

Data to the *Genisto pilosae-Quercetum* and the flora
of the Bükk Mountains

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Abstract: In the Bükk National Park a locality of *Genisto-Quercetum* was compared with other localities of a similar community on acidic soil. The H' and J values of the coverage of individual species and of all of the species per quadrat, the distribution area and life-form were analysed. We have found three new localities of *Telekia speciosa* in the Hór valley and one locality of *Vaccinium myrtillus* in Odorhegy (*Genisto-Quercetum*). 406 vascular plants have been listed: 5 are floristically new.

Introduction

We organized a botanical collecting tour to the Hór valley in the Southern-Bükk in June, 1980. We used the time to study the surroundings, and to collect floristical data about Hór valley. This valley and its surroundings is a strictly protected area of the Bükk National Park. The East of the valley is mostly limestone, in the west mainly clay slate constitutes the Southern-Bükk. It is characteristic for the long valleys in Bükk that narrow ravines engraved on limestone alternate with plain, loose hollows, deepened in clay slate. The valleys in the Southern-Bükk are separated from each other by non-karstic hills with gentle slopes and mountains reminding of uplifted blocks (e.g. Odorvár). Mainly the slopes of cliffs with rock vegetation (e.g. Odorvár, Hosszúgalya, above Subalyuk cave) and the cleared woodlands of uplifted blocks are covered with karrenfelds. Quartz and flint interbeddings can be seen in the limestone on the slope of Hór valley (PINCZÉS 1955). The hard, hardly flaking quartz pieces stick out of the round edged fissures like a sharp face. There are several dolinas, sink holes here (e.g. Subalyuk cave, Hajnóczy cave near Odorvár). The wide, plain sandhills of the southern parts of Bükkalja, somewhere covered with loess, originate from the alluvial cones of brooks of Bükk. The valleys of brooks with widening flood basin and shelf are deepened in these sandhills. This is really a transitional zone towards the Great Hungarian Plain, as the large mountains suddenly disappear about 300 m of Subalyuk and the Bükkalja is continued in the form of gentle slopes. The water output of Hór valley is fluctuating, but it is relatively abounding in water. In rainless weather it could be observed that the brook disappeared here and there like an underground stream and it flowed away in an under level, then appeared again. Clay lessivated brown forest soil could be found in most parts of Bükkalja (in Hór valley, too) and types of meadow soil (STEFANOVITS 1963) in the brook valleys. During the collecting trip the following localities were visited: Perpác, Subalyuk, Kis-Piliske, Odorhegy, Odorvár, Mák-szem, Oszla, Füzérkő, Felső-Csákány, Tebe-puszta, Hosszúgalya, Gyertyánvölgy.

The first species list of *Genisto pilosae-Quercetum* was published by MAGYAR (1933) from Répáshuta and Óhuta in the Bükk Mts. as *Quercus sessilis-Genista pilosa* community (it is indicated with No. 4 in Table 1). It was classified and terminated coenosystematically by ZÓLYOMI & JAKUCS (1957). They gave the name of the community as *Genisto pilosae* -

Quercetum petraeae. This name is used by SOÓ (1973), too. The soil types of this community were analysed and typised by SZODFRIDT (1978). The *Genisto pilosae* - *Quercetum* first was taken to be a forest type (CAJANDER 1921), later a type of *Querceto-Luzuletum subcarpaticum* of an 'acidiferous *Genista* oak-forest type' (ZÓLYOMI, JAKUCS, BARÁTH & HORÁNSZKY 1955) based on studies in the Bükk Mts. and FEKETE (1955) based on studies in the Velence Mts. in Hungary. ZÓLYOMI (1958) published a species list with estimated cover values (abundance, dominance and constancy values) as *Luzulo-Quercetum subcarpaticum* in the Buda Mts. and he noted this association might belong to the *Genisto pilosae-Quercetum petraeae* as a *luzuletum* subassociation, but more probably it is an extrazonal local variant. This community had been studied by several authors (see above) but with different sizes and numbers of sample grids. Consequently the 'similarities' of the different species lists can be examined only with regard to the presence or absence of the species in the samples.

The species which occurred near the sample plot, but were absent in the sample, are given in brackets together with the species in samples. The '+' means 0.1% cover. The AD values were counted as average values of the AD intervals. *Pinus silvestris* (cult.) is left out. In case of cryptogams we recorded only the presence of species. In the list the species are arranged by the structure of forests (tree, shrub and herb layer) and they are in alphabetic order. The species were identified by JÁVORKA (1925) and JÁVORKA & CSAPODY (1975). The name of plant communities are given from SOÓ (1973). The flora list of Hór valley contains all the species collected by us and we indicate (!) the new data of those species which are not mentioned by SOÓ (1973) as 'vulgar' or 'common' in the Hungarian Central Mts. or in the Bükk Mts. The examined area is included in 7989 C and 8089 A quadrates of the Central European Flora Map (NIKLFELD 1971). Floristical data were published by SOÓ (1937), based on the data of the Herbarium VRABÉLYI that refer mostly to the Mátra Mts. and a few of them to the Bükk Mts. Besides this, there are several articles by ZÓLYOMI (1934, 1939, 1958) and others concerning the Bükk Mts.

Material and methods

We have found three new localities of *Telekia speciosa* in Hór valley and one locality of *Vaccinium myrtillus* in Odorhegy. The distribution and covering of *Vaccinium myrtillus* and *Avenella flexuosa* had been studied in ten sample quadrates in acidic locality (clay slate soil). The samples were taken according to BRAUN-BLANQUET (1964) except the cover values of the species. The cover values were estimated and expressed in a real percentage value. The sample plots constitute a real transection, because the data were taken from every second quadrate along a line. The size of quadrates were 5 to 5 m. The angle of the slope was about 45° and the exposition was north-eastern.

The covering diversity (H'_R) and evenness (J_R) of the individual species were calculated except where the species occurs only in one sample plot. We indicated the diversity and evenness of all the species per quadrate with H'_Q and J_Q and summa covering values with H'_C and J_C . The species were grouped according to the type of the distribution area (cf. SOÓ 1964-73) and the life-form (RAUNKIAER 1907), too. They are indicated with H'_D , J_D and H'_L , J_L . The diversity values were calculated on the basis of SHANNON's (1948) and evenness by PIELOU's (1975).

Results and discussion

Quercus petraea is present in all of the three layers (as seeds or adult plants) in all of the samples in the four different localities (including Odorhegy) but *Digitalis grandiflora*, *Genista pilosa*, *Luzula albida* occur only in the herb layer. *Calamintha clinopodium*, *Carpinus betulus*, *Veronica officinalis* are common in the samples No. 1, 2, 4, *Chrysanthemum corymbosum*, *Fagus silvatica*, *Viscaria vulgaris* in the samples No. 1, 3, 4. Common species of samples No. 1, 4: *Anthoxanthum odoratum*, *Astragalus glycyphylus*, *Avenella flexuosa*, *Fragaria vesca*, *Poa nemoralis*, *Stellaria holostea*, *Vaccinium myrtillus* (Table 1).

Comparing the four samples of acidiferous oak-forests of the Hungarian Central Mts. (1, 2,

3, 4), we believe that the presence of these oak-forests depend on the pH value of the forest soil developed on acidiferous fundamental rock. There is an old granite block in Velence Mts. and a small part of acidic gritstone in Buda Mts. on which the *Querceto-Luzuletum subcarpatum* had developed. The *Genisto pilosae-Quercetum* occurs in schist stone in the Bükk Mts. The *Genista pilosa*, *Luzula albida*, *Veronica officinalis*, *Viscaria vulgaris* belong to the relatively acidiferous group of plants in Hungary (CSAPODY, HORÁNSZKY, PÓCS, SIMON, SZOD-FRIDT, TALLÓS in: MAYER 1962). In both localities *Avenella flexuosa* and *Vaccinium myrtillus* occur, too. They indicate the low pH value in the soil (Table 1). Since the size of samples, the recording time of the samples are different, we have analysed only the samples in Odorhegy in detail. The most frequent species are the next: $F = 10$ *Quercus petraea*, *Avenella flexuosa*, *Luzula albida*, *Melampyrum cristatum*; $F = 7$ *Vaccinium myrtillus*; $F = 6$ *Genista pilosa*, *Veronica officinalis*; $F = 5$ *Pinus silvestris* cult., *Brachypodium silvaticum* in Odorhegy. Based on these results the acidiferous oak-forest is believed to be extrazonal in Hungary. Geographically, and on the basis of species composition the localities of *Genisto pilosae-Quercetum* in the Bükk Mts. may be near the zonal acidiferous oak-forest.

In decreasing order of the H'_R value of the more frequent species in Table 3: *Quercus petraea*, *Avenella flexuosa*, *Melampyrum cristatum*, *Genista pilosa*, *Veronica officinalis*, *Vaccinium myrtillus*, *Luzula albida*. The other species are less frequent in samples and they have much lower H'_R values. Values of the evenness lighten the species in a more realistic form than the diversity values. The H'_R values of the individual species are more determined by the frequency than the differences among sizes of patches in a row in Table 3. (It is a well-known character of the SHANNON's information model.)

The number of species and their covering values are different in each per samples (Table 2.) The number of species is extremely high in sample No. 5, which is transitional and situated near the bottom of the valley. The H'_Q values of the samples are decreasing as follows: No. 5, 3, 1, 4, 2, 8, 7, 6 and 10. The values of evenness do not follow this order of samples. Comparing the size of patches, diversity values in H'_R and H'_Q we can conclude that some of the previous species may show higher number than the latter in the *Genisto pilosae-Quercetum* here.

We suppose that the covering behaviour of any species in ten samples also may give some information of this character of the individual species - H'_R value - refer to the area of it as a whole. Here those species produce a higher diversity value, which expand mainly or totally with vegetative (Table 3). They occur more frequently also in this community. It is a well-known fact that the species composition within one sample or community depends on numerous factors. In this case we can suppose that one of these factors is the manner of the species' expand and as a result of this, the size of patches. The size of patches of species are interdependent on each other but the nature and comprise of these relations are hardly known.

Saturation of samples or community⁺

The surface of soil is almost completely covered with the two layers (i.e. trees and herbs) in the studied samples of *Genisto pilosae-Quercetum*. So saturation by different vascular plants is more than 100 per cent with respect to the covering value (Table 2). But the number of species in the same quadrates is low and strictly limited (8-14) except in the sample No. 5.

Based on these facts the question arises, whether they are characteristic for the *Genisto pilosae-Quercetum*, being hardly saturated by the species (compared with other communities) but well or over saturated by the size of different species' populations. It seems to be true.

Following the comparison, the H' and J values refer to the H'_C and J_C ; H'_D and J_D ; also the H'_L and J_L .

⁺ The real saturation of soil is caused much more by the flowering and cryptogamous species but the latter are present often only in spores or myceliums. Consequently, we can account on only those species which are well determinable during the vegetation period.

We got the next results: $H'_C = 10.20$; $H'_D = 3.59$; $H'_L = 2.40$; $J_C = 1.82$; $J_D = 0.88$; $J_L = 0.63$.

Summary

We have reason to believe that this forest will be cut down in a short time. After the cutting this hill will change into a bare rock surface because of erosion. It would be better if this forest remained. We found many *Quercus* seedlings in the herb layer, so the forest is able to be renewed. What is more, deforestation is unwanted in this strictly protected area.

The samples of 'Genista pilosae-Quercetum' in s.s. (sensu stricto) from different localities in Hungary were simply compared by the presence of species. The samples of *Genista pilosae*-*Quercetum* in Bükk Mts. arranged in a transect were analysed in detail. Acidiferous species of this community - e.g. *Vaccinium myrtillus*, *Avenella flexuosa*, *Luzula albida*, *Genista pilosa* - were found on acidic soil.

Diversity of some individual species are higher by the size of patches in samples than the diversity of all the species in a quadrat.

Though the examined part of Bükk Mts. is not too large, and the time was short, 406 vascular plants were found including 5 floristically new species.

Table 1. Species list from the "Odor-hegy" (Bükk Mts.), (1); from the Velence Mts. (2); from the Buda Mts. (3); and also from the Bükk Mts. (Répáshuta and Óhuta) (4)

<i>Acer campestre</i> 2	<i>Cytisus nigricans</i> 2, 3
<i>Agrostis tenuis</i> 4	<i>Dactylis glomerata</i> 1
<i>Ajuga genevensis</i> 1, 2	<i>Dentaria bulbifera</i> 1
<i>Ajuga laxmanni</i> 2	<i>Digitalis grandiflora</i> 1, 2, 3, 4
<i>Antennaria dioica</i> 4	<i>Euphorbia cyparissias</i> 2, 4
<i>Anthericum ramosum</i> 1, 3	<i>Euphorbia polychroma</i> 2
<i>Anthoxanthum odoratum</i> 1, 4	<i>Fagus sylvatica</i> (1), 3, 4
<i>Asarum europaeum</i> 1	<i>Festuca heterophylla</i> 1, 3
<i>Astragalus glycyphyllos</i> 1, 4	<i>Festuca rupicola</i> 4
<i>Avenella flexuosa</i> 1, 4	<i>Fragaria vesca</i> 1, 4
<i>Betonica officinalis</i> 1	<i>Fraxinus ornus</i> 3 (secondary)
<i>Brachypodium silvaticum</i> 1	<i>Galium mollugo</i> ssp. <i>erectum</i> 2
<i>Calamagrostis arundinacea</i> 4	<i>Galium schultesii</i> 3
<i>Calamagrostis epigetos</i> 1	<i>Galium</i> sp. 1
<i>Calamintha acinos</i> 4	<i>Genista pilosa</i> 1, 2, 3, 4
<i>Calamintha clinopodium</i> 1, 2, 4	<i>Genista tinctoria</i> ssp. <i>elata</i> 2
<i>Campanula glomerata</i> 1	<i>Geranium robertianum</i> 2
<i>Campanula persicifolia</i> 1	<i>Geranium sanguineum</i> 2
<i>Campanula rapunculoides</i> 4	<i>Glechoma hirsuta</i> 2
<i>Campanula rotundifolia</i> 3	<i>Hedera helix</i> 2
<i>Campanula trachelium</i> 1	<i>Helleborus purpurascens</i> 1
<i>Cardaminopsis arenosa</i> 2	<i>Hieracium baubini</i> 1
<i>Carex montana</i> 1	<i>Hieracium lachenalii</i> 4
<i>Carpinus betulus</i> (1), 2, 4	<i>Hieracium sabaudum</i> 1, 3
<i>Chaerophyllum temulum</i> 2	<i>Hieracium sylvaticum</i> 1, 3
<i>Chrysanthemum corymbosum</i> 1, 3, 4	<i>Hypericum hirsutum</i> 4
<i>Cicerbita muralis</i> 4	<i>Hypericum montanum</i> 1
<i>Coronilla varia</i> 2	<i>Hypericum perforatum</i> 4
<i>Crataegus monogyna</i> (1)	<i>Jasione montana</i> 3
<i>Cruciata ciliata</i> 2	<i>Lactuca quercina</i> 1
<i>Cruciata glabra</i> 4	<i>Lathyrus niger</i> 2

Lathyrus vernus 1
Linaria genistifolia 2
Lithospermum purpureo-coeruleum 2
Luzula albida 1, 2, 3, 4
Medicago falcata 2
Melampyrum cristatum 1, 2
Melampyrum pratense ssp. *commutatum* 3, 4
Melica uniflora 1
Melittis grandiflora 1
Melittis melissophyllum 2
Mercurialis perennis 2
Myosotis sparsiflora 2
Peucedanum cervaria 2
Pinus silvestris 1 (cult.)
Poa nemoralis 1, 4
Polygonatum multiflorum 3
Polygonatum odoratum 3, 4
Primula veris 1
Prunus avium (1)
Pulmonaria mollissima 2
Quercus cerris 2
Quercus petraea 1, 2, 3, 4
Quercus pubescens 2
Rosa sp. 1, 4
Sedum maximum 1, 2, 3
Sedum sexangulare 2
Sempervivum schlehanii 2

Senecio silvaticus 4
Serratula tinctoria 1
Silene nutans 3
Smyrnum perfoliatum 2
Sorbus cretica 3
Sorbus semiincisa 3
Sorbus torminalis 3
Stachys recta 2
Stellaria holostea 1, 4
Symphytum tuberosum 1
Teucrium chamaedrys 2
Tilia cordata 1
Trifolium alpestre 2
Trifolium aureum 4
Trifolium montanum 1
Vaccinium myrtillus 1, 4
Valeriana officinalis 2
Verbascum austriacum 2
Veronica chamaedrys 1, 2, 4
Veronica officinalis 1, 2, 4
Veronica spicata 2
Vicia cracca ssp. *tenuifolia* 2
Vicia pisiformis 2
Vinca herbacea 2
Viola silvestris 1
Viscaria vulgaris 1, 3, 4

Cryptogams:

Asplenium breynii 2
Asplenium septentrionale 2
Asplenium trichomanes 2
Buxbaumia aphylla 3
Buxbaumia indusiata 3
Catharina undulata 3
Ceratodon purpureus 4
Cladonia furcata 4
Cladonia nemoxina 3
Cladonia pyxidata 3
Cladonia rangiferina 1, 3
Cladonia subrangiferiformis 3

Cladonia uncialis 3
Dicranella heteromalla 3
Dicranum longifolium 3
Dicranum scoparium 3, 4
Entodon schreberi 3, 4
Hypnum cupressiforme 1, 3, 4
Mnium sp. 1
Polypodium vulgare 2
Polytrichum attenuatum 3
Polytrichum sp. 1
Polytrichum piliferum 3
Abietinella sp. 1
Dicranum sp. 1

Table 2. Cover and H', J, N, S values of *Genista pilosae* - *Quercetum petraeae* on Odorhegy

June 30th 1980: No. 1-5 and August 16th 1980: No. 6-10; Height of trees: *Quercus petraea* 12-15 m, *Pinus silvestris* 13-18 m.
Exposition: North-East. Angle of slope: 45°

Layers	Species	Cover values in % by sampling										AD interval	F
		1	2	3	4	5	6	7	8	9	10		
Tree	<i>Pinus silvestris</i> (cult.)	25	25	25				45	5			5-45	5
	<i>Quercus petraea</i>	35	65	55	60	80	40	5	30	30	60	5-80	10
Shrub	<i>Quercus petraea</i>	2										+	1
Herb	<i>Ajuga genevensis</i>					+						+	1
	<i>Anthericum ramosum</i>	+				+						+	2
	<i>Anthoxanthum odoratum</i>				1	3						1-3	2
	<i>Asarum europaeum</i>					+						+	1
	<i>Astragalus glycyphyllos</i>					(+)						+	1
	<i>Avenella flexuosa</i>	40	85	65	70	10	80	70	50	5	2	2-85	10
	<i>Brachypodium silvaticum</i>						1	+	1	15	5	+15	5
	<i>Calamagrostis epigeios</i>			1	1	20						1-20	3
	<i>Calamintha clinopodium</i>					+						+	1
	<i>Campanula glomerata</i>					+						+	1
	<i>Campanula persicifolia</i>				+	1						+1	2
	<i>Campanula trachelium</i>					(+)						+	1
	<i>Carex montana</i>					+						+	1
	<i>Carpinus betulus</i>					(+)	+				+	+	3
	<i>Chrysanthemum corymbosum</i>					+						+	1
	<i>Crataegus monogyna</i>					+						+	1
	<i>Dactylis glomerata</i>					(+)						+	1
	<i>Dentaria bulbifera</i>					(+)						+	1
	<i>Digitalis grandiflora</i>					+						+	1
	<i>Fagus silvatica</i>										+	+	1
	<i>Festuca heterophylla</i>					1						+	1
	<i>Fragaria vesca</i>					+						+	1
	<i>Galium</i> sp.					+				+	+	+	3
	<i>Genista pilosa</i>	+			+			+	+	+	+	+	6
	<i>Helleborus purpurascens</i>					(+)						+	1
	<i>Hieracium bauhini</i>				+				+	+	+	+	4
	<i>Hieracium sabaudum</i>	+			1	+						+1	3
	<i>Hieracium sylvaticum</i>	1						+			+	+1	3
	<i>Hypericum montanum</i>					+						+	1
	<i>Lactuca quercina</i>					(+)						+	1

(Continuation of the Table 2)

Herb													
Lathyrus vernus					(+)							+	1
Luzula albida	7-10	5	10	10-15	30	+	+	1	+	+	+	+-30	10
Melampyrum cristatum	1	1	2	5	+	1	2	1	3	5		+-5	10
Melica uniflora					+							+	1
Melittis grandiflora					(+)							+	1
Poa nemoralis				1	+							+-1	2
Primula veris					(+)							+	1
Prunus avium					+							+	1
Quercus petraea		+			+	+	+	+		+		+	6
Rosa sp.						+						+	1
Sedum maximum							+					+	1
Serratula tinctoria					+							+	1
Stachys officinalis					(+)							+	1
Stellaria holostea					2						+	+-2	2
Symphytum tuberosum					+							+	1
Tilia cordata					+							+	1
Trifolium montanum					+							+	1
Vaccinium myrtillus		5-7	15	10		5	2	2	1			1-15	7
Veronica chamaedrys					+							+	1
Veronica officinalis	+	+	+	+	+					+		+	6
Viscaria vulgaris			+		+							+	2
Viola silvestris					(+)							+	1
Cryptogams $\leq$:	50	5	10	25	+	5	5	10	2	+		+-50	10
Cladonia rangiferina, Dicranum sp., Hypnum cupressiforme, Mnium sp., Polytrichum sp., Abietinella sp													
N ₁₋₁₀	112.9	187.2	173.2	161.9	150.7	127.4	124.6	90.3	54.4	73		167.5	
S ₁₋₁₀	11	8	9	13	45	9	11	10	9	14		48	
H'Q ₁₋₁₀	2.07	1.78	2.13	1.94	2.14	1.27	1.42	1.60	1.70	1.03		10.19	
JQ ₁₋₁₀	0.60	0.59	0.67	0.52	0.39	0.40	0.41	0.48	0.53	0.27		1.82	

Notes: AD = abundance and dominance (Values from the minimum to the maximum) ; F = frequency

The spring aspect on April 28, 1981: Ajuga reptans, Asperula odorata, Carex digitata, Carex pilosa, Cardaminopsis arenosa, Erysimum sp., Galium aparine, Heracleum sphondyleum, Polygonatum multiflorum, Polypodium vulgare, Pulmonaria mollissima, Ranunculus auricomus, Valeriana officinalis.

Table 3. H' , J , N , S values according to species

Species	H'	J	N	S
A Pinus silvestris (cult.)	2.10	0.90	125	5
Quercus petraea	3.06	0.92	455	10
C Anthericum ramosum	0.99	0.99	0.2	2
Anthoxanthum odoratum	0.81	0.81	4	2
Avenella flexuosa	2.93	0.88	477	10
Brachypodium silvaticum	1.30	0.56	22.1	5
Calamagrostis epigeios	0.53	0.33	22	3
Campanula persicifolia	0.43	0.43	1.1	2
Carpinus betulus	1.58	0.99	0.3	3
Galium sp.	1.58	0.99	0.3	3
Genista pilosa	2.58	0.99	0.6	6
Hieracium baubini	1.99	0.99	0.4	4
Hieracium sabaudum	0.81	0.51	1.2	3
Hieracium sylvaticum	0.81	0.51	1.2	3
Luzula albida	2.18	0.65	67.4	10
Melampyrum cristatum	2.89	0.87	21.1	10
Poa nemoralis	0.43	0.43	1.1	2
Quercus petraea	2.58	0.99	0.6	6
Stellaria holostea	0.27	0.27	2.1	2
Vaccinium myrtillus	2.35	0.84	41	7
Veronica officinalis	2.58	0.99	0.6	6
Viscaria vulgaris	0.99	0.99	0.2	2

A = tree layer C = herb layer

Table 4. Distribution of the species in Genisto-Quercetum petraea according to flora elements, and diversity and evenness values of them

Eurasian (-Mediterranean)	9
Central-European	8
Eurasian	7
European (-Mediterranean)	6
European	4
Central-European (-Mediterranean)	3
Central-European (-Submediterranean)	2
Circumpolar	2
Circumpolar-Cosmopolitan	1
Circumpolar-Mediterranean	1
Eurosiberian	2
Eurasian-Eurosiberian	1
European (-Submediterranean)	1
European-Eurasian	1
Subatlantic-Central-European	1
Pannon-Balkan	1
Amphiatlantic	1

 $N = 51$; $S = 17$; $H'_d = 3.59$; $I_d = 0.88$

Where N = number of species; (n = number of species belonging to same type of flora elements); S = number of species distribution area. According to distribution area of species (Table 4) there are several frequent species the Eurasian-Mediterranean, Central-European-Mediterranean,, Eurasian, European-Mediterranean and the European ones.

Table 5. Diversity and evenness by life-form of species of sample plots

	n		n
H	30	MM	3
H-(G)	1	M	4
H-G	1	Ch	1
H-Ch	2	Ch-N	1
H-(Ch)	1	(N)-Ch	1
G	3	Th	1
(G)-H	1	TH	1

$$N = 51; S = 14; H'e = 2.40; J_e = 0.63$$

Where: N = number of species; n = number of species belonging to same life-forms;
S = number of life-forms.

Species list of the Hór valley

Pteridophyta

- | | |
|---|---|
| <i>Asplenium ruta-muraria</i> L. | <i>Cystopteris fragilis</i> (L.) Bernh. |
| Odorvár, surroundings of the Subalyuk cave | <i>Dryopteris filix-mas</i> (L.) Rich. |
| <i>Asplenium septentrionale</i> (L.) Hoffm. Füzérkő | <i>Equisetum arvense</i> L. |
| <i>Asplenium trichomanes</i> L. | <i>Phyllitis scolopendrium</i> (L.) Newm. |
| <i>Athyrium filix-femina</i> (L.) Roth | foot of Odorvár |
| <i>Ceterach officinarum</i> Lam. et DC. | <i>Polypodium vulgare</i> L. |
| Odorvár, surroundings of the Subalyuk cave | |

Gymnospermatophyta

- | | |
|---|--|
| <i>Juniperus communis</i> L. Hosszú-galya | <i>Pinus nigra</i> Arn. Kiserét, Cserépváralja |
| <i>Larix decidua</i> Mill. Oszla | <i>Pinus silvestris</i> L. |
| <i>Picea abies</i> (L.) Karst. Mákszem | Odorhegy, Kiserét, Cserépváralja |

Dicotyledonopsida

- | | |
|---|--|
| <i>Acer campestre</i> L. | <i>Anchusa officinalis</i> L. |
| <i>Acer negundo</i> L. Cserépváralja | <i>Anemone silvestris</i> L. |
| <i>Acer pseudo-platanus</i> L. | <i>Antennaria dioica</i> (L.) Gaertn. |
| <i>Acer tataricum</i> L. Cserépváralja | <i>Anthemis tinctoria</i> L. |
| <i>Achillea asplenifolia</i> Vent. | surroundings of the Subalyuk cave |
| <i>Achillea nobilis</i> L. | <i>Anthriscus silvestris</i> (L.) Hoffm. |
| ssp. <i>neilreichii</i> (Kern) Formánek | <i>Anthyllis macrocephala</i> Wenderoth |
| <i>Achillea pannonica</i> Scheele | <i>Arctium lappa</i> L. |
| <i>Aconitum anthora</i> L. | <i>Aristolochia clematitis</i> L. |
| Odorvár, surroundings of the Subalyuk cave | <i>Artemisia austriaca</i> Jacq. |
| <i>Aconitum moldavicum</i> Hacq. | <i>Asarum europaeum</i> L. |
| surroundings of Füzérkő in the Hór valley | <i>Asperula cynanchica</i> L. |
| <i>Actaea spicata</i> L. | <i>Asperula odorata</i> L. |
| <i>Adonis vernalis</i> L. | <i>Aster amellus</i> L. |
| <i>Aegopodium podagraria</i> L. | surroundings of the Subalyuk cave |
| <i>Agrimonia eupatoria</i> L. | <i>Aster linosyris</i> (L.) Bernh. |
| <i>Ajuga genevensis</i> L. | <i>Astragalus cicer</i> L. |
| <i>Ajuga reptans</i> L. | <i>Astragalus glycyphyllos</i> L. |
| <i>Alliaria petiolata</i> (M.B.) Cavare et Grande | <i>Astrantia major</i> L. foot of Füzérkő |
| <i>Alnus glutinosa</i> (L.) Gaertn. | <i>Asyneuma canescens</i> (W. et K.) Griseb. et Sch. |
| <i>Alyssum montanum</i> L. | <i>Atropa belladonna</i> L. |
| Odorvár, surroundings of the Subalyuk cave | <i>Bellis perennis</i> L. |
| <i>Anagallis arvensis</i> L. | |

- Berberis vulgaris* L.
 surroundings of the Subalyuk cave
Betonica officinalis L.
Biscutella laevigata L.
Brassica sp.
Bupleurum praealtum Nath.
Calamintha clinopodium Spenner Odorhegy
Calamintha officinalis Mönch
Caltha palustris L. ssp. *laeta*
 (Sch., Nym. et Ky.) Hegi
Campanula cervicaria L.
Campanula glomerata L.
Campanula patula L.
Campanula persicifolia L.
Campanula sibirica L.
Campanula trachelium L.
Capsella bursa-pastoris (L.) Medic.
Carduus nutans L. Cserepvárálja
Carlina vulgaris L.
Carpinus betulus L.
Centaurea jacea L.
 ssp. *pannonica* Soó et Jáv.
Centaurea micranthos Gmel.
Centaurea mollis W. et K.
Centaurea sadleriana Janka
Centaurea triumfetti All.
Cephalaria pilosa (L.) Gren.
Cerastium arvense L. ssp. *matrense* (Kit.) Jáv.
 Odorvár, Hosszú-galya
Cerastium vulgatum L.
Cerasus avium Mönch
Cerasus fruticosa (Pall.) Woronow
Cerasus mahaleb Mill.
Chaerophyllum sp.
Chelidonium majus L.
Chrysanthemum corymbosum L. Odorhegy
Chrysosplenium alternifolium L.
Circaea lutetiana L. Odorhegy
Clematis recta L. Mákszem
Clematis vitalba L.
Conium maculatum L.
Convolvulus arvensis L.
Cornus mas L.
Cornus sanguinea L.
Coronilla varia L.
Corylus avellana L.
Cotinus coggygia Scop. Odorvár
Crataegus monogyna Jacq.
Crataegus oxyacantha L.
Cruciata ciliata Opiz. em Soó
Cuscuta sp.
Cynanchum vincetoxicum (L.) Pers.
Cynoglossum officinale L.
Cytisus nigricans L.
Cytisus procumbens (W. et K.) Spr.
Daucus carota L.
Dentaria bulbifera L.
Dentaria enneaphyllos L.
Dianthus pontederiae Kern.
Dianthus deltoides L. Oszla
Dictamnus albus L. Mákszem
Digitalis grandiflora Mill.
Dipsacus laciniatus L.
Doronicum hungaricum (Sadl.) Rchb.
 Odorvár, Hosszú-galya
Dorycnium germanicum (Gremli) Rouy
Echium italicum L. Perpác
Echium russicum Gmel.
Echium vulgare L.
Epilobium parviflorum (Schreb.) With.
Eryngium campestre L.
Erysimum odoratum Ehrh.
Euonymus europeus L.
Euonymus verrucosus Scop.
Euphorbia amygdaloides L.
Euphorbia cyparissias L.
Euphorbia palustris L.
Euphorbia pannonica Host. !
Euphorbia polychroma Kern.
Euphorbia segeriana Necker
Euphrasia stricta Wolf
Fagus silvatica L.
Filipendula vulgaris Mönch, Oszla, Perpác
Fragaria vesca L.
Fraxinus excelsior L.
Fraxinus ornus L.
Fumaria vaillantii Lois.
Galinsoga parviflora Cav.
Galium aparine L.
Galium schultesii Vest.
Galium verum L.
Genista pilosa L. Odorhegy
Genista tinctoria L.
Gentiana ciliata L. Pilske
Gentiana cruciata L. Kistrét
Geranium palustre Torn.
Geranium phaeum L.
Geranium pratense L.
Geranium robertianum L.
Geranium sanguineum L.
Geum urbanum L.
Glechoma hederacea L.
Globularia aphyllanthes Cr.
Gnaphalium silvaticum L.
Hedera helix L.
Helianthemum ovatum (Viv.) Dun.
Helleborus purpurascens W. et K.
Heracleum sphondylium L.
Hesperis matronalis L. Mákszem
Hieracium baubini Schult. Odorhegy
Hieracium sabaudum L. Odorhegy
Hieracium sylvaticum (L.) Grufg. Odorhegy
Hieracium sp.
Hippocrepis comosa L.
Hypericum hirsutum L. Mákszem
Hypericum perforatum L.
Hyssopus officinalis L. !
Impatiens noli-tangere L.

Inula britannica L.
Inula conyzia DC.
Inula ensifolia L.
Inula hirta L.
Isatis tinctoria L. Odorvár
Knautia arvensis (L.) Coult.
Lactuca perennis L.
Lactuca quercina L.
Lamium album L.
Lamium galeobdolon (L.) Nath.
Lamium purpureum L.
Lappula heteracantha (Ledeb.) Borb. !
Lapsana communis L.
Lathraea squamaria L.
Lathyrus hirsutus L.
Lathyrus latifolius L.
Lathyrus tuberosus L.
Lathyrus vernus (L.) Bernh.
Leontodon hispidus L.
Lepidium draba L.
Ligustrum vulgare L.
Linaria genistifolia (L.) Mill. Odorvár
Linaria vulgaris Mill.
Linum austriacum L.
 Odorvár, surroundings of the Subalyuk cave
Lithospermum purpureo-coeruleum L.
Lonicera xylosteum L.
Loranthus europaeus Jacq.
Lotus corniculatus L.
Lunaria rediviva L.
 surroundings of Füzerkő in Hór valley
Lupinus polyphyllus Lindl.
Lychnis coronaria (L.) Desr.
Lychnis flos-cuculi L.
Lycium barbarum L.
Lysimachia nummularia L.
Malus silvestris (L.) Mill.
Malva neglecta Walbr.
Matricaria maritima L. ssp. *inodora* (L.) Soó
Medicago falcata L.
Medicago lupulina L.
Medicago prostrata Jacq.
Medicago sativa L.
Medicago varia Martyn
Melampyrum nemorosum L.
Melampyrum cristatum L.
Melandrium album (Mill.) Garcke.
Melittis grandiflora Sm.
Melilotus officinalis (L.) Lam.
Mentha longifolia Huds.
Mercurialis perennis L.
Minuartia verna (L.) Hiern. Odorvár
Morus alba L.
Mycelis muralis (L.) Wallr.
Myosotis palustris (L.) Nath.
Myosotis silvatica (Ehrh.) Hoffm.
Nepeta pannonica L. Hosszú-galya
Odontites lutea (L.) Clairv.
Onopordum acanthium L.

Onosma visiani Clem.
Origanum vulgare L.
Orobancha sp.
Oxalis acetosella L.
Papaver dubium L. Odorvár
Paronychia cephalotes (M.R.) Bess. Odorvár !
Petasites hybridus (L.) G.M.Sch.
Petroselinum crispum (Mill.) Nym.
Peucedanum oreoselinum (L.) Mönch.
Phlomis tuberosa L. Oszla
Phyteuma orbiculare L.
Plantago major L.
Plantago media L.
Polygala amara L. !
Polygala comosa Schrank
Polygala major Jacq.
Polygonum hydropiper L.
Populus alba L.
Potentilla anserina L.
Potentilla arenaria Borkh.
Potentilla argentea L.
Potentilla reptans L.
Primula elatior (L.) Schreb.
 surroundings of Füzerkő in Hór valley
Primula veris Huds.
Prunella laciniata Nath.
Prunella vulgaris L.
Prunus spinosa L.
Pulmonaria mollissima Kern.
Pulsatilla grandis Wender
Pyrus achras Gartin.
Quercus cerris L.
Quercus petraea (Mattuschka) Lieblein
Quercus pubescens Willd.
Quercus robur L.
Ranunculus acris L.
Ranunculus auricomus L. Mírhó nyak
Ranunculus polyanthemus L.
Ranunculus repens L.
Reseda lutea L.
Rhinanthus minor L.
Rosa sp.
Rubus sp.
Rumex sp.
Salix cinerea L.
Salvia austriaca Jacq.
Salvia nemorosa L.
Salvia pratensis L.
Salvia verticillata L.
Sambucus ebulus L.
Sambucus nigra L.
Sanguisorba minor Scop.
Sanícula europaea L.
Saxifraga paniculata Mill.
Scopolia carniolica Jacq. in Hór valley
Schrophularia nodosa L.
Scutellaria columnae All. !
Sedum acre L.
Sedum album L.

Sedum hispanicum Jusl.
Sedum maximum (L.) Hoffm.
Sempervivum hirtum Jusl.
Senecio nemorensis L.
Seseli osseum Cr. em Simk.

Odorvár, surroundings of the Subalyuk cave

Silene otites (L.) Wib.
Silene vulgaris (Mönch) Garcke
Sisymbrium strictissimum L.
Smyrniolum perfoliatum L.
Solanum dulcamara L.
Solanum nigrum L.
Sorbus aria (L.) Cr.
Sorbus torminalis (L.) Cr.
Spiraea media Fr. Schm. Odorvár
Stachys officinalis Trevis.
Stachys recta L.
Stachys silvatica L.
Staphylea pinnata L.
Stellaria graminea L.
Stellaria holostea L.
Succisa pratensis Mönch
Symphytum officinale L.
Symphytum tuberosum L.
Taraxacum officinale F. Weber ex Wiggers
Telekia spectiosa (Schreb.) Baumg.
in Hór valley, foot of Füzérkö,
Gyertyán valley
Tetragonolobus maritimus Roth
Teucrium chamaedrys L. Derda kaszáló
Thalictrum minus L.
surroundings of the Subalyuk cave
Thymus sp.
Tilia argentea Desf.

Tilia cordata Mill.
Tilia platyphyllos Scop.
Tragopogon dubius Scop.
Trifolium alpestre L.
Trifolium arvense L.
Trifolium campestre Schreb.
Trifolium repens L.
Trifolium rubens L.
Tussilago farfara L.
Ulmus scabra Mill.
Urtica dioica L.
Vaccinium myrtillus L. Odorhegy
Valeriana officinalis L.
Verbascum austriacum Schott.
Verbascum lychnitis L.
Verbascum phoeniceum L.
Veronica chamaedrys L.
Veronica hederifolia L.
Veronica montana L. !
Veronica officinalis L.
Veronica spicata L.
Veronica teucrium L.
Viburnum opulus L.
Vicia faba L.
Vicia grandiflora Scop.
Vicia pisiformis L.
Vinca minor L.
Viola mirabilis L.
Viola silvestris Lam.
Viola tricolor L.
Viola sp.
Viscaria vulgaris Bernh.
Waldsteinia geoides Willd.

Monocotyledonopsida

Agropyron intermedium (Host.) P.B.
Agropyron repens P.B.
Agrostis sp.
Aira sp.
Allium flavum L. Odorvár,
surroundings of the Subalyuk cave
Allium montanum F.W. Schm.
Allium oleraceum L.
Allium sphaerocephalum L.
Alopecurus pratensis L.
Anthericum ramosum L.
Anthoxanthum odoratum L.
Arrhenatherum elatius (L.) Presl.
Arum maculatum L.
Asparagus officinalis L.
Avenella flexuosa (L.) Parl.
Brachypodium pinnatum (L.) P.B.
Brachypodium silvaticum (Huds.) Beauv.
Odorhegy
Briza media L.
Bromus sp.

Calamagrostis epigeios (L.) Roth.
Carex humilis Leyss.
Carex sp.
Cephalanthera longifolia (L.) Fritsch.
Cephalanthera rubra (L.) Rich.
Chrysopogon gryllus (L.) Trin.
Colchicum autumnale L.
Convallaria majalis L.
Dactylis glomerata L.
Epipactis sp.
Festuca cinerea Vill.
Festuca gigantea (L.) Vill.
Festuca rupicola Heuff.
Festuca sp.
Hordeum murinum L.
Iris pumila L. Odorvár
Iris variegata L.
Koeleria sp.
Lilium martagon L. Mákszem
Lolium perenne L.
Luzula albida (Hoffm.) DC. Odorhegy

<i>Majanthemum bifolium</i> (L.) F.W.Schm.	<i>Phleum phleoides</i> (L.) Smk.
<i>Melica ciliata</i> L.	<i>Phragmites communis</i> Trin.
<i>Melica nutans</i> L.	<i>Platanthera bifolia</i> (L.) Rich.
<i>Melica uniflora</i> Retz.	<i>Poa compressa</i> L.
<i>Milium effusum</i> L.	<i>Poa nemoralis</i> L.
<i>Muscari comosum</i> (L.) Mill.	<i>Poa pratensis</i> L.
<i>Muscari tenuiflorum</i> Tausch.	<i>Polygonatum odoratum</i> (Mill.) Druce.
<i>Neottia nidus-avis</i> (L.) Rich.	<i>Sesleria hungarica</i> Ujhelyi,
<i>Orchis purpurea</i> Huds. Hosszú-galya	Odorvár, Hosszú-galya
<i>Ornithogalum umbellatum</i> L.	<i>Stipa capillata</i> L. Odorvár
<i>Paris quadrifolia</i> L.	

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