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ECOLOGICAL AND PHYTOGEOGRAPHICAL ANALYSES OF VEGETATION OF THE ALLIANCE *HALO-AGROSTION ALBAE PANNONICUM* KNEŽEVIĆ 1990 (SYN. *BECKMANNION ERUCIFORMIS* SOÓ 1933)

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Ecological and phytogeographical analyses are employed to characterize plant cover of wet Solenetz Soils of the Banat region. On the basis of the results obtained modification of name vegetation of the alliance *Beckamnnion eruciformis* Soó 1933 (S o ó , 1940) into *Halo-Agrostio albae pannonicum* Knežević 1990 (K n e ž e v i ć , 1990) is suggested. In that way the emphasis is put upon the abundance of halomesophytes, edification role of the hygromesophyte *Agrostis alba* L., and finally upon areal limitations of their stands to the Pannonian Plain. Also, an opinion is presented that the stands of river lowland beyond the boundaries of the Pannonian Plant of Serbia and inundated ravines of Macedonia in which *Beckmannia eruciformis* (L.) Host plays a role of a constructor can not be included within their boundaries.

Key words: vegetation, characteristic species, stand, community, ecological parameter, life form, floristic element, synthaxonomical position

Ključne reči: vegetacija, karakteristične vrste, sastojina, zajednica, ekološki parametar, životna forma, florni element, sintaksonomski položaj

INTRODUCTION

Meadow plant cover of wet Solonetz Soils in the Hungarian depression was united by Soó into the alliance *Beckmannion eruciformis* Soó 1933 (Soó, 1940). He separated as a characteristic species of the alliance only a circumpolar element *Beckamnnia eruciformis* (L.) Host. Slavnić stated that the vegetation of such a type is more developed on saline soils of Voivodina. Therefore, in addition to the plant species cited above he distinguished as a characteristic of the alliance also the species *Roripa kerneri* Menyh., *Rumex stenophyllus* Ledeb., *Oenanthe silaifolia* M.B., *Melilotus dentatus* (W. et K.) Pers., and *Alopecurus geniculatus* L. (Slavnić, 1948). Bodrogközy added to the group of characteristic speices or the communities of the alliance mentioned and the alliance *Beckmannion eruciformis* Soó 1933 also *Glyceria fluitans* (L.) R.Br. var. *poiformis* Fries, *Ranunculus laterifolius* D.C., *Trifolium fragiferum* L., *Lotus tenuis* Kit., and *Agristis alba* L. (Bodrogközy, 1962, 1965, 1965/b, 1965/c, 1966, 1970; Bodrogközy, Györffy, 1970). Completing the floristic characterization of the alliance, Soó accepted to a great extent the assumption presented by Slavnić and Bodrogközy. He fully accepted that in addition to *Bekcmannia eruciformis,* also the species *Roripa kerneri, Rumex stenophyllus, Glyceria fluitans* var. *poiformis,* and *Ranunculus lateriflorus* represent a characteristic of this alliance mentioned, but he added to the group *Cardamine parviflora* L. and *Ranunculus polyphyllus* W. et K. (Soó, 1968). Therefore, a number of investigators of the halophyte vegetation of the Pannonian Plain has characterized from the floristic aspect the alliance *Beckmannion eruciformis* Soó 1933.

Owing to a higher moisture and presence of water soluble salts, the role of edificator is committed to herbs, *i.e. Agrostis alba, Alopecurus pratensis* L., *Glyceria fluitans* var. *poiformis, Alopecurus geniculatus* and *Beckmannia eruciformis.*

The role of the constructor belongs to *Beckmannia eruciformis* also in the stnads on wet nonsaline or poorly saline habitats beyond the boundaries of the Pannonian Plain. Since no satisfactory answer has been offered, also certain of such stands have been included into vegetatoin of the alliance *Beckmannion eruciformis* Soó 1933 (Jovanović, 1958; Micevski, 1963; Randelović, 1988). The categorization mentioned above and also present dual characterization (halophytic, mesophilous) have resulted in different interpretation of synthaxonomical character of the alliance *Beckmannion eruciformis* Soó 1933. Therefore, certain authors have analyzed it within march, meadow, and halophytic vegetation /*Phragmitetalis* (Koch, 1926; Topa, 1939; Jovanović, 1958; Micevski, 1963; Jovanović et al., 1986; Randelović, 1988), *Juncetalia maritimi* (Wendelberger, 1943, 1950), *Molinietalisa* (Slavnić, 1948), *Plantaginetalia* (Tuxen, 1950), *Festuco-Puccinellietalia* (Soó, 1940, 1957, 1968, 1971; Bodrogközy, 1962, 1965, 1966, 1970; Knežević, 1980, 1990; Vučković, 1985; Parabućski et al., 1986).

On the basis of the ecological and phytogeographical analyses of the flroistic composition, the present paper characterizes plant cover of wet Solonetz Soils of the

Banat region in order to elucidate its synecology and synthaxonomy. Also, the present paper represents a contribution to better understnading of the possibilities of devision within the alliance *Beckmannion eruciformis* Soó 1933.

INVESTIGATED AREA AND METHODS

A characteristic of the Banat representing a Pannonian partion within Serbia is steppe, moderate-continental climate. Winters are often with snow and frost, frost with no snow, and southeastern wind while summers are hot with dry wind, and heavy rains and hail (Matvejev, Puncer, 1980).The data on the climate diagrame after Wlater for the Banat (Fig. 1), obtained from the hydrometeorological station (Katić et al., 1979), have shown that the beggining of the vegetation period (April) is characterized by an increase in temperature and higher precipitation values enabling favourable conditions for plant development. On the contrary, a semiarid period (from middle of July to the end of September) offers unfavourable conditions since it produces air and surface soil draught. Mean year temperature is 11.2°C while year precipitation is 616 mm.

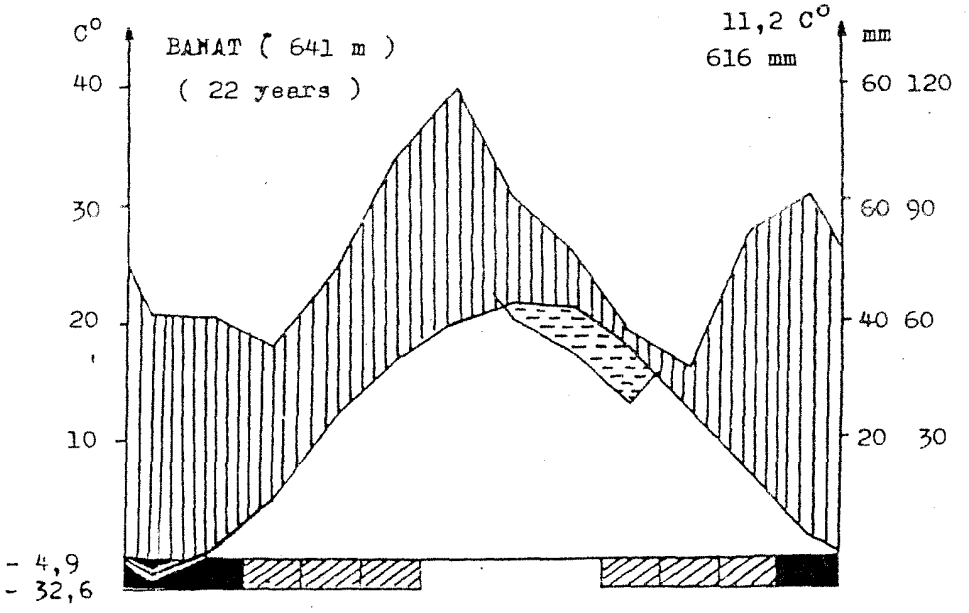

Fig. 1. – Climate diagram after Walter for Banat

The following communities are analyzed: *Halo-Agrostetum albae* Vučković, 1985, *Agrostio-Alopecuretum pratensis* Soó, (1933) 1947; *Agrostio-Glycerietum poiformis* Soó (1933) 1947; *Agrostio-Eleochariti-Alopecuretum geniculati* (Magyar, 1928); Soó, 1939, 1947 and *Agrostio-Beckmannietum* (Rapcs. 1916) Soó, 1933.

The results on the phytocenosis of the saline vegetation of the central Banat (eastern Tamiš basin) presented by Vučković (1985) were used to analyze the

community *Halo-Agrostetum albae* and *Agrostio-Glycerietum poiformis* while our own results on saline soils of southeastern northeastern and north Banat were the basis for the comparative analysis of community *Agrostio-Alopecuretum pratensis, Agrostio-Eleochariti-Alopecuretum geniculati* and *Agrostio-Bekcmannietum.*

The ecological analysis of vegetation of the alliance under consideration was done by using the ecological index after L a n d o l t (1977) and life forms of R a u n k i a e r (1934). Phytogeographical analysis was done on the basis of the floristic elements according to G a j i ć (1980).

RESULTS AND DISCUSSION

The community *Halo-Agrostetum albae* Vučković, 1985 was included by its author into the suballiance *Halo-Agrostenion albae* Vučković, 1985 of the alliance *Agrostion albae* Soó, 1933 – *stoloniferae* S o ó 1971 of the order *Molinietalia* K o e h , 1926. On the basis of the analysis of its floristic composition, high percetnage of halophytes (67.74) and characteristic pannonian *[Aster tripolium* L. var. *pannonicus* (Jacq.) Beck, *Plantago schwarzenbergiana* Schur, *Trifolium angulatum* W. et K./ and subpannonian species *[Puccinellia limosa* (Schur) Holmb., *Roripa kerneri* Menyh./ (16.12) we have come to the conclusion that they caanot belong to communities of the Central European vegetation of the order *Molinietalia.* They should be included into communities of the alliance *Halo-Agrostion albae pannonicum* Knežević, 1990 of the order *Festuco-Puccinellietalia* Soó, 1968 and therefore we analyzed them within their area limits.

The stands of all the communities under consideration represent plant cover of wet saline depressions of the Solonetz Soil zone. Water soluble salts from such habitats are rinsed from surface layers while due to a deeper level of ground water no salinization occurs. Therefore, a relative strongly developed and rinsed horizon A (plant rooting) affects formation of plant cover having no distinct halophytic character. Typical halophytes are absent in such habitats, but the plant percentage S_+ is always considerable in importance ranging from 38.70 *(Agrostio-Beckmannietum)* to 67.74 *(Halo-Agrostetum albae)* (Fig. 2. S).

An increased moisture of habitat gives not only satisfactory conditions for growth of plants indifferent or tolerant to salt (S_+) but also the highest percentage of hygromesophytes (H_4) in floristic composition of communities. *Agrostis alba* represents a dominant Subeurasian species ocurring among them. A considerable moisture degree is also documetned by mean values of the florstic composition (F) ranging from 3.35 *(Halo-Agrostetum albae)* to 4.30 *(Agrostio-Beckmannietum)* (Fig. 2. F).

The analyses done also revaeled an opposite correlation between the salinity degree and soil moisture, *i.e.* halophytes are observed to predominate in the arid habitats of the community *Halo-Agrostetum albae,* whereas they are the smallest in number in the most humid habitats of the community *Agrostio-Beckmannietum* (Figs. 2. S and 2. F).

Means of the ecological paramcter of the ratio of plants to the mechanical texture of soil (D) in the communities under investigation range from 4.40 *(Halo-Agrostetum albae)* to 4.73 *(Agrostio-Glycerietum poiformis)* (Fig. 2. D). Consequently, the habitats of these associations are described as nonskeletal, characterized by weak water permeability, weak aeration, and evident decomposition processes of plant material due to higher moisture.

N means ranging from 3.08 *(Agrostio-Eleochariti-Alopecuretum geniculati)* to 3.28 *(Agrostio-Glycerietum poiformis)* designate them as soils having a moderate content of nutrients (Fig. 2. N).

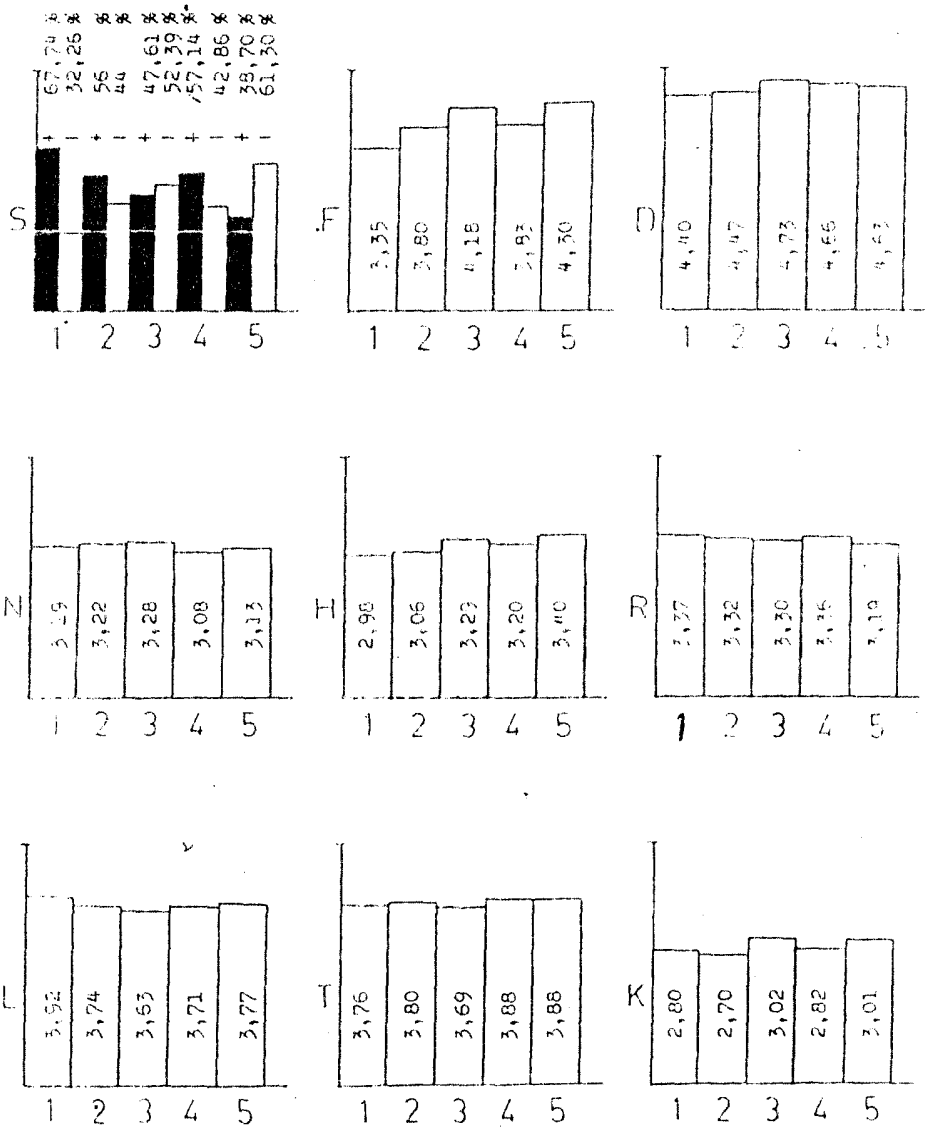

Fig. 2. – Average value of ecological indicators for soil salinity (S), soil moisture (F), soil dispersion /and deficiency of aeration/ (D), nutrients content in soil (N), humus content in soil (H), chemical reaction (R), light (L), temperature (T) and continental origin (K) in associations: *Halo-Agrostetum albae* (1), *Agrostio-Alopecuretum pratensis* (2), *Agrostio-Glycerietum poiformis* (3), *Agrostio-Eleochariti-Alopecuretum geniculati* (4) and *Agrostio-Beckmannietum* (5).

Humus content (H) ranging from 2.98 *(Halo-Agrostetum albae)* to 3.40 *(Agrostio-Beckmannietum)* (Fig. 2 H) points out also somewhat stronger horizon A. Therefore, their fertility in relation to habitats of most saline communities is greater although they are moderately rich in humus.

Variation of means of the ecological parameters for the soil chemical reaction (R) ranging from 3.19 *(Agrostio-Beckmennietum)* to 3.37 *(Halo-Agrostetum albae)* (Fig. 2. R) indicates clearly the abundance of basiphilous plants within the communities under consideration, certainly due to a considerable content of sodium in the adsorptive complex.

The meadow alliances under the investigation are developed under the conditions of full day light and they are mainly composed of heliophytes. To support this statement one can analyze high means of the ecological parameter for light (L) ranging from 3.63 *(Agrostio-Glycerietum poiformis)* to 3.92 *(Halo-Agrostion albae)* (Fig. 2. L). Also a considerable character is a favourable thermic regimen of habitats where plant cover is composed mainly of thermophilous plants. T means range from 3.69 *(Agrosti-Glycerietum poiformis)* to 3.88 *(Agrostio-Eleochariti-Alopecuretum geniculati* and *Agrostio-Beckmannietum*) (Fig. 2. T).

Mean of the ecological index for the continental character (K) ranging from 2.70 *(Agrostio-Alopecuretum pratensis)* to 3.02 *(Agrostio-Glycerietum poiformis)* (Fig. 2. K) points to milder effects of climate upon the habitats of the communities of the vegetation analyzed due to an increased moisture enabling also the development of a number of plants from more humid areas.

The spectra of life forms of the communities present also point out a remarkable harmony between plant cover under investigation and the local conditions of habitat. Predomination of hemicryptophytes upon therophytes is due to climate conditions of the region under consideration, as well as increased humidity. A long period with a high amount of water occurrence of a considerable number of emersed rhizomatous geophytes (Fig. 3).

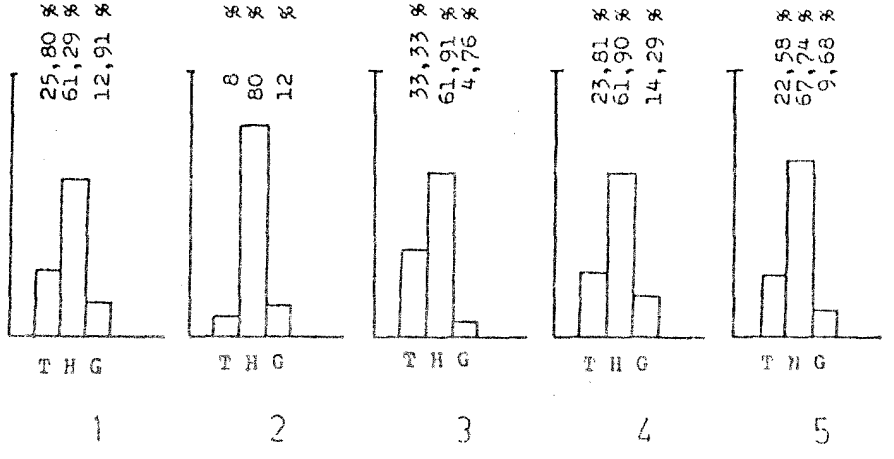

Fig. 3. – Biological spectrum of the associations: *Halo-Agrostetum albae* (1), *Agrostio-Alopecretum pratensis* (2), *Agrostio-Glycerietum poiformis* (3), *Agrostio-Eleocharti-Alopecuretum geniculati* (4), and *Agrostio-Beckmannietum* (5).

The analysis of area spectra of communities of the alliance investigated showed that the groups of phytogeographically atypical widespread plant elements (Eurasian, circumpolar, cosmopolitan) predominate. Generally, phytogeographical characters of communities of the alliance are more or less unclearly expressed certainly due to an overlapping effects of continental climate and an increased habitat moisture. Nevertheless, more xerophilous Pontic-Centralasian species prevail over remaining characteristic elements. Among them, Pannonian elements of flora are always determinable (Tab. 1).

Tab. 1. – Spectrum of area types of the associations: Halo-Agrostetum albae, Agrostio-Alopecuretum pratensis, Agrostio-Glycerietum poiformis, Agrostio-Eleochariti-Alopecuretum geniculati and Agrostio-Beckmannietum.

Floristic element	Eurasian	Cosmopolitan and Circumpolar	Pontic-Central Asian	(Pannonian)	Central European	Sub-Mediterranean
Halo-Agrostetum albae %	35.48	12.90	29.04	(16.12)	12.90	9.68
Agrostio-Alonecuretum pratensis %	48.00	12.00	16.00	(8.00)	24.00	-
Agostio-Glycerietum poiformis %	33.34	42.86	14.28	(4.76)	9.25	-
Agrostio-Eleochariti-Alopecuretum geniculati %	52.38	14.29	9.25	(4.76)	19.05	4.76
Agrostio-Beckmannietum%	25.80	38.70	16.14	(3.23)	16.14	3.22

On the basis of the former results change of the name of vegetation of the alliance *Beckmannion eruciformis* Soó 1933 into *Halo-Agrostion albae pannonicum* Knežević 1990 was suggested (K n e ž e v i ć, 1990). Considering above mentioned, the authors of this paper are of the opinion that Knežević's suggestion (K n e ž e v i ć, 1990) is acceptable and adequate becouse it is pointed out the abundance of halomesophytes and adefication role of the hygromesophyte *Agrostis alba* in stands of associations wich belong to it. Also, their areal is restracted to the Pannonian Plain since they represent a part of intrazonal saline plant cover in climazonal vegetation of the alliance *Aceri tatarico-Quercion* Zolyomi et Jakucs 1957 and *Festucion rupicolae (sulcatae)* S o ó (1940) 1964. So, local characteristics of soil and vegetation also influence their synthaxonomical belonging to the order *Festuco-Puccinellietalia* Soó 1968 of the class *Festuco-Puccinellietea* Soó 1968. Consequently, we came to the conclusion that they cannot be included into vegetation of the order *Phragmitetalia* W. Koch 1926 of the class *Phragmitetea* Tx. et Prsg. 1942 as suggested for some of them in the paper entitled, „Prodrumus phytocenosum Jugoslaviae" (J o v a n o v i ć et al., 1986). Also, they should be

recognized as being different from communities of the alliance *Agrostion albae* Soó 1933 – *stolonifera* Soó 1971 of the order *Molinietalia* Koch 1926 of nonsaline hydrophilous meadows (possibly *Meso-Agrostion albae medioeuropaeum).*

It should be noticed that also stands within which the species *Beckmannia eruciformis* predominates (the Jasenica depression Jovanović, 1958; the South Morava depression Randelović, 1988; flood ravines of Macedonia Micevski, 1963) cannot be categorized together with communities of the alliance *Halo-Agrostion albae pannonicum* Knežević 1990 (syn. *Beckmannion eruciformis* Soó 1933). They belong to certain other alliance (a possible names *Beckmannion eruciformis* R. Jovanović, 1958 and *Beckmannion eruciformis* Micevski, 1963 but not *Beckmannion eruciformis* Soó 1933) which in these regions belong to march vegetation of the order *Phragmitealia* that is in agreement with our opinion. A comparative analysis of their floristic composition, means of the ecological parameters (Fig. 4) life from spectra (Fig. 5) and area spectra (Tab. 2) has confirmed the statement presented above.In other words, in the floristic composition of the community *Beckmannietum erucaeformis prov.* (Jovanović, 1958) and *Beckmannietum eruciforms prov.* (Randelović, 1988) a considerably smaller halophyte percentage than in the communities from Solonetz Soil of the Pannonian Plant has been found. A hygromesophyte *Agrostis alba* representing a species of all the communities of the alliance *Halo-Agrostion albae pannonicum* Knežević 1990 has no representative in it. Also, their habitats are more humid and with drainage taking a longer time. Therefore, the percentage of therophytes in the spectrum of the life forms is remarkably smaller (Fig. 5), that of Central European plants in their stands exceeds the percentage of the Pontic Central Asian elements of flora, whereas there is no Pannonian element present (Tab. 2).

When communities of the analyzed alliance *Halo-Agrostion albae pannonicum* Knežević 1990 are compared with the community *Scirpeto-Alopecuretum cretici* Micevski 1957 (Micevski, 1963), one can find a similar percentage of plants characterized by the ecological index „S+" (Fig. 4. S), abundance of the species *Agrostis alba*, and similarity among life form spectra. Considerable floristic deferances between the community *Scirpo-Alopecuretum cretici* and the remaining communities of the alliance *Halo-Agrostion albae pannonicum* Knežević 1990, as well as a small number of the Pannonian elemens of flora /a taxon under question *Roripa kerneri* (Bačar, 1956; Micevski, 1963)/, and predomination of Submediterranean and Subatlantic-Submediterranean elements in the community from Macedonia led us to the conclusion that the community does not belong to the alliance mentioned above.

In addition, *Heleocharis palustris* R. Br., *Oenanthe fistulosa* L., *Rumex crispus* L. var. *unicallosus* Peterm., and *Lythrum virgatum* L. are not a characteristics of the alliance *Beckmannion eruciformis* Soó 1933 although this opinion is not in agreement with that of Micevski (1963). This community, however, belongs to the marsh vegetation due to the predomination of plants representing a characteristic of the order *Phragmitetalia* and the class *Phragmitetea.*

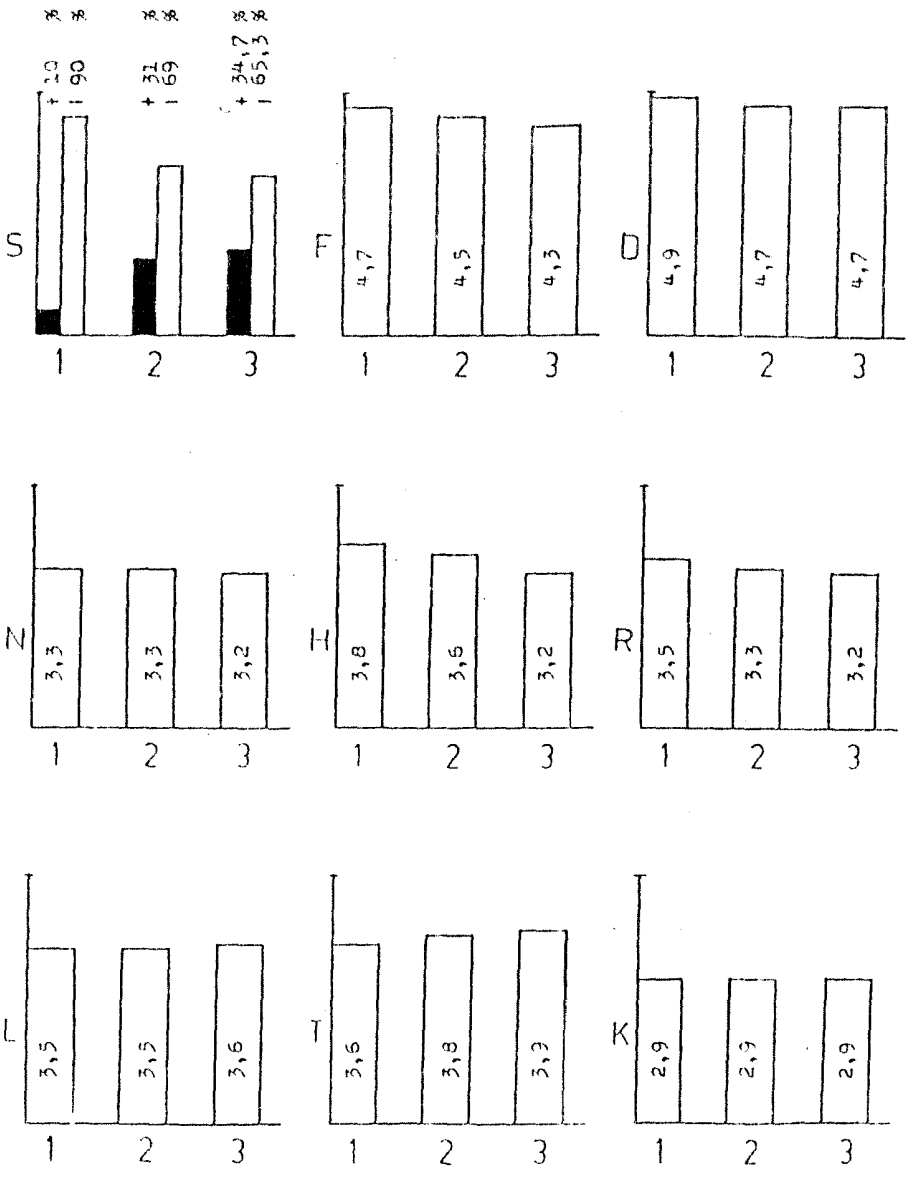

Fig. 4. – Average value of ecological indicators for soil salinity (S), soil dispersion /and deficiency of aeration/ (D), nutrients content in soil (N), humus content in soil (H), chemical reaction (R), light (L), temeprature (T) and continental origin (K) in associations: *Beckmannietum erucaeformis prov.* Jovanović, R. 1958 (1), *Beckmannietum eruciformis prov.* Randelović, V. 1988 (2) and *Scirpeto-Alopecuretum cretici* (3).

Tab. 2. Spectrum of area types of the associations: Beckmannietum erucaeformis prov. Jovanović, R. 1958, Beckmannietum erucaeformis prov. Randjelović, V. 1988 and Scirpeto-Alopecuretum cretici

Floristic element	Eurasian	Cosmopolitan and Circumpolar	Pontic-Central Aisan	(Pannonian)	Central European	Sub-Mediterranean	Sub-Atlantic-sub-Mediterranean	Moesian-Dacian
Beckmannietum erucaeformis prov. (Jovanović R. 1958) %	35	40	5	(-)	15	5	-	-
Beckmannietum erucifformis prov. (Randelović, V. 1988) %	28.12	21.87	9.37	(-)	28.12	6.25	3.12	3.12
Scirpeto-Alopecuretum cretici (Micevski 1963)	29.03	27.41	9.67	(-)	16.12	12.90	4.83	-

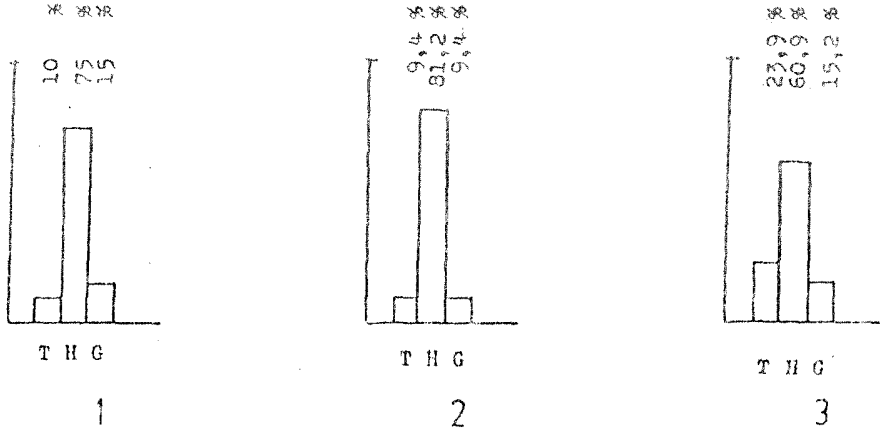

Fig. 5. – Biological spectrum of the associations: *Beckmannietum erucaeformis prov.* Janković, R. 1956, (1), *Beckmannietum eruciformis prov.* Randelović, V. 1988 (2) and *Scirpeto-Alopecuretum cretici* (3)

SUMMARY

The following communities were analyzed by using the ecological index after L a n d o l t (1977), life forms of R a u n k i a e r (1934), and floristic elements according to G a j i ć, (1980): *Halo-Agrostetum albae* Vučković 1985, *Agrostio-Alopecuretum pretensis* Soó (1933) 1947, *Agrostio-Glycerietum poiformis* Soó (1933) 1947, *Agrostio-Eleochariti-Alopecuretum geniculati* (Magyar, 1928) Soó 1939, 1947 and *Agrostio-Beckmannietum* (Rapsc. 1916) Soó 1933.

Salinity of their habitats was found to affect the occurrance of a greater number of halomesophytes while an increased moisture plants indifferent or tolerant to salt content. A hygromesophyte *Agrostis alba* predominates representing an aedificator of all the communities of the alliance under consideration.

On the basis of the means of the ecologica parameters the habitats of the vegetation under investigation were described as nonskeletal (weak water permeability, weak aearation) and with a moderate content of nutrients and humus. Basiophilos, heliphilous and thermophilous plants were found to predominate.

Moderate continental climate influences the predomination of hemicryptophytes upon therophytes while a remarkable moisture occurrence of emersed rhizomatic geophytes.

The Pannonian elements of flora were detected among the most characteristic Pontic-Centralasian plant species.

Consequently, suggested change of name of vegetation of the alliance *Beckmennion eruciformis* Soó 1933 into *Halo-Agrostion albae pannonicum* Knežević 1990 (K n e ž e v i ć, 1990) is acceptable for authors of this paper. On that way we emphasize the occurrence of a great number of halomesophytes, aedification role of a hygromesophyte *Agrostis alba* L., as well as area limitation of its communities within the Pannonian Plain area.

Since they represent a portion of intrazonal saline plant cover in the climazonal vegetation of the alliance *Aceri tatarico-Quercion* Zólyomi et Jakucs 1957 and *Festucion rupicolae (sulcatae)* Soó (1940) 1964, their syntaxonomical belonging to the order *Festuco-Puccinellietalia* Soó 1968 of the class *Festuco-Puccinellietea* Soó 1968 was determined not only by the floristic composition but also by local characteristics of soil and vegetation.

On the basis of a comparative floristic, ecological, and phytogeographical analysis, the stands were the species *Beckmannia eruciformis* (L.) Host predominates, from river depressions beyond the boundaries of Pannonian portion of Serbia and flood ravines of Macedonia, were found not to belong to the plant cover of the alliance *Halo-Agrostion albae pannonicum* Knežević, 1990.

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Rezime

ALEKSA KNEŽEVIĆ[1], BRANISLAVA BUTORAC[2], PAL BOŽA[1]

EKOLOŠKA I BILJNOGEOGRAFSKA ANALIZA VEGETACIJE SVEZE *HALO-AGROSTION ALBAE PANNONICUM* KNEŽEVIĆ 1990 (SYN. *BECKMANNION ERUCIFORMIS* SOO 1933)

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Prema ekološkim indeksima Landolt-a (1977), životnim formama Raunkiaer-a (1934) i flornim elementima Gajić-a (1980) analizirane su zajednice: *Halo-Agrostetum albae* Vučković 1985, *Agrostio-Alopecuretum pratensis* Soó (1933) 1947, *Agrostio-Glycerietum poiformis* Soó (1933) 1947, *Agrostio-Eleochariti-Alopecuretum geniculati* (Magyar 1928) Soó 1939, 1947 i *Agrostio-Beckmannietum* (Rapes. 1916) Soó 1933.

Konstatovnao je da zaslanjenost njihovih staništa omogućava brojnu zastupljenost halomezofita, a povećana vlažnost i uspešan razvoj biljkama indiferentnim ili tolerantnim na prisustvo soli. Dominantna među njima je edifikator svih zajednica sveze, higromezofita *Agrostis alba* L.

Na osnovu srednjih vrednosti ekoloških pokazatelja staništa ispitivane vegetacije su okarakterisane kao neskeletna (slabo vodopropustljiva i slabo acerisana) i sa umerenim sadržajem hranljivih materija i humusa. Na njima dominiraju bazifilne, heliofilne i termofilne biljke.

Umereno kontinentalna klima istraživanog područja uslovljava na njima dominaciju hemikriptofita nad terofitama a znatna vlažnost i zastupljenost emerznih rizomatičnih geofita.

Među biljnogeografski najkarakterističnijim pontsko-centralnoazijskim biljkama determinantno je prisustvo panonskih elemenata flore.

Stoga je predložena promena naziva vegetacije sveza *Beckmannion eruciformis* Soó 1933 u *Halo-Agrostion albae pannonicum* Knežević 1990 prihvatljiva za autore ovoga rada. Time je ukazano na brojnu zastupljenost halomezofita, edifikatorsku ulogu higromezofite *Agrostis alba* i ograničenost areala analiziranih zajednica na prostor Panonske nizije.

Pošto ove zajednice predstavljaju deo intrazonalnog slatinskog biljnog pokrivača u klimazonalnoj vegetaciji sveze *Aceritatarico-Quercion* Zolyomi et Jakucs 1957 i *Festucion rupicolae (sulcatae)* Soó (1940) 1964 njihova sintaksonomska pripadnost redu *Festuco-Puccinellietalia* Soó 1968 klase *Festuco-Puccinellietae* Soó 1968 odredena je osim floristickim sastavom i lokalnim karakteristikama zemljišta i vegetacije.

Na osnovu uporedne floristicke, ekološke i biljnogeografske analize konstatovano je da sastojine sa dominacijom vrste *Beckmannia eruciformis* (L.) Host iz rečnih dolina van panonskog dela Srbije i potopljenih kotlina Makedonije ne pripadaju biljnom pokrivaču sveze *Halo-Agrostion albae pannonicum* Knežević 1990.