

## COMPARATIVE COENOLOGICAL EXAMINATIONS ON PASTURES OF THE GREAT HUNGARIAN PLAIN I. (HORSE AND CATTLE PASTURE NEAR HÓDMEZŐVÁSÁRHELY)

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### Summary

Two groups of coenological relevés were prepared in 1997 and 2005 on sandy, alkali areas near Hódmezővásárhely town. Areas situated inside and near (0 to 50 meters far from) an animal husbandry farm belong to the first group. Coenological relevés gained from areas situated 50 to 150 meters far from intensively used areas belong to the second group. Data evaluation was made with considering naturalness state in case of habitats; and on the other hand, according to relative ecological factors of occurring species. A significant change in species composition could be detected. Particularly, deterioration of areas could be experienced. These negative processes are extremely heavy inside and near the animal husbandry farm. Even aggressive, invasive plant species occurred. Among dominant grass species, dominance relations and covering rate of disturbance tolerant *Cynodon dactylon* and *Lolium perenne* species have increased, caused partly by overgrazing and trampling as well. Farther from the farm, rate of degradation showed by vegetation has decreased compared to the areas closer to the farm, however, it has increased even on the farther area between the two time periods. During the preparation of management plans for the grasslands, these data should be considered at a higher rate in favour of preserving natural values, especially because the biggest population of nature protected *Trifolium subterraneum* lives in this area.

### Introduction

Among nature protected areas in Hungary, grasslands own the second place by covering 213469 hectares. In many cases, grazing takes place in these natural grasslands. As a consequence of Hungary's natural backgrounds, economic state and EU accession tasks, agricultural use and the aims of nature conservation should be harmonised in these areas, too.

The Hungarian National Agri-environmental Programme and the legislation about its elaboration drafts a type of agricultural practise that is based on the conservation of biodiversity and landscape values and production of healthy food, meanwhile managing natural resources on a sustainable way.

Coenological relevés were prepared by authors on different pastures (grazed by horse, cattle or sheep) of the Great Hungarian Plain in 1997 and 2005. Based on data gained during the two periods, vegetation changes caused by animal husbandry can be compared. During coenological studies, monitoring of spatial changes has also played an important role, this is why data were gained from two groups of relevés. Areas situated inside and near (0 to 50 meters far from) an animal husbandry farm belong to the first group. Coenological relevés gained from areas situated 50 to 150 meters far from

intensively used areas, where animals spend shorter time or only pass belong to the second group. Besides observing the effects of grazing on vegetation, we have also concentrated on how to strain of effects of trampling. Intensity of grazing has changed on the areas observed in 1997, as slightly and intensively grazed or overgrazed areas were separated.

The observed area has got a high importance also because a unique species for the whole area of Hungary, *Trifolium subterraneum*, was re-discovered here (PENKSZA et al. 1997). It was found during the floristical and coenological investigation works on the administrative area of Körös-Maros National Park. The observed area functions as a horse and cattle pasture, making it suitable for monitoring changes caused by grazing. The first data of *Trifolium subterraneum* L. was reported by HALÁSZ (1889) from Makó without exact localisation and proving herbarium sample. In the publication titled "Flora of the Area East of the River Tisza" by SOÓ and MÁTHÉ (1938), earlier literature data were also processed, therefore data from Makó collected by HALÁSZ (1889) was also adapted as the distribution place of *Trifolium subterraneum* near Hódmezővásárhely. First herbarium data of *Trifolium subterraneum* were collected by TÍMÁR in 1943 (from Kismargitta near Hódmezővásárhely). At the same time TÍMÁR (1954) published it later with the localisation "Mártély". BOROS visited the surroundings of Hódmezővásárhely several times to reconstruct the herbarium data of TÍMÁR from 1943. At first he visited the territory on 25-26 August 1960 (BOROS 1960), but he could not find it. On 16 May 1961 and on 31 August 1961 he managed to find it (BOROS 1961), and collected a herbarium sample from "Hódmezővásárhely (Kishomok)". On 15 May 1968 BOROS visited the area again and made the following remark "There is no trace of it." (BOROS 1968). Since 1961, *Trifolium subterraneum* has been found again at first on the area of Kishomok, between the lines of orchards parcelled out and on a pasture between Kishomok and Hódmezővásárhely in 1996. It was also found near Mártély in 1997 (PENKSZA et al. 1997).

The vegetation of the alkali grasslands close to the sampling sites of our publication was studied by BODROGKÖZY. Detailed coenological tables were published about the associations and subassociations of the alkali areas of Székkutas, Orosháza, Nagylak, Mezőhegyes and Békéssámson (BODROGKÖZY 1965a, 1965b, 1966, 1980, BODROGKÖZY and HORVÁTH 1969), among which the two subassociations of *Achilleo-Festucetum pseudovinae* Soó (1933) 1947 corr. Borhidi 1996 were also described (BODROGKÖZY 1965a). However, BODROGKÖZY (1965a) published this name incorrectly, when he referred to the work of Soó (1933) as *Achilleo-Festucetum pseudovinae* Magyar (1928) Soó 1933, although in the cited publication the name of *Festucetum pseudovinae achilleosum* and *artemisiosum* is present.

## Materials and methods

Previous coenological data, hereby used as basis for comparison were published by PENKSZA et. al. (1997). Coenological relevés prepared in 1997 belong to the group of data gained farther from the farm. For 2005, the area has been divided and fenced. One half of it (group B among relevés) is grazed by few animals and mowed as well. These areas can be considered as similar to the other farms of the Great Hungarian Plain.

Intensive grazing takes place on the other fenced area and a fold was built here as well (group A).

Coenological investigations were prepared between April and July both in 1997 and 2005, according to BRAUN-BLANQUET (1964), by using 2x2 m quadrates. As evaluation, group unit share was counted based on covering rates.

Among relative ecological value categories according to BORHIDI (1995), areas were evaluated based on water demand (WB) and nitrogen demand (NB) values. Evaluation of social behaviour types were made according to BORHIDI (1995) and ratio of nature conservation value categories according to SIMON (2000). Species names follow the nomenclature of SIMON (2000).

Data gained from the area closer to the farm are signed as group A and those from the farther one as group B. These two groups were not differentiated during the observations in 1997, this is why data gained that time were used as standards during the evaluation of data gained in 2005.

## Results and discussion

Overgrazed areas (group A) contain more species than those lying farther from the farm. Comparing with previous observations it can be stated that the area has not become poorer, however, new species appeared on the area, being mainly weeds or natural disturbance tolerant species (*Convolvulus arvensis*, *Ononis spinosa*). A significant difference could be detected considering dominant species. Previously, *Festuca pseudovina* and *Bromus mollis* were dominant. During time passed, *Festuca pseudovina* has remained in a significant rate in the association, rate of *Bromus mollis*, however, has decreased, its dominant role was taken over by *Cynodon dactylon*. On the areas near the farm, *Lolium perenne* has become dominant. On the less grazed area (group B), the number of animals per hectare is suitable (KELEMEN 1997), there was no change in dominant species as well.

### Evaluation based on relative ecological value categories

Observing water demand values it can be stated that dryness tolerant plant species cover the highest rate. Deterioration is signed by *Lolium perenne* spreading in the area as well. Species referring to semi-dry areas have a rate of about 15%, those of tolerating massive dryness exceed 8% (Figure 1). There is no significant difference in species number among the different categories in the two groups based on data gained in 2005. Comparing data to previous studies it can be seen that rate of dryness tolerant species has increased. This change is the highest in case of species referring to semi-wet (value 5) conditions, where their rate has decreased from 23% to 3% or 11%.

Based on the values it can be stated that in case of water supply of the areas, value 3 of the scale is dominant in all the 3 cases. Considering distribution of value categories, data show that dryness tolerant species are characteristic around the farm (group A), while going farther from the fold, species indicating semi-wet or wet habitats cover a bigger rate.

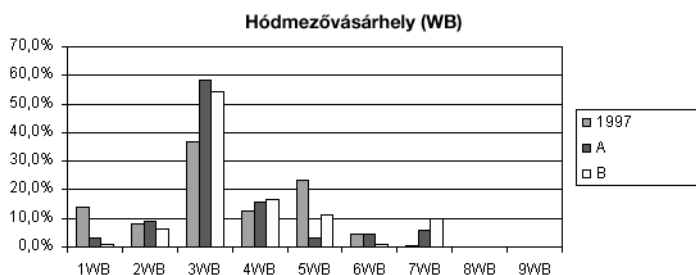


Figure 1. Relative groundwater and soil moisture demand values

1. ábra Relatív talajvíz- és talajnedvességigény értékek

### Relative nitrogen demand

Plant species referring to oligotrophic and mesotrophic environment (value 3 and 5) cover the highest rate in the observed areas (Figure 2). Plants of nutrient poor (value 2), sub-mesotrophic (value 4) and nutrient rich (value 7) sites exceed about 10%. Species indicating nutrient poor circumstances cover a greater rate than nitrogen indicating species of manured areas. Number of species with value 1 had been especially high (17%) in the previous studies, but their number has decreased significantly during the two investigation times. Within the other value categories, values of the standard area are similar to the other two areas.

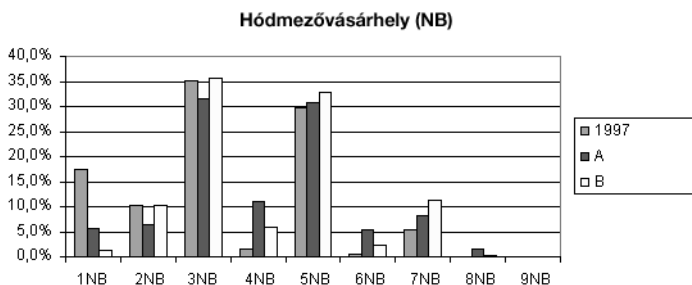


Figure 2. Relative nitrogen demand values

2. ábra Relatív nitrogénigény értékek

Considering nitrogen relations of the observed areas it can be stated that low and medium nitrogen level indicating species are present in case of all the three areas. Number of species referring to nutrient poor areas has decreased compared to the previous observations.

### Social behaviour types of species

Greatest part of species found on the observed areas belong to the group of natural disturbance tolerant ones (DT), ruderal competitors (RC) and competitors (C). Rate of ruderal competitors, indicating greater disturbance, is only 1% in 1997, however, their rate has almost exceeded 30% for 2005 (Figure 3). Rate of weeds (W) and disturbance tolerant species (DT) is higher on the areas affected by more intensive use. Moreover,

species belonging to rare specialists (*Trifolium subterraneum*) can be found only here. Sr value of 1997 exceeding 13% is caused by the high covering rate of this species. Aggressive invasive (AC) species have appeared in this area for 2005.

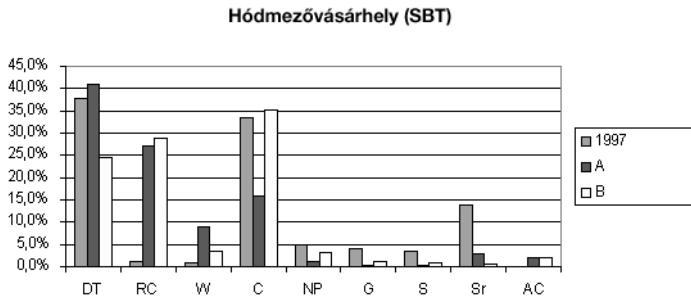


Figure 3. Social behaviour type values  
3. ábra Szociális magatartástípus értékek

Considering social behaviour types per area it can be stated that natural disturbance tolerant ones (DT), ruderal competitors (RC) and competitors (C) are present with the highest rate. Comparing categories indicating natural and disturbed state one can discover that plant species of secondary and anthropogenic habitats and of natural habitats are characteristic in a rate of about 50–50% on the areas.

### Nature protection value categories

Analysing the nature protection value categories (Figure 4) one can state that, similarly to the social behaviour types, natural disturbance tolerant (TZ) and weed (W) species occur with the highest rate. Natural disturbance tolerant (TZ) species exceed the highest rate (70%) in the areas farther from the stables. While rate of weeds (W) has not exceeded 10% in 1997, it passes 40% around the fold by 2005 (*Ambrosia artemisiifolia*, *Carduus achantoides*, *Conyza canadensis*). Rate of accompanying species (K) which refer to natural conditions and rate of pioneers (TP) have decreased between the two investigation periods. In the farther areas, where a bigger rate of natural composers should be expected, there is no representative of association composers (E). Besides these, one species can be classified into the category of crops.

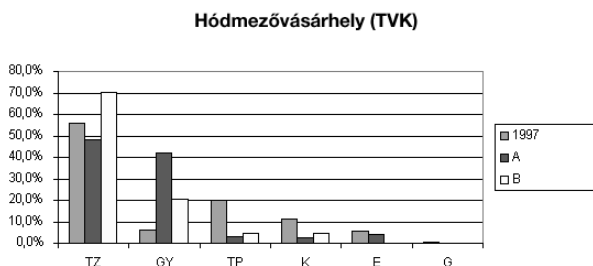


Figure 4. Nature protection value categories  
4. ábra Természetvédelmi értékkategóriák

After analysing nature protection value categories it can be stated that results gained from the areas are not significantly different from the results based on evaluation of social behaviour types.

Table 1. Coenological relevés near (0 to 50 m far from) the animal husbandry farm  
1. táblázat Cönológiai felvételek az állattartó telep közelében (0–50 m-re)

<i>Relevés</i>		1.	2.	3.	4.	5.
Festuca	pseudovina	5	15	5	15	20
Cynodon	dactylon	30	5	30	35	15
Elymus	repens	1		3	3	3
Convolvulus	arvensis	5	3	5	2	
Ononis	spinosa	5	5	15	5	
Euphorbia	cyparissias	5	15	40	15	
Plantago	lanceolata	3	3	5	3	5
Conyza	canadensis	2	2	3		
Lolium	perenne	10	15	5	10	5
Achillea	collina	2	3	2	5	3
Torilis	arvensis	2				
Potentilla	argentea	2	5	4		2
Lotus	tenuis	2		3	2	3
Digitaria	sanguinalis	2				
Melilotus	officinalis	2				
Eryngium	campestre	5	5	3		
Verbascum	phlomoides	3	3			
Geranium	pusillum	2	10	3	2	
Chenopodium	album		1			
Erodium	cicutarium		10	3	2	
Setaria	lutescens		5			
Setaria	viridis		5			
Carduus	acanthoides		3	3	2	
Trifolium	striatum		1	3	1	
Ambrosia	elatior		2			
Trifolium	subterraneum				10	5
Vicia	lathyroides				1	
Cardaria	draba				2	1
Medicago	minima					
Alopecurus	pratensis			3	5	15
Polygonum	neclegum				2	2
Inula	britannica				3	15
Lepidium	perfoliatum				1	2
Bromus	mollis				2	2
Rumex	stenophyllus					2
Mentha	pulegium					2
Puccinellia	limosa					2
Portulaca	oleracea					2
Kochia	prostrata					2

Table 2. Coenological relevés 50 to 150 m far from the animal husbandry farm  
2. táblázat Cönlógiai felvételek az állattartó teleptől 50–150 m-re

Relevés		1.	2.	3.	4.	5.	6.	7.
Festuca	pseudovina	65	60	40	5	30	20	25
Cynodon	dactylon	5	25	5	10	15	25	30
Elymus	repens	5	3	3	40	5	5	5
Plantago	lanceolata	3	2	25	1	20	20	2
Gypsophila	muralis	3	1	3	1	10	3	1
Lotus	tenuis	4	1	5		3	3	5
Achillea	collina	2		20		5	10	2
Potentilla	argentea	2						3
Podospermum	canum		2	1		1		1
Cichorium	intybus			2				
Taraxacum	officinale				1	5	1	5
Pholiurus	pannonicus				5			
Polygonum	neglectum				3	2	2	1
Setaria	lutescens					15		
Digitaria	sanguinalis					10		
Inula	britannica					5	10	5
Trifolium	subterraneum			3	3	5	2	
Eragrostis	pilosa					5		
Conyza	canadensis						3	
Verbascum	blattaria						2	
Carduus	acanthoides						2	
Carex	praecox						3	
Bupleurum	pachnospermum							2
Potentilla	reptans							5
Mentha	pulegium							5

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ALFÖLDI LEGELŐK ÖSSZEHASONLÍTÓ CÖNOLÓGIAI VISZGÁLATA I.  
(Hódmezővásárhelyi ló- és szarvasmarhalegelő)

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**Kulcsszavak:** legeltetés, túllegeltetés, taposás, szikes gyep, cönológiai vizsgálat

**Összefoglalás:** A cönológiai felvételek 1997-ben és 2005-ben a Hódmezővásárhely melletti homokos-szikes két csoportban készültek. Az első csoportba az állattartó telephez közel, 0–50 m-re lévő, és a bekerített karámok tartoznak. A második csoportba az intenzíven igénybe vett területektől 50–150 m-re található állományok felvételei találhatók. Az adatok értékelése az élőhelyekre vonatkozóan a természetességi állapot figyelembevételével; másrészt pedig az előforduló fajok relatív ökológiai mutatói alapján történt. A fajösszetételben jelentős változás történt. Elsősorban a területek leromlása tapasztalható. Különösen erősek ezek a folyamatok a karám, illetve a karámhoz közeli területeken. A vegetációban az agresszív tájidegen növényfajok is megjelentek. Az uralkodó pázsitfű fajok esetében a zavarást jobban tűrő *Cynodon dactylon* és *Lolium perenne* dominancia viszonyai és elterjedési területe nőtt meg, ami részben a túllegeltetésnek és a taposásnak is köszönhető. A karámtól távolodva a vegetációban kimutatható degradáció mértéke a közeli területekhez képest csökken, viszont a két időszak között a távolabbi területen is nőtt. A gyepek kezelési terveinél, a természetvédelmi értékek fennmaradása érdekében ezeket az adatokat jobban figyelembe kell venni, különösen azért, mert itt található nőhazánk két állománya közül a nagyobb, unikális földbentermő here (*Trifolium subterraneum*) is.