ECOLOGICAL CHARACTERIZATION OF THE SPONTANEOUS SPECIES OF FLORA WITHIN NATIONAL PARK CHEILE NEREI-BEUŞNIŢA

Loredana LINŢA, Oxana MANOLACHE, Mădălina BORCA

Banat`s University of Agricultural Sciences and Veterinary Medicine "King Michael I of Romania", Faculty of Agriculture, Timişoara, Romania
Calea Aradului 119, 300645 Timişoara, Romania,
E-mail: mada_iordache@yahoo.com

Abstract: *The study aimed the ecological characterization of the spontaneous species of flora within the National Park Cheile Nerei - Beuşniţa, in order to identify the life-form categories and the requirements of the plant species for several ecological factors: humidity, temperature, soil reaction. The working methodology consisted of: biological analyses in order to establish the life-form categories and ecological analyses to establish the requirements of plant species for humidity, temperature, and soil reaction. The following conclusions have been established through this study: considering the plant life-forms, the most numerous species were the hemicryptophites, the annual therophytes and the geophyites, and the least numerous species were the helohydatophytes and the nanophanerophytes; considering the requirements for the ecological factor humidity, the most numerous species were the xero-mesophiles and the mesophiles and the least numerous species were the hydrophiles; considering the requirements for the ecological factor temperature, the most numerous species were the mesothermals and the least numerous species were the cryothermals and the thermophiles; considering the requirements for the ecological factor soil reaction, the most numerous species were the low acido- neutrophiles, the euryionics, and the acido-neutrophiles, and the least numerous species were the strongly acidophiles.*

.

Key words**:** *National Park Cheile Nerei - Beuşniţa, life-form categories, humidity, temperature, soil reaction*

INTRODUCTION

The The National Park Cheile Nerei-Beuşniţa is located in south-west of Romania, in Caraş – Severin County, in the southern part of Anina Mountains. The administrative – territorial units of the park are: Anina, Bozovici, Lăpuşnicu Mare, Şopotul Nou, Cărbunari, Sasca Montană, Ciclova Română, Oraviţa.

The study aimed the ecological characterization of the spontaneous species of flora within this National Park, in order to identify the life-form categories and the requirements of the plant species for several ecological factors: humidity, temperature, soil reaction [MANOLACHE ET AL., 2015].

MATERIAL AND METHODS

The working methodology consisted of: biological analyses in order to establish the life-form categories and ecological analyses to establish the requirements of plant species for humidity, temperature, and soil reaction.

The life-forms represent the expression of the convergent evolution of different species, evolution which determines similar morphological, structural and physiological characteristics [SÂRBU ET AL., 2003]. In this study the plant life-forms have been established according to C. Raunkiaer [RAUNKIAER, 1934; IORDACHE AND BORZA, 2014], essentially based on the way how are protected during the unfavourable periods the regenerative structures of the plants, respectively the position of the regenerative organs. The establishment of plant requirements for the ecological factors humidity, temperature and soil reaction has been realised using the methodology of SANDA et al. (1983).

Within the National Park Cheile Nerei - Beuşniţa were identified 73 plant families (plan management) [6]: *Selaginellacea, Equisetaceae, Hypolepidaceae, Thelypteridaceae, Aspleniaceae, Athyriaceae, Aspidiaceae, Polypodiaceae, Taxaceae, Pinaceae, Betulaceae, Juglandaceae, Salicaceae, Moraceae, Fagaceae, Ulmaceae, Urticaceae, Loranthaceae, Polygonaceae, Chenopodiaceae, Caryophyllaceae, Euphorbiaceae, Ranunculaceae, Aristolochiaceae, Papaveraceae, Cruciferae, Cistaceae, Violaceae, Hypericaceae, Crassulaceae, Saxifragaceae, Rosaceae, Onagraceae, Tiliaceae, Linaceae, Oxalidaceae, Geraniaceae, Balsaminaceae, Anacardiaceae, Leguminoase, Aceraceae, Cornaceae, Araliaceae, Umbelliferae, Primulaceae, Cuscutaceae, Orobanchaceae, Boraginaceae, Solanaceaea, Scrophulariaceae, Labiatae, Plantaginaceaea, Gentinaceae, Apocynaceae, Oleaceae, Rubiaceae, Caprifoliaceae, Valerianaceae, Dipsacaceae, Campanulaceae, Compositae, Butomaceae, Potamogetonaceae, Typhaceae, Spargainaceae, Liliaceae, Amaryllidaceae, Iridaceae, Juncaceae, Cyperaceae, Araceae, Orchidaceae, Gramineae*.

RESULTS AND DISCUSSION

The identified plant species are represented through the following proportions of life forms (table 1):

Table 1

Classification of plant species within the National Park Cheile Nerei - Beuşniţa considering the life-form categories

Life-form category	Annual thero-phytes (Th)	Biannual thero-phytes (TH)	Helo-hydato-phytes (HH)	Hemi-crypto-phites (H)	Geo-phytes (G)	Chame-phytes (Ch)	Nano-phanero-phytes (N)	Mega-phanero-phytes (MM)	Mezo-phanero-phytes (M)
Amount (% of total)	16.83	4.39	1.95	43.66	14.63	4.63	2.20	5.12	6.59

Considering the requirements of plant species for the ecological factor humidity, the following statistics have been established (table 2):

Table 2

Classification of plant species within the National Park Cheile Nerei - Beuşniţa considering the requirements for the ecological factor humidity

Ecological indices: value and signification	Amount (% of total)
0 = euryhydrics	3,17
1 - 1,5 = xerophiles	9,02
2 - 2,5 = xero-mesophiles	37,31
3 - 3,5 = mesophiles	35,12
4 - 4,5 = mesohigrofiles	11,47
5 - 5,5 = hygrophiles	2,93
6 = hydrophiles	0,98

The requirements of plant species regarding the ecological factor humidity depending on life-form category are listed in table 3.

Table 3

The requirements of plant species from the National Park Cheile Nerei - Beuşniţa regarding the ecological factor humidity depending on life-form category

Value of the ecological parameter	Chame-phytes (Ch)	Geo-phytes (G)	Hemi-crypto-phites (H)	Helo-hydato-phytes (HH)	Mezo-phanero-phytes (M)	Mega-phanero-phytes (MM)	Nano-phanero-phytes (N)	Annual therophytes (Th)	Biannual therophytes (TH)
	%								
0 = euryhydrics	0.24	0.48	1.46	-	-	0.24	-	0.73	-
1 - 1,5 = xerophiles	0.24	1.46	4.14	-	0.73	0.48	-	1.70	0.24
2 - 2,5 = xeromesophiles	2.43	5.36	14.39	-	2.19	1.70	0.73	7.56	2.92

3 - 3,5 = mesophiles	0.97	5.85	16.58	-	1.70	3.17	1.46	4.87	0.48
4 - 4,5 = mesohigrofiles	0.73	0.97	5.85	0.48	0.24	0.48	-	1.95	0.73
5 - 5,5 = hygrophiles	-	0.48	1.21	0.48	0.24	0.48	-	-	-
6 = hydrophiles	-	-	-	0.97	-	-	-	-	-

Considering the requirements of plant species for the ecological factor temperature, the following statistics have been established (table 4):

Table 4

Classification of plant species within the National Park Cheile Nerei - Beuşniţa considering the requirements for the ecological factor temperature

Ecological indices: value and signification	Amount (% of total)
0 = eurythermals	16,11
1 - 1,5 = cryothermals	0,24
2 - 2,5 = microthermals	7,56
3 - 3,5 = mesothermals	57,07
4 - 4,5 = moderate thermophiles	18,29
5 - 5,5 = thermophiles	0,73

The requirements of plant species regarding the ecological factor temperature depending on life-form category are listed in table 5.

Table 5

The requirements of plant species from the National Park Cheile Nerei - Beuşniţa regarding the ecological factor temperature depending on life-form category

Value of the ecological parameter	Chame-phytes (Ch)	Geo-phytes (G)	Hemi-crypto-phites (H)	Helo-hydato-phytes (HH)	Mezo-phanero-phytes (M)	Mega-phanero-phytes (MM)	Nano-phanero-phytes (N)	Annual therophytes (Th)	Biannual therophytes (TH)
	%								
0 = eurythermals	0.24	1.46	10.00	0.24	-	0.24	-	3.41	0.48
1 - 1,5 = cryothermals	0.24	-	-	-	-	-	-	-	-
2 - 2,5 = microthermals	0.73	0.48	4.39	-	0.48	0.24	0.48	0.73	-
3 - 3,5 = mesothermals	2.43	9.26	22.19	1.46	4.14	4.63	1.70	8.29	2.92
4 - 4,5 = moderate thermophiles	0.97	3.41	6.58	0.24	0.48	1.46	-	4.14	0.97
5 - 5,5 = thermophiles	-	-	0.48	-	-	-	-	0.24	-

Considering the requirements of plant species for the ecological factor soil reaction, the following statistics have been established (table 6):

Table 6

Classification of plant species within the National Park Cheile Nerei - Beuşniţa considering the requirements for the ecological factor soil reaction

Ecological indices: value and signification	Amount (% of total)
0 = euryionics	30,24
1 - 1,5 = strongly acidophiles	0,73
2 - 2,5 = acidophiles	3,66
3 - 3,5 = acido-neutrophiles	20,73
4 - 4,5 = low acido- neutrophiles	40,74
5 - 5,5 = neutral- alkaliphiles	3,90

The requirements of plant species regarding the ecological factor soil reaction depending on life-form category are listed in table 7.

Table 7

The requirements of plant species from the National Park Cheile Nerei - Beuşniţa regarding the ecological factor soil reaction depending on life-form category

Value of the ecological parameter	Chame-phytes (Ch)	Geo-phytes (G)	Hemi-crypto-phites (H)	Helo-hydato-phytes (HH)	Mezo-phanero-phytes (M)	Mega-phanero-phytes (MM)	Nano-phanero-phytes (N)	Annual therophytes (Th)	Biannual therophytes (TH)
	%								
0 = euryionic	0.97	3.65	13.90	0.97	0.24	0.97	0.24	7.31	1.95
1 - 1,5 = strongly acidophiles	0.24	0.24	-	0.24	-	-	-	-	-
2 - 2,5 = acidophiles	0.48	0.48	1.70	-	-	0.24	0.24	0.48	-
3 - 3,5 = acido-neutrophiles	1.21	1.70	8.29	0.24	1.95	2.68	1.46	2.92	0.24
4 - 4,5 = low acido-neutrophiles	1.46	7.80	17.80	0.48	2.43	2.43	-	6.09	2.19
5 - 5,5 = neutral-alkaliphiles	0.24	0.73	1.95	-	0.48	0.24	0.24	-	-

CONCLUSIONS

The following conclusions have been established through this study:

- Considering the *plant life-forms*, the *most numerous* species were: the hemicryptophites (43,66% species of total); the annual therophytes (16,83% of total); the geophyites (14,63% of total).
- Considering the *plant life-forms*, the *least numerous* species were: the helohydatophytes (1,95% of total); the nanophanerophytes (2,20% of total).
- Considering the requirements for the ecological factor *humidity*, the *most numerous* species were: the xero-mesophiles (37,31% of total); the mesophiles (35,12% of total).
- Considering the requirements for the ecological factor *humidity*, the *least numerous* species were the hydrophiles (0,98 % of total).
- Considering the requirements for the ecological factor *temperature*, the *most numerous* species were the mesothermals (57,07% of total).
- Considering the requirements for the ecological factor *temperature*, the *least numerous* species were: the cryothermals (0,24% of total); the thermophiles (0,73% of total).
- Considering the requirements for the ecological factor *soil reaction*, the *most numerous* species were: the low acido- neutrophiles (40,74% of total); the euryionics (30,24% of total); the acido-neutrophiles (20,73% of total).
- Considering the requirements for the ecological factor *soil reaction*, the *least numerous* species were: the strongly acidophiles (0,73% of total).

BIBLIOGRAFY

1. IORDACHE MĂDĂLINA, BORZA I. (2014): *Ecologie generală*. Editura Eurobit, Timişoara, ISBN 978-973-132-154-7;
2. MANOLACHE OXANA, LINŢA LOREDANA, BORCA MĂDĂLINA (2015): *Characterization of several protected grassland habitats within National Park Semenic-Cheile Carasului through ecological analyses of flora*, Research Journal of Agricultural Research, vol. 47.
3. RAUNKIAER C. (1934): *The life forms of plants and statistical plant geography*, being the collected papers of C. Raunkiaer, translated by H. Gilbert-Carter and A.G. Tansley. Oxford: Clarendon Press;

4. SÂRBU ANCA, SMARANDACHE DANIELA, PASCALE GABRIELA (2003): *Îndrumător de practică botanică: Munţii Bucegi-Baiului*. Editura Universităţii din Bucureşti (disponibil şi la http://ebooks.unibuc.ro/ biologie/asarbufinal/2.htm);
5. SANDA V., POPESCU A., DOLTU M.I., DONIŢĂ N. (1983): *Caracterizarea ecologică şi fitocenologică a speciilor spontane din flora României.* Studii şi comunicări, 25, Muzeul Brukenthal, Sibiu, p. 126;
6. *******Planul de management al Parcului Cheile Nerei - Beuşniţa, Reşiţa, România, 2004 (The management plan of the National Park Cheile Nerei - Beuşniţa, Reşiţa, Romania, 2004).