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Role of vascular plant resources in the lower montane zone in relation to the flora of a mountain and its adjacent area: the South Base of Mt. Babia Góra (Western Carpathians)

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Abstract: The article is the first scientific summary of contemporary flora of vascular plants growing within the S base of Mt. Babia Góra. It presents main statistics concerning general aspects of species richness, its taxonomical structure and spatial distribution (within 54 squares of 0.25 km^2 each). Native vs. anthropogenic origin of species is considered in relation to the neighbouring Babia Góra National Park, as well as the Orawian Hills investigated ca. 30 years ago. The problem of local frequency of taxa is also discussed in relation to general species richness within the investigated area. The enclosed full register of recorded species accompanied by some individual characteristics, such as e.g. frequency of each plant, mountain vs. lowland status etc. provides necessary background for further studies and may enable potential estimation of future changes in the flora of this area, as well as the neighbouring Babia Góra National Park. The investigated flora of the lower montane zone comprised 498 species (439 of which were native), 258 genera and 79 families. These numbers represented the following parts of the neighbouring national park's taxonomic diversity: 79.6% of its species richness, 89.3% of genera and 96.3% of families. In the light of clearly high contribution of the investigated area to the flora of the whole massif, also considering relatively low share of alien taxa (only 39 permanently established species; i.e. 7.8% of the flora) the lower montane zone deserves effective protection, preferably by including it entirely into the national park.

Key words: flora, vascular plants, species richness, spatial diversity, native vs. alien species, lower montane zone, biosphere reserve, Mt. Babia Góra, Western Carpathians

Introduction

Biodiversity is a complex phenomenon and, regardless of various definitions and its different aspects (cf. Heywood & Baste 1995), what seems certain is that it is not evenly distributed in space. From the nature conservation perspective it is particularly important to recognize spatial concentrations of biodiversity. Even though different measures are sometimes used to define these concentrations (e.g. species richness and distribution of endemic taxa), it is crucial to distinguish areas of highest international importance for *in situ* conservation of wildlife, the areas which are often called "biodiversity hotspots" (Myers *et al*. 2000; Possingham & Wilson 2005; Forest *et al*. 2007; Krishnankutty & Chandrasekaran 2007). Despite some discordance between global patterns depending on which criterion of hotspots (e.g. number of species or endemism) is considered (Orme *et al*. 2005; Lamoreux *et al*. 2006), it seems reasonable that areas of supra-regional significance for biodiversity should not only be delineated and put under protection but also continuously monitored according to its resources of living organisms. One of the internationally most successful monitoring system of such areas is the UNESCO's Man and Biosphere Reserves network in which mountain areas play a significant role (over 160 of 531 sites are situated in the mountains – Anonymous 2008). In this context, it is intriguing that although elevation gradient is indisputably one of the main patterns in worldwide distribution of biodiversity (cf. Gaston 2000), i.e. the higher elevation, the lower number of species, the following questions seems to remain unanswered:

- what is the real contribution of different climatic-vegetation zones to general species richness of a mountain massif?

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- and, in particular, considering the above-mentioned negative elevation effect, how important is the lower montane zone in comparison with adjacent areas?

I carried out my own investigations on the contemporary flora of vascular plants in an area situated entirely within the lower montane zone of Mount Babia Góra (Western Carpathians, Poland; Fig. 1-3). Mt. Babia Góra (1725 m a.s.l.) is the culmination of the Beskid Wysoki Mts., the second largest, after the Tatry Mts., mountain range in Poland. The plant cover of Babia Góra exemplifies well-developed climatic-vegetation zones: from the lower montane forests up to alpine grasslands and bare rocks. It is preserved in the Babia Góra National Park (abbreviated below as BGNP) which was officially established in 1954 and since 1977 the park has been recognised as an international Biosphere Reserve. Thus, it is not surprising that, since quite a long time ago, the mountain has been attracting not only tourists but also numerous researchers – naturalists (e.g. Zapałowicz 1880; Walas 1933). Consequently, the

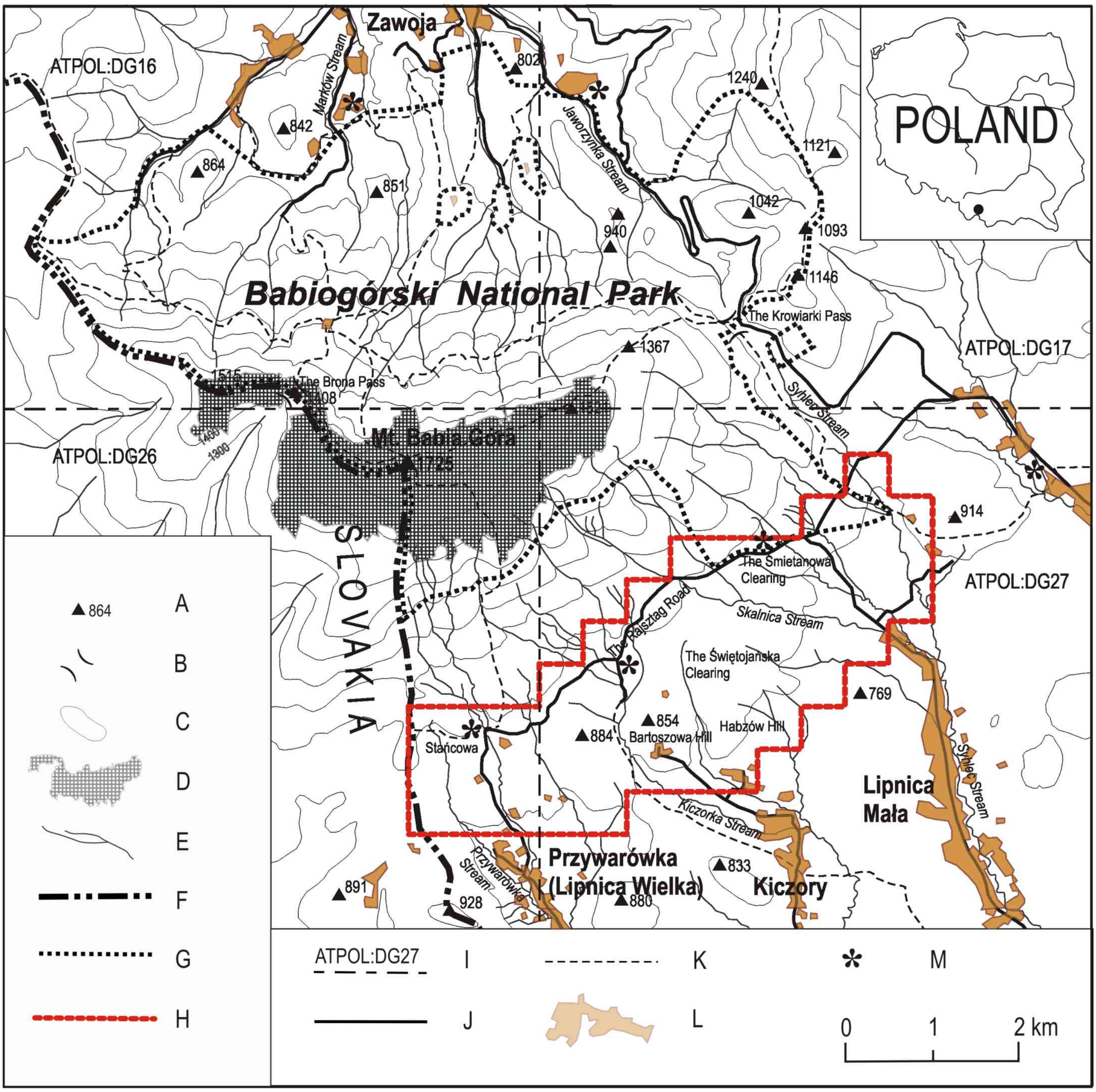

Fig. 1. Situation of the investigated South Base of Mt. Babia Góra in relation to the whole massif and its vicinity

Explanations: A – mountain peaks and main hills; B – mountain passes; C – main contour lines (increasingly by 100 m of elevation a.s.l.); D – high mountain vegetation zones (alpine and sub-alpine zones above the upper forest limit); E – main streams; F – state border between Poland and Slovakia; G – border of the Babia Góra National Park, as well as the proposed European Special Area of Conservation within the Natura 2000 system (PLH120001); H – boundary of the investigated area; I – range and numbers of squares within the national ATPOL grid system; J – main roads; K – main tourist routes; L – built-up areas (willows); M – main foresters' houses and cottages literature concerning Mt. Babia Góra, even 11 years ago, comprised over 5000 works (Anonymous 1996), including many publications dealing with various geobotanical aspects. Despite relatively good recognition of the massif's plant cover, especially of the montane zones (e.g. Celiński & Wojterski 1964, 1978, 1983; Borysiak 1984; Kasprowicz 1996a, 1996b), vascular flora of the BGNP has not been, so far, completely analysed, and the latest summary of available data (Borysiak & Stachnowicz 2004) confirmed some considerable gaps in our knowledge about distribution and resources of many plant species growing in the area.

Fig. 2. Mt. Babia Góra visible from its South Base: traditionally managed meadows and pastures in the vicinity of the village Przywarówka

Floristical records summarized a couple of years ago in a database completed during research aimed at the protection plan of the BGNP (Borysiak & Stachnowicz 2004) revealed a distinct disproportion between the state of inventory and recognition of N and S slopes of Mt. Babia Góra: for a disadvantage of the second ones. It seems highly probable that this image was partly a consequence of the National Park's previous range, before it was enlarged in 1997. No doubt that most of geobotanical investigations had been carried out, until the mentioned enlargement, only on the north part of the mountain. Furthermore, evidently smaller amount of available herbarium collections, as well as floristical observations, concerned particularly the southern base of the Babia Góra massif, which not so far ago was situated entirely outside the National Park. The plant cover of this part of the massif, also due to its relative isolation of the main tourist routes (Fig. 1), had been therefore the worst documented, and if we exclude few unpublished MSc thesis (e.g. Baranowska 1980; Flaum 1980; Hajnowska-Ratajszczak 1984), there were no systematic, long-term geobotanical investigations carried out in the area.

The results presented in this article are a part of a more extensive, unpublished elaboration by Stachnowicz (2001) devoted to vascular plant flora of the South Base of Mt. Babia Góra (abbreviated below as SBMBG), on which the detailed geobotanical investigations were carried out in 1996-2000. In this paper I would like to concentrate on the following main issues concerning the currently recognized flora of the SBMBG:

- general number of species and taxonomical diversity of vascular plants,
- spatial diversity of species richness,
- general geographical origin of species (i.e. native vs. alien taxa), as well as
- species frequency as a basis for further assessment of richness within the 'rarity to commoness' gradient.

Fig. 3. A view on the middle part of the investigated area from the S slope of Mt. Babia Góra, above its upper limit of the sub-alpine vegetation zone: dwarf pine thickets (*Pinus mughus*) are visible in the foreground, whereas in the background there is a mosaic of narrow arable fields and meadows on the Bartoszowa Hill which is surrounded by spruce and fir forests

These aspects of local floristic resources will be discussed both in relation to general flora of the investigated area, as well as in comparison with the whole flora of the BGNP (cf. Borysiak & Stachnowicz 2004) and with the adjacent Orawian Hills (cf. Guzikowa 1977).

I believe that presentation of the above-mentioned issues, accompanied by the first publication of a full list of taxa recorded in the SBMBG, will be a good basis for further discussion of other ecological problems including various aspects of biodiversity in the investigated mountain area.

1. Area of research – an outline physiography

The investigations comprised the Polish (i.e. main) part of the Southern Base of Mt. Babia Góra (SBMBG) situated within the Beskid Wysoki Mountain Range, on the border between Poland and Slovakia (Fig. 1). During delineation of the research area the following main criteria were taken into account: (1) the massif's geomorphology, (2) the state boundary between Poland

and Slovakia, and (3) the cartographic ATPOL grid system (Zając & Zając 2001). The most important criterion was the range of the mountain base for delimitation of which I am grateful to geomorphologist Prof. Adam Łajczak. It is assumed that this base comprises the first chain of local hills situated below a road called Rajsztag (Fig. 1). These hills are not entirely separated from the S slope of the mountain which makes their classification within the neighbouring Orawian Hills (cf. Kondracki 1994) highly disputable. The projection of the investigated area on a map covers ca. 13.25 km^2. In reality, however, the surface is much larger as a result of its high hypsometric variability (Fig. 4, 5). Altitude above the sea level ranges from ca. 740 m in the vicinity of the village Siarka up to ca. 980 m above the road Rajsztag, on the west of the Gubernasówka Clearing (Fig. 4). The maximum differences in altitude in the whole area is ca. 230 m, whereas within a single square covering 0.25 km^2 (500x500 m) up to 115 m (Fig. 5).

is situated in the following units: the Province of Carpathians, the Division and Region of Western Carpathians, the Sub-Region of Western Beskidy Mts., the Żywiec District and the Babia Góra Montane Sub-district.

The climate in the vicinity of Mt. Babia Góra was a subject of research by Obrębska-Starklowa (1963, 1983, 2004). The SBMBG is entirely situated within the moderate cool climatic zone, where the natural plant cover is dominated by lower montane forests and the mean annual temperature fluctuates in between 4-6^{o}C. The mean annual precipitation in Stańcowa (ca. 1200 mm) is similar to the value recorded on the opposite side of the massif – in Zawoja. In lower parts of the mountain slopes the snow cover remains usually for ca. 5 months, and it is significant that it lasts for ca. 20-28 days shorter than on the northern side. There are western and south-western winds which prevail, and the concave land forms have noticeably worse ventilation than the convex

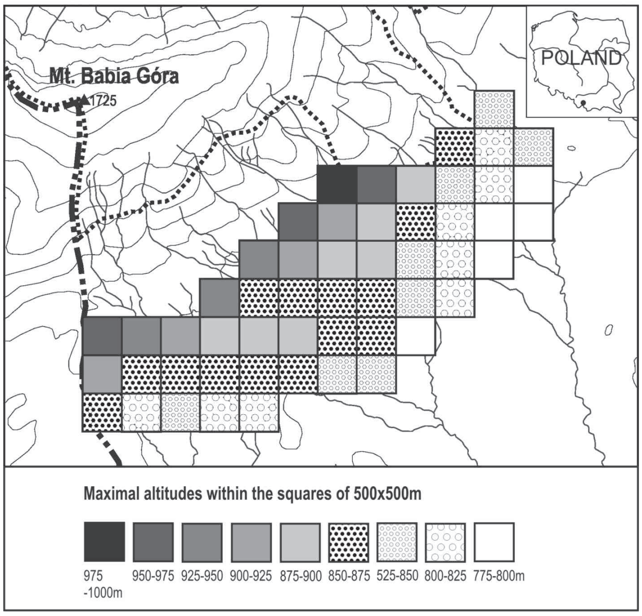

Fig. 4. Maximal altitude a.s.l. on the South Base of Mt. Babia Góra, within the investigated squares of 500x500m (orig. according to the topographic map in the scale of 1:10 000)

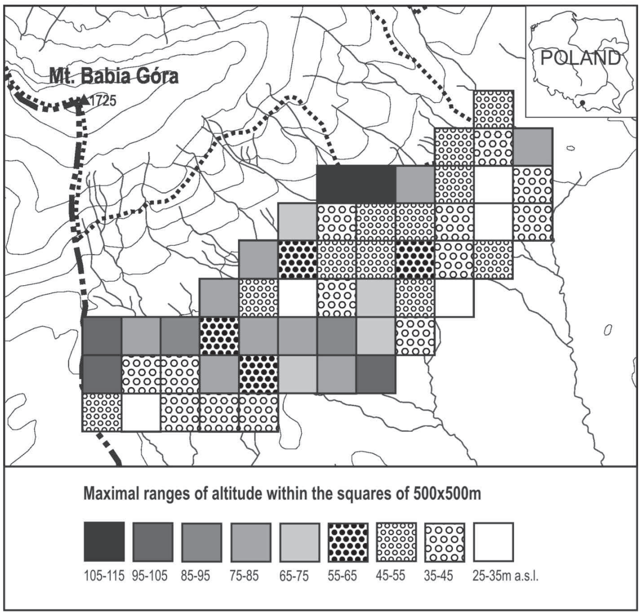

Fig. 5. Maximal differences in altitude within the investigated squares of 500x500m (orig. acc. to the topographic map in the scale of 1:10 000)

The southern boundary of the Babia Góra massif is not distinctly recognizable and it is usually assumed that it is outlined by a contour line of 800 m a.s.l. (Łajczak 1995). The SBMBG is situated therefore on the border between two physic-geographical micro-regions (Kondracki 1994): Mt. Babia Góra Range (513.512) and Działy Orawskie – i.e. the 'Orawian Hills' (513.513). Within the geobotanical division of Polish mountains (Pawłowski 1972) Mt. Babia Góra is classified within: the Silesian-Babia Góra Sub-district of the Beskidy Mts. District and the Division of Western Carpathians. According to the newest geobotanical regionalisation of Poland (by Matuszkiewicz 1993) the investigated area

zones or peaks, which favours formation of fogs accompanied by an inverse thermal stratification in local hollows.

Mt. Babia Góra constitutes the European Watershed separating the Baltic basin from the Black Sea basin. The southern base of the mountain is entirely situated within the second one. The density of streams is lower on the south side than on the north and it reaches ca. 2 km of length per 1 km^2 (Niemirowski 1983). The stream network in SBMBG is composed of two main water flows: Syhlec and Lipnica, including its tributaries (Fig. 1). Below the investigated area they reach the Czarna (Black) Orawa River, on which a large artificial retention reservoir was built on the Slovak side. However, within the borders of the research area, there is no natural, stagnant water body. The only one small artificial water pond is situated near the Śmietanowa forester's cottage. On the south, Polish side of the mountain there are 35.9 ha of boggy areas which constitute ca. 4.6% of the S slope and the S mountain base (Łajczak 2004).

The SBMBG is a relatively extensively managed agricultural-forested area. According to the classification of human pressure by Faliński (1972), the following main forms of management may be distinguished: agriculture, forestry, communication (roads) and settlements. Whereas the first two forms of anthropopressure are still distinctly dominant in space, at the same time a clear zonality in spatial dominance is noticeable: in the N part of the SMBBG forestry is more or less the only important way of anthropogenic influence on the plant cover (excluding the limited usage of local roads), while on the S parts there is agriculture (meadows, pastures and arable fields) which prevails. Below the Rajsztag road relatively more intensively exploited private and common village forests dominate. The network of local, poor quality ground roads is sometimes quite dense there. Agriculture, as it was mentioned, has mainly a traditional, non-intensive character. The following cereal and root crops are most often cultivated: wheat, oat, barley and potatoes. Meadows and pastures are usually cultivated alternately: mowed and pastured. Traditional pasturing (herding of sheep) is today rather poorly developed and it concentrates within the large mountain clearings: Śmietanowa, Liniorka and Gubernasówka, as well as in the vicinity of the village Lipnica Mała – Zagrody. Human settlement, though directly in the investigated area is hardly noticeable, however in its close neighbourhood it is quite well developed. In the valleys of every main stream, there are long and densely inhabited (over 1500 houses) villages: Lipnica Wielka and Lipnica Mała, which constitute separate administrative communes. Within the investigated area, except for still not numerous 'agro-tourist' farms, there is practically no accommodation available for tourists. The only one object of such kind in Stańcowa (Fig. 1) is not regularly open for the public as it houses the 'Children in Crisis' hospice, where a few camps are organized annually for the secondary school children and young hospital patients. The network of driveable roads is not well developed in the SBMBG and has only a local importance. The main asphalt (in many parts destroyed) forest route called Rajsztag (Fig. 1) is usually available exclusively for the forestry and the BGNP employees.

The plant cover of the SBMBG has a remarkably montane character. According to my own cautious investigations (Stachnowicz 2001) as many as 55 types of plant communities (associations and an equivalent rank communities) were found and classified within 29 phytosociological alliances, 21 orders and 16 classes. There is no place in this article for listing them all, so only the most important components of vegetation will be mentioned. Forests constituted a dominant part of landscape, and at the same time their contribution in space noticeably decreased from the north to the south. The most common were the spruce (*Picea abies*) stands, sometimes with an admixture of fir (*Abies alba*) which rarely dominated. The most important forest communities were: the lower montane spruce-fir forests *Abieti-Piceetum* and the montane fir forests *Galio-Abietetum,* the syntaxonomical position of which is still disputable (cf. Matuszkiewicz 2001). A considerable surface was also covered by artificial, often dense stands of planted spruces. An undeniable geobotanical peculiarity of the area is the sub-montane spruce forest on peatbogs *Bazzanio-Piceetum*, which in Poland has been reported for the first time exactly from the investigated area (Bujakiewicz 1981; Kasprowicz 1996a). On local spring and wet terraces of mountain streams there were also small phytocoenoses of the montane boggy alder forests *Caltho-Alnetum*. Forest edges and clearings were often overgrown by natural thickets and herbal communities which were also more or less common on roadsides and along streams. Bogs, especially meso-eutrophic, were developed locally and covered a relatively small surface. Most frequently observed were patches of calciphilous bog-spring grasslands (*Scheuchzerio-Caricetea*), spatially linked to water springs with outflows limited by hardly permeable, weathered rocks. They were most often represented by phytocoenoses of *Valeriano-Caricetum flavae*, distinguished by a domination of *Eriophorum latifolium*. One of the characteristic feature of the plant cover of the SBMBG was a high share of extensively mown and pastured meadows, diversified both according to their moisture as well as the way of management, e.g. moist and sometimes irregularly mown, common in lower elevations phytocoenoses of *Cirsietum rivularis* or less frequent, developed in moderately watered areas, often excessively mown and pastured patches of *Gladiolo-Agrostietum*. Pastures were widespread and they may be divided into two types: extensively pastured by cows (mainly *Festuco-Cynosuretum*) and intensively managed sheep pastures (*Hieracio vulgati-Nardetum*). Purely synanthropic vegetation was observed only sporadically. It was connected with agricultural activities, seldom if ever, with human settlements. The areas covered by agrocoenoses were more or less uniform as far as the species composition of weeds is considered, and at the same time they were very rich in spontaneously growing species. Arable fields were often long and belt-like in shape, many times narrower than meadows in the neighbourhood. In some areas the fields had remained abandoned for many years. Ruderal communities were usually representing unspecialised aggregations (cf. Faliński 1969) of predominantly native, synanthropic flora. They were relatively not frequent and found only in the vicinity of buildings or in such places as non-permanent deposits of manure.

2. Material and methods

The article contains only chosen results of multi-aspect analysis of vascular flora of the SBMBG, obtained using a relational database especially designed for this project (Stachnowicz 2001). The basis of the mentioned analysis were field investigations focused on mapping of each species of wild flora, carried out in 1996-2000. The sites of floristic registers (localities) were located 'punctually' on a topographic map in the scale of 1:10000, with a cartographic grid composed of 216 basic square fields of 250x250 m (1/16 km^2), adjusted to the national ATPOL grid system (cf. Zając & Zając 2001). The mentioned 250x250 m grid was a basis for further consideration of individual distribution of each plant species (not presented in this article), whereas other analysis of spatial differentiation of the flora were made in 54 squares of 500x500 m (compare Fig. 1 and 6).

Altogether, 1418 floristical registers were made in 811 sites, which resulted in 25 720 data on occurrence of 498 species of vascular plants.

The herbarium documentation comprised ca. 1800 specimens and was deposited in the Department of Plant Taxonomy, Adam Mickiewicz University in Poznań. Many specimens were verified or determined by specialists (acknowledged later in this article). In some cases, e.g. the so-called 'critical' taxa, particularly of the genus *Alchemilla*, in statistical analysis only those species were considered which had been precisely recognised in the herbarium material. Furthermore, the broad understanding of *Dryopteris dilatata* s.l. (without distinguishing the diploidal species *D. expansa*) was accepted, which was a consequence of a relatively high number (most) of collected specimens representing noticeably intermediate features between the mentioned taxa. Moreover, most of these ferns were also immature, and identifying them using their spores would be hardly possible. The problem of distinction between these two species, as well as frequent presence of intermediate specimens, was emphasised by Piękoś-Mirkowa (1979).

The scientific names of plant species were input to the database according to a national checklist by Mirek *et al.* (1995), whereas all the taxa listed in this article (Appendix 1) are also in accordance with the newest checklist (Mirek *et al.* 2002). The plants affiliation to families were based on Rothmaler *et al.* (1994). In statistical calculations of various aspects of species richness only those taxa were taken into account which possessed a stable position in the botanical literature. This refers in particular to the hybrid forms.

In this paper the origin and naturalization status of species was described according to the general geographical-historical classification of species (cf. Thellung 1915; Kornaś 1968; Kornaś & Medwecka-Kornaś 1986; Mirek 1981) with a simplified, broad meaning of apophytes defined as all native taxa with an ability to grow permanently on more or less transformed habitats. The issue of apophytism was a subject of my own, more insightful research on the SBMBG (Stachnowicz 2001), the results of which, however would not fit to the concept of this article. The division of established alien species into 'old invaders' – i.e. archaeophytes and 'newcomers' – i.e. kenophytes followed the concepts presented by Zając (1979) and Zając *et al.* (1998). It should be emphasised that the whole geographical-historical classification was referred to the area of investigation, which means that in some cases a species considered to be native in some parts of Poland would not necessarily be also regarded as native in the Babia Góra massif.

Mountain vs. lowland status species in the flora (see Appendix 1) was originally adapted to the Babia Góra Mountain Range. This classification was elaborated on the basis of a comprehensive literature concerning Polish Carpathians in general (e.g. Walas 1938; Pawłowski 1948; Kornaś 1955, 1957, 1963, 1966; Grodzińska & Pancer-Kotejowa 1960; Stuchlikowa & Stuchlik 1962; Jasiewicz 1965; Guzikowa 1977; Michalik 1979; Białecka 1982; Dubiel *et al.* 1983; Mirek 1989; Zając 1996), as well as Mt. Babia Góra itself (e.g. Zapałowicz 1880; Borysiak 1984, 1987; Borysiak & Szwed 1990; Szwed 1990 and unpublished data used by Borysiak & Stachnowicz 2004).

Altitude ranges of each species recorded in the investigated area were presented (Appendix 1) referring to published and unpublished data available from Mt. Babia Góra (National Park), its S slope, and the SBMBG.

Local frequency of species was defined by a number of basic squares (250x250 m) in which they were recorded and then classified according to original 7-level scale (Table 3) which is discussed later.

3. Results and discussion

3.1. General species richness and taxonomical diversity of the flora

The investigated vascular flora of the SBMBG comprises 498 species representing 258 genera and 79 families (see Appendix 1). Comparing this number to the data available for the neighbouring BGNP, where 626 species were recorded by Borysiak & Stachnowicz (2004), it may be found that the discussed flora of the

Table 1. Species richness of genera in the flora of the South Base of Mt. Babia Góra

Level of local species richness	Genera	No. of species*	% of the SBMBG's flora (N=498)	Sequential No. in the SBMBG	Sequential No. in the BGNP	Number of species* in the BGNP	% of the BGNP's flora (N=626)
Species-richest genera (comprising 7 and more species)	*Carex*	22	4.4	1	1	23	3.7
	Juncus	11	2.2	2	4	12	1.9
	Salix	10	2.0	3	3	13	2.1
	Veronica	10	2.0	3	5	11	1.8
	Galium	7	1.4	4	7	9	1.4
	Hieracium	7	1.4	4	9	7	1.1
	Poa	7	1.4	4	6	10	1.6
	Rumex	7	1.4	4	9	7	1.1
	Trifolium	7	1.4	4	8	8	1.3
	Viola	7	1.4	4	9	7	1.1
	10 richest genera altogether	95	19.0	1-4	1-9	107	17.1
Relatively rich (5-6 species)	*Luzula*	6	1.2	5	8	8	1.3
	Ranunculus	6	1.2	5	6	10	1.6
	Senecio	6	1.2	5	9	7	1.1
	Centaurea	5	1.0	6	13	3	0.5
	Cirsium	5	1.0	6	10	6	1.0
	Equisetum	5	1.0	6	9	7	1.1
	Festuca	5	1.0	6	6	10	1.6
	Geranium	5	1.0	6	13	3	0.5
	Glyceria	5	1.0	6	11	5	0.8
	Potentilla	5	1.0	6	11	5	0.8
	Stellaria	5	1.0	6	10	6	1.0
	Vicia	5	1.0	6	10	6	1.0
	12 relatively rich genera altogether	63	12.6	5-6	6-11	76	12.3
Average-rich genera (3-4 species)	*Agrostis, Alchemilla**, Calamagrostis, Cardamine, Dryopteris, Eleocharis, Epilobium, Euphorbia, Lamium, Polygonum, Rosa, Valeriana*	4	0.8	7	-	-	-
	12 above-listed genera altogether	48	9.6		-	-	-
	Bromus, Campanula, Dactylorhiza, Eriophorum, Euphrasia, Galeopsis, Leontodon, Lysimachia, Myosotis, Petasites, Plantago, Ribes, Rorippa	3	0.6	8	-	-	-
	13 above-listed genera altogether	39	7.8		-	-	-
	25 average-rich genera altogether	87	17.5	7-8	-	-	-
Poor-in species genera (1-2 species)	42 other genera (each of them comprising 2 species) altogether	84	16.9	9	-	-	-
	169 remaining genera altogether	169	34.0	10	-	-	-
	poor-in species genera altogether	123	24.7	9-10	-	-	-

Explanations: * – hybrids of uncertain taxonomic status have been excluded from calculation; ** – some of herbarium documentation concerning the genus *Alchemilla* deserve further verification by specialists; - not classified

southern base of the massif constitutes ca. 79.6% of the Park's total species richness.

The highest number of species, namely 22 (which is 4.4% of the whole investigated flora) belonged to the genus *Carex*, the second richest genus was *Juncus* – 11 taxa, while 10 species represented both *Salix* and *Veronica*. Ten richest-in-species genera altogether comprised 95 species, which is ca. 19% of the SBMBG's flora (Table 1). The presence of as many as the mentioned 22 sedges (*Carex* sp. div.) is probably a consequence of both a relatively high level of humidity and locally frequent small streams, springs etc. and on the other hand, also common non-forest communities (meadows etc.).

It is striking that ca. 40% of the SBMBG's flora is composed of the poorest-in-species (i.e. represented by only 2-3 taxa) genera.

Ten richest families (having 16 and more species) concentrate almost 60% of the investigated flora (Table 2). Their sequence according to the decreasing number of species in families is similar to the flora of the BGNP (cf. Borysiak & Stachnowicz 2004). Moreover, in general it also resembles such a sequence for the whole flora of Poland (Jackowiak 1999), with some exceptions, e.g. locally relatively lower position (i.e. 8th instead of 5th in Poland) of *Caryophyllaceae* (Table 2). Quite a high number (11 species) of orchids (*Orchidaceae*)

Table 2. Species richness of families in the flora of the South Base of Mt. Babia Góra

Level of species richness	Plant families	No. of species*	% of the SBMBG's flora	Sequential No. in the SBMBG	No. of species* in the BGNP	% of the BGNP's flora	Sequential No. in the BGNP
Richest (16 or more taxa)	*Asteraceae*	70	14.1	1	73	11.7	1
	Poaceae	54	10.8	2	65	10.4	2
	Cyperaceae	31	6.2	3	30	4.8	4
	Rosaceae	28	5.6	4	46	7.4	3
	Fabaceae	23	4.6	5	28	4.5	5
	Scrophulariaceae	19	3.8	6	26	4.2	6
	Brassicaceae	18	3.6	7	22	3.5	8
	Juncaceae	17	3.4	8	20	3.2	10
	Lamiaceae	17	3.4	8	21	3.4	9
	Caryophyllaceae	16	3.2	9	23	3.7	7
	10 richest families altogether	293	58.7	1-9	354	56.8	1-10
Relatively rich (7-12 taxa)	*Apiaceae*	12	2.4	11	17	2.7	12
	Polygonaceae	12	2.4	11	17	2.7	12
	Ranunculaceae	12	2.4	11	19	3.0	11
	Salicaceae	12	2.4	11	14	2.2	13
	Orchidaceae	11	2.2	12	11	1.8	15
	Rubiaceae	8	1.6	13	11	1.8	11
	Violaceae	7	1.4	14	7	1.1	17
	7 relatively rich families altogether	74	14.8	11-14	96	15.3	11-17
Average-rich (4-6 taxa)	*Boraginaceae*	6	1.2	15	8	1.3	16
	Geraniaceae	6	1.2	15	3	0.5	21
	Onagraceae	6	1.2	15	12	1.9	14
	Primulaceae	6	1.2	15	5	0.8	19
	Aspidiaceae	5	1.0	16	8	1.3	16
	Equisetaceae	5	1.0	16	7	1.1	17
	Euphorbiaceae	5	1.0	16	6	1.0	18
	Campanulaceae	4	0.8	17	6	1.0	18
	Caprifoliaceae	4	0.8	17	5	0.8	19
	Ericaceae	4	0.8	17	5	0.8	19
	Liliaceae	4	0.8	17	8	1.3	16
	Pinaceae	4	0.8	17	5	0.8	19
	Pyrolaceae	4	0.8	17	6	1.0	18
	Valerianaceae	4	0.8	17	5	0.8	18
	14 average-rich families altogether	114	13.4	15-17	89	14.4	14-19
Remaining families (1-3 taxa)	*Betulaceae, Grossulariaceae, Plantaginaceae*	3	0.6	18	-	-	-
	3 above-listed families altogether	9	1.8	-	-	-	-
	Balsaminaceae, Chenopodiaceae, Dipsacaceae, Gentianaceae, Iridaceae, Lycopodiaceae, Lythraceae, Oleaceae, Polygalaceae, Solanaceae	2	0.4	19	-	-	-
	10 above-listed families altogether	20	4.0	-	-	-	-
	Aceraceae, Adoxaceae, Alismataceae, Amaryllidaceae, Aristolochiaceae, Athyriaceae, Blechnaceae, Callitrichaceae, Convolvulaceae, Crassulaceae, Cucurbitaceae, Cupressaceae, Cuscutaceae, Droseraceae, Fagaceae, Huperziaceae, Hypericaceae, Hypolepidaceae, Juncaginaceae, Lentibulariaceae, Linaceae, Monotropaceae, Ophioglossaceae, Orobanchaceae, Oxalidaceae, Papaveraceae, Parnassiaceae, Rhamnaceae, Saxifragaceae, Thelypteridaceae, Thymeleaceae, Trilliaceae, Typhaceae, Ulmaceae, Urticaceae	1	0.2	20	-	-	-
	35 above-listed families altogether	35	7.0	-	-	-	-
	remaining 48 families altogether	64	12.9	18-20	-	-	-

Explanations: * – hybrids of uncertain position have been excluded from calculation; - not classified recorded on the SBMBG is also worth mentioning. They almost equalled in this respect *Apiaceae*, as well as: *Polygonaceae*, *Ranunculaceae* and *Salicaceae* (each of which was represented by 12 species).

3.2. Local frequency of species versus floristic richness

Frequency is a statistical feature which partially describes resources of each individual species, as well as it may be used to assess general allocation of floristic richness within the locally observed 'rarity to commonness' gradient.

In my research I have appended the number of basic field squares (250x250 m), in which particular species was present, as a general criterion of its local frequency (Table 3). The scale of such defined frequency was then divided into 7 cut levels with the middle one (i.e. level 4 in Table 3) comprising more than 12.5% and up to 25% of the total number of basic squares (which was 212). The level borders were set considering also the number of squares (N=188) occupied by the most common species which on the SBMBG was *Picea abies*.

This means that classification of species according to their frequency was made in relation to the most common species, whereas the rarest ones, as they were present in only one locality, obviously were not suitable for that purpose. As in various other floras, it is usually observed that the highest number of species belong to the rarest ones (Fig. 6). Consequently, it should not be surprising that average level of local frequency must have been set far below half of the highest observed number of localities.

Despite the above discussed reservations, and in consequence of rather cautious approach to the frequency levels, as far as the SBMBG's general species richness is concerned, it is quite clearly visible that most of it (62.9%) was concentrated within below-average levels of frequency (Table 3 and Fig. 6). It is particularly significant that 27.5% of the whole flora was represented by extremely rare species which were present in not more than 3 of 212 squares (250x250 m).

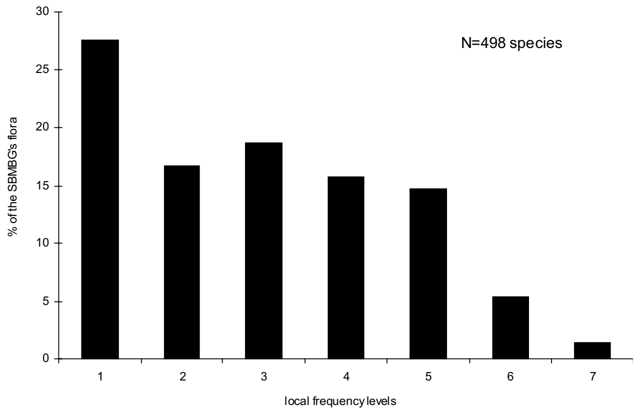

Fig. 6. Species richness versus local frequency of vascular plants within the South Base of Mt. Babia Góra (cf. Table 3)

3.3. Spatial concentration of species richness

The spatial diversification of floristic richness was analysed cartographically: on a quantitative cartogram with a basic square field of 500x500 m (Fig. 7). The poorest in species squares counted only 95 taxa, whereas in the richest one there were 236 species, i.e. almost 2.5 times more (Fig. 7).

It is worth mentioning that, in many cases, higher numbers of species per square were accompanied by generally noticeable increase in spatial importance of agriculture and settlements, e.g. in the vicinity of Przywarówka, the Bartoszowa Hill, Kiczorka and on the N edge of Lipnica Mała (cf. Fig. 1). However, this aspect will not be discussed here in detail because the full assessment of possible links between forms of human pressure and plant diversity would need some

Table 3. Frequency of species recorded on the South Base of Mt. Babia Góra

Local frequency level	Frequency description	Number of 250x250 m squares in which certain species was recorded*	The level borders expressed by a percentage of the number of squares occupied by a species in relation to the total number of basic fields (N=212)	The lower limit of a level expressed by a percentage of the number of squares occupied by a species in relation to such number revealed by the most frequent species (N=188)	Number of species	% of the SBMBG's flora (N=498 species)
1	extremely rare	1-3	<1.5	0.5	137	27.5
2	very rare	4-10	1.5-5.0	2.1	83	16.7
3	rare	11-26	5.1-12.5	5.9	93	18.7
4	averagely spread	27-53	12.6-25.0	14.4	78	15.7
5	frequent	54-106	25.1-50.0	28.7	73	14.7
6	common	107-159	50.1-75.0	56.9	27	5.4
7	very common	160-212	75.1-100.0	85.1	7	1.4

Explanation: * – values have been rounded off so that they comprised the relevant integral numbers of basic squares

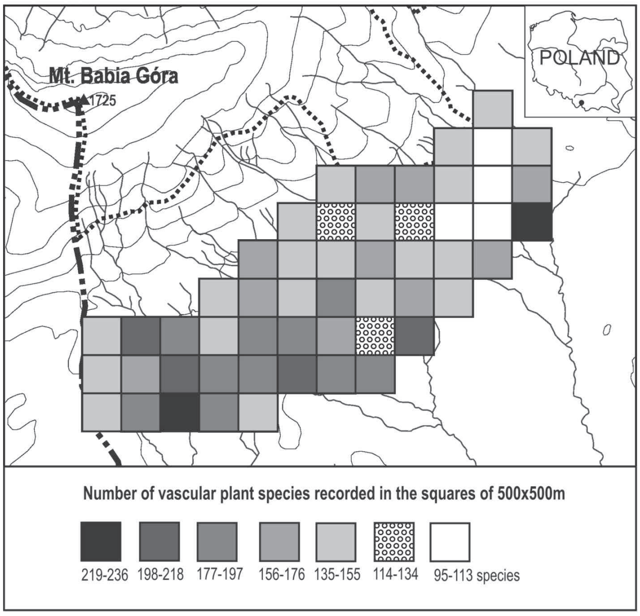

Fig. 7. Spatial differentiation in species richness on the South Base of Mt. Babia Góra. Number of vascular plants species calculated within the investigated squares of 500x500m

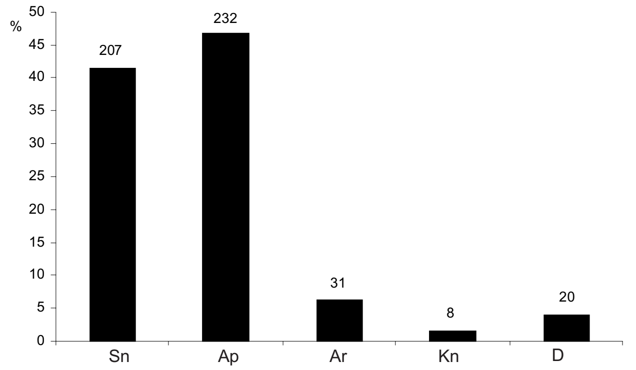

Fig. 8. Share of native and alien species in the flora of the South Base of Mt. Babia Góra

Explanations: Sn – non-synanthropic native species; Ap – apophytes; Ar – archaeophytes; Kn – kenophytes; D – diaphytes

further, statistically important analysis, and as such it must be treated as a separate subject.

Considering the predominant form of anthropopressure observed directly in a locality, i.e. in the field (Stachnowicz 2001), again not entering into methodological details, and consequently not being able to present and discuss here the whole results, it may be mentioned in this context that almost 3/4 of the whole flora was recorded in places remaining under main influence of agriculture (372 species – 74.7 % of the flora). Not much less (351 species – 70.5%) were found along various roads, whereas the number of taxa linked in their distribution to forestry was considerably smaller 63.5% (316 species). On the other hand, the flora of habitats undoubtedly linked to settlements (which were relatively not numerous in the area) was the poorest of all (194 species – 39%).

Although it may seem to be quite surprising, in some cases there was no clear relationship between total number of species present in squares (Fig. 7) and their altitudinal differentiation (Fig. 4), even if maximal differences in local altitude within a square were considered (Fig. 5).

3.4. Outline anthropogenic transformations of the flora

A broad geographical-historical spectrum of the whole SBMBG's flora is presented in Fig. 8. Particularly striking seems to be a very low share of alien species (altogether 59 taxa), which constitutes only ca. 12% of the flora. This number is also very similar to an equivalent result achieved for the BGNP (i.e. 10% of its flora according to Borysiak & Stachnowicz 2004). Moreover, only 39 of alien taxa were permanently established (i.e. the so-called metaphytes) in the SBMBG, which constituted only 7.8% of the flora and 8.3% of its permanent part. In the neighbouring, large area of the Orawian Hills and the Sieniawska Gate (Guzikowa 1977) there were at least 108 metaphytes (i.e. 13.5% of its flora), and obviously the cited data may currently not be entirely adequate as they were collected over thirty years ago. The absolute most of metaphytes recorded on the SBMBG were of ancient origin, i.e. the so-called 'archaeophytes' (31 species; 6.2% of the flora), while there were only 8 'newcomers' (kenophytes). Not established alien species (diaphytes) constituted altogether ca. 4% of the flora (20 taxa). It is significant that according to my observations 3/4 of non-established aliens most probably were direct 'escapers' from local plantations (ergasiophytes), e.g. *Aster novi-belgii*, *Cosmos bipinnatus*, *Lycopersicon esculentum*, *Narcissus pseudonarcissus* (Fig. 9), *Solanum tuberosum*, and even *Telekia speciosa* (which is native in the Eastern part of the Carpathian Mts.).

The generally low level of the flora's transformation was also emphasised by a distinctly high share of non-synanthropic native species (spontaneophytes), i.e. 207 species which constituted ca. 41.6% of all the recorded taxa and ca. 47.1% of all native species, despite the previously mentioned wide understanding of native synanthropic plants (Fig. 10).

A synthetic image of the flora's transformations is also reflected by the so-called indexes of anthropogenic changes counted on the basis of the mentioned percentage share of geographical-historical groups. Using archival data published by Guzikowa (1977), when it was possible, such indexes were also calculated for the neighbouring Orawian Hills, and then compared with the SBMBG (Table 4). The 'anthropophytisation' indexes may be considered in relation to the whole flora (a share of all alien taxa in the whole species list), as well as to its permanent part (in this case it is a share of metaphytes in relation to the whole established flora). On the SBMBG both indexes are considerably lower (11.8%

Fig. 9. *Narcissus pseudonarcissus* is an example of alien species which has locally escaped from gardens. It is probable that it has been transported to a meadow with e.g. horse manure

Fig. 10. *Gladiolus imbricatus* is a rare native species (an apophyte) which locally grows abundantly in potato and barley plantations – these crops are cultivated alternately, also in rotation with neighbouring narrow meadows

and 8.2% respectively) than values counted for the Orawian Hills (17.8% and 13.5% respectively). Even more differences between the compared areas become visible when considering only the share of kenophytes which on the S base of Mt. Babia Góra constituted merely 1.7% of its permanent flora, whereas on the Orawian Hills, over 30 years ago, they comprised 4.4% of their established flora.

4. Summary of conclusions and general discussion

The South Base of Mt. Babia Góra may be considered as a representative area not only for the lower montane zone within the massif (cf. Celiński & Wojterski 1983) but also in Western Carpathians (cf. Mirek & Piękoś-Mirkowa 1992). Its elevation above the sea level and particularly its climate and vegetation

Table 4. Basic indexes of anthropogenic changes in the flora of the South Base of Mt. Babia Góra (orig.) and the neighbouring Orawian Hills (counted acc. to data by Guzikowa 1977)

Index*	Formula*	Value [%]	
		SBMBG**	Orawian Hills***
WSt – index of synanthropization of the established flora	WS_t = [(Ap+Meta)/(Sp+Meta)] x 100%	56.7	(?)
WApt – index of general share of apophytes in the established flora	WAp_t = [Ap/(Sp+Meta)] x 100%	48.5	(?)
Wap – index of general share of apophytes within native species	Wap = (Ap/Sp) x 100%	52.8	(?)
WAn – index of general share of alien species within the whole flora	WAn = An/(Sp+An) x 100%	11.8	17.8
WAnt – index of share of established alien species within the permanent flora	WAn_t = [Meta/(Sp+Meta)] x 100%	8.2	13.5
WArt – index of share of archaeophytes within the established flora	WAr_t = [Ar/(Sp+Meta)] x 100%	6.5	9.1
WKnt – index of share of kenophytes within the established flora	$WKen_t$ = [Kn / (Sp+Meta)] x 100%	1.7	4.4
WM – index of 'modernisation' of metaphytes (a share of newcomers within the permanently established alien species)	WM = (Kn/Meta) x 100%	20.5	32.4
WF – index of fluctuation changes in the flora (a share of ephemeral alien species within the whole flora)	WF = [D/(Sp+An)] x 100%	4.0	5.0
WerD – index of 'cultivation-origin' of diaphytes, i.e. a share of diaphytes originating from cultivation within ephemeral alien species (diaphytes s.l.)	WerD = (Eef/D) x 100%	75.0	85.7

Explanations: * – formula of indexes according to Jackowiak (1990) excepting WerD which is originally proposed; Ap – number of apophytes; Meta – metaphytes; Sp – spontaneophytes s.l. (non-synanthropic + apophytes); An – anthropophytes; Ar – archaeophytes; Kn – kenophytes; D – diaphytes; Eef – ergasiophytes; ** – hybrids of uncertain taxonomic position have been excluded from calculation; *** – acc. to data by Guzikowa (1977): 8 species regarded by the cited author as ergasiophytes (despite observation that they had not been observed growing in the wild) have been excluded from my calculation; (?) – value has not been possible to calculate for the Orawian Hills due to lack of precise data (cf. Guzikowa 1977) fully correspond with the mentioned climatic-vegetation zone for which potential forest communities are locally composed of spruce and fir (*Abieti-Piceetum*) or solely fir (*Galio-Abietetum*). On the other hand, vegetation of the S slopes of Mt. Babia Góra slightly differs from generally more steep and rocky N side, where for instance the mountain beech forests (*Dentario glandulosae-Fagetum*) are well developed (Celiński & Wojterski 1978, 1983; Kasprowicz 1996b).

The investigated area's contemporary plant cover is obviously determined by both main natural conditions (such as climate, rocks and water system), as well as by human activities, in this case especially by agriculture and forestry. As such, the SBMBG constitutes a very suitable research object for investigations on various aspects of species richness and its determinants.

The investigated lower montane flora comprised 498 species of vascular plants, 439 of which (88.2%) were of native origin and only 59 (11.8%) represented aliens. The permanently established flora counted 478 species (excluding some hybrids of uncertain status), among which were 39 alien species (metaphytes). The flora comprised 258 genera and 79 families. Considering taxonomical diversity of the investigated area it is crucial to remember that it covers approximately 1/3 of surface occupied by the neighbouring BGNP, and at the same time, the flora of the SBMBG comprises as many as: 79.6% of the park's species richness, 89.3 % of its genera and 96.3 % of families. These results seem to suggest that it is highly probable that absolute most of Mt. Babia Góra's floristic diversity is actually concentrated within the lower montane zone. This area, however, especially on the southern side of the mountain, in its largest part remains outside current range of the national park (Fig. 1) which, consequently needs to be enlarged.

On the other hand, comparison of the above discussed numbers seems to be in accordance with more comprehensive statistical analysis by Pyšek *et al.* (2002) who considered species richness in 302 nature reserves in the Czech Republic. It revealed a general, strong correlation between the number of species and the number of genera or families. Consequently, as the authors also suggest, if the number of higher rank taxa is determined by the same factors as the number of species in regional floras, it could also mean that the same methods of protection should be effective for both conservation of species richness as well as of the higher rank taxonomic diversity.

Cartographical analysis of spatial distribution of general species richness within the SBMBG revealed its outstandingly high diversity: from merely 95 species up to even 236 species per single square 500x500m (Fig. 7). At the same time it is worth noticing that the mentioned squares were situated close to each other. This image is most probably a complex result of both natural diversity, as well, as human impact, therefore no clear relation with e.g. land elevation (Fig. 4) or even its diversity (maximal differences) in space (Fig. 5) may be observed. Discussing the scale dependence of species richness in North American floras Palmer (2006) noticed that the elevation effect, although usually negative for both native and alien species (i.e. fewer species at higher elevations), becomes positive for native species at broad grains. He argued for this observation that it was an effect of higher variation in elevation at broad scales. However, the presented general results of spatial analysis from the SBMBG (i.e. variability in altitude – Fig. 5 and in species richness – Fig. 7), also considering the absolute domination of native components in total species richness (Fig. 8), seem to suggest that the mentioned 'scale-elevation-richness' relation may not be strong enough to dominate, probably even stronger, influence of main forms of human impact, especially agriculture. Therefore, the mentioned results (Fig. 7) may suggest that it is rather higher environmental heterogeneity that determined so high differences (up to almost 2.5 times) in species richness between the squares of 0.25 km^2. This conclusion obviously includes all habitats which have developed in the investigated area both of natural, as well as under influence or created by human activity. The mentioned relation between higher environmental heterogeneity and increasing species richness is generally rather expected and sometimes observed (e.g. Palmer 1991, 1994; Pausas *et al.* 2003), however it becomes a much more complicated problem if such issues as floristic composition (Beta-diversity) of various vegetation types (plant formations and communities) are taken into account.

The extent of anthropogenic transformations of the investigated flora was outlined by presentation of general share of native versus alien species, and the second were divided into permanently established (39 metaphytes – 7.8% of the flora) and ephemeral components (20 diaphytes – 4%). It is significant that within the whole SBMBG just only 8 established newcomers – kenophytes (i.e. only 1.7% of permanent flora) have been so far recorded, whereas even ca. 30 years ago there were at least 4.4% of kenophytes within established species recorded on the neighbouring Orawian Hills by Guzikowa (1977). Such a small share of permanently established alien species is similar to an outline assessment available for the BGNP (Borysiak & Stachnowicz 2004). While at higher elevations it is rather expected – considering e.g. the so-called low altitude filter effect (Becker *et al.* 2005), in the lower montane zone it becomes particularly important – as a still positive perspective for conservation of natural biodiversity of the whole Babia Góra massif. Nonetheless, particular attention should be paid to prevent further inflow of alien species into this zone. Global warming is often predicted as one of the main risks for the future of alpine regions (McDougall *et al.*

2005; cf. also Walther 2003; Daehler 2005). However, the lower montane zone is, indeed, potentially an area where most important threats of plant invasions may appear in the nearest future, such as e.g. non-native species used for revegetation of eroded slopes or garden escapes in the vicinity of ski resorts as it was observed in Australian Alps (McDougall *et al.* 2005).

Considering the broad meaning (in this elaboration) of native synanthropic plants (apophytes), it is still significant that currently they seem to play crucial role in the overall reaction of the flora on anthropogenic influences. This claim may be illustrated by high contribution of 232 apophytes s.l. to general species richness (46.6% – Fig. 8), as well as their domination (52.8%) among all 439 native species. Such a high concentration of native vascular plant resources is not only a kind of 'buffer' zone for anthropopressure (which is still dominated by apophytism) but most of all, it is and indispensable contribution to the flora of the whole Babia Góra massif, and as such it deserves conservation. Taking into account also predominantly natural and semi-natural character of vegetation in the investigated area, it seems reasonable to consider rapid including the whole SBMBG into the BGNP.

Local frequency of species was highly diversified and it was classified within 7 levels with the fourth one representing the 'averagely spread' species (Table 1). This classification made possible further recognition of general allocation pattern of species richness along the local 'rarity to commonness' gradient (Fig. 6). It revealed that ca. 62.9% of all species may be treated as more or less 'rare', whilst only 21.5% of species richness represented the 'frequent', 'common' or 'very common' taxa. This particular result indicates that general problem of successful protection of rare species is in this case practically the same problem as the conservation of biodiversity (measured by species richness).

Publication of full species register along with chosen results concerning: their local frequency, geographical and naturalisation status, life form, mountain vs. lowland status, as well as local altitudinal ranges within Mt. Babia Góra and the SBMBG, should provide an important point of departure for further studies on flora of the massif and various issues of its fascinating biodiversity.

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Appendix 1. Register of vascular plants recorded in the flora of the South Base of Mt. Babia Góra with some ecological characteristics

1	2	3	4	5	6	7	8	9	10	11	12
Abies alba Mill.	Pinaceae	Sn	M	287	250	143	6	reg	610-1420	706-1420	742-942
Acer pseudoplatanus L.	Aceraceae	Ap	M	150	131	91	5	ng	600-1340	780-1275	740-915
Achillea millefolium L.	Asteraceae	Ap	H	264	207	122	6	ng	600-1670	668-1435	740-915
Achillea ptarmica L.	Asteraceae	Ap	H	4	4	4	2	n	610-810	810-810	780-832
Aconitum firmum (Rchb.) Neilr.	Ranunculaceae	Sn	H	1	1	1	1	ogg	705-1665	910-1620	765-765
Aconitum sp.*	Ranunculaceae	Sn	H	6	6	5	2	ogg	-	-	790-940
Aconitum variegatum L.	Ranunculaceae	Sn	H	14	9	9	2	reg	950-985	970-970	742-915
Actaea spicata L.	Ranunculaceae	Sn	H	2	2	2	1	ng	650-1125	780-1090	850-869
Adoxa moschatellina L.	Adoxaceae	Sn	G	2	2	2	1	ng	760-1380	1120-1315	867-915
Aegopodium podagraria L.	Apiaceae	Ap	H	75	62	48	4	ng	600-1015	668-970	746-915
Agrostis canina L.	Poaceae	Sn	H	43	38	30	4	ng	705-875	765-875	752-888
Agrostis capillaris L.	Poaceae	Ap	H	236	185	115	6	ng	600-1470	668-1470	742-932
Agrostis gigantea Roth	Poaceae	Ap	H	42	38	29	4	ng	615-1160	668-1160	740-887
Agrostis stolonifera L.	Poaceae	Sn	H	28	27	22	3	ng	620-1125	668-1125	751-900
Ajuga reptans L.	Lamiaceae	Ap	H	127	109	78	5	ng	615-1070	683-1020	750-924
Alchemilla acutiloba Opiz	Rosaceae	Ap	H	27	26	24	3	ng	620-1485	740-1405	748-897
Alchemilla crinita Buser	Rosaceae	Ap	H	12	11	10	2	ogg	625-1580	668-1440	756-888
Alchemilla glabra Neygenf.	Rosaceae	Sn	H	8	8	8	2	ogg	650-1620	790-1620	790-915
Alchemilla monticola Opiz	Rosaceae	Sn	H	2	2	2	1	ng	640-1620	720-1285	772-858
Alisma plantago-aquatica L.	Alismataceae	Ap	He	16	16	15	3	n	630-785	785-785	753-873
Alnus glutinosa (L.) Gaertn.	Betulaceae	Sn	M	6	6	6	2	n	630-1045	760-1045	736-948
Alnus incana (L.) Moench	Betulaceae	Sn	M	49	43	34	4	pg	600-1045	668-1045	740-906
Alopecurus geniculatus L.	Poaceae	Ap	H	4	4	4	2	n	775-970	825-825	760-805
Alopecurus pratensis L.	Poaceae	Ap	H	31	30	25	3	n	635-900	830-900	736-878
Anemone nemorosa L.	Ranunculaceae	Sn	G	71	58	46	4	ng	735-1315	808-1315	740-942
Angelica sylvestris L.	Apiaceae	Ap	H	61	52	36	4	ng	610-1440	668-1120	736-900
Antennaria dioica (L.) Gaertn.	Asteraceae	Sn	C	4	4	4	2	ng	660-1460	725-970	764-850
Anthemis arvensis L.	Asteraceae	Ar	T	44	40	30	4	ng	610-986	790-930	740-885
Anthoxanthum odoratum L.	Poaceae	Ap	H	270	224	139	6	ng	620-1650	668-1620	748-915
Anthriscus sylvestris (L.) Hoffm.	Apiaceae	Ap	H	3	3	3	1	n	610-796	-	740-832
Anthyllis vulneraria L.	Fabaceae	Ap	H	1	1	1	1	ng	775-1090	780-780	845-845
Apera spica-venti (L.) P. Beauv.	Poaceae	Ar	T	4	4	4	2	n	790-800	790-800	799-845
Arctium minus (HILL) Bernh.	Asteraceae	Ap	H	3	1	1	1	n	-	-	850-850
Arctium tomentosum Mill.	Asteraceae	Ap	H	10	9	9	2	n	620-700	683-700	752-870
Arenaria serpyllifolia L.	Caryophyllaceae	Ap	T	1	1	1	1	ng	600-986	780-885	750-750
Armoracia rusticana P. Gaertn., B. Mey & Scherb.	Brassicaceae	Ar	G	13	10	9	2	n	615-875	875-875	753-887
Arrhenatherum elatius (L.) P. Beauv. ex J. Presl & C. Presl	Poaceae	Ap	H	7	7	7	2	ng	715-1090	950-950	750-878
Artemisia vulgaris L.	Asteraceae	Ap	C	3	1	1	1	n	600-840	840-840	792-792
Aruncus sylvestris Kostel.	Rosaceae	Sn	H	8	7	6	2	reg	615-1363	860-1140	765-908
Asarum europaeum L.	Aristolochiaceae	Sn	H	31	27	22	3	ng	615-1010	670-1000	742-930
Aster novi-belgii L.	Asteraceae	D	H	1	1	1	1	n	-	-	798-798
Astrantia major L.	Apiaceae	Sn	H	59	50	41	4	ng	615-1425	668-1425	739-942
Athyrium filix-femina (L.) Roth	Athyriaceae	Ap	H	395	309	154	6	ng	610-1425	683-1425	740-948
Avena sativa L.	Poaceae	D	T	13	12	12	3	n	620-950	688-950	775-875
Barbarea vulgaris R. Br.	Brassicaceae	Ap	H	6	6	6	2	n	645-986	-	774-852
Bellis perennis L.	Asteraceae	Ap	H	28	28	26	3	ng	610-986	698-950	753-915
Betula pendula Roth	Betulaceae	Ap	M	101	93	75	5	ng	630-1220	755-1220	742-910
Bidens tripartita L.	Asteraceae	Ap	T	3	3	3	1	n	620-705	670-670	784-820
Blechnum spicant (L.) Roth	Blechnaceae	Sn	H	16	16	15	3	ng	660-1425	800-1425	782-905
Blysmus compressus (L.) Panz. ex Link	Cyperaceae	Ap	G	17	16	15	3	ng	660-1080	775-1080	754-870
Brachypodium sylvaticum (Huds.) P. Beauv.	Poaceae	Sn	H	1	1	1	1	n	668-668	668-668	740-740
Briza media L.	Poaceae	Ap	H	124	108	75	5	ng	620-1585	725-1585	748-905
Bromus hordaceus L.	Poaceae	Ap	T	7	7	7	2	n	830-830	830-830	771-853
Bromus inermis Leyss.	Poaceae	Sn	H	2	1	1	1	n	860-1090	860-860	885-885
Bromus secalinus L.	Poaceae	Ar	T	11	11	9	2	ng	800-865	800-865	776-875
Calamagrostis arundinacea (L.) Roth	Poaceae	Sn	H	125	117	81	5	ng	615-1550	755-1480	742-942
Calamagrostis canescens (Weber) Roth	Poaceae	Sn	H	5	4	2	1	n	-	-	783-791
Calamagrostis epigejos (L.) Roth	Poaceae	Ap	G	87	75	58	5	ng	705-1400	820-1400	736-915
Calamagrostis villosa (Chaix) J. F. Gmel.	Poaceae	Sn	H	12	12	10	2	ogg	725-1665	745-1575	781-932
Callitriche cophocarpa Sendtn.	Callitrichaceae	Ap	Hy	15	15	14	3	ng	1105-1105	-	764-942
Calluna vulgaris (L.) Hull	Ericaceae	Sn	Ch	27	27	21	3	ng	750-885	755-885	742-868
Caltha laeta Schott, Nyman & Kotschy	Ranunculaceae	Ap	H	306	250	153	6	ogg	620-1600	683-1600	737-948
Campanula patula L.	Campanulaceae	Ap	H	30	28	21	3	ng	615-1560	810-1410	775-942
Campanula rapunculoides L.	Campanulaceae	Ap	H	11	11	10	2	ng	610-1055	706-1055	780-887
Campanula rotundifolia L.	Campanulaceae	Ap	H	1	1	1	1	ng	151-1670	895-1620	792-792

1	2	3	4	5	6	7	8	9	10	11	12
Capsella bursa-pastoris (L.) Medik.	Brassicaceae	Ar	T	39	33	29	4	ng	620-1180	668-895	740-887
Cardamine amara L. ssp. amara	Brassicaceae	Ap	H	47	42	36	4	ng	615-1435	770-1435	739-948
Cardamine flexuosa With.	Brassicaceae	Ap	H	23	22	21	3	ng	610-1630	830-1325	768-942
Cardamine pratensis L.	Brassicaceae	Ap	H	102	93	78	5	ng	610-1495	750-1360	739-925
Cardamine trifolia L.	Brassicaceae	Sn	G	2	2	2	1	reg	705-1310	875-925	840-870
Carduus acanthoides L.	Asteraceae	Ar	H	1	1	1	1	n	-	-	792-792
Carduus personata (L.) Jacq.	Asteraceae	Sn	H	4	4	3	1	reg	870-1365	870-1365	770-860
Carex brizoides L.	Cyperaceae	Sn	H	17	15	11	3	ng	785-1300	790-1300	736-915
Carex canescens L.	Cyperaceae	Sn	H	19	19	17	3	ng	745-1438	745-1438	783-870
Carex davalliana Sm.	Cyperaceae	Ap	H	1	1	1	1	ng	-	-	790-790
Carex demissa Hornem.	Cyperaceae	Ap	H	16	15	15	3	ng	635-825	755-825	750-888
Carex digitata L.	Cyperaceae	Sn	H	2	2	2	1	ng	705-886	705-886	852-859
Carex echinata Murray	Cyperaceae	Ap	H	61	56	45	4	ng	630-1438	745-1438	752-915
Carex elongata L.	Cyperaceae	Sn	H	1	1	1	1	n	725-725	-	804-804
Carex flacca Schreb.	Cyperaceae	Ap	G	39	33	28	4	ng	660-1015	725-1015	753-913
Carex flava L.	Cyperaceae	Ap	H	70	63	55	5	ng	620-1438	750-1438	751-920
Carex flava x demissa*	Cyperaceae	Sn	H	3	3	3	1	?	-	-	782-852
Carex flava x lepidocarpa*	Cyperaceae	Sn	H	4	4	4	2	?	-	-	751-840
Carex gracilis Curtis	Cyperaceae	Sn	H	1	1	1	1	n	775-775	775-775	819-819
Carex hirta L.	Cyperaceae	Ap	G	148	119	88	5	ng	660-1045	785-1045	740-933
Carex lepidocarpa Lausch	Cyperaceae	Sn	H	3	3	3	1	ng	630-835	755-835	792-869
Carex leporina L.	Cyperaceae	Ap	H	57	55	48	4	ng	630-1400	745-1400	754-933
Carex nigra Reichard	Cyperaceae	Ap	G	158	131	87	5	ng	640-1680	745-1680	741-888
Carex pallescens L.	Cyperaceae	Ap	H	121	107	77	5	ng	620-1395	706-1395	748-942
Carex panicea L.	Cyperaceae	Ap	G	119	100	72	5	ng	635-1438	745-1438	750-915
Carex paniculata L.	Cyperaceae	Sn	H	1	1	1	1	n	735-735	-	818-818
Carex pilulifera L.	Cyperaceae	Sn	H	23	21	20	3	ng	680-1405	706-1405	742-925
Carex remota L.	Cyperaceae	Sn	H	37	34	29	4	ng	640-1050	750-1050	750-946
Carex riparia Curtis	Cyperaceae	Sn	H	1	1	1	1	n	-	-	853-853
Carex rostrata Stokes	Cyperaceae	Sn	H	7	5	5	2	ng	750-1325	750-750	782-890
Carex sylvatica Huds.	Cyperaceae	Sn	H	159	139	89	5	ng	610-1300	683-1300	750-946
Carlina acaulis L.	Asteraceae	Ap	H	34	32	26	3	ng	635-1425	706-1425	750-905
Carlina vulgaris L.	Asteraceae	Sn	H	4	4	4	2	ng	690-885	725-885	784-822
Carum carvi L.	Apiaceae	Ap	H	119	96	75	5	ng	620-1064	808-830	746-915
Centaurea cyanus L.	Asteraceae	Ar	T	5	5	4	2	n	620-886	765-886	799-845
Centaurea jacea L.	Asteraceae	Sn	H	10	10	9	2	ng	600-1420	668-1420	773-832
Centaurea jacea x oxylepis*	Asteraceae	Sn	H	7	7	7	2	?	-	-	765-866
Centaurea oxylepis (Wimm. & Grab.) Hayek	Asteraceae	Ap	H	52	44	33	4	reg	642-1080	780-1080	780-890
Centaurea phrygia L.	Asteraceae	Sn	H	1	1	1	1	ng	-	-	900-900
Centaurea pseudophrygia C. A. Mey	Asteraceae	Sn	H	1	1	1	1	ng	705-705	-	820-820
Cerastium arvense L.	Caryophyllaceae	Sn	C	1	1	1	1	ng	705-1220	-	817-817
Cerastium holosteoides Fr. em. Hyl.	Caryophyllaceae	Ap	T	94	86	73	5	ng	610-1550	765-1550	742-915
Cerasus avium (L.) Moench.	Rosaceae	Sn	M	29	27	26	3	ng	615-895	810-895	736-910
Chaerophyllum aromaticum L.	Apiaceae	Ap	H	71	51	32	4	ng	600-1590	668-1590	752-900
Chaerophyllum hirsutum L.	Apiaceae	Ap	H	397	299	151	6	ogg	600-1620	668-1620	737-948
Chamaenerion angustifolium (L.) Scop.	Onagraceae	Ap	H	137	120	91	5	ng	600-1610	698-1575	736-940
Chamomilla suaveolens (Pursh) Rydb.	Asteraceae	Kn	T	16	13	11	3	n	-	-	767-887
Chenopodium album L.	Chenopodiaceae	Ap	T	19	19	18	3	ng	615-830	688-830	740-940
Chenopodium bonus-henricus L.	Chenopodiaceae	Ar	C	1	1	1	1	ng	-	-	850-850
Chrysosplenium alternifolium L.	Saxifragaceae	Ap	H	28	25	22	3	ng	610-1580	810-1485	762-948
Cicerbita alpina (L.) Wallr.	Asteraceae	Sn	H	12	11	8	2	ogg	680-1610	855-1365	850-940
Circaea alpina L.	Onagraceae	Sn	G	3	3	3	1	ng	615-1325	780-1240	840-905
Cirsium arvense (L.) Scop.	Asteraceae	Ap	G	114	91	72	5	ng	610-970	668-970	741-895
Cirsium oleraceum (L.) Scop.	Asteraceae	Sn	H	8	6	6	2	ng	620-1040	770-1025	760-915
Cirsium palustre (L.) Scop.	Asteraceae	Ap	H	231	195	114	6	ng	615-1230	683-1230	740-933
Cirsium rivulare (Jacq.) All.	Asteraceae	Ap	H	159	131	82	5	ng	610-1064	890-985	737-900
Cirsium vulgare (Savi) Ten.	Asteraceae	Ar	H	15	14	13	3	ng	610-988	668-895	752-865
Colchicum autumnale L.	Liliaceae	Sn	G	2	2	2	1	ng	720-720	720-720	820-865
Convolvulus arvensis L.	Convolvulaceae	Ap	H	2	2	2	1	n	-	-	798-860
Cosmos bipinnatus Cav.	Asteraceae	D	T	1	1	1	1	n	-	-	832-832
Crataegus x macrocarpa Hegetschw.	Rosaceae	Sn	N	3	3	3	1	n	600-630	-	784-836
Crataegus x subsphaericea Gand.	Rosaceae	Sn	N	1	1	1	1	n	-	-	807-807
Crepis biennis L.	Asteraceae	Ap	H	11	10	10	2	ng	640-1125	-	774-885
Crepis paludosa (L.) Moench.	Asteraceae	Sn	H	268	217	137	6	ng	620-1380	750-1380	737-948
Crocus scepusiensis (Rehmann & Woł.)Borbás	Iridaceae	Sn	G	19	19	13	3	reg	-	-	799-901
Cruciata glabra (L.) Ehrend.	Rubiaceae	Ap	H	135	117	72	5	ng	620-1440	790-1440	748-890
Cuscuta epithymum (L.) L.	Cuscutaceae	Sn	T	1	1	1	1	ng	725-845	780-845	770-770
Cynosurus cristatus L.	Poaceae	Ap	H	124	106	75	5	ng	600-1410	668-1160	748-905
Dactylis glomerata L.	Poaceae	Ap	H	116	101	72	5	ng	600-1285	820-1285	750-942

1	2	3	4	5	6	7	8	9	10	11	12
Dactylorhiza fuchsii (Druce) Soó	Orchidaceae	Sn	G	57	55	44	4	ng	720-1160	745-1160	748-915
Dactylorhiza majalis (Rchb.) P. F. Hunt & Summers.	Orchidaceae	Sn	G	92	79	58	5	ng	685-1185	775-1185	748-890
Dactylorhiza sambucina (L.) Soó	Orchidaceae	Sn	G	1	1	1	1	reg	-	-	885-885
Danthonia decumbens DC.	Poaceae	Ap	H	67	58	42	4	ng	630-1060	698-970	742-915
Daphne mezereum L.	Thymelaceae	Sn	N	23	21	20	3	ng	615-1505	795-1440	755-930
Dentaria bulbifera L.	Brassicaceae	Sn	G	1	1	1	1	ng	680-1175	780-1060	930-930
Dentaria glandulosa Waldst. & Kit.	Brassicaceae	Sn	G	57	52	36	4	reg	615-1200	780-1185	742-946
Deschampsia caespitosa (L.) P. Beauv.	Poaceae	Ap	H	408	325	162	7	ng	610-1735	668-1620	737-948
Deschampsia flexuosa (L.) Trin.	Poaceae	Sn	H	36	34	32	4	ng	151-1715	706-1680	741-940
Doronicum austriacum Jacq.	Asteraceae	Sn	H	5	5	4	2	sa	740-1610	900-1485	765-940
Drosera rotundifolia L.	Droseraceae	Sn	H	6	5	5	2	ng	745-840	745-840	765-861
Dryopteris affinis (Lowe) Fraser-Jenk.	Aspidiaceae	Sn	H	2	2	2	1	reg	780-1065	-	877-922
Dryopteris carthusiana (Vill.) H. P. Fuchs	Aspidiaceae	Sn	H	38	35	31	4	ng	620-1500	683-1495	736-922
Dryopteris dilatata (Hoffm.) A. Gray	Aspidiaceae	Sn	H	47	44	37	4	ogg	0-1665	760-1590	755-942
Dryopteris filix-mas (L.) Schott	Aspidiaceae	Sn	H	57	52	44	4	ng	610-1585	730-1585	782-946
Echinocystis lobata (F. Michx.) Torr. & A. Gray	Cucurbitaceae	D	T	1	1	1	1	n	-	-	800-800
Eleocharis austriaca Hayek	Cyperaceae	Sn	He	1	1	1	1	ogg	-	-	915-915
Eleocharis palustris (L.) Roem. & Schulz.	Cyperaceae	Ap	He	8	7	7	2	n	650-720	-	770-860
Eleocharis quinqueflora (Hartmann) O. Schwarz	Cyperaceae	Ap	H	4	4	4	2	ng	-	-	762-869
Eleocharis uniglumis (Link) Schulz.	Cyperaceae	Sn	G	4	4	3	1	ng	-	-	815-850
Elymus caninus (L.) L.	Poaceae	Ap	H	27	23	16	3	ng	600-1072	668-940	787-885
Elymus repens (L.) Golud	Poaceae	Ap	G	88	69	51	4	ng	615-1250	668-1120	740-915
Epilobium hirsutum L.	Onagraceae	Ap	H	4	4	4	2	n	-	-	760-805
Epilobium montanum L.	Onagraceae	Ap	H	117	101	83	5	ng	620-1490	780-1410	736-942
Epilobium palustre L.	Onagraceae	Sn	H	90	84	66	5	ng	620-1380	760-1380	741-915
Epilobium parviflorum Schreb.	Onagraceae	Sn	H	1	1	1	1	ng	600-1495	668-785	812-812
Epipactis helleborine (L.) Crantz	Orchidaceae	Sn	G	106	101	75	5	ng	655-1200	698-1200	750-930
Epipactis palustris (L.) Crantz	Orchidaceae	Ap	G	15	13	13	3	ng	685-880	730-880	750-869
Equisetum arvense L.	Equisetaceae	Ap	G	252	196	125	6	ng	600-1380	688-1380	740-948
Equisetum fluviatile L.	Equisetaceae	Sn	He	41	32	32	4	ng	630-1370	745-885	739-933
Equisetum palustre L.	Equisetaceae	Ap	G	174	132	92	5	ng	630-1250	745-1125	739-946
Equisetum sylvaticum L.	Equisetaceae	Ap	G	378	267	144	6	ng	645-1435	706-1435	736-948
Equisetum telmateia Ehrh.	Equisetaceae	Sn	G	4	3	2	1	pg	650-910	800-910	865-881
Equisetum x litorale Kuhlew. ex. Rupr.*	Equisetaceae	Sn	G	1	1	1	1	ng	-	-	877-877
Eriophorum angustifolium Honck.	Cyperaceae	Sn	G	45	43	37	4	ng	745-1230	745-1230	755-870
Eriophorum latifolium Hoppe	Cyperaceae	Sn	H	32	30	28	4	ng	704-1160	810-1160	753-888
Eriophorum vaginatum L.	Cyperaceae	Sn	H	2	2	1	1	ng	760-840	760-840	804-809
Erodium cicutarium (L.) L' Hér.	Geraniaceae	Ap	T	1	1	1	1	n	660-660	-	798-798
Erysimum cheiranthoides L.	Brassicaceae	Ar	T	4	4	3	1	n	675-875	875-875	780-870
Eupatorium cannabinum L.	Asteraceae	Sn	H	2	2	2	1	n	800-800	-	760-885
Euphorbia amygdaloides L.	Euphorbiaceae	Sn	C	56	48	40	4	ng	615-1120	670-1120	742-942
Euphorbia cyparissias L.	Euphorbiaceae	Ap	H	37	37	31	4	n	600-970	668-970	746-885
Euphorbia helioscopia L.	Euphorbiaceae	Ar	T	2	2	2	1	n	650-820	800-800	798-802
Euphorbia serrulata Thuill.	Euphorbiaceae	Ap	T	19	19	17	3	reg	600-910	668-910	753-888
Euphrasia rostkoviana Halne	Scrophulariaceae	Ap	T	52	45	40	4	ng	600-1590	683-1315	750-940
Euphrasia stricta D. Wolff ex J. F. Lehm.	Scrophulariaceae	Sn	T	9	8	8	2	ng	610-1420	775-1420	760-850
Fagus sylvatica L.	Fagaceae	Sn	M	70	66	48	4	ng	615-1340	706-1310	768-942
Fallopia convolvulus (L.) Á. Löve	Polygonaceae	Ar	T	35	30	25	3	ng	610-1035	790-1035	753-887
Festuca arundinacea Schreb.	Poaceae	Ap	H	4	4	4	2	n	600-885	870-885	805-860
Festuca gigantea (L.) Vill.	Poaceae	Sn	H	28	23	19	3	ng	600-1085	668-1085	740-942
Festuca pratensis Huds.	Poaceae	Ap	H	179	145	91	5	ng	630-990	800-985	737-932
Festuca rubra L. s.s.	Poaceae	Ap	H	184	147	96	5	ng	615-1410	730-910	742-915
Festuca trachyphylla (Hack.) Krajina	Poaceae	Ap	H	14	13	12	3	ng	-	-	776-879
Filipendula ulmaria (L.) Maxi.	Rosaceae	Sn	H	61	47	35	4	ng	683-1360	683-1360	736-915
Fragaria vesca L.	Rosaceae	Ap	H	166	148	108	6	ng	600-1185	668-1185	742-930
Frangula alnus Mill.	Rhamnaceae	Sn	N	21	21	18	3	ng	625-1000	705-1000	739-816
Fraxinus excelsior L.	Oleaceae	Ap	M	84	75	58	5	ng	600-1075	810-1000	745-946
Galeobdolon luteum Huds.	Lamiaceae	Sn	C	44	42	36	4	ng	600-1360	683-1360	750-930
Galeopsis bifida Boenn.	Lamiaceae	Sn	T	4	3	3	1	ng	610-1080	-	760-885
Galeopsis pubescens Besler	Lamiaceae	Ap	T	23	21	19	3	ng	688-1505	688-1505	762-942
Galeopsis tetrahit L.	Lamiaceae	Ap	T	60	47	31	4	ng	610-1250	755-1250	740-942
Galinsoga ciliata (Raf.) S. F. Blade	Asteraceae	D	T	1	1	1	1	n	615-705	-	789-789
Galium aparine L.	Rubiaceae	Ap	T	46	36	26	3	ng	615-1050	688-830	753-887
Galium mollugo L.	Rubiaceae	Ap	H	143	123	80	5	ng	610-1410	668-1410	745-900
Galium odoratum (L.) Scop.	Rubiaceae	Sn	G	27	23	20	3	ng	645-1280	780-1240	805-930
Galium palustre L.	Rubiaceae	Ap	H	83	76	63	5	ng	620-1420	750-1420	737-915

1	2	3	4	5	6	7	8	9	10	11	12
Galium rotundifolium L.	Rubiaceae	Sn	C	26	22	16	3	reg	655-1160	706-1160	785-924
Galium schultesii Vest	Rubiaceae	Sn	G	17	13	12	3	ng	640-1425	670-1425	740-908
Galium uliginosum L.	Rubiaceae	Sn	H	104	88	66	5	ng	750-1160	750-1160	739-933
Gentiana asclepiadea L.	Gentianaceae	Sn	H	95	84	59	5	ogg	615-1600	780-1600	739-942
Gentianella ciliata (L.) Borkh.	Gentianaceae	Ap	H	9	8	6	2	ng	668-1185	668-1185	774-793
Geranium columbinum L.	Geraniaceae	Ar	T	1	1	1	1	n	615-780	770-780	788-788
Geranium dissectum L.	Geraniaceae	Ar	T	1	1	1	1	ng	730-845	830-845	798-798
Geranium pratense L.	Geraniaceae	Ap	H	1	1	1	1	n	-	-	805-805
Geranium pusillum Burm. f. ex L.	Geraniaceae	Ar	T	4	3	3	1	ng	615-885	885-885	784-805
Geranium robertianum L.	Geraniaceae	Sn	T	14	12	12	3	ng	600-1350	683-1240	742-935
Geum rivale L.	Rosaceae	Sn	H	194	157	101	5	ng	615-1485	668-1485	736-948
Geum urbanum L.	Rosaceae	Ap	H	6	6	6	2	ng	600-1385	683-1385	789-869
Gladiolus imbricatus L.	Iridaceae	Ap	G	10	8	7	2	ng	705-850	-	786-879
Glechoma hederacea L.	Lamiaceae	Ap	G	6	6	5	2	ng	600-1210	830-1055	832-879
Glyceria cfr. nemoralis x declinata*	Poaceae	Sn	He	2	1	1	1	?	-	-	842-842
Glyceria cfr. nemoralis x fluitans*	Poaceae	Sn	He	1	1	1	1	?	-	-	835-835
Glyceria declinata Bréb.	Poaceae	Ap	He	7	7	7	2	ng	760-875	-	760-900
Glyceria fluitans (L.) R. Br.	Poaceae	Ap	He	73	67	55	5	ng	630-1045	750-1045	736-942
Glyceria nemoralis (R. Uechtr.) R. Uechtr. & Körn.	Poaceae	Sn	He	8	8	8	2	ng	715-1050	920-1015	740-928
Glyceria notata Chevall.	Poaceae	Ap	He	13	13	13	3	ng	600-1230	700-1230	785-907
Glyceria x pedicellata F. Towos.*	Poaceae	Sn	He	3	3	3	1	ng	885-885	885-885	835-857
Gnaphalium sylvaticum L.	Asteraceae	Ap	H	18	17	17	3	ng	640-1450	668-1380	770-915
Gnaphalium uliginosum L.	Asteraceae	Ap	T	6	6	6	2	ng	620-1450	755-875	736-887
Gymnadenia conopsea (L.) R. Br.	Orchidaceae	Sn	G	4	4	4	2	reg	750-1090	750-810	785-822
Gymnocarpium dryopteris (L.) Newman	Aspidiaceae	Sn	G	10	10	10	2	ng	0-1443	750-1430	818-940
Heracleum sphondylium L. s.s.	Apiaceae	Ap	H	37	33	26	3	ng	615-1495	668-1420	739-885
Hesperis matronalis L.	Brassicaceae	Kn	H	1	1	1	1	ng	680-680	-	880-880
Hieracium lachenalii C. C. Gumel.	Asteraceae	Ap	H	38	34	29	4	ng	630-1620	800-1620	742-922
Hieracium lactucella Wallr.	Asteraceae	Ap	H	7	7	7	2	ng	745-825	745-825	754-869
Hieracium laevigatum Willd.	Asteraceae	Sn	H	7	6	5	2	ogg	665-990	810-990	742-915
Hieracium murorum L.	Asteraceae	Sn	H	100	93	69	5	ng	610-1485	698-1435	755-942
Hieracium pilosella L.	Asteraceae	Sn	H	31	31	31	4	ng	610-1060	725-1015	750-905
Hieracium schultesii F. W. Schultz	Asteraceae	Sn	H	1	1	1	1	ng	-	-	815-815
Hieracium umbellatum L.	Asteraceae	Sn	H	1	1	1	1	n	720-825	-	750-750
Holcus lanatus L.	Poaceae	Ap	H	6	6	6	2	ng	610-1325	790-1100	820-887
Holcus mollis L.	Poaceae	Ap	H	45	32	22	3	ng	600-1240	668-1125	765-905
Homogyne alpina (L.) Cass.	Asteraceae	Sn	H	123	113	80	5	ogg	620-1735	745-1660	741-942
Hordeum vulgare L.	Poaceae	D	T	1	1	1	1	n	720-720	-	825-825
Huperzia selago (L.) Bernh. ex Schrank & Mart.	Huperziaceae	Sn	C	21	20	20	3	ogg	151-1715	800-1680	805-907
Hypericum maculatum Crantz	Hypericaceae	Ap	H	247	209	128	6	ng	610-1550	670-1550	739-942
Hypochoeris radicata L.	Asteraceae	Ap	H	45	42	36	4	ng	610-1010	790-900	754-888
Impatiens noli-tangere L.	Balsaminaceae	Ap	T	55	48	37	4	ng	600-1200	750-1140	740-948
Impatiens parviflora DC.	Balsaminaceae	Kn	T	2	2	1	1	n	685-1200	-	760-762
Juncus alpino-articulatus ChaixX	Junaceae	Sn	H	6	6	6	2	reg	770-1015	770-1015	754-853
Juncus articulatus L. em. K. Richt.	Junaceae	Ap	G	90	85	67	5	ng	620-1405	668-1405	736-915
Juncus bufonius L.	Junaceae	Ap	T	42	39	37	4	ng	630-1030	700-890	736-900
Juncus bulbosus L.	Junaceae	Ap	H	3	3	3	1	ng	745-770	745-770	791-804
Juncus compressus Jacq.	Junaceae	Ap	G	6	6	6	2	ng	865-885	865-885	752-839
Juncus conglomeratus L. em. Leers	Junaceae	Ap	H	69	60	46	4	ng	630-1438	750-1438	751-888
Juncus effusus L.	Junaceae	Ap	H	210	173	110	6	ng	620-1230	745-1230	736-948
Juncus filiformis L.	Junaceae	Sn	G	16	16	13	3	ng	705-1470	808-1438	756-861
Juncus inflexus L.	Junaceae	Ap	H	45	43	32	4	ng	630-1160	668-1160	754-913
Juncus squarrosus L.	Junaceae	Ap	H	20	19	17	3	ng	745-1405	745-1405	752-863
Juncus tenuis Willd.	Junaceae	Kn	H	18	17	17	3	ng	630-986	790-920	761-875
Juniperus communis L.	Cuperssaceae	Sn	N	63	56	49	4	ng	600-1060	698-920	750-881
Knautia arvensis (L.) J. M. Coult.	Dipsacaceae	Ap	H	77	69	49	4	ng	600-1090	698-1010	746-915
Lamium album L.	Lamiaceae	Ar	H	1	1	1	1	n	610-620	-	800-800
Lamium maculatum L.	Lamiaceae	Sn	H	3	3	3	1	ng	610-1399	870-1399	770-940
Lamium moluccellifolium Fr.	Lamiaceae	Ap	T	1	1	1	1	n	780-800	-	753-753
Lamium purpureum L.	Lamiaceae	Ap	T	10	7	6	2	n	600-775	688-688	740-874
Lapsana communis L.	Asteraceae	Ap	T	47	40	30	4	ng	600-1420	790-885	740-887
Larix decidua Mill. ssp. decidua	Pinaceae	Kn	M	19	19	18	3	ng	635-1330	765-1160	760-921
Lathyrus pratensis L.	Fabaceae	Ap	H	205	167	108	6	ng	610-1045	725-1045	737-933
Lathyrus vernus (L.) Bernh.	Fabaceae	Sn	G	3	3	3	1	n	-	-	775-812
Leontodon autumnalis L.	Asteraceae	Ap	H	83	75	65	5	ng	610-1054	668-900	746-915
Leontodon hispidus L. ssp. hastilis (L.) Rchb.	Asteraceae	Sn	H	14	14	12	3	ng	640-1420	790-1420	754-885
Leontodon hispidus L. ssp. hispidus	Asteraceae	Ap	H	76	71	55	5	ng	600-1435	670-1435	748-895

1	2	3	4	5	6	7	8	9	10	11	12
Leucanthemum vulgare Lam. S.s.	Asteraceae	Ap	H	123	108	82	5	ng	630-1440	790-1160	741-915
Leucanthemum waldsteinii (Sch. Bip.) Pouzar	Asteraceae	Sn	H	12	9	7	2	ogg	635-1590	668-1562	790-920
Linaria vulgaris Mill.	Scrophulariaceae	Ap	G	9	8	8	2	ng	610-1010	670-1010	741-885
Linum catharticum L.	Linaceae	Ap	T	43	39	35	4	ng	620-1110	668-1110	750-913
Listera cordata (L.) R. Br.	Orchidaceae	Sn	G	3	3	3	1	reg	1250-1470	-	785-856
Listera ovata (L.) R. Br.	Orchidaceae	Sn	G	45	41	33	4	ng	685-1090	750-1045	748-902
Lolium perenne L.	Poaceae	Ap	H	43	37	31	4	ng	600-986	668-885	760-913
Lonicera nigra L.	Caprifoliaceae	Sn	N	21	21	19	3	reg	0-1525	805-1470	742-908
Lotus corniculatus L.	Fabaceae	Ap	H	36	34	27	4	ng	600-1125	765-1110	742-915
Lotus uliginosus Schkuhr	Fabaceae	Ap	H	23	22	21	3	ng	610-1090	790-840	751-892
Lupinus luteus L.	Fabaceae	D	T	1	1	1	1	n	660-705	-	873-873
Lupinus polyphyllus Lindl.	Fabaceae	Kn	H	4	3	3	1	n	760-760	-	805-887
Luzula campestris (L.) DC.	Junaceae	Ap	H	43	41	32	4	ng	690-830	745-820	750-882
Luzula luzulina (Vill.) Dalla Torre & Sarnth.	Junaceae	Sn	H	31	29	23	3	reg	620-1430	705-1430	755-942
Luzula luzuloides (Lam.) Dandy & Wilmott	Junaceae	Sn	H	11	9	8	2	ng	620-1670	815-1497	770-868
Luzula multiflora (Retz.) Lej.	Junaceae	Sn	H	41	39	32	4	ng	630-1438	668-1438	742-888
Luzula pilosa (L.) Willd.	Junaceae	Sn	H	8	8	7	2	ng	615-1175	698-1080	765-856
Luzula sylvatica (Huds.) Gaudin	Junaceae	Sn	H	28	28	26	3	reg	0-1507	706-1500	765-946
Lychnis flos-cuculi L.	Caryophyllaceae	Ap	H	119	108	80	5	ng	620-1080	750-1080	748-933
Lycopersicon esculentum Mill.	Solanaceae	D	T	2	2	2	1	n	-	-	784-798
Lycopodium annotinum L.	Lycopodiaceae	Sn	C	17	16	16	3	ng	700-1630	835-1225	776-905
Lycopodium clavatum L.	Lycopodiaceae	Sn	C	13	13	13	3	ng	660-1640	755-1100	752-903
Lycopus europaeus L.	Lamiaceae	Ap	H	5	5	5	2	ng	620-970	745-775	778-840
Lysimachia nemorum L.	Primulaceae	Ap	C	280	224	126	6	reg	610-1380	668-1380	740-948
Lysimachia nummularia L.	Primulaceae	Sn	C	1	1	1	1	n	615-1040	668-1040	802-802
Lysimachia vulgaris L.	Primulaceae	Ap	H	6	4	4	2	ng	615-1120	790-945	760-885
Lythrum salicaria L.	Lythraceae	Sn	H	3	3	3	1	ng	650-810	800-800	760-784
Maianthemum bifolium (L.) F. W. Schmidt	Liliaceae	Sn	G	109	103	81	5	ng	615-1550	706-1475	741-928
Matricaria maritima L. ssp. inodora (L.) Dostal	Asteraceae	Ar	T	9	8	8	2	ng	610-895	765-895	759-887
Medicago lupulina L.	Fabaceae	Ap	T	12	11	10	2	ng	615-1100	668-885	750-887
Melampyrum sylvaticum L.	Scrophulariaceae	Sn	T	5	5	4	2	ogg	745-1580	745-1480	776-835
Melandrium album (Mill.) Garcke	Caryophyllaceae	Ar	H	2	2	2	1	n	615-775	700-700	789-837
Melandrium rubrum (Weigel) Garcke	Caryophyllaceae	Ap	H	66	54	43	4	ng	600-1610	800-1470	740-942
Melilotus alba Medik.	Fabaceae	Ap	H	6	4	4	2	n	615-615	-	782-845
Mentha arvensis L.	Lamiaceae	Ap	H	130	119	83	5	ng	610-930	688-930	741-928
Mentha longifolia (L.) L.	Lamiaceae	Ap	H	36	30	25	3	ng	600-1190	670-1190	742-933
Mercurialis perennis L.	Euphorbiaceae	Sn	G	2	2	2	1	ng	615-1150	780-1055	845-870
Milium effusum L.	Poaceae	Sn	H	20	15	12	3	ng	0-1610	850-1485	805-932
Moehringia trinervia (L.) Clairv.	Caryophyllaceae	Ap	T	10	10	10	2	ng	620-1320	780-1105	742-928
Moneses uniflora (L.) A. Gray	Pyrolaceae	Sn	G	3	3	3	1	ng	765-860	765-860	755-833
Monotropa hypopitis L. s.s.	Monotropaceae	Sn	G	9	9	7	2	ng	790-940	790-865	795-882
Mutellina purpurea (Poir.) Thell.	Apiaceae	Sn	H	2	2	2	1	wg	760-1715	1000-1620	882-922
Mycelis muralis (L.) Dumort.	Asteraceae	Ap	H	79	71	55	5	ng	615-1230	705-1230	740-930
Myosotis arvensis (L.) Hill	Boraginaceae	Ar	T	34	30	26	3	n	615-875	688-875	740-887
Myosotis palustris (L.) L. em. Rchb.	Boraginaceae	Ap	H	366	297	169	7	ng	600-1610	668-1485	736-948
Myosotis sylvatica Ehrh. ex Hoffm.	Boraginaceae	Ap	H	1	1	1	1	ng	650-1285	688-1285	840-840
Narcissus pseudonarcissus L.	Amaryllidaceae	D	G	1	1	1	1	n	-	-	792-792
Nardus stricta L.	Poaceae	Ap	H	146	125	84	5	ng	610-1670	745-1647	748-905
Neottia nidus-avis (L.) Rich.	Orchidaceae	Sn	G	3	3	3	1	ng	725-826	-	780-923
Ononis arvensis L.	Fabaceae	Ap	H	32	26	24	3	ng	600-865	765-865	754-850
Ophioglossum vulgatum L.	Ophioglossaceae	Sn	G	1	1	1	1	n	-	-	748-748
Orobanche flava Mart. ex F. W. Schultz	Orobanchaceae	Sn	G	3	3	3	1	reg	600-780	-	870-920
Orthilia secunda (L.) House	Pyrolaceae	Sn	Ch	21	21	20	3	ng	640-1001	706-950	745-923
Oxalis acetosella L.	Oxalidaceae	Ap	G	260	208	120	6	ng	0-1675	668-1515	742-946
Oxycoccus palustris Pers.	Ericaceae	Sn	Ch	15	13	13	3	ng	745-840	745-840	752-861
Padus avium Mill.	Rosaceae	Sn	M	4	2	2	1	ng	670-920	670-920	740-863
Papaver somniferum L.	Papaveraceae	D	T	3	3	3	1	n	-	-	789-845
Paris quadrifolia L.	Trilliaceae	Sn	G	29	27	24	3	ng	640-1380	765-1380	772-942
Parnassia palustris L.	Parnassiaceae	Sn	H	21	19	13	3	ng	770-1570	770-875	753-869
Pedicularis palustris L.	Scrophulariaceae	Sn	H	29	27	22	3	ng	630-890	745-890	773-888
Pedicularis sylvatica L.	Scrophulariaceae	Sn	H	7	6	6	2	ng	-	-	748-842
Peplis portula L.	Lythraceae	Ap	T	3	3	3	1	n	-	-	762-779
Petasites albus (L.) Gaertn.	Asteraceae	Ap	G	131	114	82	5	reg	615-1230	780-1110	742-948
Petasites hybridus (L.) Gaertn., B. Mey & Scherb.	Asteraceae	Ap	H	21	19	17	3	ng	600-1340	698-1275	755-913
Petasites kablikianus Tausch ex Bercht.	Asteraceae	Sn	H	38	33	30	4	ogg	600-1610	880-1250	740-932
Phalaris arundinacea L.	Poaceae	Sn	H	4	3	3	1	n	600-700	-	752-862
Phegopteris connectilis (Michx.) Watt	Thelypteridaceae	Sn	G	14	13	13	3	ng	0-1455	730-1430	768-922
Phleum pratense L.	Poaceae	Ap	H	122	106	75	5	ng	600-1060	668-1060	736-932

1	2	3	4	5	6	7	8	9	10	11	12
Phyteuma spicatum L.	Campanulaceae	Sn	H	91	76	61	5	ng	615-1665	683-1315	742-946
Picea abies (L.) H. Karst.	Pinaceae	Ap	M	483	377	188	7	ng	610-1680	706-1600	739-942
Picris hieracioides L.	Asteraceae	Sn	H	2	2	2	1	n	660-878	878-878	819-845
Pimpinella major (L.) Huds.	Apiaceae	Ap	H	45	40	31	4	ng	625-1545	670-885	750-905
Pimpinella saxifraga L.	Apiaceae	Ap	H	49	45	37	4	ng	600-1090	698-910	750-915
Pinguicula vulgaris L.	Lentibulariaceae	Ap	H	21	21	19	3	ng	745-1160	745-1160	753-888
Pinus sylvestris L.	Pinaceae	Kn	M	38	36	28	4	n	660-1030	755-1030	742-903
Pisum sativum L.	Fabaceae	D	T	3	3	2	1	n	660-860	800-860	798-805
Plantago lanceolata L.	Planataginaceae	Ap	H	147	137	98	5	ng	600-986	668-950	748-905
Plantago major L.	Planataginaceae	Ap	H	151	133	96	5	ng	600-1210	670-985	741-932
Plantago media L.	Planataginaceae	Ap	H	27	26	24	3	ng	640-870	698-870	746-867
Platanthera bifolia (L.) Rich.	Orchidaceae	Sn	G	14	13	12	3	ng	650-915	740-915	748-879
Poa annua L.	Poaceae	Ap	T	106	91	68	5	ng	600-1735	770-1295	740-942
Poa compressa L.	Poaceae	Ap	H	8	8	8	2	ng	610-986	668-930	789-885
Poa nemoralis L.	Poaceae	Sn	H	14	13	13	3	ng	615-1420	780-1380	745-883
Poa palustris L.	Poaceae	Sn	H	5	4	4	2	n	600-865	865-865	790-862
Poa pratensis L.	Poaceae	Ap	H	73	67	49	4	ng	615-1410	700-1410	754-892
Poa remota Forselles	Poaceae	Sn	H	1	1	1	1	ng	725-1370	870-1370	828-828
Poa trivialis L.	Poaceae	Ap	H	155	116	80	5	ng	615-1380	750-1110	736-942
Polygala oxyptera Rchb.	Polygalaceae	Sn	H	3	3	3	1	ng	725-845	845-845	790-837
Polygala vulgaris L.	Polygalaceae	Sn	H	22	22	19	3	ng	660-1055	725-920	748-915
Polygonatum verticillatum (L.) All.	Liliaceae	Sn	G	81	73	55	5	reg	620-1505	780-1445	739-942
Polygonum aviculare L.	Polygonaceae	Ap	T	38	34	28	4	ng	600-900	800-900	740-887
Polygonum hydropiper L.	Polygonaceae	Ap	T	33	32	29	4	ng	600-1085	765-980	764-879
Polygonum lapathifolium L. ssp. pallidum (With.) Fr.	Polygonaceae	Ap	T	8	8	8	2	n	645-1310	915-1310	740-879
Polygonum persicaria L.	Polygonaceae	Ap	T	44	37	29	4	n	600-930	688-930	740-903
Populus tremula L.	Salicaceae	Ap	M	56	51	44	4	ng	630-1055	705-1010	742-900
Populus x canescens (Aiton) Sm.	Salicaceae	D	M	1	1	1	1	n	-	-	903-903
Potentilla alba L.	Rosaceae	Sn	H	1	1	1	1	n	825-825	825-825	809-809
Potentilla anserina L.	Rosaceae	Ap	H	93	78	58	5	ng	640-1440	790-1440	741-888
Potentilla aurea L.	Rosaceae	Sn	H	8	8	6	2	ogg	630-1675	668-1620	836-905
Potentilla erecta (L.) Raeusch.	Rosaceae	Ap	H	350	283	154	6	ng	610-1497	698-1497	736-915
Potentilla reptans L.	Rosaceae	Ap	H	18	15	11	3	ng	600-1140	688-1140	754-858
Prenanthes purpurea L.	Asteraceae	Sn	H	114	102	67	5	reg	615-1410	750-1390	741-942
Primula elatior (L.) Hill	Primulaceae	Sn	H	130	116	77	5	ng	615-1610	668-1420	739-935
Prunella vulgaris L.	Lamiaceae	Ap	H	220	198	128	6	ng	600-1438	670-1438	741-942
Prunus spinosa L.	Rosaceae	Sn	N	2	2	2	1	n	610-850	-	780-825
Pteridium aquilinum (L.) Kuhn	Hypolepidaceae	Sn	G	1	1	1	1	ng	1315-1315	1315-1315	740-740
Pulmonaria obscura Dumort.	Boraginaceae	Sn	H	7	6	6	2	ng	615-1365	668-1365	755-857
Pyrola minor L.	Pyrolaceae	Sn	H	9	9	9	2	ng	650-1560	706-905	782-870
Pyrola rotundifolia L.	Pyrolaceae	Sn	H	4	3	3	1	ng	790-1280	865-865	784-858
Pyrus communis L.	Rosaceae	Sn	M	3	3	3	1	n	610-895	790-895	776-822
Pyrus pyraster Burgsd.	Rosaceae	Sn	M	1	1	1	1	n	-	-	825-825
Ranunculus acris L. s.s.	Ranunculaceae	Ap	H	333	279	145	6	ng	600-1270	698-1160	736-932
Ranunculus flammula L.	Ranunculaceae	Ap	H	110	103	79	5	ng	610-1140	670-1140	736-928
Ranunculus lanuginosus L.	Ranunculaceae	Sn	H	27	25	21	3	ng	610-1360	780-1360	780-946
Ranunculus lingua L.	Ranunculaceae	Sn	H	1	1	1	1	n	1170-1170	-	779-779
Ranunculus platanifolius L.	Ranunculaceae	Sn	H	2	1	1	1	sa	683-1665	683-1445	805-805
Ranunculus repens L.	Ranunculaceae	Ap	H	381	295	164	7	ng	600-1355	668-1355	736-942
Raphanus raphanistrum L.	Brassicaceae	Ar	T	12	12	11	3	ng	610-1035	700-1035	740-887
Rhinanthus alectorolophus (Scop.) Pollich	Scrophulariaceae	Ar	T	20	16	13	3	ng	642-915	808-915	759-885
Rhinanthus serotinus (Schoenh.) Oborný	Scrophulariaceae	Ap	T	53	45	36	4	ng	610-980	800-895	746-885
Ribes nigrum L.	Grossulariaceae	D	N	1	1	1	1	n	685-1180	-	805-805
Ribes rubrum s.l.*	Grossulariaceae	Sn	N	2	2	2	1	ng	-	-	850-885
Ribes uva-crispa L.	Grossulariaceae	Sn	N	1	1	1	1	n	655-750	-	842-842
Rorippa palustris (L.) Besser	Brassicaceae	Ap	T	1	1	1	1	n	610-750	700-700	792-792
Rorippa sylvestris (L.) Besser	Brassicaceae	Ap	H	3	2	1	1	ng	615-970	-	874-874
Rorippa x prostrata (J. P. Bergeret) Schinz & Tell.*	Brassicaceae	Ap	H	1	1	1	1	n	-	-	789-789
Rosa agrestis Savi	Rosaceae	Sn	N	3	3	2	1	n	-	-	773-815
Rosa canina L.	Rosaceae	Ap	N	28	25	21	3	n	620-995	830-995	740-889
Rosa dumalis Bechst. em. Boulenger	Rosaceae	Sn	N	5	5	5	2	reg	640-819	-	800-892
Rosa pendulina L.	Rosaceae	Sn	N	40	39	34	4	reg	0-1585	820-1585	741-946
Rubus hirtus Waldst. & Kit. agg.	Rosaceae	Sn	N	216	187	107	6	reg	615-1265	730-1265	740-946
Rubus idaeus L.	Rosaceae	Ap	N	367	303	167	7	ng	0-1670	698-1620	736-942
Rumex acetosa L.	Polygonaceae	Ap	H	152	127	84	5	ng	610-1190	800-1110	736-907
Rumex acetosella L.	Polygonaceae	Ap	H	33	32	26	3	ng	610-1400	780-1400	760-887
Rumex alpestris Jacq.	Polygonaceae	Sn	H	2	1	1	1	sa	610-1620	755-1620	840-840

1	2	3	4	5	6	7	8	9	10	11	12
Rumex alpestris x acetosa*	Polygonaceae	Sn	H	1	1	1	1	?	-	-	860-860
Rumex alpinus L.	Polygonaceae	Ap	H	12	11	11	3	sa	670-1600	845-1600	770-940
Rumex crispus L.	Polygonaceae	Ap	H	21	20	18	3	ng	640-1035	670-1035	741-892
Rumex obtusifolius L.	Polygonaceae	Ap	H	72	59	41	4	ng	600-1250	805-1250	736-942
Rumex sanguineus L.	Polygonaceae	Sn	H	2	2	2	1	ng	620-980	765-980	853-855
Sagina procumbens L.	Caryophyllaceae	Ap	C	9	8	8	2	ng	615-1320	668-1200	760-851
Salix aurita L.	Salicaceae	Ap	N	129	115	86	5	ng	796-1072	-	739-903
Salix aurita x Kaprea*	Salicaceae	Sn	N	6	6	6	2	?	-	-	785-868
Salix aurita x silesiaca*	Salicaceae	Sn	N	35	34	31	4	?	-	-	751-890
Salix caprea L.	Salicaceae	Ap	N	99	93	78	5	ng	600-1410	730-1410	745-932
Salix eleagnos Scop.	Salicaceae	Sn	N	1	1	1	1	reg	600-855	855-855	750-750
Salix fragilis L.	Salicaceae	Ap	M	5	5	5	2	ng	600-760	668-668	754-846
Salix pentandra L.	Salicaceae	Ap	N	44	42	33	4	ng	640-870	765-870	737-913
Salix purpurea L.	Salicaceae	Ap	N	44	38	32	4	ng	610-990	668-895	740-913
Salix repens L. ssp. rosmarinifolia (L.) Hartm.	Salicaceae	Sn	Ch	1	1	1	1	n	-	-	775-775
Salix silesiaca Willd.	Salicaceae	Ap	N	51	50	42	4	ogg	650-1650	770-1575	740-948
Salix silesiaca x caprea*	Salicaceae	Sn	N	23	22	18	3	?	-	-	766-935
Salix triandra L.	Salicaceae	Sn	N	1	1	1	1	n	620-840	840-840	870-870
Salix viminalis L.	Salicaceae	Sn	N	3	3	2	1	ng	860-915	860-915	864-887
Sambucus ebulus L.	Caprifoliaceae	Sn	H	1	1	1	1	ng	610-615	-	880-880
Sambucus racemosa L.	Caprifoliaceae	Ap	N	135	124	81	5	reg	600-1350	755-1310	736-942
Sanicula europaea L.	Apiaceae	Sn	H	100	87	60	5	ng	615-1060	780-1060	750-946
Scirpus sylvaticus L.	Cyperaceae	Sn	G	108	86	73	5	ng	620-1370	668-1370	737-915
Scleranthus annuus L.	Caryophyllaceae	Ar	T	15	14	13	3	ng	645-1287	765-1287	765-887
Scrophularia scopolii Hoppe	Scrophulariaceae	Ap	H	5	5	5	2	reg	630-1485	815-1485	778-940
Secale cereale L.	Poaceae	D	T	1	1	1	1	n	645-800	800-800	805-805
Sedum fabaria W. D. J. Koch	Crassulaceae	Sn	H	2	2	2	1	ogg	615-1610	870-1485	887-889
Senecio carpaticus Herbich	Asteraceae	Sn	H	11	11	11	3	reg	620-1420	780-1380	792-925
Senecio carpaticus x ovatus*	Asteraceae	Sn	H	5	5	5	2	reg	-	-	802-879
Senecio ovatus (P. Gaertn., B. Mey., Schreb.) Willd.	Asteraceae	Ap	H	399	309	160	7	reg	615-1390	668-1390	736-948
Senecio subalpinus W. D. J. Koch	Asteraceae	Ap	H	119	110	83	5	ogg	610-1600	755-1600	736-942
Senecio sylvaticus L.	Asteraceae	Sn	T	2	2	2	1	ng	780-1125	-	810-883
Senecio vernalis Waldst. & Kit.	Asteraceae	D	T	1	1	1	1	ng	840-840	-	845-845
Senecio vulgaris L.	Asteraceae	Ar	T	2	2	2	1	ng	615-1590	860-860	759-791
Sinapis arvensis L.	Brassicaceae	Ar	T	47	41	30	4	ng	615-930	688-930	753-887
Sisymbrium strictissimum L.	Brassicaceae	Ap	H	1	1	1	1	ng	-	-	818-818
Solanum tuberosum L.	Solanaceae	D	G	10	10	10	2	n	620-1180	670-830	740-879
Soldanella carpatica Vierh.	Primulaceae	Sn	H	2	2	2	1	ogg	630-1725	815-1438	840-875
Solidago canadensis L.	Asteraceae	D	H	1	1	1	1	n	-	-	805-805
Solidago virgaurea L.	Asteraceae	Sn	H	18	18	16	3	ng	620-1585	780-1470	805-942
Sonchus arvensis L.	Asteraceae	Ap	H	40	34	28	4	ng	610-1035	668-1035	750-900
Sorbus aucuparia L. em. Hedl.	Rosaceae	Sn	M	248	228	145	6	ng	151-1675	698-1590	736-946
Spergula arvensis L.	Caryophyllaceae	Ar	T	29	27	21	3	n	650-880	765-880	740-887
Spergularia rubra (L.) J. Presl & C. Presl	Caryophyllaceae	Ap	T	4	3	3	1	n	-	-	845-874
Stachys palustris L.	Lamiaceae	Ap	G	49	41	29	4	n	620-1035	800-1035	741-887
Stachys sylvatica L.	Lamiaceae	Sn	H	27	23	21	3	ng	610-1210	800-1210	740-907
Stellaria graminea L.	Caryophyllaceae	Ap	H	87	81	65	5	ng	600-1125	700-1045	736-892
Stellaria media (L.) Vill.	Caryophyllaceae	Ap	T	57	50	37	4	ng	610-1180	688-1105	740-903
Stellaria nemorum L.	Caryophyllaceae	Ap	H	70	57	37	4	ng	0-1620	780-1620	740-948
Stellaria palustris Retz.	Caryophyllaceae	Sn	H	4	4	3	1	ng	640-1275	825-1275	751-789
Stellaria uliginosa Murray	Caryophyllaceae	Ap	H	59	57	45	4	ng	600-1390	800-1390	736-942
Succisa pratensis Moench	Dipsacaceae	Ap	H	16	14	12	3	ng	720-920	775-920	772-885
Symphytum officinale L.	Boraginaceae	Ap	H	7	6	6	2	n	610-875	810-875	799-879
Symphytum tuberosum L.	Boraginaceae	Sn	G	30	29	24	3	ng	615-1360	780-1360	740-935
Syringa vulgaris L.	Oleaceae	D	N	1	1	1	1	n	-	-	762-762
Tanacetum vulgare L.	Asteraceae	Ap	H	7	7	7	2	ng	640-840	-	778-933
Taraxacum officinale F. H. Wigg. agg.*	Asteraceae	Ap	H	225	177	111	6	ng	600-1620	668-1620	740-942
Taraxacum palustre (Lyons) Symons agg.*	Asteraceae	Sn	H	1	1	1	1	ng	-	-	814-814
Telekia speciosa (Schreb.) Baumg.	Asteraceae	D	H	1	1	1	1	ng	-	-	805-805
Thalictrum aquilegiifolium L.	Ranunculaceae	Sn	H	32	32	27	4	ng	620-1460	668-1440	770-935
Thlaspi arvense L.	Brassicaceae	Ar	T	2	2	2	1	ng	750-800	800-800	762-788
Thymus pulegioides L.	Lamiaceae	Ap	C	21	19	17	3	ng	600-875	775-875	754-915
Traunsteinera globosa (L.) Rchb.	Orchidaceae	Ap	G	1	1	1	1	ogg	1330-1545	-	878-878
Trientalis europaea L.	Primulaceae	Sn	G	2	2	2	1	ng	-	-	760-797
Trifolium dubium Sibth.	Fabaceae	Ap	T	6	6	5	2	ng	615-770	765-770	770-838
Trifolium hybridum L.	Fabaceae	Ap	H	49	45	38	4	ng	640-1000	670-1000	750-933
Trifolium medium L.	Fabaceae	Ap	H	120	101	70	5	ng	640-1090	705-885	746-915
Trifolium montanum L.	Fabaceae	Sn	H	4	3	3	1	ng	1000-1000	1000-1000	807-822

1	2	3	4	5	6	7	8	9	10	11	12
Trifolium pratense L.	Fabaceae	Ap	H	131	116	92	5	ng	600-1488	668-1480	750-933
Trifolium repens L.	Fabaceae	Ap	H	203	171	120	6	ng	610-1180	700-940	741-913
Trifolium spadiceum L.	Fabaceae	Sn	T	10	10	8	2	reg	810-1080	810-1080	751-853
Triglochin palustre L.	Juncaginaceae	Ap	H	8	8	7	2	ng	765-870	765-870	780-852
Trisetum flavescens (L.) P. Beauv.	Poaceae	Ap	H	19	17	14	3	ng	610-800	-	746-878
Triticum aestivum L.	Poaceae	D	T	4	4	4	2	n	-	-	789-832
Tussilago farfara L.	Asteraceae	Ap	G	220	181	122	6	ng	610-1287	668-1287	742-930
Typha latifolia L.	Typhaceae	Ap	He	3	3	3	1	n	785-785	785-785	773-870
Ulmus glabra Huds.	Ulmaceae	Sn	M	3	2	2	1	n	610-780	-	818-885
Urtica dioica L.	Urticaceae	Ap	H	167	132	85	5	ng	600-1440	668-1440	736-948
Vaccinium myrtillus L.	Ericaceae	Sn	Ch	404	338	177	7	ng	0-1680	698-1680	741-942
Vaccinium vitis-idaea L.	Ericaceae	Sn	Ch	148	129	89	5	ng	625-1680	698-1660	741-928
Valeriana officinalis L.	Valerianaceae	Sn	H	4	4	4	2	ng	700-990	835-975	775-857
Valeriana sambucifolia J. C. Mikan	Valerianaceae	Sn	H	12	11	10	2	ogg	650-1380	835-1365	742-935
Valeriana simplicifolia Kabath	Valerianaceae	Ap	H	204	178	120	6	ng	630-1560	750-1080	739-946
Valeriana tripteris L.	Valerianaceae	Sn	H	26	25	20	3	ogg	645-1675	800-1430	745-946
Veratrum lobelianum Bernh.	Liliaceae	Sn	H	23	21	19	3	ogg	660-1670	840-1600	755-915
Veronica agrestis L.	Scrophulariaceae	Ar	T	1	1	1	1	n	688-875	688-875	798-798
Veronica arvensis L.	Scrophulariaceae	Ap	T	22	20	18	3	ng	615-930	765-930	741-880
Veronica beccabunga L.	Scrophulariaceae	Ap	Hy	65	60	46	4	ng	600-1190	670-1190	740-948
Veronica chamaedrys L.	Scrophulariaceae	Ap	C	155	131	84	5	ng	600-1180	670-1045	739-905
Veronica hederifolia L. s.s.	Scrophulariaceae	Ap	T	1	1	1	1	n	-	-	831-831
Veronica montana L.	Scrophulariaceae	Ap	C	24	22	21	3	reg	640-1630	765-1365	780-942
Veronica officinalis L.	Scrophulariaceae	Ap	C	69	65	58	5	ng	630-1160	706-1160	742-928
Veronica persica Poir.	Scrophulariaceae	Kn	T	4	4	4	2	n	615-875	800-875	767-837
Veronica scutellata L.	Scrophulariaceae	Sn	H	3	3	3	1	ng	760-825	760-825	840-853
Veronica serpyllifolia L.	Scrophulariaceae	Ap	H	14	14	13	3	ng	700-1200	830-945	760-872
Viburnum opulus L.	Caprifoliaceae	Sn	N	8	8	7	2	n	615-895	790-895	736-880
Vicia angustifolia L.	Fabaceae	Ar	T	18	15	12	3	ng	620-940	830-940	765-887
Vicia cracca L.	Fabaceae	Ap	H	256	197	113	6	ng	600-1160	770-1160	737-915
Vicia hirsuta (L.) Gray	Fabaceae	Ar	T	6	6	6	2	ng	615-1090	688-1010	798-838
Vicia sativa L.	Fabaceae	Ar	T	1	1	1	1	n	620-1295	683-1295	825-825
Vicia sepium L.	Fabaceae	Ap	H	114	100	69	5	ng	610-1010	668-1010	739-892
Viola arvensis Murray	Violaceae	Ar	T	55	49	36	4	ng	610-1020	688-900	740-887
Viola biflora L.	Violaceae	Sn	H	12	12	9	2	ogg	705-1675	750-1620	790-948
Viola canina L.	Violaceae	Sn	H	12	12	8	2	ng	670-1240	745-910	772-868
Viola palustris L.	Violaceae	Sn	H	49	45	38	4	ng	630-1072	745-1020	752-902
Viola reichenbachiana Jord. ex Boreau	Violaceae	Sn	H	51	45	34	4	ng	610-1450	683-1120	740-930
Viola riviniana Rchb.	Violaceae	Sn	H	3	3	3	1	ng	770-900	770-770	745-863
Viola tricolor L.	Violaceae	Ap	T	2	2	2	1	ng	620-1240	790-900	776-872

Explanations: 1 – name (acc. to Mirek *et al*. 2002); 2 – family names; 3 – origin and naturalization status on the SBMBG: Ap – apophytes; Sn – non-synanthropic spontaneophytes; Ar – archaeophytes; Kn – kenophytes; D – diaphytes; 4 – life form – dominant on the SBMBG: M – megaphanerophytes, N – nanophanerophytes, Ch – lignified chamaephytes, C – herbaceous chamaephytes, H – hemicryptophytes, G – geophytes, He – helophytes, Hy – hydrophytes, T – therophytes; 5 – number of records in the SBMBG, i.e. number of all individual observations for each species (separately for each plant community within a site); 6 – number of sites in the SBMBG, i.e. number of geographically distinctive places in which species have been found; 7 – number of occupied squares 250x250 m, regardless of a number of real sites within certain square, providing that it was other than zero; 8 – local frequency level – according to number of occupied squares; 9 – mountain vs. lowland category of species on Mt. Babia Góra (orig.) – refers to optimal range of species within Western Carpathians, with particular attention being paid to Mt. Babia Góra: ? – unspecified; n – lowland species; ng – lowland-mountain sp., pg – sub-montane sp., reg – montane sp., ogg – generally mountain sp., sa – sub-alpine sp., wg – generally high mountain sp. (alpine to sub-alpine); 10 – min.-max. altitude on Mt Babia Góra without SBMBG; 11 – min.-max. altitude on S slopes of Mt Babia Góra without SBMBG; 12 – min.-max. altitude on the SBMBG