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SUBALPINE POPULATIONS OF *PETASITES KABLIKIANUS* TAUSCH EX. BERCHT IN THE BABIA GÓRA AND THE KARKONOSZE NATIONAL PARKS

Subalpejskie populacje *Petasites kablikianus* Tausch ex. Bercht w Babiogórskim i Karkonoskim Parku Narodowym

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Petasites kablikianus is a mountain species, which occurs in poor phytocoenoses of *Petasitetum kablikiani*. The association was described by Walas (1933), as subalpine tall-herbs with butterbur domination. In the Polish part of the Giant Mountains the species occurs on one stand in the Mały Śnieżny Kocioł cirque (1200–1300 m a.s.l.). On the Babia Góra Mts. (Western Carpathians) it grows on the northern slopes at 1400–1650 m n.p.m.

Floristical composition of subalpine phytocoenoses with *Petasites kablikianus*, come from the Babia Góra Mts. and from the Giant Mountains, is clearly similar. The analysis of morphological features proved a separate character of population from the Giant Mountains. Probably the geographical isolation of the analysed population conduces this phenomenon.

Petasites kablikianus jest gatunkiem górskim, występującym w ubogich gatunkowo fitocenozach zespołu *Petasitetum kablikiani*. Zespół ten został opisany z Babiej Góry przez Walasa (1933), jako subalpejskie ziołorośla z dominacją lepieźnika wyżsiałego. W Karkonoskim Parku Narodowym gatunek ten występuje bodaj na jednym tylko stanowisku w Małym Śnieżnym Kotle (1200–1300 m n.p.m.). Na Babiej Górze (Beskid Wysoki) gatunek ten rośnie na północnym stoku w pasie 1400–1650 m n.p.m.

Skład florystyczny ziołorośli subalpejskich z Babiej Góry i Małego Śnieżnego Kotła wykazuje znaczne podobieństwa. Analiza cech morfologicznych osobników omawianego gatunku pozwoliła na stwierdzenie wyraźnej odrębności populacji karkonoskiej, której prawdopodobnie sprzyja jej geograficzna izolacja.

Słowa kluczowe: *Petasites kablikianus*, populacja subalpejska, ziołorośla
Keywords: *Petasites kablikianus*, subalpine population, tall-herbs

INTRODUCTION

Butterbur *Petasites kablikianus* is a species of mountain range. In Poland it is widely distributed in Western Carpathians (mountains: Beskid Żywiecki, Beskid Wysoki, Tatra, Gorce) and in Eastern Carpathians (Bieszczady Mts.). It occurs especially in floristical poor phytocoenoses of *Petasitetum kablikiani*. This association was described by WALAS (1933) from northern slopes of the Babia Góra

Mts. (Western Carpathians) as subalpine tall-herbs community with *Petasites kablikianus* domination. Actually floristically poor patches occurring on stream aluvia in lower part of mountains are most frequently included into *Petasitetum kablikianum*.

In the Czech side of the Giant Mountains butterbur was noted on five stands in submontane, montane and subalpine zone:

- the Labe valey from Špindlerův Mlýn to Kunčice (550 m a.s.l.)
- the Úpa valley (640 m a.s.l.)
- valey of stream Malá Úpa (770 m a.s.l.)
- Obří důl – near tourist track (870 m a.s.l.)
- Velká Kotelní jáma (1300 m a.s.l.) – (ŠOUŘEK 1969)

In the Polish part of the Karkonosze National Park, the species occurs on the one stand in the Mały Śnieżny Kocioł cirque, on altitude 1200–1300 m a.s.l. It grows in typical subalpine tall-herbs community similar to patches come from the Babia Góra Mts., where it grows only on the northern slopes in 1400–1650 m a.s.l. This paper is an attempt of comparison both of these subalpine populations.

MATERIAL AND METHODS

The data was collected in 2002–2003 in the Babia Góra and the Karkonosze National Parks. There were taken phytosociological records, reflecting floral composition of every subalpine patches of *Petasitetum kablikianum*, using traditional Braun-Blanquet method. All records were basis to construct the phytosociological table (Tab. 1.).

Biometrical data was collected in both seasons. In each year jointly 260 gynodynamic specimens of *Petasites kablikianus* were measured. The habit of each sprout, its assimilatic leaf and seed (the analysis includes an average value from measured 20 seeds from each inflorescence) was described by 16 features (Fig. 1.). There were measured following features:

- DNL – length of the lowest leaf on the sprout
- SNL – width of the lowest leaf
- DWL – length of the highest leaf on the sprout
- SWL – width of the highest leaf
- LK – number of baskets in inflorescence
- DL1W – length of first internode
- S1W – first internode diameter
- DN – length of fruit
- DP – length of pappus
- CNAS – mean weight of 10 fruits collected from each specimen
- DLO – length of assimilatic leaf stalk
- SON – leaf stalk diameter (at the bottom)
- SOPB – leaf stalk diameter (under the blade)
- DLB – length of assimilatic leaf blade
- SBL – width of assimilatic leaf blade
- KNE – angle between main internal nerves

Morphological diversity of both subalpine populations was proved by discriminant analysis (Statistica'99).

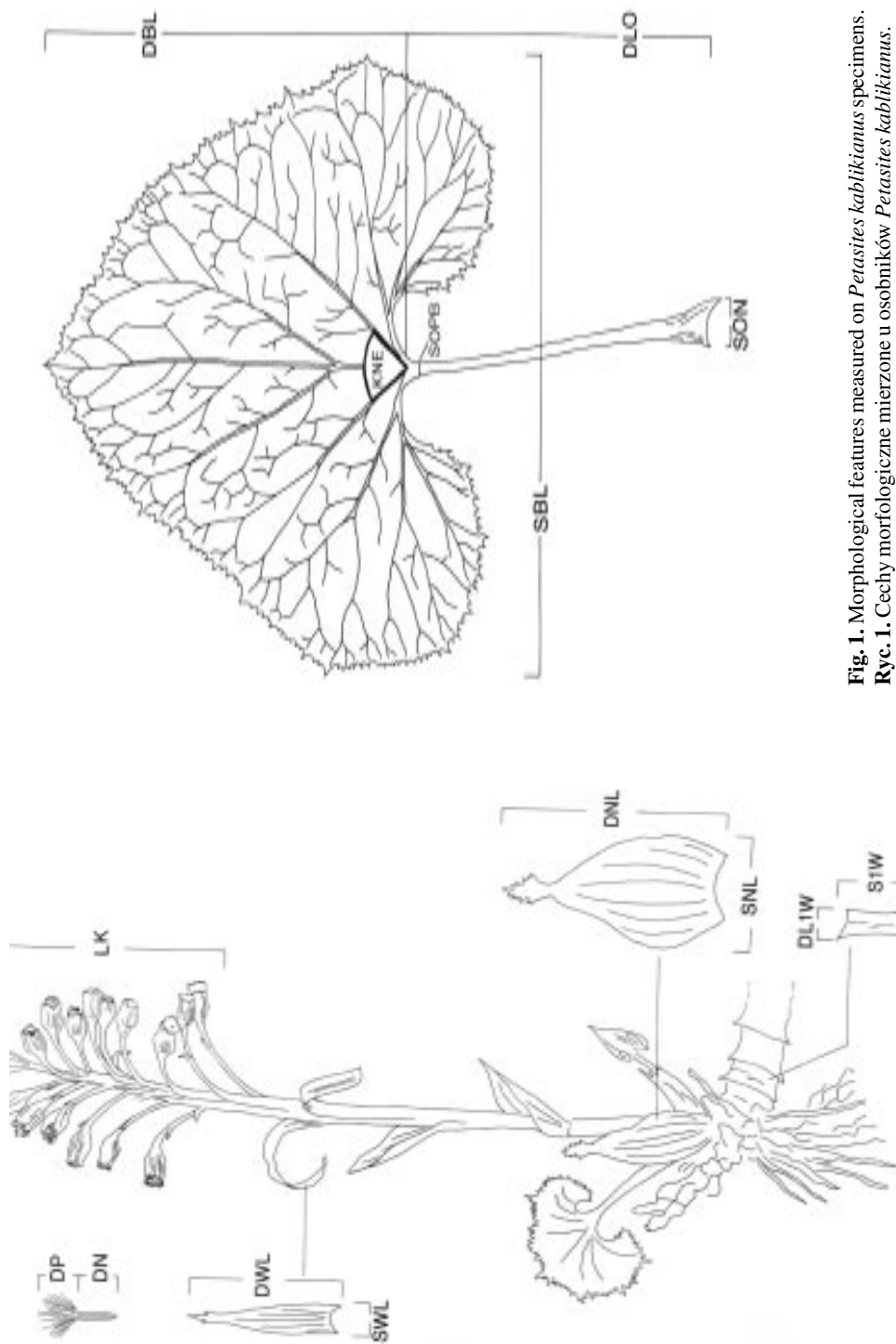


Fig. 1. Morphological features measured on *Petasites kablikianus* specimens.
Ryc. 1. Cechy morfologiczne mierzone u osobników *Petasites kablikianus*.

RESULTS

On the Babia Góra Mts. tall-herbs with butterbur appear in the whole subalpine zone in the altitude 1400–1650 m a.s.l. They form small isolated patches, located as the mosaic with patches of *Adenostyletum alliariae*. It was observed that subalpine phytocoenoses of *Petasitetum kablikiani* stayed in succession interdependence with *Adenostyletum alliariae*.

Petasites kablikianus as a pioneer species appears on landslides, in humid chutes with unstable bedrock. It is not resistant enough on interspecific competition so after some time it gives way to high perennial plants like – *Adenostyles alliariae*, *Cicerbita alpina*, *Doronicum austriacum*. However in spite of dynamic transformations of patches their presence on the northern slopes is permanent and depended on creating new convenient habitats (UZIĘBŁO 1997).

Phytocoenoses from the Mały Śnieżny Kocioł (Polish side of the Giant Mts.) occupies considerably more space than typical patch of *Petasitetum kablikiani* from the Babia Góra Mts. It takes up almost all western part of the cirque bottom, from steep slopes down up to humid area of heads of a river, on the other side of the green tourist track. In spite of big surface occupied by the patch, it is rather florally homogenous. Therefore they were taken only 4 phytosociological relevés, which reflect enough characteristic floral composition.

Phytosociological table (Tab. 1.) illustrates that the composition of main species in both groups of relevés is very similar. Differences include a lack of such species as: *Doronicum austriacum*, *Epilobium alpestre*, *Alchemilla glabra*, *Millium effusum* or *Chrysosplenium alternifolium* in the phytocoenoses of the Giant Mts. It is difficult to say if the difference could have some syntaxonomic value, because of inconspicuous comparative material.

Biometric analysis of 260 gynodynamic sprouts of *Petasites kablikianus* proved clear morphological diversity between both analysed populations (Fig. 2.). There were stated just single statistically significant seasonal differences within both groups, concerning features describing the habit of assimilatic leaves. In comparative analysis there were included except subalpine populations from Babia Góra Mts. and the Giant Mts., also specimens come from montane and submontane zone from High and Western Tatra Mts. and Gorce Mts. as well. This confrontation clearly heightens on the one hand the separate character of subalpine populations, and on the other one the differentiation between them.

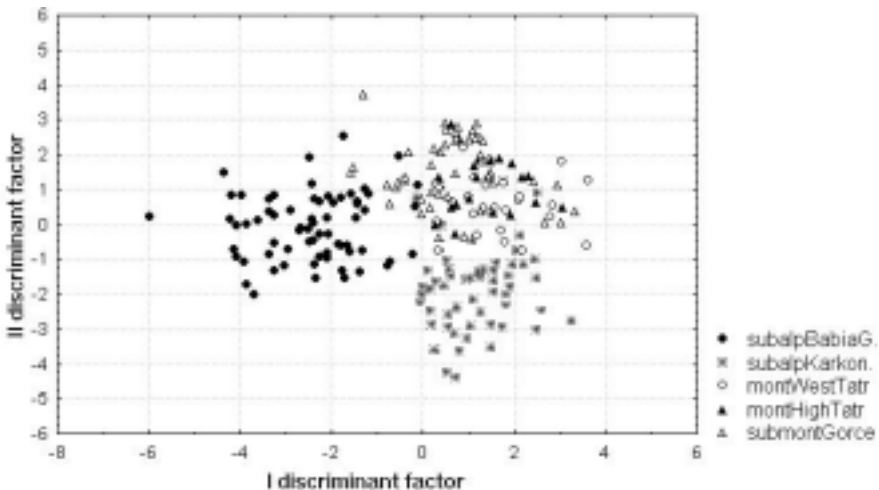


Fig. 2. Morphological variation of *Petasites kablikianus* populations from different montane areas.
Ryc. 2. Morfologiczne zróżnicowanie populacji *Petasites kablikianus* z różnych obszarów górskich.

Tab. 1. Phytosociological table of *Petasitetum kabilikiani* phytocoenoses from the Babia Góra massif (B.G.) and the Giant Mts. (Kark.).
Tabela fitosocjologiczna fitocenozy *Petasitetum kabilikiani* z Babiej Góry (B.G.) i Karkonoszy (Kark.).

No of relevés	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	C	
Location	B.G.	B.G.	B.G.	B.G.	B.G.	B.G.	B.G.	B.G.	B.G.	B.G.	B.G.	B.G.	B.G.	B.G.	B.G.	B.G.	B.G.	Kark.	O
Altitude [m asl]	1480	1455	1550	1460	1500	1480	1450	1450	1600	1550	1420	1550	1520	1285	1280	1280	1275	N	
Patch size [m ²]	50	50	50	20	100	20	100	50	60	100	30	50	30	30	40	30	40	S	
Declination	52	50	55	70	45	52	45	50	55	50	50	55	45	30	40	35	30	T	
Slope exposure	NW	NW	NW	NW	N	NW	NW	NW	N	NW	NW	NW	NW	N	NE	NE	N	A	
Cover of herb layer [%]	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	N	
Number of species in relevés	17	22	24	23	17	16	22	18	16	17	21	15	11	24	20	20	21	C	
Ch. Petasitetum kabilikiani*																		O	
+																		N	
Ch., D'. Adenostylin:																		S	
*Petasites kabilikianus	4	4	5	3	3	3	4	5	5	3	4	3	4	4	4	3	4	T	
Aconitum firmum/napellus	1	r	+	1	2	1	1	+	+	+	+	+	+	2		2	1	A	
Cicerbita alpina	1	2	1	1	1		2	1	+	1	1	+		4	4	2	2	N	
Adenostyles alliariae			1	1		2		1	+	1	1	1	1	1		1	1	C	
Doronicum austriacum	2	+	+		1	2	1	+	1	3	1							Y	
*Chaerophyllum hirsutum	1	1	1				2			+				1	2	2	2	C	
Epilobium alpestre	+	r	+					+	+	+		+						Y	
Valeriana sambucifolia									1			1						C	
Ch. Betulo-Adenostyletea:																		O	
Primula elatior	1	1	2	+	+	1	1	1	1	1	1	2	1	1	1	1	1	V	
Geranium sylvaticum	+	1	1				1	1	+	+		1	1	1	1		+	V	
Thalictrum aquilegifolium			2	1			1	2	+		1	1	+	3	2	2	2	IV	
Athyrium distentifolium			+	1		1	1	+	r		1	1		1	1	1	1	IV	

DISCUSSION

Petasites kablikianus is a species with typical montane distribution. It was mentioned above that it forms subalpine phytocoenoses with significant contribution of characteristic species for *Betulo-Adenostyletea* class, and such type of community was firstly described as *Petasitetum kablikiani* association (WALAS 1933). At present florally poor patches with domination of butterbur, growing on the gravel heaps near streams, are included into this association. This impoverished in tall-herbs species, type of phytocoenoses is the most distributed in Polish montane areas. Typical subalpine phytocoenoses appears with significantly smaller frequency. In Tatras they are noted as sporadic (MIREK & PIĘKOŚ-MIRKOWA 1995), on the northern slopes of the Babia Góra massif there are totally only a dozen or so bigger patches. The most sporadic they are in the Giant Mts. especially on the Polish side. This is really symptomatic fact, that WALAS in his paper (1933) mentioned subalpine zone as an optimal zone for analysed species appearance, and wrote that „there were some small clusters of *Petasites kablikianus* on the stream sides” in the lower part of Babia Góra massif. Today the situation is extremally opposite. So it may be possible that subalpine phytocoenoses have „primary” character, and the species migrated towards lower parts of the mountains, finding convenient habitats on the gravel heaps, succesively enlarged by anthropopression. Distribution of the species on Polish side of the Giant Mts. seems to confirm such hypothesis.

This study is an attempt of comparison in morphological aspect two the most isolated populations of *Petasites kablikianus* come from the Babia Góra massif (Beskid Wysoki) and from the Giant Mts. Analysis of the investigated features proved significant separateness both populations, in spite of similarity of climatic and ecological conditions they are existing in, reflected in floral composition of their phytocoenoses. Therefore they are probably not the ecotypes, developed in account of different ecological conditions. This variation then could be an effect of geographical and fenological (in relation to lower localized populations) isolation, which could intensify the process and lead to speciation. It seems to be necessary to carry out the cytogenetic analysis of both populations to estimate real character of the differentiation. It should be next stage of researching this phenomenon.

SUMMARY

The results of morphological analysis of *Petasites kablikianus* populations come from the Babia Góra area (Beskid Wysoki, Western Carpathians) and Mały Śnieżny Kocioł cirque (Polish part of Giant Mts.), and as well phytosociological analysis of phytocoenoses where the species is a dominant, proved significant separateness of analysed populations. Distinct similarity of climatic and habitat conditions, that both populations exist in, allow to exclude hypothesis that morphological differences have character of ecotypes. Their differentiation could be reasoned by prolonged speciation process, assisted by geographical and fenological isolation.

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