

Carex brunnescens (Pers.) Poir. in Poland and in the neighbouring regions – in the past and at present

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Abstract. In the article, new and historical locations of *Carex brunnescens* (Pers.) Poir. from Poland and the neighbouring regions are described. This species was found in 2019 at two stands in north-eastern Poland – on the peaty shores of two small lakes; one situated in the Suwałki Landscape Park and the other in the Augustów Forest. Three historical records, supported by the herbarium materials, from the turn of the 19th and the 20th centuries, were situated in the Lower Vistula region (north-central Poland), i.e. in the vicinity of Kielno, Nowe and Susz. The literature data indicates the existence of many stands in the historical Eastern Prussia, one of which was situated south of the Romnicka Forest in Poland and all the others in the Kaliningrad region. Moreover, numerous incorrect reports from the Sudetes and the Carpathians were discussed. As *Carex brunnescens* is probably extinct at all the historical locations in the present territory of Poland, the species deserves special attention and protection at the two recently identified stands.

Key words: *Carex*, Central Europe, distribution, north-eastern Poland

1. Introduction

Carex brunnescens (Pers.) Poir. (*C. Personnii* Sieb., *C. vitilis* Fr.), belonging to subgenus *Vignea* (P. Beauv. ex T. Lestib.) Heer, section *Glareosae* G. Don (Villaverde *et al.* 2020; Roalson *et al.* 2021), is mainly a boreal-montane species with circumpolar distribution (Fig. 1) reaching in Europe the southern limit in the Alps and the Caucasus Mts (Hultén & Fries 1986). As the data on the distribution of this species in the present territory of Poland is very scarce (Zajac & Zajac 2001) and there have been no reliable records of the occurrence of *C. brunnescens* in Poland in the literature for a long time, the search for this species in north-eastern Poland has been undertaken. *C. brunnescens* is morphologically similar to *C. canescens* L., therefore these species are frequently confused. Both species show morphological variability leading to the description of several varieties and forms (Ascherson & Graebner 1902; Kalela 1965). In Europe, *C. brunnescens* subsp. *brunnescens* and *C. brunnescens* subsp. *vitilis* (Fr. em. Bl.) Kalela (*C. vitilis* Fr.) were distinguished (Kalela 1965). Among

C. canescens, the following varieties and forms were described: f. *laetevirens* Asch., var. *subloliacea* Laest. (*C. canescens* var. *montana* Schur), f. *tenuis* Lang and var. *fallax* F. Kurtz (Ascherson & Graebner 1902). These taxa are probably only the ecotypes, resulting from habitat modifications of growth (Kalela 1965; Egorova 1999; Kuusk *et al.* 2003). Therefore, they are of no taxonomical value and are usually regarded as synonyms of the corresponding species (Koopman 2021).

The morphological differences between *C. canescens*, *C. brunnescens* and their two subspecies are presented in Table 1. The key character delimiting both of the discussed species is a distinct slit along the beak on the outer face of the utricles (perygina) in *C. brunnescens* (Fig. 2), whereas in *C. canescens* only small teeth at the tip of the beak are found (Fig. 3). However, these characters are not always permanent and evident. For example, among the typical utricles of *C. canescens*, some with an evidently long slit may be found (Fig. 4). On the other hand, among the utricles of *C. brunnescens*, frequently more or less numerous utricles can be found with only a short slit or those typical for

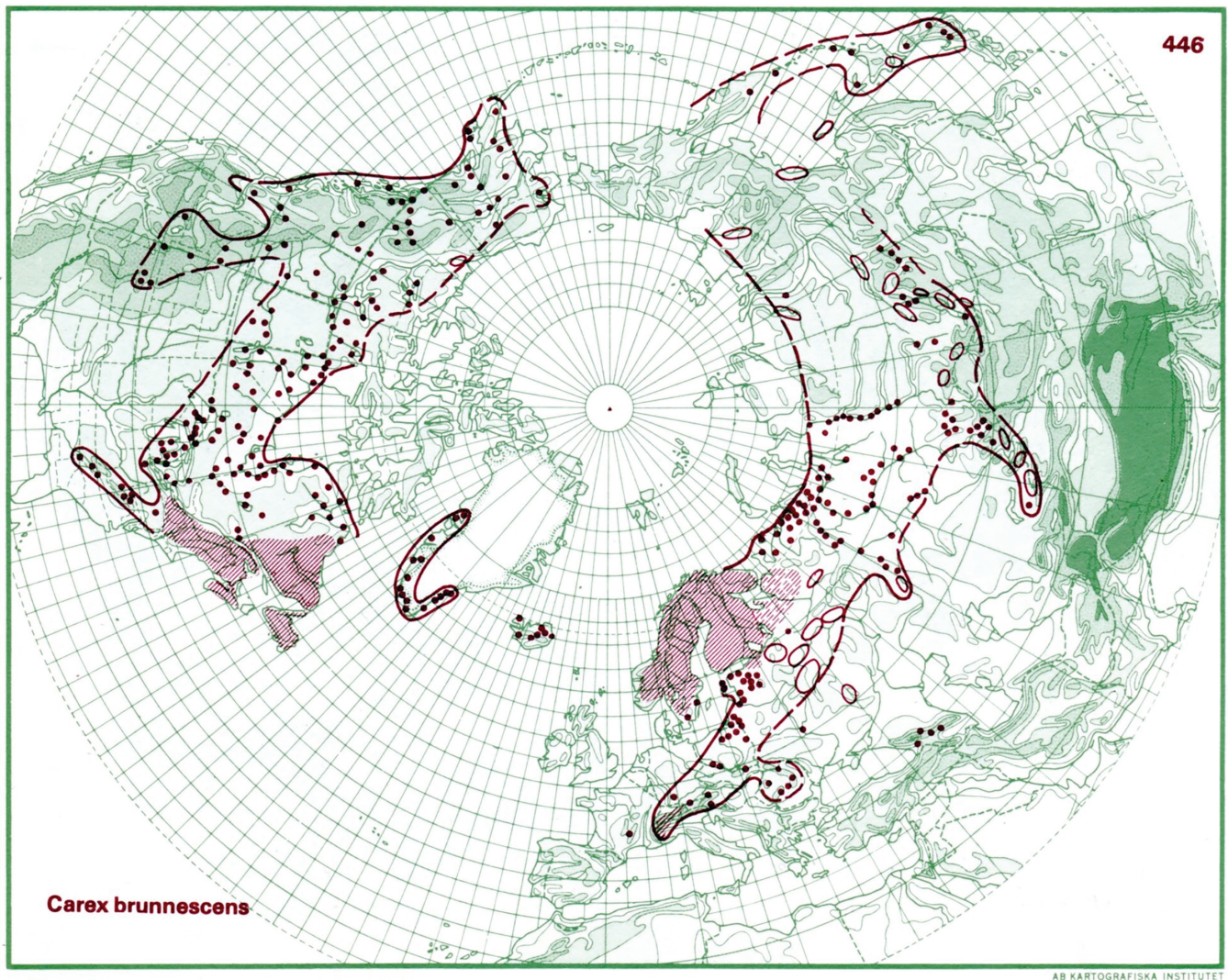


Fig. 1. The general distribution map of *Carex brunnescens* according to Hultén & Fries (1986). Reproduced with permission

C. canescens. Therefore, only the plants with distinct slits in the majority of the utricles should be treated as *C. brunnescens*.

In the present study, besides the field studies, a critical verification of the available herbarium materials and

an extensive literature search was performed to reveal the historical and present status of *C. brunnescens* in Poland and in the neighbouring regions.

Table 1. Diagnostic characteristics of *Carex brunnescens* and *C. canescens* and their varieties (based on Kalela 1965, Chater 1980)

***Carex brunnescens* (Pers.) Poir. – a distinct slit along the beak, usually brown utricles, brownish scales**

s. str. – compact plants (15-40 cm), rigid leaves, shorter than the flowering stems, dark-brown basal sheaths, 1.5-2 mm wide leaves, often brighter green than in the case of *C. canescens*, densely arranged spikes, usually ovoid-oblong, mostly yellow- to dark-brown ripe utricles, open stands

subsp. vitilis (Fr. em. Bl.) Kalela (*Carex vitilis* Fr.) – higher plants (40-70 cm) and slimmer than the type, frequently leaning, the leaves usually as long as the flowering stems, more widely separated spikes, usually olive green, rarely pure green ripe utricles, shaded stands (peaty forests)

***Carex canescens* L. – the utricles without a slit along the beak, only the small teeth at the tip of the beak, usually pale green to bright brown utricles, pale yellow scales**

the stems usually 20-50 cm, gray green plants, slightly floppy stem and leaves, pale grayish- or pinkish-brown basal sheaths, 2-3 mm wide leaves, pale or grayish green, inflorescence (2-) 3-5 cm, ovoid-oblong spikes, the scales first whitish, finally bright-yellow with a green midrib



Fig. 2. The utricles and a spike of typical *Carex brunnescens* (Flora Suecica, Vermlandia, 20.06.1897, leg. Herman A. Fröding, KRA211522)



Fig. 3. The utricles and a spike of typical *Carex canescens* (the Perkuć reserve, the Augustów Forest, 14.07.2015, fot. J. Kruk)



Fig. 4. The utricles of *Carex canescens* from the herbarium specimen collected at the Filipów Trzeci, in the Zachodniosuwalskie Lake District, in the Filipów Commune, in the low peat bog in the Rospuda Valley, in an overgrowing drainage ditch, 10.06.2009, leg. et det. Artur Pliszko, FB0612 ATPOL square, KRA0419391. The arrow indicates an utricule typical for *Carex brunnescens*

2. Material and methods

The field studies were conducted between 2018 and 2020 in north-eastern Poland. The herbarium studies were performed at the following herbaria: Jagiellonian University (KRA), Institute of Botany, Polish Academy of Sciences (KRAM), Nicolaus Copernicus University in Toruń (TRN), Warsaw University (WA) and Forest Research Institute in Białowieża (BIL). The maps from The Map Archives of Western Poland (<http://mapy.amzp.pl/maps.shtml>) were used for the identification of the historical places. The literature query was complemented by the personal information from the herbaria curators and other persons mentioned in the main text and in the acknowledgements. The records for *C. brunnescens* deposited in the ATPOL database (A. Zajac, pers. comm.) were also considered and verified.

The nomenclature of the species was based on Kalela (1965), Koopman (2021) and Ascherson & Graebner (1902) (*C. canescens* varietes).

The microscopic observations and the photographs of the utricles were performed using the Bresser Advance ICD 10x-160x microscope (the Meade Instruments Europe GmbH & Co. KG, Germany). The geographical coordinates of the stands were determined with a Garmin Legend HCx GPS receiver. A distribution map in the ATPOL grid (10 × 10 km squares) (Zajac 1978) was generated using the Gnomon 3.3 software (Desmodus, Poland).

3. Results and discussion

New locations

The field studies performed in north-eastern Poland in 2019 led to the discovery of two new stands of *C. brunnescens* in this region.

The first is at Lake Linówek near the Rutka village, peaty shore of the SW part of the lake (54°13'26.8", 22°50'21.8") (FA97, ATPOL grid, Fig. 5), 3.07.2019, in the Rutka nature reserve. Among the accompanying species were *C. limosa*, *C. echinata* and *C. nigra*. This

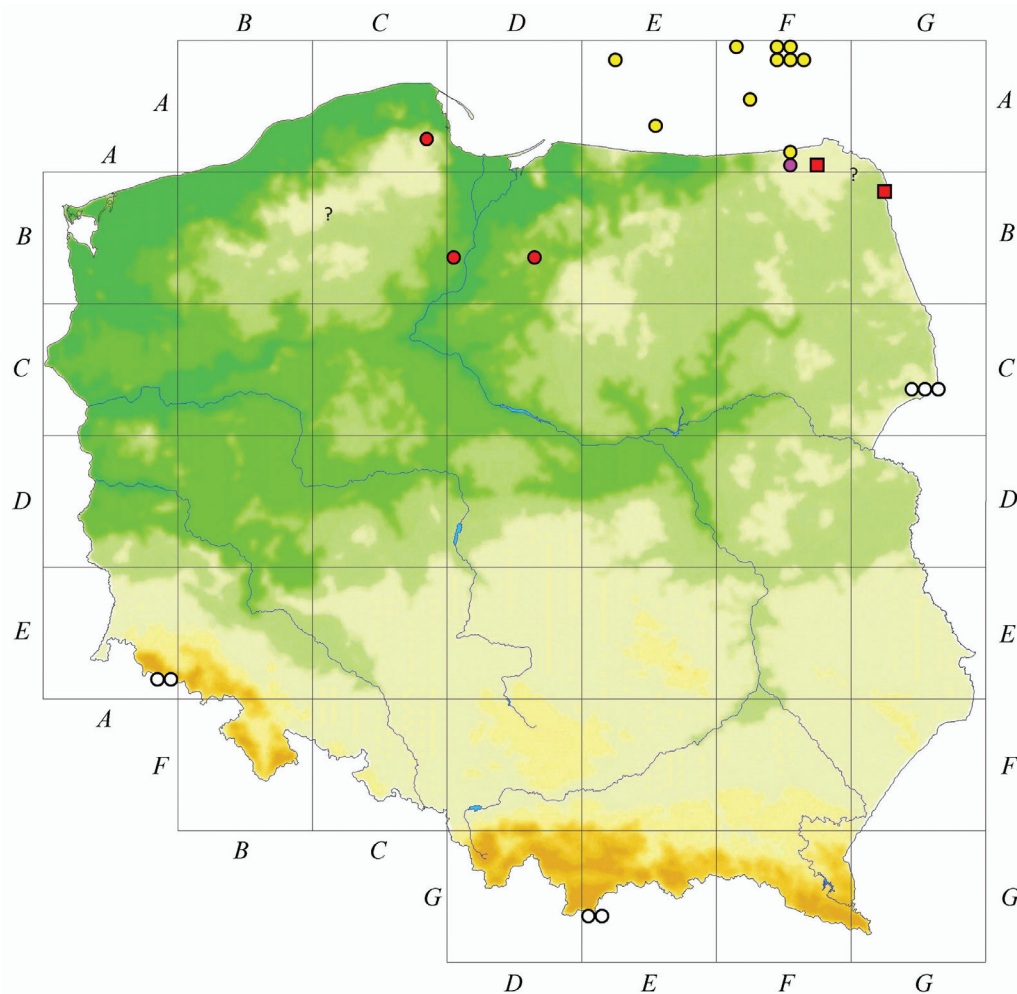


Fig. 5. The distribution map of *Carex brunnescens* in Poland and in the neighbouring regions in the ATPOL grid. Red squares – recent findings, red dots – herbarium data, pink dots – literature data concerning the territory of Poland, yellow dots – literature data concerning the Kaliningrad region, white dots – incorrect data, ? – uncertain data

reserve is known for the occurrence of other rare bog plants like *Liparis loeselii*, *C. chordorrhiza*, *C. dioica* and *Scorpidium scorpiodes* (moss) (P. Pawlikowski, pers. comm.). The utricles of the plants of interest from that stand are typical for *C. brunnescens* with evident slits along the beaks in most of the utricles that are dark-brown, while the scales are brownish (Fig. 6).

The second location was found at Lake Przystajnie (Dzikie I) near the Zelwa village, on the peaty shore of the lake (54°01'36", 23°30'35") (GB12), 7.07.2019, in the Kukle nature reserve. The utricles of the plants from this stand have slightly shorter slits along the beaks than in the formed case, but are evident and found in most of the utricles. Therefore, the analyzed individuals unquestionably belong to *C. brunnescens* (Fig. 6).

Herbarium specimens

The following revised specimens of *C. brunnescens* from the turn of the 19th and the 20th centuries were found in the TRN:

- *C. vitilis* Fr., Schwetz district (Świecie), Neuenburg, im grossen Waldbruch rechts von Wege nach Dobrau (Nowe, in a large forest bog right from the road to Dobre), Aug 25, 1881, leg. Hugo von Klinggräff, det. Heidenreich (DB60) – unconfirmed in 2020, although the bog still exists (L. Rutkowski, pers. comm.),
- *C. vitilis* Fr.?, Neustadt district (Wejherowo), am Brzozowka See bei Kölln (at Lake Brzozówka near Kielno), June 23, 1882, leg. Hugo von Klinggräff (CA71) – the lake does not exist any longer,
- *C. brunnescens a) vitilis*, Rosenberg district (Susz), F.R. Schönberg, an der Mohrunger Kreisgrenze, 2. Fundstelle in Westpreussen (Forst Szymbark, at the Morąg district border, 2nd finding in the Western Prussia), June 1907, leg. Hans Preuss (DB66) – the location is inaccurate, therefore difficult to verify.

In the BIL herbarium two sheets from the territory of the Białowieża Forest, collected from the same site



Fig. 6. The utricles and a spike of *Carex brunnescens* from Lake Linówek (left and center) (FA97) and the utricles from Lake Przystajnie (Dzikie I) (right) (GB12)

and at the same time, labeled as *C. brunnescens* were found:

- The Białowieża Forest, the Białowieża forestry management, the spruce forest on peat, L-738, 477B forest section, 7.06.1974, leg. & det. A. Sokołowski, BIL57752 (GC66),
- The Białowieża Forest, the Białowieża forestry management, the spruce forest on peat, L-738, 477B forest section, 7.06.1974, leg. & det. A. Sokołowski, BIL57759 (GC66).

The utricles of these plants were at a very early stage of development, nevertheless in both cases they are evidently characteristic for *C. canescens* and not for *C. brunnescens*.

In the ATPOL database, two additional herbarium records are mentioned from the same region:

- Białowieża Forest, 629 forest section, 1976, Sokołowski, BIL (GC64),
- Białowieża Forest, Białowieża forestry management, 1973, Sokołowski, BIL (GC65).

Despite extensive herbarium search, these sheets were not found (A. Szulc, pers. comm.). Therefore, there are no reliable data confirming the occurrence of *C. brunnescens* in the Białowieża Forest. It is quite probable that Sokołowski was not convinced about the determination of his *C. brunnescens* herbarium specimens, as he did not mention this species in any of his numerous publications on the Białowieża Forest, including *The Flora of Vascular Plants in the Białowieża Forest* (Sokołowski 1995).

There is also another herbarium record of Sokołowski from the BIL in the ATPOL database: Remieńkiń, E of Suwałki, 1969 (GB00), but this specimen was not found in the BIL either. This record probably refers to the peatbog at the SW shore of Lake Żubrowo (P. Pawlikowski, pers. comm.). This bog was visited in 2020 but *C. brunnescens* was not found there (J. Kruk, pers. observation). However, the existence of this species at this site in the past cannot be excluded.

There are several specimens in the WA herbarium from the W. Lackowitz herbarium, collected in the Sudetes at the turn of the 19th and the 20th centuries that were ascribed to *C. brunnescens* (*C. vitilis*) and some of them verified later as the varieties of *C. canescens*. Among them are:

- *C. canescens* L. subsp. *brunnescens* Poir., Hochmoore a.d. Kamme (raised bogs at the ridge), Aug 1904, leg. E.R. Missbach, Dresden, rev. *C. canescens* L. var. *fallax* F. Kurtz, WA10807 (AE89) – the exact location is uncertain,
- *C. canescens* L. subsp. *brunnescens* Poir., Hochmoore a.d. Kamme (raised bogs at the ridge), Aug 1904, leg. E.R. Missbach, Dresden, rev. nicht *brunnescens* Poir. sondern *C. canescens* L. var. *fallax* F. Kurtz, WA10808 (AE89) – the exact location is uncertain,
- *C. vitilis* Fr., Riesengebirge: zwischen der Hasenbaude und Schlingelbaude (the Old Meadow); 1067 m, July 2, 1896, leg. C. Baenitz, WA10848 (AE89),
- *C. canescens* L. var. *vitilis* Fries, PANTSche Wiese (Pančavská Louca), July 24, 1900, leg. E.R. Miss-



Fig. 7. The utricles of *Carex canescens* from the Lackowitz herbarium collected in the Sudetes: *C. canescens* L. var. *vitis* Fries, Pantsche Wiese (Pančavská Louca), July 24, 1900, leg. E.R. Missbach, Dresden, WA10849 (AE88)

bach, Dresden, rev. *C. canescens* L. var. *sublohiacea* Laest., WA10818 (AE88),

- *C. canescens* L. var. *vitis* Fries, Pantsche Wiese (Pančavská Louca), July 24, 1900, leg. E.R. Missbach, Dresden, WA10849 (AE88).

The utricles of all of these specimens are more or less typical for *C. canescens*. The utricles similar to a certain extent to those of *C. brunnescens* were found for plants from Pantsche Wiese (Pančavská Louca) (the Czech Republic) (Fig. 7), nevertheless they cannot be ascribed to that species. These data indicate that *C. brunnescens* was wrongly reported as present in the Sudetes.

Literature data

Numerous records from 19th century regarding the Western and the Eastern Prussia, i.e. contemporary north-eastern Poland and the neighbouring regions was provided by Abromeit *et al.* (1898-1940):

- District Schwetz (Świecie): Neuenburg, gr. Waldbruch N v. Wege nach Dobrau (Hugo v. Klinggräff 1881) (DB60) – this data corresponds to the herbarium specimen mentioned before,
- District Goldap: N-Ufer des Sees von Szielasken (N shore of the lake at Żelazki), (Rehse 1893) (FA95).

The records located outside the present Polish territory (nowadays Kaliningrad Region), according to Abromeit *et al.* (1898-1940), are:

- District Tilsit (Sowieck) (Heidenreich 1881) (FA01),
- District Ragnit (Ragneta) (FA04, FA05),
- District Fischhausen (Primorsk) (EA12),
- District Wehlau (Welawa) (EA65),
- District Pillkallen (Pilkawy) (FA05, FA14, FA15, FA16),
- Gumbinnen (Gusiew) (FA42),
- Goldap: Rominter Heide (the Romnicka Forest), Jg. 74 (FA85) – this stand is the closest one to the present territory of Poland, ca. 1 km N from the border.

There is another literature record from the northern Poland: a transitional bog NW from Stara Brda, district Miastko (Marek 1975), (CB31), research performed in 1966-67. This is a doubtful record – there are no bogs at the indicated location. However, the occurrence of the species in this region cannot be excluded.

C. brunnescens was also reported in the 19th century from the Tatra Mts, both from the Polish and the Slovakia part of the mountains, at the following sites: The Black Pond (Czarny Staw) above Morskie Oko (EG60) (Uechtritz 1857; Haussknecht 1864; Knapp 1872),



Fig. 8. The herbarium specimen from Mt. Czywczyn (in the meadow on the top of Mt. Czywczyn, ca. 1769 m a.s.l., Czywczyn Mts, Aug 9, 1934, leg. & det. J. Mądalski, KRAM465781)

Młynicka Valley (EG60) (Sagorski & Schneider 1891), Zelené pleso Kežmarské (the Green Kezmary Lake) (EG61) (Sagorski & Schneider 1891). On the other hand, Zapałowicz claimed that he did not find *C. brunnescens* in the Tatra Mts in those times (Zapałowicz

1906). In the present study none of the herbarium specimens confirming the occurrence of this species in the Tatra Mts were found. It is worth mentioning here that Mądalski, who originally claimed that *C. brunnescens* probably did not grow in the Carpathians (Mądalski

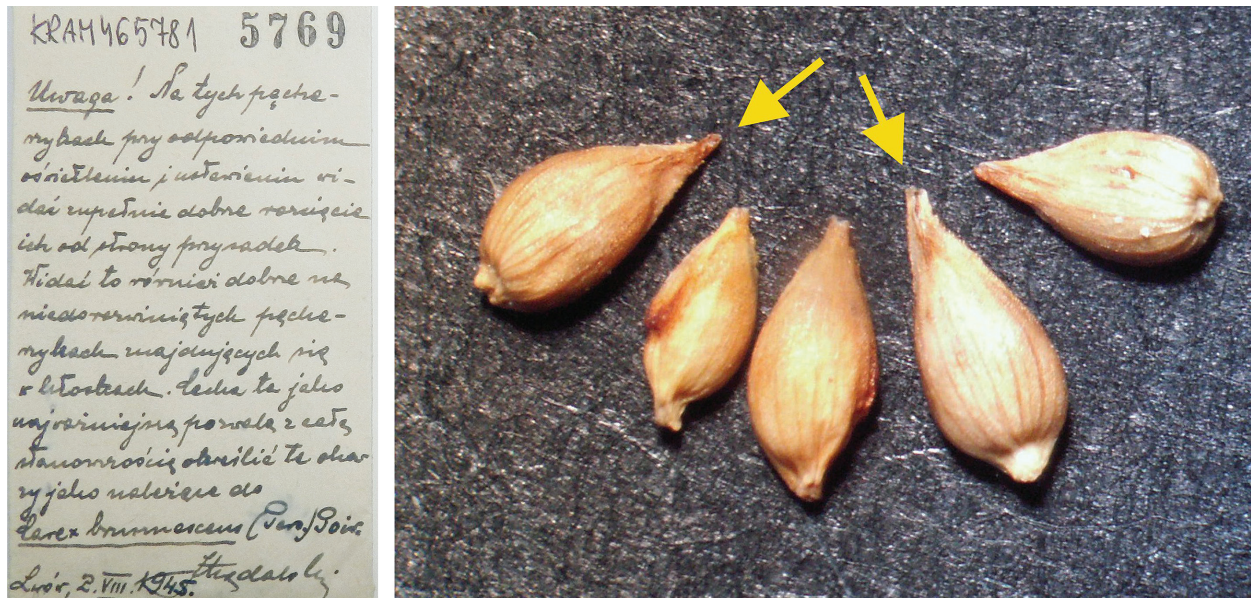


Fig. 9. The comment of Mądalski and the utricles of the individuals from Mt. Czywczyn (in the meadow on the top of Mt. Czywczyn, ca. 1769 m a.s.l., Czywczyn Mts, Aug 9, 1934, leg. & det. J. Mądalski, KRAM465781). The arrows indicate the utricles typical for *Carex brunnescens*

1930), collected three individuals on the Czywczyn Mt. (on the meadow on the top of Mt. Czywczyn, ca. 1769 m a.s.l., Czywczyn Mts, Aug 9, 1934, leg & det. J. Mądalski, KRAM 465781) in the Eastern Carpathians (presently Ukraine). According to his observations and the comments included on the herbarium sheet (Fig. 8), the plants belong to *C. brunnescens* due to the utricles characteristic for this species. Nevertheless, the utricles show evident slits only in some of the utricles (Fig. 9), therefore, the collected individuals can be attributed at most to the intermediate form between *C. brunnescens* and *C. canescens*. Further south, in the Romanian Carpathians, *C. brunnescens* has been found in several locations (Oprea & Sîrbu 2013; Mirek 2020).

4. Conclusions

Two new locations of *C. brunnescens* have been found in north-eastern Poland. Until now, the occurrence of this species in Poland has not been proven by reliable records for at least 50 years. The historical stands in the present territory of Poland were not confirmed, and most of them, if not all, probably do not exist anymore. Nevertheless, besides the two new stands identified in the current research, other locations of the investigated species may exist in north-eastern Poland, especially in the Romnicka Forest region.

Based on the presented data, it can be concluded that *C. brunnescens* does not occur in the Sudetes and

the Western Carpathians, therefore the corresponding locations on the distribution map of Hultén & Fries (Fig. 1) can be regarded as incorrect. This is in line with the absence of *C. brunnescens* in the Czech (Dostál 1989) and the Slovakia flora (Dostál 1989), although this species is mentioned in the checklist of vascular plants of the Czech Republic (Daniehka *et al.* 2012). This is probably based on one uncertain record in the database (Mukařov u Úštěku, dist. Litoměřice, 1967) ([https://pladias.cz/en/taxon/distribution/Carex brunnescens](https://pladias.cz/en/taxon/distribution/Carex_brunnescens)). In Ukraine, this species was reported only recently from the Sumy region (Danylyk & Panchenko 2001).

The investigated species deserves special attention and protection, as it has always been very rare throughout the current territory of Poland, and is at present confirmed at only two locations, where it can be found in very small populations. Thus, it should be regarded as critically endangered. Although the species grows in protected areas (nature reserves), its existence is mainly threatened by the succession processes.

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