Studia Universitatis "Vasile Goldiş", Seria Ştiinţele Vieţii
Vol. 22, issue 3, 2012, pp. 435-441

PRESENT-DAY CONDITION OF CORMOPHYTES DIVERSITY ON ALKALI SOILS IN VĂRŞAND (ARAD COUNTY, W-ROMANIA)

Iulia-Natalia DĂRĂBAN[1], Gicu-Gabriel ARSENE[2,3], Violeta TURCUŞ[3], Marian-Constantin PETRESCU[1], Aurel ARDELEAN[3]
[1]Institute of Life Sciences, „Vasile Goldis" Western University of Arad
[2] Banat's University of Agricultural Sciences and Veterinary Medicine, Faculty of Agriculture
[3]„Vasile Goldis" Western University of Arad

ABSTRACT. The paper contains a list of 180 cormophyte species found on alkali soils near the village of Vărșand (Arad county, W-Romania) during the years 2010-2012. The flora in immediate proximities is also recorded, sometimes ruderal species and weeds being found mixed in halophilous communities. The studied zone, belonging to a Community Importance Site (ROSCI0231 Nădab-Socodor-Vărșand), is an overgrazed meadow. We mainly classify species in the following categories: a) halophilic and salt-tolerant species (*Achillea setacea*, *Artemisia santonicum* subsp. *santonicum*, *Aster tripolium*, *Bupleurum tenuissimum*, *Camphorosma annua*, *Chamomilla recutita*, *Festuca pseudovina*, *Hordeum hystrix*, *Juncus gerardi*, *Limonium gmelinii,* etc.); b) species from soil-microdepression habitats, with temporary stagnant water (*Oenanthe silaifolia*, *Beckmania eruciformis*, *Juncus gerardi*, *Lycopus europaeus*, *Rumex stenophyllus, Rumex dentatus, Rorippa sylvestris* subsp. *kerneri*); c) drainage-canals species (*Agrostis stolonifera, Carex vulpina*, *Echinochloa crus-galli*, *Eleocharis palustris, Juncus inflexus*, *Lycopus exaltatus* and *Lycopus europaeus*, *Lythrum salicaria*, *Mentha aquatica*, *Pastinaca sativa*, *Ranunculus sardous*, *Polygonum lapathifolium*, *Scirpus lacustris* subsp. *lacustris,* etc.), and d) ruderal species and weeds, including invasives like *Ambrosia artemisiifolia* and *Eriochloa villosa*. We state the inappropriate conservation condition of this Natura 2000 site-part, the small populations of red-listed species *Lotus angustissimus* and *Trifolium ornithopodioides*, due in the main to overgrazing.

Keywords: Vărșand, Arad county, halophilic flora and vegetation, Natura 2000, conservation, plant diversity

INTRODUCTION

Halophilic vegetation from W Romania was considered a long while as a particular aspect of a steppe (or silvo-steppe), quite different from the typical steppes in E and S-E Romania by the amount of rain, and by the absence of *Stipa* species; another particular feature is the absence of species from some genera (*Suaeda*, *Obione*, *Salicornia*), common for that matter in the Romanian Plain (e.g. Popescu, 1959). However, *Suaeda* and *Salicornia* species live in Hungary (Molnár, 2008, Mile & Walter, 2003, Jakab, 2005 etc.). Hungarian authors endorse the conception of a primary vegetation character of halophilic vegetation, dated from the end of a last glaciation; in this respect, Molnár & Borhidi (2003) argue with: the relatively high halophilic species diversity, the discovery of alkali fossil soils, some toponymic proofs, the military-survey maps (1783-1785). The same authors notice the change of these plant communities as a result of hydro-ameliorative works during the XIXth century; in some cases, a process of secondary salinization took place in the between-dykes enclosures, as show studies made by Toth *et al.* (2009) in the Tisza Plain. Rivers-regulation works were made also in the communist era (the level of phreatic waters decreased), as well as cultivation trials of salty soils, in both countries. Biró *et al*. (2007) observe the reduction and degradation of alkali vegetation in the Danube-Tisza interfluve.

Flora and vegetation of continental salty soils in W Romania (Timiș, Arad and Bihor counties) are studied by various authors (Prodan, 1939, 1956, Popescu & Bujorean, 1957, Pop, 1968, Pop, 1977, Pătruț, 2003, Ardelean, 1989, 1999, 2002, 2006, Ardelean *et al.*, 2005 etc.). Sporadic allusions to flora and vegetation near Vărșand appears before 1900: Kitaibel (1798, *in* Gombocz, 1945; 1805, *in* Lökös, 2001), Borbas (1884), Simonkai (1893). Pop (1972) relates two non-halophilic plant associations near Vărșand, and Drăgulescu & Kunigunda (1996) report a list of ruderal plant associations (*Carduetum acanthoidis* (Allorge 1922) Morariu 1939, *Conietum maculati* I. Pop 1968, *Lolio – Plantaginetum majoris* (Linkola 1921) Beger 1930, *Xanthietum italici* Timár 1950, *Urticetum dioicae* (Steffen 1931) Turenschi 1966). Ardelean (1999) publishes a plant species conspectus from the valley of the Crișul Alb river, containing species from Vărșand vicinities, including halophilic ones. Erdös *et al.* (2011) make a comparative study of halophilic vegetation from Gyula (Hungary) and Vărșand, foccusing on conservation complexion; their paper does not contain a floristic list. Recent studies on salty soils flora and vegetation from the most contiguous territories in Hungary (Elek and Gyula) are made, among others, by Kertesz (1999), Molnar & Borhidi (2003),

Jakab & Toth (2003), Jakab (2005), Erdös et al. (2011). Plant specimens collected in Vărşand are to be found in the herbarium of the Natural Sciences Museum in Oradea (Bihor county) (Ştefănuţ et al., 2003).

MATERIAL S AND METHODS

The studied territory stretches near Vărşand village, in its western and south-western part (fig. 1.), limited at west by the state border with Hungary, and at south by the administrative territory of Pilu village; it belongs to the Aradului Plain, and biogeographically to the Pannonic Region (Doniţă et al., 2005). It belongs also to the Natura 2000 network, as a part of the Site of Community Importance ROSCI0231 Nădab-Vărşand-Socodor. From an agricultural point of view, it is a pasture, with a huge animal charge. A network of drainage canals go trough this pasture, build before 1989, and with a maximum depth of 1,5 m. Before 1989, this communal meadow was fertilized with artificials.

Fig. 1 The studied zone (red line); in yellow – the state border between Romania and Hungary (source: GoogleEarth).

Our research took place in 2010-2012. We remarked the severe drought during summers of 2011 and especially 2012. The floristic inventory is made by compliling species from floristic relevés and vegetation relevés (we will publish another paper on vegetation and soil analysis). The list contains also species found in canals, and species from immediate proximity (20-30 m) of halophilic communities. Species identification was made according to Ciocârlan (2009), mainly. The nomenclature and the systematic status (family) is presented according to *Flora Europea Online*. Each species is characterized as life form and biogeographical criteria, and the values of auto-ecological indices for: soil humidity (U), general temperature in habitat (T), and soil reaction (R) according to Sanda *et al*. (2003); the considered abreviations are also taken from these author's system.

RESULTS AND DISCUSSION

Floristic inventory:

1. *Achillea setacea* Waldst. & Kit. (*Compositae*), H, Eua (Cont), $U_2 T_3 R_5$
2. *Agrostis stolonifera* L. (*Gramineae*), H, Circ, $U_4 T_0 R_0$
3. *Allium vineale* L. (*Liliaceae*), G, Eur, $U_2 T_3 R_4$
4. *Alopecurus geniculatus* L. (*Gramineae*), Th-TH-H, Cosm, $U_5 T_0 R_4$
5. *Alopecurus pratensis* L. (*Gramineae*) H, Eua, $U_4 T_3 R_0$
6. *Althaea officinalis* L. (*Malvaceae*), H, Eua (Cont), $U_3 T_4 R_4$
7. *Amaranthus albus* L. (*Amaranthaceae*), Th, Adv, $U_3 T_3 R_3$
8. *Amaranthus retroflexus* L. (*Amaranthaceae*), Th, Adv, $U_3 T_3 R_0$
9. *Ambrosia artemisiifolia* L., (*Compositae*), Th, Adv, $U_2 T_0 R_0$

Studia Universitatis "Vasile Goldiş", Seria Ştiinţele Vieţii
Vol. 22, issue 3, 2012, pp. 435-441

10. *Arctium lappa* L. (*Compositae*), TH, Eua, $U_{3,5}T_3R_4$
11. *Artemisia santonicum* L. subsp. *santonicum* (*Compositae*), Ch-H, Eua(Cont)
12. *Artemisia vulgaris* L. (*Compositae*), H, Circ, $U_{2,5}T_3R_4$
13. *Aster tripolium* L. (*Compositae*), H, Eua, $U_5T_0R_5$
14. *Atriplex littoralis* L. (*Chenopodiaceae*), Th, Eua, $U_0T_0R_0$
15. *Atriplex patula* L. (*Chenopodiaceae*), Th, Circ (Med), $U_0T_0R_0$
16. *Atriplex prostrata* (Boucher) ex DC. (*Chenopodiaceae*), Th, Circ, $U_{3,5}T_0R_3$
17. *Beckmannia eruciformis* (L.) Host. (*Gramineae*), H, Circ, $U_{4,5}T_3R_4$
18. *Bidens tripartita* L. (*Compositae*), Th, Eua, $U_{4,5}T_3R_0$
19. *Bromus arvensis* L. (*Gramineae*), Th-TH, Eua(Med), $U_{2,5}T_3R_0$
20. *Bromus hordeaceus* L. (*Gramineae*), Th-TH, Eua (Med), $U_0T_3R_0$
21. *Bromus tectorum* L. (*Gramineae*) Th, Eua (Cont), $U_{1,5}T_{3,5}R_0$
22. *Bupleurum tenuissimum* L. (*Umbelliferae*), Th, Alt-Med, $U_0T_{3,5}R_{4,5}$
23. *Calystegia sepium* (L.) R.Br. (*Convolvulaceae*), G(H), Eua, $U_5T_3R_4$
24. *Camphorosma annua* Pallas. (*Chenopodiaceae*), Th, Pont, $U_2T_4R_5$
25. *Capsella bursa-pastoris* (L.) Medik. (*Cruciferae*), Th-TH, Cosm (Med), $U_3T_0R_0$
26. *Cardaria draba* (L.) Desv. (*Cruciferae*), H, Eua (Med), $U_2T_4R_4$
27. *Carduus acanhoides* L. (*Compositae*), TH, Eur, $U_2T_3R_0$
28. *Carduus nutans* L. (*Compositae*), TH, Eua, $U_{1,5}T_3R_3$
29. *Carex caryophyllea* Latourr. (*Cyperaceae*), G, Eua (Cont), $U_2T_3R_3$
30. *Carex distans* L. (*Cyperaceae*), H, Eua (Med), $U_4T_3R_4$
31. *Carex vulpina* L. (*Cyperaceae*), H, Eua, $U_4T_3R_4$
32. *Carthamus lanatus* L. (*Compositae*), Th, Pont-Med, $U_{2,5}T_4R_0$
33. *Centaurea pannonica* (Heuff.) Simonk., (*Compositae*), H, Euc, $U_2T_3R_4$
34. *Cerastium brachypetalum* Pers. (*Caryophyllaceae*), Th, Med, $U_3T_3R_0$
35. *Cerastium dubium* (Bastard) Guépin (*Caryophyllaceae*), Th, Pont-Med, $U_3T_3R_0$
36. *Chamomilla recutita* (L.) Rauschert (*Compositae*), Th, Eua, $U_{2,5}T_{3,5}R_5$
37. *Chenopodium album* L. (*Chenopodiaceae*), Th, Cosm, $U_3T_3R_0$
38. *Chenopodium polyspermum* L. (*Chenopodiaceae*), Th, Eua, $U_3T_4R_0$
39. *Chenopodium strictum* Roth (*Chenopodiaceae*), Th, Euc, $U_{2,5}T_4R_0$
40. *Cichorium intybus* L. (*Compositae*), H, Eua, $U_3T_0R_3$
41. *Cirsium arvense* (L.) Scop. (*Compositae*), G, Eua, $U_{2,5}T_3R_0$
42. *Cirsium vulgare* (Savi) Ten., (*Compositae*), TH, Eua, $U_3T_3R_0$
43. *Conium maculatum* L. (*Umbelliferae*), TH, Eua, $U_3T_3R_3$
44. *Consolida regalis* Gray subsp. *regalis* (*Ranunculaceae*), Th, Eua, $U_2T_4R_4$
45. *Convolvulus arvensis* L. (*Convolvulaceae*), G (H), Cosm, $U_{2,5}T_{3,5}R_{3,5}$
46. *Conyza canadensis* (L.) Cronquist (= *Erigeron canadensis*), (*Compositae*), Th, Adv, $U_{2,5}T_0R_0$
47. *Cruciata pedemontana* (Bellardi) Ehrend. (= *Galium pedemontanum* (Bellardi) All.) (*Rubiaceae*), Th, Med, $U_2T_{3,5}R_4$
48. *Cuscuta europaea* L. (*Convolvulaceae*), Th, Eua, $U_4T_0R_0$
49. *Cynodon dactylon* (L.) Pers. (*Gramineae*), G, Cosm, $U_2T_{3,5}R_0$
50. *Dactylis glomerata* L. (*Gramineae*), H, Eua, $U_3T_0R_4$
51. *Datura stramonium* L. (*Solanaceae*), Th, Adv, $U_{3,5}T_4R_4$
52. *Daucus carota* L. subsp. *carota* (*Umbelliferae*), TH-H, Eua (Med)
53. *Descurainia sophia* (L.) Webb ex Prant. (*Cruciferae*), Th-TH, Eua, $U_{2,5}T_4R_4$
54. *Dichanthium ischaemum* (L.) Roberty (= *Botriochloa ischaemum* (L.) Keng) (*Gramineae*), H, Eua(Med), $U_{1,5}T_5R_3$
55. *Digitaria sanguinalis* (L.) Scop. (*Gramineae*), Th, Cosm, $U_{1,5}T_0R_4$
56. *Dipsacus laciniatus* L. (*Dipsacaceae*), TH, Eua (Cont), $U_4T_{3,5}R_4$
57. *Echinochloa crus-galli* (L.) P.Beauv., (*Gramineae*), Th, Cosm, $U_4T_0R_3$
58. *Eleocharis palustris* (L.) Roem. & Schult., (*Cyperaceae*), G (HH), Cosm, $U_5T_0R_4$
59. *Elymus repens* (L.) Gould (*Gramineae*), G, Circ, $U_0T_0R_0$
60. *Epilobium angustifolium* L. (*Onagraceae*), H, Circ, $U_4T_{1,5}R_0$
61. *Eragrostis pilosa* (L.) P.Beauv. (*Gramineae*), Th, Euc (Med), $U_3T_{3,5}R_0$
62. *Erigeron annuus* (L.) Pers. (= *Stenactis annua* (L.) Less.), (*Compositae*), Th-TH-H, Adv, $U_4T_0R_4$
63. *Eringyum campestre* L. (*Umbelliferae*), H, Pont-Med, $U_1T_5R_4$
64. *Eriochloa villosa* (Thunb.) Kunth (*Gramineae*) Th, Adv.
65. *Erodium cicutarium* (L.) L'Hér. (*Geraniaceae*), Th, Cosm, $U_{2,5}T_0R_0$
66. *Erophila verna* (L.) Chevall. (*Cruciferae*), Th, Eua, $U_{2,5}T_{3,5}R_0$
67. *Euphorbia cyparissias* L. (*Euphorbiaceae*), H-G, Eua, $U_2T_3R_4$
68. *Festuca arundinacea* Schreb. (*Gramineae*), H, Euc, $U_4T_3R_4$

69. *Festuca pratensis* Huds. (*Gramineae*), H, Eua, $U_{3,5}$ T_2 R_0
70. *Festuca pseudovina* Hack. ex Wiesb. (*Gramineae*), H, Eua (Cont), U_2 T_4 R_4
71. *Festuca rupicola* Heuff. (*Gramineae*), H, Eua (Cont), $U_{1,5}$ T_4 R_4
72. *Fragaria viridis* Duchesne (*Rosaceae*), H, Euar(Cont), U_2 T_4 R_3
73. *Galium verum* L. (*Rubiaceae*), H, Eua, $U_{2,5}$ $T_{2,5}$ R_0
74. *Geranium pusillum* L. (*Geraniaceae*), Th, Eur (Med), $U_{2,5}$ T_3 R_0
75. *Gypsophila muralis* L. (*Caryophyllaceae*) Th, Eua (Cont), U_2 T_3 R_2
76. *Heliotropium europaeum* L. (*Boraginaceae*), Th, Med-Euc, U_2 T_4 R_0
77. *Hibiscus trionum* L. (*Malvaceae*), Th, Eua (Med), $U_{2,5}$ T_4 R_4
78. *Hordeum hystrix* Roth (*Gramineae*), Eua (Cont), U_2 T_4 $R_{4,5}$
79. *Hordeum murinum* L. (*Gramineae*), Th, Eua, $U_{2,5}$ T_4 R_0
80. *Inula britannica* L. (*Compositae*), TH, Eua (Med), U_3 T_3 R_0
81. *Inula salicina* L. (*Compositae*), H, Eua, $U_{2,5}$ T_3 R_3
82. *Juncus gerardi* Loisel. (*Juncaceae*), G, Circ, $U_{4,5}$ T_3 R_5
83. *Juncus inflexus* L. (*Juncaceae*), H, Eua, U_4 T_4 R_4
84. *Lactuca saligna* L. (*Compositae*), TH, Euc, $U_{1,5}$ T_4 R_4
85. *Lactuca serriola* L. (*Compositae*), TH, Eua, $U_{1,5}$ $T_{3,5}$ R_0
86. *Lamium purpureum L.* (*Labiatae*), Th, Eua, U_3 T_0 R_0
87. *Lathyrus tuberosus* L. (*Leguminosae*), H(G), Eua(Med), U_2 T_4 R_4
88. *Lepidium perfoliatum* L. (*Cruciferae*), Th (TH), Eua (Cont), U_2 T_4 R_3
89. *Lepidium ruderale* L. (*Cruciferae*), Th, Eua, U_2 $T_{3,5}$ R_0
90. *Limonium gmelinii* (Willd.) Kuntze (*Plumbaginaceae*), H, Eua (Cont), $U_{3,5}$ T_4 R_4
91. *Lolium perenne* L. (*Gramineae*), H, Cosm, U_3 T_3 R_0
92. *Lotus angustissimus* L. (*Leguminosae*), Th, Eua, U_2 T_4 R_4
93. *Lotus corniculatus* L. (*Leguminosae*), H, Eua, $U_{2,5}$ T_0 R_0
94. *Lotus tenuis* Waldst. & Kit. ex Willd. (*Leguminosae*), H, Eua (Med), $U_{3,5}$ T_3 R_4
95. *Luzula campestris* (L.) D.C. (*Juncaceae*), H, Cosm, U_3 T_0 R_3
96. *Lycium barbarum* L. (*Solanaceae*), M, Adv., U_3 T_4 R_0
97. *Lycopus europaeus* L., (*Labiatae*), H-HH, Eua, U_5 T_3 R_0
98. *Lycopus exaltatus* L.f. (*Labiatae*), H-HH, Eua (Cont), U_5 T_3 R_0
99. *Lythrum salicaria* L. (*Lythraceae*), H-HH, Circ, U_4 $T_{2,5}$ R_0
100. *Lythrum virgatum* L. (*Lythraceae*), H-HH, Eua(Cont), $U_{4,5}$ $T_{3,5}$ R_4
101. *Malva neglecta* Wallr. (*Malvaceae*), Th, Eua, U_3 T_3 R_3
102. *Malva sylvestris* L. (*Malvaceae*), TH-H, Eua-Cosm, U_3 T_3 R_0
103. *Marrubium vulgare* L. (*Labiatae*), H, Eua, U_1 T_4 R_4
104. *Matricaria perforata* Mérat (*Compositae*), Th-TH, Eua, U_0 T_0 $R_{3,5}$
105. *Melilotus alba* Medik. (*Leguminosae*), Th(TH), Eua, $U_{2,5}$ T_3 R_0
106. *Mentha aquatica* L., (*Labiatae*), H-HH, Eur, U_5 T_3 R_0
107. *Mentha longifolia* (L.) Huds. (*Labiatae*), H, Eua, $U_{4,5}$ T_3 R_4
108. *Mentha pulegium* L. (*Labiatae*), H, Eua (Med), $U_{4,5}$ T_3 R_5
109. *Myosotis arvensis* (L.) Hill (*Boraginaceae*), TH, Eua, U_3 T_3 R_0
110. *Myosurus minimus* L. (*Ranunculaceae*), Th, Circ, U_4 T_4 R_3
111. *Oenanthe silaifolia* M. Bieb. (*Umbelliferae*), H, Med, U_5 $T_{3,5}$ R_0
112. *Ononis arvensis* L. (*Leguminosae*), Ch-H, Eua(Cont), U_3 T_4 R_0
113. *Onopordum acanthium* L. (*Compositae*), TH, Eua, $U_{2,5}$ T_4 R_4
114. *Ornithogalum umbellatum* L. (*Liliaceae*), G, Med-Euc, U_0 $T_{3,5}$ R_4
115. *Pastinaca sativa* L. (*Umbelliferae*), TH-H, Eua, U_3 T_4 R_4
116. *Pholiurus pannonicus* (Host.) Trin. (*Gramineae*), Th, Pont-Pan-Balc, U_0 T_4 $R_{4,5}$
117. *Picris hieracioides* L. (*Compositae*), TH-H, Eua, $U_{1,5}$ T_3 R_4
118. *Pimpinella saxifraga* L. (*Umbelliferae*), H, Eua (Med), $U_{2,5}$ T_0 R_3
119. *Plantago lanceolata* L. (*Plantaginaceae*), H, Eua, U_3 T_0 R_0
120. *Plantago major* L. (*Plantaginaceae*), H, Eua, U_3 T_0 R_0.
121. *Plantago maritima* L. (*Plantaginaceae*), H, Eua, U_4 T_0 R_5
122. *Plantago schwarzenbergiana* Schur (*Plantaginaceae*), H, Pan-Dac, $U_{3,5}$ T_4 R_5
123. *Plantago tenuiflora* Waldst. & Kit. (*Plantaginaceae*), Th, Eua (Cont), $U_{3,5}$ $T_{3,5}$ R_5
124. *Poa angustifolia* L. (*Gramineae*), H, Eua, U_2 T_3 R_0
125. *Poa annua* L. (*Gramineae*), Th-TH, Cosm, $U_{3,5}$ T_0 R_0
126. *Poa bulbosa* L. f. *vivipara* (*Gramineae*), G-H, Eua (Cont), U_2 $T_{3,5}$ R_4
127. *Poa pratensis* L. (*Gramineae*), H, Circ, U_3 T_0 R_0
128. *Polygonum aviculare* L. (*Polygonaceae*), Th, Cosm, $U_{2,5}$ T_0 R_3
129. *Polygonum lapathifolium* L. (*Polygonaceae*), Th, Cosm, U_4 T_0 R_3

Studia Universitatis "Vasile Goldiş", Seria Ştiinţele Vieţii
Vol. 22, issue 3, 2012, pp. 435-441

130. *Populus alba* L. (*Salicaceae*), MM-M, Eua, $U_{3,5}T_3R_3$
131. *Portulaca oleracea* L. (*Portulacaceae*), Th, Cosm, U_3T_0R
132. *Potentilla reptans* L. (*Rosaceae*), H, Eua, $U_{3,5}T_4R_4$
133. *Potentilla supina* L. (*Rosaceae*), Th-H, Eua (Med), $U_4T_3R_0$
134. *Prunella vulgaris* L. (*Labiatae*), H, Cosm, $U_3T_3R_0$
135. *Prunus spinosa* L. (*Rosaceae*), M, Eua(Med), $U_2T_3R_3$
136. *Puccinellia distans* (L.) Parl. subsp. *limosa* (Schur) Jáv. (= *Puccinellia limosa* (Schur) Holmb.), (*Gramineae*), H, Eua, $U_{3,5}T_0R_5$
137. *Pulicaria vulgaris* Gaertn. (*Compositae*), Th, Eua, $U_4T_3R_3$
138. *Ranunculus lateriflorus* DC. (*Ranunculaceae*), Th, Eua, $U_5T_3R_5$
139. *Ranunculus sardous* Crantz (*Ranunculaceae*), Th (TH, H), Euar, $U_3T_3R_4$
140. *Robinia pseudacacia* L. (*Leguminosae*), MM, Adv, $U_{2,5}T_4R_0$
141. *Rorippa sylvestris* (L.) Besser. ssp. *kerneri* (Menyh.) Soó (*Cruciferae*), H, Eur, $U_4T_3R_4$
142. *Rubus caesius* L. (*Rosaceae*), H-N, Eur, $U_{4,5}T_3R_4$
143. *Rumex conglomeratus* Murray (*Polygonaceae*), H, Circ, $U_4T_4R_4$
144. *Rumex crispus* L. (*Polygonaceae*), H, Eua, $U_4T_3R_0$
145. *Rumex dentatus* L. (*Polygonaceae*), Th(TH), Eua(Cont), $U_{4,5}T_{4,5}R_4$
146. *Rumex stenophyllus* Ledeb. (*Polygonaceae*), H, Eua (Cont)
147. *Salvia nemorosa* L. (Labiatae), H, Euc, $U_{2,5}T_4R_3$
148. *Scirpus lacustris* L. subsp. *lacustris* (= *Schoenoplectus lacustris* (L.) Palla), (*Cyperaceae*), G(HH), Cosm, $U_6T_3R_4$
149. *Scleranthus annuus* L. (*Caryophyllaceae*), Th (TH), Eua (Med), $U_2T_3R_2$
150. *Sclerochloa dura* (L.) P.Beauv. (*Gramineae*), Th, Med, $U_{2,5}T_3R_3$
151. *Scorzonera cana* (C.A.Mey.) O.Hoffm. (= *Podospermum canum* C.A.Mey.), (*Compositae*), G, Pont-Med, $U_2T_4R_{4,5}$
152. *Senecio jacobaea* L. (*Compositae*), H, Eua, $U_{2,5}T_3R_3$
153. *Setaria pumila* (Poir.) Schult. (*Gramineae*), Th, Cosm, $U_{2,5}T_4R_0$
154. *Setaria verticillata* (*Gramineae*), Th, Euc-Med, $U_2T_4R_0$
155. *Setaria viridis* (L.) P.Beauv. (*Gramineae*), Th, Cosm, $U_2T_{3,5}R_0$
156. *Silene latifolia* Poir. subsp. *alba* (Mill.) Greuter & Burdet (*Caryophyllaceae*), Th(TH), Eua, $U_{3,5}T_2R_3$
157. *Solanum nigrum* L. (*Solanaceae*), Th, Cosm, $U_3T_4R_0$
158. *Sonchus oleraceus* L. (*Compositae*), Th, Cosm, $U_3T_0R_0$
159. *Stachys annua* (L.) L. (*Labiatae*), Th, Eur (Med), $U_3T_{3,5}R_3$
160. *Symphytum officinale* L. (*Boraginaceae*), H, Eua, $U_4T_3R_0$
161. *Taraxacum bessarabicum* (Hornem.) Hand.-Mazz. (*Compositae*), H, Eua(Cont), $U_4T_3R_4$
162. *Taraxacum officinale* Weber (Compositae), H, Eua, $U_3T_0R_0$
163. *Teucrium scordium* L. (*Labiatae*), H, Eua(Med), $U_4T_4R_{4,5}$
164. *Thlaspi arvense* L. (*Cruciferae*), Th-TH, Eua, $U_2T_3R_4$
165. *Thymus glabrescens* Willd. (*Labiatae*), Ch, Pont-Pan, $U_2T_4R_0$
166. *Thymus pannonicus* All. (*Labiatae*), Ch, Pont-Pan, $U_{1,5}T_{3,5}R_4$
167. *Trifolium angulatum* Waldst. & Kit. (*Leguminosae*), Th, Balc-Cauc, $U_0T_5R_{4,5}$
168. *Trifolium fragiferum* L. (*Leguminosae*), H, Eua, $U_3T_3R_5$
169. *Trifolium micranthum* Viv. (*Leguminosae*), Th(TH), Atl-Med, $U_{1,5}T_4R_{4,5}$
170. *Trifolium ornithopodioides* L. (*Leguminosae*), Th, Med, $U_4T_4R_5$
171. *Trifolium pratense* L. (*Leguminosae*), H-TH, Eua, $U_3T_0R_0$
172. *Trifolium repens* L. (*Leguminosae*), H, Eua, $U_{3,5}T_0R_0$
173. *Trifolium striatum* L. (*Leguminosae*), Th, Atl-Med-Euc, $U_{1,5}T_3R_4$
174. *Urtica dioica* L. (*Urticaceae*), H, Cosm, $U_3T_3R_4$
175. *Verbascum blattaria* L. (*Scrophulariaceae*), H, Eua (Med), $U_{2,5}T_{3,5}R_3$
176. *Verbena officinalis* L. (*Verbenaceae*), H, Cosm, $U_{2,5}T_3R_0$
177. *Vicia grandiflora* Scop. (*Leguminosae*), Th, Pont-Cauc-Balc, $U_3T_3R_0$
178. *Xanthium spinosum* L. (*Compositae*), Th, Adv, $U_{2,5}T_4R_3$
179. *Xanthium strumarium* L. (*Compositae*), Th, Eua, $U_{3,5}T_{3,5}R_4$
180. *Xanthium strumarium* L. subsp. *italicum* (Moretti) D.Löve, (*Compositae*), Th, Adv, $U_{3,5}T_4R_0$

The halophilic flora, including salt-tolerant species, is composed by: *Achillea setacea*, *Artemisia santonicum* subsp. *santonicum*, *Aster tripolium*, *Bupleurum tenuissimum*, *Camphorosma annua*, *Chamomilla recutita*, *Festuca pseudovina*, *Hordeum hystrix*, *Juncus gerardi*, *Limonium gmelinii* (often presented by Hungarian, Czech and Serbian authors as *Limonium gmelinii* subsp. *hungaricum* / *hungarica*, as in Soó, 1968), *Lotus angustissimus*, *Lotus tenuis*, *Pholiurus pannonicus*, *Plantago maritima*, *Plantago*

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Cow herd on a *Limonium gmelinii* dominated pasture, Vărșand, august, 2012 (photo: I.-N. DĂRĂBAN).

schwarzenbergiana, *Plantago tenuiflora*, *Puccinelia distans* subsp. *limosa*, *Ranunculus lateriflorus*, *Scorzonera cana*, *Thymus pannonicus*, *Trifolium angulatum*, *Trifolium fragiferum*, *Trifolium ornithopodioides*. Populations of *Bupleurum tenuissimum*, *Lotus angustissimus*, *Plantago scwarzenbergiana*, *Plantago tenuiflora*, *Ranunculus lateriflorus* and *Trifolium ornithopodioides* are the less abundant, and this fact could be considered as a result of overgrazing, as well as the presence of large patches, almost monospecific of *Cynodon dactylon*, a bioindicator of overgrazing (Biró *et al.*, 2011).

Large populations of *Alopecurus pratensis* occupies the lower parts of the meadows, in association with *Oenanthe silaifolia*, *Beckmania eruciformis*, *Juncus gerardi*, *Lycopus europaeus*, *Rumex stenophyllus, Rumex dentatus, Rorippa sylvestris* subsp. *kerneri*.

In the drainage canals, dry in summer of 2011 and 2012, the dominant species is *Agrostis stolonifera*, accompanied by *Carex vulpina*, *Echinochloa crus-galli*, *Juncus inflexus*, *Lycopus exaltatus* and *Lycopus europaeus*, *Lythrum salicaria*, *Mentha aquatica*, *Pastinaca sativa*, *Ranunculus sardous*, *Polygonum lapathifolium*, *Scirpus lacustris* subsp. *lacustris*, *Teucrium scordium*. The canal's slopes are systematically occupied by *Artemisia santonicum* and *Puccinellia distans* subsp. *limosa*. We did not find in these canals *Elatine hungarica*, a species included in the romanian plant-red list (Dihoru & Negrean, 2009) and recorded in Vărşand, a species with a geographical distribution poorly known (Popiela *et al*., 2012).

Large populations from species as *Carduus nutans, Cynodon dactylon, Eryngium campestre, Ononis spinosa, Cirsium vulgare*, especially at the edges of the studied zone and near the stables, as well as *Urtica dioica* dense patches are a clear symptom of overgrazing.

We consider the overgrazing of this meadow will convey to a change in the florisic structure, by the decrease and even the vanishing of *Trifolium fragiferum, Lotus angustissimus, Plantago scwarzenbergiana, Plantago maritima, Puccinellia distans* ssp. *limosa, Trifolium ornithopodioides* populations, namely a part of the species that gives the high conservative value and the prioritary trait to the habitat 1530 (*Pannonic salt steppes and salt marshes*). Although Erdös *et al*. (2011) find a higher cormophyte diversity in halophilic communities from Vărşand, by comparison with the mown salty meadows from Gyula, we agree with Török *et al.* (2011), who emphasize the role played by the extensive grazing with cattle and sheep in maintaining these archaic and cultural-value bearer elements of the landscape.

Note: This work was supported by Structural Funds POSDRU/CPP107/DMI 1.5/S/77082" "Burse doctorale de pregătire ecoeconomică şi bioeconomică complexă pentru siguranţa şi securitatea alimentelor şi furajelor din ecosisteme antropice"

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