbarium studies were supplemented with targeted field search. The species has been recorded in 28 phytogeographical districts and sub-districts but most of the records are concentrated in the Záhorská nížina lowland in western Slovakia, in the Slovenské stredohorie Mts. in central Slovakia and in the Slovenské rudohorie Mts. in eastern Slovakia. While most of the occurrences once recorded in the Pannonian part of the country vanished, many new populations were recently found in the Carpathians. Our results show that the evaluation of the species as near threatened (NT) in the recent version of the Slovak Red List is correct.

Keywords: Compositae, distribution, garden escape, ornamental plants, phytogeography, Slovakia, sneezewort.

**Introduction**

The genus *Achillea*, naturally distributed in Eurasia, northern Africa and North America, includes about 130 perennial allogamous species. Its members occur in various habitats including semideserts, sea coasts, moist meadows, alpine
The genus was traditionally divided into five sections but recent phylogenetic studies have shown that also the western Mediterranean genera *Onanthus* and *Leucocyclus* have to be merged with *Achillea*, the former as a section of its own (Ehrendorfer & Guo 2005). The same authors also considerably restricted the traditionally broadly circumscribed and heterogeneous *A. sect. Ptarmica* by separating the plants of mountain habitats of central and southern Europe as *A. sect. Anthemoideae*. In its recent narrow and more natural circumscription *A. sect. Ptarmica* includes about 10 species mainly of humid and moderately dry lowland habitats in the temperate zone of Eurasia (Meusel & Jäger 1992; Ehrendorfer & Guo 2006), with only one species distributed also in the boreal zone of North America (Trock 2006). Of those only *A. ptarmica* and *A. salicifolia* occur in central Europe, the latter being restricted to the easternmost part of Germany and Polish Silesia.

*Achillea ptarmica* L., Sp. Pl. 2: 898 (1753) [= *Ptarmica vulgaris* DC. Prodr. 6: 23, 1838] is the only species of *Achillea* sect. *Ptarmica* native to Slovakia. Its distribution range includes most of Europe, reaching as far as France and the British Isles in the west, Scandinavia and the Saint Petersburg area in the north, the western bank of the Odra River in Poland and northern Ukraine in the east, as well as northern Italy, Slovenia, Serbia and Romania in the south and southeast. It has become naturalized in Canada, the United States (including Alaska), Australia and Tasmania; it was also recorded in Iceland (Meusel & Jäger 1992; Surches & Edwards 1998; Danhelka 2004; Trock 2006).

*Achillea ptarmica* is a perennial herb with a creeping rhizome. Stem (20–)30–100 cm tall, erect, terete, simple or rarely branched above. Leaves simple, sessile, not divided or rarely pinnatilobed, linear to linear-lanceolate, 3–7 cm × 2.5–6 mm, margin 1–2× serrate. Flower heads in a corymbous panicle, 5–36(–49) in number, ± 15 mm in diameter. Involucrum bowl-shaped to hemispheric, 3–4.6 mm long; involucral bracts narrowly ovate, with brown membranous margin, loosely tomentose. Ray flowers (5–)8(–13), ligule broadly elliptic, 2.8–5.0 × 2.2–4.6 mm, shallowly 3-toothed at the tip. Disc flowers numerous, tubular, small, yellow. Achenes cuneate in outline, 1.5–2 × 0.8–1.0 mm. Flowering time from July to September (Danhelka 2004). The species is diploid with 2n = 18; the only count from Slovakia (Hindáková in Majošák et al. 1974) corresponds to about 70 counts from other parts of the species’s range currently registered in the Chromosome Counts Database (Rice et al. 2015).

*Achillea ptarmica* was used in folk medicine and also as a magical plant (Futák 1946; Dostál 1989; Hanelt 2001). It has been sometimes cultivated as an ornamental, more frequently in double- and semi-double-flowered cultivars (Fig. 1; Dostál 1989; Thorton-Wood 2000), usually referred to as *flore pleno*, and it is also available in some garden shops. The species easily escapes from cultivation. For this reason, it is often very difficult to distinguish between indigenous populations and those derived from garden escapes.
JÁVORKA (1924–1925) reported the occurrence of *Achillea ptarmica* in the present Slovakia only for the former counties of Túróc (Turčianska župa), Zólyom (Zvolenská ž.), Nógrád (Novohradská ž.) and Gőmőr (Gemerská ž.). DOSTÁL (1958) knew it only from the surroundings of the town of Malacky in westernmost Slovakia. HENDRYCH (1963) was the first to summarize the species’ records from the country in a map (p. 11), listing only ten localities in central and eastern Slovakia. Later ŠPÁNIKOVÁ (1971) added a further four localities from eastern Slovakia from the south-western part of the Košická kotliná Basin.

*Achillea ptarmica* is included in the local Red Lists of vascular plants of the Morava River floodplain (ŐTAHEĽOVÁ et al. 1997) and of the Volovské vrchy Mts. (MRÁZ & MIKOLÁŠ 1996). In the latest version of the Slovak Red List (ELIÁŠ et al. 2015) the species is evaluated as near threatened (NT). It is generally considered rare in Slovakia but no recent comprehensive information on its distribution exists. The purpose of this study is to summarize the records of *A. ptarmica* in the country and to reassess its conservation status, based on exact information.

**Materials and methods**

The study and field research was done mainly in the years 2013–2016. As the source of species’ records we used herbarium specimens, published and unpublished studies on flora and vegetation, and unpublished field notes. We used specimens from 22 public Slovak, Czech, Hungarian and Austrian herbaria, including BP, BRA, BRNM, BRNU, GM, HUM, KO, LTM, MOP, MP, MPS, NI, OLM, PR, PRC, SAV, SLO, SMBB, SNV, TNP, TYM and W, while in many other Czech and Slovak herbaria no specimens from Slovakia were found. Herbarium codes follow THIERS (2017). The map was designed in the program ArcGis, version 9.2. The mapping grid follows the traditionally used CEBA (Central European Basic Area) grid template described by NIKLFELD (1971), divided into quadrants of 5 × 3 arc minutes (corresponding to approximately 5.5 × 5.9 km). A list of revised specimens and other records is provided in Appendix 1. The information on habitat type was extracted from herbarium labels and supplemented by field observations. Taxonomy and nomenclature of vascular plants follow MARHOLD & HINDÁK (1998).
Results and discussion

Distribution in Slovakia

Altogether we have seen 93 herbarium specimens (apart from duplicates) and collected further at least 58 published and unpublished records not supported by herbarium specimens. A full list of records is given in Appendix 1. All herbarium specimens were identified correctly. Compared to the other Achillea species found in Slovakia, A. ptarmica is a distinct and the easiest to identify species of the genus: the usually undivided linear-lanceolate leaves toothed on the margin and large flower heads are particularly diagnostic.

Achillea ptarmica has been found in Slovakia altogether in 28 phytogeographic districts. Of those seven are situated in the area of the Pannonian flora (Pannonicum) and twenty-one in the area of the Carpathian flora (Carpathicum).

As shown in Fig. 2, most of the species’ localities are concentrated in three parts of the country. The first and in the same time the smallest area is situated in the west in the Záhorská nížina lowland of the area of the Pannonian flora. Achillea ptarmica occurs there in the surroundings of the town of Malacky, in the floodplain of the Morava River and at several places along streams and on the shores of fishponds. Its occurrence has been documented there since the 1920s; the earliest specimens were collected mainly by S. Staněk. From these sites A. ptarmica may have spread downstream to the localities along the Danube River in the Podunajská nížina lowland near the city of Bratislava and near the towns of Kolárovo and Moča.

![Fig. 2. Distribution of Achillea ptarmica in Slovakia: ● – plants with normal flowers (70 occupied quadrants), ○ – only semi double- and double-flowered plants (8 occupied quadrants), x – plants escaped from cultivation (7 occupied quadrants).](image)
The second and largest compact distribution area of *Achillea ptarmica* is situated in central Slovakia. It includes mainly the southern and north-eastern parts of the Slovenské stredohorie phytogeographic district of the area of the Carpathian flora (sub-districts Štiavnické vrchy Mts., Javorie Mts., and Poľana Mts.). The earliest species’ record from the country also originated from this area: P. Kitaibel found *A. ptarmica* near the town of Banská Bystrica as soon as in 1804 (KANITZ 1863). However, only a few records have been collected since then, and HLAVAČEK (1985), for instance, regarded the species in the Štiavnické vrchy Mts. as very rare. As shown by our study, *A. ptarmica* is found in the Javorie Mts. and Poľana Mts. at numerous sites, and new populations are still being found, for example, in the surroundings of the Detva town (Fig. 2, Appendix 1). The species’ occurrences continue towards the south to the Ipeľsko-rimavská brázda phytogeographic district at the northern edge of the area of the Pannonian flora, where a few localities have been known since the 1860s (e.g. FÁBRY 1867).

The third, also a rather compact distribution patch of *Achillea ptarmica* is situated in eastern Slovakia in the eastern part of the Slovenské rudohorie phytogeographic district. Most of the populations were discovered around the town of Gelnica about 15 years ago (MRÁZ & MRÁZOVA 2003). The earliest gathering of *A. ptarmica* from this area is that by L. de Thaisz from 1908. Unfortunately, the locality information on its label says only *Abauj-Torna Megye, Kassa [= Košice]*. It may have been collected in the alluvium of the Vrbica stream or in wet meadows on Kamenný Hrb Hill (48°45'10"N, 21°9'46"E) about 8 km north-west of the city. At the latter site the species forms a large and vital population consisting of hundreds of flowering and thousands of sterile plants, as confirmed by our field observations (DUDÁŠ 2015). Among plants with normal flowers, three double-flowered plants were found.

*Achillea ptarmica* is present also in the adjacent area of the Pannonian flora, i.e. in the Slovenský kras karst, the Košická kotliná Basin and in the Borsod-Abaúj-Zemplén county in north-eastern Hungary (BARTHA et al. 2015; VÍRÖK et al. 2016). While the presence of *A. ptarmica* at its former Slovak localities in this area has not been confirmed recently (R. Šuvada in verb. and our field research), it is still present in the adjacent Hungarian territory (SOMLYAY & LŐKÖS 1999; SIMON 2006; SZÚCS & BARINA 2007; R. Šuvada in verb.).

From easternmost Slovakia only five records of *Achillea ptarmica* exist, most of them from the Carpathians. Three of these records are recent. The populations near the village of Dargov and in the Ruské sedlo pass consist of a small number of individuals, while the largest population in the Pod Ruským Nature Reserve harbours dozens of flowering plants, as observed in 2015. Actually, the number of plants at the latter site may be even larger because the meadow was freshly mown during the site inspection. In general, *A. ptarmica* is rare in the Eastern Carpathians, and KRICSFALUSI & BUDNIKOV (2007) classified *A. ptarmica* as vulnerable (VU) in the Red List of the Ukrainian Carpathians.
The situation in north-western and northern Slovakia is not very different. *Achillea ptarmica* occurs there as scattered (13 quadrants occupied by plants with normal or double flowers). With the only exception being those in ruderal habitats, it is difficult to assess the origin of these populations. Even some of those found in wet meadows may have been founded by plants escaped from cultivation, e.g. self-sown or from garden waste brought to the place, or they may represent direct relics of cultivation in abandoned settlements. Frequent cultivation of double-flowered plants is reported, for instance, by DOSTÁL (1989) for the whole of the former Czechoslovakia. In a local study, MIGRA (1983) listed *A. ptarmica* as a frequently cultivated ornamental plant, which had been able to escape into suitable habitats around former villages and settlements and to persist there for decades. The occurrence in the Gaderská valley was reported by FÁBRY (1880: 51) and repeatedly cited by later authors but it has not been confirmed ever since (KLIMENT & BERNAŤOVÁ 1996). However, it is also possible that some populations are indigenous because *A. ptarmica* is rather frequent in south-eastern Poland (ZAJĄC & ZAJĄC 2001).

The considerations about the status (indigenous versus introduced) concern more or less the majority of *Achillea ptarmica* populations in the country. Slovakia is situated close to the eastern limits of its total distribution range, where the species is becoming progressively rare towards the east. A comparison is possible, for instance, with the distribution pattern in the Czech Republic, where *A. ptarmica* is widespread at middle and higher altitudes of Bohemia, much less so in the Moravian part of the Bohemian massif and rare to scarce in eastern Moravia, where it is somewhat more frequent only in the Carpathians. Some of the populations at lower altitudes of central and southern Moravia may represent temporary outposts (spread along streams and rivers) and even more frequently garden escapes. Among 1214 revised herbarium specimens from the Czech Republic the share of double-flowered and semi double-flowered plants was about 5.5%, and the frequency of such plants increased towards the east. The share of double-flowered plants among the specimens from Slovakia was even higher, namely 11%. This suggests that also the proportion of populations established by plants escaped from cultivation is larger in Slovakia than in the Czech Republic. However, at least plants with semi double-flowers may probably arise in nature by spontaneous mutations and co-occur with plants bearing normal flowers, while some double-flowered cultivars are not true-breeding (MACLACHLAN et al. s.a.). Not all double-flowered plants are therefore necessarily garden escapes and, vice versa, also plants with normal flowers may be progeny of garden escapes or relics of cultivation for ornamental or medicinal purposes. Consequently, there is no clear-cut decision, and status of many populations will always remain uncertain.

**Habitats**

*Achillea ptarmica* requires non calcareous and permanently wet soils. It occurs mainly in wet meadows of the alliance *Calthion palustris*, less frequently also in meadows of the alliance *Molinio caeruleae*, which are wet in spring but mesic
in summer, and perhaps also in alluvial meadows of the alliance \textit{Deschampsiion cespitosae}. Apart from wet and fen meadows it is also found around springs, on stream-sides and along ditches, in shrubberies and openings of alluvial forests, as well as in various types of humid ruderal habitats. The most frequently co-occurring species are \textit{Agrostis canina}, \textit{Anthoxanthum odoratum}, \textit{Betonica officinalis}, \textit{Briza media}, \textit{Carex flava}, \textit{C. hirta}, \textit{C. nigra}, \textit{C. panicea}, \textit{Cirsium palustre}, \textit{Dactylorhiza majalis}, \textit{Deschampsia cespitosa}, \textit{Filipendula ulmaria}, \textit{Lysimachia vulgaris}, \textit{Molinia caerulea}, \textit{Potentilla erecta}, \textit{Ranunculus acris}, \textit{R. flammula}, \textit{Sanguisorba officinalis}, \textit{Selinum carvifolia}, \textit{Serratula tinctoria} and \textit{Succisa pratensis}.

\textbf{Threats and conservation status}

An attempt to analyse the changes in the distribution of \textit{Achillea ptarmica} in time is shown in Fig. 3. Keeping in mind the history of the research into the flora of Slovakia, the graph has to be interpreted with caution. Because of general scarcity (and local decline), the species was included already into the first version of the Slovak Red List (\textsc{Maglocky} 1983), and it has remained red-listed ever since (\textsc{Maglocky} \& \textsc{Feraková} 1993; \textsc{Feraková} et al. 2001; \textsc{Eliáš} et al. 2015). The slight increase in the number of records and occupied quadrants since 2001 may be best explained by more intense research, particularly due to habitat mapping for the Natura 2000 network (\textsc{Šefferová Stanová} et al. 2015). Thus, can we still consider \textit{A. ptarmica} an endangered species? Fig. 4 offers a response. While the number of occupied quadrants in the Carpathians increased twice, the number of occupied quadrants in the Pannonian area has fallen by two thirds when compared with the situation until 1950. The reasons are well known. The lowlands of Slovakia have turned into intensively managed agricultural landscape since the end of the 19th century (e.g. \textsc{Španíková} 1982, 1985; \textsc{Kubalová} 2003; \textsc{Šefferová Stanová} 2015). River regulations, drainage and conversion of lowland meadows and pastures to arable land were the main causes for \textit{A. ptarmica} habitat loss in the Pannonian area, particularly in the phytogeographic districts of the Podunajská nížina lowland, the Slovenský kras karst and the Košická kotlina Basin. In these areas we failed to confirm the presence of \textit{A. ptarmica} at any of the previously reported sites (see Appendix 1). The Záhorská nížina lowland is the only part of the area of the Pannonian flora where \textit{A. ptarmica} has survived until now. It occurs there mainly in alluvial meadows along the Morava River, which were not managed intensively in the past due to their position in the border zone with restricted access until the late 1980s (\textsc{Šeffer \& Stanová} 1999). However, this habitat is currently under threat by spread of invasive plant species (\textsc{Uherčíková} 1997; \textsc{Jarolímek} et al. 1999).

For these reasons, we believe that the classification of \textit{A. ptarmica} as near threatened (NT) in the latest Slovak Red List of ferns and flowering plants (\textsc{Eliáš} et al. 2015) is correct. The decline of \textit{A. ptarmica} was observed also in other countries of Central Europe, therefore it is considered near threatened in Hungary (\textsc{Király} 2007) and endangered (EN) in Austria (\textsc{Niklfeld \& Schratt-Ehrendorfer} 1999).
Fig. 3. Frequency of *Achillea ptarmica* in four different time periods in Slovakia. Numbers of occupied quadrants of the CEBA grid template are given separately for plants with normal flowers (grey) and for semi double-flowered and double-flowered plants (white).

Fig. 4. Frequency of *Achillea ptarmica* expressed as numbers of occupied quadrants of the CEBA grid template in four different time periods in the area of the Carpathian (grey) and Pannonian (white) flora. Only records of plants with normally developed flowers from non-ruderal (natural and semi-natural) habitats are included.
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References


Appendix 1. List of revised herbarium specimens, published and unpublished records

For herbarium specimens the collector, year of collection and herbarium are given; herbarium codes follow THIERS (2017). References for published records from sources not listed in References chapter are given in an abridged form including the page of a particular Achillea ptarmica record. For unpublished field records the year is given, followed by the name(s) of its author(s). Records are arranged following the phytogeographical division of Slovakia by FUTÁK (1980) and assigned to the quadrants of the CEBA grid template (for its description see NIKLFELD 1971). Locality information was translated into English but in some instances place names are given in the original language in parentheses. Abbreviation: rkm – river km.

Plants with normal flowers

107


Double-flowered and semi-double-flowered plants


Cultivated plants

Doubtful records

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