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PHYTOSOCIOLOGICAL AND ECOLOGICAL EVALUATION OF SELECTED HABITATS OF *TELEKIA SPECIOSA* (SCHREB.) BAUMG. (ASTERACEAE)

K. DOBOLYI

Department of Botany, Hungarian Natural History Museum
H-1476 Budapest, Pf. 222, Hungary; E-mail: dobolyi@bot.nhmus.hu

Phytosociological and ecological investigation of *Telekia speciosa* habitats has been carried out in Hungary, Carpathian Mountains and on the Balkan Peninsula based on 78 relevés. The raw data matrix and the phytosociological matrix were analysed by a number of multivariate methods. Statistics of life forms, phytosociological characters, social behaviour types and ecological indicator values are given. The ecological range of *Telekia speciosa* is relatively wide and it occurs in numerous types of vegetation: suffruticose associations along streams, beech woodlands and riverine ash-alder woodlands.

Key words: *Telekia speciosa*, phytosociology, ecological indicator values, social behaviour types, multivariate data analysis

INTRODUCTION

According to flora works the wild distribution of *Telekia speciosa* (Schreb.) Baumg. contains areas of the SE Alps, Carpathians, Balkan Peninsula, Asia Minor and the Caucasus. First of all it occurs in the montane habitats of cool, humid climate, usually along streams. In Hungary, native occurrence of this species is in the Bükk Mts. Other occurrences, *e.g.* Zemplén Mts, near Sopron, or Zala Hills among others, are surely subspontaneous or deliberately planted. On the other hand, it has long been cultivated in gardens as an ornamental plant, from where it easily escapes.

In western Europe it appeared about at the beginning of the 20th century and began breeding intensively in the U. K., Germany, Belgium and in other countries. According to observations, in the last few years it started becoming an agressive invador in some places in Belgium and seriously threatens the native vegetation.

Phytosociological study and examination of its ecological requirements in the native distribution range can help to understand the invasive behaviour of this species. Investigations on this matter were conducted and the results published about 20 years ago (DOBOLYI 1983). Since methods for multivariate data analysis and statistics have been developed intensively in recent years, a new evaluation of early data can provide essential new information about the ecological and phytosociological characteristics of this species.

MATERIAL AND METHODS

The evaluation is based on 78 phytosociological relevés of 5 m × 5 m size taken on the habitat of *Telekia speciosa* in the Bükk Mts (NE Hungary), in the eastern Carpathians (Bodok Mts, Transylvania), in the Vitosa and Rila Mts (Bulgaria) (DOBOLYI 1983). Data of the relevés are summarized in Table 1.

Table 1. Additional data of the relevés.

No	Site	Date	Altitude (m s. m.)	Exposure	Angle of slope (°)	Parent material
1	Bodoki Mts	23.07.1974	650	N	15	andesite
2	Bodoki Mts	23.07.1974	650	N	5	andesite
3	Bodoki Mts	12.06.1976	750	NW	15	andesite
4	Bodoki Mts	27.07.1977	800	N	5	andesite
5	Bodoki Mts	11.08.1977	900	N	5	andesite
6	Bodoki Mts	01.07.1976	1000	N	5	andesite
7	Bodoki Mts	05.07.1977	800	N	3	andesite
8	Bodoki Mts	12.06.1976	730	N	8	andesite
9	Bodoki Mts	09.08.1977	720	N	10	andesite
10	Bodoki Mts	13.08.1976	950	S	30	andesite
11	Bodoki Mts	20.07.1976	1000	NE	20	andesite
12	Bodoki Mts	05.07.1977	850	N	5	andesite
13	Rila Mts	20.06.1981	900	NE	15	granit
14	Rila Mts	25.06.1981	800	SW	20	granit
15	Rila Mts	20.06.1981	850	NE	15	granit
16	Rila Mts	25.06.1981	800	W	10	granit
17	Vitosa Mts	27.06.1981	800	NE	5	cristal shale
18	Vitosa Mts	27.06.1981	700	N	30	cristal shale
19	Vitosa Mts	27.06.1981	750	E	20	cristal shale
20	Vitosa Mts	27.06.1981	700	NE	15	cristal shale
21	Vitosa Mts	27.06.1981	700	N	40	granit
22	Vitosa Mts	27.06.1981	700	N	45	cristal shale
23	Vitosa Mts	27.06.1981	750	N	20	cristal shale
24	Vitosa Mts	27.06.1981	1000	NE	10	granit
25	Bodoki Mts	15.09.1981	650	SW	5	andesite
26	Bodoki Mts	15.09.1981	650	W	50	andesite
27	Bodoki Mts	15.09.1981	700	W	40	andesite
28	Bodoki Mts	15.09.1981	650	–	0	andesite
29	Bodoki Mts	17.09.1981	900	SW	10	andesite tuff
30	Bodoki Mts	17.09.1981	900	SW	10	andesite tuff

Table 1 (continued)

No	Site	Date	Altitude (m s. m.)	Exposure	Angle of slope (°)	Parent material
31	Bodoki Mts	17.09.1981	900	SW	10	andesite
32	Bodoki Mts	17.09.1981	900	W	5	andesite
33	Bodoki Mts	17.09.1981	900	SW	10	andesite
34	Bodoki Mts	17.09.1981	900	S	5	andesite
35	Rila Mts	19.06.1981	650	–	0	granit
36	Rila Mts	20.06.1981	750	N	30	granit
37	Rila Mts	25.06.1981	800	SW	10	granit
38	Rila Mts	25.06.1981	750	S	5	granit
39	Vitosa Mts	27.06.1981	750	NE	5	cristal shale
40	Rila Mts	25.06.1981	700	–	0	granit
41	Rila Mts	25.06.1981	700	–	0	granit
42	Rila Mts	25.06.1981	730	–	0	granit
43	Rila Mts	25.06.1981	1000	NW	15	granit
44	Rila Mts	25.06.1981	800	–	0	granit
45	Rila Mts	25.06.1981	800	–	0	granit
46	Rila Mts	25.06.1981	750	–	0	granit
47	Vitosa Mts	27.06.1981	650	E	5	cristal shale
48	Vitosa Mts	27.06.1981	800	E	10	cristal shale
49	Vitosa Mts	27.06.1981	800	E	5	cristal shale
50	Rila Mts	19.06.1981	700	–	0	granit
51	Rila Mts	19.06.1981	900	N	25	granit
52	Rila Mts	19.06.1981	800	NE	30	granit
53	Vitosa Mts	27.06.1981	700	N	45	cristal shale
54	Bodoki Mts	17.09.1981	900	W	5	andesite
55	Bodoki Mts	17.09.1981	900	W	5	andesite
56	Bodoki Mts	17.09.1981	950	SW	10	andesite
57	Bodoki Mts	17.09.1981	850	W	10	andesite
58	Bodoki Mts	17.09.1981	900	W	15	andesite
59	Bodoki Mts	17.09.1981	900	W	10	andesite
60	Bodoki Mts	17.09.1981	900	W	5	andesite
61	Bodoki Mts	16.09.1981	750	W	15	andesite
62	Bodoki Mts	16.09.1981	650	W	5	andesite
63	Bodoki Mts	16.09.1981	650	SW	10	andesite
64	Bodoki Mts	17.09.1981	750	W	20	andesite
65	Bodoki Mts	16.09.1981	650	SW	5	andesite
66	Bodoki Mts	16.09.1981	700	W	10	andesite
67	Bodoki Mts	16.09.1981	700	W	10	andesite tuff
68	Bodoki Mts	16.09.1981	750	W	15	andesite tuff

Table 1 (continued)

No	Site	Date	Altitude (m s. m.)	Exposure	Angle of slope (°)	Parent material
69	Bodoki Mts	16.09.1981	850	NE	30	andesite
70	Bodoki Mts	16.09.1981	800	E	25	andesite tuff
71	Bodoki Mts	17.09.1981	750	W	5	andesite
72	Vitosa Mts	27.06.1981	800	NE	5	granit
73	Bükk Mts	04.08.1981	300	–	0	limestone
74	Bükk Mts	20.06.1981	300	–	0	limestone
75	Bükk Mts	31.07.1981	400	–	0	limestone
76	Bükk Mts	31.07.1981	450	–	0	clay shale
77	Bükk Mts	31.07.1981	450	–	0	clay shale
78	Bükk Mts	31.07.1981	450	–	0	clay shale

The relevés were analysed by the following multivariate numerical methods with SYN-TAX 5.1 and SYN-TAX 2000 program packages (PODANI 1993, 2001).

1) hierarchical classifications:

– distance optimizing procedures: single link, complete link, group average (UPGMA),

– global optimization,

– ordinal clustering,

2) ordinations:

– centered principal component analysis (PCA),

– principal coordinate analysis (metric multidimensional scaling) (PCoA),

– correspondence analysis (COA),

– symmetric weighting,

3) block clustering (of raw data matrices), sum of squares.

The applied distance coefficients (used as dissimilarity): Euclidean distance, Jaccard, Sørensen, Bray-Curtis, similarity ratio, Goodman-Kruskal's gamma, Kendall's tau, Podani's discordance (PODANI 1997).

All mentioned multivariate analyses were performed on two data matrices:

"Matrix A": relevé/species matrix: 78 objects/235 variables. The original cover values according to Braun-Blanquet have been converted to a numerical scale of 0 to 6 in the following way: absence→0, +→1, 1→2, 2→3, 3→4, 4→5, 5→6.

"Matrix B": relevé/phytosociological character matrix: 78 objects/32 variables. The values were calculated in the following way: cover values of species having the same phytosociological character were summed pro relevés.

Based on multivariate analyses (classifications, ordinations and block clustering) four groups of relevés were separated. (These groups are not identical with those in DOBOLYI (1983).)

The groups of relevés were analysed statistically on the basis of the following characteristics of their species: life form, phytogeographical area (floral element) (HORVÁTH *et al.* 1995), phytosociological character, social behaviour type and ecological indicator values (BORHIDI 1993). (BORHIDI has applied ELLENBERG's relative ecological indicator value system to the Hungarian

flora. The general concept and the scales follow ELLENBERG *et al.* (1991), so the two systems are compatible.) The values of features characterizing the sample groups were calculated according to percentage pro rata of plant mass (DOBOLYI 1992).

Abbreviations of the names of plant species follow the "MEMO" field in HORVÁTH *et al.* (1995).

RESULTS

Results of classifications

The multivariate analyses uncovered the structure of the data matrices, the distances of relevés and their groups. Comparison of classifications of "matrix A" (based on the floral composition) and "matrix B" (based on the phytosociological character) provides the following results:

1) Classifications of "matrix B" give much more homogeneous groups than "matrix A".

2) The dendrograms obtained by the different methods are more similar to each other in the case of "matrix B" than "matrix A".

3) The clusters obtained by the same methods are connected at lower dissimilarity values in the case of "matrix B" than "matrix A".

The different methods for classifications provide varied and different results. Among the numerous methods the global optimizing with Bray-Curtis coefficient has provided the most relevant classifications (Figs 1–2). The dendrograms of

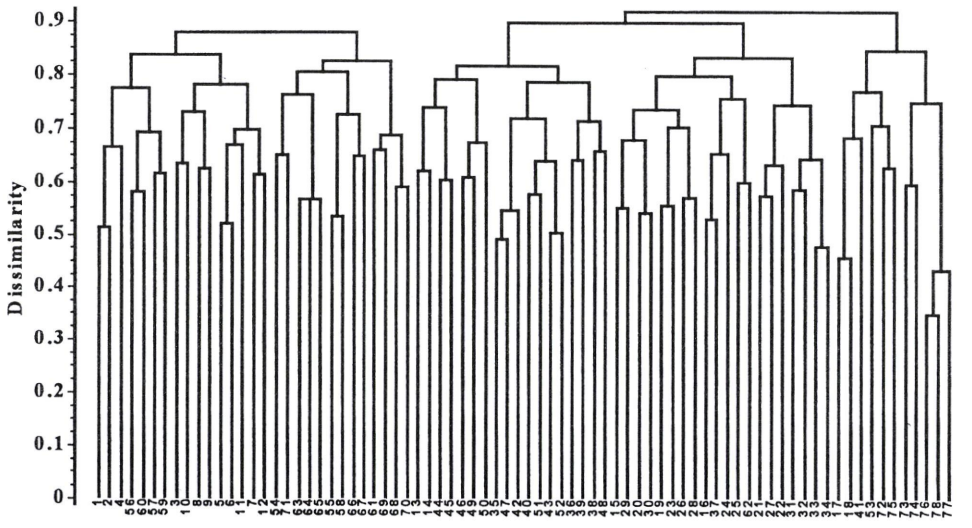


Fig. 1. Dendrogram of "matrix A", global optimization, Bray-Curtis.

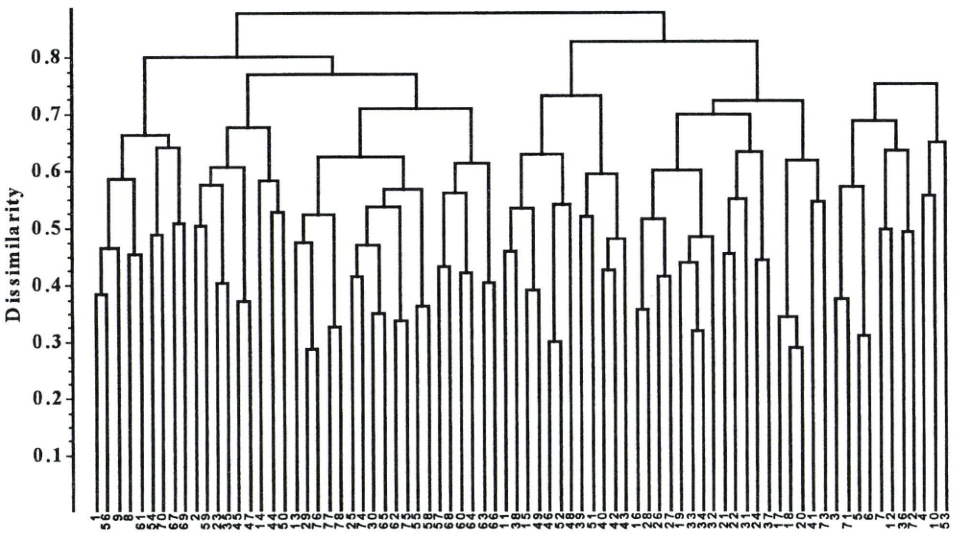


Fig. 2. Dendrogram of "matrix B", global optimization, Bray-Curtis.

"matrix A" and "matrix B" give essentially the same groups, but the dissimilarity values are significantly higher in the case of "matrix A" than "matrix B".

Results of the ordination methods

The first three components of the centered PCA explain *ca* 67% of the variance in the case of "matrix B" and 27% in the case of "matrix A".

Scattergrams of PCA show that the patterns of relevés (objects) in the abstract space of variables are "diffuse" and the distribution of the objects are rather different in the case of "matrix A" and "matrix B" (Figs 3–4). It is as much as saying that the groups of the relevés are not separated clearly and there are a number of transitions between them.

According to biplots of PCA and joint plots of COA the "beech woodland" (Fagetalia and Fagion sylvaticae) species and the indifferent species have importance in determination of the vegetation structure.

Results of the block clustering

Block clustering of "matrix A" and "matrix B" make clear the correspondence between the groups of relevés and groups of species and phytosociological

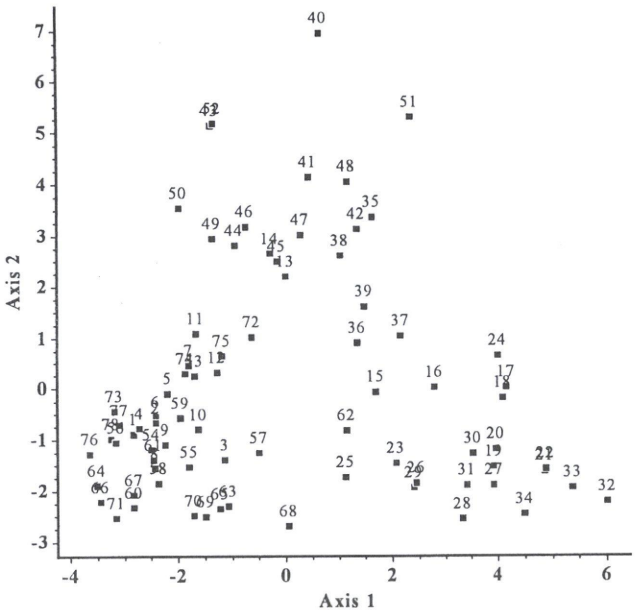


Fig. 3. Centered principal component analysis (PCA) of "matrix A".

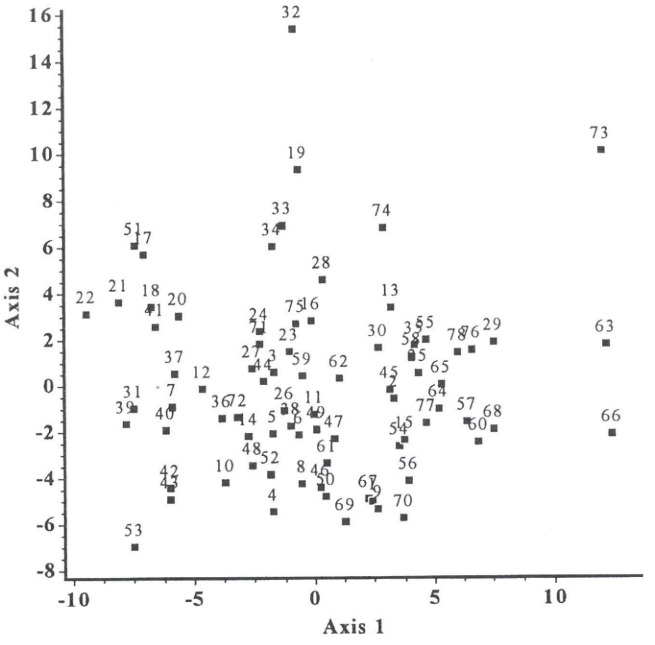


Fig. 4. Centered principal component analysis (PCA) of "matrix B".

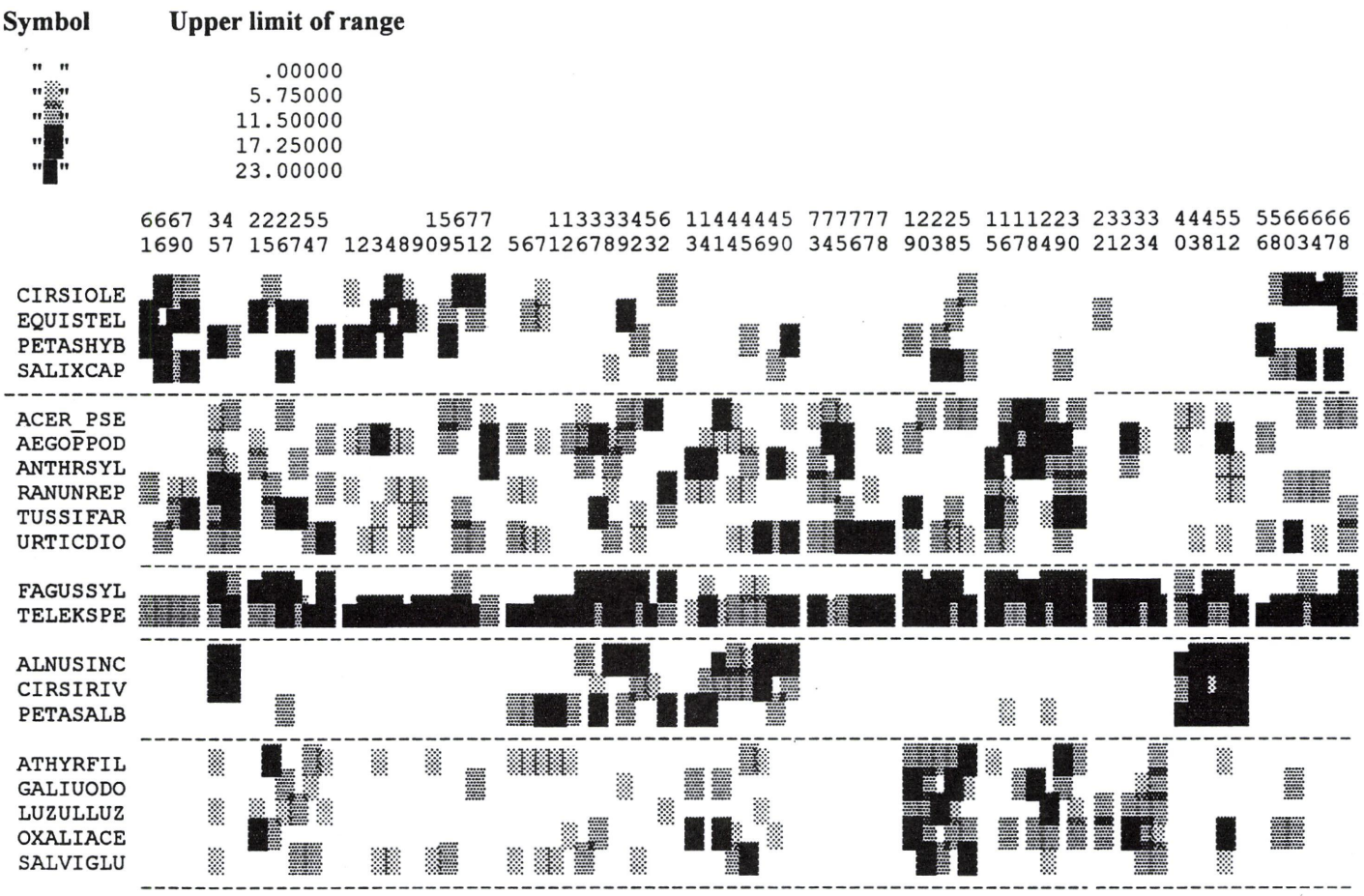

Symbol
Upper limit of range
.00000
5.75000
11.50000
17.25000
23.00000
6667 34 222255 15677 113333456 11444445 777777 12225 1111223 23333 44455 5566666
1690 57 156747 12348909512 567126789232 34145690 345678 90385 5678490 21234 03812 6803478
CIRSIOLE
EQUISTEL
PETASHYB
SALIXCAP
ACER_PSE
AEGOPPOD
ANTHRSYL
RANUNREP
TUSSIFAR
URTICDIO
FAGUSSYL
TELEKSPE
ALNUSINC
CIRSIRIV
PETASALB
ATHYRFIL
GALIUODO
LUZULLUZ
OXALIACE
SALVIGLU

Fig. 5. Significant parts of block-clustering of "matrix A".

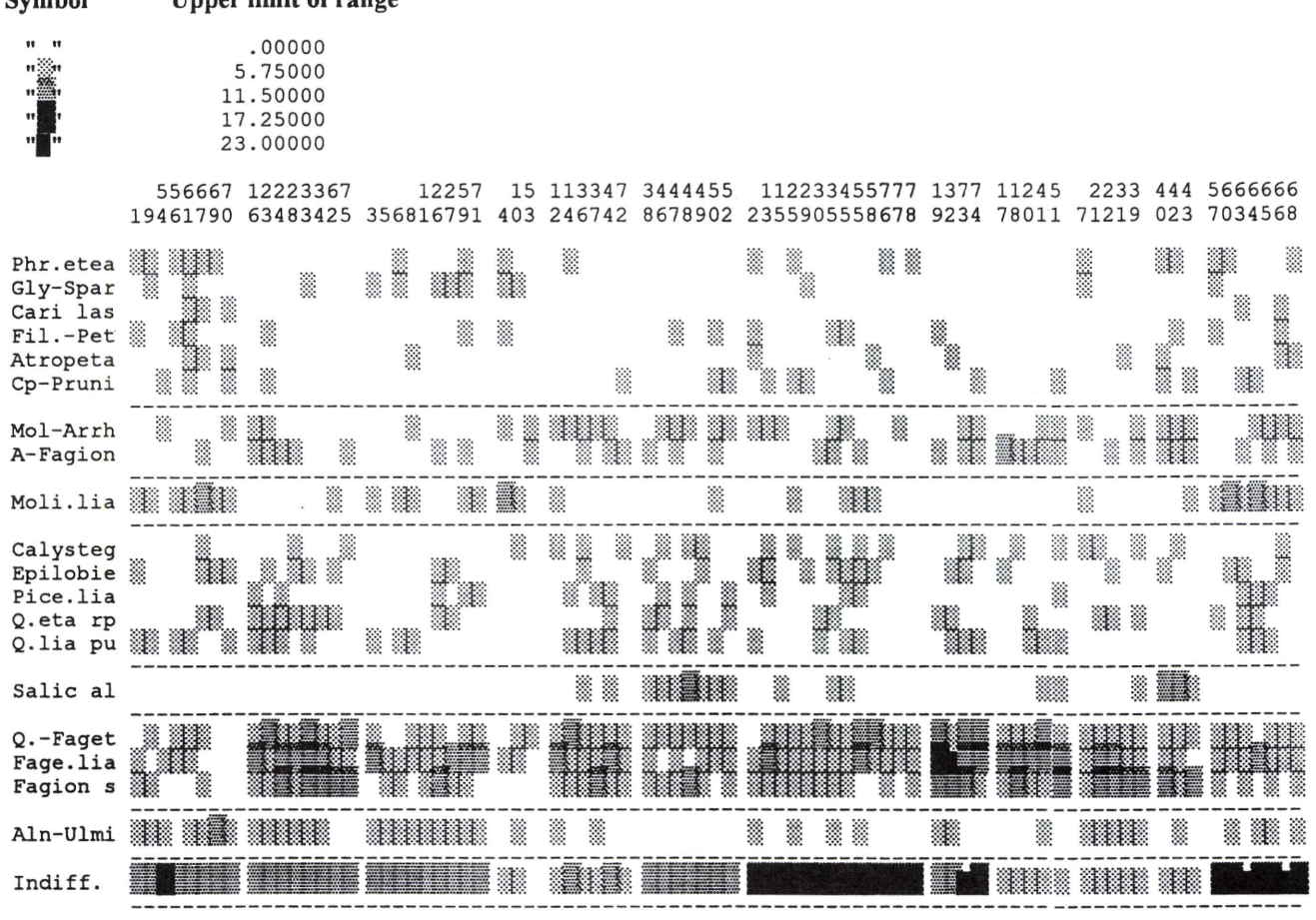


Fig. 6. Significant parts of block-clustering of "matrix B".

characters, respectively (Figs 5–6). This method is also particularly useful at separating groups for statistical analyses. The blocks differenciate those few variables, which characterize the groups of relevés.

Block clustering of "matrix A" shows that 141 accident plant species occur in the relevés (60%). This extremely high proportion causes difficulties at habitat evaluation based on the floral composition.

In the block diagram of the "matrix B" it is remarkable that the Indifferent group is a determining factor in all relevé blocks (Fig. 6).

Results of statistical analyses

Four groups of relevés have been separated on the basis of a consensus among the results of classifications, ordinations and block clustering methods. These groups represent the different vegetation types where *Telekia speciosa* occurs, but the relevés (representing the habitats) do not create clearly discrete groups that could be identified with well defined plant communities. Most relevés or their groups represent mixed or disturbed vegetation types.

Group I

Relevés: 1, 9, 54, 56, 61, 67, 69, 70.

Highest proportion of Balkan floral elements (Table 3) and Filipendulo-Petasition species, high proportion of indifferent species (Table 4), many Hydato-helophyta, few trees (Table 2) and many halflight plants (Table 10) are significant.

Table 2. Distribution of life forms (ranking according to HORVÁTH *et al.* (1995)) (expressed in percentage).

	Groups of relevés				
Life form	I	II	III	IV	Total
Mega-mesophanerophyta	5.3	11.9	24.2	19.0	14.4
Microphanerophyta	4.1	2.7	1.6	2.6	3.5
Nanophanerophyta	2.4	1.8	1.6	0.5	1.2
Chamaephyta	0.4	–	0.7	0.9	0.5
Geophyta	12.6	7.5	12.1	13.7	11.5
Hydato-helophyta	2.9	0.4	–	0.5	0.7
Hemicryptophyta	70.7	71.1	54.6	59.4	63.7
Hemitherophyta	–	0.6	–	–	0.6
Therophyta	1.6	4.0	5.2	3.3	3.9

This group seems to be close to some kind of suffruticose community. Characteristic species: *Petasites hybridus*.

Group II

Relevés: 13, 25, 29, 30, 57–58, 60, 63–66, 68, 76–78.

Highest proportion of cosmopolitan elements (Table 3), indifferent species (Table 4) and disturbance tolerant species (Table 5) are significant. This is a disturbed, weedy vegetation type. Characteristic species: *Urtica dioica*.

Group III

Relevés: 11, 38–40, 42–43, 46, 48–49, 52.

Table 3. The phytogeographical spectrum of the groups of relevés (ranking according to HORVÁTH *et al.* (1995)) (expressed in percentage).

	Groups of relevés				
Area	I	II	III	IV	Total
Cosmopolitan	9.4	17.0	8.5	8.4	10.8
Circumpolar	19.1	9.3	21.6	17.1	13.4
Eurasian	39.0	38.2	26.1	25.0	32.7
Continental	0.8	0.2	1.0	0.5	0.5
European	12.2	11.7	14.1	11.4	14.7
Central European	6.1	13.9	15.4	25.3	15.4
Central European–Alpin	–	0.2	2.9	1.2	0.8
Sub-Mediterranean	0.4	0.6	0.7	0.7	1.0
East sub-Mediterranean	–	–	–	–	0.1
Pontic	–	–	–	1.2	0.3
Pontic–Sub-Mediterranean	–	–	–	–	0.1
Atlantic–Sub-Mediterranean	0.4	–	–	1.2	0.3
Subatlantic	–	–	0.7	0.9	0.6
Sarmatian	–	0.6	–	–	0.1
Dacic (East Carpathian)	0.4	–	–	–	0.2
Carpathian endemic	–	–	0.7	0.4	0.2
Pannonian–Balkan	–	–	–	–	0.04
Balkan	12.2	8.4	8.5	6.5	8.7
Unknown	–	–	–	0.2	0.1

Table 4. Distribution of phytosociological characters on the sites (BORHIDI 1993) (expressed in percentage).

	Groups of relevés				
Phytosociological character	I	II	III	IV	Total
Phragmitetea	4.1	1.8	1.0	–	1.1
Phragmitetalia	–	–	1.3	–	0.3
Glycerio-Sparganion	2.0	0.6	–	0.4	0.7
Magnocaricion	–	–	–	0.4	0.2
Montio-Cardaminetalia	0.4	–	1.0	–	0.3
Caricion lasiocarpae	3.3	0.9	–	–	0.5
Chenopodietea	–	1.3	1.0	–	0.4
Calystegietalia	0.4	0.7	2.0	0.9	1.3
Glechometalia	–	0.9	–	0.9	0.5
Molinio-Arrhenatheretea	0.4	1.5	5.9	0.7	2.9
Molinietalia	9.8	6.8	–	–	3.3
Filipendulo-Petasition	15.9	9.5	9.2	6.9	10.3
Polygono-Trisetion	–	–	0.7	0.9	0.6
Cynosurion	–	0.2	0.7	0.4	0.5
Epilobietea angustifoliae	3.7	1.7	1.6	1.8	1.9
Atropetalia	2.0	1.1	–	0.7	0.7
Piceetalia	–	1.7	2.0	1.2	1.3
Vaccinio-Abietion	–	0.4	0.7	1.1	0.6
Salicion albae	–	–	12.8	0.9	2.4
Quercetea robori-petraeae	2.0	1.1	3.9	4.0	2.0
Quercetalia robori-petraeae	0.4	0.4	0.3	0.4	0.6
Pino-Quercion	0.8	–	–	1.2	0.5
Querco-Fagetea	4.1	7.0	7.8	9.7	8.4
Quercetalia pubescentis-petraeae	1.6	0.6	0.7	1.2	1.3
Fagetalia	4.1	11.0	5.9	23.2	13.5
Fagion sylvaticae	1.2	5.9	15.4	16.0	9.6
Acerio-Fagion	0.8	1.1	2.0	4.4	2.4
Tilio-Acerion	–	0.2	1.6	0.5	0.5
Alno-Ulmion	7.7	1.5	2.0	5.6	3.6
Carpino-Prunion	2.4	1.8	1.6	–	1.0
Indifferent	32.1	40.3	18.9	16.7	25.8

Table 5. Distribution of the social behaviour types on the sites (BORHIDI 1993) (expressed in percentage).

	Groups of relevés				
Social behaviour type	I	II	III	IV	Total
Specialists	16.7	10.4	16.0	20.6	16.7
Competitors	22.8	20.7	23.5	33.7	24.2
Generalists	27.2	30.4	37.5	27.6	31.4
Disturbance tolerants	32.5	34.5	18.3	16.0	24.6
Weeds	–	1.7	2.0	0.5	1.0
Introduced alien species	–	1.7	2.0	1.2	1.3
Ruderal competitors	0.8	0.6	0.7	0.2	0.5
Unknown	–	–	–	0.2	0.3

Table 6. Distribution of the temperature preference categories on the sites (BORHIDI 1993) (expressed in percentage).

Temperature preference categories	Groups of relevés				
	I	II	III	IV	Total
1–2	–	–	–	–	–
3	2.4	2.4	2.3	2.1	2.1
4	11.8	4.8	19.0	9.0	8.8
5	50.8	64.3	52.6	68.0	60.2
6	35.0	28.1	25.8	20.7	27.8
7	–	–	–	–	0.4
8	–	0.4	0.3	–	0.2
9	–	–	–	–	–
Unknown	–	–	–	0.2	0.5

Very high proportion of Salicion albae species, relatively high proportion of Fagion species (Table 4), many generalists (Table 5) are significant. Characterization of this group is not simple and clear. It is considered to be a transition between riverine ash-alder woodlands, suffruticose communities and beech woodlands. Characteristic species: *Alnus incana, Cirsium rivulare* and *Petasites albus.*

Table 7. Distribution of the water preference categories on the sites (BORHIDI 1993) (expressed in percentage).

Water preference categories	Groups of relevés				
	I	II	III	IV	Total
1	–	–	–	–	–
2	–	0.2	–	0.4	0.3
3	0.8	0.6	1.3	0.5	0.7
4	2.9	2.2	1.0	0.9	1.4
5	21.5	30.7	23.5	40.4	30.1
6	7.7	18.1	19.3	24.1	19.5
7	30.9	31.2	36.6	27.2	31.5
8	22.0	10.6	10.8	4.2	10.5
9	14.2	6.4	7.5	2.1	5.7
10–12	–	–	–	–	–
Unknown	–	–	–	0.2	0.3

Table 8. Distribution of the reaction preference categories on the sites (BORHIDI 1993) (expressed in percentage).

Reaction preference categories	Groups of relevés				
	I	II	III	IV	Total
1–2	–	–	–	–	–
3	1.6	1.1	1.6	1.2	0.9
4	2.4	3.1	5.2	6.9	4.3
5	7.3	4.8	4.6	4.8	4.9
6	47.2	48.8	39.6	42.7	44.6
7	15.1	21.4	17.0	28.3	23.0
8	26.4	20.8	32.0	16.0	22.0
9	–	–	–	–	–
Unknown	–	–	–	0.1	0.3

Table 9. Distribution of the nitrogen preference categories on the sites (BORHIDI 1993) (expressed in percentage).

Nitrogen preference categories	Groups of relevés				
	I	II	III	IV	Total
1	–	–	–	–	0.1
2	4.1	1.7	1.0	1.1	1.4
3	7.3	5.8	5.2	4.0	5.4
4	11.0	10.2	22.8	11.6	13.0
5	22.0	27.2	14.1	25.3	21.8
6	21.5	23.4	27.1	22.7	23.3
7	17.9	14.8	15.4	20.9	18.3
8	13.0	9.0	10.8	11.6	11.8
9	3.2	7.9	3.6	2.6	4.6
Unknown	–	–	–	0.2	0.3

Table 10. Distribution of the light preference categories on the sites (BORHIDI 1993) (expressed in percentage).

Light preference categories	Groups of relevés				
	I	II	III	IV	Total
1	–	–	–	–	–
2	0.4	2.7	0.3	7.7	3.2
3	–	6.9	5.6	15.1	6.7
4	10.2	13.0	26.8	33.7	23.8
5	10.2	11.0	9.5	12.0	11.8
6	14.2	19.4	18.3	6.9	13.9
7	52.0	37.1	32.7	19.3	32.3
8	7.3	6.4	1.6	1.8	4.0
9	5.7	3.5	5.2	3.3	3.9
Unknown	–	–	–	0.2	0.4

Table 11. Distribution of the continentality preference categories on the sites (BORHIDI 1993) (expressed in percentage).

Continentality preference categories	Groups of relevés				
	I	II	III	IV	Total
1	–	–	–	0.9	0.2
2	11.0	8.8	16.0	23.3	14.1
3	33.7	36.3	19.9	31.8	31.2
4	32.1	30.2	46.8	24.1	33.9
5	21.6	21.5	10.1	17.1	16.0
6	0.8	2.3	6.5	2.1	3.2
7	0.4	0.9	0.7	0.5	1.0
8	0.4	–	–	–	0.1
9	–	–	–	–	–
Unknown	–	–	–	0.2	0.3

Group IV

Relevés: 16–22, 24, 27–28, 31–34, 37, 41.

Highest proportion of Querco-Fagetea, Fagetalia and Fagion sylvaticae species, lowest proportion of indifferent species (Table 4), high proportion of specialists and competitors (Table 5) are significant. This group can be identified with beech woodlands. Characteristic species: *Fagus sylvatica, Oxalis acetosella.*

DISCUSSION

Results of the multivariate analyses indicate that the phytosociological character of the plant species can be very useful at evaluation and characterizing of vegetation types. All methods performed on "matrix B" have provided more informative results than "matrix A". It means that the phytosociological character of the species can effectively concentrate the relevant information about the vegetation.

The statistical analyses according to the characteristics of the associated plant species prove that the phytosociological and ecological range of *Telekia speciosa* is wide. Distribution of ecological indicator values varies in a wide range (Tables 6 to 11). Although *T. speciosa* is considered to be a Filipendulo-Petasition species (SOÓ 1980, BORHIDI 1993), it occurs in a number of different plant communities and vegetation types including disturbed and weedy vegetation.

The following facts verify and affirm that *T. speciosa* can become an invador under suitable circumstances: high proportion of indifferent and disturbance tolerant species in its habitats, the wide range in the distribution of reaction, nitrogen and light preference categories (Tables 8–10). The distributions of temperature, water and continentality preference categories indicate those characterictics of *T. speciosa* that can explain why this species is becoming invasive in western Europe: low level of continentality (Table 11), cool, humid, steady, and temperate climate, wet soil with abundant nutriment content (Tables 6–9).

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The Editor of Studia Botanica Hungarica
H-1476 Budapest, Pf. 222, Hungary
Fax: +36-1-3141483
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