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DATA UPON FOLIOSE AND FRUTICOSE LICHENS FROM VALEA NEAGRĂ (LANDSCAPE RESERVE "DEFILEUL DEDA – TOPLIȚA")

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Abstract: An number of 32 fruticose and foliose lichens were identified in Valea Neagră, 19 species being new for Deda – Toplița Landscape Reserve. Among those species *Cetrelia cetrarioides, Usnea filipendula, Physconia distorta, Ramalina fastigiata, R. thrausta, Peltigera collina,* are rare in Central Europe.

The lichen species were characterised using the ecological indexes (light, humidity, temperature and chemical reaction of the substrate) published by *Ellenberg* et al. (1992) and *Wirth* (1995) and the geographical elements.

Our paper completes the information on the lichen flora of the landscape reservation Deda – Toplița Gorges, currently a number of 57 foliaceous and fruticulous species having been identified, of which 11 being considered as rare taxa according to the species corology in Central Europe.

Keywords: macrolichens, lichenflora, ecology, Valea Neagră, Romania.

Introduction

Valea Neagra is located in a volcano-sedimentary area in the piedmont of the Călimani Mountains, Neagră Brook being a right-hand effluent of Mureşului Valley [2]. The area under study is part of the Deda-Toplița Gorges landscape reservation, in the neighbourhood of Neagra village, Lunca Bradului commune, Mureş County. Neagră Valley is 9 km in length, the altitude varying between 600 and 1100 m. The lower part of the valley is located in the hilly level, the upper one in the lower mountainous level [1, 8, 13]. The climate is specific for the piedmont and low mountain areas. The wooden vegetation of the area is mainly represented by leafy trees, beech and oak being dominant, while mixed forests and spruce fir forests are common in the upper part of the valley [10].

Material and Method

The analysis of the flora was carried out on the basis of foliose and fruticose lichen specimens collected and determined during the summer and autumn of 2005, according the professional literature [9, 11, 12, 14, 15, 16, 17, 18, 19].

The lichen flora was analysed in relation with the ecological preferences of the species toward light, temperature, humidity, and chemical reaction of the substrate [3, 4, 5, 6]. We have used the indicator values for the lichens according to Ellenberg [7].

Results and Discussion

We have identified 32 foliose and fruticose lichen species, 19 being new for the Defileul Deda – Toplița Landscape Reserve. Among those species *Cetrelia cetrarioides, Usnea filipendula, Physconia distorta, Ramalina fastigiata, R. thrausta, Peltigera collina,* are rare in Central Europe.

Regarding the preferences of the lichen species toward the substrate, the high majority (16) are corticolus, 5 are tericolous, 4 are lignicolous, 2 are tericolous – muscicolous, 2

saxicolous – corticolous, 1 saxicolous, 1 saxicolous - muscicolous and 1 muscicolous – tericolous - saxicolous.

For each species we have indicate the repartition in the studied area, the indicator values and the geographical elements (the shortcuts used for the geographical elements are corresponding to Wirth [7].

The underlined species are new for the Landscape Reserve Defileul Deda – Toplița.

EUMYCOTA
ASCOMYCOTINA
DISCOMYCETES
LECANORALES
CLADONIACEAE

1. ***Cladonia chlorophaea*** (Flörke ex Sommerf.) Spreng. – identified on the basis of spruce stumps, on both sides of Valea Neagra. Lignicolous, moderate photophilous, euryhygrous, eurythermic, acidophilous, arkt-med. L_7, U_0, T_0, R_3.
2. ***C. coniocraea*** (Flörke) Spreng. – found on rotten wood and at the basis of spruce trunks in Zespezel area. Lignicolous, photo - ombrophilous, mesophilous – mesohygrophilous, eurythermic, acidophilous – moderate acidophilous, bor-med. L_5, U_6, T_0, R_4.
3. ***C. fimbriata*** (L.) Fr. - identified on soil at the trunk basis of spruce and alder tree, on both sides of Valea Neagra. Tericolous, moderate photophilous, euryhygrous, micro – mesothermal, acidophilous – moderate acidophilous, (arkt) bor-med. L_7, U_0, T_5, R_4.
4. ***C. furcata*** (Huds.) Schrad.- founded on Valea Neagră on rocks, among mosses. Muscicolous – terricolous - saxicolous, photo-ombrophilous - moderate photophilous, euryhygrous, micro – mesothermal, acidophilous – moderate acidophilous, bor-med. L_6, U_0, T_5, R_4.
5. ***C. macilenta*** Hoffm.- on rotten spruce stumps on the right side of Valea Neagră, at aprox. 1 km of Neagra village. Lignicolous, moderate photophilous, euryhygrous, micro – mesothermal, strong acidophilous. s'bor-smed (med). L_7, U_0, T_5, R_2..
6. ***C. pyxidata*** (L.) Hoffm. – identified on soil at the basis of spruces and on decomposed trunks among mosses. Tericolous – muscicolous, moderate photophilous, euryhygrous, eurythermic, moderate acidophilous, arkt-med. L_7, U_0, T_5, R_5.
7. ***C. subulata*** (L.) Weber ex Wigg. – identified on Zespezel top, on soil at the basis of spruces trunks. Lignicolous, photophilous, euryhygrous, micro – mesothermal, acidophilous, bor-med. L_8, U_0, T_5, R_3.

PARMELIACEAE

8. ***Cetrelia cetrarioides*** (Del ex Duby) W. Culb. & C.C.Culb – frequent on the trunks of beeches, on both slopes, at the basis of the valley. Corticolous, photo-ombrophilous, mesophilous – mesohygrophilous, micro - mesothermal, moderate acidophilous, s'bor-subatl-med (subatl). L_5, U_6, T_4, R_5. Rare.
9. ***Evernia prunastri*** (L) Ach. – very frequent on the beeches trunks and branches on the right slope of Valea Neagră, also on spruces trunks near Pripor glade. Corticolous, moderate photophilous, micro - mesothermal, xero – mesophilous, acidophilous, bor-med. L_7, U_3, T_5, R_3.
10. ***Hypogymnia physodes*** (L) Nyl. – identified on beech trunks, in the lower part of the valley, also very frequent on spruces, in Pripor glade. Corticolous, moderate photophilous, xero - mesophilous, eurythermic, acidophilous, arkt-med. L_7, U_3, T_0, R_3.
11. ***M. exasperatula*** (Nyl.) Essl. - identified in Pripor glade on the rhytidoma of leafy trees. Corticolous, moderate photophilous, xero - mesophilous, micro - mesothermal, moderate acidophilous, bor-med. L_7, U_3, T_5, R_5.

12. ***Melanelia fuliginosa*** (Fr. ex Duby) Essl. in Egan – identified on spruce trunks on the right slope of the valley and also on the ridge of the mountain. Corticolous, photo-ombrophilous, xero - mesophilous – mesophilous, micro - mesothermal, acidophilous, bor-med. L_5, U_4, T_5, R_3.

13. ***M. subargentifera*** (Nyl.) Essl. - founded on the rhytidoma of leafy trees in Pripor glade and on the ridge of Zespezel. Corticolous, moderate photophilous, mesophilous, micro - mesothermal, subneutrophilous, s'bor-mieur (subko) -med. L_7, U_5, T_5, R_7.

14. ***Parmelia omphalodes*** (L.) Ach. - founded on rocks on the ridge of Zespezel. Saxicolous, moderate photophilous, mesohygrophilous, micro - mesothermal, acidophilous, arkt-smed-mo/alp. L_7, U_7, T_4, R_3.

15. ***P. saxatilis*** (L.) Ach. – identified on rocks Pripor on the ridge, among mosses, and on the rhytidoma of leafy trees in the mixed forest. Saxicolous - corticolous, photo-ombrophilous - moderate photophilous, mesophilous, microthermal, acidophilous, arkt-mieur-med-mo. L_6, U_5, T_4, R_3.

16. ***P. sulcata*** Taylor - frequently founded on the trunks and branches of oaks, and on the trunks of durmast oak, alder tree and beech in the mixed forest on the ridge. Corticolous, moderate photophilous, xero-mesophilous, eurithermal, moderate acidophilous, arkt-med. L_6, U_3, T_0, R_5.

17. ***Parmotrema chinense*** (Osbeck) Hale & Ahti – identified on alder tree trunks near Zespezel top. Corticolous, mesophilous, moderate photophilous, moderate thermophilous, moderate acidophilous, mieur-subatl-med (mo/subatl). L_7, U_5,T_7, R_5. Rare.

18. ***Pseudevernia furfuracea*** (L.) Zopf. – frequently found on oak trunks in the lower part of the valley, on beech trunks at the limit between the mixed and coniferous forest, and on the branches and trunks of spruces. Corticolous, photophilous, xero - mesophilous, micro thermal, extreme acidophilous, bor-med-mo. L_8, U_3, T_4, R_2.

19. ***Usnea filipendula*** Stirt. – on spruce trunks in the mixed forest. Corticolous, moderate photophilous, microthermal, mesophilous - mesohygrophilous, acidophilous, bor-med-mo**.** L_7, U_6, T_4, R_3. Rare.

PHYSCIACEAE

20. ***Physcia caesia*** (Hoffm.) Fürnr. - identified on poplar trunk in the mixed forest. Corticolous, photophilous, euryhygrous, eurythermic, neutrophilous, arkt-med. L_8, U_0, T_0, R_8.

21. ***P. stellaris*** (L.) Nyl - identified on oaks and oneseed hawtorn branches, nearby *Xanthoria parietina*. Corticolous, moderate photophilous, xero - mesophilous, micro - mesothermal, moderate acidophilous – subneutrophilous, bor-med (mo). L_7, U_3, T_5, R_6.

22. ***Physconia distorta*** **(**With.) J.R.Laundon - found on poplar rhytidoma in the mixed forest, near Zespezel. Corticolous, moderate photophilous, xero - mesophilous, micro - mesothermal, subneutrophilous, (s')bor-smed-med. L_7, U_3, T_5, R_7. Rare.

RAMALINACEAE

23. ***Ramalina fastigiata*** (Pers.) Ach.- identified on oak trunks on the left slope of the valley and in the mixed forest. Corticolous, moderate photophilous, mesophilous - mesohigrophilous, micro- mesothermal, moderate acidophilous - subneutrophilous, (s')bor-mieur-med. L_7, U_6, T_5, R_6. Rare.

24. ***R. pollinaria*** (Westr.) Ach.- on oak trunks and on rocks, near Cracul lui Ștefan. Corticolous – saxicolous, moderate photophilous, mesophilous, micro thermal, acidophilous - moderate acidophilous, bor-med. L_7, U_5, T_5, R_4.

25. ***R. thrausta*** **(**Ach.) Nyl. – mainly on spruce and fir, ocasionaly also on beech. Corticolous, photo-ombrophilous - moderate photophilous, mesophilous, micro - mesothermal, moderate acidophilous, bor-smed-h'mo. L_6, U_5, T_5, R_5. Rare.

PELTIGERALES
PELTIGERACEAE

26. ***Peltigera canina*** (L) Willd. – identified on soil, on both slopes of Valea Neagră, at aprox. 2 km of Neagra village. Tericolous, photo-ombrophilous, micro thermal, moderate acidophilous, bor-smed (med). L_6, U_5, T_5, R_6.

27. ***P. collina*** (Ach.) Schrad. – on rocks among mosses on the ridge, in shady place. Saxicolous - muscicolous, photo-ombrophilous - moderate photophilous, hygrophilous, microthermal, moderate acidophilous, bor-mieur(subatl) med-mo L_6, U_9, T_4, R_5. Rare.

28. ***P. didactyla*** (With.) J.R.Laundon – on soil at the basis of stumps, among mosses, at about 3,5 km of Neagra village. Tericolous - muscicolous, moderate photophilous, xero-mesophilous, eurythermic, moderate acidophilous, arkt-med. L_7, U_3, T_0, R_5**.**

29. ***P. polydactilon*** (Neck.) Hoffm. - on soil among mosses near Cracul lui Ştefan. Tericolous, photo-ombrophilous – moderate photophilous, mesophilous, micro - mesothermal, moderate acidophilous, arkt-mieur-med-mo. L_6, U_5, T_5, R_5.

30. ***P. praetextata*** (Florke ex Sommerf.) Zopf. – identified on bot slopes in the middle area of the valley, on soil among mosses, at the basis of stumps. Tericolous, photo-ombrophilous, mesophilous, micro - mesothermal, moderate acidophilous, bor-med. L_5, U_5, T_5, R_5.

31. ***P. rufescens*** (Weiss) Humb.– founded on soil in sunny place in Poiana Pripor. Tericolous, photophilous, xerophilous, eurithermal, neutrophilous, arkt-med. L_8, U_3, T_0, R_8.

TELEOSCHISTALES
TELEOSCHISTACEAE

32. ***Xanthoria parietina*** (L.) Th. Fr.- very frequent on branches of oak, oneseed hawtorn trunks and branches, along the valley and on leafy trees in the mixed forest. Corticolous, moderate photophilous, xero-mesophilous, micro-mesothermal, subneutrophilous, bor-med. L_7, U_3, T_5, R_7.

Table 1: The distribution of species in relation with the geographical elements in the two valleys

Geographical element	**Number of species**
Arkt-med	7
Arkt-smed-mo/alp	1
Arkt-mieur-med-mo	2
(Arkt) bor-med	1
Bor-med	9
Bor-med-mo	2
Bor-med-(mo)	1
Bor-mieur (subatl) med-mo	1
Bor-smed (med)	1
Bor-smed-h'mo	1
Mieur-subatl-med (mo/subatl)	1
S'bor-smed (med)	1
S'bor-subatl-med (subatl)	1
S'bor-mieur (subko) med	1
(S')bor-smed-med	1
(S')bor-mieur-med	1
TOTAL	**32**

***The shortcuts used for the geographical elements are coresponding to Wirth [17].**

The analysis of the lichen flora in relation with the preferences of the species toward light reveals the predominance of the moderate photophilous (52 %) followed by the photo-

ombrophilous – moderate photophilous species (22%), less represented being the photophilous and photo – ombrophilous species, with 13 % each.

The temperature figure indicate the dominance of the micro-mesothermal species (56%), with 22% are represented the eurythermic species, 19% being microthermal and 3 % moderat thermophilous.

The humidity regime indicates the predominance of xero-mesophilous (31%) and mesophilous (25%) species; 22% of the identified species are euryhygrous, 13% mesophilous – mesohygrophilous, the other categories being less represented (xero-mesophilous – mesophilous, mesohygrophilous and hygrophilous, with 3% each).

Regarding the chemical reaction of the substrate in Neagră Valley predominant are two categories of species - the moderate acidophilous (31%), followed by the acidophilous (25%). Less represented are: acidophilous – moderate acidophilous (12,5%), moderate acidophilous - subneutrophilous (9%), subneutrophilous (9%), strong acidophilous (6%) and neutrophilous (6%).

The analysis of the geographical elements spectra (Tab. 1) reveals that, as a result of the geographical position and altitude of the studied area, predominant are of two categories: boreal-mediterranean (28%) and arcto-mediterranean (22%), the other elements being less represented.

Conclusions

The floristic study on the foliaceous and fruticulous lichens from Valea Neagră (Deda – Toplița Gorges) resulted in an inventory comprising 32 species. Among them, 13 are common with those identified during the firsts investigations carried out in 2004 on the lichen flora in the Deda – Toplița Gorges Reservation, in Bistrei and Gălăoii valleys [6]. Of the 19 newly identified species, 6 are considered to be rare in Central Europe: *Cetrelia cetrarioides, Usnea filipendula, Physconia distorta, Ramalina fastigiata, R. thrausta,* and *Peltigera collina*.

The dominance of corticolous lichen species, located on the trunks and branches of the trees in the forest massifs is also reflected by the light preferences of the identified lichens, the moderate photophylous species being most prominent (51%).

When considering the behaviour towards humidity, the species can be assigned to four distinctive groups: 1) xero-mesophylous and xeromesophylous-mesophylous species mainly represented by corticolous lichens; 2) mesophylous species, a group consisting of terricolous and corticolous lichens living in partly shaded places where precipitation water drains without being accumulated; 3) euryhydrous species; 4) mesohygrophylous species collected from trees, soil and cliffs in the close proximity of Neagră Brook**.**

The location of the area under study in the upper part of the hilly level and in the lower mountainous level is also reflected by the temperature preference of the lichen species, most of them being micro-mesothermal (68%)**.**

The preference of lichens for the chemical type of substrate points to the dominance (84%) of species preferring substrates with various acidity levels, including lignicolous lichens collected from decayed wood installed on the oak, alder, beech, and spruce fir rhitidome, and the terricolous ones installed on humus-rich soils.

Our paper completes the information on the lichen flora of the landscape reservation Deda – Toplița Gorges, currently a number of 57 foliaceous and fruticulous species having been identified, of which 11 being considered as rare taxa according to the species corology in Central Europe.

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STUDIUL FLORISTIC ASUPRA LICHENILOR FOLIACEI ŞI FRUTICULOŞI DIN VALEA NEAGRĂ ("DEFILEUL DEDA – TOPLIŢA")

(Rezumat)

Studiul floristic asupra lichenilor foliacei şi fruticuloşi din Valea Neagră (Defileul Deda – Toplita) a dus la inventarierea unui număr de 32 de specii. Dintre acestea 13 sunt comune cu cele identificate cu ocazia primelor cercetări desfăşurate in 2004 asupra lichenoflorei din Rezervaţia Defileul Deda - Topliţa, în Valea Bistrei şi Valea Gălăoii. Dintre cele 19 specii noi identificate, 6 sunt considerate rare în Europa Centrală: *Cetrelia cetrarioides, Usnea filipendula, Physconia distorta, Ramalina fastigiata, R. thrausta, Peltigera collina*.

Din punct de vedere sistematic, lichenii identificaţi se încadrează în 3 ordine, 6 familii şi 19 genuri, cel mai bine reprezentate fiind genurile *Cladonia* (7 specii) şi *Peltigera* (6 specii). Pentru fiecare specie sunt redate valorile principalilor indici ecologici (L, U, T, R), după Ellenberg (1992) şi Wirth (1995), fiind realizată şi analiza comportamentului ecologic al speciilor identificate. Analiza preferinţelor lichenilor identificaţi faţă de lumină indica predominanţa speciilor moderat fotofile (51%). Comportamentul faţă de factorul umiditate grupează speciile în patru categorii: 1) xeromezofile (31%) şi xeromezofile-mezofile (3%) reprezentate de licheni corticoli; 2) mezofile (25%), licheni tericoli şi corticoli instalaţi în locuri unde apa de precipitaţii se scurge fără să stagneze; 3) mezofile – mezohigrofile (135) şi mezohigrofile (3%) sunt licheni aflaţi în stricta apropierea a pârâului; 4) eurihidre (22%). Situarea zonei studiate în etajul montan inferior determină predominanţa speciilor micromezoterme (68%). Preferinţele faţă de natura chimică a substratului indică dominanţa lichenilor care preferă diferite grade de aciditate (84%).

Lucrarea contribuie la mai buna cunoaştere a Rezervaţiei peisagistice Defileul Deda – Topliţa sub aspectul lichenoflorei, în prezent fiind inventariaţi din zonă un număr de 57 de licheni foliacei şi fruticuloşi, 11 dintre aceştia fiind consideraţi specii rare în Europa Centrală.

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