THE PRODUCTIVITY ASSESSMENT OF THE VEGETATION OF THE SALINE GRASSLANDS IN ROMANIA

Teodor MARUȘCA[1]

Abstract. *The vegetation of the saline soils (Solonceacuri, Soloneturi and Solodii) in Romania is represented by permanent grasslands and occupies approximately 300,000 hectares from the Black Sea coast to some low plains with groundwater on the surface. Habitat 1310, Salicornia and other annuals colonizing mud and sand represented by the Salicornion prostratae alliance, has a pastoral value (PV) of 3.9 and green mass production (GMP) of barely 0.36 t/ha and Habitat 1410, Mediterranean salt meadows (Juncetalia maritimi) with 5.5 PV and 0.45 t/ha GMP, both are assessed as degraded form forage quality point of view. Habitat 1530, Pannonic salt-steppes and salt marshes comprises 5 alliances (Cypero-Spergularion, Puccinellion limosae, Junciongerardii, Beckmanione ruciformis and Festucion pseudovinae) with 30.9 PV and 3.85 t/ha GMP, which allows an optimal loading of 0.37 LU/ha in 160 days, 10 times higher than at H 1310 and H 1410. Respecting the optimal grazing capacity is necessary to preserve the biodiversity of these grasslands.*

Keywords: salty grasslands habitats, pastoral value, green mass production

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1. Introduction

The vegetation of the grasslands of the halomorph soils (soloneturi, solonceacuri, solodii) and the ones from the Black Sea of Romania covering an area of about 300,000 ha have been studied much more from a floristic and geobotanical point of view by numerous researchers.

There are just a few studies regarding the productivity of the halophilous grasslands and their grazing capacity and this is the reason why we set up to research this aspect and present the results in this paper.

2. Materials and Methods

In order to evaluate the pastoral value, the production of green fodder mass and the optimal grazing capacity, the synthetic geobotanical surveys from the work "Vegetation of saline soils in Romania", compiled by Ioan Pop and published in 2002 were used [7].

[1]Senior Researcher PhD. Eng. Teodor MARUȘCA, The Research and Development Institute for Grasslands, Brasov, Romania, Full member of the Academy of Romanian Scientists, (e-mail: maruscat@yahoo.com)

The method of evaluating the productivity of grasslands based on a floristic survey was presented in several works published in the Annals of the Academy of the Romanian Scientists [1, 2, 3, 4, 5, 6], so we do not return to them.

The following cenotaxonomic units were encountered and studied:

Cls. *JUNCETEA MARITIMI* Br-Bl. 1931
Ord. *JUNCETALIA MARITIMI* Br-Bl. 1931
Al. ***Juncion maritimi*** Br-Bl. 1931
1. As. *Juncetum maritimi* (Rübel 1930) Pignatti 1953
2. As. *Artemisiosantonici - Juncetumlittoralis* (Popescu et Sanda 1976) Géhu, Roman, Boutlet 1994
3. As. *Halimionopedunculatae-Aeluropetumlittoralis* Géhu, Roman, Boutlet 1994
4. As. *Halocnemetumstrobilacei* (Keller 1925) Ţopa 1939
5. As. *Cakiloeuxinae - Salsoletum tragi* Vicherek 1971
Cls. *PUCCINELLIO – SALICORNIETEA,* Ţopa 1939
Ord. *SALICORNIETALIA*, Br-Bl. (1928) 1933
Al. ***Salicornionprostratae*** Géhu 1989
6. As. *Salicornietumprostratae*, Soó (1927) 1964
7. As. *Suaedo-Salicornietumpatulae* (Brullo et Furnari 1976) Géhu 1984
8. As. *Crypsidoaculeatae-Suaedetummaritimae* (Wendelberger 1943) Mucina 1993
9. As. *Suaedo-Bassietumhirsutae* (Br-Bl. 1928) Ţopa 1039
10. As. *Salsoletumsodae* Slavnič 1939
Ord. *PUCCINELLIETALIA LIMOSAE* (Soó1968) Géhu et RivasMartinez 1982
Al. ***Cypero-Spergularion*** Slavnič 1948
11. As. *Acorelletumpannonici* Soó (1939) 1947
12. As. *Crypsidetumaculeatae* Wenzl 1934 em. Mucina 1993
13. As. *Heleochloëtumalopecuroidis* Rapaics 1927
14. As. *Heleochloëtumschoenoidis* (Soó 1933), Ţopa 1039 em. I. Pop 1968
15. As. *Spergulario-Polypogonetummonspeliensis* (Morariu 1957) nom. nov. et emend.
Al. ***Puccinellionlimosae***
16. As. *Asteropannonici-Puccinellietumdistantis* Géhu, Roman, Boullet 1994
17. As. *Aeluropo-Puccinellietumlimosae* Popescu et Sanda 1975
18. As. *Puccinellietumlimosae* Rapaics 1927 ex Soó1933,1936
19. As. *Lepidiocrassifolio-Puccinellietumlimosae* (Rapaics 1927, Ţopa 1938) Soó1957
20. As. *Puccinellio-Limonietumdanubialis* Géhu, Roman, Boullet 1994
21. As. *Puccinellio-Halimionetum verruciferae* Géhu, Roman, Boullet 1994

22. As. *Nitrario-Artemisietummaritimae* Mititelu et al. 1979, 1982
23. As. *Halimionetumverruciferae* (Keller 1923) Ţopa 1939
24. As. *Taraxacobessarabici-Caricetumdistantis* Wendelberger 1943
25. As. *Hordeetumhystricis* (Soó1933) Wendelberger 1943
26. As. *Hordeetum maritimi* I.Şerbănescu 1965
27. As. *Camphorosmetumannuae* Rapaics exSoó1933
28. As. *Camphorosmetummonspeliacae* (Ţopa 1939) I. Şerbănescu 1965
29. As. *Agropyretumelongati* I. Şerbănescu 1959, 1965
30.As.*Pholiuro-Plantaginetumtenuiflorae* (Rapaics 1927) Wendelb.1943
31. As. *Agrostietumponticae* Popescu et Sanda 1973
32. As. *Bassietumsedoidis* Ubrizsy ex Soó1947, corr. Soó1964
33. As. *Leuzeetumsalinae* (Borza 1931 n.n.) Răvăruţ 1958
34. As. *Iridetumhalophylae* (Prodan 1939 n.n.) I. Şerbănescu 1965
    Al. ***Junciongerardii*** Wendelberger 1943 (J.g)
35. As. *Limonio gmelini-Juncetumgerardii* Géhu et Uslu 1981
36. As. *Juncetumgerardii* (Warming 1906) Nordhagen 1923, Wenzl 1934
37. As. *Caricetumdivisae* Slavnič 1948
38. As. *Asterotripolio-Triglochietum maritimi* Soó1927, Ţopa 1939
39. As. *Triglochinopalustris-Asteretumpannonici* Sanda, Popescu, Doltu 1980
40.As.*Plantaginicornuti-Agrotetumstoloniferae* Soó,Csürös1947,1973
41. As. *Agrostio-Caricetumdistantis* (Rapaics 1927) Soó1930
    Al. ***Beckmannioneruciformis*** Soó1933 (Bion)
42. As. *Agrostio-Beckmannietum* (Rapaics 1916) Soó1933
43. As. *Agrostio-Eleochari-Alopecuretumgeniculati* (Magyar 1928) Soó 1939
44. As. *Rorippokerneri-Alopecuretumpratensis* I.Pop 1968

Ord. *ARTEMISIO-FESTUCETALIA PSEUDOVINAE*Soó1933
    Al***. Festucetaliapseudovinae***Soó1933
45. As. *Peucedano-Festucetumpseudovinae* (Rapaics 1972) I. Pop 1968
46. As. *Achilleo-Festucetumpseudovinae* (Magyar1928) Soó(1933) 1945
47. As. *Artemisio-Festucetumpseudovinae* (Magyar1928)Soó(1933) 1945
48. As. *Limonio gmelini-Artemisietummonogynae* Ţopa 1939
49. As. *Artemisio-Petrosimonietumtriandrae* Soó(1927) 1947

3. Results and Discussions

The grasslands on the saline soils at the level of phytosociologocal alliances have a number of 125 cormophytes, lower in *Salicornionprostratae* (59 species) and higher in *Festucionpseudovinae* (213 species (Table 1).

The participation of forage species in the grass carpet is on average 36%, from 5% in Juncion maritimilaaaa to 69% in Bekmanioneruciformis.

The average pastoral value (VP) is 23.4 very poor with limits between 3.9 (degraded) in Salicornionprostratae to 50.6 (middle) in Beckmanioneruciformis (Table 2).

Table 1. Phytodiversity and the participation of forage species in the grassy carpet of the grasslands on saline soils

Habitat	Phytosociological alliance	Plant species		Species particicpation %	
		nr.	%	Forage	Harmful
1310	*Salicornionprosratae*	59	47	8	92
1410	*Juncion maritimi*	66	53	5	95
1530	*Cypero-Spergularion*	99	79	15	85
	Puccinelionlimosae	157	126	43	57
	Junciongerardii	118	94	57	43
	Beckmanioneruciformis	163	130	69	31
	Festucionpseudovinae	213	170	54	46
Average Habitat 1530		150	120	48	52
General average of the alliances		125	100	36	64

Note: Habitat 1310 *Salicornia* and other annuals colonising murd and sand
Habitat 1410 Mediterranean salt meadows (*Juncetalia maritimi*)
Habitat 1530 Pannonicsalt-steppes and salt marshes

Green mass production (MV) is directly proportional to VP and averages 2.87 t/ha (very poor) with differences from 0.36 t/ha MV in Salicornion to 9.73 t/ha in Bech manion.

The optimal animal load in 160 grazing days is on average 0.28 LU/ha with variations between 0.03 and 0.94 LU/ha depending on the green mass production.

Table 2. Productivity of salt march grasslands and optimal grazing capacity ina 160-day season

Habitat	Phytosociological alliance	Pastoral value		Green mass production		Animal load LU/ha	Appreciation
		ind.	%	t/ha	%		
1310	*Salicornionprosratae*	3.9	17	0.36	13	0.03	Degraded
1410	*Juncion maritimi*	5.5	24	0.45	16	0.04	Degraded
1530	*Cypero-Spergularion*	9.8	42	0.80	28	0.08	Degraded
	Puccinelionlimosae	27.1	116	2.46	88	0.24	Very poor
	Junciongerardii	33.3	142	2.85	99	0.27	Very poor
	Beckmanioneruciformis	50.6	216	9.73	339	0.97	Middle
	Festucionpseudovinae	33.5	143	3.43	120	0.33	Very poor
Average Habitat 1530		30.9	132	3.85	134	0.37	Very poor
General average in alliances		23.4	100	2.87	100	0.28	Very poor

In order to align to the European Union classification for grasslands, the productivity indicators are briefly presented below:

- 1310, Salicornia and other annuals colonising murd and sand 3.9 VP; 0.36 t/ha MV; 0.03 LU/ha;
- 1410 Mediterranean saline grasslands (Juncetalia maritimi), 5.5 VP; 0.45 t/ha MV; 0.04 LU/ha;
- 1530 Pannonic salt-steppes and salt marshes, 30.9 VP; 3.87 t/ha MV; 0.37 LU/ha.

From the present results, it can be seen that Habitats 1310 and 1410 are degraded from an economic point of view and Habitat 1530 has a very poor economic value.

Conclusions

(1). Permanent grasslands on saline soils have a poor fodder productivity and low economic value.

(2). The grazing capacity is very low with 0.3-0.4 LU/ha at Habitats 1310, 1410 and 0.37 LU/ha at Habitat 1530 in 160 days grazing season.

(3). Compliance with animal loading during grazing has positive effects for the conservation of biodiversity, which includes on average 125 species of cormophytes in a phytosociological alliance.

R E F E R E N C E S

[1] Maruşca, T., Memedemin, D., Groza, A., Pop, G. O., Simion, I., Taulescu, E., Comparative study of steppic grasslands productivity and grazing pressure in Babadag and Casimcea Plateaus, Annals of the Academy of Romanian ScientistsSeries on Agriculture, Silviculture and Veterinary Medicine Sciences, Vol. 8, No.2 , 33-42 (2019).

[2] Maruşca T., Assessments on the productivity of grasslands located in the subcarpathic area of Oltenia, acording to the moisture regime expressed by vegetation, Annals of the Academy of Romanian Scientists Series on Agriculture, Silviculture and Veterinary Medicine Sciences, Vol. 10, No., 72-78 (2021).

[3] Maruşca, T., Danciu, M., Gurean, D.M., Contributions to the evaluation of grassland from South Baraolt Mountains in terms of productivity, Annals of the Academy of Romanian Scientists Series on Agriculture, Silviculture and Veterinary Medicine Sciences, Vol.10, No.1, 79-87(2021).

[4] Maruşca, T., Memedemin, D., Taulescu, E., Băjenaru, B., Roşca, V., Andreoiu, C. A., Studies Regarding the Productivity of Grasslands from Agrosilvopastoral System from Greci Village, Tulcea County, Romania, Annals of the Academy of Romanian Scientists Series on Agriculture, Silviculture and Veterinary Medicine Sciences, Vol. 10, No. 2, 5-12, (2021).

[5] Maruşca, T., Burescu, L.I.N., Evaluation of theProductivity of Permanent Grasslandsfrom Lăzărenilor Hills, Bihor County, Romania, Annals of the Academy of Romanian Scientists Series on Agriculture, Silviculture and Veterinary Medicine Sciences, Vol. 10, No. 2, 13-21, (2021).

[6] Oprea, A., Marușca, T., Contribution to the assessment of mountain grasslands productivity from Râmnicu Sărat River Basin, Academy of Romanian Scientists Series on Agriculture, Silviculture and Veterinary Medicine Sciences, Vol. 11, No.1, 50-61, (2022).

[7] Pop, I., Vegetation of the salin soils in Romania. Botanical contributions XXXV (2) (1999-2009) "Alexandru Borza" Botanical Garden Cluj-Napoca. In Romanian (Vegetația solurilor sărăturoase din România, Contribuții Botanice XXXV (2) (1999-2009) Grădina Botanică “Alexandru Borza” Cluj Napoca) (2002).