

## VEGETATION OF THE LOWER TISA RIVER

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### Abstract

The preliminary results on the recent autochthonous vegetation of the lower part of the Tisa river are presented. The investigations included forest, marsh, meadow, and meadow-steppe vegetation types.

### Introduction

The phytocenological aspect of vegetation of the floodplain of the lower Tisa river has been insufficiently examined. An intensive melioration and certain other anthropogenic factors have considerably disturbed natural vegetation bordering the Tisa river and reduced it to a narrow belt. In a limited portion of the Tisa river shore, most vegetation belongs to the anthropogenic forest phytocenoses (Euramerican poplar, willow, and American ash). With regard to the floral composition, no specific features are shown. Natural vegetation is recorded only in the form of small oases, and it has preserved its characteristics despite the strong anthropogenic influence.

This paper describes the most important characteristics of recent autochthonous vegetation along the Tisa river banks which is threatened with decline due to a permanent anthropogenic influence.

### Materials and Methods

Investigation into plant covering of the floodplain of the Tisa river (from Horgoš and Martonoš to its mouth into the Danube) was performed according to the method of BRAUN-BLANQUET (1928, 1951). Plant material was determined according to Flora SR Srbije (1970—1977) and JÁVORKA (1925, 1975). Sintaxonomic location of vegetation units was presented according to Soó (1964—1980) and Prodrumum phytocoenosum Jugoslaviae (1986).

### Results and Discussion

List of vegetation units

Class: **Salicetea purpureae** MOOR (1958) 1960

Order: **Salicetalia purpureae** MOOR (1958) 1960

Alliance: *Salicion triandrae* Malcuit 1929, Müller et Görs 1958 (non BR.-BL. 1956)  
 Ass.: *Salicetum triandrae* MALCUIT 1929  
 Alliance: *Salicion albae* Soó (1930) 1940  
 Ass.: *Salicetum albae-amygdalinae* SLAVNIĆ 1952  
     (*Salicetum albae-fragilis* Soó 1971)  
 Class: **Quercio-Fagetea** BR.-BL. et Vlieg. 1937  
 Order: **Populetalia albae** BR.-BL. 1931  
 Alliance: *Alno-Quercion roboris* HORVAT 1938  
 Ass.: *Populetum nigrae-albae* SLAVNIĆ (1942) 1952  
 Class: **Phragmitetea** W. KOCH 1926  
 Order: **Phragmitetalia** W. KOCH 1926  
 Alliance: *Phragmition communis* W. KOCH 1926  
 Ass.: *Scirpo-Phragmitetum* W. KOCH 1926  
 subass. *typhetosum (angustifoliae-latifoliae)* Soó 1973  
 subass. *phragmitetosum* SCHMALLE 1939  
 subass. *bolboschoenetosum maritimi* UBRIZSY 1961  
 Ass.: *Glycerietum maximae* HUECK. 1931  
 Order: **Magnocaricetalia** PIGN. 1953  
 Alliance: *Magnocaricion* W. KOCH 1926  
 Ass.: *Heleochareto-Caricetum nutantis* R. JOV. 1958  
 Alliance: *Caricion gracilis* (NEUHÄ. 1959, BAL-TUL. 1963) OBERD. 1967, Soó 1968  
 Ass.: *Caricetum gracilis* R. TX. 1937  
 Class: **Molinio-Arrhenatheretea** R. TX. 1937  
 Order: **Molinietalia** W. KOCH 1926  
 Alliance: *Deschampsion caespitosae* HORVATIĆ 1930  
 Order: **Arrhenatheretalia** PAWL. 1926  
 Alliance: *Arrhenatherion elatioris* BR.-BL. 1925  
 Ass.: *Arrhenatheretum medioeuropaeum* (SCHERR. 1925/non BR.-BL. 1915/  
     HORVATIĆ 1941  
 Order: **Agrostietalia stoloniferae** OBERD. 1967  
 Alliance: *Agropyro-Rumicion cripsi* NORDH. 1940  
 Class: **Festuco-Brometea** BR.-BL. et R. TX. 1943  
 Order: **Festicetalia valesiaca** BR.-BL. et R. TX. 1943  
 Alliance: *Festucion rupicola* (sulcatae) Soó (1940) 1964  
 Ass.: *Coronillo-Festucetum sulcatae* PARABUĆSKI 1982  
 Alliance: *Artemisio-Kochion* Soó 1959  
 Ass.: *Agropyro-Kochietum prostratae* ZÓLYOMI 1958  
 subass. *thymetosum* STOJANOVIĆ (1981) 1983  
 subass. *artemisietosum* STOJANOVIĆ (1981) 1983

#### Forest vegetation

*Ass. Salicetum triandrae.* The stands of this pioneer forest phytocenosis occur near running waters, occupying very small areas. They are exposed to long-term floods, while during summer to a sudden natural draining. Such extremes affect their specific stratification: a stratum of small trees and shrubs and a stratum of herbaceous plants.

*Salix triandra* L. is a dominant species. Also frequent are *Amorpha fruticosa* L and *Salix alba* L. while scattered are *Fraxinus americana* L., *Fraxinus lanceolata* BORKH., *Populus alba* L. and *Populus nigra* L. (near Bečej).

The stratum of herbaceous plants is characterized by certain floral luxuriance. Among others, *Poa palustris* L., *Agrostis alba* L., *Iris pseudacorus* L., *Lysimachia nummularia* L., and *Bidens tripartitus* L., are abundant to some degree.

*Ass. Salicetum albae-amygdalinae.* Of the natural forest phytocenoses found in the Tisa Basin, the most widespread are the stands of this association.

In the stratum of trees, owing to absolute domination of the species *Salix alba* L., very small numbers of other plant species are present. Considerably less frequent is *Salix triandra* L. while scattered are *Populus alba* L., *Populus nigra* L., *Fraxinus laceolata* BROKH., and *Fraxinus americana* L.

The stratum of shrubs is developed only in certain stands. Floristically, it is a poor layer composed of *Fraxinus lanceolata* Borkh., *Fraxinus americana* L., and *Amorpha fruticosa* L.

In the stratum of herbaceous plants the most frequent are *Rubus caesius* L., *Lysimachia vulgaris* L., and *Poa palustris* L. This layer is not developed in densely composed stands due to submergence by flood for a considerable length of time.

*Ass. Populetum nigrae-albae.* These forests have been almost completely declined and where replaced by the cultures of Euramerican poplar. They have been preserved only in the form of limited oases and recorded from raised areas, usually far from the river banks, at older alluvial deposits. They superseded oak forests which were cleared.

A dominant species in the stratum of trees is *Populus alba* L. In this layer also occur *Populus euramericana* (Dode) Guin., *Fraxinus americana* L., *Fraxinus lanceolata* BORKH., *Ulmus carpiniifolia* GLED., *Ulmus laevis* PALL., and *Quercus robur* L.

In the stratum of shrubs a distinguished species is *Amorpha fruticosa* L. while certain such as *Morus alba* L., *Populus alba* L., *Ulmus carpiniifolia* GLED. also occur.

The species *Rubus caesius* L. predominates in the layer of herbaceous plants.

### Marsh vegetation

*Ass. Scirpo-Phragmitetum.* In the portion of the Tisa Basin studied, the stands of this phytocenosis are the most widespread and are developed at sites where back-water occurs during a considerable length of time.

Floral composition and other characteristics of the common reed localities analyzed, show certain variations depending upon habitat conditions. Only a very small number of species in stands belonging to the subassociation *Scirpo-Phragmitetum typhetosum (angustifoliae-latifoliae)* are observed owing to a permanent water during a year. At shallow water sites, drained during summer, the stands of the subassociation *Scirpo-Phragmitetum phragmitetosum* are developed. They are characterized by a relatively high percentage of marsh and meadow plant species. On slightly saline soils, among marsh and meadow species, the most distinguished is *Bolboschoenus maritimus* (L.) PALL. — subassociation *Scirpo-Phragmitetum bolboschoenetosum maritimi*.

*Ass. Glycerietum maximae.* In the ecological succession, these tall grasses are followed by stands of this association, being well developed near Sanad in the surroundings of Novi Kneževac. A characteristic of their composition is the presence of *Glyceria maxima* (HARTM.) HOLNOG. Of the marsh plants, considerable number and covering are observed in *Schoenoplectus lacustris* (L.) PALL. and *Lycopus europaeus* L. while less abundant are *Oenanthe aquatica* (L.) POIR., *Mentha aquatica* L., and *Lythrum salicaria* L.

*Ass. Heleochareto-Caricetum nutantis.* The stands of this phytocenosis are deve-

loped in the form of a narrow belt on somewhat more arid soils. They are in the immediate vicinity of stands of the association *Glycerietum maximae*.

The closest relationship with the association is shown with *Carex nutans* HOST. In all stands analyzed, this plant species is characterized by abundance and a considerable covering, in contrast to the species *Heleocharis palustris* (L.) R. BR., being relatively rare.

A certain specificity of these stands is indicated by the occurrence of the species *Stachys palustris* L., *Bolboschoenus maritimus* (L.) PALL., and *Glyceria maxima* (HARTM.) HOLMBG.

*Ass. Caricetum gracilis.* The stands of this community are found along the edges or open areas within autochthonous willow forests.

The most important characteristic species of the stands analyzed, is *Carex gracilis* CURT. In all stands the most abundant is the species *Sium latifolium* L., then *Stachys palustris* L., and *Oenanthe aquatica* (L.) POIR. On the organic-mineral substratum where stagnant water is retained, favourable conditions for certain aquatic plants such as the species of the genus *Lemna* and *Salvinia* are produced. At shallow depressions of the forest clearings, dense stands of this community representing the most luxuriant vegetation of the region, are found. In addition to a typical species *Carex gracilis* CURT., certain other species such as *Rumex hydrolapatum* HUDS. and *Senecio paludosus* L. are also distinguished. At the edge of the willow forests towards the levee, stands are characterized by an impoverished floral composition. Most frequently predominates the species *Lysimachia vulgaris* L.

#### Meadow vegetation

*Deschampsion caespitosae.* Vegetation of wet, flood meadows is observed fragmentarily in the form of small oases surrounded by willow forests. The most important characteristic is imposed by the presence of *Scutellaria hastifolia* and *Lysimachia vulgaris* L. while somewhat less frequent are *Thalictrum flavum* L., *Thalictrum lucidum* L., *Polygonum aviculare* L. ssp. *heterophyllum* LINDM., *Stachys palustris* L., *Equisetum palustre* L., and *Calystegia sepium* (L.) R. BR.

*Ass. Arrhenatheretum medioeuropaeum.* Stands of this community of valley meadows are widespread in the Tisa Basin, mostly at levees. They are characterized by certain floral richness and a high percentage of the species *Arrhenatherum elatius* PRESL. somewhat lower percentage is found with *Pastinaca sativa* L., *Dactylis glomerata* L., *Lotus corniculatus* L., *Galium mollugo* L., *Daucus carota* L., *Vicia cracca* L., *Vicia hirsuta* (L.) S. F. GRAY, *Trifolium pratense* L., *Trifolium repens* L., and *Achillea millefolium* L.

*Agropyro-Rumicion crispi.* Vegetation of pastures which are periodically covered with flood water. In the region investigated it is spreading owing to the anthropogenic influence. The most important characteristics of stands of the vegetation described are imposed by the species *Alopecurus geniculatus* L., *Rumex crispus* L., *Rorippa sylvestris* (L.) BESS., *Rorippa austriaca* (CR.) BESS., *Mentha pulegium* L., *Agropyron repens* (L.) BEAUV., *Carex vulpina* L., and *Inula britannica* L.

#### Meadow-steppe vegetation

*Ass. Coronillo-Festucetum sulcatae.* Scattered stands in which *Coronilla varia* L. and *Astragalus cicer* L. are the most distinguished species growing at the highest points of the raised area bordering the river. Also numerous are *Festuca valesiaca*

SCHL., *Poa pratensis* L. ssp. *angustifolia* (L.) SM., *Astragalus glycyphyllos* L., *Melampyrum arvense* L., *Galium verum* L., and *Salvia nemorosa* L., as well as a number of elements of communities of valley meadows including *Knautia arvensis* (L.) COULT., *Trifolium pratense* L., *Lotus corniculatus* L., and *Tragopogon pratensis* L.

*Ass. Agropyro-Kochietum prostratae.* High sections of the loess plateau of Titelski Breg make the right bank of the Tisa river. Edges of this plateau are covered by stands of this association surrounding them in the form of a ring. A predominant species is *Kochia prostrata* (L.) Schrad. Its isolated shrubs are observed also beyond the limits of the stands mentioned, at bare, steep sections of the plateau. In addition to the species mentioned, typical for this community is also the species *Agropyron cristatum* (SCHREB.) P. B. At the southern slopes, the stands of the subassociation *Agropyro-Kochietum prostratae artemisietosum* are found. Apparently xerothermous species such as *Artemisia campestris* L., *Artemisia annua* L., *Stipa capillata* L., and *Centaurea solstitialis* L. are typical for these stands. Under relatively more favourable conditions, the stands of the subassociation *Agropyro-Kochietum prostratae thymetosum* are developed. This finding is confirmed by the presence of the species *Thymus marschallianus* Willd., *Centaurea stoebe* L. ssp. *micranthos* (GMEL.) HAYEK, *Kochia laniflora* (GMEL.) BORB., and *Bromus squarrosus* L.

### Conclusion

Preliminary investigations into the autochthonous recent vegetation of floodplain of the lower Tisa river included forest, marsh, meadow, and meadow-steppe vegetation types.

Of the widespread autochthonous forests occurring in times long past, only small stands of the associations *Salicetum triandrae* MALCUIT 1929, *Salicetum albae-amygdalinae* SLAVNIĆ 1952, and *Populetum nigrae-albae* SLAVNIĆ (1942) 1952 have been preserved.

Marsh vegetation is composed of the stands of the association *Scirpo-Phragmitetum* W. KOCH 1926 including the subassociation subass. *typhetosum (angustifoliae-latifoliae)* SoB 1973, subass. *phragmitetosum* Schamalle 1939, and subass. *bolboschoenetosum maritimi* UBRIZSY 1961, as well as the association *Glycerietum maximae* HUECK 1931, *Heleochareto-Caricetum mutantis* R. JOV. 1958, and *Caricetum gracilis* R. TX. 1937.

Within the type of the meadow vegetation, the most widespread are the stands of the association *Arrhenatheretum medioeuropaeum* (SCHERR. 1925) non BR.-BL. 1915 (HOVATIĆ 1941). Fragmentarily developed stands in which the most important characteristic is imposed by the elements of the community of the alliance *Deschampsion caespitosae* Horvatić 1930 and *Agropyro-Rumicion crispi* NORDH. 1940 are also observed.

Meadow-steppe vegetation is represented by two associations. An association *Coronillo-Festucetum sulcatae* PARABUĆSKI 1982 is found in fragments at the levee bordering the river while *Agropyro-Kochietum prostratae* ZÓLYOMI 1958 is developed at the edge of the loess plateau of Titelski Breg which partly makes the right bank of the Tisa river. This community type includes the subassociation subass. *thymetosum* STOJANOVIĆ (1981) 1983 and subass. *artemisietosum* STOJANOVIĆ (1981) 1983.

## References

- BODROGKÖZY, GY. (1967): Vegetation of the Tisza inundation area IV. Examination results of the Magnocaricion associations from the area of Alpár. — *Tiscia (Szeged)* 3, 27—41.
- GROUP OF AUTHORS (1970—1977): Flora SR Srbije (Flore de la Republique Socialiste de Serbie). I—IX. — SANU (Beograd).
- GROUP OF AUTHORS (1986): Prodrromus phytocoenosum Jugoslaviae ad mappam vegetationis m 1:200 000. — *Naučno veće vegetacijske karte Jugoslavije (Bribir-Ilok)*.
- HORVATIĆ, S. (1963): Vegetacijska karta otoka Paga s općim pregledom vegetacijskih jedinica hrvatskog primorja (Carte des groupements végétaux de l'île Nord-Adriatique de Pag avec un aperçu générale des unités végétales du littoral Croate). — *Acta biologica (Zagreb)* 4, Odjel za prirodne nauke, 1—87.
- JÁVORKA, S. (1925): Magyar flóra (Flora Hungarica). — Budapest.
- JÁVORKA, S., CSAPODY, V. (1975): *Iconographia florae Partis Austro-orientalis Europae centralis*. — Budapest.
- JOVANOVIĆ, R. (1958): Tipovi močvarne vegetacije u Jasenici. (Sumpf-vegetationstypen in Jasenica.) — *Zbornik radova, Biološki institut NR Srbije (Beograd)* knj. 1, 1—36.
- PARABUĆSKI, S. (1972): Šumska vegetacija Koviljskog rita (The Forest Vegetation of the Kovilj Marsh). — *Zbornik Matice srpske za prirodne nauke (Novi Sad)* 42, 5—88.
- PARABUĆSKI, S. (1982): Neke karakteristike stepske vegetacije u Vojvodini (Some characteristics of steppe vegetation of Vojvodina Province). — *Glas. republ. zavoda za št. prirode Prirodnjačkog muzeja (Titograd)* 15, 147—162.
- PARABUĆSKI, S., STOJANOVIĆ, S., BUTORAC, B., PEKANOVIĆ, V.: Prodrromus vegetacije Vojvodine (An introduction to the vegetation of the Vojvodina Province). — *Zbornik Matice srpske za prirodne nauke (Novi Sad)* 71, 5—40.
- SLAVNIĆ, Ž. (1952): Nizinske šume Vojvodine. (Die Niederungswälder der Vojvodina.) — *Zbornik Matice srpske za prirodne nauke (Novi Sad)* 2, 17—39.
- SLAVNIĆ, Ž. (1956): Vodena i barska vegetacija Vojvodine. (Die Wasser- und Sumpfvegetation der Vojvodina.) — *Zbornik Matice srpske za prirodne nauke (Novi Sad)* 10, 5—73.
- Soó, R. (1964—1980): A magyar flóra és vegetáció rendszertani-növényföldrajzi kézikönyve. (Synopsis systematico-geobotanica Florae vegetationsque Hungariae.) I—VI. — *Akadémiai kiadó (Budapest)*.
- STOJANOVIĆ, S. (1983): Vegetacija Titelskog brega. (Vegetation of the Titel hill.) — *Zbornik Matice srpske za prirodne nauke (Novi Sad)* 65, 5—51.
- TIMÁR, L. BODROGKÖZY, GY. (1959): Die Pflanzengeographische karte von Tiszaug. — *Acta Botanica scientiarum Hungaricae (Budapest)* 1—2, 203—232.

### A Tisza alsó szakaszának vegetációja (Jugoszlávia)

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#### Kivonat

A Tiszavölgy alsó szakasza növénytakarójának eddigi fitocönológiai vizsgálata hiányos. Az intenzív meliorációs és egyéb antropogén hatás következtében az autochton növénytakaró még a hullámtéren is szegényes. A keskeny sávban húzódó hullámtér vegetációja elsősorban ültetett erdő-sáv, amelyet euro-amerikai nyár, fűz és amerikai kőris homogén monokultúrái képeznek, kizárva az összetettebb florisztikai jelleget. A természetes vegetáció csak fragmentálisan jelentkezik, és autochton jellegét csak kisebb, oázisszerűen fennmaradt foltokon őrizte meg.

A dolgozat a Tiszavölgy recens autochton vegetációjának alapvető jellegét ismerteti. Az állandó antropogén hatás feltételezi a még fennmaradt természetes vegetáció teljes felszámolását.

## Растительность нижнего течения р. Тиса (Югославия)

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### Резюме

Растительность инундационного района нижнего течения р. Тиса до настоящего времени фитоценологическими испытаниями была недостаточно изучена. Интенсивные мелиоративные мероприятия и другие антропогенные влияния в непосредственной близости р. Тиса привели к значительному нарушению природной растительности и ее сохранению на неширокой полосе. В ограниченном прибрежном поясе Тисы самая большая часть растительности относится к лесным фитоценозам антропогенным, включающим: европейско-американские тополя, ивы и американский ясень, не характеризующиеся особенностями в отношении состава растений.

Природная растительность обнаруживается в виде небольших оазисов, которые несмотря на антропогенные влияния, сохранили свои основные особенности.

В настоящей работе указываются основные, важные характеристики рецентной автохтонной растительности вдоль р. Тиса, которая учитывая антропогенные влияния, стоит пред угрозой полного исчезновения.

### Vegetacija donjeg toka Tise

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### Izvod

Vegetacija u inundacionom području donjeg toka Tisa dosadašnjim fitocenološkim istraživanjima nije bila dovoljno proučena. Usled intenzivnih meliorativnih zahvata i drugih antropogenih uticaja, prirodna vegetacija neposredno uz Tisu je u velikoj meri narušena i scedena na uzan pojas. U ograničenom priobalnom pojasu Tise najveći deo vegetacije zauzimaju antropogene šumske fitocenoze, koju čine: euro-američke topole, vrbe i američki jasen i u pogledu florističkog sastava nemaju nekih posebnih odlika. Prirodna vegetacija je konstatovana samo u vidu manjih oaza, koje su i pored antropogenih uticaja sačuvalе svoja osnovna obeležja.

U ovom radu se iznose osnovne i bitne karakteristike recentne autohtone vegetacije duž Tise, kojoj usled daljih antropogenih uticaja preti potpuno iščezavanje.