VII. TALL HERB COMMUNITIES – MOLINIETALIA

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General description

Tall herb communities grow on flooded areas along rivers, lakes and channels. These habitats can be characterized with the flooding in spring and the drought in summer, and the gley horizon in the soil developed as a consequence of the intensive movement of soil water table. The latter may cause also the salinization of the soil.

The overuse of the areas (grazing, mowing) degrades the communities by decreasing of the proportion of natural generalists and specialists and increasing weed species (Borhidi 2003).

VII.1 *Carici vulpinae-Alopecuretum pratensis* (Máthé & Kovács M. 1967 Soó 1971 corr. Borhidi 1996)

Habitat conditions

Although this community is a characteristic mesotrophic wet meadow located on lowlands but it also occurs in the wide valleys of the Hungarian Northern Mountain Range. The habitats are the regularly flooded areas of riverbeds and other mineral- and phosphate-rich permanently or frequently flooded areas. This community can be formed on loamy soil or meadow soil (Borhidi 2003).

Characterisation of the stands along Tisza and its tributaries

Alltogether 189 relevés of sedge community could be found that were taken along the rivers Tisza, Hármas-Körös and Maros. For details see Appendix page 187. Collected data demonstrated that this community has often two layers – the upper layer consists of tall grasses (*Alopecurus pratensis, Arrhenatherum elatius, Carex* sp.) while dicotyledons (e.g. *Lotus corniculatus, Potentilla* spp.) and smaller monocotyledons (e.g. *Festuca pseudovina*) can be found in the lower layer. The community is dominated by *Alopecurus pratensis. Carex vulpina* occurs only in a few relevés recorded on percentage scale with low abundance as an accompanying species and is not listed in the records on several occasions at all. The most frequent accompanying species slightly differ from the literature data (Borhidi 2003): *Ranunculus repens, Iris pseudacorus, Carex melanostachya, Lythrum virgatum, Lythrum salicaria, Lysimachia vulgaris, Potentilla reptans, Ranunculus acris, Carex hirta, Lotus corniculatus, Lychnis flos-cuculi, Galium rubioides*. The

distribution of the weed species like *Cirsium arvense, Inula britannica, Lamium purpureum* indicates certain degradation processes. The number of accidental and xerophilous elements (e.g. *Achillea collina, Carex stenophylla, Galium verum*) is rather high compared to that of community description (Borhidi 2003). The presence of the numerous taxa with different ecological requirements should be caused by the strong annual and seasonal fluctuation of the water table. This phenomenon can be justified with the occurrence of xerophilous grassland species mentioned above and swamp elements like *Alisma plantago-aquatica, Symphytum officinale, Juncus compressus, Euphorbia lucida.*

The relevés made along Tisza on percent scale can be characterized with the dominance of *Alopecurus pratensis.* The most frequent additional species are: *Galium verum, Elymus repens, Potentilla reptans, Carex distans, Carex stenophylla, Carex praecox, Agrostis alba, Carex hirta, Poa pratensis, Festuca pratensis, Arrhenatherium elatius, Vicia hirsuta, Carex melanostachya, Phalaris arundinacea, Ranunculus repens, Iris pseudacorus.*

One of the relevés of Lake Nyíres (which is totally degraded) differs from the average in the section of North-Eastern border and Tokaj as *Alopecurus pratensis* is not present in the relevé and is replaced by the dominant *Poa angustifolia* and *Tanacetum vulgare*. The latter species refers to the xerophilous, disturbed feature of the sampling area. During the 20th century, most of the semi-natural meadows of Bereg-mires have been cut off and were put in cultivation (Nagy *et al.* 2003). At the area of Tokaj-Szolnok section in the relevé of Sarud, *Drepanocladus aduncus* covers the entire soil surface (the cover value is 100 %). The cover value of *Alopecurus pratensis* is lower but that of *Eleocharis palustris* and *Lythrum virgatum* is higher than the average. In the relevés of Jászapáti and Jásztelek, *Carex distans* and *Carex praecox* are dominant. In the relevés recorded along the River Maros near Bezdin and Semlac, *Alopecurus pratensis* is not present or has lower cover values and the stands are dominated or co-dominated by *Carex hirta, Festuca pratensis, Agrostis alba* or *Carex vulpina*. In the relevés along river Maros, *Galium verum* is dominant which refers to a drier and more degraded state.

In most of the relevés recorded on AD scale along river Tisza, *Alopecurus pratensis* is dominant or co-dominant, and further frequent species are: *Lysimachia nummularia, Lamium purpureum, Poa angustifolia, Potentilla reptans, Trifolium repens, Ranunculus repens, Galium rubioides, Agrostis stolonifera, Symphytum officinale, Taraxacum officinale, Glycyrrhiza echinata, Lotus corniculatus, Lythrum virgatum.*

The relevé recorded at Kisar is polidominant. It differs from the average of the section of North-Eastern border—Tokaj since *Ajuga reptans, Anthoxanthum odoratum, Leucanthemum vulgare* ssp. *vulgare, Lysimachia nummularia* and *Poa pratensis* are the dominant taxa. *Ranunculus acris* is dominant in the relevé at Vásárosnamény, and in the relevés at Tiszaadony-Tiszakerecsend *Agrostis stolonifera* as well. *Alopecurus pratensis* has rather low cover in the later site. In

the section between Tokaj and Szolnok in one relevé near Tokaj, *Agrostis stolonifera* and *Eleocharis palustris* are codominant and *Alopecurus pratensis* is subordinate. In this region some of the relevés are co-dominated by *Agrostis stolonifera, Cichorium intybus, Equisetum arvense, Poa angustifolia, Ranunculus repens, Rorippa sylvestris, Taraxacum officinale. Alopecurus pratensis* is subordinate again. In one of the relevés in the Szolnok-Southern border section, the cover value of *Alopecurus pratensis* is low. In another relevé of the same section at Nagyrév, *Alopecurus pratensis* is replaced by *A. geniculatus* that refers to a permanent water cover.

The protected species of the community in certain localities are the following: *Aster punctatus* – Cserőköz; *Clematis integrifolia* – Tiszafüred, Apátfalva, Gyügérzug and in the stands on the west from it, Makó, Maroslele, Maroslele-pasture, Tápérét; *Gentianella ciliata* – Tiszafüred; *Lathyrus palustris* – Kisar, between Tokaj and Szolnok; *Leucanthemella serotina* – Tiszaalpár, Lake Nyíres, Mártély, Szolnok-southern border; *Leucojum aestivum* - Makó, Maroslele; *Orchis laxiflora* ssp. *palustris* – Tőserdő.

Multivariate statistical analysis

Relevés recorded on percentage scale were analysed with centred principal component analysis. On the basis of the eigenvalues, 10 components accounted for 85.8 % of the total variance of data (due to the large number of species). The separation of the points on the scattergram (Fig.1) is not very clear-cut. Points scattered along the first axis belong mainly to river Tisza and those along the second axis belong mainly to river Maros. On the other hand, the two directions of the range of points should be attributed to the cover values of the two dominant species. The dominance of *Alopecurus pratensis* increases along the first axis from the left to the right, this species associated with the first component. The cover value of *Galium verum* decreases from the top to the bottom along the second axis, and this species can be associated with the second component. In certain relevés the cover of *Alopecurus pratensis* is quite low (0-5 %), it is absent form certain relevés or is present as a subordinate species. The co-dominance of the two species is very rare.

The relevés characterized by the absence or low dominance of *Alopecurus pratensis* are dominated by *Carex hirta, Festuca pratensis, Arrhenatherum elatius, Poa angustifolia* or *Elymus repens*. The relevé with the dominance of *Cirsium arvense* was probably recorded in a degraded patch of the study area and this sample indicates the inhomogeneity of the stand. It is interesting that in one of the separated samples *Drepanocladus aduncus* forms facies.

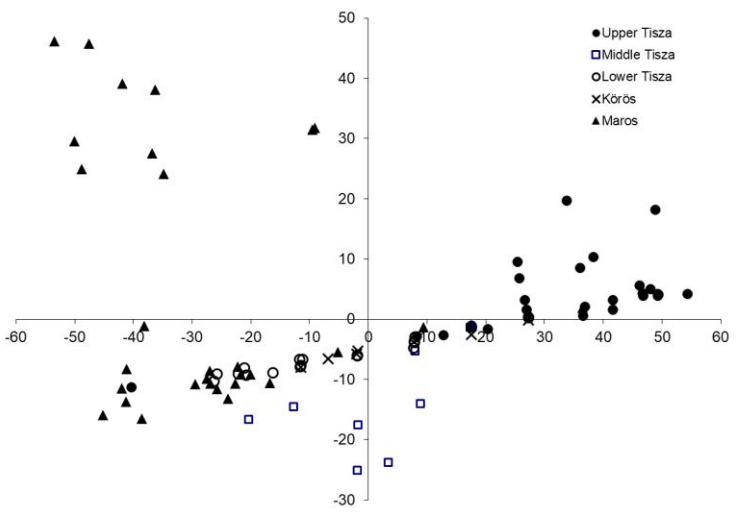

Fig. 1. PCA ordination of the 90 relevés of *Carici vulpinae-Alopecuretum* community recorded on percentage scale (centered PCA). Separation of the points is mainly due to the position along the rivers.

Relevés recorded on AD scale seem much more homogeneous on the basis of the ordination. The original AD values were converted according to van der Maarel (1979) prior to the analysis. The relevés were analysed with centred principal component analysis again. On the basis of the eigenvalues, 15 components accounted for 74,7 % of the total variance; the number of species was large again. It can be summarized that no definite grouping of the objects can be recognized at the scatter diagram therrefore the diagram is not presented.

The above examples refer to the wide tolerance of *Alopecurus pratensis* because the occurrence of this species ranges from xerophilous grasslands to marshmeadows.

Examining the distribution of social behaviour types (SBT; Borhidi 1999) of the species groups on the basis of the data from the last 50 years, the proportion of specialist with low tolerance did not change considerably between the earlier (AD scale data) and later (% scale data) records (Table 1). More specialist species were found in the lower section and less in the upper section of Tisza and no specialist was found along river Maros. The proportion of the competitors grew in the middle and upper sections of Tisza while decreased in the lower section and along Maros.

Table 1. Percentage distribution of social Behavior Types in the relevés along River Tisza and Maros (between1958-2006)

	Upper Tisza/North-Eastern border-Tokaj/		Middle-Tisza /Tokaj-Szolnok/		Lower-Tisza /Szolnok-Southern border/		Maros	
	AD	%	AD	%	AD	%	AD	%
S	4	3	5	3	4	5	4	
C	7	8	9	18	12	7	8	5
G	27	32	31	13	29	28	25	18
NP	5	1	3		3	3	2	2
DT	42	39	34	42	33	38	38	43
W	11	10	15	11	12	14	18	21
I			2	3				
RC	2	6	1	8	4	5	4	7
AC	2	1	1	3	2	1	2	3
n	106	38	88	94	118	155	113	108

S (+6):	Stress tolerant specialists of narrow ecological range
C (+5):	Natural competitors, dominant species, which are able to stabilize the composition and functioning of the community over a longer period and preserve the structure and basic characteristics of the community from strange effects for a longer time
G (+4):	Stress tolerant generalists, species of wide ecological range or tolerance living in natural plant communities, mostly perennials, do not tolerate anthropogenic disturbance
NP (+3):	Natural pioneers, important resilience factors, important means of the rehabilitation processes
DT (+2):	Disturbance tolerants, generally pioneer elements of the secondary successions mostly perennials of roads and banks
W (+1):	Weeds, members of plant communities living on artificial habitats or those heavily disturbed by frequently long lasting anthropogenic influence
I (-1):	Introduced alien species
RC (-2):	Ruderal competitors, dominant or type-forming weeds able to transform the habitat and modify the successional trend
AC (-3):	Aggressive alien species or invadors
n	number of species

Number of generalists decreased everywhere except for Upper Tisza. Number of the natural pioneers did not change considerably at the Lower Tisza and along Maros, it decreased at Upper Tisza and they disappeared from the middle section. The number of natural disturbance-tolerant species increased everywhere, except for Upper-Tisza. The natural weed species were present in a quite great number in the newer relevés except for Middle-Tisza, where invasive species were found. The number of ruderal competitors increased everywhere; it was the most serious in the region of Middle-Tisza. The number of invasive species decreased at Upper and Lower Tisza but increased in the Middle Tisza region and along Maros.

Summarizing the results, we can see that in the recent samples (recorded on % scale) fewer sensitive competitor and generalist species occur while the number of disturbance tolerant, weed species is higher thus a certain kind of degradation can be observed comparing to the earlier samples (made on AD scale).

Further on, it can also be stated about the samples along Tisza and mainly along Maros that the ratio of swamp elements (like *Symphytum officinale, Juncus compressus, Euphorbia lucida*) decreased that refers to the desiccation and degradation of the habitats. As the relevés cover a long period of time the observed differences for example the appearance of xerophilous grassland species may be the consequence of climatic changes.

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