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Occurrence of Small flower Hawksbeard (*Crepis pulchra* L.) in Slovakia

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Abstract: Historical and recent occurrence of a rare weed Small flower Hawksbeard (*Crepis pulchra* L.) was studied. Herbarium specimens deposited in thirteen herbaria were revised and field research during 2005–2010 was made. Overall, 49 localities of the species was recorded during our study, 29 were confirmed or newly found at present. According to our results, the IUCN category of the species was re-evaluated. Recently, *Crepis pulchra* is considered as vulnerable species (VU) of the Slovak flora. Distribution map of the species is given.

Keywords: *Crepis pulchra*, distribution, rare weeds, Slovakia.

Introduction

The genus *Crepis* includes about 200 annual, biennial or perennial plant species distributed in Eurasia, Africa and North America with the diversity centre in Asia. Many species are introduced nearly worldwide and often occur as ruderal plants or weeds of field crops (BABCOCK 1947a, KAPLAN 2004, BOGLER 2006).

Small flower Hawksbeard (*Crepis pulchra* L.) belongs to the genus representatives occurring in different ruderal stands. The species was found on dry open habitats, grasslands, pastures, abandoned fields, waste areas, railroads and roadsides (HOLUB 1999, BOGLER 2006).

BABCOCK (1947b) included it in the sect. *Phaecasium* (CASS.) DUMORT. The taxa of this section are pubescent annuals (rarely perennials) with lower leaves petiolate, denticulate to pinnatifid and usually many anthodia in a corymb, with few to many yellow florets (BABCOCK 1947a, KAPLAN 2004). *Crepis pulchra* is characteristic by its annual habit; solitary, erect, glandular, and viscid stems; narrowly oblanceolate, runcinate, hispid leaves with relatively large terminal segments; glabrous and strongly keeled phyllaries; sometimes dimorphic achenes; and fluffy, dusky white pappi (BOGLER 2006). From the taxonomical point of view, the species is divided into three subspecies: C. *pulchra* subsp. *pulchra*, C. *pulchra* subsp. *turkestanica* BABC. and C. *pulchra* subsp. *africana* BABC. The nominate subspecies occurs in most of the species range (Europe, Caucasus), the subsp. *turkestanica* is known from West and East Asia (from Turkey to Turkmenistan) and subsp. *africana* was recorded in Algeria and Morocco (BABCOCK 1947b). However, this subdivision is not accepted in some works (SELL 1976, BOGLER 2006).

The native range of *Crepis pulchra* includes the northern Africa (Morocco, Algeria, Egypt), southwestern, cental, east and southeastern Europe, Caucasus as well as Western and Middle Asia (BABCOCK 1947a, HOLUB 1999, VALDÉS et al. 2002). It was found as an alien species in North (USA, Canada) and South America (Columbia, Chile) (CASTRO et al. 2005, BOGLER 2006). In central Europe the species is quite rare and endangered – it was included in Red Lists of Austria, Germany and Slovakia (KORNECK et al. 1996, NIKLFELD & SCHRATT-EHRENDORFER 1999, FERÁKOVÁ et al. 2001). In Hungary, *C. pulchra* belongs to relatively common plant species (SOÓ 1970, SIMON 1992, KIRÁLY 2009) and therefore it was not included in the latest Red list of vascular flora of Hungary (KIRÁLY 2007).

Although some data were published (HOLUB & MORAVEC 1965, HENDRYCH 1968, HOLUB 1999), the exact occurrence of *Crepis pulchra* in Slovakia was not known as yet. Therefore, the aim of this study was to obtain detail information on the historical and present distribution of the species.

Material and Methods

The study was carried out during the years 2005 – 2010. The data concerning the distribution of the species were achieved from herbaria BP, BRA, BRNU, BRNM, MZ, NI, OLM, PR, PRC, SAV, SMBB, SLO and ZV. Herbarium specimens collected during field research are stored in herbarium NI. Herbarium acronyms are according to work of HOLMGREN et al. (1990) and VOZÁROVÁ & SUTORÝ (2001). Results of this study are presented on the dot map. The grid on the map follows one that was described by NIKLFELD (1971). Nomenclature of flowering plants is according to MARHOLD et al. (1998). In chapter Results, the abbreviations of works published before 1952 cited follows FUTÁK & DOMIN (1960) as well as newer publications were cited in short form. Phytogeographical division of Slovakia follows FUTÁK (1980).

Results

We recorded 49 localities of *Crepis pulchra* in Slovakia, exclusively in the Pannonian phytogeographical region (see the List of localities below). The species is distributed in southwestern and south part of Slovakia (Fig. 1); especially in phytogeographical districts of the Podunajská nížina Lowland and the Ipeľsko-rimavská brázda Region. Only a few localities were found in the Devínska Kobyla Hills and the Burda Hills (Fig. 2). One doubtful site was also given in the Carpathian phytogeographical region (Banská Štiavnica). During our field research, we confirmed 8 localities which were known already in the past (Bajtava, Belá, Gbelce, Kamenica nad Hronom, Kamenín, Mužla, Pastovce, Salka) and 21 new ones were discovered mainly in the Podunajská nížina Lowland (18 in our field research).

Comparing the number of historical and recent localities, a strong increase was recorded (Fig. 3). However, this increase is not related to intensive spreading of the species now, but to the intensity of floristic research in Slovakia. The species belongs still to rare plants and it is recently missing from some localities (Fig. 2). According to our results, we propose to transfer the species from IUCN category Endangered (EN) to the IUCN category VU (vulnerable species) in Slovakia.

From the ecological point of view, *Crepis pulchra* has occupied mainly ruderal stands – field and road edges, vineyards, abandoned sites, fallows, etc. It was also rarely found in native xerothermic vegetation.

List of localities of *Crepis pulchra* in Slovakia [numbers of phytogeographical regions according to FUTÁK (1980)].

1. Burda Hills: Kamenica nad Hronom, northern margin of the village (FEICHTINGER 1899: 15; ELIÁŠ jun. 2003 NI, 2009 NI). – Kamenica nad Hronom, along the road to Bajtava village (KIRÁLY 2006 NI). – Kamenica nad Hronom, Kováčovské kopce hills [DOMIN, KRAJINA et DEYL 1929 BP, BRA, BRNM, BRNU, PR, PRC; WEBER 1933 PR, 1936 BRA; PULCHART 1934 PRC; F. NÁBĚLEK 1936 BRA and 1942: 122; F. NÁBĚLEK 1936 SAV; KLIKA 1937 PR; OPLUŠTILOVÁ 1946 SLO; KAVKA 1950 BRA; KOMÁREK 1951 MZ; ŠOUREK 1951 PR, PRC; NOVÁK in VESELÝ (ed.), Ochr. Československ. Přír. a Kraj. 2, 1954, p. 308; MICHALKO 1951 SAV; ŽERTOVÁ 1952 PRC and 1959 PRC; DEYL 1951 PRC and 1963 PRC; ŠMARDA 1950 BRNM, 1957 BRNM and Ochr. Přír. 20, 1965, p. 146; SMEJKAL 1962 BRNU; VICHEREK 1967 BRNU]. – Kamenica nad Hronom, Kráľovský vrch hill (KRIST 1934 BRNU; HLAVAČEK 1957 SAV). – Kováčov hamlet (SUZA 1929 BRNM; DOMIN 1929 PRC, 1930 PRC and 1933v: 246; KLIKA 1933: 448; KLÁŠTERSKÝ et DEYL 1933 PR; SKŘIVÁNEK 1934 PRC; WEBER 1935 PR, PRC; BOROS 1939 BP; J. DOSTÁL 1952 PRC; FUTÁK 1953 SAV; GREBENŠČIKOV 1956 SAV; FUTÁK et HLAVAČEK 1958 SAV; MÁJOVSKÝ et MURÍN 1980 SLO).

2. Ipeľsko-rimavská brázda Region: Pavlová N (ELIÁŠ jun. 2009 NI). – Sikenička, E (BARINA 2006 BP). – Bajtava (MÁJOVSKÝ 1958 SAV; ELIÁŠ jun. 2004 NI). – Salka, Sovie vinohrady Nature Reserve (FUTÁK 1951 SAV and Sborn. Prác Ochr. Prír. Západoslov. Kraji 1962, p. 40; MÁJOVSKÝ et al. 1970; SVOBODOVÁ,

Zborn. Odbor. Prác V. Západoslov. TOP-u IV. Kamenín, 1988, p. 31; ELIÁŠ jun. 2004 NI). – Salka, 2.3 km NW from the village, field edge (ELIÁŠ jun. 2009 NI). – Pastovce, Puszkes hill, 201 m (KRIST 1936 BRNU and 1937: 57; WEBER 1936 BRA; ELIÁŠ jun. 2009 NI). – Zalaba, railway station (WEBER 1934 PR). – Malý Pesek, Ivánka hill (J. DOSTÁL 1966 PRC). – Malé Ludince – Šalov E – Bielovce SW (all data ELIÁŠ jun. et SÁDOVSKÝ 2006 NI). – Horné Semerovce (KITAIBEL 3: 869; KUPČOK, Biol. Práce Slov. Akad Vied. 2/9, 1956, p. 44). – Šahy, Studený vrch hill ca 1 km E from the town (SMEJKAL 1968 BRNU; Smejkal et Vicherek, Zprávy. Československ. Bot. Společn. 5/1, 1970, p. 50). – Vinica, Orhegy hill [ČERNOCH, Biologia (Bratislava) 15/11, 1960, p. 816]. – Nová Ves nad Ipľom (MARVANOVÁ et MARVAN 1955 BRNU). – Slatina, vineyards north from the village (CHRTEK, Preslia 30, 1958, p. 78-79). – Hontianska Vrbica, vineyards (OSVAČILOVÁ 1956 NI). – Hajnáčka (ŠOUREK 1954 PR, PRC; ČERNOCH l. c.; HOLUB et MORAVEC, Biol. Práce Slov. Akad. Vied 11/6, 1965, p. 38). – Fiľakovo (Hulják 1941: 78). – Fiľakovo, Beňadikova stráň site (HULJÁK 1941: 78; HOLUB et MORAVEC l.c.). – Jesenské, near railway station – Mučín – Hostice – Šávoľ – Šurice (all data HENDRYCH, Acta Univ. Carol., Biol. 2, 1967, p. 129).

5. *Devínska Kobyla Hills:* Devín, Devínska Kobyla Hills, southwestern slopes (PULCHART et SOUČEK 1933 BRNM).
6. *Podunajská nížina Lowland:* Dolný Bar, near the road bridge trough the canal of "Gabčíkovo-Topoľníky" – Komárno, part Nová Stráž, field depression near the railway – Marcelová, southern part of the Pohrebište Nature Reserve near the chanel of Patince (all data ELIÁŠ jun., KIRÁLY et SÁDOVSKÝ 2007 NI). – Nitra (ELIÁŠ jun. 2009 NI). – Svätý Peter, SE (BARINA 2006 BP). – Gbelce, Drieňová hora Nature Reserve (J. DOSTÁL 1966 PRC; FERÁKOVÁ et HODÁLOVÁ 2004 ined.; ELIÁŠ jun. 2007 NI). – Búč, Búčske slanisko Nature Reserve (ELIÁŠ jun. 2010 NI). – Čenkov farmstead (ŠOUREK 1950 PR). – Belá, Belianske kopce Hills (DOMIN 1929 PR, MÁJOVSKÝ s. d. SLO; DEYL 1978 OLM; ELIÁŠ jun. 2008 NI). – Mužla, Jurský Chlm farmstead (BARINA 2006 BP; ELIÁŠ jun. 2010 NI).– Mužla, Belianske kopce Hills (DOMIN 1929 PRC and 1933v: 246; KLÁŠTERSKÝ et DEYL 1933 PR; KLIKA 1938: 448; ŠOUREK 1951 PR, PRC; HAJNÝ 1954 PRC; KLÁŠTERSKÝ 1958 PR; FUTÁK, Sborn. Prác Ochr. Prír. Západoslov. Kraji, 1962, p. 40; SMEJKAL 1967, 1972 BRNU; KLOKNER, Zborn. Slov. Nár. Múz., Prír. Vedy. XX, 1974, p. 58; DVOŘÁK 1978 BRNU; ELIÁŠ jun. 2005 NI, 2006 NI). – Mužla, Belianske kopce Hills, the Starý vrch hill – Mužla N (both data ELIÁŠ jun. 2009 NI). – Obid E, in vineyards (ELIÁŠ jun. 2006 NI). – Čata, the Bíňanský sprašový profil site (ELIÁŠ jun. 2009 NI). – Bíňa, mound near train station (ELIÁŠ jun. 2010 NI). – Kamenín, the Kamenínske slanisko Nature Reserve (SVOBODOVÁ et ŘEHOŘEK, Zborn. Odbor. Prác V. Západoslov. TOP-u IV. Kamenín, 1988, p. 23; ELIÁŠ jun. 2007 NI). – Kamenný Most, the Čistiny Nature Reserve (ELIÁŠ jun. 2007 NI). – Kamenný Most W, vineyards (ELIÁŠ jun. 2009 NI). – Štúrovo (F. NÁBĚLEK 1936 SAV).

Doubtful data (not mapped):

14. *Štiavnické vrchy Mts.:* Banská Štiavnica, Paradajz hill (CSEREY 1897:27; HLAVAČEK, Flóra CHKO Štiavnické vrchy, Bratislava, 1985, p. 163).

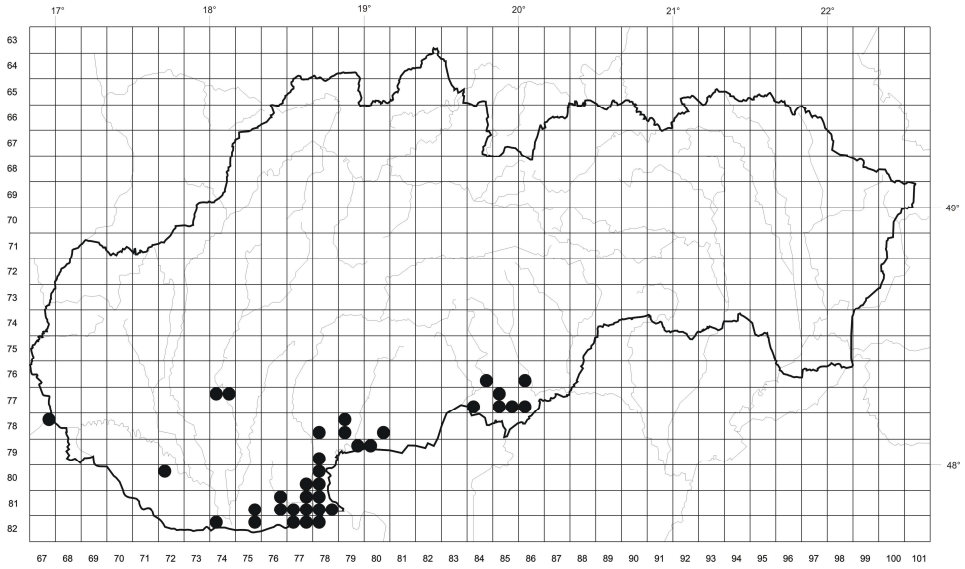

Fig. 1. Distribution of *Crepis pulchra* in Slovakia (orig. O. ŤAVODA).

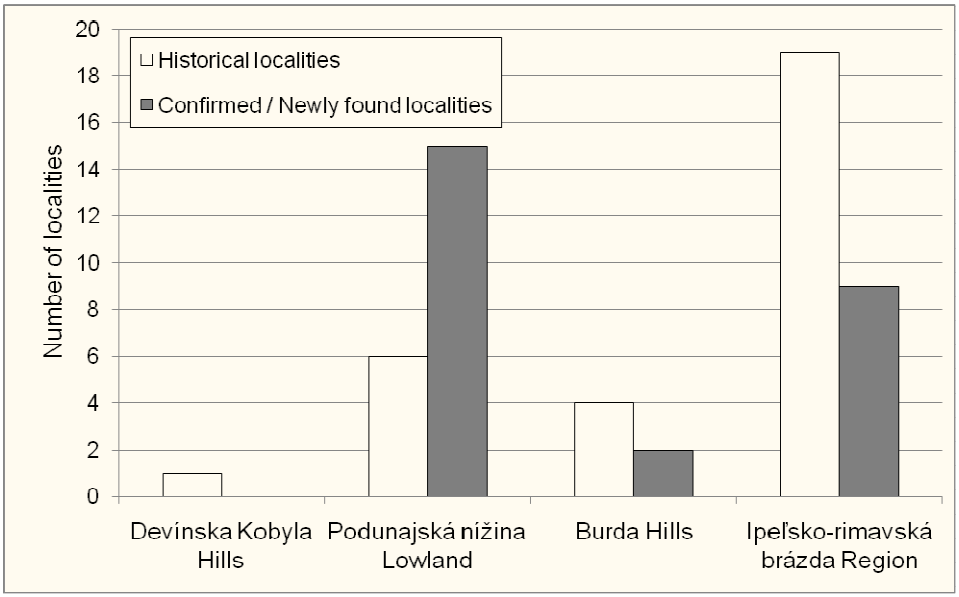

Fig. 2. Summary of historical localities and localities confirmed during the research / newly found sites of *Crepis pulchra* in different phytogeographical districts of Slovakia.

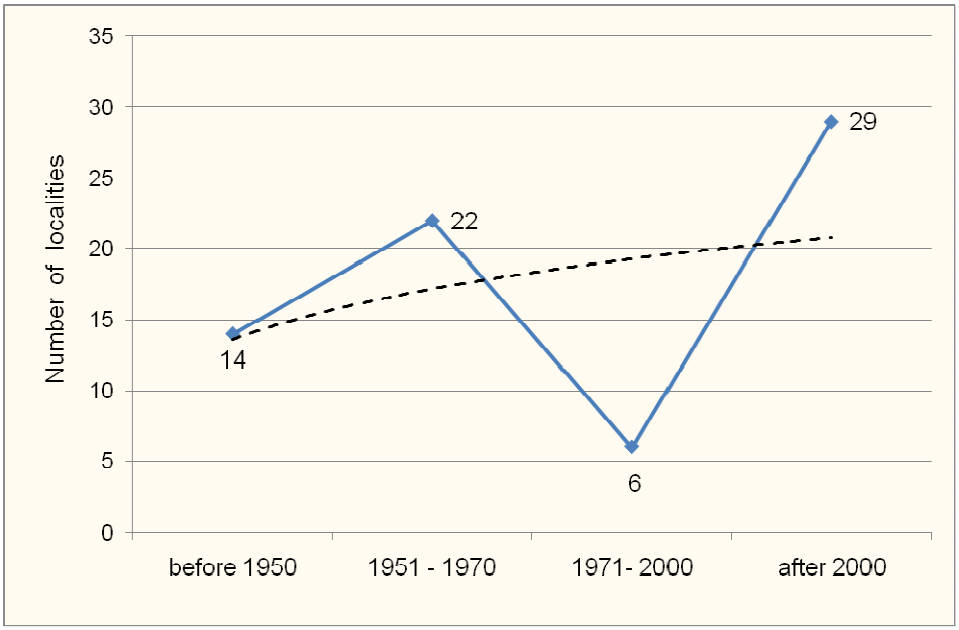

Fig. 3. The distribution trend of *Crepis pulchra* in Slovakia.

Discussion

Crepis pulchra is regarded as a rare and phytogeographically important element of the Slovak flora (HOLUB 1999); the species reaches here the northern limit of its native range. The distribution of Small flower Hawksbeard was published in three older works (DOSTÁL 1989, DOSTÁL & ČERVENKA 1992, HOLUB 1999). However, although all mentioned works described the occurrence of the species relatively correctly, they are incomplete.

The first record on the occurrence of *Crepis pulchra* was given by Sándor FEICHTINGER (1899) at the end of the nineteenth century from the Kamenica nad Hronom village. But data on the distribution of the species were sporadic until the early fifties. Then, during the two decades most of the historical localities of *C. pulchra* in Slovakia were found. It appears that *Crepis pulchra* was relatively abundant plant species to the seventies of 20. century, and then there has been a rapid decline in number of sites (Fig. 3). On the one hand, this could be due to the less intensive floristic research as we mentioned above, on the other hand, intensification of agriculture reached the highest level in the former Czechoslovakia during this period. Massive application of herbicides and new tillage methods could result in species decline. After the fall of the communist regime, inputs to primary agricultural production fell sharply. Many fields and vineyards were abandoned (VAROŠČÁK 2008) and new survival sites of ruderal species were established. It is therefore possible that the relatively high number of confirmed and newly discovered sites during our research (Fig. 2, 3) was

caused by reducing the intensity of agricultural production. This confirms the fact that the species was now frequently present in the fallows and abandoned vineyards. The survival of the species was also supported by the ability to tolerate considerable stem damage without lost of generative reproduction (ESCARRÉ et al. 1996) and probably also by long-term survival of diasporas in the soil. Indeed, long-term seeds persistence in soil seed bank is typical of other ruderal representatives of the genus *Crepis* (ANDERSSON 1990).

HOLUB (1999) estimated around 20 – 25 recent *C. pulchra* localities. Our research has confirmed his assumption, we have confirmed the 8 sites, and we also recorded 15 new localities. The results also show that the species spreads west. All historical localities were located between the towns of Štúrovo, Šahy and Fiľakovo except one site in the Devínska Kobyla Mts. We found five new localities (Dolný Bar, Nitra, Komárno, Marcelová, and Búč), which were considerably more to the west – up to seventy kilometres from the original area mentioned above. This trend was confirmed also by the new occurrence of *C. pulchra* in northwestern Hungary in surrounding of Györ (NAGY 2005, SCHMIDT & BAUER 2005). As we noted above, this is related to the existence of suitable stands, especially fallows and abandoned fields, because all above mentioned localities were found on those habitat types.

Conversely, we were unable to confirm any occurrence at easternmost historical occurrence of the species in broad surrounding of the Fiľakovo town. The same results were obtained during a detailed mapping of flora and vegetation in this region (CSIKY 2004, pers. comm.). Reasons for decline of *C. pulchra* in this area are not precisely known.

Finally, we can conclude, that the recent IUCN category (IUCN 2001) of the species should be revised in Slovakia. FERÁKOVÁ et al. (2001) as well as ELIÁŠ jun. et al. (2007) included the species in the IUCN category "endangered" (EN) following data given by HOLUB (1999). The author pointed out that *C. pulchra* usually occurred in small-size and temporary populations. However, when detailed research was conducted, we confirmed not only the many historical sites, but there were more than ten new ones. In addition, the population size of recent local populations was usually high and stabile. The vast majority of local populations include hundreds or thousands of individuals, so their disappearance would require massive changes in the country and it is unlikely at present. Based on these data, we classify *C. pulchra* in the IUCN category "vulnerable" [VU B1c(iii, iv)].

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