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**THE OCCURRENCE OF CROWBERRY
(*EMPETRUM NIGRUM* L., EMPETRACEAE) IN THE KUŹNIK
LAKES CHANNEL (NORTHERN WIELKOPOLSKA)**

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ABSTRACT. In this work new localities and earlier reported locality of the crowberry (*Empetrum nigrum* L.) from the Kuźnik Lakes Channel are described. The information on phytocoenoses, habitats and protection of *E. nigrum* in this region are provided.

Key words: phytogeography, *Empetrum nigrum* L., habitats, protection, Kuźnik Nature Reserve, Kuźnik Bagienny, Zdrojowa Góra, Kuźnik Lakes Channel, Wielkopolska region

Introduction

The crowberry (*Empetrum nigrum* L.) is a dwarf shrub 40-50 cm tall, whose red-dish-brown sprouts usually raise over the ground. Its evergreen leaves are needle-shaped and shiny, with a small white hollow on the underside. It is a dioecious plant with pink male and purple female flowers, located by 2-3s in the leaves' corners. Its fruit is a black edible drupe (Szafer et al. 1986, Rutkowski 1998). The crowberry is a glacial relict reaching in Poland its southern geographical extent (Czubiński 1950, Browicz and Zieliński 1973). It is common in the Pomerania region, first of all as a part of maritime crowberry forests *Empetro nigri-Pinetum* growing on the Baltic shore (Piotrowska 2003). Similarly, it is frequently present in marshy coniferous forests, on high and transitional bogs in north-eastern Poland and in the Masurian and Lithuanian Lake Districts. It is relatively frequent in the Carpathian and Sudety Mountains, too (Zarzycki and Guzik 1975).

In the Wielkopolska region, *E. nigrum* was considered by Żukowski and Jackowski (1995) as a species in the imminent danger of extinction (the E category). The

plant has been recorded from the sites not far from Biała near Trzcianka (**Pfuhl** 1896, **Ascherson** and **Graebner** 1898-1899, **Hryniewiecki** 1932), from the shores of the lake Niewiemko-Głębiczyń (Scholz 1905, **Juhnke** 1912, **Wodziczko et al.** 1938, **Szulczewski** 1951), and from the Kuźnik Natural Reserve, esp. from the shores of the lake Kuźnik Mały (**Frase** 1927, 1935, **Nowaczyk** 1961, Plan zagospodarowania... 1961, **Podgórski** 1962, **Frechmin** 1973, **Staniewska-Zątek** 1997, **Celka** and **Szkudlarz** 1999, **Owianny** and **Gąbka** 2004 a, **Gąbka** and **Owianny** 2005) and from the Chlebowo Swamp (**Staniewska-Zątek** 1997, **Celka** and **Szkudlarz** 1999).

An earlier verification of the crowberry sites in Wielkopolska, carried out by **Celka** and **Szkudlarz** (1999), demonstrated the species' presence only in the Chlebowo Swamp and in the Kuźnik Natural Reserve. The remaining sites were considered obsolete.

The aim of this study is to present the habitat conditions of *E. nigrum* in the Kuźnik Lakes Channel in the northern Wielkopolska, paying special attention to the characteristics of its newly found sites.

Area study and methods

The Kuźnickie Lakes Channel starts to the north of the city of Piła, in the vicinity of Bukowa Góra near Wiesiółka. It is a long and deep glacial channel with 6 small bog lakes, two bigger fertile ones, and a complex of ponds and meadows growing on peat and gyttja beds, with bog-pit ponds dug in them. The channel runs to the south-west to the Łubianka forester's lodge, and then assumes meridional direction, ending in the south-western outskirts of Piła. Its formation started with the last ice-sheet located on the line Czarnków-Chodzież, i.e. ca. 17 700 years BP (**Kozarski** 1995).

The study of the sites of *Empetrum nigrum* in the Kuźnik Lakes Channel was conducted in the vegetative seasons of the years 2000-2005. Numerical force of the population was measured, and phytosociological records made for both the previously documented and the newly found sites of the crowberry. In three cases water samples coming from shallow piezometric wells in peat-forming layers were taken for physico-chemical analyses. Each of the analysed samples consisted of 3 sub-samples taken from the central part of each of the patches (**Kłosowski** and **Tomaszewicz** 1993, **Kłosowski** 1999). Physico-chemical analyses included 18 water and 15 substratum parameters made according to the methods presented in the studies by **Siepak** (Fizyczno-chemiczna analiza... 1992) and **Hermanowicz et al.** (1999). The nomenclature of vascular plants follows **Mirek et al.** (1995), that of mosses – **Ochyra et al.** (1992), and the plant communities' nomenclature is used according to **Brzeg** and **Wojterska** (2001).

Results and discussion

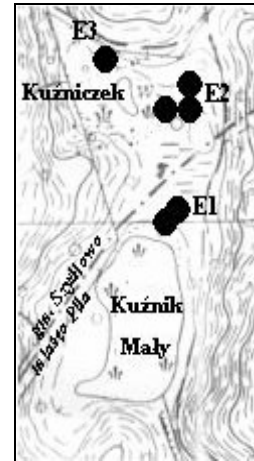
Distribution of *Empetrum nigrum* in the Kuźnik Lakes Channel

The study pointed out three sites of *E. nigrum* in the Kuźnik Lakes Channel (the BC17 square in the ATPOL) (Zajac 1978):

1) the Kuźnik Natural Reserve (Fig. 1), at the border between the northern part of Piła and the village district Szydłowo, the county of Piła, Zdrojowa Góra Forest Division (Zdrojowa Góra forest district);

Fig. 1. Approximate location of the sub-population of the crowberry (*Empetrum nigrum* L.) in the southern part of the Kuźnickie Lakes Channel; sub-populations E1-3 in the western part of the Kuźnik Natural Reserve (marked in the text)

Ryc. 1. Orientacyjna lokalizacja subpopulacji bażyny czarnej (*Empetrum nigrum* L.) w południowej części Rynny Jezior Kuźnickich; subpopulacje E1-3 w zachodniej części Rezerwatu Przyrody Kuźnik (oznaczenia w tekście)

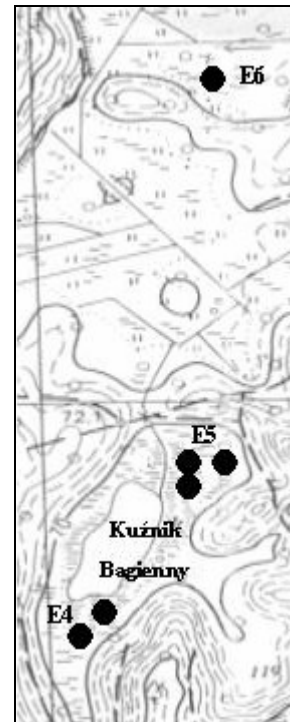


2) biogenic accumulation plains at the Kuźnik Bagienny Lake (Fig. 2), ca. 1.5 km to the north of the Kuźnik Natural Reserve, Szydłowo village district, Piła county, Zdrojowa Góra Forest Division (Zdrojowa Góra forest district);

3) marshy coniferous forest (Fig. 2), ca. 1.0 km to the south-west of Łubianka forester's lodge (Czapla) and 0.7 km to the north of the Kuźnik Bagienny Lake, Szydłowo village district, Piła county, Zdrojowa Góra Forest Division (Zdrojowa Góra forest district).

Fig. 2. Approximate location of the sub-population of the crowberry *Empetrum nigrum* L. in the central part of the Kuźnickie Lakes Channel; the sub-populations E4-5 at the Kuźnik Bagienny and the sub-population E6 in the transitional peat-moor (marked in the text)

Ryc. 2. Orientacyjna lokalizacja subpopulacji bażyny czarnej (*Empetrum nigrum* L.) w środkowej części Rynny Jezior Kuźnickich; subpopulacje E4-5 nad Kuźnikiem Bagiennym oraz subpopulacja E6 na mszarze przejściowym (oznaczenia w tekście)



Within the “natural reserve” (1) population we can distinguish three sub-populations located in the section 193:

- sub-population (**E1**): two patches located on the high bog 30-40 m away from the northern shore of the Kuźnik Mały Lake;
- sub-population (**E2**) located ca. 130-140 m further to the north of the shores of the Kuźnik Mały Lake (section 193a) with three patches; two of them are located in the marshy coniferous forest, while the third one can be found in the pine forest growing over a mineral elevation separating the marshy forest from the peat bogs lying to its west, at the Kuźniczek lake;
- sub-population (**E3**): a patch located in the marshy birch thicket at the northern fringes of the peat bog at the Kuźniczek Lake.

The first two sub-populations (E1 and E2) have been mentioned by numerous authors. The most extensive descriptions have come from the studies of **Celka and Szku-dlarz** (1999). **Enderlein** (1938) has also documented the site of *E. nigrum* at the western shore of the Kuźnik Mały Lake. Interestingly, however, the same study ignores the site at the northern shore, previously mentioned by the **Frase** (1927), and by numerous later studies. We may assume that the documentation of the western location might have been simply a mistake, and this conclusion is confirmed by the lack of any further references. This study, despite thorough investigation, was unable to confirm the occurrence of the crowberry on the western side of the Kuźnik Mały Lake. The sub-population E3, located at the Kuźniczek Lake, has never been a subject of a more detailed description going beyond the mentioning of the site (**Gąbka and Owsiany** 2005).

The crowberry site at the Kuźnik Bagienny Lake (2) is particularly abundant. Its presence has been signalled by **Owsiany and Gąbka** (2004 a) and **Gąbka and Owsiany** (2005), lacking, however, habitat and phytocenotic characteristics. The population located in the section 119 at the Kuźnik Bagienny Lake can be divided into:

- southern sub-population (**E4**) consisting of two patches,
- northern sub-population (**E5**) comprising three patches.

The third site of *E. nigrum* in the Kuźnik Lakes Channel is located in a deforested marshy coniferous forest. In this freshly discovered site, the crowberry appears in a dried place, close to the mineral island, forming a single, relatively dense patch (**E6**).

Phytocenotic and habitat characteristics of patches with *E. nigrum*

By and large, the occurrence of *E. nigrum* in the Kuźnik Lakes Channel is connected with the presence of marshy forests and birch thickets, and with peat moors. The phytosociological records made for the patches of the crowberry are presented in Table 1. In the analysed sites 44 species were identified altogether, with a considerable quantitative and qualitative participation of the class *Oxycocco-Sphagnetea* (Table 1). Numerous represented, too, are the species of the class *Scheuchzerio-Caricetea fuscae*. In all of the analysed sites a high participation of *Sphagnum fallax* in the moss layer is visible. *E. nigrum* grows in various light conditions, mostly connected with the shade provided by trees and shrubs. In the Kuźnik Natural Reserve (E1-3) the crowberry can be found first of all in the peatbog area, in the gaps in the forest vegetation, sometimes accompanied by *Carex rostrata* or with the participation of *Oxycoccus palustris*, *Eriophorum vaginatum* and *Andromeda polifolia*.

Table 1 – cont.

Successive number Numer kolejny	1	2	3	4	5	6	7	8	9	10	11
<i>Calliergon stramineum</i>	+	+	.	.	.	.	+	.	.	.	+
<i>Carex rostrata</i>	4.4	3.3	.	+	.	.	.	+	r	.	+
<i>Carex nigra</i>	.	.	.	.	+	.	+	.	.	.	.
<i>Agrostis canina</i>	.	.	.	.	.	.	.	.	.	.	1.1
<i>Carex limosa</i>	+	.	.	.	.	.	.	.	.	.	.
<i>Carex canescens</i>	.	.	.	.	.	.	+	.	.	.	.
<i>Carex echinata</i>	+	+	.	.	.	.	.	.	.	.	+
<i>Viola palustris</i>	+	.	.	.	.	.	.	.	.	.	.
<i>Comarum palustre</i>	.	+	.	.	.	.	.	.	.	.	.
<i>Sphagnum flexuosum</i>	.	+	.	.	.	.	.	.	.	.	.
<i>Lysimachia thrysisflora</i>	.	.	.	.	.	.	.	.	.	.	+
<i>Calla palustris</i>	.	.	.	.	.	+	.	.	.	.	.
Others – Inne											
<i>Pinus sylvestris</i> a	.	.	3.3	.	.	+	.	.	1.1	2.2	.
<i>Pinus sylvestris</i> fo. <i>turfosa</i> a2	2.2	1.1	.	.	.	.	1.1	3.1	.	.	.
<i>Pinus sylvestris</i> fo. <i>turfosa</i> b	2.2	.	.	+	.	.	2.2	1.1	1.1	.	1.1
<i>Pinus sylvestris</i> c/juv.	+	.	+	.	.	+	.	+	+	+	+
<i>Betula pubescens</i> b	.	.	+	+	+	1.1	.	.	r	.	4.4
<i>Betula pubescens</i> juv.	+	.	1.1	+	+	1.1	.	+	+	1.1	+
<i>Betula pendula</i> b	.	.	.	.	1.1	.	.	.	1.1	+	1.1
<i>Molinia caerulea</i>	.	.	.	.	.	.	.	.	.	.	1.2
<i>Vaccinium myrtillus</i>	.	.	.	.	.	.	.	.	.	.	+
<i>Sphagnum palustre</i>	+	+	.	.	.	.	.	.	.	.	.
<i>Thelypteris palustris</i>	+	.	.	.	.	.	.	.	.	.	.
<i>Quercus robur</i> juv.	+	r	+	+	+	+	.	r	.	.	.
<i>Frangula alnus</i> juv.	+	1.1	.	.	.	.	.	.	.	.	.
<i>Peucedanum palustre</i>	.	.	.	.	.	.	r	.	.	.	.
<i>Alnus glutinosa</i> a	.	4.4	.	.	.	.	.	.	.	.	.
<i>Alnus glutinosa</i> b	.	1.1	.	.	.	+	.	.	.	.	.
<i>Stellaria palustris</i>	.	.	.	.	.	.	.	.	.	.	+
<i>Holcus mollis</i>	.	.	.	.	.	.	.	.	.	.	+
<i>Dryopteris cristata</i>	+	.	.	.	.	.	.	.	.	.	.
<i>Calliergonella cuspidata</i>	+	.	.	.	.	.	.	.	.	.	.
<i>Picea abies</i> juv./c	.	.	.	.	.	r	.	.	.	r	.
<i>Entodon schreberi</i>	.	.	.	.	+	.	.	.	r	+	.
<i>Caluna vulgaris</i>	.	.	.	1.1	.	.	.	.	.	.	.
<i>Dryopteris cartusiana</i>	.	.	.	.	.	+	.	.	.	.	.

Explanations:

Localities of relevés are described in the text.

Objaśnienia:

Lokalizację zdjęć fitosocjologicznych opisano w tekście.

The sub-population (E1), located on the high bog at the northern shore of the Kuźnik Mały Lake, forms two adjacent patches of the joint area ca. 60 m² (Table 1, no. 1-2). The sprouts are more or less loosely distributed, usually leafed and in a good state (Phot. 1).



Phot. 1. Individuals of the crowberry of the sub-population E1 in the high bog at the northern shore of the Kuźnik Mały (photo by P.M. Owskianny)

Fot. 1. Okazy bazyli czarnej z subpopulacji E1 na torfowisku wysokim nad północnym brzegiem Kuźnika Małego (fot. P.M. Owskianny)

The sub-population (E2), located further to the north of the Kuźnik Mały Lake, consists of three patches in various states of preservation, depending on their location. The patch growing in the pine forest, at the mineral elevation between the peat bogs at the Kuźniczek Lake and the marshy coniferous forest (Table 1, no. 3), consists of individuals leafed only at the top parts of the stems. In a similarly poor state are the individuals of the small patch located in the northern part of the marshy coniferous forest (Phot. 2). Both patches are considerably shaded. In this population, only the individuals growing in the central, exposed part of the marshy coniferous forest were in a good condition (Table 1, no. 4). The patches of this population are no bigger than several dozen square metres.



Phot. 2. In intensely shaded places, the individuals developed leaves at the upper parts of the stems only (the northern patch of the sub-population E2) (photo by P.M. Owskianny)
 Fot. 2. W miejscach znacznie zacienionych stwierdzano osobniki ulistnione tylko na szczytowych partiach łodyżek (północny płat subpopulacji E2) (fot. P.M. Owskianny)

A small patch of the crowberry (ca. 10 m²), located in a marshy birch thicket to the north of the Kuźniczek Lake's shore (sub-population E3), shows characteristic dispersal of leafed sprouts ca. 15-18 cm long. Old, thick or lignified sprouts were virtually absent from this sub-population. Compared to the remaining patches of *E. nigrum*, the latter one exhibited a considerable participation of *Polytrichum strictum* and a complete lack of *Sphagnum magellanicum* (Table 1, no. 5). The absence of the individuals with old and thick sprouts, together with the lack of data concerning the occurrence of the crowberry in the so well explored natural reserve, suggest that the sub-population E3 might be relatively "young".

In the Kuźnik Lakes Channel region, the crowberry occupied the largest area in the belt of biogenic accumulation plains of the Kuźnik Bagienny Lake. On this site two sub-populations can be distinguished, growing in two initial forms of continental high coniferous forest *Ledo-Sphagnetum magellanicum* (northern and southern) separated by the alder carr. The patches tend to show the domination of *Ledum palustre* and a considerable



Phot. 3. Long, branched sprouts of the sub-population E4 at the Kuźnik Bagienny Lake (photo by P.M. Owsiany)
 Fot. 3. Dłgie, rozgałęzione pędy subpopulacji E4 nad jeziorem Kuźnik Bagienny (fot. P.M. Owsiany)

participation of *Eriophorum vaginatum*, *Oxycoccus palustris* and *Pinus sylvestris* of various sizes. The sub-population located to the south of the Kuźnik Bagienny Lake (E4) consists of two patches of 15 and 50 m². The plants have raised, long and often forking sprouts (Phot. 3), usually leafed along their total length. The bigger patch is located in the southern part of the marshy coniferous forest growing here, the small patch – in the northern one. The sub-population located in the northern continental high coniferous forest (E5) consists of three agglomerations of a considerable size, ca. 100-300 m². Some of the older individuals of *Empetrum nigrum*, growing among the clumps of *Ledum palustre* in the south-western part of the northern coniferous forest (Table 1, no. 9), were even 60-70 cm long. Occasional examples of ripening drupes (Fig. 4) could be found here, too. The latter fact is especially interesting, since the plants in the remaining sites had only female flowers, or did not flower at all. This observation would suggest their vegetative reproduction only (Celka and Szkudlarz 1999; authorial observation). Two subsequent patches are located in the north-eastern (Table 1, no. 8) and in the north-western parts (Table 1, no. 10) of the northern coniferous forest. In the north-western part the crowberry occupies the largest of all its areas, ca. 250-300 m².



Phot. 4. The only site with the fruiting crowberry; the sub-population E5 in the northern continental high coniferous forest at the Kuźnik Bagienny Lake
(photo by P.M. Owskianny)

Fot. 4. Jedyne stanowisko owocującej bażyny czarnej – subpopulacja E5 w północnym kontynentalnym borze wysokim nad jeziorem Kuźnik Bagienny (fot. P.M. Owskianny)

It is dense and in a good shape (Phot. 5). Therefore, the site at the Kuźnik Bagienny Lake can be considered as the most abundant of all the locations recorded so far in the Wielkopolska region (see **Celka** and **Szkudlarz** 1999).

The third site of *E. nigrum* (E6), so far undocumented, is located in the deforested marshy coniferous forest (Table 1, no. 11) at the edge of the mineral island and the meadow situated to the south-west of the Łubianka forester's lodge (Phot. 6). This deforested peatbog fragment is on a massive scale overgrown with a metre tall upgrowth of *Betula pubescens* and *Pinus sylvestris*, superseding the earlier introduced *Alnus glutinosa*. The crowberry is accompanied by, among others, *Eriophorum vaginatum*, *Oxycoccus palustris*, *Ledum palustre* and *Molinia caerulea*. In the highly dried moss layer numerous individuals of *Sphagnum fallax*, *Aulacomnium palustre*, *Polytrichum strictum* and, less frequently, of *Sphagnum magellanicum* could be spotted. A dense patch with *E. nigrum* occupied the area of ca. 400 m². The crowberry growing in this freshly discovered site, however, had badly damaged sprouts (the year 2000). The damage resulted from forest works involving the tree-clearance of the pine-stand previously growing there. Together with the renovation of the adjacent drainage ditch lowering the ground water level in the peat bog, this damage meant a serious danger to the crowberry. Starting with the following year, however, the drainage ditch started to spontaneously overgrow and silt up, gradually diminishing the water runoff. Most probably, the considerable mechanical damage, that had shortened the crowberry sprouts, together with favourable light conditions resulting from the tree-clearance, provoked the creation of numerous new sprouts. At the end of the study the plants had short but strongly branching sprouts covered with leaves at their total length.



Phot. 5. Some of the patches demonstrated a very good shape and considerable density (the sub-population E5, Kuźnik Bagienny) (photo by P.M. Owskianny)
Fot. 5. Niektóre płaty charakteryzowały się bardzo dobrą kondycją i znacznym zwarcieciem (subpopulacja E5, Kuźnik Bagienny) (fot. P.M. Owskianny)



Phot. 6. The deforested marshy coniferous forest; the entering birch coating can gradually lead to a considerable shading of the crowberry (photo by P.M. Owskianny)
Fot. 6. Odlesiony bór bagienny – wkraczający nalot brzożowy mogący wywołać z czasem znaczne zacielenie bazyńny czarnej (fot. P.M. Owskianny)

The physical and chemical analyses of the water taken from the peat-forming layer in three patches of the sub-populations E1, E4 and E5 pointed to the high mineralisation of the habitats of *E. nigrum*. It was expressed both with high values of electrolytic conductivity and with a considerable abundance of the water in nutrients (Table 2). High content of oxygen in the water was a proof of the mineralisation processes taking place in the peat substratum. The presence of *E. nigrum* is connected with highly acidic habitats and with soft waters, nevertheless including a higher content of calcium. The waters of the peat-forming layer were rich in humic substances and strongly coloured. In the patches with the analysed species, the content of potassium was higher than that of sodium.

Table 2

Physical-chemical properties of water samples collected from the peat forming layer white sites *Empetrum nigrum*
Właściwości fizyczno-chemiczne wody pobranej z warstwy torfotwórczej ze stanowisk z *Empetrum nigrum*

Successive number – Numer kolejny	1	2	3	
Number of relevé – Numer zdjęcia	14\7	14\11	43\3	
pH	3.47	4.12	3.76	
Colour – Barwa	mg Pt/l	998	588	490
Turbidity – Mętność	FTU	152	129	904
Saturation with O ₂ – Nasycenie tlenem	%	1.51	10.17	22.8
O ₂ dissolved – Tlen rozpuszczony	mg O ₂ /l	0.12	0.79	2.02
Conductivity – Przewodnictwo elektrolityczne	µS/cm	332	291	195
NH ₄ -N	mg N/l	2.46	3.67	3.57
NO ₃ -N	mg N/l	0.4	0.6	0.6
PO ₄	mg PO ₄ /l	2.48	3.34	1.99
Total Fe – Żelazo ogólne	mg Fe/L	1.22	1.03	0.93
Total hardness – Twardość ogólna	mval/l	0.54	0.68	0.39
Carbonate hardness – Twardość węglanowa	mval/l	0.35	0.41	0.06
Ca	mg Ca/l	6.99	8.29	1.22
Mg	mg Mg/l	2.17	3.04	4.03
Na	mg Na/l	1.33	2.94	4.83
K	mg K/l	3.17	5.27	7.51
SO ₄	mg SO ₄ /l	unde- tected nie wykryto	unde- tected nie wykryto	unde- tected nie wykryto
Cl	mg Cl/l	7	12	7
SiO ₂ dissolved – Krzemionka zdysocjowana	mg SiO ₄ /l	3.64	0.01	1.02

We have to point out, however, that the frequent appearance of the crowberry in the Kuźnik Lakes Channel was connected mainly with dried or elevated areas of peat bogs, less often with peat-moors adjacent to mineral areas. As **Jasnowska** and **Jasnowski** (1983) demonstrated, the occurrence of *E. nigrum* in the vegetation of high bogs of the Bytowskie Lake District is related to the drying of peat-moor and the reduction of water retention and peat-forming processes. Because of the extreme dryness of the patches with *E. nigrum* growing in the section 104 (E6), the water samples for the physico-chemical analyses could not be obtained.

Protection of *Empetrum nigrum* sites in the Kuźnik Lakes Channel

To protect – among others – the sites of *E. nigrum*, in 1926 the German authorities created the natural reserve called “Naturschutzgebiet Hammer”. In 1959 it was reactivated and expanded by the Polish authorities who changed its name into “Kuźnik” (Zarządzenie... 1959, **Ruta** and **Owsianny** 2004). As it has been noted above, the “reserve” population consists of three sub-populations (E1-3) located relatively close to each other. Unfortunately, they are dominated mostly by the individuals of scarce and usually short sprouts. In shady areas only top-most fragments of the sprouts were leafed, and sometimes the chlorosis of the leaves could be observed. These facts can prove decisive for the regression of the population in the nearest future. The individuals pertaining to the patch located on the exposed peat-moor (E2) were in the best shape. Thus, we can conclude that among the three existing sites of *E. nigrum* in the Kuźnik Lakes Channel, the individuals of the “reserve” population show the poorest condition. Working on a project of a new protection of the Reserve, **Owsianny** and **Gąbka** (2004 b) suggested the necessity of constant monitoring of the population of *E. nigrum* existing there. They suggested the reduction of the shading and the seasonal pruning of some of the individuals in order to stimulate the creation of new sprouts, plant propagation and “rejuvenation” of the plants.

The observation of all the sites of *E. nigrum* in the Kuźnik Lakes Channel confirms the previously noticed mutual dependence of sprout fitness and light conditions (**Celka** and **Szkudlarz** 1999). The populations of this species growing on the peat-bogs adjacent to the Kuźnik Bagienny Lake (E4-5) and on the transitional bog located to the south-west of the Łubianka forester’s lodge, were generally in a good shape chiefly due either to the absence, or to a small degree of shade provided by trees and shrubs. In the peat-bogs next to the Kuźnik Bagienny Lake (E4-5) a partial, limited cutting out of several pine trees could be suggested as a means of providing the *E. nigrum* growing there with light, and thus preserving its good condition. Similarly, a mosaic-like pruning of some of the individuals could lead to the plant “rejuvenation”, as it has been suggested before.

In the deforested marshy coniferous forest located to the south-west of the Łubianka forester’s lodge, the most important factor endangering the crowberry seems to be the spontaneous renewal of the populations of *Betula pubescens* and *Pinus sylvestris*. Therefore, it would be advisable to remove the coating of *B. pubescens* and, partially, of *P. sylvestris*. Further development of this thickly growing tree coating will probably overshadow the crowberry and result in the population regression. It would be expedient, too, to install regulation weirs in the near-by drainage ditch, stabilising the ground water-table.

Following the suggestions of the first of the authors, and with the help and understanding of the Zdrojowa Góra Forest Division, both of the newly discovered sites, the one near the Kuźnik Bagienny Lake and the other in the deforested marshy coniferous forest (section 104), were listed in **Plan urządzania...** (2003), as ecological utility areas recommended for protection. This idea has been presented by the authors in numerous publications (**Owsiany and Gąbka 2004 a**, **Gąbka and Owsiany 2005**, **Stańko et al. 2005**). It has been suggested that the lake-peat moor ecosystem of the Kuźnik Bagienny Lake (together with the neighbouring lake-peat moor complex of the Kuźnik Olsowy Lake) should be included into the Kuźnik Natural Reserve (**Owsiany and Gąbka 2004 a**). Recently, the preparations have been made to draw up a project of a separate reserve intended to protect the lake-peat moor ecosystems described above. Out of the suggested forms of protection, the crowberry populations require both the active protection and the monitoring of plant fitness, including the reaction to the existing dangers and protective measures taken.

Conclusions

In the Kuźnik Lakes Channel, three out of four presently known sites of the crowberry in the Wielkopolska region were found (see **Celka and Szkudlarz 1999**). The populations detected at the Kuźnik Bagienny Lake and in the deforested marshy coniferous forest to the south-west of the Łubianka forester's lodge (section 104) have not been documented before. In the studied area the crowberry grew mostly on peat-moors and in marshy coniferous forests and brick thickets. The ground waters of the species sites were acidic and soft. Their considerable oxygenation and high values of electrolytic conductivity point to the mineralisation of overdried peat-bog substrata. Therefore, active and passive protective measures have been suggested. The active ones comprise the focused cutting out of separate trees facilitating the crowberry the access to light, the removal of tree coating and the seasonal local sprout pruning stimulating the "rejuvenation" of the plants. Advisable, too, is the construction of weirs in the ditch draining one of the studied sites, and monitoring of the fitness of the crowberry, as well as of the results of the procedures mentioned above observable in the analysed area. The passive protection comprises the launch of a project of a new reserve that would include the population of the Kuźnik Bagienny Lake. Suggested, too, was the need to establish an ecological utility area protecting the transitional bog with *E. nigrum* located to the south-west of the Łubianka forester's lodge.

Acknowledgements

The authors would like to express their gratitude to the forest inspector Mr. Adam Standio, and to the forest officers Mr. Jarosław Szczepkowski and Mr. Michał Mendyk of the Zdrojowa Góra Forest Division for their understanding and help offered during the research.

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WARUNKI WYSTĘPOWANIA BAŻYNY CZARNEJ
(*EMPETRUM NIGRUM* L., EMPETRACEAE)
W RYNNIE JEZIOR KUŹNICKICH (PÓLNOČNA WIELKOPOLSKA)

S t r e s z c z e n i e

Bażyna czarna (*Empetrum nigrum* L.) jest silnie zagrożonym gatunkiem w Wielkopolsce. Nowe stanowiska tego gatunku stwierdzono na północ od Piły. Jedna populacja była zlokalizowana koło jeziora Kuźnik Bagienny (oddział leśny 119), a kolejna znajdowała się na torfowisku niedaleko łąki, na południowy-zachód od leśnictwa Łubianka (oddział leśny 104, obręb i nadleśnictwo Zdrojowa Góra). Opisano także szczegółowo populację bażyny czarnej z rezerwatu przyrody „Kuźnik” (zarówno wcześniej podawane, jak i nie opisywane dotąd płaty z udziałem *E. nigrum*). W pracy przedstawiono informacje fitocenotyczne i siedliskowe oraz zaproponowano działania ochrony biernej i czynnej tego gatunku w Rynnie Jezior Kuźnickich.

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