CORMOPHYTES DIVERSITY IN A SMALL FRAGMENT OF GREEN INFRASTRUCTURE (APA MARE VALLEY, FIRITEAZ, ARAD COUNTY, WEST ROMANIA)

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Abstract. *The paper presents the results of a research undertaken in 2022 on the vascular flora of a fragment of the Apa Mare valley located to the SE of Firiteaz, Arad county. This valley is an important component of the green infrastructure in the area and is not currently included in any protected area, nor has it been the subject of cormophyte inventory studies. The studied area is about 17 ha, on the right bank of the Apa Mare river and belongs to the organic agriculture farm BioFarmland Manufactura SRL (Firiteaz). In this heterogeneous area, composed of meadows normally mowed once a year, some areas of which were plowed in the past, a portion of reeds, clumps of trees and shrubs (willows, hawthorns, red dogwood), we identified more than 150 species, of which more than half have medicinal potential. After the drastic drought in the summer of 2022 and after the episode of heavy rains in September, we found that the vegetal carpet was drastically affected, but not by the large variation in water conditions, but due to illegal grazing with sheep, visible pressure all along the valley. We appreciate that the diversity of cormophytes is quite high, which contrasts with the surrounding agricultural landscape composed of arable crops. Remarkable is the presence of the species Eleocharis carniolica W.D.J. Koch (species from Annexes II and IV of the Habitats Directive (Council Directive 92/43/EEC of 21 May 1992), even if represented by a few individuals. We consider that the study of the biodiversity of this valley fragment must be extended to the whole valley as well as to other systematic groups of organisms in order to investigate the opportunity of establishing a community importance site, to join the Mlaștinile Murani - Birds directive site (site code: ROSPA0079) located downstream.*

Keywords*: cormophytes, diversity, green infrastructure, Firiteaz*

INTRODUCTION

Green infrastructure (GI) has been studied in recent years in Romania, especially with regard to its urban component (e.g. LUCA *et al*., 2015; GAVRILIDIS *et al*., 2020) as well as the most important part in terms of the biodiversity hotspots or biodiversity hubs – protected natural areas. Thus, the study of the species and habitats of the latter was boosted after Romania's accession to the EU (January 1, 2007), through the implementation of programs with European funding (operational sectoral programs, mainly).

We can also find publications that have as their object another category of GI components: the corridors and stepping stones, which includes "*natural features like small watercourses, ponds, hedgerows and woodland stripes*" (https://biodiversity.europa.eu /green-infrastructure/typology-of-gi). Studies on ecological corridors in Romania are done at various scales and for different systematic groups of organisms (e.g. PREDOIU *et al*., 2003; BADIU *et al*., 2015; TACHE *et al*., 2021), but such studies are not abundant.

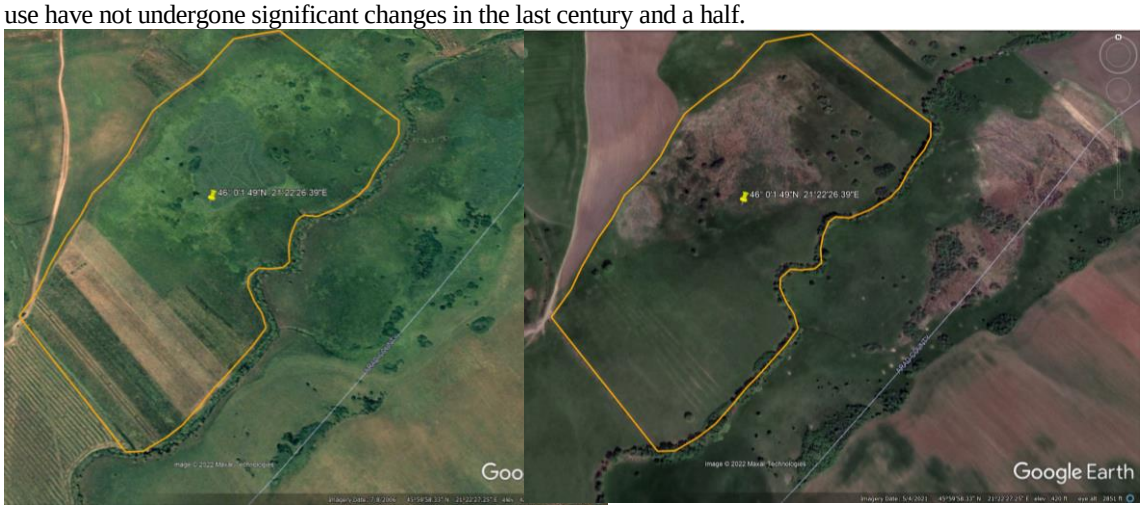
Instead, we do not find (Web of Science/Clarivate Database, Scopus Database, GoogleScholar Database) studies that strictly address the ecosystem services, the ecosystem functions of the ecological corridors in Romania (on the scale at which these corridors are defined above).

This is one of the reasons why we set out to address as exhaustively as possible the diversity of cormophytes from a fragment of the Apa Mare (The Big Water, in Romania)

valley, located in the high plain area of Arad county, south of the Mureș / Maros river. From the point of view of flora studies, the area is not researched (very few mentions of the area and surrounding localities in the main flora and vegetation monograph of Arad County – ARDELEAN, 2006; TURCUȘ *et al*., 2010).

MATERIAL AND METHODS

The study area, of about 17.3 ha, is located on Valea Mare, southeast of the village of Firiteaz (fig. 1). The central coordinates of the area are 46°0'1.49"N, 21°22'26.39"E. In general, as historical maps (https://maps.arcanum.com/...) show, the morphology of the area as well as the land use have not undergone significant changes in the last century and a half.



2006 2022

Figure. 1. The boundaries of the studied area (orange line) and the coordinates of the central point. It can be seen that the southern part of the area was occupied by arable crops in 2006, which have become fallows now. (GoogleEarth).

The cormophyte flora (the one that is the object of the study) was first approached in the field, during the months of April, May, June and October 2022. Thus, we covered various routes (transects), trying to cover the main plant formations (fallows of different ages, a wet zone, stabilized meadows, and less the riparian vegetation along the Apa Mare rivulet).

In the case of common species, we made the determination *in situ*, in the other cases, we took samples for herbalization/preservation and further determination in the laboratory. We also recorded, where necessary, the GPS coordinates. To record the data, we used a tape recorder, and the information was to be transcribed upon returning from the field. To facilitate the species identifications, we also took photos.

In the laboratory phase, we proceeded with the rest of the determinations, using as the main tool SÂRBU *et al*. (2013). Also from this source we extracted the species characterization information (life form, floristic element = geoelement, autoecological index values for soil moisture, temperature and soil rection).

Because since 2013, the date of publication of flora of SÂRBU *et al*., there have been changes in the systematics of some species, we updated the classification by querying The Euro+Med Plant Base (https://ww2.bgbm.org/EuroPlusMed/query.Asp and https://europlusmed.org/).

For the medicinal value of some species, we used information from *Plants For A Future (Earth-Plants-People)* database - https://pfaf.org/user/Default.aspx).

The criteria through which the species are presented are the following:

- the botanical family,
- the life form (according to SÂRBU *et al*., 2013: *Ch* – chamaephytes, *H* – hemicryptophytes, *H* – hemicryptophytes, *G* – Geophytes, *HH* – helohydatophytes, *T* – terrophytes, *Ht* – Hemicryptophytes-terophytes.),
- the geoelement (floristic element), (according to SÂRBU *et al*., 2013: *Adv.*- adventive, *Asia centr.*- central Asia, *Atl.*- Atlantic, *Balc.*- Balcanic, *Circ.*- Circumpolar, *Centr.Eur.*- Central European, *Cont., cont.*- continental, *Cosm.*- Cosmopolite, *Dac.*- Dacian, *Eur.*- European, *Euras.*- Euro-Asiatic, *Medit.*- Mediterranean, *Pan.*- Pannonian, *Pont.*- Pontic (Black Sea region), *Submedit.*- sub-Mediterranean),
- indicator value for soil moisture (from *1*, extreme xerophytic, to *10*, hydrophyte, with *x* = amphitolerant),
- indicator value for temperature (from *1*, cryophytes, to *9*, termophytes, with *x* = amphitolerant)
- indicator value for soil reaction (from *1*, extreme acidophytes, to *9*, halophytes, with x = amphitolerant).

(The system for the indicator value of species is that of SÂRBU *et al*., 2013, which in turn represents an adaptation for Romania of the well-known system of HEINZ ELLENBERG for Central Europe, 1974).

RESULTS AND DISCUSSIONS

The species inventory, which we tried to make as exhaustive as possible, includes 155 cormophytes, as follows:

1. *Acer campestre* L. (*Sapindaceae*); Ph; Eur.; $U_5T_6R_7$. Medicinal uses (Med. us.): astringent, anticholesterolemic (the bark).
2. *Achillea millefolium* L. (*Compositae*); H; Euras.; $U_4T_xR_x$. Med. us.: antidiarrhoeal, antiinflammatory, antiseptic, antispasmodic, appetizer, aromatic, digestive, odontalgic, vasodilator, tonic etc.
3. *Agrimonia eupatoria* L. **(***Rosaceae*); H; Euras.; $U_4T_xR_x$. Med. us.: antiphonic, antidiarhhoeal, astringent, cholagogue, diuretic, hepatic, tonic, vulnerary etc.
4. *Agrostis stolonifera* L. (*Poaceae*); H; Circ.; $U_6T_xR_x$. Med. us.: none known.
5. *Alisma plantago-aquatica* L. (*Alismataceae*); Hd; Circ.; $U_{10}T_6R_x$. Med. u: antibacterial, anticholesterolemic, astringent, diuretic, hypotensive, rubefacient etc.
6. *Allium scorodoprasum* L. (*Amaryllidaceae*); G; Centr.Eur.; $U_6T_6R_7$. Med. us.: against cholera and dysentery, depurative, digestive.
7. *Alopecurus pratensis* L. (*Poaceae*); H; Euras.; $U_6T_XR_7$. Species not included yet in PFAF Database.
8. *Anacamptis palustris (*Jacq.) R.M. Bateman, Pridgeon & M.W. Chase = *Orchis laxiflora* subsp. *palustris* (Jacq.) Bonnier & Layens., (*Orchidaceae*); G; Centr.Eur.-Submedit.-Atl.; $U_4T_xR_x$. Med. us. (given in PFAF for *Orchis laxiflora*): antiflatulent, astringent, anti-cancer, demulcent, expectorant, nutritive.
9. *Aristolochia clematitis* L. (*Aristolochiaceae*); G; Medit.; $U_4T_7R_7$. Med. us.: abortifacient, antiinflamatory, antispasmodic, diaphoretic, emmenagogue, febrifuge etc.
10. *Artemisia vulgaris* L. (*Compositae*); H; Circ.; $U_6T_xR_x$. Med. us.: anticonvulsant, antidepressant, antiemetic, antiseptic, carminative, haemostatic, nervine, purgative etc.
11. *Berula erecta* (Huds.) Coville (*Apiaceae*); H; Circ.; $U_{10}T_6R_x$. Med. us.: externally in the treatment of rheumatism, swellings, rashes, athletes foot infections.

12. *Betonica officinalis* L. (*Lamiaceae*); H; Euras.; $U_xT_6R_x$. Med. us.: anthelmintic, antiseptic, cathartic, digestive, emetic, homeopathy, sternutatory, vulnerary etc.
13. *Bolboschoenus maritimus* (L.) Palla (*Cyperaceae*); G (HH); Cosm.; $U_{10}T_xR_7$. Med. us.: astringent and diuretic.
14. *Briza media* L. (*Poaceae*); H; Euras.; $U_xT_4R_7$. Not included yet in PFAF Database.
15. *Bromus arvensis* L. (*Poaceae*); T-H; Euras.; $U_4T_xR_7$. Not included yet in PFAF Database.
16. *B. hordeaceus* L. (*Poaceae*); T-H; Euras.; $U_xT_xR_7$. Not included yet in PFAF Database.
17. *B. sterilis* L. (*Poaceae*)*;* T; Euras.; $U_4T_6R_x$. Not included yet in PFAF Database.
18. *Caltha laeta* Schott & *al.* (*Ranunculaceae*); H; Circ.; $U_{10}T_xR_x$. Med. us.: anodyne, antspasmodic, diaphoretic, expectorant, irritant, rubefacient etc.
19. *Calystegia sepium* (L.) R. Br. (*Convolvulaceae);* G (H); Euras.; $U_6T_6R_7$. Med. us.: cholagogue, demulcent, diuretic, febrifuge, poultice, purgative.
20. *Catabrosa aquatica* (L.) P. Beauv. (*Poaceae*); H; Circ.; $U_9T_xR_x$. Med. us.: stimulant and tonic.
21. *Capsella bursa-pastoris* (L.) Medik. (*Brassicaceae*); T- Ht; Cosm.; $U_xT_xR_x$. Med. us.: antiscorbutic, astringent, haemostatic, hypotensive, oxytoxic, vasoconstrictor, vulnerary etc.
22. *Cardaria draba* (L.) Desv. (*Brassicaceae*); H; Euras. Medit.; $U_3T_7R_7$. Med. us.: antiscorbutic, carminative.
23. *Carex distans* L. (*Cyperaceae*); H; Euras.; $U_7T_6R_7$. Not included yet in PFAF Database.
24. *C. elata* All. (*Cyperaceae*); H(HH); Eur.; $U_{10}T_6R_7$. Med. us.: none known.
25. *C. hirta* L. (*Cyperaceae*); G; Circ.; $U_6T_xR_x$. Med. us.: diuretic.
26. *C. praecox* Schreb. (C*yperaceae*); G; Euras. cont. $U_3T_6R_x$. Not included yet in PFAF Database
27. *C. riparia* Curtis (*Cyperaceae*); G (HH); Euras.; $U_9T_6R_7$. Med. us.: none known.
28. *C. vulpina* L. (*Cyperaceae);* H; Euras.; $U_9T_xR_x$. Not included yet in PFAF Database.
29. *Centaurea jacea* L. (*Compositae*)*;* H; Centr.Eur. and SE Eur.; $U_4T_6R_x$. Med. us.: bitter, diuretic, ophthalmic, stomachic, tonic.
30. *C. pannonica* (Heuff.) Simonk. (*Compositae*); H; Dac.-Pan.; $U_4T_6R_x$. Not included yet in PFAF Database.
31. *Cerastium glomeratum* Thuill. (*Caryophyllaceae*); T; Cosm.; $U_4T_xR_x$. Med. us.: against headaches and nosebleeds.
32. *C. umbellatum* (*Caryophyllaceae*)*;* T; Euras.; $U_3T_6R_x$. Not included yet in PFAF Database
33. *Cichorium intybus* L. (*Compositae*); H; Euras.; $U_4T_xR_x$. Med. us.: appetizer, cardiac, cholagogue, depurative, digestive, hypoglycaemic etc.
34. *Cicuta virosa* L. (*Apiaceae*); H; Euras.; $U_9T_6R_7$. Med. us.: analgesic, antispasmodic, emetic, epilepsy, galactofuge, sedative.
35. *Cirsium arvense* (L.) Scop. (*Compositae*); G; Euras.; $U_xT_xR_x$. Med. us.: antiphlogistic, astringent, diuretic, hepatic, tonic etc.
36. *C. canum* (L.) All. (*Compositae*); G; Euras. cont.; $U_8T_6R_7$. Not included yet in PFAF Database
37. *C. vulgare* (Savi) Ten. (*Compositae*); Ht; Euras.; $U_5T_xR_x$. Med. us.: antihaemorrhoidal, antirheumatic, Poultice.
38. *Clematis integrifolia* L. (*Ranunculaceae*); H; Euras. cont.; $U_3T_6R_7$. Not included yet in PFAF Database
39. *Conium maculatum* L. (*Apiaceae*); T-Ht; Euras.; $U_6T_6R_x$. Med. us.: analgesic, antirheumatic, antispasmodic, epilepsy, homeopathy etc.
40. *Convolvulus arvensis* L. (*Convolvulaceae*); G(H); Cosm.; $U_4T_xR_x$. Medicina uses: cholagogue, diuretic, laxative, purgative etc.
41. *Coronilla varia* L. (*Fabaceae*); H; Centr.Eur.-Submedit.; $U_4T_xR_x$. Med. us.: cardiotonic, emetic, salve.
42. *Cornus sanguinea* L. (*Cornaceae*); Ph; Centr.Eur.; $U_xT_xR_x$. Med. us.: astringent, emetic, febrifuge.

43. *Crataegus monogyna* Jacq. (*Rosaceae*); Ph; Euras.; $U_4T_xR_x$. Med. us.: antispasmodic, cardiotonic, diuretic, hypotensive etc.
44. *Dactylis glomerata* L. (*Poaceae*); H; Euras.; $U_4T_xR_x$. Med. us.: miscellany.
45. *Daucus carota* L. (*Apiaceae*); Ht; Euras.; $U_4T_xR_x$. Med. us. (for wild carrot): anthelmintic, carminative, deobstruent, diuretic, galactogogue etc.
46. *Dianthus carthusianorum* L. (*Caryophyllaceae*); H; Eur.; $U_4T_5R_5$. Med. us.: PFAF mentions antiperiodic for the genus *Dianthus*.
47. *Draba verna* L. (*Brassicaceae*); T; Eur.; $U_4T_6R_x$. Med. us.: astringent, vulnerary, treatment of whitlows.
48. *Eleocharis acicularis* (*Cyperaceae*); H (HH); Circ.; $U_{10}T_6R_7$. Not included yet in PFAF Database
49. *E. carniolica* (*Cyperaceae*); H (HH); Centr. and E Eur.; $U_9T_xR_x$. Not included yet in PFAF Database
50. *E. palustris* (*Cyperaceae*); G (HH); Cosm.; $U_{10}T_xR_x$. Med. us.: none known.
51. *Elymus repens* (L.) Gould (*Poaceae*); G; Circ.; $U_5T_xR_x$. Med. us.: "considerable value as a herbal medicine" – various uses.
52. *Equisetum arvense* L. (*Equisetaceae*); G; Cosm.; $U_6T_6R_x$. Med. us.: anodyne, antiseptic, cardiac, carminative, haemostatic, nervine etc.
53. *Eryngium campestre* L. (*Apiaceae*); H; Pont. -Medit.-Centr.Eur.; $U_3T_6R_7$. Med. us.: antispasmodic, aromatic, diaphoretic, diuretic etc.
54. *Euphorbia lingulata* Heuff. (*Euphorbiaceae*); H; Balc.; $U_4T_5R_7$. Toxic plant.
55. *Falcaria vulgaris* Bernh. (*Apiaceae*); T (Ht; H); Euras.; $U_3T_xR_x$. Not included yet in PFAF Database
56. *Festuca arundinacea* Schreb. (*Poaceae*); H; Eur.Centr.; $U_7T_XR_X$. Not included yet in PFAF Database
57. *F. gigantea* (L.) Vill. *(Poaceae*); H; Euras.; $U_7T_5R_6$. Not included yet in PFAF Database
58. *F. pratensis* Huds. (*Poaceae*); H; Euras.; $U_6T_xR_x$. Med. us.: none known.
59. *F. pseudovina* Wiesb. (*Poaceae*); H; Cont.; Euras.; $U_3T_6R_7$. Not included yet in PFAF Database.
60. *F. rupicola* Heuff. *(Poaceae*); H; Euras.; $U_3T_4R_5$. Not included yet in PFAF Database.
61. *F. valesiaca* Gaudin (*Poaceae*); H; Cont.; Euras.; $U_2T_6R_7$. Not included yet in PFAF Database.
62. *Filipendula hexapetala* Moench (*Rosaceae*); H; Euras.; $U_4T_xR_x$. Med. us.: anthelmintic, antispasmodic, epilepsy, lithontripic.
63. *Galium album* Mill. (*Rubiaceae*); H; Eur.; $U_5T_xR_x$. Not included yet in PFAF Database.
64. *G. mollugo* L. (*Rubiaceae*); H; Euras.; $U_5T_xR_x$. Med. us.: antispasmodic, epilepsy, lithontripic, vulnerary.
65. *G. palustre* L. (*Rubiaceae*); H; Eur.; $U_9T_xR_x$. Not included yet in PFAF Database
66. *G. rubioides* L. (*Rubiaceae*); H; Centr.Eur.; $U_7T_6R_7$. Not included yet in PFAF Database
67. *G. verum* L. (*Rubiaceae*); H; Euras.; $U_4T_5R_7$. Med. us.: antispasmodic; astringent, diuretic, epilepsiy, urinary etc.
68. *Geranium pratense* L. (*Geraniaceae*); H; Euras.cont.; $U_5T_5R_6$. Med. us.: analgesic, antiinflamatory, febrifuge, vulnerary.
69. *Glyceria maxima* (Hartm.) Holmb. (*Poaceae*); H(HH); Circ.; $U_{10}T_6R_7$. Med. us. (for the genus *Glyceria*): stimulant, tonic.
70. *Gratiola officinalis* L. (*Plantaginaceae*) H; Circ.; $U_9T_6R_x$. Med. us.: cardiac, diuretic, homeopathy, purgative, vermifuge.
71. *Hordeum murinum* L. (*Poaceae*); T; Euras.; $U_4T_6R_x$. Med. us.: diuretic.
72. *Inula helenium* L. (*Compositae*); H; Eur.; $U_5T_6R_7$. Med. us.: alterative, antiseptic, astringent, bitter, cholagogue, demulcent etc.
73. *Iris pseudacorus* L. (*Iridaceae*); G; Eur.; $U_{10}T_xR_x$. Med. us.: astringent, cathartic, emetic, emenagogue, odontalgic.

74. *Juncus inflexus* L. (*Juncaceae*); H; Euras.; $U_7T_xR_x$. Med. us.: none known.
75. *J. tenuis* Willd. (*Juncaceae*); G; Adv.; $U_6T_5R_5$. Med. us.: prevent lameness in babies.
76. *Knautia arvensis* (L.) Coult. (*Dipsacaceae*); H; Euras.; $U_4T_xR_x$. Med. us.: antipruritic, astringent, diuretic, eczema, homeopathy.
77. *Lactuca serriola* L. (*Compositae*); T-Ht; Euras.; $U_4T_6R_x$. Med. us.: anodyne, antipyretic, duretic, homeopathy, narcotic etc.
78. *Lathyrus nissolia* L. (*Fabaceae*); T; Atl.-medit.; $U_4T_6R_7$. Med. us. (for the genus *Lathyrus*): none known.
79. *L. pratensis* L. (*Fabaceae);* H; Euras.; $U_4T_5R_6$. Med. us.: idem.
80. *L. tuberosus* L. (*Fabaceae*); H; Euras.; $U_4T_6R_7$. Med. us.: idem.
81. *Lolium perenne* L. (*Poaceae*)*;* H; Cosm.; $U_5T_xR_x$. Med. us.: astringent, cancer, malaria.
82. *Lotus corniculatus* L. (*Fabaceae*); H; Euras.; $U_4T_xR_x$. Med. us.: antiinflamatory, antispasmodic, febrifuge, sedative, tonic, vermifuge etc.
83. *Lycopus europaeus* L. (*Lamiaceae*); H; Euras.; $U_9T_6R_x$. Med. us.: astringent, poultice, sedative, miscellany.
84. *Lysimachia vulgaris* L. (*Primulaceae*); H; Euras.; $U_8T_xR_x$. Med. us.: antidiarrhoeal, astringent, demulcent, dysentery, expectorant.
85. *Lythrum salicaria* L. (*Lythraceae*); H; Circ.; $U_8T_6R_7$. Med. us.: antibiotic, astringent, hypoglycaemic etc.
86. *Medicago lupulina* L. (*Fabaceae*); T-H; Euras.; $U_4T_xR_x$. Med. us.: antibacterial, lenitive.
87. *M. sativa* L. (*Fabaceae*); H; Eur.de est; Asia centr.; $U_4T_6R_7$. Med. us.: anodyne, antibacterial, aperient, emetic, nutritive etc.
88. *Melilotus officinalis* (L.) Lam. (*Fabaceae*); Ht; Euras.; $U_3T_xR_x$. Med. us.: antispasmodic, aromatic, diuretic, carminative, expectorant etc.
89. *Mentha aquatica* L. (*Lamiaceae*); H; Eur.; $U_9T_6R_7$. Med. us.: anodyne, antiseptic, astringent, diaphoretic, emetic, refrigerant, stomachic etc.
90. *M. arvensis* L. (*Lamiaceae*); H(G); Circ.; $U_8T_xR_x$. Med. us.: anesthetic, antiphlogistic, aromatic, cancer, antiseptic, febrifuge etc.
91. *Myosotis arvensis* (L.) Hill (*Boraginacea*); Ht; Euras.; $U_4T_6R_x$. Not included yet in PFAF Database.
92. *Nepeta nuda* L. (*Lamiaceae*); H; Euras.; Cont.; $U_3T_xR_7$. Not included yet in PFAF Database.
93. *Oenanthe aquatica* (L.) Poir. (*Apiaceae*); T; Euras.; $U_{10}T_6R_7$. Med. us.: antiperiodic, diaphoretic, diuretic, expectorant, homeopathy etc.
94. *Ononis spinosa* subsp. *hircina* (Jacq.) Gams = *Ononis arvensis* L. (*Fabaceae*); H; Cont.; Euras.; $U_4T_6R_7$. Med. us.: antirheumatic, antitussive, aperient, diuretic, lithontripic.
95. *Pastinaca sativa* L. (*Apiaceae*); Ht; Euras.; $U_4T_6R_7$. Med. us. (for wild parsnip): poultice, women's complaint.
96. *Peucedanum oreoselium* Moench (*Apiaceae*)*;* H; Euras. Cont; $U_3T_5R_7$. Med. us.: diuretic.
97. *Picris hieracioides* L. (*Compositae*); Ht-H; Centr.Eur.; $U_4T_xR_x$. Med. us.: febrifuge.
98. *Plantago lanceolata* L. (*Plantaginaceae*); H; Euras.; $U_xT_xR_x$. Med. us.: antibacterial, astringent, laxative, ophthalmic, poultice etc.
99. *P. major* L. (*Plantaginaceae*); H; Euras.; $U_5T_xR_x$. Med. us.: antidote, astringent, demulcent, expectorant, haemostatic, laxative, refrigerant etc.
100. *P. media* L. (*Plantaginaceae*); H; Euras.; $U_4T_xR_x$. Med. us.: astringent, demulcent, depurative, expectorant, laxative, odontalgic, refrigerant.
101. *Poa annua* L. (*Poaceae*); T-H; Cosm.; $U_6T_xR_x$. Med. us.: none known.
102. *P. pratensis* L. (*Poaceae*); H; Cosm.; $U_5T_xR_x$. Med. us.: none known.
103. *P. trivialis* L. (*Poaceae*); H; Euras.; $U_7T_xR_x$. Not included yet in PFAF Database.
104. *Polygonum aviculare* L. (*Polygonaceae*); T; Cosm.; $U_xT_xR_x$. Med. us.: antihelmintic, astringent, cardiotonic, colagogue, febrifuge etc.

105. *Potentilla anserina* L. (*Rosaceae*); H; Cosm.; $U_6T_xR_x$. Med. us.: analgesic, antidiarrhoeal, antispasmodic, astringent, haemostatic, tonic etc.
106. *P. argentea* L. (*Rosaceae*); H; Euras.; $U_3T_xR_x$. Not included yet in PFAF Database.
107. *P. erecta* (L.) Räusch. (*Rosaceae*); H; Euras.; $U_4T_5R_5$. Med. us.: antibiotic, astringent, haemostatic, odontalgic etc.
108. *P. reptans* L. (*Rosaceae*); H; Euras.; $U_6T_6R_7$. Med. us.: antidiarrhoeal, antispasmodic, astringent, febrifuge, odontalgic.
109. *Prunus spinosa* L. (*Rosaceae*); Ph; Eur.; $U_xT_6R_x$. Med. us.: antidiarrhoeal, antiflatulent, antispasmodic, astringent, diuretic, laxative, stomachic etc.
110. *Ranunculus acris* L. (*Ranunculaceae*); H; Euras.; $U_6T_xR_x$. Med. us.: acrid, anodyne, antispasmodic, rubefacient etc.
111. *R. repens* L. (*Ranunculaceae*); H; Euras.; $U_7T_xR_x$. Medidinal uses: analgesic, rubefacient.
112. *R. sardous* Crantz (*Ranunculaceae*); T; Euras.-Nord Afr.; $U_8T_7R_7$. Not included yet in PFAF Database.
113. *R. stevenii* Andrz. (*Ranunculaceae*); H; Euras.; $U_6T_xR_x$. Not included yet in PFAF Database.
114. *Rhinanthus rumelicus* Velen. (*Orobanchaceae*); T; Pont.-Pan.-Balc; $U_5T_xR_x$. Not included yet in PFAF Database.
115. *Rorippa sylvestris* (L.) Besser (*Brassicaceae*); H; Euras.; $U_8T_7R_6$. Med. us. (for the genus *Rorippa*): various.
116. *Rosa canina* L. (*Rosaceae*); Ph; Eur.; $U_4T_xR_x$. Med. us.: antirheumatic, astringent, cancer, diuretic, laxative, tonic, vitamin C etc.
117. *R. gallica* L. (*Rosaceae*); Ph; Pont.-Medit.; $U_4T_7R_7$. Med. us.: antibacterial, aromatherapy, astringent, cancer, tonic.
118. *Rubus caesius* L. (*Rosaceae*); Ph; Eur.; $U_7T_6R_7$. Med. us.: none known.
119. *Rumex acetosa* L. (*Polygonaceae*); H; Cosm.; $U_xT_xR_x$. Med. us.: antihelmintic, antiscorbutic, depurative, febrifuge, laxative, refrigerant, stomachic etc.
120. *R. confertus* Willd. (*Polygonaceae*); H; Euras.cont.; $U_7T_7R_7$. Not yet included in PFAF Database.
121. *R. crispus* L. (*Polygonaceae*); H; Euras.; $U_6T_xR_x$. Med. us.: alterative, antiscorbutic, cancer, depurative, laxative, poultice etc.
122. *Salix alba* L. (*Salicaceae*); Ph; Euras.; $U_7T_6R_x$. Med. us.: anodyne, antiperiodic, antiseptic, febrifuge, hypnotic, sedative, tonic etc.
123. *S. caprea* L. (*Salicaceae*); Ph; Euras.; $U_6T_xR_x$. Med. us.: anodyne, aphrodisiac, astringent, febrifuge, ophthalmic, stimulant.
124. *Salvia nemorosa* L. (*Lamiaceae*); H; Pont.-Medit.-Centr.Eur.; $U_4T_xR_x$. Not yet included in PFAF Database.
125. *S. pratensis* L. (*Lamiaceae*); H; Eur.; $U_4T_xR_x$. Med. us.: none known.
126. *Sambucus ebulus* L. (*Viburnaceae*); H; Euras. (Submedit.); $U_5T_6R_7$. Med. us.: antiphlogistic, antirheumatic, cholague, expectorant, homeopathy etc.
127. *S. nigra* L. (*Viburnaceae*); Ph; Eur.; $U_5T_xR_x$. Med. us.: antiinflamatory, aperient, diaphoretic, diuretic, expectorant, laxative, purgative.
128. *Serratula tinctoria* L. (*Compositae*); H; Euras.; $U_4T_6R_7$. Med. us.: astringent, vulnerary.
129. *Sonchus arvensis* L. (*Compositae*); G; Euras.; $U_5T_xR_x$. Med. us.: antiinflamatory, pectoral, sedative, vitamin C.
130. *S. oleraceus* L. (*Compositae*); T; Cosm.; $U_4T_xR_x$. Med. us.: cancer, emmenagogue, febrifuge, hepatic, hydrogogue, warts etc.
131. *Stachys officinalis* (L.) Trevis. (*Lamiaceae*); H; Euras.; $U_xT_6R_x$. Med. us.: antihelmintic, antiseptic, astringent, cathartic, digestive, emmenagogue etc.
132. *Stellaria graminea* L. (*Caryophyllaceae*); H; Euras.; $U_5T_xR_6$. Med. us.: plant were used - allegedly to cure that pain in the side known as 'stitch'.
133. *Stenactis annua* (L.) Less. (*Compositae*); T (Ht; H); Adv.; $U_6T_6R_x$. Med. us.: none known.

134. *Symphytum officinale* L. (*Boraginaceae*); H; Euras.; $U_8T_xR_x$. Med. us.: anodyne, antirheumatic, astringent, emollient, expectorant, homeopathy, vulnerary.
135. *Taraxacum officinale* F. H. Wigg. (*Compositae*); H; Euras.; $U_5T_xR_x$. Utilizări Med. us.: aperient, cholagogue, depurative, hepatic, laxative, tonic, urinary etc.
136. *Teucrium chamaedrys* L. (*Lamiaceae*); Ch; Euras.Centr.; $U_2T_6R_7$. Med. us.: antiinflamatory, antirheumatic, aperient, carminative, digestive etc.
137. *Thalictrum minus* L. (*Ranunculaceae*); H; Euras.Cont.; $U_3T_xR_7$. Med. us.: febrifuge.
138. *Tordylium maximum* L. (*Apiaceae*)*;* T;Ht;H; Central and S Europe- SW Asia; $U_3T_7R_7$. Not included yet in PFAF Database.
139. *Tragopogon pratensis* L. (*Compositae*)*;* Ht-H; Euras.; $U_4T_6R_7$. Med. us.: astringent, depurative, diuretic, expectorant, stomachic.
140. *Trifolium hybridum* L. (*Fabaceae*); H; Atl.-eur.; $U_6T_xR_x$. Med. us.: galactogogue.
141. *T. montanum* L. (*Fabaceae*); H; Euras.Cont.; $U_3T_xR_x$. Not included yet in PFAF Database.
142. *T. pratense* L. (*Fabaceae*); H; Alp.-eur.; $U_4T_2R_2$. Med. us.: alterative, antipsoriatic, antiscrophulatic, aperient, diuretic, expectorant etc.
143. *T. striatum* L. (*Fabaceae*); T; Alt.-medit.; $U_3T_6R_7$. Not included yet in PFAF Database.
144. *T. repens* L. (*Fabaceae*), H, Euras.Cont.; $U_5T_4R_5$. Med. us.: antirheumatic, antiscrophulatic, depurative, detergent, ophtalmic, tonic.
145. *Tripleurospermum inodorum* (L.) Sch. Bip. (*Compositae*)*;* T; Euras.; $U_xT_xR_x$. Not included yet in PFAF Database.
146. *Verbascum phoeniceum* L. (*Scrophulariceae*); H; Euras.; Cont.; $U_3T_6R_7$. Med. us. (for the genus *Verbascum*): none known.
147. *Veronica agrestis* L. (*Plantaginaceae*)*;* T; Eur.; $U_6T_6R_7$. Med. us.: afecțiuni women's complaints.
148. *Vicia cracca* L. (*Fabaceae*); H; Euras.; $U_4T_xR_x$. Med. us.: galactogogue.
149. *V. grandiflora* Scop. (*Fabaceae*); T; Pont.- Balc.Cauc.; $U_4T_6R_x$. Med. us.: none known.
150. *V. hirsuta* (L.) Gray (*Fabaceae*); T; Euras.; $U_xT_6R_x$. Med. us.: none known.
151. *V. pannonica* Crantz (*Fabaceae*); T; Pont.-medit.; $U_4T_6R_7$. Not included yet in PFAF Database.
152. *V. sativa* L. (*Fabaceae*)*;* T; Medit.; $U_xT_xR_x$. Med. us.: none known.
153. *Viola elatior* Fr. *(Violaceae*); H; Euras.; $U_4T_6R_7$. Not included yet in PFAF Database.
154. *Xanthium strumarium* L. (*Compositae*); T; Cosm.; $U_5T_6R_x$. Med. us.: anodyne, antibacterial, antifungal, antispasmodic, cytotoxic, emollient, febrifuge etc.
155. *Xeranthemum annuum* L. (*Compositae*); Pont.-medit.; $U_2T_6R_7$. Not included yet in PFAF Database.

This picture of plant diversity is characterized by the following:

- the presence of species from various botanical families (more than 30);
- the dominance of hemicryptophytes, among the types of life forms, which reflects on the one hand the presence of few species of phanerophytes and on the other the use as pasture of both the portion of the actual meadow and the wet area as well as the fallow. In a short visit to the site in October 2022, after the drastic drought of the previous months, we found grazing of the reed area (fig. 2). In the discussion with one of the owners of the company *Biofarmland*, which owns the land, Ms. Katharina Hanni, we learned that it is about illegal grazing with sheep by trespassing on the property. The normal exploitation regime of the area, applied by the owner, is mowing once a year. Traces of overgrazing are also visible in the neighboring area, on the slopes of the valley (fig. 2).
- regarding the biogeographical aspect, the net dominance of the Eurasian species is found, followed by the European ones. What is remarkable is the quasi-absence of adventive species, although the valley is surrounded by agricultural

crops, although the river, the presence and movement of herds and the vicinity of arable crops represent *a priori* factors favoring the presence of invasives.

- in the spectrum of indicator values for soil moisture, we find species from all categories, which was expected, considering the variety of biotopes, even on a small area.

Figure 2. Traces of overgrazing in the reeds, inside the studied area (left) and traces of overgrazing on a slope of the Valea Mare, in the immediate vicinity (right). The rows do not represent an agricultural crop, but paths on which the sheep move!

- the majority of species is composed of eurythermic and mesothermic-slightly thermophilic species (with an index value of 6 out of 9);
- almost 2/3 of the species are amphitolerant towards the soil reaction, the rest being more or less neutrophilic species.

In a small channel, with a depth of about 0.5-0.7 m, we found few individuals of *Eleocharis carniolica*, a species from annexes II and IV of the Habitats Directive (Council Directive 92/43/EEC - https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:31992L0043) and a species whose presence in western Romania we consider to be underestimated. The closest protected area to our study area is the special protection area (SPA) Mlaștinile Murani (code ROSPA0079), located in the same valley, downstream, at a distance in a straight line of about 3.6 km (fig. 3). From the perspective of connectivity, given the results of our investigation (focused only on cormophytes!), we believe that there is a real potential for the declaration of the entire valley as a Natura 2000 protected area. Entry under the protection regime could be a stimulus for organic agriculture, but also for limiting overgrazing.

The medicinal plant potential of the area is qualitatively high, as the vast majority of species have medicinal uses, some of them being well-known medicinal plants. Their harvesting should obviously take into account the sizes of the respective populations. From this point of view, we recommend an assessment of the carrying capacity of the area and of each species. Spontaneous medicinal plants could complete the medicinal plants offer of Biofarmland.

We can consider our research as preliminary to more detailed investigations with economic, conservation and green infrastructure inventory and management purposes. Examining the GI functions inventoried in WANG & BANZHAF's (2018) synthesis, many of which have direct correspondence in ecosystem service typologies, we find that many of them are fulfilled or likely to be fulfilled even by a small GI fragment, such as the area of our study (e.g. capacity to provide a diversified portfolio of products, maintenance of soil fertility, biological control, pollination, carbon storage and sequestration, tourism, recreation, research, education,

existence value of species and habitat, etc. The importance of such an approach for the Romanian rural space is emphasized by HARTEL *et al*. (2014).

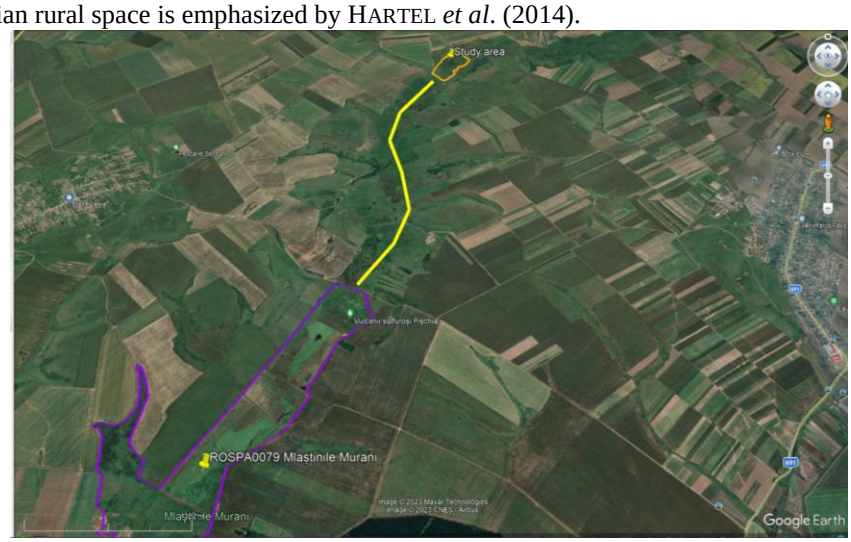


Figure 3. The position of our study area relative to the nearest protected area, ROSPA0079 Murani Marshes (purple borders), on the high water valley (yellow line) (GoogleEarth).

CONCLUSIONS

On a relatively small surface (approx. 17 ha), but complex in structure, we found a number of more than 150 species of cormophytes, most of them herbaceous plants. The identified flora is composed, in general, of species of wetlands, meadows and fallows.

The potential for use as a source of medicinal plants is high, given the large proportion (approx. 4/5) of species with medicinal uses.

Among the species found is *Eleocharis carniolica*, a species listed in Annexes II and IV of 92/43/EEC Directive.

The study area, like the entire valley, is under a strong impact of overgrazing with sheep (including in the form of illegal grazing).

We consider it an urgent necessity to carry out detailed biodiversity studies on the entire Apa Mare valley, as well as studies on the functions of this important GI element at south of the Mureș/Maros River. Given the economic evolution and implicitly the increased anthropogenic impacts, the opportunity to declare the entire valley as a protected area (as part of the Natura2000 network) must be examined as soon as possible.

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