

## BIOMONITORING STUDIES ON SALTY PASTURES AND MEADOWS IN SOUTH-EAST HUNGARY

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### Abstract

Coenological records were gained in compliance with the regulations of the National Biodiversity Monitoring System (NBmR) in the Tiszántúl region (territories east of the river Tisza), on three areas of the Körös-Maros National Park (*Csanádi-puszta* (*Blaskovics-puszta*), *Bélmegyér* and *Biharugra*), in four associations (*Peucedano-Asteretum sedifolii*, *Agrostio-Alopecuretum pratensis*, *Agrostio-Beckmannietum eruciformis*, *Atrémisio santonici-Festucetum pseudovinae*) in 2004. Results were compared with data recorded on the same places three years earlier (in 2001). Decrease in species number could be detected only in the case of *Agrostio-Alopecuretum pratensis* association. In the case of the three other studied associations, more humid periods always led to higher diversity of species. Even new species were recorded in 2004 as well as rare or protected plants on these areas.

**Keywords:** salty pasture, salty meadow, coenological record, grazing

### Introduction

In order to follow changes occurring in certain associations, it is necessary to carry out surveys regularly and repeatedly and to prepare their comparative analyses. The sequence of surveys is particularly important if the area is influenced by other impacts beyond climatic changes. Our fields of research are effected by regular grazing and crop production, thus, besides changes of flora and vegetation, records can also be obtained on the effects of these “treatments”.

### Material and method

Coenological records were gained in sampling areas of the possibly most homogeneous patches of habitats, in 50 pieces of 1x1 m sized micro-quadrates, designated randomly in a permanent square of 50x50 m. The permanent sampling area was designated during the first year of recording (2001). Designations were made according to SIPOS and VIDRA (2001a, 2001b) and MOLNÁR and BIRÓ (2001a, 2001b). Records of 2004 were collected between May and June in the same sampling square and by the same applied method as in 2001, but some of the areas were visited also in autumn. In the comparison, species are listed only from authors' database, in line with the nomenclature of Simon (2000), nevertheless, tendencies are also highlighted. Naming of the associations was applied according to BORHIDI and SÁNTA (1999).

## Results and discussion

### Coenological results of a *Peucedano-Asteretum sedifolii* association (Soó 1947) in Bélmegyer

The association has got a high diversity (Table 1). The number of species increased from 54 of 2001 to 63 of 2004. The prognosis that this association was threatened by the decrease of species (Sipos and Vidra 2001) has not been verified so far. There are a number of pioneer species among the newly recorded species (some of them even considered as weed), which appeared mostly in spring (*Bromus japonicus*, *Vicia lathyroides*, *Veronica arvensis*, *Myosotis stricta*). During the survey of 2004, the spring plants were still present or were fortunately recognizable. The occurrence of *Ventenata dubia* has got a high significance, since according to Simon (2000) it is rare in the Great Hungarian Plane. In authors' surveys it appeared in very high numbers in some places. *Lotus angustissimus* appeared as well, although, this species is also considered as uncommon east of the river Tisza. Besides the appearance of new species, however, previously reported spreading of scrubs still has existed as a source of threats.

Comparing the list of species during the two periods, the number of species has increased, although, there was no intensive grazing or crop production in the area. Dominant species were the same. Some differences were found in terms of pioneer spring species or weeds.

### Coenological results of an *Agrostio-Alopecuretum pratensis* association (Soó 1933/1947) in Biharugra

The number of species decreased from 41 of 2001 to 32 of 2004 (Table 2). Some weeds and the species of arid habitats have disappeared. This can be explained also by the fact that in the year 2004 there was much more precipitation than in 2001. As a result of more precipitation, covering rate of *Alopecurus pratensis* has increased. The characteristic species of humid or flooded habitats (*Carex vulpina*, *Carex melanostachya*, *Eleocharis palustris*, *Bolboschoenus maritimus*) also appeared in greater proportion or as new species. Species of salty areas still occurred in the area, but mostly those that tolerate humidity better. Among the rare species *Lotus angustissimus* was found as well. This species was absent in the previous records. A protected species, *Plantago schwarzenbergiana* was also encountered. Finally, it can be concluded that, in spite of the decrease in the number of species, the association has shifted into the direction of a more natural condition as a result of greater water supply.

### Coenological results of an *Agrostio-Beckmannietum eruciformis* association on the area of Csanádi-puszták (Blaskovics puszta)

This association has developed into a positive direction in terms of its natural condition compared to the previous records (2001). The number of present species increased from 15 to 26. This significant change is a result of more favourable water supply and of the fact that in the time of the survey in 2004, several spring plants were found (Table 3).

The proportion of weeds was minor. In the records of 2004, even *Phragmites australis* has appeared, but it did not represent significant threat as only one or two smaller patches were found. Among the newly recorded species, *Veronica scutellata* and *Myosotis palustris* have appeared as well, due to favourable water supply. Two *Ranunculus* species appeared, too, one of which is protected (*Ranunculus lateriflorus*).

Compared to the previous situation, when the association consisted mostly of monocotyledon species, dicotyledon species appeared in the records of 2004, too. This proves that the association is stable and its natural status has improved.

#### **Coenological results of an *Artemisia santonici-Festucetum pseudovinae* association (Soó in Máthé 1933) on the area of Bélmegyér and Csanádi-puszták (Blaskovicspuszta)**

Comparing the list of species of the two surveyed periods, number of species has not changed considerably (Table 4). Dominant species were the same. The associations of the two surveyed areas are equal, but the farming factors and treatment are completely different. In the area of Bélmegyér, rich flora has developed due to intensive rains and as a result of less intensive grazing. The rare *Trifolium michrantom* appeared in great quantities. The proportion of weeds has dropped to a minimum. The only “threatening” factor is the overdominance of *Alopecurus pratensis* due to the more humid period. A moderate grazing on the area should definitely be reasonable. The area at Blaskovicspuszta was badly overgrazed while the year 2003 was extremely dry. This implied such great changes in the vegetation that the dominant and characteristic species (*Festuca pseudovina*, *Artemisia santonicum*) have disappeared from the area almost entirely. They appeared in the autumn season with greater coverage value. The majority of the species that have appeared in autumn were weeds and pioneer species. Even *Agropyron pectiniforme* has appeared.

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## BIOMONITORING VIZSGÁLATOK DÉL-TISZÁNTÚLI SZIKI LEGELŐKÖN ÉS KASZÁLÓKON

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**Összefoglalás:** A Körös-Maros Nemzeti Park három részterületén (Csanádi-puszták (Blaskovics-pusztá), Bélmegyer, Biharugra), négy társulásban (szikes erdeirét – *Peucedano-Asteretum sedifolii*, ecsetpázsitos sziki rét – *Agrostio-Alopecuretum pratensis*, hernyópázsitos szikes rét – *Agrostio-Beckmannietum eruciformis*, ürmös pusztá – *Atrémisio santonici-Festucetum pseudovinae*) cönológiai felvételeket készítettünk 2004-ben az NBmR előírásainak megfelelően. Az eredményeket összehasonlítottuk a 3 évvel korábban ugyanitt készített felvételekkel. Az eredményekből kitűnik, hogy fajszegényedés csak az ecsetpázsitos sziki rét esetében tapasztalható. A másik három vizsgált társulásban a nedvesebb időszak minden esetben nagyobb fajdiverzitáshoz vezetett.

**Kulcsszavak:** sziki legelő, szikes rét, cönológiai felvétel, legeltetés

1. table Coenological results of a *Peucedano-Asteretum sedifolii* association  
(Soó 1947) in Bélmegyer

1. táblázat A *Peucedano-Asteretum sedifolii* társulás (Soó 1947)  
összevont cönológia tabellája Bélmegyeren

	A–D	K
<i>Festuca rupicola</i>	1–20	II
<i>Festuca pseudovina</i>	1–5	II
<i>Iris spuria</i>	3–10	I
<i>Koeleria cristata</i>	3–10	II
<i>Ventenata dubia</i>	1–40	IV
<i>Artemisia pontica</i>	2–30	III
<i>Aster linosyris</i>	1–50	V
<i>Aster sedifolius</i>	1–45	V
<i>Vicia tetrasperma</i>	1–3	II
<i>Serratula tinctoria</i>	1–15	I
<i>Quercus robur</i>	1	III
<i>Galium verum</i>	1–30	IV
<i>Alopecurus pratensis</i>	1–20	IV
<i>Veronica spicata</i>	1–5	II
<i>Valerianella locusta</i>	1–3	I
<i>Potentilla argentea</i>	1–3	IV
<i>Peucedanum officinale</i>	2–70	III
<i>Veronica arvensis</i>	1–2	IV
<i>Myosotis stricta</i>	1–15	II
<i>Ornithogalum umbellatum</i>	1	I
<i>Hieracium</i> sp.	1	V
<i>Cruciata pedemontana</i>	1–8	I
<i>Crataegus monogyna</i>	1	I
<i>Rumex pseudonatronatus</i>	2–5	III
<i>Cerastium dubium</i>	1–5	II
<i>Lotus angustissimus</i>	1–20	I
<i>Fragaria viridis</i>	1–5	V
<i>Carex praecox</i>	1–30	I
<i>Podospermum canum</i>	1	I
<i>Vicia lathyroides</i>	1	I
<i>Carex muricata</i>	1	I
<i>Agrimonia eupatoria</i>	1	I
<i>Eryngium campestre</i>	2–5	II
<i>Allium vineale</i>	1–2	I
<i>Thymus galbrescens</i>	1–5	II
<i>Stellaria graminea</i>	1	I
<i>Dianthus pontederare</i>	1–3	V
<i>Bromus japonicus</i>	1	III
<i>Limonium gmelinii</i>	1–5	II
<i>Poa angustifolia</i>	1–18	I
<i>Elymus repens</i>	1–15	I
<i>Myosurus minimus</i>	1	I
<i>Odontites lutea</i>	1–3	I
<i>Ranunculus pedatus</i>	1	I

*Contd. 1. table*  
*1. táblázat folytatása*

	A-D	K
Asparagus officinalis	1	I
Myosotis arvensis	11	I
Bromus mollis	1	I
Arenaria serpyllifolia	1	I
Achillea setacea	1	I
Rosa rubiginosa	2-10	I
Ajuga genevensis	1	I
Ranunculus polyanthemos	1	I
Phragmites australis	1-15	II
Lamium purpureum	2	I
Inula britannica	2	I
Rumex stenophyllus	2-10	I
Euphorbia virgata	1	I
Odontites rubra	1	I
Senecio jacobaea	1	I
Achillea collina	2-3	I
Polygonum aviculare	1	I
Pyrus pyraeaster	3	I

2. table Coenological results of an *Agrostio-Alopecuretum pratensis* association  
(Soó 1933/1947) in Biharugra  
2. táblázat Az *Agrostio-Alopecuretum pratensis* társulás (Soó 1933/1947)  
összevont cönológiai tabelláján Biharugrán

	A-D	K
<i>Alopecurus pratensis</i>	30-90	V
<i>Elymus repens</i>	1-40	V
<i>Carex vulpina</i>	3-40	I
<i>Rorippa kernerii</i>	1	I
<i>Oenanthe silaifolia</i>	5-10	III
<i>Eleocharis palustris</i>	5	III
<i>Carex melanostachya</i>	1	I
<i>Bolboschoenus maritimus</i>	3-35	I
<i>Juncus gerardii</i>	1-10	I
<i>Agrostis stolonifera</i>	1-35	III
<i>Trifolium angulatum</i>	5	I
<i>Symphytum officinale</i>	1-20	I
<i>Limonium gmelinii</i>	1	I
<i>Poa angustifolia</i>	1-5	I
<i>Cerastium dubium</i>	1-3	I
<i>Trifolium micranthum</i>	1	I
<i>Epilobium</i> sp.	1	I
<i>Bupleurum</i> sp.	1	I
<i>Lactuca serriola</i>	1	I
<i>Myosotis stricta</i>	1	I
<i>Chenopodium album</i>	1	I
<i>Festuca pseudovina</i>	1-3	I
<i>Lotus angustissimus</i>	1	I
<i>Puccinellia limosa</i>	1-3	I
<i>Matricaria inodora</i>	1-3	I
<i>Senecio erucifolius</i>	2	I
<i>Trifolium campestre</i>	1	I
<i>Plantago schwarzenbergiana</i>	3	I
<i>Artemisia santonicum</i>	5	I
<i>Allium vineale</i>	1	I
<i>Taraxacum officinale</i>	1	I

3. table Coenological results of an *Agrostio stoloniferae-Beckmannietum eruciformis* RAPAICS ex Soó 1930 association on the area of Csanádi-puszták (Blaskovics puszta)

3. táblázat Az *Agrostio stoloniferae-Beckmannietum eruciformis* RAPAICS ex Soó 1930 társulás összevont cönológiai tabellája Csanádi-pusztán (Blaskovics puszta)

	A-D	K
<i>Beckmannia eruciformis</i>	5-30	V
<i>Alopecurus pratensis</i>	1-60	V
<i>Rorippa kernerii</i>	1-3	III
<i>Ranunculus lateriflorus</i>	1-15	IV
<i>Ranunculus sardous</i>	2-5	II
<i>Carex melanostachya</i>	5-40	IV
<i>Sium silaifolia</i>	1-10	V
<i>Typha latifolia</i>	1-2	I
<i>Myosotis palustris</i>	1-5	III
<i>Bolboschoenus maritimus</i>	2-60	II
<i>Galium palustre</i>	2-5	I
<i>Rumex stenophyllus</i>	5	I
<i>Mentha aquatica</i>	1-2	I
<i>Agrostis stolonifera</i>	1-15	III
<i>Lemna minor</i>	1-20	IV
<i>Scoenoplectus lacustris</i>	3-15	IV
<i>Eleocharis palustris</i>	2-5	II
<i>Glyceria fluitans</i>	5-8	I
<i>Butomus umbellatus</i>	2-5	I
<i>Phragmites australis</i>	10	I
<i>Elymus repens</i>	5-10	I
<i>Lythrum virgatum</i>	1-3	I
<i>Alisma lanceolatum</i>	2-5	I
<i>Trifolium angulatum</i>	2	I
<i>Veronica scutellata</i>	2	I

4. tábla Coenological results of an *Atrémisio santonici-Festucetum pseudovinae* association (Soó in MÁTHÉ 1933) on the area of Bélmegeyer

4. táblázat Az *Atrémisio santonici-Festucetum pseudovinae* társulás (Soó in MÁTHÉ 1933) összevont cönológiai tabellája Bélmegeyer

	A-D	K
<i>Festuca pseudovina</i>	15-41	V
<i>Alopecurus pratensis</i>	1-5	III
<i>Bromus mollis</i>	1-10	II
<i>Achillea setacea</i>	1-5	V
<i>Trifolium angulatum</i>	2-60	V
<i>Trifolium retusum</i>	2-20	IV
<i>Lotus angustissimus</i>	1-25	II
<i>Plantago lanceolata</i>	1-5	III
<i>Veronica arvensis</i>	1-5	II
<i>Lepidium draba</i>	1-3	III
<i>Cerastium dubium</i>	1-2	I
<i>Ornithogalum umbellatum</i>	1-3	II
<i>Limonium gmelinii</i>	2-15	II
<i>Myosotis stricta</i>	1-3	II
<i>Cruciata pedemontana</i>	1	III
<i>Podospermum canum</i>	1-3	I
<i>Ventenata dubia</i>	1-5	I
<i>Lepidium perfoliatum</i>	3	I
<i>Peucedanum officinale</i>	15	I
<i>Ranunculus pedatus</i>	1	III
<i>Carex praecox</i>	1	IV
<i>Poa bulbosa</i>	1-5	I
<i>Artemisia santonicum</i>	5-25	I
<i>Pholiurus pannonicus</i>	1-3	I
<i>Plantago tenuiflora</i>	1-3	I
<i>Matricaria inodora</i>	1	I
<i>Trifolium micranthum</i>	1-3	I
<i>Allium vineale</i>	1	I
<i>Poa angustifolia</i>	1	I
<i>Veronica praecox</i>	1-5	I
<i>Myosurus minimus</i>	1	I
<i>Polygonum neglectum</i>	1	I
<i>Trifolium striatum</i>	1-10	I
<i>Trifolium campestre</i>	1-5	I
<i>Eryngium campestre</i>	1	I
<i>Erophila verna</i>	1	I

5. *tabe* Coenological results of an *Atrémisio santonici-Festucetum pseudovinae* association (Soó in MÁTHÉ 1933) of Csanádi-puszták (Blaskovics-puszta)  
 5. *táblázat* Az *Atrémisio santonici-Festucetum pseudovinae* társulás (Soó in MÁTHÉ 1933) összehívott cönológiai tabellája Csanádi-pusztán (Blaskovics-pusztán)

	A–D	K
<i>Artemisia santonicum</i>	1–25	V
<i>Poa bulbosa</i>	1–20	V
<i>Bromus mollis</i>	1–25	V
<i>Gypsophila muralis</i>	1–35	IV
<i>Lepidium perfoliatum</i>	1–40	III
<i>Matricaria chamomilla</i>	2–40	V
<i>Trifolium angulatum</i>	1–95	V
<i>Trifolium retusum</i>	1–35	V
<i>Cerastium dubium</i>	1–35	V
<i>Plantago tenuiflorum</i>	1–25	III
<i>Crepis tectorum</i>	2–15	IV
<i>Pholiurus pannonicus</i>	1–3	I
<i>Lepidium rudérale</i>	1–3	II
<i>Allium vineale</i>	3–10	I
<i>Ranunculus pedatus</i>	1	IV
<i>Capsella bursa-pastoris</i>	1–5	I
<i>Vicia angustifolia</i>	3–5	I
<i>Podospermum canum</i>	1	II
<i>Geranium dissectum</i>	1–3	I
<i>Festuca pseudovina</i>	2–20	IV
<i>Veronica arvensis</i>	1–15	I
<i>Alopecurus pratensis</i>	1–2	I
<i>Erophila verna</i>	2–5	I
<i>Myosotis stricta</i>	2	I
<i>Trifolium arvense</i>	1	I
<i>Lactuca serriola</i>	2–20	I
<i>Bilderdykia convolvulus</i>	1	I