AQUATIC AND PALUDICOLOUS FLORA OF THE NATURE RESERVE PIŞCHIA

FLORA ACVATICĂ ŞI PALUSTRĂ DIN REZERVAŢIA NATURALĂ PIŞCHIA

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Abstract: *The flora of the natural reserve Pişchia is very interesting mainly due to the presence of aquatic and paludicolous species. For the moment the synopsis of the flora counts up to 153 cormophite species, belonging to 43 botanic families. The observations were made during the period 2005 – 2006. Together with drawing up the floristic inventory, we have also considered the analysis of the species based on several aspects: categories of bio-forms, geo-elements and ecologic categories.*

Rezumat: *Flora rezervaţiei naturale Pişchia este interesantă, în principal, datorită prezenţei speciilor acvatice şi palustre. Conspectul florei numără deocamdată 153 de specii de cormofite, aparţinând la 43 de familii botanice. Observaţiile au fost făcute în perioada 2005-2006. Pe lângă întocmirea inventarului floristic, am avut în vedere şi analiza speciilor sub diferite aspecte: categorii de bioforme, de geoelemente şi categorii ecologice.*

Key words**:** *Pişchia, aquatic and paludicolous flora, bio-forms, geo-elements, ecologic categories*
Cuvinte cheie: *Pişchia, floră acvatică şi palustră, bioforme, geoelemente, categorii ecologice*

INTODUCTION

It is known that Banat used to be a marshy region. Following the extensive hydrological improving works that were performed in time in Banat, a series of the natural damp areas have disappeared (swamps, flood plains, damp hayfields, etc) and others have considerably decreased in surface. As these areas diminished, there were created artificial arrangements on considerably large areas.

In this context, in the year 1971, by building a dam on the river course of Măgheruş, instead of a swampy valley which spread over several kilometres, it was performed the accumulation Murani – Pişchia. The purpose of the arrangement was to decrease the effects of floods. At the beginning, did not have a permanent character, subsequently becoming a permanent retention.

On the left side, the lake neighbours on Pişchia forest, and on the right side it is bordered by the soft hillocks cultivated with cereals. The water is not very deep and it maintains upstream a large area of damp hayfield. The accumulation is situated at the altitude of 130 m, 45^0 54' N, 21^0 20' E. The volume of the water is 6,240,000 m^3 and the surface area – 200 ha (95 ha of shine).

In what the relief is concerned, the studied territory belongs to the Vingăi Plains, more precisely to Secani Plains, a plateau slightly inclined East-West, with an altitude of 125 – 160 m. The geological substratum is represented by loess and alluvial deposits (gravel, sands, bedrocks, clays). The main rivers in the area are the brooks Beregsău (canalized) and Măgheruş (the river valley is canalized and dammed upstream forming the storage lake). The climate of this region presents sub – Mediterranean and oceanic influences. The average annual temperatures are of 10.9^0 C and the average annual precipitations of 631 mm. The soils are represented of typical preluvisoils. The vegetation is characteristic for the forest steppe area.

As for the major habitat type, the reserve is part of the category oh habitats of sweet water / damp areas, swamps – peat bogs (from the eco-region of Hungarian Plains). The region was declared Ornithological Natural Reserve (no. 2743) „The Murani-Pişchia Swamps" (with the observation „Habitat specific for aquatic flora – *Ixobrychus minutus*: little heron"), by Law no. 5/2000, H. C. J. no. 19/1995. The land on which it is situated is a state property. At present, the reserve is administered by the Local Council of Pişchia, after being taking over in the past by a trading company which exploited it for fishing. Unfortunately, there is no management project of the reserve yet. Anthropic activities practiced within the protected area: grazing, pleasure fishing, pisciculture, hydro-technical arrangements, tourism, and other leisure activities.

MATERIAL AND METHOD

The synopsis of the flora was accomplished in the period 2005 – 2006 following the expeditions in the area. We took into account writing down all the species encountered with a view to creating the floristic inventory and we performed phyto-coenologic sampling. The species which were not identified in the field were subsequently determined in the Botanic laboratory. We have used for determining *Flora R.S.R.* (1952 – 1976) and *Flora ilustrată a României. Pterydophyta et Spermatophyta* (CIOCÂRLAN, 2000). It is known that for the qualitative approach of phyto-coenoses, several aspects are considered: the floristic composition, the structure of bio-forms and geo-elements, the ecological and genetic structure, the economic value. We mentioned for each species characteristic indexes regarding phyto-geographic and bio-form elements, and the ecologic requirements regarding humidity (U), temperature (T) and soil reaction (R). We have performed the analysis of flora from the point of view of these indexes. The species comprised in the inventory were ordered according to family, alphabetically, the nomenclature used being the one suggested by CIOCÂRLAN (2000). For the notation and analysis of indexes we used the study „*Caracterizarea ecologică şi fitocenologică a speciilor spontane din flora României"* (SANDA *et al*., 1983).

RESULTS AND DISCUSSIONS

Floristic inventory

Hereinafter are presented the species, followed by naming the bio – form, the geo-element, the values of the autoecologic indexes of humidity (U), temperature (T) and soil reaction (R).

Alismataceae

1. *Alisma plantago-aquatica* L.; HH, Cosm, U 6 T 0 R 0

Amaranthaceae

2. *Amaranthus blitum* L.; Th, Cosm, U 3,5 T 4 R 4
3. *Amaranthus retroflexus* L.; Th, Adv, U 3 T 3 R 0

Apiaceae

4. *Daucus carota* L. subsp. *carota*; TH-H, Eua (Med), U 2,5 T 3 R 0
5. *Oenanthe banatica* Heuffel; H, Dac-Balc-Pan, U 4 T 3,5 R 0
6. *Pastinaca sativa* L.; TH-H, Eua, U 3 T 4 R 4
7. *Thorilis arvensis* (Hudson) Link; Th, Med-Euc, U 2,5 T 3,5 R 4

Asclepiadaceae

8. *Asclepias syriaca* L.; H, U 3, T 4 R 4

Asteraceae

9. *Achillea millefolium* L.; H, Eua, U 3 T 0 R 0
10. *Ambrosia artemisiifolia* L.; Th, Adv, U 2 T 0 R 0
11. *Bidens tripartita* L.; Th, Eua, U 4,5 T 3 R 0
12. *Carduus acanthoides* L.; TH, Eur (Med), U 2 T 3 R 0
13. *Centaurea panonica* (Heuffel) Simonkai; H, Euc, U 2 T 3 R 4
14. *Cichorium intybus* L.; H-TH, Eua, U 2,5 T 3,5 R 4,5
15. *Cirsium arvense* (L.) Scop.; G, Eua (Med), U 0 T 0 R 0
16. *Conyza canadensis* (L.) Cronq.; Th-TH, Adv, U 2,5 T 0 R 0

17. *Crepis setosa* Haller; Th, Atl-Med, U 2 T 3 R 3
18. *Erigeron annuus* (L.) Pers.; Th, Adv, U 4 T 0 R 4
19. *Eupatorium cannabinum* L.; H, Eua (Med), U 4 T 3 R 0
20. *Gnaphalium uliginosum* L.; Th, Eua, U 5 T 3 R 4
21. *Inula salicina* L.; H, Eua, U 2,5 T 3 R 3
22. *Lactuca saligna* L.; Th-TH, Med, U 1,5 T 4 R 4
23. *Lactuca serriola* L.; Th-TH, Eua (Med), U 1,5 T 3,5 R 0
24. *Leontodon autumnalis* L.; H, Eua, U 3 T 0 R 0
25. *Matricaria perforata* Mérat; Th-TH, Eua, U 0 T 3 R 3,5
26. *Pulicaria vulgaris* Gaertner; Th, Eua (Med), U 4 T 3 R 3
27. *Senecio jacobea* L.; H, Eua, U 2,5 T 3 R 3
28. *Sonchus arvensis* L.; H, Eua (Cosm), U 3 T 3 R 4
29. *Sonchus asper* (L.) Hill; Th, Eua, U 3,5 T 3 R 4
30. *Sonchus palustris* L.; H, Eua, U 4,5 T 3,5 R 4
31. *Taraxacum officinale* Weber ex Wiggers; H, Eua (Med) (Cosm), U 3 T 0 R 0
32. *Tragopogon pratensis* L.; TH-H, Eua, U 3 T 2 R 3
33. *Xanthium spinosum* L.; Th, Adv, U 2,5 T 4 R 3
34. *Xanthium strumarium* L.; Th, Eua, U 3,5 T 3,5 R 4

Boraginaceae

35. *Echium vulgare* L.; TH, Eua, U 2 T 3 R 4
36. *Symphytum officinale* L.; H, Eua, U 4 T 3 R 0

Brassicaceae

37. *Berteroa incana* (L.) DC.; Th-TH, Eua (cont), U 2 T 3,5 R 0
38. *Capsella bursa-pastoris* (L.) Medik.; Th, Cosm (Med), U 3 T 0 R 0
39. *Rorippa amphibia* (L.) Besser; HH, Eua (Med), U 6 T 3 R 4
40. *Rorippa austriaca* (Crantz) Besser; H-G, Euc, U 4 T 3,5 R 4
41. *Thlaspi arvense* L.; Th, Eua (Med), U 2 T 3 R 4

Butomaceae

42. *Butomus umbellatus* L.; HH, Eua (Med), U 6 T 3 R 0

Caprifoliaceae

43. *Sambucus ebulus* L.; H, Eua (Med), U 3 T 3 R 4,5

Caryophyllaceae

44. *Gypsophila muralis* L.; Th, Eua (cont), U 2 T 3 R 2
45. *Silene alba* (Miller) E.H.L Krause; Th-TH, Eua, U 3,5 T 2 R 3

Chenopodiaceae

46. *Atriplex patula* L.; Th, Circ (Med), U 0 T 0 R 0
47. *Chenopodium album* L.; Th, Cosm, U 3 T 3 R 0
48. *Chenopodium polyspermum* L.; T, Eua, U 3 T 4 R 0

Convolvulaceae

49. *Calystegia sepium* (L.) R. Br.; H, Eua, U 4 T 3 R 4
50. *Convolvulus arvensis* L; H-G, Cosm, U 0 T 0 R 0

Cyperaceae

51. *Carex hirta* L.; G, Eur (Med), U 0 T 3 R 0
52. *Carex riparia* Curtis; HH, Eua (Med), U 5 T 4 R 4
53. *Cyperus flavescens* Jacq.; Th, Cosm, U 4,5 T 0 R 4
54. *Eleocharis palustris* (L.) Roemer et Schultes; G-HH, Cosm, U 5 T 0 R 4
55. *Schoenoplectus lacustris* (L.) Palla; HH-G, Cosm, U 6 T 3 R 4

Dipsacaceae

56. *Dipsacus laciniatus* L.; TH, Eua (cont), U 4 T 3,5 R 4

Equisetaceae

57. *Equisetum arvense* L.; G, Cosm, U 3 T 3 R 0

Euphorbiaceae

58. *Euphorbia cyparissias* L.; H (G), Eua, U 2 T 3 R 4

Fabaceae

59. *Coronilla varia* L.; H, Euc-Med, U 2 T 3 R 4
60. *Galega officinalis* L.; H, Pont-Med, U 4,5 T 3 R 4
61. *Lathyrus tuberosus* L.; H (G), Eua (Med), U 2 T 4 R 4
62. *Lotus corniculatus* L.; H, Eua, U 2,5 T 0 R 0
63. *Medicago lupulina* L.; Th-TH, Eua, U 2,5 T 3 R 4
64. *Trifolium arvense* L.; Th, Eua (Med), U 1,5 T 3 R 4
65. *Trifolium pratense* L.; H-TH, Eua, U 3 T 0 R 0

66. *Trifolium repens* L.; H, Eua, U 3,5 T 0 R 0

Geraniaceae

67. *Erodium cicutarium* (L.) L' Hérit.; Th, Cosm, U 2,5 T 0 R 0
68. *Geranium dissectum* L.; Th, Eua, U 3 T 3,5 R 0
69. *Geranium pratense* L.; H, Eua, U 3,5 T 3 R 5

Hypericaceae

70. *Hypericum perforatum* L.; H, Eua, U 3 T 3 R 0

Iridaceae

71. *Iris pseudacorus* L.; G-HH, Eur, U 3,5 T 0 R 0

Juncaceae

72. *Juncus articulatus* L.; H, Circ (bor), U 5 T 2 R 0
73. *Juncus inflexus* L.; H, Eua (Med), U 4 T 4 R 4
74. *Juncus tenuis* Willd.; H, Adv, U 3,5 T 3 R 4

Lamiaceae

75. *Glechoma hederacea* L.; Ch-H, Eua, U 3,5 T 3 R 0
76. *Lycopus europaeus* L.; HH, Eua, U 5 T 3 R 0
77. *Mentha aquatica* L.; HH-H, Eua, U 5 T 3 R 0
78. *Mentha longifolia* (L.) Hudson; H (G), Eua (Med), U 4,5 T 3 R 0
79. *Mentha pulegium* L.; H, Eua (Med), U 4 T 3 R 5
80. *Prunella vulgaris* L.; H, Circ (bor), U 3 T 3 R 0
81. *Salvia pratensis* L.; H, Eur (Med), U 2,5 T 3 R 4,5
82. *Scutellaria hastifolia* L.; H, Euc, U 5 T 3 R 3
83. *Stachys annua* (L.) L.; Th, Med (Est), U 3 T 3,5 R 4,5
84. *Stachys palustris* L.; H (G), Circ (bor), U 4 T 3 R 4
85. *Stachys recta* L.; H, Pont-Med, U 2 T 4 R 4,5
86. *Teucrium scordium* L.; H, Eua (Med), U 4,5 T 4 R 4,5

Lemnaceae

87. *Lemna minor* L.; HH, Cosm, U 6 T 0 R 0

Lythraceae

88. *Lythrum salicaria* L.; H-HH, Cosm, U 4 T 3 R 0
89. *Lytrum hyssopifolia* L.; Th, Cosm, U 4 T 3 R 0

Malvaceae

90. *Abutilon theophrasti* Medik.; Th, Eua, U 3 T 3 R 3
91. *Althaea officinalis* L.; H, Eua (cont), U 3 T 4 R 4
92. *Hibiscus trionum* L.; TH, Eua, U 2,5 T 4 R 4
93. *Malva sylvestris* L.; Th-TH, H, Eua (Cosm), U 3 T 3 R 0

Onagraceae

94. *Epilobium tetragonum* L.; H, Eua, U 4,5 T 3 R 0

Plantaginaceae

95. *Plantago lanceolata* L.; H, Eua, U 0 T 0 R 0
96. *Plantago major* L.; H, Eua, U 3 T 0 R 0
97. *Plantago media* L.; H, Eua, U 2,5 T 0 R 4,5

Poaceae

98. *Agrostis stolonifera* L.; H, Circ (bor), U 4 T 0 R 0
99. *Alopecurus pratensis* L.; H, Eua, U 4 T 3 R O
100. *Bromus arvensis* L.; Th-TH, Eua (Med), U 2,5 T 3 R 0
101. *Bromus sterilis* L.; Th, Eua (Med), U 2 T 4 R 4
102. *Calamagrostis arundinacea* (L.) Roth.; H (G), Eua, U 2,5 T 3 R 2
103. *Cynodon dactylon* (L.) Pers.; G (H), Cosm, U 2 T 3,5 R 0
104. *Dactylis glomerata* L.; H, Eua (Med), U 3 T 0 R 4
105. *Digitaria sanguinalis* (L.) Scop.; Th, Cosm, U 1,5 T 0 R 4
106. *Echinochloa crus-galli* (L.) Beauv.; Th, Cosm, U 4 T 0 R 3
107. *Elymus repens* (L.) Gould; G, Eua, U 0 T 0 R 0
108. *Eriochloa villosa* (Thumb.) Kunth
109. *Festuca pratensis* Hudson; H, Eua, U 3,5 T 0 R 0
110. *Glyceria fluitans* (L.) R. Br.; HH-H, Cosm, U 5 T 3 R 0
111. *Phalaris arundinacea* L.; HH-H, Circ (bor), U 5 T 3 R 0
112. *Phragmites australis* (Cav.) Steudel; HH, Cosm, U 4 T O R 4
113. *Setaria pumila* (Poiret) Schultes; Th, Cosm, U 2,5 T 4 R 0
114. *Setaria viridis* (L.) Beauv.; Th, Eua, U 2 T 3,5 R 0

Polygonaceae
115. *Polygonum aviculare* L.; Th, Cosm, U 2,5 T 0 R 3
116. *Polygonum hydropiper* L.; Th, Eua (Med), U 4,5 T 3 R 4
117. *Polygonum lapathifolium* L.; Th, Cosm, U 4 T 0 R 3
118. *Polygonum persicaria* L.; Th, Eua, U 4,5 T 3 R 0
119. *Rumex obtusifolius* L.; H, Eur, U 4 T 0 R 3

Portulacaceae
120. *Portulaca oleracea* L.; Th, Cosm, U 3 T 0 R 0

Potamogetonaceae
121. *Potamogeton crispus* L.; HH, Cosm, U 6 T 3,5 R 4

Primulaceae
122. *Anagallis arvensis* L.; Th, Cosm, U 3 T 3 R 0
123. *Lysimachia numularia* L.; Ch, Eur, U 4 T 3 R 0

Ranunculaceae
124. *Clematis integrifolia* L.; H, Eua (cont), U 3 T 3,5 R 5
125. *Consolida regalis* S.F. Gray; Th, Eua, U 2 T 4 R 4
126. *Ranunculus repens* L.; H, Eua (Med), U 4 T 0 R 0
127. *Ranunculus sardous* Crantz; Th-TH, H, Eua, U 3 T 3 R 4
128. *Thalictrum flavum* L.; H, Eua, U 4,5 T 0 R 4,5

Rosaceae
129. *Agrimonia eupatoria* L.; H, Eua, U 2,5 T 3 R 4
130. *Crataegus monogyna* Jacq.; M, Eur, U 2,5 T 3 R 3
131. *Potentilla anserina* L.; H, Cosm, U 4 T 3 R 4
132. *Potentilla argentea* L.; H, Eua, U 2 T 4 R 2
133. *Potentilla reptans* L.; H, Cosm, U 3,5 T 0 R 4
134. *Potentilla supina* L.; Th-H, Med (est), U 4 T 3 R 0
135. *Prunus spinosa* L.; M, Eua, U 2 T 3 R 3
136. *Rosa canina* L.; N, Eur, U 2 T 3 R 3
137. *Rubus caesius* L.; H (N), Eua (Med), U 4,5 T 3 R 4

Rubiaceae
138. *Cruciata glabra* (L.) Ehrend.; H, Eua, U 3 T 2 R 2
139. *Galium album* L.; H, Eua, U 2,5 T 2,5 R 3
140. *Galium aparine* L.; Th, Circ, U 3 T 3 R 3
141. *Galium verum* L.; H, Eua, U 2,5 T 2,5 R 0

Salicaceae
142. *Populus alba* L.; MM-M, Eua, U 3,5 T 3 R 3
143. *Salix alba* L.; MM-M, Eua, U 5 T 3 R 4
144. *Salix cinerea* L.; M, Eua, U 5 T 3 R 3

Scrophulariaceae
145. *Digitalis lanata* Ehrh.; TH, Balc-Pan, U 1,5 T 4 R 4,5
146. *Linaria vulgaris* Miller; H (TH), Eua, U 2 T 3 R 4
147. *Verbascum phlomoides* L.; TH, Eur, U 2,5 T 3,5 R 4

Solanaceae
148. *Solanum dulcamara* L.; Ch (N), Eua (Med), U 4,5 T 3 R 4

Sparganiaceae
149. *Sparganium erectum* L.; HH, Eua, U 5,5 T 3,5 R 0

Trapaceae
150. *Trapa natans* L.; HH, Eua (Med), U 6 T 4 R 4

Typhaceae
151. *Typha latifolia* L; HH, Cosm, U 6 T 3,5 R 0

Urticaceae
152. *Urtica dioica* L.; H-G, Cosm, U 3 T 3 R 4

Verbenaceae
153. *Verbena officinalis* L.; Th-H, Cosm, U 3 T 3 R 4

It is obvious from the flora synopsis that the classification of the species by botanic family is quite heterogeneous. The largest participation with species belong to the families *Asteraceae* (26 species), *Poaceae* (17 species), *Lamiaceae* (12 species), *Rosaceae* (9 species) and *Fabaceae* (8 species). The rest of the species belong to other botanic families.

The spectrum of the bio-forms (figure 1) evinces the increased presence of hemi-cryptophytes (H) – 40.39 % and of annual therophytes (Th) – 33.11 %, followed by helohydatophytes (HH) – 9.93 % and biannual therophytes (TH) – 5.96 %. The geophytes are present in proportion of 4.63%. Poorly represented are the chamephytes (Ch) – 1.98%, micro-phanerophytes (M) – 1.98, mega-phanerophytes (MM) – 1.32% and nano-phanerophytes (N) – 0.66%.

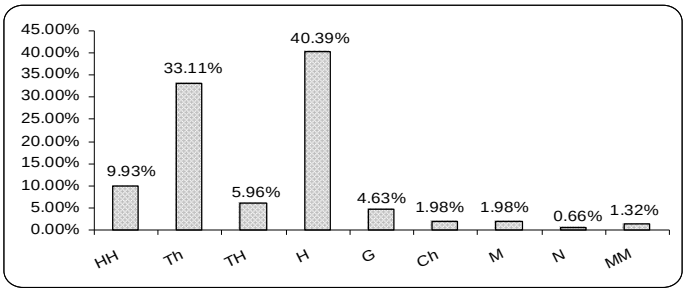

Figure 1. The bio – forms spectrum

From the analysis of the phytogeographic spectrum (figure 2) results the predominance of the Eurasian species (Eua) – 57.61% followed by the cosmopolitan ones (Cosm) – 19.20%. The other elements are represented as follows: European (Eur) – 5.96%, circumpolar (Circ) – 4.63%, adventive (Adv) – 3.97%, Mediterranean (Med) – 2.64%, Central European (Euc) – 2.64%, Pontic (Pont) – 1.32%. Insignificant (below 1%) is the presence of Dacian-Balkan-Pannonic (Dac-Balc-Pan) – 0.66%, Balkan-Pannonic (Balc-Pan) – 0.66 % and of the Atlantic-Mediterranean (Atl-Med) species – 0.66 %.

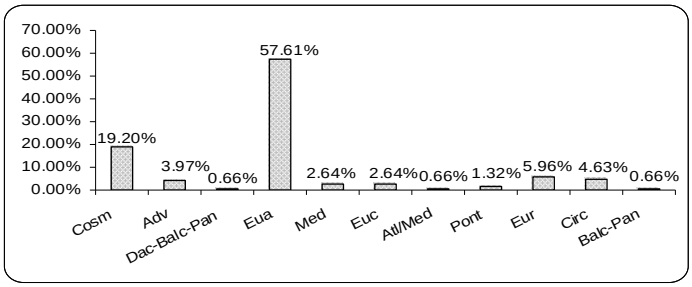

Figure 2. The phytogeographical spectrum

In relation to the humidity requirements (figure 3), there is the following participation: mesophytes (3) – 27,81 %, xero-mesophytes (2) – 27,15 %, meso-hydrophytes (4) – 23,84 %, hydrophytes (5) – 7,94 %, ultra-hydrophytes (6) – 5,20%, amphytolerant (0) – 4,63 %, xerophytes (1) – 3,31 %.

As to temperature (figure 4). meso-thermes (3) have the greatest participation – 60.92 %, followed by amphytolerant species (0) – 23.84 %. The presence of the moderately – thermophyllous species (4) – 11.25 % and of the microthermes (2) – 3.97 % results to be reduced.

From the spectrum for soil reaction (figure 5) results that the most numerous species are the amphytolerants (0) – 41.72 % and the poorly acidic-neutrophillous ones (4) – 39.73 %; these are followed by the acidic-neutrophillous (3) – 13.90 %, acidophillous (2) – 2.64 % and neutro-basiphillous (5) – 1.98 %.

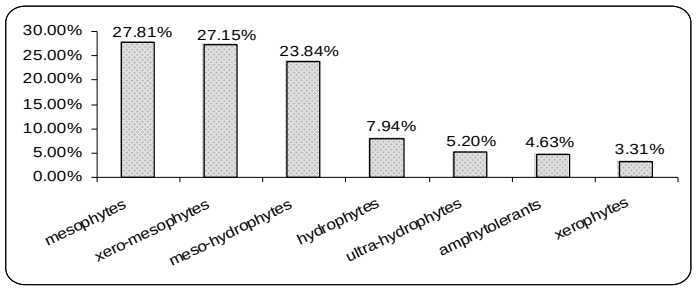

Figure 3. The humidity spectrum

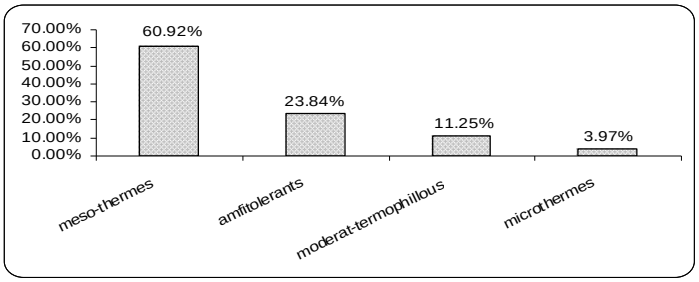

Figure 4. The temperature spectrum

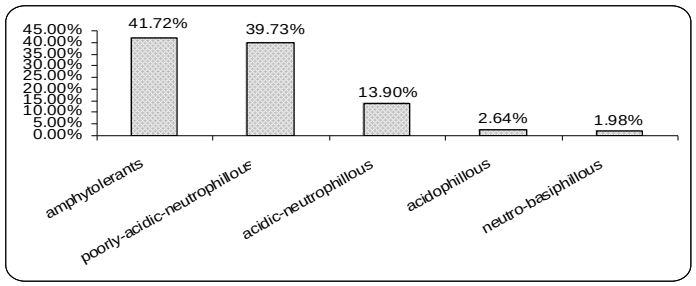

Figure 5. The soil reaction spectrum

CONCLUSIONS

1. The ecological conditions in the regions have favoured the settlement of a rich aquatic and paludicolous flora and of an important vegetation by consisting of an island for bird species.
2. The synopsis of the vascular flora around the Murani-Pischia natural reserve consists for the moment in 153 species belonging to 43 botanic families.
3. The classification in botanic families is heterogeneous, the greatest participation with species belongs to the families *Asteraceae* (26 species), *Poaceae* (17 species), *Lamiaceae* (12 species), *Rosaceae* (9 species) and *Fabaceae* (8 species).
4. Regarding the bio-forms, it is observed the predominance of hemi-cryptophytes – 40.39% and annual terophytes – 33.11%.

5. Phyto-geographically, the Eurasian species – 57.61% have the most considerable participation, followed by the cosmopolite ones – 19.20%.
6. In relation to the humidity requirements, the species are represented by mesophytes – 27.81%, xero-mesophytes – 27.15%, meso-hydrophytes – 23.84%, hydrophytes – 7.94%, ultra-hydrophytes – 5.20%.
7. As to the temperature, the greatest prevalence belongs to mesothermes – 60.92%, followed by amphytolerant species – 23.84%.
8. Regarding the soil reaction, the species are mostly amphytolerant – 41.72% or poorly acidic-neutrophillous – 39.73%.
9. We notice the presence of the species *Eriochloa villosa* (Thumb.) Kunth. a new weed for Banat and Romania.
10. It is necessary the continuous monitoring of flora from the studied area in order to complete the floristic inventory with species the apparition of which is related to the natural multi-annual dynamics as well as to anthropic influences.

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