PHYTOSOCIOLOGICAL COMPARATIVE ANALYSIS OF TWO LOCALITIES OF *CAREX PULICARIS* L. IN THE ŁÓDŹ PROVINCE (CENTRAL POLAND)

Ryszard Plackowski

9 Maja str. 6/14, 97-300 Piotrków Trybunalski, plackowski@interia.pl

Summary. *Carex pulicaris* L. is a rare Sub-Atlantic species. In Poland it is classified as an endangered species (E). The paper presents a comparative analysis of two localities of *Carex pulicaris* in Central Poland. Floral inventories revealed that *Carex pulicaris* can be found in different plant communities: where species from classes *Scheuchzerio-Caricetea Nigrae*, *Phragmitetea* and *Molinio-Arrhenatheretea* dominate, as well as where species from the following classes where found: *Nardo-Callunetea*, *Molinio-Arrhenatheretea* and *Vaccinio-Piceetea*. In order to estimate the present condition of both populations and forecast their further occurrence and threats resulting from succession, a permanent many-year monitoring should be carried out.

Key words: Carex pulicaris L., endangered species, ecology, protection,

INTRODUCTION

Carex pulicaris L. is a rare subatlantic species. In Poland it is classified as an endangered species (E) [Zarzycki and Szelag 2006]. The Eastern European limit of this species runs through Poland. As many as 30 localities are known, mostly in Western Pomerania New discovered localities are located mostly outside of the main range of the species [Bartoszek 1999, Nobis and Piwowarczyk 2004, Plackowski 1986–1987, Trojecka 2007].

Carex pulicaris is a perennial plant with stubbly leaves that grows in loose clusters. Its height ranges from several centimetres to 25 cm [Rutkowski 1998]. It occurs in boggy meadows, peat bogs and areas rich in calcareous compounds. This species is connected with the community *Caricetalia davallianae* [Matusz-kiewicz 2002].

RESEARCH AIM, MATERIAL AND METHODS

The research aimed at a comparative study of species composition in two localities with *Carex pulicaris* in the vicinity of Radomsko and Końskie in the Łódź Province.

The locality to the North from Radomsko (DE56), a part of Wzgórza Radomszczańskie (the Radomszczanskie Hills) [Kondracki 1994], is a transitional peat bog with an area of 5 ha, fed with waters from the left bank of the Widawka river. It was discovered by Plackowski [1986–1987]. The range of *Carex pulicaris* in the peat bog covers ca. 200 m². The population was estimated for ca. 100 shoots.

The second locality was found to the north from Końskie (EE32), in the eastern part of Wzgórza Opoczyńskie (the Opoczno Hills) which are part of Wyżyna Przedborska (the Przedbórz Upland) within Wyżyna Małopolska (the Małopolska Upland) [Kondracki 1994]. *Carex pulicaris* occurs here in dispersed localities on a peaty overgrowing meadow with accompanying species such as *Oxycoccus palustris* Hill, *Epipactis palustris* (L.) Crantz and *Molinia caerulea* [Trojecka 2007].

In order to identify the species composition of plant communities with *Carex pulicaris*, square sample plots of 20 m² m area were marked in places of its most numerous occurrence. In each plot the phytosociological sampling was applied according to the Braun-Blanquet method: near Radomsko on 30^{th} July 2009 (locality 1) and near Końskie on 20^{th} August 2009 (locality 2). The research was carried out on square sample plots according to Faliński's recommendations [2001]. Additionally, some ecological indices were calculated [Zarzycki *et al.* 2002]. Herbaceous plants were identified with the Rutkowski identification guide [1998] and mosses with the Frahm and Frey [1987] guide. Names were accepted after Mirek *et al.* [2002]. The syntaxonomic analysis was carried out with the Matuszkiewicz guide [2002].

RESULTS

The following species were found in locality 1: Agrostis canina 3.2, Alnus glutinosa (b) +2, Anthoxanthum odoratum +, Aulacomnium palustre (d) 1.2, Betula pubescens (b) +, Briza media +, Carex diandra +2, Carex panicea 2.2, Carex pulicaris +2 (20 shoots on the studied area), Cirsium palustre +, Comarum palustre +, Festuca rubra +, Frangula alnus (b) +2, Holcus lanatus +, Juniperus communis (b) +, Lythrum salicaria +, Oxycoccus palustris +2, Phragmites australis 3.2, Pinus sylvestris (b) 1.1, Salix cinerea (b) 1.2, Salix aurita (b) 1.2, Sphagnum falllax (d) 3.2, Sphagnum rubellum (d) 3.2, Stellaria palustris +, Viola palustris 3.2.

Locality 1 was covered with bushes in 20%, herbaceous plants in 80%, and mosses in 65%.

In locality 2 the following species were found: Achillea millefolium +, Agrimonia eupatoria +, Agrostis capillaris 1.2, Anthoxanthum odoratum 1.2, Aulacomnium palustre (d) +2, Betula pendula (b) +, Briza media 2.2, Bryum pseudotriquetrum (d) +, Carex hirta +2, Carex ovalis +, Carex pulicaris 1.2 (50 shoots on the studied area), Cerastium holestoides +, Cirsium palustre +, Climacium dendroides (d) +2, Danthonia decumbens +, Deschampsia caespitosa 3.2, Dianthus deltoides +, Epilobium lamyi +, Equisetum arvensis +, Festuca rubra 2.2, Frangula alnus (b) 1.1, Galium uliginosum +, Genista tinctoria +, Gnaphalium uliginosum +, Hieracium pilosella +, Holcus lanatus +2, Hydrocotyle vulgaris +, Hylocomnium splendens (d) +2, Hypericum maculatum +, Juncus effusus +, Juniperus communis (b) +, Knautia arvensis +, Lotus corniculatus 1.2, Lychnis flos cuculi +, Nardus stricta +, Padus serotina (b) 1.1, Pimpinella saxifraga +, Pinus sylvestris (b) 1.1, Pinus sylvestris (c) +, Plantago lanceolata +, Potentilla erecta 2.2, Potentila reptans 2.2, Prunella vulgaris +, Rosa sp. +, Ranunculus acris +, Rumex acetosella +, Senecio jacobea +, Thuidium delicatulum (d) +2, Thymus pulegioides +, Thymus serphyllum +, Vaccinium vitis-idaea +, Viola canina +.

Locality 2 was covered with bushes in 3%, herbaceous plants in 90%, and mosses in 5%.

Ecological indices for locality 1 were as follows: L 4.0, T 3.3, W 4.0, Tr 3.0, R 3.1, H 2.5, and for locality 2: L 3.8, T 3.0, W 2.8, Tr 2.8, R 2.9, H 2.2. The humidity indices revealed that in locality 2 the soil was wet and in locality 1 it was humid. Other indices did not differ significantly between the localities. The indices revealed such characteristics as semi-shadowed localities, moderately cool conditions of plant growth, mesotrophic and moderately acidic soils, from mineral and humus character to rich in organic matter.

CONCLUSIONS

Carex pulicaris occurs together with other species of different ecological requirements. Species compositions of both research plots differ significantly. Only 6 species from the class *Molinio-Arrhenatheretea* were common for both plots.

Locality 1 is a transitional peat bog that is undergoing an acidification process with development of uniform and poor species composition. Some species, which occurred here before, have vanished. The species were typical for calcareous marshes, e.g. *Eleocharis quinqueflora* and *Liparis loesoelii* as well as for raised peat bogs, e.g. *Drosera rotundifolia* [Plackowski 1999, 2008]. Species that dominated here represented classes *Scheuchzerio-Caricetea Nigrae (Agrostis canina, Viola palustris)* and *Phragmitetea (Phragmites australis)*, which can pose a threat the population of *Carex pulicaris* by overgrowing its localities.

Ryszard Plackowski

The occurrence of forest species (*Betula pendula, Juniperus comumnis, Pinus sylvestris, Vaccinium vitis-idaea*) and acidophilus species (*Nardetalia*), along with hygrophilous species (*Bryum pseudotriquetrum, Hydrocotyle vulgaris, Hylocomnium splendens*) in locality 1 revealed quite a differentiated species composition. A specific feature of this locality was a significant occurrence of species form the classes *Nardo-Callunetea* and *Molinio-Arrhenatheretea*. This community does not belong to *Caricetalia davallianae*. However, *Carex pulicaris* is connected with it. Mosses were represented by species indicating acidification of the habitat: *Aulacomnium palustre* (localities 1 and 2) and *Sphagnum rubellum* (locality 1).

It is difficult to provide a definite syntaxonomic classification of both localities. A similar problem was indicated by Bock [1987].

Zarzycki *et al.* [2002] included *Carex pulicaris* in the list of hygrophilous plants. The observations from locality 2, however, revealed species from the class *Nardo-Callunetea*, which proves a wider ecological scale of this species.

It is difficult to assess an actual condition of the *Carex pulicaris* population in locality 2 on the basis of single-season observations. It seems, however, to be more favourable than in locality 1, which was already described and where a decline of this species was observed by Plackowski [2008]. Recognition of species composition, development biology of *Carex pulicaris* and accompanying actual flora would be helpful in establishing a monitoring scheme. In consequence it would allow determination of the threats to this species in both localities. In case of potential threat of overgrowing by competitive species of wider ecological spectrum, it could be necessary to implement active protection measures which are commonly used for this type of habitats.

REFERENCES

- Bartoszek W., 1999. A new station for *Carex pulicaris* (Cyperaceae) in the Polish Carpathians (in Polish). Fragm. Flor. Geob. Ser. Polonica 6, 274–279.
- Bartoszek W., Mirek Z., 2001. Carex pulicaris L. [in:] Polish Red Data Book of Plants (in Polish). Instytut Botaniki im. W. Szafera, PAN, Instytut Ochrony Przyrody PAN, Kraków, 526–527.
- Bock C., 1987. Le Marais de Cessieres Montbavin. Du Cote du Laonnois Centre de Recherche de Cessières. Aisne, 13–15.
- Faliński J., 2001. Guide book for long-duration ecological investigations (in Polish). S. Vedemecum Geobot. PWN, Warszawa, 1–672.

Frahm J., Frey W., 1987. Bryophyta. (Moosflora) Verlag Eugen Ulmer. UTB, Stuttgart, 1-522.

- Kondracki J., 1994. Geography of Poland. Physical geographic meso-regions (in Polish). PWN, Warszawa, pp. 339.
- Matuszkiewicz W., 2002. Guide book for plant communities determination (in Polish). Wydawnictwo Naukowe PWN, Warszawa, pp. 536.

- Mirek Z., Piękoś-Mirkowa H., Zając A., Zając M. (red.), 2002. Flowering Plants and Pteridophytes of Poland a Checklist (in Polish). Instytut Botaniki im. W. Szafera, PAN, Instytut Ochrony Przyrody PAN, Kraków, pp. 442.
- Nobis M., Piwowarczyk R., 2004. *Carex pulicaris (Cyperaceae)* in the area of north foreground of Świętokrzyskie Mts. (in Polish). Fragm. Flor. Geob. Ser. Polonica 11 (2), 415–416.
- Plackowski R., 1986–1987. New localities of rare species of plants near Radomsko in the province of Piotrków Trybunalski (in Polish). Fragm., Flor. Geob. 31–32, 1–2, 45–48.
- Plackowski R., 1999. Data on biology and ecology of Liparis leselli in Central Poland. (Observation sur la biologie et l'écologie de *Liparis loeselii* (Linne) L.C.M. Richard en Pologne Centrale), 176–192 Cah. Soc. Fr. Orch. 6, 14, Colloque de Paris.
- Plackowski R., 2008. Decline of the population of flea sedge *Carex pulicaris* L. at the site near Radomsko (in Polish). Chrońmy Przyrodę Ojczystą 64 (1), 63–71.
- Rutkowski L., 1998. Guide book for determination of the vascular plants of the lowland Poland (in Polish). Wydawnictwo Naukowe PWN, Warszawa, pp. 812.
- Trojecka A., 2007. New locality of *Carex pulicaris* (Cyperaceae) on the eastern part of the Opoczyńskie Hills (Małopolska Upland) (in Polish). Fragm. Flor. Geob. Ser. Polonica 14 (2), 393–395.
- Zarzycki K., Trzcińska-Tacik H., Różański W., Szeląg Z., Wołek J., Korzeniak U., 2002. Ecological indicator values of vascular plants of Poland (in Polish). Instytut Botaniki im. W. Szafera PAN, Kraków.
- Zarzycki K., Szeląg Z., 2006. Red list of vascular plants in Poland (in Polish) [in:] Zarzycki K., Mirek Z., Red list of plants and fungi in Poland (in Polish). Instytut Botaniki im. W. Szafera, PAN, Kraków.

FITOSOCJOLOGICZNA ANALIZA PORÓWNAWCZA DWÓCH STANOWISK CAREX PULICARIS L. W WOJEWÓDZTWIE ŁÓDZKIM (POLSKA CENTRALNA)

Streszczenie. *Carex pulicaris* L. to rzadki subatlantycki gatunek; w Polsce został zaliczony do wymierającej kategorii (E). Artykuł przedstawia analizę porównawczą dwóch stanowisk turzycy pchlej w Polsce Centralnej. Z wykonanych spisów gatunków wynika, że turzyca pchla rośnie w różnych zbiorowiskach: na takich, gdzie wśród gatunków towarzyszących dominują te z klas *Scheuchzerio-Caricetea Nigrae, Phragmitetea i Molinio-Arrhenatheretea*, oraz na takich, gdzie zanotowano gatunki z klas *Nardo-Callunetea, Molinio-Arrhenatheretea* i *Vaccinio-Piceetea*. Celem dokładniejszej oceny stanu obu populacji i prognozy co do ich dalszego trwania i zagrożeń sukcesją należałoby prowadzić stałe, kilkuletnie obserwacje.

Slowa kluczowe: turzyca pchla, wymierające gatunki, ekologia, ochrona