IV. SMALL GALINGALE SWARDS – NANOCYPERETALIA KLIKA 1935

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The association order of small galingale sward vegetation consists of the West-, Central- and South-European mud associations. The main conditions for developing are short vegetation period, permanently humid mud and the absence of any perennial vegetation.

We can find excellent habitats around newly dried shores and shallows of the rivers, on rice fields and such kind of anthropogenic habitats as fisheries dried basin, and wheel-tracks. These habitats are characterised by continuous fluctuation of environmental factors and frequent disturbance which all can hinder the development of perennial vegetation. This kind of fluctuation is, for example, the annual oscillation of the water level that results a nitrogen poor sediment with unfavourable mechanical features. All of these effects determine the composition of the developing vegetation and only annual or ephemeral plants can survive in this habitat.

The research of the *Nanocyperion* associations has been neglected for a long time. The first relevés were made by botanists who carried out floristical researches along larger rivers. The small galingale swards are known from the publications of Timár (1947, 1948, 1950a, 1950b, 1954a, 1957a, 1957b), Ubrizsy (1948), Felföldy (1950), Fintha (1969), Bagi (1985, 1986, 1987a, 1987b, 1988a) and Molnár (2000a). Detailed studies were published by Bagi (1985, 1986, 1987a, 1987b), who dealt with the structure, dynamics, succession and classification of these associations. After the great floods of Tisza River in 1998, Molnár (1999a, 1999b, 2000b, 2000c, 2001) and Farkas (2001) published floristic data and some relevés about *Nanocyperion* communities.

The species composition of the relevés (see Appendix page 167) did not differ from that published in the literature. Categorization of the stands into exact associations was difficult, because the species compositions were similar and the most comprehensive Hungarian literature (Borhidi 2003) did not publish reference relevés. Furthermore, it was difficult because most of the relevés were made to demonstrate the preference of a particular species, and not to document an average and/or typical habitat. Hence, majority of the relevés were dominated by one of the pioneer species, while the other species occurred as subordinate ones. Therefore, it was hard to decide which association, facies or consociation did a given relevé belong to (see Fig. 1).

According to the relevés made on the Tisza valley, 32 % of these habitats was covered by natural pioneer species. From the floristical elements point of view, the widespread eurasian (28.7 %), cosmopolitan (29.4 %) and circumpolar (33.3 %) elements dominate this community (Fig. 2). Because of the heterogeneity of the sediment and the occasional evaporation or carbonate accumulation it may also develop on nitrogen and nutrient rich sediments, dominated by different species. These features suggest that *Nanocyperion* associations have an azonal character. However, the edafic and climate dependences are evident on the level of the stands due to specific ecological demands of the species.

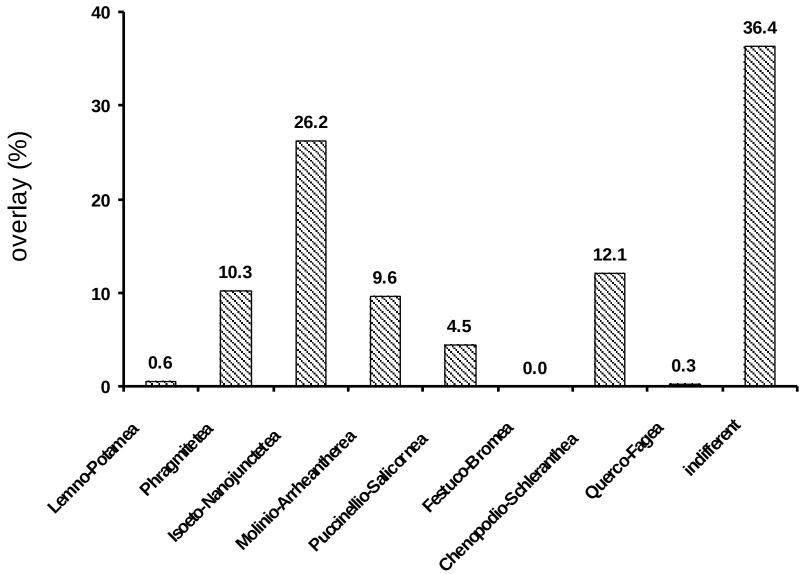

Fig. 1. Distribution of coenosystematic categories in the *Nanocyperion* relevés along River Tisza based on the percentage cover.

With the use of the social behaviour types (Borhidi 1996) we can detect that the native elements are the most frequent; this indicates high naturalness of the relevés. Because *Nanocyperion* communities are pioneer associations the natural pioneer species dominated (32 %) the relevés. In addition, the stress tolerant generalists (16.5 %), disturbance tolerant species (15.8 %) and native weeds (17.8 %) were the most frequent in the plots.

According to Borhidi (2003), *Nanocyperion* stands have low vegetation cover, they are relatively species poor. Relevés made along River Tisza showed the following features: average plant cover was 45 % and species number ranged from 3 to 29. The coverage of the individual species was rather low. Typically the plants formed small tussocks and prostrate shoots.

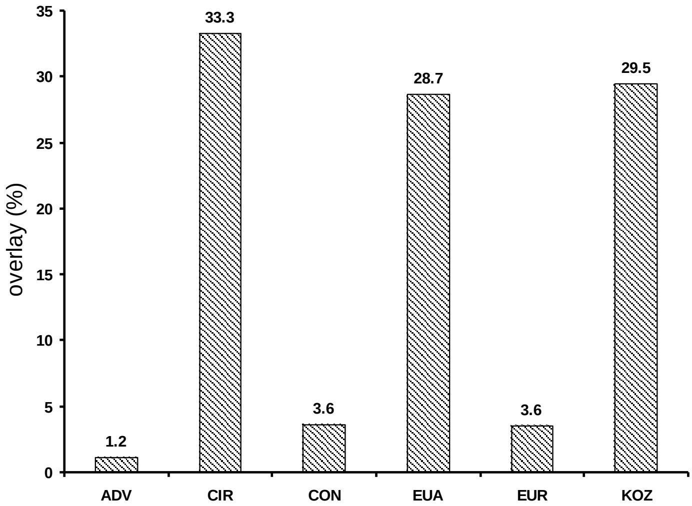

Fig. 2. Distribution of the floristic elements in the *Nanocyperion* relevés along River Tisza based on the percentage cover.

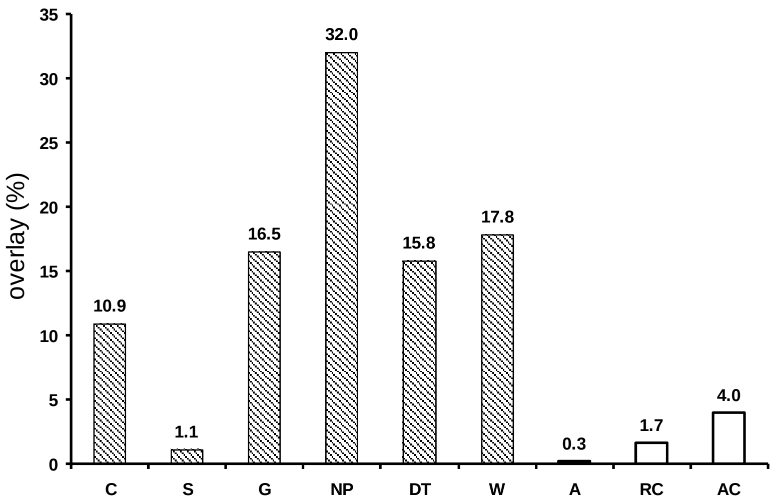

Fig. 3. Distribution of the social behaviour (Borhidi 1995) types in the *Nanocyperion* relevés along River Tisza based on the percentage cover (invasive species with white columns).

Most of the species had specifically low (I-III) constancy value (see Appendix page 167), higher values were very rare. The highest constancy values (IV-III) along the Tisza-River were recorded in the case of the following species: *Agrostis stolonifera, Cyperus fuscus, Echinochloa crus-galli, Persicaria lapathifolia*. Characteristic species were with lower (II) constancy: *Alisma plantago-aquatica, Amaranthus lividus, Atriplex oblongifolia, Bidens cernua, Bidens tripartitus, Carex serotina, Chenopodium album, Chenopodium polyspermum, Chenopodium rubrum, Cyperus michelianus, Eleocharis ovata, Gnaphalium uliginosum, Juncus articulatus, Juncus buffonius, Leersia oryzoides, Lycopus europeaus, Lythrum virgatum, Plantago major, Ranunculus sceleratus, Rorippa sylvestris, Rumex crispus, Rumex stenophyllus, Tanacetum vulgare, Typha latifolia, Xanthium italicum.*

Nanocyperion habitats became very scarce by this time. With the decrease of the former intensive rice-cultivations and with the drainage of the rainwater and inland inundations their habitats were drastically ebbed away, reducing considerably the survival of several rare species. Important data from the relevés along the River Tisza were the occurrence of *Elatine* species (*E. triandra, E. hungarica, E. alsinastrum, E. hydropiper*), *Carex bohemica, Eleocharis carniolica, E. ovata.* These species were extremely rare all across the country; therefore, their frequency in the relevés overestimates their real occurrence frequency.

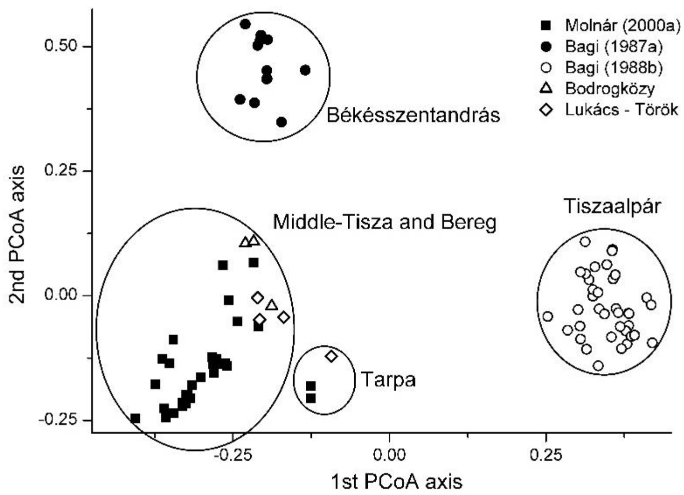

Fig. 4. Ordination of the relevés (PCoA) with Bray-Curtis similarity (n=87) based on the percentage cover. Symbols denote the botanist responsible for the relevés; circles indicate the geographic location of the relevés.

With the ordination of the relevés (Fig. 4) we could distinguish rather separated groups only on the basis of their geographic distribution. This distribution did not coincide with the group of authors responsible for the relevés.

References

Bagi, I. (1988a): Effects of mud vegetation on the nutrient condition of flood-plain lakes. – Aquat. Bot. 32, 321-328

Bagi, I. (1988b): Cenological relations of mud vegetation of a hypertrofic lake in the Tiszaalpár basin. – Tiscia 23, 3-12

Bagi, I. (1991) Edafic factors in the development of dwarf-plant communities of mud. – Folia Geobot. et Phytotax. 26, 431-437

Bagi, I (1994): Measures of association and correlation between two coexistent forms of *Carex serotina* Mérat; pattern and distribution of dominance. Tiscia 28, 15-19

Bagi, I. (1997): Árterek és zátonyok pionír növényzete. (Vegetation of floodplains and flats.) In: Fekete, G., Molnár, Zs., Horváth, F. (eds): A Nemzeti Biodiverzitás Monitorozó Rendszer II. A magyarországi élőhelyek leírása, határozója és a Nemzeti Élőhelyosztályozási Rendszer. – Magyar Természettudományi Múzeum, Bp. pp. 112-113.

Bagi, I. (1999): Törpekákás iszaptársulások. (Small galingale swards association.) In: Borhidi, A., Sánta, A. (eds): Vörös könyv Magyarország növénytársulásairól 1. – A KöM Természetvédelmi Hivatalának Tanulmánykötetei 6. – TermészetBúvár Alapítvány Kiadó, Bp. pp. 142-151.

Bagi, I. (1985): Studies on the vegetation dynamics of Nanocyperion communities I. Characteristic indicator values and classification and ordination of stands. – Tiscia 20, 29-43

Bagi, I., Körmöczi, L. (1986): Studies on the vegetation dynamics of Nanocyperion communities II. Classification and ordination of species. – Tiscia 21, 13-24

Bagi, I. (1987a): Studies on the vegetation dynamics of Nanocyperion communities III. Zonation and succession. – Tiscia 22, 31-45

Bagi, I. (1987b): Studies on the vegetation dynamics of Nanocyperion communities IV. Diversity and succession. – Tiscia 22, 47-54

Bodrogközy, Gy. (1958): Beuträge zur Kenntnis der synokologischen Verhaltnisse der Schlammvegetation auf Kultur- und Halbkultur-Sandbodengebieten. – Acta Biol. Szeged. 4, 121-142

Borhidi, A. (1995): Social behaviour types, the naturalness and relative ecological indicator values of the higher plants in the Hungarian Flora. – Acta Bot. Hung. 39, 97-181

Borhidi, A. (2003): Magyarország növénytársulásai. (Plant associations of Hungary.) – Akadémiai Kiadó, Bp.

Boros, Á. (1960): Rizs-gyom tanulmányok. (Rice weed studies.) – Agrobotanika 2, 141-163

Csapody, V. (1953): A rizs gyomnövényei. (The weeds of rice.) – Annals Hist.-nat. Mus. Nat. Hung. 4, 35-45

Farkas, S., Molnár, V. A. (2001): Adatok a hazai *Nanocyperion*-fajok ismeretéhez VI. A *Cyperus glaber* L. második magyarországi lelőhelye. (Data to the knowledge of *Nanocyperion*-species in Hungary VI. Second Hungarian locality of *Cyperus glaber*.) – Kitaibelia 6, 197.

Felföldy, L. (1950): Studies on the shore vegetation of Lake Belső-tó at Tihany. – Magyar Biológiai Kutatóintézet Évkönyve (Arch. Biol. Hung.) [1949-1950] 19, 135-146

Fintha, I. (1969): Szárazra kerülő élőhelyek növénytakarójának kialakulása és fejlődése a Szamos mentén. (The evolvation and development of the vegetation of dried habitats.) – Debreceni Agrártudományi Főiskola Közleményei 15, 19-44

Molnár, V. A., Molnár A., Vidéki R., Pfeiffer N. (1999a): Adatok a hazai *Nanocyperion*-fajok ismeretéhez I. *Elatine hungarica* Moesz. (Data to the knowledge of *Nanocyperion*-species in Hungary I. *Elatine hungarica* Moesz.) – Kitaibelia 4, 83-94

Molnár, V. A., Pfeiffer, N. (1999b): Adatok a hazai *Nanocyperion*-fajok ismeretéhez II. Iszapnövényzet-kutatás az ár- és belvizek évében Magyarországon. (Data to the knowledge of *Nanocyperion*-species in Hungary II. Researching of muddy vegetation in Hungary in the year of high floods and inland waters.) – Kitaibelia 4, 391-421

Molnár, V. A. (2000a): Magyarországi *Nanocyperion* fajok vizsgálata. (Survey of the Hungarian *Nanocyperion* species.) PhD thesis, 123 p.

Molnár, V. A., Pfeiffer, N., Ristow, M. (2000b): Adatok a hazai *Nanocyperion*-fajok ismeretéhez IV. A *Lindernia dubia* (L.) Pennel [Scrophulariaceae] Magyarországon (Data to the knowledge of *Nanocyperion*-species in Hungary IV. *Lindernia dubia* (L.) Pennel in Hungary.) – Kitaibelia 5, 279-287

Molnár, V. A., Molnár, A., Gulyás, G., Schmotzer, A. (2000c): Adatok a hazai *Nanocyperion*-fajok ismeretéhez V. *Heliotropium supinum* L. és *Verbena supina* L. (Data to the knowledge of *Nanocyperion*-species in Hungary V. *Heliotropium supinum* L. and *Verbena supina* L.) – Kitaibelia 5, 289-296

Molnár, V. A., Gulyás, G. (2001): Adatok a hazai *Nanocyperion*-fajok ismeretéhez VII. Az iszapnövényzet fajainak térképezése az Alföldön 2000-ben. (Data to the knowledge of *Nanocyperion*-species in Hungary VII. Mapping of the species of mud vegetation on the Great Hungarian Plain in 2000.) – Kitaibelia 6, 169-198

Simon, T. (2000): A magyarországi edényes flóra határozója. Harasztok-virágos növények. (Vascular plants of Hungary. Ferns and flowering plants.) – Nemzeti Tankönyvkiadó, Bp.

Timár, L. (1947): Les associations végétables du lit de la Tisza de Szolnok á Szeged. (Publication préliminaire). – Acta Geobotanica Hungarica 6, 70-82

Timár, L. (1948): Egy szolnoki zátonysziget benépesedése. (Colonization of a sand-shoal at Szolnok.) – Alföldi Tudományos Gyűjtemény (Alföldi Tudományos Intézet Évkönyve) [1946-1947] 2, 165-170.

Timár, L. (1950a): A Tiszameder növényzete Szolnok és Szeged között. (Plants of Tisza-River between Szolnok and Szeged.)– Ann. Biol. Univ. Debrecen 1, 72-145

Timár, L. (1950b): A Marosmeder növényzete. (Plants of Maros-River.) – Annales Biologicae Universitatis Szegediensis 1, 117-136

Timár, L. (1954a): Egyéves növénytársulások a Szeged környéki szikesek iszapján I. (Annual plant associations in saline mud in the coutryside of Szeged.) – Ann. Biol. Univ. Hung. (1952) 2, 491-499

Timár, L. (1957a): Die botanische Erforschung des Sees Fehértó bei Szeged. – Acta Botanica Hungarica 3, 375-389

Timár, L. (1957b): Zonációtanulmányok szikes vizek partján. (Zonation studies on the shoreline of saline waters.) – Botanikai Közlemények 47, 157-163

Ubrizsy, G. (1948): A rizs hazai gyomnövényzete. (La végétation des mauvaises herbes dans les cultures de riz en Hongrie). – Acta Agrobotanica Hungarica 1, 1-43