CHARACTERIZATION OF SEVERAL PROTECTED GRASSLAND HABITATS WITHIN NATIONAL PARK SEMENIC-CHEILE CARAŞULUI THROUGH ECOLOGICAL ANALYSES OF FLORA

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Abstract: *The study aimed the ecological characterization of the spontaneous species of flora from two protected habitats of the National Park Semenic - Cheile Carasului: rupicolous pannonic grasslands (Stipo – Festucetalia pallentis) and lowland hay meadows (Alopecurus pratensis, Sanguisorba officinalis), 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 life-form categories, the study showed that in the rupicolous pannonic grasslands (Stipo – Festucetalia pallentis) the most numerous species were the hemicryptophites, and the least were the therophytes . The hemicryptophites were the most abundant in the lowland hay meadows (Alopecurus pratensis, Sanguisorba officinalis), but in these type of protected area the therophytes are lacking and the chamephytes and the geophytes are low represented. In both types of protected area, the rest of life-forms are absent. Regarding the requirements for the ecological factors humidity, temperature, and soil reaction, the following observations were achieved: in the rupicolous pannonic grasslands (Stipo – Festucetalia pallentis) the most numerous species were the xerophiles and the xero-mesophiles, the mesothermals and the moderate thermophiles and the low acido-neutrophiles; in the lowland hay meadows (Alopecurus pratensis, Sanguisorba officinalis) the most numerous species were the mesophiles, the eurythermals and the euryionics.*

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Key words**:** *National Park Semenic - Cheile Carasului, protected, habitats, grassland, meadow, life-form categories, humidity, temperature, soil reaction*

INTRODUCTION

The natural ecosystems from the researched park comprise terrestrial, aquatic and underground areas, in natural and semi-natural state, which differ by geographical, abiotic and biotic features. Due to the great variety of the relief and because the climate is temperate continental with strong Mediterranean influences, in this national park there is an important number of natural terrestrial habitats of grasslands and shrubs, of woods, rockery and caves and fresh waters [DONIȚĂ ET AL., 2005].

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 requirements of plants for the

ecological factors humidity, temperature and soil reaction has been realised using the methodology of Sanda et al. (1983) [SANDA ET AL., 1983; LINȚA ET AL., 2015].

Within the National Park Semenic - Cheile Carasului **t**he study has been carried out in the following types of grasslands, protected within the network Nature 2000: Rupicolous pannonic grasslands *(Stipo – Festucetalia pallentis)* (code Nature 2000 – 6190); Lowland hay meadows *(Alopecurus pratensis, Sanguisorba officinalis)* (code Nature 2000 – 6510).

RESULTS AND DISCUSSION

In the two types of protected habitats, there have been identified the following plant species (tables 1-7).

Table 1

The spontaneous plant species identified within the rupicolous pannonic grasslands *(Stipo – Festucetalia pallentis)* [7]

Plant species	Life-form category	Requirements for the ecological factors (value of the ecological parameter)		
		Humidity	Temperature	Soil reaction
Festuca pallens	Hemicryptophite	1,5	4	4,5
Stipa pulcherrima	Hemicryptophite	1	4	5
Melica ciliata	Hemicryptophite	1,5	4,0	4
Vincetoxicum hirundinaria	Hemicryptophite	2	4	4
Linum tenuifolium	Hemicryptophite	2	4	5
Artemisia campestris	Chamephyte	2	3,5	3
Jurinea mollis	Hemicryptophite	1	4,5	4
Erysimum odoratum	Hemicryptophite	2,5	3	4
Galium album	Hemicryptophite	2,5	2,5	3
Genista januensis var. *spathulata*	Chamephyte	2	4	4
Teucrium montanum	Chamephyte	1	4	5
Acinos arvensis	Chamephyte	1,5	3,5	4
Teucrium chamaedrys	Chamephyte	2	3,4	4
Cruciata glabra	Hemicryptophite	3	2	2
Cystopteris fragilis	Hemicryptophite	3,5	0	0
Asplenium ruta-muraria	Hemicryptophite	1,5	3	5
Asplenium septentrionale	Hemicryptophite	1	3	2
Asplenium trichomanes	Hemicryptophite	3	0	4
Moehringia muscosa	Hemicryptophite	4	2	4
Sedum hispanicum	Annual therophyte	1	3,5	4
Thymus comosus	Chamephyte	2	3,5	4,5
Phleum montanum	Hemicryptophite	1,5	4,5	4
Stipa joannis	Hemicryptophite	1,5	4	4
Seseli gracile	Hemicryptophite	2	4	4,5
Ferula sadleriana	Hemicryptophite	2,5	4	4
Helianthemum nummularium	Chamephyte	2	3	4
Cardaminopsis arenosa	Biannual therophyte	2,5	3	4
Stachys recta	Hemicryptophite	2	4	4,5
Veronica austriaca ssp. jacquinii	Hemicryptophite	1,5	4	4,5
Peucedanum oreoselinum	Hemicryptophite	2,5	3	0
Poa pannonica ssp. scabra	Hemicryptophite	1	3	4
Festuca rupicola	Hemicryptophite	1,5	4	4

Table 2

The spontaneous plant species identified within the lowland hay meadows *(Alopecurus pratensis, Sanguisorba officinalis)* [7]

Plant species	Life-form category	Requirements for the ecological factors (value of the ecological parameter)		
		Humidity	Temperature	Soil reaction
Poa pratensis	Hemicryptophite	3	0	0
Festuca pratensis	Hemicryptophite	3,5	0	0
Dactylis glomerata	Hemicryptophite	3	0	4
Agropyron repens	Hemicryptophite	2	4	4,5

Agrostis stolonifera	Hemicryptophite	4	0	0
Alopecurus pratensis	Hemicryptophite	4	3	0
Juncus effusus	Hemicryptophite	4,5	3	3
Trifolium pratense	Hemicryptophite	3	0	0
Lotus corniculatus	Hemicryptophite	2,5	0	0
Trifolium repens	Hemicryptophite	3,5	0	0
Ranunculus repens	Hemicryptophite	4	0	0
Ranunculus acris	Hemicryptophite	3,5	0	0
Carex hirta	Geophyte	0	3	0
Lysimachia nummularia	Chamephyte	4	3	0
Potentilla reptans	Hemicryptophite	3,5	0	4
Galium palustre	Hemicryptophite	5	3	0
Poa palustris	Hemicryptophite	5	3	4
Holcus lanatus	Hemicryptophite	3,5	3	0
Agrostis capillaris	Hemicryptophite	0	0	0
Briza media	Hemicryptophite	0	3	0
Taraxacum officinale	Hemicryptophite	3	0	0
Leucanthemum vulgare	Hemicryptophite	3	0	0
Stellaria graminea	Hemicryptophite	2,5	2	3

Table 3

Percentage distribution of plant species found in the rupicolous pannonic grasslands *(Stipo – Festucetalia pallentis)* considering the life-form categories

Life-form category	Number of identified species	Amount (% of total)
Chamephytes (Ch)	6	18,75
Hemicryptophites (H)	23	71,87
Annual therophytes (Th)	2	6,25
Biannual therophytes (TH)	1	3,12

Table 4

Classification of plant species found in the lowland hay meadows *(Alopecurus pratensis, Sanguisorba officinalis)* considering the life-form categories

Life-form category	Number of identified species	Amount (% of total)
Chamephytes (Ch)	1	4,34
Geophytes (G)	1	4,34
Hemicryptophites (H)	21	91,30

Table 5

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

Ecological indices: value and signification	Number of species	
	Rupicolous pannonic grasslands *(Stipo – Festucetalia pallentis)*	Lowland hay meadows *(Alopecurus pratensis, Sanguisorba officinalis)*
0 = euryhydrics	0	3
1 - 1,5 = xerophiles	14	0
2 - 2,5 = xero-mesophiles	14	3
3 - 3,5 = mesophiles	3	10
4 - 4,5 = mesohigrofiles	1	5
5 - 5,5 = hygrophiles	0	2
6 = hydrophiles	0	0

Table 6

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

Ecological indices: value and signification	Number of species	
	Rupicolous pannonic grasslands *(Stipo – Festucetalia pallentis)*	Lowland hay meadows *(Alopecurus pratensis, Sanguisorba officinalis)*
0 = eurythermals	2	13
1 - 1,5 = cryothermals	0	0
2 - 2,5 = microthermals	3	1
3 - 3,5 = mesothermals	12	8
4 - 4,5 = moderate thermophiles	15	1
5 - 5,5 = thermophiles	0	0

Table 7

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

Ecological indices: value and signification	Number of species	
	Rupicolous pannonic grasslands *(Stipo – Festucetalia pallentis)*	Lowland hay meadows *(Alopecurus pratensis, Sanguisorba officinalis)*
0 = euryionics	2	17
1 - 1,5 = strongly acidophiles	0	0
2 - 2,5 = acidophiles	2	0
3 - 3,5 = acido-neutrophiles	2	2
4 - 4,5 = low acido- neutrophiles	22	4
5 - 5,5 = neutral- alkaliphiles	4	0

CONCLUSIONS

Considering the life-form categories, the study showed that in the rupicolous pannonic grasslands *(Stipo – Festucetalia pallentis)* the most numerous species were the hemicryptophites, and the least were the therophytes.

Also, the hemicryptophites were the most abundant in the lowland hay meadows *(Alopecurus pratensis, Sanguisorba officinalis),* but in these type of protected area the therophytes are lacking and the chamephytes and the geophytes are low represented.

In both types of protected area, the rest of life-forms are absent.

Regarding the requirements for the ecological factors humidity, temperature, and soil reaction, the following observations were achieved:

- in the rupicolous pannonic grasslands *(Stipo – Festucetalia pallentis)* the most numerous species were the xerophiles and the xero-mesophiles, the mesothermals and the moderate thermophiles and the low acido- neutrophiles;

- in the lowland hay meadows *(Alopecurus pratensis, Sanguisorba officinalis)* the most numerous species were the mesophiles, the eurythermals and the euryionics.

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