

Appendix A

Example data matrices

The sample data files can be downloaded in zipped format (TBLS.ZIP) from the following web address: <http://ramet.elte.hu/~podani>

The archive may be decompressed by the PKUNZIP program.

Table A1. Vegetation data for 12 species and 8 sites (sampling units). The values are percentage cover estimates. The data are a subset of a more extensive table comprising 123 species and 80 sites from the rock grasslands of Sas-hill, Budapest, Podani (1985). From left to right, the sites represent a series from the open grassland (*Festucetum pallentis*) to a closed relic grassland community (*Seslerietum sadleriana*).

Species	Sites							
	1	2	3	4	5	6	7	8
<i>Bromus erectus</i>	5	7	18	0	1	0	50	11
<i>Campanula sibirica</i>	0	1	0	0	0	0	2	1
<i>Carex humilis</i>	1	0	0	0	0	0	1	4
<i>C. liparicarpos</i>	2	0	1	1	3	1	0	0
<i>Centaurea sadleriana</i>	1	1	1	4	1	2	3	3
<i>Chrysopogon gryllus</i>	30	8	5	0	4	0	0	0
<i>Festuca pallens</i>	20	11	5	15	25	4	6	2
<i>Fumana procumbens</i>	3	11	7	5	7	12	3	2
<i>Koeleria cristata</i>	5	1	2	1	1	0	2	1
<i>Scabiosa canescens</i>	1	10	0	0	0	0	2	8
<i>Seseli leucospermum</i>	25	15	0	8	25	1	1	0
<i>Sesleria sadleriana</i>	0	0	0	0	0	0	4	70

Table A2. Flower morphological measurements for three iris species (from left to right: *Iris setosa*, *I. versicolor* and *I. virginica*), each represented by 50 specimens. The four variables are sepal length, sepal width, petal length and petal width (this order within each main column) (Anderson 1935, 1936).

5.10	3.50	1.40	0.20	7.00	3.20	4.70	1.40	6.30	3.30	6.00	2.50
4.90	3.00	1.40	0.20	6.40	3.20	4.50	1.50	5.80	2.70	5.10	1.90
4.70	3.20	1.30	0.20	6.90	3.10	4.90	1.50	7.10	3.50	5.90	2.10
4.00	3.10	1.50	0.20	5.50	2.30	4.00	1.30	6.30	2.90	5.60	1.80
5.00	3.60	1.40	0.20	6.50	2.80	4.60	1.50	6.50	3.00	5.80	2.20
5.40	3.90	1.70	0.40	5.70	2.80	4.50	1.30	7.60	3.00	6.60	2.10
4.60	3.40	1.40	0.30	6.30	3.30	4.70	1.60	4.90	2.50	4.50	1.70
5.00	3.40	1.50	0.20	4.90	2.40	3.30	1.00	7.30	2.90	6.30	1.80
4.40	2.90	1.40	0.20	6.60	2.90	4.60	1.30	6.70	2.50	5.80	1.80
4.90	3.10	1.50	0.10	5.20	2.70	3.90	1.40	7.20	3.60	6.10	2.50
5.40	3.70	1.50	0.20	5.00	2.00	3.50	1.00	6.50	3.20	5.10	2.00
4.80	3.40	1.60	0.20	5.90	3.00	4.20	1.50	6.40	2.70	5.30	1.90
4.80	3.00	1.40	0.10	6.00	2.20	4.00	1.00	6.80	3.00	5.50	2.10
4.30	3.00	1.10	0.10	6.10	2.90	4.70	1.40	5.70	2.50	5.00	2.00
5.80	4.00	1.20	0.20	5.60	2.90	3.60	1.30	5.80	2.80	5.10	2.40
5.70	4.40	1.50	0.40	6.70	3.10	4.40	1.40	6.40	3.20	5.30	2.30
5.40	3.90	1.30	0.40	5.60	3.00	4.50	1.50	6.50	3.00	5.50	1.80
5.10	3.50	1.40	0.30	5.80	2.70	4.10	1.00	7.70	3.80	6.70	2.20
5.70	3.80	1.70	0.30	6.20	2.20	4.50	1.50	7.70	2.60	6.90	2.30
5.10	3.80	1.50	0.30	5.60	2.50	3.90	1.10	6.00	2.20	5.00	1.50
5.40	3.40	1.70	0.20	5.90	3.20	4.80	1.80	6.90	3.20	5.70	2.30
5.10	3.70	1.50	0.40	6.10	2.80	4.00	1.30	5.60	2.80	4.90	2.00
4.60	3.60	1.00	0.20	6.30	2.50	4.90	1.50	7.70	2.80	6.70	2.00
5.10	3.30	1.70	0.50	6.10	2.80	4.70	1.20	6.30	2.70	4.90	1.80
4.80	3.40	1.90	0.20	6.40	2.90	4.30	1.30	6.70	3.30	5.70	2.10
5.00	3.00	1.60	0.20	6.60	3.00	4.40	1.40	7.20	3.20	6.00	1.80
5.00	3.40	1.60	0.40	6.80	2.80	4.80	1.40	6.20	2.80	4.80	1.80
5.20	3.50	1.50	0.20	6.70	3.00	5.00	1.70	6.10	3.00	4.90	1.80
5.20	3.40	1.40	0.20	6.00	2.90	4.50	1.50	6.40	2.80	5.60	2.10
4.70	3.20	1.60	0.20	5.70	2.60	3.50	1.00	7.20	3.00	5.80	1.60
4.80	3.10	1.60	0.20	5.50	2.40	3.80	1.10	7.40	2.80	6.10	1.90
5.40	3.40	1.50	0.40	5.50	2.40	3.70	1.00	7.90	3.80	6.40	2.00
5.20	4.10	1.50	0.10	5.80	2.70	3.90	1.20	6.40	2.80	5.60	2.20
5.50	4.20	1.40	0.20	6.00	2.70	5.10	1.60	6.30	2.80	5.10	1.50
4.90	3.10	1.50	0.20	5.40	3.00	4.50	1.50	6.10	2.60	5.60	1.40
5.00	3.20	1.20	0.20	6.00	3.40	4.50	1.60	7.70	3.00	6.10	2.30
5.50	3.50	1.30	0.20	6.70	3.10	4.70	1.50	6.30	3.40	5.60	2.40
4.90	3.60	1.40	0.10	6.30	2.30	4.40	1.30	6.40	3.10	5.50	1.80
4.40	3.00	1.30	0.20	5.60	3.00	4.10	1.30	6.00	3.00	4.80	1.80
5.10	3.40	1.50	0.20	5.50	2.50	4.00	1.30	6.90	3.10	5.40	2.10
5.00	3.50	1.30	0.30	5.50	2.60	4.40	1.20	6.70	3.10	5.60	2.40
4.50	2.30	1.30	0.30	6.10	3.00	4.60	1.40	6.90	3.10	5.10	2.30
4.00	3.20	1.30	0.20	5.80	2.60	4.00	1.20	5.80	2.70	5.10	1.90
5.00	3.50	1.60	0.60	5.00	2.30	3.30	1.00	6.80	3.20	5.90	2.30
5.10	3.80	1.90	0.40	5.60	2.70	4.20	1.30	6.70	3.30	5.70	2.50
4.80	3.00	1.40	0.30	5.70	3.00	4.20	1.20	6.70	3.00	5.20	2.30
5.10	3.80	1.60	0.20	5.70	2.90	4.20	1.30	6.30	2.50	5.00	1.90
4.60	3.20	1.40	0.20	6.20	2.90	4.30	1.30	6.50	3.00	5.20	2.00
5.30	3.70	1.50	0.20	5.10	2.50	3.00	1.10	6.20	3.40	5.40	2.30
5.00	3.30	1.40	0.20	5.70	2.80	4.10	1.30	5.90	3.00	5.10	1.80

Table A3. Coordinates for point patterns shown in Figure 4.3 (points as rows, the horizontal and vertical coordinates for each pattern in columns).

Number	a		b		c		d		e		f	
	1	2	1	2	1	2	1	2	1	2	1	2
1	6.503	9.022	2.186	3.478	2.819	4.758	1.019	5.876	1.002	3.330	1.00390	1.00250
2	5.599	4.396	2.678	2.498	3.519	4.687	1.991	7.231	1.102	4.453	1.00991	3.00695
3	3.982	2.322	3.010	3.109	3.254	5.159	2.579	6.876	1.819	3.903	1.00255	5.00271
4	8.093	7.655	3.314	3.153	2.756	5.332	3.102	7.990	2.001	2.660	1.00331	7.00549
5	3.093	9.659	3.754	2.478	4.001	5.110	4.039	7.950	3.201	2.001	1.00311	9.00929
6	0.117	3.772	3.279	3.978	3.756	5.660	3.967	8.906	3.520	3.276	3.00770	1.00259
7	1.576	5.504	4.312	3.289	2.619	6.102	5.378	9.178	4.412	2.389	3.00624	3.00418
8	8.838	3.495	6.498	1.910	3.192	6.330	1.660	1.871	5.857	3.695	3.00891	5.00580
9	1.424	7.085	6.889	1.212	4.500	5.610	2.901	3.990	6.189	2.153	3.00460	7.00539
10	9.690	4.377	6.831	2.567	3.001	7.009	3.856	2.901	7.112	3.354	3.00094	9.00707
11	9.044	4.870	7.312	2.243	3.856	6.958	4.131	4.512	8.412	3.254	5.00400	1.00035
12	7.826	3.123	7.598	1.609	4.058	6.401	5.203	4.152	7.790	4.934	5.00607	3.00330
13	8.305	1.721	8.192	2.509	4.452	6.019	4.857	6.019	8.876	4.564	5.00516	5.00120
14	5.580	7.993	7.002	4.910	4.996	5.579	6.102	6.001	9.480	6.019	5.00077	7.00383
15	7.736	4.471	7.843	5.230	5.519	6.004	7.259	6.123	8.564	6.213	5.00607	9.00195
16	7.207	2.994	7.122	5.423	6.132	6.709	7.005	8.001	8.887	7.610	7.00705	1.00475
17	3.105	1.677	7.312	5.879	5.213	4.989	8.032	7.965	7.353	7.705	7.00505	3.00751
18	2.119	7.620	6.879	6.223	5.910	4.212	8.978	8.976	7.312	8.897	7.00962	5.00014
19	6.644	1.284	6.443	5.389	6.009	5.009	6.220	1.123	5.598	5.713	7.00431	7.00454
20	4.908	5.890	3.773	6.623	6.110	5.610	7.210	1.891	5.311	6.523	7.00851	9.00014
21	4.164	1.974	4.231	7.311	7.001	6.510	7.098	2.921	4.807	6.019	9.00427	1.00431
22	4.367	8.435	4.123	8.094	6.819	5.810	8.302	2.534	4.675	5.219	9.00745	3.00591
23	1.308	1.927	3.009	8.003	6.732	4.857	8.367	3.693	3.621	5.622	9.00841	5.00725
24	9.787	1.381	3.500	7.253	7.156	4.212	9.518	3.603	3.976	6.178	9.00778	7.00147
25	0.198	8.759	2.783	7.102	7.654	5.589	9.178	4.278	4.213	7.069	9.00879	9.00953

Table A4. Dune vegetation data, as a subset from a larger matrix obtained in Terschelling, The Netherlands (Batterink & Wijffels 1983, taken with permission from Jongman et al. 1987). The abundance/dominance of species is measured on the van der Maarel (1979) scale (from 0 to 9). The last three rows comprise environmental variables, two expressed on a five-value scale, considered to be of the interval type for simplicity.

Species	Sample sites																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
<i>Achillea millefolium</i>	1	3	0	0	2	2	2	0	0	4	0	0	0	0	0	0	2	0	0	0
<i>Agrostis stolonifera</i>	0	0	4	8	0	0	0	4	3	0	0	4	5	4	4	7	0	0	0	5
<i>Aira praecox</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	3	0
<i>Alopecurus geniculatus</i>	0	2	7	2	0	0	0	5	3	0	0	8	5	0	0	4	0	0	0	0
<i>Anthoxanthum odoratum</i>	0	0	0	0	4	3	2	0	0	4	0	0	0	0	0	0	4	0	4	0
<i>Bellis perennis</i>	0	3	2	2	2	0	0	0	0	2	0	0	0	0	0	0	0	2	0	0
<i>Bromus hordaceus</i>	0	4	0	3	2	0	2	0	0	4	0	0	0	0	0	0	0	0	0	0
<i>Chenopodium album</i>	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
<i>Cirsium arvense</i>	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<i>Eleocharis palustris</i>	0	0	0	0	0	0	0	4	0	0	0	0	0	4	5	8	0	0	0	4
<i>Elymus repens</i>	4	4	4	4	4	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0
<i>Empetrum nigrum</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
<i>Hypochaeris radicata</i>	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	2	0	5	0	0
<i>Juncus articulatus</i>	0	0	0	0	0	0	0	4	4	0	0	0	0	0	3	3	0	0	0	4
<i>J. bufonius</i>	0	0	0	0	0	0	2	0	4	0	0	4	3	0	0	0	0	0	0	0
<i>Leontodon autumnalis</i>	0	5	2	2	3	3	3	3	2	3	5	2	2	2	2	0	2	5	6	2
<i>Lolium perenne</i>	7	5	6	5	2	6	6	4	2	6	7	0	0	0	0	0	2	0	0	0
<i>Plantago lanceolata</i>	0	0	0	0	5	5	5	0	0	3	3	0	0	0	0	0	2	3	0	0
<i>Poa pratensis</i>	4	4	5	4	2	3	4	4	4	4	4	0	2	0	0	0	1	3	0	0
<i>P. trivialis</i>	2	7	6	5	6	4	5	4	5	4	0	4	9	0	0	2	0	0	0	0
<i>Potentilla palustris</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0
<i>Ranunculus flammula</i>	0	0	0	0	0	0	0	2	0	0	0	0	2	2	2	2	0	0	0	4
<i>Rumex acetosa</i>	0	0	0	0	5	6	3	0	2	0	0	2	0	0	0	0	0	0	0	0
<i>Sagina procumbens</i>	0	0	0	5	0	0	0	2	2	0	2	4	2	0	0	0	0	0	3	0
<i>Salix repens</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3	5
<i>Trifolium pratense</i>	0	0	0	0	2	5	2	0	0	0	0	0	0	0	0	0	0	0	0	0
<i>T. repens</i>	0	5	2	1	2	5	2	2	3	6	3	3	2	6	1	0	0	2	2	0
<i>Vicia lathyroides</i>	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0	1	0	0
<i>Brachythecium rutabulum</i>	0	0	2	2	2	6	2	2	2	4	4	0	0	4	4	0	6	3	4	4
<i>Calliergonella cuspidata</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	3	0	0	0	3
Depth of horizon A1	2.8	3.5	4.3	4.2	6.3	4.3	2.8	4.2	3.7	3.3	3.5	5.8	6.0	9.3	11	5.7	4	4.6	3.7	3.5
Soil humidity	1	1	2	2	1	1	1	5	4	2	1	4	5	5	5	5	2	1	5	5
Fertilization	4	2	4	4	2	2	3	3	1	1	1	2	3	0	0	3	0	0	0	0

Table A5. Immunological distances for some mammals based on albumine (after Sarich 1969). $d = 100 \times \log \text{ID}$, in which ID is the antigene level needed.

	Cat	Bear	Raccoon	Dog	Sea lion	Seal	Mink	Monkey
Cat	0							
Bear	84	0						
Raccoon	92	26	0					
Dog	98	32	48	0				
Sea lion	86	33	44	48	0			
Seal	89	29	44	50	24	0		
Mink	90	34	42	51	38	44	0	
Monkey	148	136	152	148	142	142	142	0

Table A6. Presence (1) or absence (0) of morphological features in major groups of seed plants and in ferns (outgroup). After Humphries et al. (1988).

	Ferns	Cycads	Conifers	<i>Ginkgo</i>	<i>Gnetum</i>	Angiosperms
Vascular cambium	0	1	1	1	1	1
Eustele	0	1	1	1	1	1
Embryogenesis with free nuclear phase	0	1	1	1	1	0
One functional megaspore mother cell	0	1	1	1	1	1
Integument	0	1	1	1	1	1
Micropyle	0	1	1	1	1	1
Megaspores in linear tetrad	0	1	1	1	1	1
Seed	0	1	1	1	1	1
Axillary branching	0	0	1	1	1	1
Saccate pollen	0	0	1	1	1	1
Platyspermic ovules	0	0	1	1	1	1
Pollen with distal aperture	0	0	0	0	1	1
Loss of pollen sacs	0	0	0	0	1	1
Siphonogamy	0	0	0	0	1	1
Ovules borne in cupule	0	0	0	0	1	1
Megaspore with thin membrane	0	0	0	0	1	1
Uniovulate cupule	0	0	0	0	1	1
"Flowers"	0	0	0	0	1	1
Granular pollen wall	0	0	0	0	1	0
Erect uniovulate cupule	0	0	0	0	1	0
Unicupullate megasporophyll	0	0	0	0	1	0
Porose perforation plates in vessels	0	0	0	0	1	0
"Flowers" with opposite bracteoles	0	0	0	0	1	0
Ovulate shoots in inflorescence	0	0	1	0	1	0
Sporophylls on short axillary shoots	0	0	1	1	1	0
Pollen without distal aperture	0	1	1	1	0	0
Narrowly triangular leaves	0	0	1	0	1	0
Essential oils in leaves	0	0	0	0	0	1
Simultaneous microsporogenesis	0	0	0	0	0	1

Table A7. Semimatrix of road distances (km) for some European cities.

	Ams.	Berlin	Budapest	Helsinki	Istanbul	London	Madrid	Paris	Rome	Warsaw
Amsterdam	0									
Berlin	660	0								
Budapest	1410	910	0							
Helsinki	1830	1460	2360	0						
Istanbul	2780	2290	1320	3740	0					
London	550	1170	1760	2380	3010	0				
Madrid	1760	2350	2620	3560	3690	1670	0			
Paris	510	1090	1460	2310	2750	450	1250	0		
Rome	1730	1490	1250	3070	2260	1810	2040	1400	0	
Warsaw	1220	560	680	1950	1940	1730	1930	1620	1830	0

Table A8. Contour lines of *Unio* shells based on the radius function (mm). Radius 0 points to the right tip of the shell (Figure 7.25), the number of radii is 32; twice as many as shown in the figure.

Radius	<i>U. pictorum</i>			<i>U. tumidus</i>	<i>U. crassus</i>			<i>U. elong.</i>
	Vácrátót	Ráckeve	Balaton	Balaton	Kétfalu	Szakonyf.	Körös	Turkey
0	44.75	36.50	36.25	28.75	25.25	22.25	27.00	32.25
1	39.50	33.50	33.75	27.25	23.75	20.00	24.25	31.00
2	32.50	27.75	27.25	23.25	22.25	18.00	21.75	28.50
3	27.50	23.50	22.75	20.50	19.25	16.25	19.50	26.50
4	24.25	20.25	20.25	17.40	17.50	15.25	17.50	24.25
5	21.75	18.00	18.50	15.25	16.00	14.50	15.75	22.50
6	20.10	16.25	16.75	14.25	15.50	13.90	15.00	20.50
7	18.75	15.25	15.75	13.75	15.00	13.25	14.50	19.25
8	18.50	14.75	15.50	13.25	14.50	13.00	14.00	18.50
9	19.00	15.00	16.25	13.65	14.25	13.50	14.25	18.50
10	20.00	16.25	18.25	14.50	14.50	14.10	15.00	19.50
11	23.00	18.75	20.75	16.25	15.25	14.50	17.00	21.50
12	27.00	22.25	24.25	20.00	17.50	15.25	20.25	25.00
13	29.25	24.75	26.25	22.00	19.50	17.25	21.75	26.25
14	35.75	28.75	32.00	24.00	20.75	19.25	23.50	29.50
15	42.75	35.00	35.75	27.25	24.00	21.50	27.50	32.50
16	45.75	36.00	36.00	28.50	25.50	22.50	29.50	34.00
17	44.25	31.25	34.50	28.25	26.00	23.00	27.75	33.00
18	39.50	29.00	30.50	25.25	24.25	22.00	24.50	30.50
19	34.25	24.00	26.25	21.75	21.25	19.25	21.00	26.75
20	29.00	20.75	22.75	18.75	18.75	17.25	18.50	23.75
21	24.50	18.25	19.50	16.00	17.00	15.75	16.25	21.00
22	22.25	16.75	17.75	14.50	15.50	14.50	14.50	19.25
23	21.00	15.50	16.75	13.75	14.75	13.75	13.25	18.00
24	20.50	15.00	16.25	13.50	14.50	13.75	12.75	17.50
25	20.75	15.25	16.50	13.25	14.50	14.25	13.00	18.50
26	21.75	15.75	17.25	14.25	15.25	14.75	13.75	19.00
27	23.50	17.00	18.75	15.50	16.25	16.25	15.25	20.75
28	26.25	19.00	21.00	17.00	18.25	18.00	18.00	24.50
29	30.50	22.50	24.00	19.75	20.50	19.50	22.25	29.50
30	35.75	27.25	27.25	23.50	22.50	21.00	25.50	33.00
31	42.00	33.00	32.50	28.25	24.25	23.00	28.00	32.75

