

## Occurrence of *Taraxacum serotinum* (Waldst. et Kit.) Fisch. (sect. *Dioszegia*) in Slovakia

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Abstract: Historical and recent occurrence of a rare dandelion *Taraxacum serotinum* (Waldst. et Kit.) Fisch. in the area of Slovakia was studied. Herbarium specimens deposited in 16 herbaria were revised and field research during 2009–2015 was carried. In total, 76 localities were recorded, but only 16 sites have been confirmed or newly found at the present. *Taraxacum serotinum* is recently considered as an endangered species (EN) of the Slovak flora. Distribution map of the historical and recent locations of the species is given.

Keywords: *Taraxacum serotinum*, endangered species, distribution, Slovakia.

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### Introduction

The genus *Taraxacum* Wigg. is a taxonomically complicated genus divided into ca. 55 sections (KIRSCHNER & ŠTĚPÁNEK 1997). According to TRÁVNÍČEK & VAŠUT (2011) ancestral sections comprise only a few species and these are usually diploid sexuals (e.g. sections *Piesis*, *Dioszegia*, etc.). Advanced sections consist of tens or even hundreds of apomictic microspecies and usually only one or two diploid sexual species (e.g. sections *Ruderalia*, *Erythrosperma*).

Section *Dioszegia* (Heuffel) Heuffel Verh. K. K. Zool.-Bot. Ges. Wien 8: 148 (1858). is evolutionarily primitive section of the genus *Taraxacum* widely-spread in a little areole in SW Europe and in ± continuous area in SE Europe and SW Asia from Anatolia to Middle Asia and to Afghanistan. There are 2 – 3 obligatorily sexually reproducing and probably diploid species bound to arid biotopes, growing in well drain deep soils (ZEISEK et al. 2015). Only one species – *Taraxacum serotinum* naturally occurs in the Central Europe (KIRSCHNER & ŠTĚPÁNEK 1997; KIRSCHNER et al. 2011).

*Taraxacum serotinum* (W. et K.) Fisch. Catal. Jard. Gorenki, p. 34 (1812) [= *Leontodon serotinus* W. et K., Descr. Icon. Pl. Hung. 2: 119 (1802); = *Dioszegia crispa* Heuffel, Z. Natur-Heilk. Ungarn 1854: 177 (1854); = *Taraxacum crispum* (Heuffel) Heuffel, Verh. Zool.-Bot. Ges. Wien 8: 148 (1858); = *Taraxacum libanoticum* DC., Prodr. Syst. Natur. 7: 149 (1838)] is sexually reproducing alogamic species naturally occurring in the Central and SE Europe (the Czech Republic, Slovakia, Austria, Liechtenstein, Hungary, Croatia, Romania, Bulgaria, Ukraine, Greece, Moldavia, Kosovo, Serbia), France, Macedonia, the European part of Russia, Azerbaijan, Armenia, Georgia, Lebanon, Turkey, Syria, Iran, Kazakhstan, Turkmenistan and the Middle Asia. It is possibly introduced in Slovenia (KIRSCHNER et al 2007+). In the Central Europe, the species belongs to rare and vanishing species. It is evaluated as endangered (EN) in Austria (NIKLFELD & SCHRATT-EHRENDORFER 1999), Slovakia (TURIS et al. 2014; ELIÁŠ et al. 2015) and the Czech Republic (GRULICH 2012) and it is included in the category “near threatened” (NT) in Hungary (KIRÁLY 2007).

According to KIRSCHNER et al. (2002, 2011) the species is 12–35 cm high perennial plant densely brownish aranose at base. Leaves are usually appressed to ground in basal rosette, subcoriaceous, leaf surface often swollen at hair base, not shiny, dark green to greyish green, not spotted, sometimes suffused purplish in the upper part. Leaf blade oblong, elliptical to obovoid, 10–20 × 2.5–5.5 cm, obtusely acute to rounded at apex, densely irregularly denticulate, or pinnatilobed to pinnatisect. Terminal leaf segment triangular to broadly ovate, rounded to obtusely acute, distal margin convex, denticulate, proximal margin straight to concave, denticulate, patent to recurved; lateral segments (3)4–6, large, approximately triangular, patent to subhamate, both margins denticulate, distal one convex, proximal one ± straight or concave; interlobes ± short; irregularly denticulate, margins raised, mid-vein pale green to pale brownish pink. Petiole short, usually 1–2 cm long, pink to purple. Scapes over tops of leaves, irregularly densely floccose-aranose. Capitulum ca. 3 cm in diameter, ± flat, yellow; involucre cylindrical, outer phyllaries 30–46, linear to lanceolate, 6–8 × 1.3–1.8 mm, imbricate, adpressed at base, markedly hooked recurved in upper half, green to grey-green with middle dark stripe. Ligules flat, outer ones abaxially striped brown-purple. Pollen present, pollen grain with ± regular size, stigmas yellow. Achenes of various colours, pale greyish straw-brown to silvery whitish, gradually narrowing at both ends, 4.4–6.8(–7.2) mm long (incl. cone), cone narrow (0.7–)0.8–1.4(–2.0) mm long, rostrum 7–9 mm long, pappus 6–8 mm

long, yellowish-brown (cf. ZEISEK et al. 2015). Main flowering period is from July to September (October).

Karyology:  $2n = 16$ , district Podunajská nížina Lowland (06), Pata near Nitra (7772b) (MURIN in MÁJOVSKÝ et al. Acta Fac. Rerum Nat. Univ. Comen., Bot. 16, p. 22, 1970).

The paper is aimed at obtaining of detailed data on the occurrence of *Taraxacum serotinum* in Slovakia, including historical as well as recently confirmed locations.

## Material and methods

### Data collection and processing

The study was carried out during the years 2009–2015. Due to the unreliability of the data in literature, we used primarily revised herbarium sheets to determine the species distribution in Slovakia. The data concerning the distribution of the species were obtained from 16 herbaria (BP, BRA, BRNU, BRNM, HLO, LTM, NI, OLM, PMK, PR, PRA, PRC, SAV, SLO, TTM and ZV). Herbarium abbreviations are according to THIERS (2015) and VOZÁROVÁ & SUTORÝ (2001). The results of this study are presented on a dot map. The map was designed by the program ArcGis, version 9.2. The grid on the map follows the one that was described by NIKLFELD (1971). A list of localities was compiled according to the directives of Flóra Slovenska VI/1 (cf. GOLIAŠOVÁ & MICHALKOVÁ 2012). Each location that was found/confirmed not more than 25 years ago was considered recent (ELIÁŠ et al. 2015), all other locations are considered historical. The data of habitat type was obtained from the text of herbarium labels.

## Results

The results of the study confirmed, that *Taraxacum serotinum* has occurred only in SW and W part of the country in five phytogeographical districts. The occurrence is situated in *Pannonicum* in the districts Devínska Kobyla Hills, Podunajská nížina Lowland, Burda Hills and western part of the Ipeľsko-rimavská brázda Region. In the *Carpaticum*, the occurrence is situated only on the border with the Podunajská nížina Lowland in south and south-east slopes of the Malé Karpaty Mts., in south foothills of Považský Inovec Mts. and Tribeč Mts. In total, we recorded 76 locations of the species. Of this number, only 16 sites have been considered recent (Fig. 1). This means that 83 % of all locations were destroyed or not confirmed. Although almost a third of the sites have not a habitat type given on herbarium labels, we can conclude that *T. serotinum* occurrence on grassland sites predominated both in the past and the present (Fig. 2). Conversely, some saline site, as the second most common habitat of the species, has not been confirmed recently.

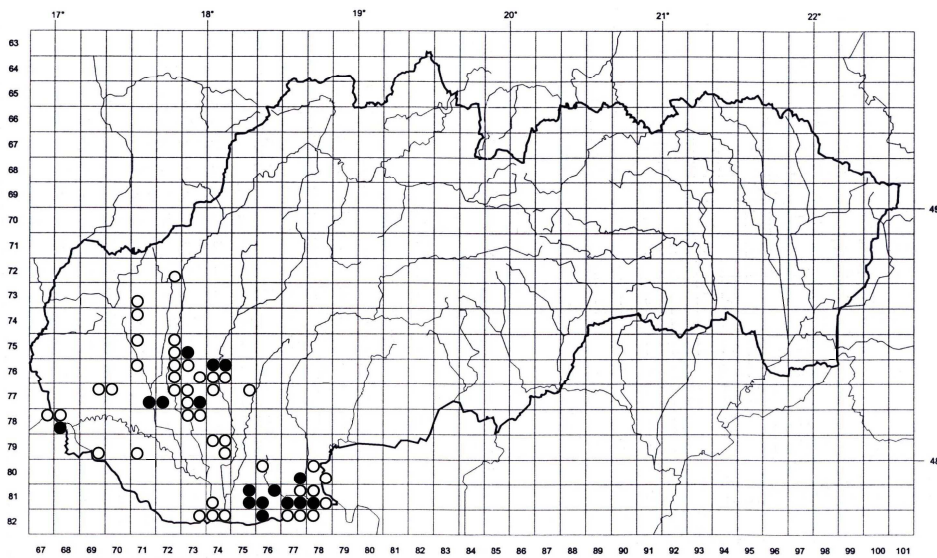


Fig. 1. Occurrence of *Taraxacum serotinum* in Slovakia: ○ – historical locations, ● – recent locations.

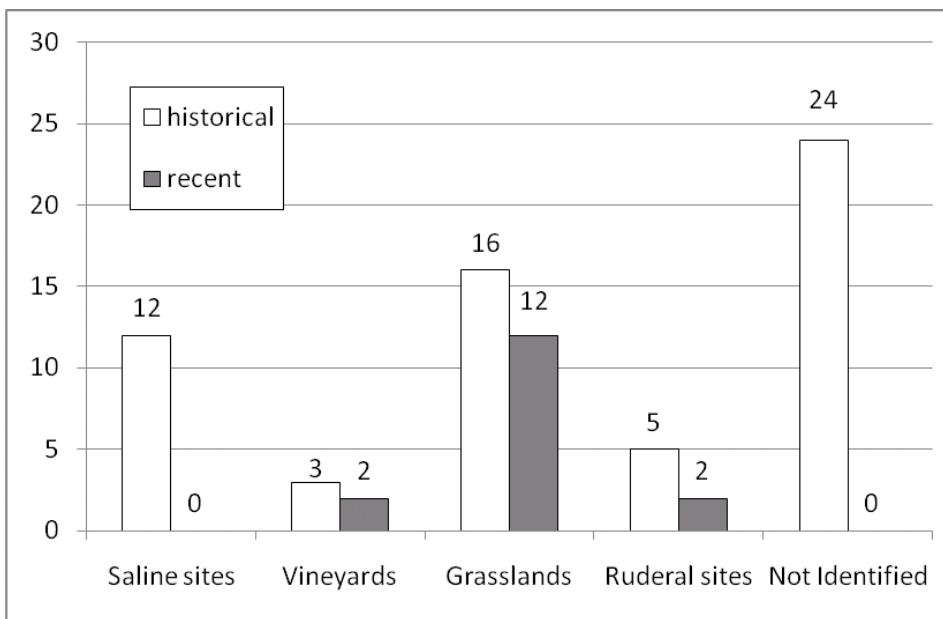


Fig. 2. Preference to habitat type of *Taraxacum serotinum* in Slovakia.

**The list of revised herbarium specimen and localities of *Taraxacum serotinum* in Slovakia** [numbers of phytogeographical regions according to FUTÁK (1980)]:

**Pannonicum.**

**District 1. Burda Hills:** between villages of Bajtava and Leľa (Osvačilová 1955 NI) – Kamenica (s. coll. 1962 SLO) – Kamenica nad Hronom (Weber 1932 OLM; Krist 1934 BRNU, no. 262044; Weber 1936 BRA; Futák 1948, 1949 SLO, no. 2513, 2514; Plocek 1973 PRA; Lhotský 1978 PR, no. 821064) – Kamenica nad Hronom, Čierna hora Hill (Eliáš jun. 2013 NI) – Kamenica nad Hronom, Hill 317 (Smejkal et Marvan 1960 BRNU) – Kamenica nad Hronom, above vineyards (Smejkal 1965 BRNU, no. 421082) – Kamenica nad Hronom, steppe above the railway gateway above rocks (Soják 1956 PR, no. 564806) – Kamenica nad Hronom, lawn near the railway station (Soják 1956 PR, no. 564777) – Kováčovské kopce, surroundings of village Kamenín (Futák 1948 SLO, no. 2505, 2506; Dostál 1950 PRC, no. 403326) – Chľaba, vineyards (Sillinger & Deyl 1930 PR, no. 821095) – Chľaba [Helemba] (Nábělek 1936 BRA; Deyl 1952 PR, no. 821093).

**District 2. Ipeľsko-rimavská brázda Region:** Malé Ludince, Horný vrch Hill, abandoned vineyards (Eliáš jun. et Sádovský 2006 NI) – Malé Kosihy (Chrtek, Křisa et Chrtková 1973 PRC, no. 403312) – Pastovce (Weber 1935 BRA).

**District 5. Devínska Kobyla Hills:** Devínska Kobyla, south-west slope (Kavka 1936 PRC; Futák 1965 SAV, no. 2495; Schwarzová 1972 SLO, no. 2533) – Devínska Kobyla, in the slots of limestone (Kavka 1936 BRA; Kavka 1936 PRC, no. 403335) – Devínska Kobyla, near the footpath to Sandberg (Hodoval 1982 BRA) – Devín, west slope on the path towards Kamenný les (Feráková et al. 1997, p. 137).

**District 6. Podunajská nížina Lowland:** Šamorín (Májovský 1954 SLO, no. 2498) – Pezinok [Bazinium] (Holuby 1917 BRNM, no. 246650) – Viničné [Schweinsbach] (Holuby 1914 PRC, no. 403285; Zigmundík 1915 BRA; Holuby 1916 PRC, no. 403296; s. coll. 1920 PR, no. 821099) – Vydrany, dead meander outside the village (Manica 1970 ZV, no. 16768, 16768) – Trnava [Toyrnau] (Dichtl 1864 BRNU, no. 98963; Haszlinsky 1883 BP) – Boleráz (Nevole 1930 BRNU, no. 212584) – Sládkovičovo, dune (Zlatošová 1995 TTM) – Malá Mača, Mačiansky presyp site (Eliáš jun. & Eliášová 2002 NI; Eliáš jun. 2014 NI) – Sereď, Svätý Chrasť (Suza 1930 BRNU) – Pata (Májovský et al. 1970), 2n = 16. – Zlatná na Ostrove, Svätý Pavol farmstead (Valenta 1936 BRA) – Zlatná na Ostrove, saline soil (s. coll. 1927 PR, no. 821049; Weber 1934 PR, no. 234113; Krist 1936 BRNU, no. 297875) – Komárno, Veľké Písky farmstead (Weber 1935 BRA) – Komárno, Nová Stráž (Skřivánek 1950 BRNM, no. 722002) – Sasinkovo (Ješko 1965, 1968 BRA, 1966, 1968 HLO) – Dvorníky, Panónia farmstead (Feráková 1966 SLO, no. 2528, 2526) – Dvorníky, Posádka (Feráková 1966 SLO, no. 2525) – Bojničky (Feráková 1966 SLO, no. 2527) – Hlohovec, Sedlisko (Feráková 1964 SLO, no. 2516; Feráková 1968 SLO, no. 2519) – Hlohovec, Soroš (Feráková 1965 SLO, no. 2515) – Pastuchov, roadside against cemetery

(Košťál 2009 NI; Eliáš jun. 2015 NI) – Močenok, Močenský les site (Matušicová & Čerušáková 2005: 74) – Močenok, Sík farmstead (Krist 1936 BRNU, no. 297877) – Hájske, saline soils (Svobodová 1978 NI) – Šaľa (Jávorka 1929 BP) – Šaľa, Andelek farmstead (Weber 1933 PR, no. 234115) – Palárikovo, railway station Slovenský Meder (Součková 1950 BRNM, no. 68799) – Palárikovo [Slovenský Meder] (Krist 1936 BRNU, 297879) – Palárikovo [Slovenský Meder], Veľké Čiky farmstead (Weber 1933 PR, no. 234114) – Svätý Peter, Kurta Hill (Klokner 1969 PMK; Letz 1998 SAV) – Šrobárová, Pod Starým vrchom Nature Reserve (Eliáš jun. 2015 NI) – Modrany, vineyards (Májovský 1958 SLO, no. 2508) = Modrany, Suchý vrch Hill (Somogyi 1998 SAV; Eliáš jun. 2014 NI) – Cabaj-Čápor (Osvačilová 1953 NI) – Veľké Zálužie, Bábsky sek [Bábiség] (Osvačilová 1953, 1955 NI) – Nitra, near the road to Dražovce (Pospíšil 1952 BRNM, no. 75897; Osvačilová 1953 NI) – Nitra (Kupčok 1906 BP) – Vráble (Futák, Hejná & Ružička 1949 SLO, no. 2503, 2504) – Jásová (Osvačilová 1954 NI) – Gbelce [Köbölkút], Nová Vieska, Drieňová hora Hill (Májovský 1958 SLO, no. 2501) – Nová Vieska (Procházka et al. 1999) – Mužla, Jurský chlm farmstead (Eliáš jun. 2008, 2009 NI) – Čenkov (Futák 1948 SLO, no. 2517) – Štúrovo, Ďarmotské kopce (Krist 1935 BRNU, no. 265010; Májovský 1958 SLO, no. 2509, 2510) = Kamenný Most, SE and E slopes of Belianske kopce Hills (Procházka et al. 1999) – Ďarmotské kopce, Veľký vrch [Nagy hegy] (Domin et Jirásek 1936 PRC, no. 403337) – Štúrovo [Parkány, Parkaň] (Novák 1921 PRC, no. 403320; Futák 1948 SLO, no. 2511; Pospíšil 1948 BRNM, no. 79984) – Bíňa, Kolónia farmstead (Májovský 1958 SLO, no. 2502) – Bíňa (David 2009: 84; Eliáš jun. 2009 NI) = Bíňa, “Avarský hrnk” site (Weber 1934 OLM; Domin et Jirásek 1936 PRC, no. 403290; Weber 1936 BRA) – Nána (Deyl 1951 PR, no. 821063) – Obid, in the field and by the river (Deyl 1952 PR, no. 821062) – Kamenný Most [Kamenné Ďarmoty], saline soil (Osvačilová 1955 NI; Hodoval 1976 BRA) – Kamenný Most, railway embankment (Weber 1934 PRC, no. 403289) – Kamenín [Kamendín] (Krist 1935 BRNU, no. 268988) – Kamenín, Kamenínske slanisko Nature Reserve (Švec 1953 LTM).

### **Carpaticum.**

**District 10. Malé Karpaty Mts.:** Dechtice (Futák 1960 SAV, no. 2494) – Čachtice, pasture above the village (Futák 1960 SAV, no. 2493) – Dobrá Voda (Feráková 1971 SLO, no. 2530-2532; Ladovičová 1971 SLO, no. 2529).

**District 11. Považský Inovec Mts.:** Koplastovce (Ottinger 1964 HLO).

**District 12. Tribeč Mts.:** Dražovce, grasslands N from the village (Deyl 1978 OLM; Košťál 2010 <http://www.fotonet.sk/>; Eliáš jun. 2015 NI) – Nitra, Lupka, Hill 222 (Vlach 1935 PRC, no. 403338; Deyl 1977 OLM) – Nitra, Zobor city part, road edge (Eliáš jun. 2009 NI).

### **Discussion**

The genus *Taraxacum* is a taxonomically difficult group, however *Taraxacum serotinum* is a relatively easily determinable and also a rare species of the flora of Slovakia.

The species is a good indicator of loess (PROCHÁZKA et al. 1999; DANIHELKA & GRULICH 1999; KIRSCHNER et al. 2011). In Slovakia, it often grows in grassy steppes and steppe slopes in secondary vegetation developed on the sites of the original thermophilic oak forests previously used as a sheep pastures in the stands of class *Festuco-Brometea* Br.-Bl. et Tüxen ex Soó 1947 especially in alliance *Festucion valesiacae* Klika 1931. The alliance includes species-rich continental xerophilous communities with the dominance of narrow-leaved *Festuca* species (*F. valesiaca*, *F. pseudodalmatica*, *F. pseudovina* and *F. rupicola*), *Carex humilis* and various species of the genus *Stipa* (*S. dasyphylla*, *S. capillata*, *S. joannis*, *S. pulcherrima*, *S. tirsia*). Soils are of varying depth from shallow rendzinas and rankers to deep soils on loess (OSVAČILOVÁ & SVOBODOVÁ 1961; ŠKODOVÁ et al. 2014). Presence of *Taraxacum serotinum* is documented in two associations of this alliance: *Festuco valesiacae-Stipetum capillatae* Sillinger 1930 and *Festuco rupicolae-Caricetum humilis* Klika 1939. The first one is characteristic by co-dominance of *Stipa capillata* and occurrence of xerothermic species as *Acosta rhenana*, *Allium flavum*, *Astragalus onobrychis*, *Medicago falcata*, *Melica ciliata*, *Sanguisorba minor*, *Sedum sexangulare*, and *Thymus praecox* is typical (DAVID 2009; ŠKODOVÁ et al. 2014). The second one is regarded as the least thermophilic community of the alliance (DÚBRAVKOVÁ et al. 2010) where xero-mezophytes as *Arrhenatherum elatius*, *Fragaria viridis*, *Salvia verticillata* and *Seseli annuum* are present to a greater extent in addition to xerophytic taxa e. g. *Acinos arvensis*, *Festuca valesiaca*, *Koeleria macrantha* and *Scabiosa ochroleuca* (ŠKODOVÁ et al. l. c.). Representation of *Taraxacum serotinum* in both above mentioned associations is merely incidental, the coverage does not exceed 5% (OSVAČILOVÁ & SVOBODOVÁ 1961; DAVID l. c.; ŠKODOVÁ et al. l. c.)

The species was also growing as a member of vegetation developed on salt affected soils of solonetz type (e.g. Hájske, Palárikovo, Zlatná na Ostrove, Kamenín, Kamenný Most etc.) from the alliance *Festucion pseudovinae* Soó 1933. Within this alliance, *T. serotinum* was found in communities developed only on slightly salinized soils, especially in the association *Achilleo setaceae-Festucetum pseudovinae* Soó 1947 together with species such as *Bupleurum tenuissimum*, *Cynodon dactylon*, *Festuca pseudovina*, *Jacea pratensis*, and several taxa of *Achillea* (*A. collina*, *A. pannonica*, *A. setacea*) and *Trifolium* (*T. angulatum*, *T. campestre*, *T. retusum*) (KLIKA & VLACH 1937; DÍTĚ et al. 2014). As in above mentioned xerothermic communities, presence of *T. serotinum* in those stands is low – its coverage did not reach 5 % (OSVAČILOVÁ & SVOBODOVÁ 1961; DÍTĚ et al. l. c.).

As showed in our study fewer occurrences were noted in limestones in Devínska Kobyla Mts. and on the banks of rivers. An interesting specimen collected near Vydrany village on the bank of a dead meander (Manica 1970 ZV) show common features between *T. serotinum* and the plants belonging to *Taraxacum* sect. *Ruderalia* Kirschner, H. Ollgaard et Štěpánek. It cannot be excluded, that this is a hybrid with *T. sect. Ruderalia*. According to KIRSCHNER & ŠTĚPÁNEK (2004) there is a hybridogenous section *Borysthenica* Kirschner et

Štěpánek in the South Ukraine (incl. Crimea), where one parent is sure by *T. serotinum*, the second one is probably a species from the section *Ruderalia*.

This species also grows in the secondary biotopes near vineyards, on railway embankments, near railway stations in dry lawns, near farmsteads and near paths and roads (PROCHÁZKA et al. 1999; KIRSCHNER et al. 2002). Our study of herbarium materials showed many locations from the surroundings of capitals as Vienna, Budapest and few from Bratislava in Devínska Kobyla Mts. and the south area of Komárom city in Hungary.

Up to day there is a severe lack of information on distribution of the species in Slovakia. Actual distribution is unknown. According to DOSTÁL & ČERVENKA (1992) the distribution of *T. serotinum* was reported only in Záhorská nížina Lowland, Podunajská nížina Lowland and surroundings of the town of Banská Bystrica. PROCHÁZKA et al. (1999) declares over 50 localities in Slovakia in Podunajská nížina Lowland and in Burda Mts. and adds that there is a decrease of the number of localities about 80 % of them are destroyed (mainly the ones on saline soils). The main cause of the rapidly decrease of the number of localities is a change the suitable biotopes in vineyards and fields, destroying of saline soils, the end of pasture management and forest invasion.

Some other literary data are doubtful. The occurrence in other regions of Slovakia is improbable. Questionable, not confirmed and evidently the mistake is the occurrence in Záhorská nížina Lowland, in the surroundings of Banská Bystrica city, in the Staré Hory village and in Vihorlat Mts. in the pastures on SE slope of Dúpná hill, which is not documented by any herbarium specimens. Moreover the occurrence of *T. serotinum* in Kremnické vrchy Mts. is doubtful even though CSEREY describes it from east slope of Sitno hill (HLAVAČEK 1985).

The first records of the occurrence of *T. serotinum* were given by DICHTL (1864 BRNU) and later by F. HASZLINSKY (1883 BP) from the surrounding of the town of Trnava. From the thirties to the seventies of the 20th century many historical localities were found. In the last fifteen years there are only 14 records of the occurrence of *T. serotinum* from SW Slovakia.

As shown by our data, the northern limit of the distribution range of the species is in W Slovakia in the border area between the Pannonian Basin and the Western Carpathians in the surroundings of Dechtice, Čachtice (Malé Karpaty Mts.), Koptovce (Považský Inovec Mts.), Dražovce and Nitra (Tribeč Mts.). According to KIRSCHNER et al. (2011) the NW limit of the native occurrence in Europe is in the Czech Republic in the area of South Moravia, primarily near Čejč village. Distribution in South Moravia is discussed in the work DANIHELKA & GRULICH (1999).

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## References

- DANIHELKA J. & GRULICH V. (2000): Pampeliška pozdní (*Taraxacum serotinum*) v České republice (*Taraxacum serotinum* in the Czech Republic). – Zpr. Čes. Bot. Společ. 34: 123–134.
- DAVID S. (2009): Stepní flóra a vegetace zemních valů hradiska v obci Bíňa (okr. Nové Zámky). – Bull. Slov. Bot. Spoločn. 31(2): 77–85.
- DÍTĚ D., MELEČKOVÁ Z. & ELIÁŠ P. jun. (2014): *Festuco-Puccinellietea*. – In HEGEDŮŠOVÁ VANTAROVÁ K. & ŠKODOVÁ I. (eds.), Rastlinné spoločenstvá Slovenska. 5. Travninno-bylinná vegetácia. Veda, Bratislava, p. 483–510.
- DOSTÁL J. & ČERVENKA M. (1992): Velký klíč na určovanie vyšších rastlín II. – SPN, Bratislava, 1567 pp.
- DÚBRAVKOVÁ D., CHYTRÝ M., WILLNER W., ILLYÉS E., JANIŠOVÁ M. & KÁLLAYNÉ SZERÉNYI J. (2010): Dry grasslands in the Western Carpathians and the northern Pannonian Basin: a numerical classification. – Preslia 82: 165–221.
- ELIÁŠ P. ml. (2014): *Taraxacum serotinum* [report] – In: ELIÁŠ P. ml. (ed.): Zaujímavejšie floristické nálezy. Bull. Slov. Bot. Spoločn. 36(2): 244–263.
- ELIÁŠ P. jun., DÍTĚ D., KLIMENT J., HRIVNÁK R. & FERÁKOVÁ V. (2015): Red list of ferns and flowering plants of Slovakia, 5th edition (October 2014). – Biologia 70(2): 218–228.
- FERÁKOVÁ V. (ed.) (1997): Flóra, geológia a paleontológia Devínskej Kobyly. – LITERA s.r.o. & APOP, Bratislava, 190 pp.
- FUTÁK J. (1980): Phytogeographical division of Slovakia (1: 1 000 000). – In: MAZÚR E. (ed.): Atlas Slovenskej socialistickej republiky. SPN, Bratislava, 88 pp.
- GOLIAŠOVÁ K. & MICHALKOVÁ E. (eds.) (2012): Flóra Slovenska VI/3. – Veda, Bratislava, 712 pp.
- GRULICH V. (2012): Red List of vascular plants of the Czech Republic: 3rd edition. – Preslia 84: 631–645.
- HLAVAČEK A. (1985): Flóra CHKO Štiavnické vrchy. – ÚŠOP, Liptovský Mikuláš, 549 pp.
- KIRÁLY G. (ed.) (2007): Vörös Lista. A magyarországi edényes flóra veszélyeztetett fajai. – Sopron, 73 pp.
- KIRSCHNER J. & ŠTĚPÁNEK J. (1997): A nomenclatural checklist of supraspecific names in *Taraxacum*. – Taxon 46: 87–98.
- KIRSCHNER J., ŠTĚPÁNEK J. & TRÁVNÍČEK B. (2002): 99. *Taraxacum* Wigg. – pampeliška (smetánka). – In: KUBÁT K (ed.): Klíč ke květeně České republiky. Academia, Praha, p. 686–702.
- KIRSCHNER J. & ŠTĚPÁNEK J. (2004): New sections in *Taraxacum*. Folia Geobot. 39 (3): 259–274.
- KIRSCHNER J., ŠTĚPÁNEK J. & GREUTER W. (2007+): *Taraxacum*. – In: GREUTER W. & RAAB-STRAUPE E. VON (ed.): Compositae. Euro+Med Plantbase - the information resource for Euro-Mediterranean plant diversity. Published on the Internet: <http://ww2.bgbm.org/EuroPlusMed/> [accessed June 5 2015].
- KIRSCHNER J., ŠTĚPÁNEK J., TRÁVNÍČEK B. & VAŠUT R. J. (2011): *Taraxacum* Wigger – Pampeliška (smetánka). – In: ŠTĚPÁNKOVÁ J. (ed.), Květena České republiky 8, Academia, Praha. p. 712. ISBN 978-80-200-1824-3.

- KLIKA J. & VLACH V. (1937): Pastviny a louky na szikách jižního Slovenska. – Sb. Čs. Akad. Zeměd. 12: 407–417.
- MÁJOVSKÝ J. (ed.) (1970): Index of chromosome numbers of Slovakian flora (Part 1). – Acta Fac. Rerum Nat. Univ. Comen., Bot. 16: 1–26.
- MATUŠICOVÁ B. & ČERNUŠÁKOVÁ D. (2005): Protected and endangered vascular plant species in the surroundings of the villages Hájske, Horná Kráľová and Močenok on the Podunajská nížina Lowland. – Bull. Slov. Bot. Spoločn. 27: 71–76.
- NIKLFIELD H. (1971): Bericht über die Kartierung der Flora Mitteleuropas. – Taxon 20: 545–571.
- NIKLFIELD H. & SCHRATT-EHRENDORFER L. (1999): Rote Liste gefährdeter Farn- und Blütenpflanzen (Pteridophyta und Spermatophyta) Österreichs. – In: NIKLFIELD H. (ed.), Rote Listen Gefährdeter Pflanzen Österreichs. 2. neu bearbeitete Auflage. Bundesministerium für Umwelt, Jugend und Familie, Graz, 292 pp.
- OSVAČILOVÁ V. & SVOBODOVÁ Z. (1961): Floristicko-fytocenologický výskum Nitrianskeho kraja. – VŠP Nitra, 332 pp.
- PROCHÁZKA F., ŠTĚPÁNEK J. & GRULICH V. (1999): *Taraxacum serotinum* Waldst. et Kit.) Poir. – In: ČEŘOVSKÝ J., FERÁKOVÁ V., HOLUB J., MAGLOCKÝ Š. & PROCHÁZKA F. (eds.): Červená kniha ohrozených a vzácných druhů rostlin a živočichů SR a ČR. Vol. 5. Vyšší rostliny. Příroda a.s., Bratislava, p. 369.
- ŠKODOVÁ I., JANIŠOVÁ M., DÚBRAVKOVÁ D. & UJHÁZY K. (2014): *Festuco-Brometea*. – In: HEGEDŮŠOVÁ VANTAROVÁ K. & ŠKODOVÁ I. (eds.), Rastlinné spoločenstvá Slovenska. 5. Travnino-bylinná vegetácia. Veda, Bratislava, p. 35–146.
- TRÁVNÍČEK B. & VAŠUT R. J. (2011): Notes on the genus *Taraxacum* in Slovakia. I. *Taraxacum* sect. *Hamata*: a new group of dandelions in Slovakia. – Biologia 66/4: 595–603.
- TURIS P., KLIMENT J., FERÁKOVÁ V., DÍTĚ D., ELIÁŠ P., HRIVNÁK R., KOŠTÁL J., ŠUVADA R., MRÁZ P. & BERNÁTOVÁ D. (2014): Red List of vascular plants of the Carpathian part of Slovakia. – Thaiszia - J. Bot. 24(1): 35–87.
- THIERS B. (2015): Index Herbariorum: A global directory of public herbaria and associated staff. – New York Botanical Garden's Virtual Herbarium, New York. <http://sweetgum.nybg.org/ih/>
- VOZÁROVÁ M. & SUTORÝ K. (eds.) (2001): Index herbariorum Reipublicae bohemicae et Reipublicae slovacae. – Bull. Slov. Bot. Spoločn., Bratislava, Suppl. 7, 95 pp.
- ZEISEK V., KIRSCHNER J., ŠTĚPÁNEK J. & AMINI RAD M. (2015): Microsatellite variation, sexual reproduction and taxonomic revision of *Taraxacum* sect. *Dioszegia*: relationships on a large spatial scale. – Preslia 87: 87–117.

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