THE DISTRIBUTION OF *ALLIUM SCHOENOPRASUM* L. SUBSP. *SIBIRICUM* (L.) HARTM. IN POLAND

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ABSTRACT

Chorological analysis of the distribution of *Allium schoenoprasum* L. subsp. *sibiricum* (L) Hartm. presented in the paper is based on literature data, herbaria and the authors own observations. *A. *sibiricum* is a rare and threatened species in Poland, reported exclusively from the Karkonosze Mts. and the Pilsko Massif in the Beskid Żywiecki Mts. The author discusses the taxonomic position, general distribution as well as environmental and phytocoenotic conditions preferred by the species in Europe. Detailed phytosociological analysis of phytocoenoses in which *A. *sibiricum* typically occurs in the Karkonosze Mts. is presented. They belong to the association *Allietum sibirici* Šmarda 1950 which is described here for the first time from Poland.

KEY WORDS: *Allium schoenoprasum* L. subsp. *sibiricum* (L.) Hartm., taxonomy, distribution, phytocoenoses, *Allietum sibirici* Šmarda 1950.

INTRODUCTION

Allium schoenoprasum L. subsp. *sibiricum* (L.) Hartm. is a very rare and endangered species of Polish vascular flora (Jasiewicz 1981, Zarzycki 1986, Zarzycki, Szeląg 1992) – Fig. 1. It was reported for the first time in Poland by Neygenfind (1821) from the Mały Staw Cirque in the Karkonosze Mts. as *Allium sibiricum*. Another report comes from Krupa (1879), who found this species in the Pilsko Massif (Beskid Żywiecki Mts.). All these localities were later confirmed by other florists, however, neither a habitat where *A. *sibiricum* grows nor its phytocoenotic scale have been thoroughly characterised. The only information was provided by Michalik (1992), who found *A. *sibiricum* to be a component of certain plant communities of the Pilsko Massif.

Therefore the present paper characterises a phytocoenotic scale and environmental conditions typical for *A. *sibiricum* in Poland and its present distribution in our country. A special attention has been paid to localities in the Karkonosze Mts., which are the centre of *A. *sibiricum* distribution in Poland. A plant community in which *A. *sibiricum* typically occurs in the Karkonosze Mts. is a spring-head association *Allietum sibirici* Šmarda 1950 from the class *Montio-Cardaminetea*. It is described in details in the present paper since only few relevés of this association have been published till now from Polish part of the Karkonosze Mts. (Kwiatkowski 1995).

MATERIAL AND METHODS

The map of the distribution of *A. *sibiricum* in Poland was prepared on the basis of data from literature and herbaria, as well as the author's own observations. Herbarium specimens are hosted in the following collections (acronyms according to Mirek et al. 1997):

- Institute of Botany, Jagiellonian University, Kraków (KRA);
- W. Szafer Institute of Botany, Polish Academy of Sciences, Kraków (KRAM);
- Museum of Natural History, University of Wrocław, Wrocław (WRSL).

Relevés were prepared according to the Zürich-Montpellier method of Braun-Blanquet (Pawłowski 1972). A modified system of classification of spring plant species to syntaxa from the class *Montio-Cardaminetea* was adopted from Maas (1959), Persson (1961), Philippi, Oberdorfer (1974), Hinterlang (1992), and Zechmeister (1993). The systematic value (D) of syntaxonomic groups was calculated according to the Tüxen and Ellenberg equation (Pawłowski 1972). The nomenclature of vascular plants follows Mirek et al. (1995), mosses – Frahm and Frey (1983).

Fig. 1. The inflorescence of *Allium schoenoprasum* L. subsp. *sibiricum* (L.) Hartm.

RESULTS AND DISCUSSION

Taxonomic position

Allium schoenoprasum L. subsp. *sibiricum* (L.) Hartmann, Handb. Skand. Fl. 212. 1870

[syn.: *Allium sibiricum* L., Mant. Alt. II 562. 1771; *Allium róseum* sens. Krock., Fl. Siles. 1. 32: 516. 1787; *Allium schoenoprasum* var. *alpinum* Lam & DC., Fl. Franc. III. 227. 1805; *Allium tenuifolium* Pohl, Tent. II 10. 1814; *Porum alpinum* (Schwenkf. Catal.) ex Pohl l.c. in syn. 1814; *Allium sibiricum* Opiz, Böh. Gew. 44. 1823; *Allium schoenoprasum* var. *alpinum* Kunth, Enum. Pl. 4: 391. 1843; *Allium schoenoprasum* L. var. *sibiricum* Garcke, Fl. N. u. Mitt. Deutschl. ed. 1: 322. 1849; *Allium schoenoprasum* L. subsp. *alpinum* Čelakovský, Prodr. Fl. Böhm. 91. 1867; *Allium alpinum* Hort. ex Regel., All. Mon. 78. 1875; *Allium sibiricum* (L.) Nyman, Consp. Fl. Europ. 741. 1878; *Allium schoenoprasum* var. *alpinum* Richter, Pl. Europ. I. 202. 1899; *Allium schoenoprasum* L. subsp. *sibiricum* Hayek, Prodr. Fl. Penins. Balcan. 3: 45. 1933]

The nomenclature and taxonomic status of *A. *sibiricum* are disputable. Most of florists include it within the species *Allium schoenoprasum* L. as a subspecies or varietas either *sibiricum* or *alpinum* (e.g. Čelakovský 1867, Hegi 1908, Hayek, Markgraff 1933, Garcke 1972, Stearn 1980). Others regard it as a separate taxon *Allium sibiricum* L., or less commonly *Allium foliosum* Clarion ex DC., or *Allium montanum* Schrank, non. F.W. Schmidt. Following the recent literature concerning this species, in the present paper the nomenclatoric type of Hartmann was adopted (1870). He described a taxon *Allium schoenoprasum* L. subsp. *sibiricum*, which differs from subspecies *schoenoprasum* in height (20-50 cm in case of the former), leaf thickness (2-4 mm in subsp. *sibiricum*), and the length of perianth tepals (10-15 mm). Tepals in *A. *sibiricum* are linear-lanceolate, gradually acuminate, brightly red or purple in the form *denticulatum* Adamović.

Distribution

*A. *sibiricum* is an arctic-alpine-circumpolar geographic element (Hultén 1968, Hultén, Fries 1986, Dostal 1989), often regarded as a subalpine species with European-Siberian and North-American distribution. In Europe it occurs mainly in Fennoscandia, northern part of Russia, in subalpine parts of mountain ranges of Iberian Peninsula, Alps (predominantly in the calcareous western part), the Sudety Mts., Carpathians (mainly in Slovakian and Romanian parts), in Serbia, Balkan Peninsula, and Ural. Moreover it spreads over Ararat, Caucasus and Central Asia (Himalaya – maximal altitude 4760 m a.s.l.), Siberia, and Far East, up to North America (boreal parts of USA and Canada) (Ascherson, Graebner 1905-1907, Hegi 1908, Pax 1928, Hueck 1939, Sussenguth 1939, Hermann 1956, Válev, Assenov 1964, Hess et al. 1967, Hulten 1968, 1971, Walter, Straka 1970, Rothmaler et al. 1976, Omelczuk-Mjakushko 1979, Dostal 1989, Gleason, Cronquist 1993, Dahl 1998). In most of carthographic analyses the distribution of *Allium schoenoprasum* subsp. *sibiricum* is presented jointly with that of *Allium schoenoprasum* L. subsp. *schoenoprasum* (see e.g. Hultén, Fries 1986, Haupler, Schönfelder 1989). However, it should be emphasised that natural habitats of the latter subspecies are lowland-river valeys and seashore. Moreover, this plant is often cultivated and frequently escapes from the cultivation.

In Poland *A. *sibiricum* occurs exclusively in the Karkonosze Mts. (Western Sudety) and in the Pilsko Massif (Beskid Żywiecki Mts.) – Fig. 2. About 30 localities with c. 5 000 individuals were found in the former mountain range. Most of them are in glacial cirques in the subalpine part of the range – Łomniczka Cirque, Mały Staw Cirque, Wielki Staw Cirque (Fig. 3) and Mały Śnieżny Cirque. From the Pilsko Massif five localities were reported: near Szczawnica, on Hala Cebulowa, Hala Cudzichowa, Hala Miziowa, and on Pilsko.

List of localities

For every locality in the list the following data are presented: a geographical name of the cirque or hill; the coordinates of the locality in the ATPOL grid system, in square parentheses (Zając 1978); the name of a person who collected the specimen; names of authors of any published material about the locality and the year in which they reported the species; an altitude in meters above the see level. The abbreviations are: B – Białecka; Č – Čelakovský; E – east; F & U – Fiek & Uechtritz; K – Krupa; Kw – Kwiatkowski; max. – a maximum of a vertical range; min. – a minimum of a vertical range; Ma – Matuszkiewicz W. & A. ; Mi – Michalik; N – north; Ne – Neygenfind; NE – north-east; NW – north-west; R – Ralski; S – Schube; Š – Šourek; W – Wimmer; W & G – Wimmer, Grabowski; Wi – Winkler; Wo – Wołoszczak; Z – Zapałowicz; Zl – Zlatnik.

KARKONOSZE MTS.: Łomniczka Cirque (AE 89) – W 1857; *leg. F. Pax* 1879 (WRSL); *leg. E. Fiek* 1881 (WRSL); M 1960; *leg. J. Serwatka* 1967 (KRAM 375189); Ma 1975; M 1970; Kw 1992, N, NE and NW slopes 1180-1200 m a.s.l. (compare Table 1, rel. 1-3, 6); Kw 1993, N and NE slopes 1290-1310 m (Table 1, rel. 9-12); Kw 1994, N and NW

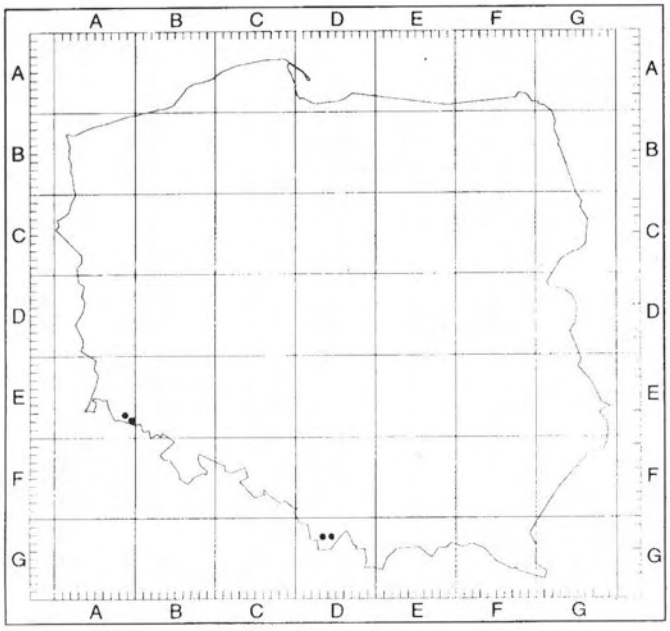

Fig. 2. The distribution of *Allium schoenoprasum* L. subsp. *sibiricum* (L.) Hartm. in Poland. Localities are shown in the ATPOL square grid system.

1315-1365 (Table 1, rel. 15, 16, 25, 26); Mały Staw Cirque (AE 89) – Ne 1821; W & G 1827; W 1844; Wi 1881; Wi 1900; Č 1867; F 1881; *leg. Hirte* 1891 (WRSL – *A. Callier, Flora Silesiaca Exciccata* no 487); S 1903; M 1960; Š 1969; Ma 1975; Kw 1995, N NE and NW slopes 1210-1260 m (Table 1, rel. 13, 14, 22, 23, 27-30); Kw 1996, NW slopes 1275-1290 m (Table 1, rel. 7, 8); Kw 1997, E slopes 1225 m (Table 1, rel. 24); Wielki Staw Cirque (AE 89) – Č 1867; F 1881; *leg. Dittrich* 1882 (WRSL); *leg. E. Fiek* 1884, W slopes (WRSL); Wi 1900; Z 1928; S 1903; *leg. E.R. Missbach* 1904 (KRAM 079395, 079397); *leg. E. R. Missbach* 1908 (KRA 0150934); M 1960; Š 1969, 1300 m; Kw 1995, NE and NE slopes 1355-1380 m (Table 1, rel. 17, 18); Kw 1996, N, NE and E slopes 1265-1325 m (Table 1, rel. 4, 5, 19-21); Mały Śnieżny Cirque (AE 78) – Š 1969; Kw 1997, NE slopes 1375 m (several individuals).

PILSKO MASSIF: Pilsko (DB 24) – K 1879; *leg. Zapałowicz* 1895 (KRAM 079398); Wo 1897; B 1982 E slopes 1350-1445 m a. s. l. max. (spring-heads of Glinny); Hala Miziowa (DB 24) – Z 1880; B 1982 1285 m; Hala Cebulowa (DB 24) – R 1930; *leg.*?, 1330 m, 1938 (KRA 0150933); B 1982 1280-1300 m; Mi 1992; Hala Cudzichowa (DB 24) – R 1930; Szczawina (DB 23) – B 1982 N slopes 1180 m min.

Habitats and phytocoenoses

Allium schoenoprasum L. comp. is a heliophyte (L = 7 in Ellenberg scale, Ellenberg et al. 1994). It prefers slightly acid or slightly alkaline soils (R = 7; Ellenberg et al. l.e.). Habitats typically occupied by this species in Europe are slopes varying in aspect and inclination, usually rocky and wet, with rills or spring-heads, in subalpine parts of mountains at altitudes 1200-2650 m a.s.l. Habitat character is eutrophic or mesotrophic. *A. *sibiricum* is a component of calcicolous fens, or plant communities developing on spring-heads and wet screes (Hegi 1908, Hermann 1956, Rothmaler, Vent 1976). In some places it grows at altitudes lower than 1000 m; e.g. at 840 m in the Czech part of the Karkonosze Mts. (Šourek 1969). In Poland altitude is between 1160 and 1445 m a.s.l.

Because of its environmental requirements in Europe *A. *sibiricum* shows the tendency to occur in two distinct types of phytocoenoses. The first are plant associations of calcicolous fens belonging to the order *Caricetalia davallianae* Klika 1934; e.g. in Alps and the Carpathian Mts. where it has been found in associations *Caricetum davallianae* Dutoit 1924 em. Görs 1963, *Caricetum frigidae* Rüb. 1912, and *Primulo-Schoenetum ferruginei* (W. Koch 1926) Oberd. 1957 em. 1962 (Görs 1974). The second type are subalpine and alpine spring-head plant communties from the order *Montio-Cardaminetalia* Pawł. 1928 em. Zechmeister 1993, where *A. *sibiricum* is one of differential species. From Alps it was reported by Philippi (1975) who found it in the association *Cratoneuretum falcati* Gams 1927. In the Czech part of the Sudety Mts. (the Karkonosze Mts., the Hruby Jesenik Mts.) *A. *si-*

Fig. 3. The Wielki Staw Cirque (Polish part of the Karkonosze Mts.).

TABLE 1. *Allietum sibirici* Šmarda 1950.

Succesive number of relevé		1	2	3	4	5	6	7	8	9
Date (Year)		1992	1992	1992	1996	1996	1992	1996	1996	1993
Localities		ŁC	ŁC	ŁC	WSC	WSC	ŁC	MSC	MSC	ŁC
Altitude (m a.s.l.)		1180	1200	1190	1325	1310	1170	1275	1290	1305
Aspect		NE	N	N	N	NE	NW	NW	NW	N
Angle of slope in degrees		30	25	30	45	40	25	30	15	20
Cover of herb layer in %		30	35	50	40	55	75	65	30	45
Cover of moss layer in %		40	45	40	55	50	30	25	60	45
Area (m)		2 x 2	2 x 3	2 x 2	2 x 3	2 x 4	3 x 3	2 x 3	3 x 3	2 x 3
Number of species in relevé		19	18	18	14	20	28	10	20	16
Ch*, DAss: *Allietum sibirici*										
Allium schoenoprasum subsp. *sibiricum**		2.3	2.3	3.4	3.4	2.3	2.3	4.4	2.3	2.3
Epilobium nutans		.	+	.	.	.	.	.	.	+
Primula mimina		.	.	.	.	.	.	.	.	.
Alchemilla fissa		.	.	.	.	.	.	.	.	.
*Blindia acuta**	d	+	.	.	.	.	.	.	+	.
Ch, DSubAll: *Montenion* et ChAll: *Cardamino-Montion*										
Swertia perennis		1.2	.	+	+	1.2	1.2	.	1.2	+
Epilobium anagallidifolium		+	1.2	+	+	.	.	.	+	.
Scapania uliginosa	d	2.3	3.4	2.3	3.4	3.4	2.3	2.3	3.4	3.4
Bryum schleicheri		1.1	1.1	1.1	+	.	+	.	+	1.1
Rhizomnium punctatum		.	+	.	1.1	.	1.1	.	1.1	.
Dicranella palustris		1.2	.	.	.	1.2	.	.	.	.
Pohlia wahlenbergii		1.1	+	2.2	.	+	.	+	2.2	.
ChO: *Montio-Cardaminetalia* et ChCl: *Montio-Cardaminetea*										
Viola biflora		.	1.2	1.2	+	1.2	2.2	+	.	.
Epilobium alsinifolium		.	.	.	+	.	.	.	.	+
Pedicularis sudetica		1.1	+	+	.	+	.	.	.	+
Bartsia alpina		.	.	.	.	.	+	.	.	+
ChCl: *Scheuchzerio-Caricetea nigrae*										
Eriophorum angustifolium		+	.	.	.	1.1	1.1	.	.	.
Viola palustris		.	+	1.1	1.1	.	+	+	.	.
Sphagnum subsecundum	d	.	+	+	1.1	1.1	+	.	+	+
Calliergon sarmentosum		.	.	1.2	1.2	.	.	.	1.2	+
Meesia triquetra		.	.	.	.	.	+	.	+	.
sporadic species: *Carex curta* + (15, 17, 19); *Carex nigra* + (8, 19); *Carex stellulata* + (5, 6, 7, 21); *Dactylorhiza maculata* ssp. *psychrophila* 1.1 (20), + (22); *Juncus filiformis* + (5, 19, 21, 28).										
ChCl: *Betulo-Adenostyletea*										
Veratrum album ssp. *lobelianum*		+	+	+	.	+	+	.	+	1.1
Adenostyles alliariae		+	.	.	.	.	.	.	.	.
Chaerophyllum hirsutum		.	.	+	.	.	1.1	.	.	.
Aconitum callibotryon		.	.	+	.	.	.	+	+	.
Alchemilla xanthochlora		.	.	.	.	.	+	1.1	.	+
sporadic species: *Calamagrostis villosa* + (10, 24, 26), 1.2 (6); *Carex atrata* + (6, 12, 14, 17), 1.1 (21); *Cirsium helenioides* + (25, 30); *Crepis conyzifolia* + (21); *Gentiana asclepiadea* + (6, 24); *Geranium sylvaticum* + (8, 14, 26, 28); *Hieracium prenanthoides* + (6, 26), 1.2 (18); *Hypericum maculatum* + (27); *Phyteuma spicatum* + (26, 28); *Ranunculus platanifolius* + (28); *Salix lapponum* (juv.) + (8, 25); *Valeriana sambucifolia* + (14, 26).										
Accompanying species										
Deschampsia caespitosa var. *alpicola*		+	+	1.2	+	2.3	2.3	.	1.2	2.3
Molinia caerulea var. *alpina*		.	1.2	.	.	1.2	1.2	.	.	1.2
Crepis paludosa		+	.	+	.	.	.	.	+	.
Homogyne alpina		+	.	.	.	1.2	.	.	.	.
Potentilla erecta		.	.	.	.	+	1.1	.	.	+
Vaccinium myrtillus		+	+	.	.	.	+	.	.	.
Solidago alpestris		.	+	.	+	.	.	.	.	.
Salix silesiaca (juv.)		.	.	.	.	+	+	.	.	.
Polygonum bistorta		.	.	.	.	.	.	+	.	.
Polytrichum commune	d	1.2	.	.	.	1.2	+	1.2	.	1.2
Sphagnum squarrosum		1.1	.	.	.	+	.	.	.	.
Sphagnum girgensohnii		+	.	.	+	.	1.2	.	.	.
Pohlia nutans		.	+	.	.	.	.	.	.	.
sporadic species: *Anthoxanthum odoratum* + (15); *Brachythecium rivulare* d+ (3); *Calluna vulgaris* + (2); *Campanula rotundifolia* + (2); *Carex bigelowii* subsp. *rigida* + (19); *Carex pallescens* + (21); *Chiloscyphus pallescens* d + (30); *Cystopteris fragilis* + (14); *Eriophorum vaginatum* + (6); *Huperzia selago* + (1); *Isothecium alopecuroides* d + (17); *Luzula sudetica* + (19); *Mnium stellare* d + (11, 21); *Myosotis nemorosa* + (3, 30); *Nardus stricta* + (16); *Plagiothecium platyphyllum* d + (8, 12, 30); *Pulsatilla alpina* + (11); *Scirpus caespitosus* + (5); *Sphagnum nemoreum* d + (6); *Trientalis europaea* + (15); *Vaccinium uliginosum* + (28).										

Explanations – localities: ŁC – Łomniczka Cirque; MSC – Mały Staw Cirque; WSC – Wielki Staw Cirque.

10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
1993	1993	1993	1995	1995	1994	1994	1995	1995	1996	1996	1996	1995	1995	1997	1994	1994	1995	1995	1995	1995	C
ŁC	ŁC	ŁC	MSC	MSC	ŁC	ŁC	WSC	WSC	WSC	WSC	WSC	MSC	MSC	MSC	ŁC	ŁC	MSC	MSC	MSC	MSC	o
1290	1295	1310	1230	1245	1365	1340	1380	1355	1275	1285	1265	1210	1260	1225	1315	1330	1215	1245	1225	1220	n
N	NE	N	N	N	N	NW	NW	NE	E	E	E	NE	NE	E	NW	N	NE	NW	NE	NE	s
20	25	30	35	35	45	40	45	40	45	40	35	35	25	20	15	30	30	25	20	25	t
60	55	50	45	60	40	65	60	75	80	65	80	65	55	75	75	56	45	50	60	60	a
25	35	35	40	40	45	45	35	25	35	35	30	40	35	20	45	26	35	40	55	30	n
2 x 2	2 x 3	3 x 3	3 x 3	2 x 2	3 x 4	3 x 3	3 x 4	3 x 3	3 x 4	2 x 3	2 x 3	2 x 2	2 x 2	2 x 3	2 x 3	3 x 3	3 x 3	2 x 3	2 x 3	2 x 2	c
17	23	24	19	24	19	16	24	22	27	19	24	20	22	21	24	26	21	25	19	23	y
4.4	1.2	1.2	2.3	3.4	2.3	3.4	3.4	4.4	2.3	1.2	2.3	3.4	2.3	3.4	2.3	2.3	2.3	2.3	2.3	3.3	V
.	.	.	+	+	.	.	1.1	1.1	2.2	2.2	3.3	1.1	1.1	2.2	3.3	2.2	.	.	+	+	III
.	3.3	3.3	2.3	1.2	1.2	1.2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2.2	2.2	3.3	1.1	I
+	+	.	+	+	.	.	.	.	+	.	.	.	.	+	.	+	.	+	.	.	II
+	+	+	1.2	1.2	1.2	1.2	+	+	1.2	.	+	1.2	1.2	+	1.2	+	+	.	.	+	V
+	.	.	.	.	.	.	+	.	.	+	+	1.2	1.2	+	1.2	.	.	.	.	.	III
1.2	2.3	2.3	3.4	2.3	3.4	3.4	2.3	2.3	2.3	2.3	2.3	3.4	2.3	2.3	3.4	1.2	2.3	2.3	3.4	2.3	V
+	1.1	.	.	.	+	+	2.2	+	1.1	1.1	1.1	+	+	.	1.1	1.1	.	.	1.1	+	IV
1.1	1.1	1.1	+	+	.	1.1	.	1.1	1.1	1.1	+	.	1.1	+	1.1	.	1.1	1.1	.	+	IV
1.2	+	1.2	+	2.2	+	1.2	.	.	1.2	.	.	1.2	+	+	.	1.2	.	.	.	1.2	III
.	.	+	+	1.1	.	.	+	+	.	+	2.2	.	2.2	.	+	.	1.1	.	+	.	III
+	.	+	.	1.2	1.2	1.2	1.2	+	2.2	1.2	+	1.2	+	.	1.2	.	.	+	.	+	IV
.	.	.	.	1.1	+	+	1.1	+	2.2	1.1	2.2	1.1	1.1	2.2	1.1	2.2	.	.	.	.	III
.	1.1	.	.	+	+	.	+	.	1.2	.	.	.	+	.	+	.	.	.	.	.	II
+	1.1	1.1	.	.	.	.	+	+	.	+	.	+	+	.	.	.	+	+	.	.	II
+	.	+	.	+	+	1.1	+	1.1	1.1	.	+	+	1.1	1.1	+	.	.	.	+	.	III
.	.	.	+	.	.	.	.	+	+	1.1	.	+	.	.	.	+	+	.	.	.	II
.	1.1	.	.	.	+	.	+	1.1	.	+	+	+	.	+	.	.	.	+	+	1.1	III
.	.	+	+	.	1.2	.	+	+	.	.	.	.	.	+	.	+	.	1.2	+	.	III
.	+	1.1	.	.	+	+	.	.	1.1	.	.	.	+	.	.	+	+	.	1.1	.	II
.	.	+	+	.	.	.	.	.	+	.	+	1.1	.	.	+	.	+	1.1	+	+	III
+	+	.	+	+	+	.	+	.	.	+	.	.	.	+	.	+	1.1	.	+	+	III
+	.	+	+	.	.	.	.	+	.	.	.	.	.	.	+	.	.	+	.	+	II
.	+	.	.	+	.	.	.	.	+	.	1.1	.	+	.	.	.	+	.	.	.	II
.	+	+	.	.	.	.	.	.	+	.	.	.	.	+	.	.	1.1	+	+	.	II
+	+	.	+	1.2	1.2	1.2	.	+	1.2	.	+	+	.	.	.	+	+	1.2	1.2	1.2	IV
.	1.2	.	1.2	.	1.2	1.2	1.2	1.2	.	.	1.2	+	.	+	1.2	1.2	1.2	1.2	1.2	1.2	IV
.	.	+	.	+	.	.	.	.	+	+	.	.	+	.	+	+	+	+	+	1.1	III
.	+	1.2	+	.	+	+	+	.	+	+	.	+	1.2	.	.	.	.	+	.	.	III
+	+	.	.	.	.	.	+	+	.	+	.	+	1.1	1.1	+	1.1	+	.	.	1.1	III
.	.	.	.	.	.	.	.	+	.	.	.	.	1.1	+	+	+	.	+	.	.	II
.	.	+	+	.	.	.	.	.	.	.	.	.	+	.	.	+	.	.	.	+	II
.	+	.	.	.	.	.	+	.	+	.	.	+	.	+	.	.	.	.	.	+	II
.	.	.	.	+	.	+	.	.	.	.	.	.	.	+	+	.	.	+	+	.	II
.	.	1.2	1.2	.	.	.	1.2	+	.	1.2	+	.	+	.	+	1.2	1.2	.	1.2	.	III
1.1	1.1	+	.	+	.	.	+	.	+	.	+	.	.	+	+	.	+	.	1.1	.	III
.	.	+	.	.	.	.	.	.	.	+	.	.	.	.	.	+	.	+	.	.	II
.	.	.	.	1.1	.	.	.	+	.	.	.	.	.	.	.	+	+	+	.	.	II

Fig. 4. A habitus of *Allietum sibirici* Šmarda 1950 in the Łomniczka Cirque (1290 m a.s.l.).

biricum occurs in associations *Swertietum perennis* Zlatnik 1928, *Mnyobrietum albicantis* Šmarda 1950, *Crepido paludosae-Philonotidetum serriatae* Hadač, Vaňa 1971, *Allio sibirici-Cratoneuretum filicinum* Jenik, Bureš, Burešová 1980, *Epilobio alsinifolii-Philonotidetum serriatae* Jenik, Bureš, Burešová 1980; and most characteristically – in a subalpine *Allietum sibirici* Šmarda 1950. Less often it was noted in subalpine *Bupleuro-Calamagrostietum arundinaceae* (Zlatnik 1928) Jenik 1961; *Salicetum lapponum* (Zlatnik 1928) W. Mat. 1965, or finally rocky associations *Saxifrago paniculatae-Agrostietum alpinae* Jenik, Bureš, Burešová 1980, *Hedysaro hedysaroidis-Molinietum* Jenik Bureš, Burešová 1980 (Zlatnik 1928, Šmarda 1950, Jenik 1961, Hadač, Vaňa 1971, Berciková 1976, Jenik, Bureš, Burešová 1980, Hadač 1983).

Both habitats and plant communities in which *A. *sibiricum* grows in Poland are generally analogous to those described above. In the Pilsko Massif it occurs in calcicolous eutrophic fens from the association *Valeriano-Caricetum flavae* Pawł. (1949 n.n.) 1960 (Michalik 1992). The localities in the Polish part of the Karkonosze Mts. were described as associations *Salicetum lapponum* (Zlatnik 1928), *Bartsio-Caricetum fuscae* and *Bupleuro-Calamagrostietum arundinaceae* (Matuszkiewicz, Matuszkiewicz 1975). Nevertheless, according to this authors own observations *A. *sibiricum* in the Karkonosze Mts. is most often a component of the spring-head association *Allietum sibirici* Šmarda 1950 (Figs 4, 5; Table 1).

Allietum sibirici develops on steep (15-45°), rocky, wet, north facing slopes. The soil is slightly acid (pH 5.5-6.8). Sometimes it covers small rocky shelves with local rills. All the localities found by the author are within glacial cirques at altitude 1160-1380 m a.s.l. Floristic structure of the association is characterised in Table 1. The phytocoenoses is distinctly bilayered. Spring-head species from the alliance *Cardamino-Montion* Br.-Bl. 1926 em. Zechmeister 1993 are dominating both among herbs and mosses. The most distinct element is *A. *sibiricum*, which decides on the specific appearance of this association. In some places it covers as much as 75% of area. The floristic composition of the association closely resembles *Allietum sibirici* described from Czech part of the Karkonosze Mts. (Hadač, Vaňa 1971). Its affiliation to the class of spring-head plant communities *Montio-Cardaminetea* Br.-Bl. et R. Tx. ex Klika et Hadač 1944 em. Zechmeister 1993 is also distinctly manifested. This is further sup-

Fig. 5. The population of *Allium * sibiricum* in another locality of the Łomniczka Cirque (1350 m a.s.l.).

TABLE 2. Phytosociological structure of the association *Allietum sibirci*.

Group of species	z	g	G	C	D
Allietum sibirci	5	66	10.56	44	4.65
Cardamino-Montion	7	143	22.88	68.1	15.58
Montio-Cardaminetea	4	60	9.6	50	4.8
Scheuchzerio-Caricetea nigrae	10	86	13.76	28.66	3.94
Betulo-Adenostyletea	17	87	13.92	17.06	2.37
Accompanying species	34	183	29.28	17.94	5.25
Total	77	625			

z – number of species; g – the sum of species' appearances; G – group contribution; C – constancy; D – systematic value

ported by the systematic value D (Table 2), which shows that *Allietum sibirici* is a natural association of a subalpine part of the Karkonosze Mts., which has reached a climax state.

CONCLUSIONS

Both environmental conditions and phytocoenoses typically occurring in the Karkonosze Mts. create favourable habitats for *A. *sibiricum*. Especially valuable are the north facing wet slopes and rocky shelves with spring-heads and slightly acid soils, where the association *Allietum sibirici* develops. All of the localities are within the borders of the Karkonosze National Park, and it seems highly probable that populations of this rare element of Polish vascular flora are not threatened in the Karkonosze Mts. Similar is the status of calcicolous fens *Valeriano-Caricetum flavae* where *A. *sibricum* occurs in the nature reserve "Pilsko".

It should nevertheless be emphasised that this subalpine taxon, although locally common in the Karkonosze Mts. and in the Pilsko Massif, is a rare and endangered species of Polish flora. Any changes in environmental conditions, most of all hydrology, can become an important factor threatening the existence of *A. *sibiricum* populations in our country.

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ROZMIESZCZENIE *ALLIUM SCHOENOPRASUM* L. SUBSP. *SIBIRICUM* (L.) HARTM. W POLSCE

STRESZCZENIE

W oparciu o dane z literatury, materiały zielnikowe i własne obserwacje, zamieszczono wyniki badań chorologicznych nad występowaniem *Allium schoenoprasum* L. subsp. *sibiricum* (L) Hartm., gatunku rzadkiego i zagrożonego w Polsce, notowanego wyłącznie z Karkonoszy i Masywu Pilska w Beskidzie Żywieckim. Przedstawiono pozycję taksonomiczną, ogólne rozmieszczenie oraz warunki siedliskowe i fitocenotyczne taksonu w Europie. W szczególności zaprezentowano wyniki badań fitosocjologicznych nad nowym dla szaty roślinnej Polski zespołem *Allietum sibirici* Šmarda 1950 z obszaru Karkonoszy, w którym opisywany takson posiada optimum występowania w naszym kraju.

SŁOWA KLUCZOWE: *Allium schoenoprasum* L. subsp. *sibiricum* (L.) Hartm., pozycja taksonomiczna, mapa rozmieszczenia, wykaz stanowisk, siedlisko, fitocenozy, *Allietum sibirici* Šmarda 1950.