

SPECIES INVENTORY OF PROTECTED AREAS FROM SUATU

Vârban Rodica*, Stoie Andrei*

* University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Faculty of Agriculture,
3-5 Manastur St., 400372, Cluj-Napoca, Romania, e-mail: andreisbio@yahoo.de

Abstract

In this paper we propose to emphasize certain botanical aspects of the Suatu area Nature Reserve: the inventory of the species and the analysis of the main ecological indicators (humidity, temperature, and soil reaction), the bioforms and the geographical elements of the identified species.

Key words: the inventory, ecological indicators, bioforms, Suatu.

INTRODUCTION

The Suatu Nature Reserve is situated 26 km southeast of the city of Cluj-Napoca. It is one of the most beautiful and complex vegetation islands preserved in the Transylvanian Plain and covers an area of 14 ha. The protected area aims to help maintain and conserve a mixture of endemic elements: Pontic Mediterranean, Ponto-Mediterranean tertiary and postglacial relicts. The purpose of creating this reserve was primarily to protect the endemic species present: *Astragalus peterfii* and *Salvia transsilvanica*. These two species are only present in the Suatu Reserve.

Alongside these two unique species, there have been reported other valuable species of plants: *Ephedra distachya*, *Nepeta ucrainica*, *Cephalaria uralensis*, plus relict rare or very rare species at the areal borders: *Allium ammophilum* (Pannonian endemic element) *Serratula radiata* (continental-Pontic element), *Iris humilis* (glacial relict, rare flora).

The Suatu Reserves includes, in a small area, a relatively large number of cormophyte species. Up-to date inventories contain about 175 species. Phytogeographical origin is much differentiated, the main feature being given through the preponderance of thermophilic and endemic elements.

Through field observations and discussions with local people the absence of any service or maintenance activities for a long period of years has not been observed within these reserves.

Objectives: In this paper we propose to emphasize certain botanical aspects present in the natural conservation area in Suatu: the species inventory and the analysis of the main ecological indicators (humidity, temperature and soil reaction), the bioforms and the geographical elements of the identified species.

MATERIAL AND METHOD

Species inventory was done in May and June 2013, according to the flowering time. Some species were identified in field or in laboratory studies, using the identification manual (Ciocârlan V., 2000). The species were analyzed according to major ecological indices (U, T, R), bioforms and geographical features (floral elements) or using the necessary literature (Sanda V. et al., 2003; Kovács J. A., 1997).

RESULTS AND DISCUSSION

In the following, there are present the list of species found in the two Suatu area natural reserves.

Table 1

Species inventory in Suatu 1 Reserve

No	Scientific name	Family	T	U	R	bioforms	Floristic elements
1.	<i>Achillea collina</i>	Asteraceae	3	3,5	3,5	H	Euc
2.	<i>Adonis vernalis</i>	Ranunculaceae	3	1,5	3,5	H	Eua (Cont)
3.	<i>Agrimonia eupatoria</i>	Rosaceae	3	2	4	H	Eua
4.	<i>Agropyron repens</i>	Poaceae	0	2,5	0	G	Circ
5.	<i>Ajuga chamaepitys</i>	Lamiaceae	3,5	2	2,5	Th	Med.
6.	<i>Ajuga laxmannii</i>	Lamiaceae	3,5	1	3,5	H	Pont-Pan - Balc
7.	<i>Anthericum ramosum</i>	Liliaceae	4	2,5	4	H	Euc (Med)
8.	<i>Allium ammophilum</i>	Alliaceae	4	1,5	4,5	G	Pont-Dac-Balc
9.	<i>Allium sphaerocephalon</i>	Alliaceae	3,5	1,5	4	G	Euc
10.	<i>Artemisia campestris</i>	Asteraceae	3	1,5	2,5	Ch	Eua (Cont)
11.	<i>Asparagus officinalis</i>	Liliaceae	3	1,5	2	G	Eua (Med)
12.	<i>Asperula cynanchica</i>	Rubiaceae	3,5	1,5	4	H	Pont
13.	<i>Asperula glauca</i>	Rubiaceae	3,5	1,5	4	H	Pont
14.	<i>Aster linosyris</i>	Asteraceae	3,5	1,5	4	H	Eua (Cont)
15.	<i>Astragalus austriacus</i>	Fabaceae	3	1	3,5	H	Eua-Alp
16.	<i>Astragalus monspessulanus</i>	Fabaceae	3,5	1	3,5	H	Pont-Med
17.	<i>Astragalus peterfii</i>	Fabaceae	3,5	1	4	H	End
18.	<i>Botriochloa ischaemum</i>	Poaceae	3,5	1,5	0	H	Eua
19.	<i>Brachypodium pinnatum</i>	Poaceae	2,5	2	3,5	H(Ch)	Eua (Med)
20.	<i>Brassica elongate</i>	Brassicaceae	3,5	1	3,5	TH-H	Eua (Cont)
21.	<i>Briza media</i>	Poaceae	0	0	0	H	Eua
22.	<i>Bromus inermis</i>	Poaceae	0	2	4	H	Eua (Cont)
23.	<i>Calamintha acinos</i>	Lamiaceae	3	1	3,5	Th-TH	Eua (Med)
24.	<i>Campanula sibirica</i>	Campanulaceae	3,5	2	3,5	H	Eua (Cont)
25.	<i>Carex humilis</i>	Cyperaceae	2,5	1,5	4	H	Eua (Cont)

26.	<i>Centaurea micranthos</i>	Asteraceae	3	1,5	3,5	H-TH	Eur (Cont)
27.	<i>Cephalaria radiata</i>	Dipsacaceae	3,5	1,5	3,5	H	Dac-End rara
28.	<i>Cleistogenes serotina</i>	Poaceae	3,5	1,5	3,5	G	Euc (Med)
29.	<i>Crataegus monogyna</i>	Rosaceae	2,5	2	4	M	Eur
30.	<i>Dactylis glomerata</i>	Poaceae	0	2,5	0	H	Eua (Med)
31.	<i>Dorycnium herbaceum</i>	Fabaceae	3,5	1,5	4,5	Ch	Eua (Med)
32.	<i>Eryngium campestre</i>	Apiaceae	3,5	1,5	4	H	Pont (Med)
33.	<i>Euphorbia cyparissias</i>	Euphorbiaceae	0	1,5	0	H(G)	Eua
34.	<i>Euphorbia sequieriana</i>	Euphorbiaceae	3	1	3,5	H	Eua
35.	<i>Euphorbia virgata</i>	Euphorbiaceae	2,5	2	3,5	H	Eua (Cont)
36.	<i>Falcaria sioides</i>	Apiaceae	3,5	1,5	4,5	Th-TH	Eua (Med)
37.	<i>Festuca rupicola</i>	Poaceae	3,5	1,5	4	H	Eua (Cont)
38.	<i>Filipendula hexapetala</i>	Rosaceae	3,5	2	0	H	Eua
39.	<i>Fragaria viridis</i>	Rosaceae	2,5	1,5	4	H	Eur (Cont)
40.	<i>Galium verum</i>	Rubiaceae	2,5	2	3,5	H	Eua
41.	<i>Hypericum perforatum</i>	Hypericaceae	0	2	0	H	Eua
42.	<i>Inula ensifolia</i>	Asteraceae	3	1	3,5	H	Pont-Pan
43.	<i>Inula hirta</i>	Asteraceae	3	1,5	4	H	Eua (Cont)
44.	<i>Iris aphilla</i>	Iridaceae	4	2	4	G	Cont (Eur)
45.	<i>Iris humilis</i>	Iridaceae	2,5	1,5	3,5	G	Pont. rara
46.	<i>Jurinea mollis</i> ssp. <i>transylvanica</i>	Asteraceae	3	1,5	3,5	H	Pont. rara
47.	<i>Koeleria macrantha</i>	Poaceae	3	1,5	3,5	H	Circ.
48.	<i>Leontodon asper</i>	Asteraceae	3,5	1,5	3,5	H	Carp-Cauc.
49.	<i>Linum austriacum</i>	Linaceae	3	1	3,5	H	Eua (Cont)
50.	<i>Linum flavum</i>	Linaceae	3,5	1,5	3,5	H	Pont-Pan- Balc
51.	<i>Linum perenne</i>	Linaceae	3	0	3,5	H	Eua (Cont)
	<i>Linum tenuifolium</i>	Linaceae	3,5	1,5	4,5	H	Pont-Pan- Balc
52.	<i>Medicago falcata</i>	Fabaceae	2,5	1,5	4,5	H	Eua
53.	<i>Muscari comosum</i>	Liliaceae	3,5	1,5	0	G	Eur
54.	<i>Melica ciliata</i>	Poaceae	3,5	1	3,5	H	Euc-Balc
55.	<i>Nepeta ucranica</i>	Lamiaceae	3,5	1	4	H	Pont-Pan
56.	<i>Nonnea pulla</i>	Boraginaceae	3	1,5	4	TH-H	Eua
57.	<i>Onobrychis viciifolia</i>	Fabaceae	3,5	1,5	3,5	H	Eua
58.	<i>Ornithogalum umbellatum</i>	Liliaceae	3	0	3,5	G	Med-Euc
59.	<i>Oxytropis pillosa</i>	Fabaceae	3,5	0	3,5	H	Eua (Cont)
60.	<i>Plantago lanceolata</i>	Plantaginaceae	0	0	0	H	Eua
61.	<i>Plantago media</i>	Plantaginaceae	3,5	0	2	H	Eua
62.	<i>Potentilla cinerea</i>	Rosaceae	3	1	4	H	Eur (Cont)
63.	<i>Prunella vulgaris</i>	Lamiaceae	0	0	2	H	Cosm.
64.	<i>Prunus spinosa</i>	Rosaceae	2,5	0	0	M	Eua (Med)

65.	<i>Salvia austriaca</i>	Lamiaceae	3	1,5	3,5	H	Pont-Pan
66.	<i>Salvia nemorosa</i>	Lamiaceae	3	1,5	3,5	H	Euc.
67.	<i>Salvia nutans</i>	Lamiaceae	3,5	0	4,5	H	Pont-Pan
68.	<i>Salvia transsilvanica</i>	Lamiaceae	3	1	3,5	H	Dac-End rara
69.	<i>Salvia verticillata</i>	Lamiaceae	3	1	3,5	H	Eua (Med)
70.	<i>Scorzonera austriaca</i>	Asteraceae	3,5	1,5	4	H	Eua (Med)
71.	<i>Serratula radiata</i>	Asteraceae	3	1,5	4	H	Pont-Pan
72.	<i>Stachys recta</i>	Lamiaceae	3	1,5	4	H	Pont-Med
73.	<i>Stipa capillata</i>	Poaceae	3,5	1	4	H	Eua (Cont)
74.	<i>Stipa ioannis</i>	Poaceae	4	0	4	H	Eua (Cont)
75.	<i>Stipa lessingiana</i>	Poaceae	4	0	4	H	Pont
76.	<i>Stipa pulcherima</i>	Poaceae	4	0	4	H	Eua (Med)
77.	<i>Teucrium chamaedris</i>	Lamiaceae	3	1	4	H	Euc-Med
78.	<i>Teucrium montanum</i>	Lamiaceae	3,5	0	4,5	H	Euc-Med
79.	<i>Thalictrum minus</i>	Ranunculaceae	2,5	0	0	H	Eua
80.	<i>Thesium linophyllum</i>	Santalaceae	3	1,5	4	G-H	Euc
81.	<i>Thymus marschalianus</i>	Lamiaceae	0	2	2,5	Ch	Eua (Cont)
82.	<i>Tragopogon dubius</i>	Asteraceae	3	2	0	TH	Euc-Med
83.	<i>Verbascum phoeniceum</i>	Scrophulariaceae	3,5	1,5	3,5	H	Eua (Cont)
84.	<i>Veronica prostrata</i>	Scrophulariaceae	0	2	3,5	Ch	Eua (Cont)
85.	<i>Veronica spicata</i>	Scrophulariaceae	0	2	-	H	Eua
86.	<i>Vinca herbacea</i>	Apocynaceae	3,5	2	0	Ch	Pont.
87.	<i>Viola hirta</i>	Violaceae	2,5	1,5	4	H	Eua

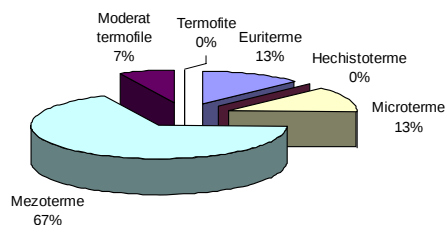


Fig. 1. Temperature indices in the Suatu 1 Reserve

According to the analysis of temperature indices from the Suatu 1 reserve, there is a clear dominance of mesothermal species (67%). Microtherm and amphytolerant species represented with 13% and 7% are moderately thermophilic.

Within the ecological structure xerophyte species dominate (62%), followed by xero-mezophyte species (20%) and amphi-tolerant species (16%).

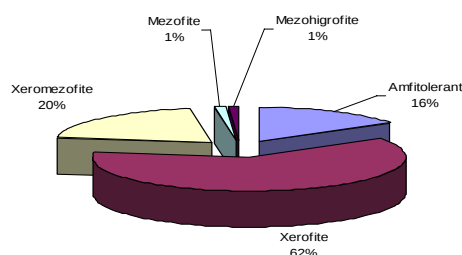


Fig. 2. Reserve Suatu 1 moisture indices

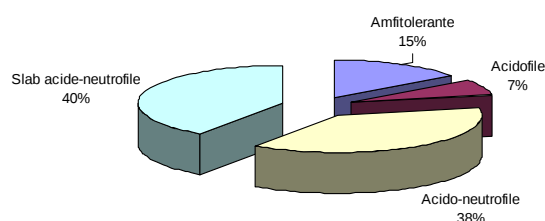


Fig. 3. Indications of soil reaction in Suatu 1 reserve

Regarding soil reaction, the highest rates were recorded in weak acid species, neutrophils (40%) and acid-neutrophils (38%) and amphytolerant species (15%).

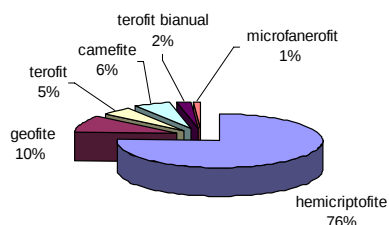


Fig. 4. Bioforms in Suatu 1 Reserve

The bioform analysis shows that 76% of species are hemicryptophytes and 10% geophytes. Chamaephytes and Therophytes species record 6% respectively 5%. Also are present a limited number of microfanerophyte species (1%).

Analyzing the floristic spectrum, the Eurasian element is predominant represented by a percentage of 58% of all species identified Pontic elements 16%, Central-European elements 12% and the Pontic-Pannonian while European and Balkan elements represent 5%. In the Suatu 1 reserve there have been identified three cases of Dacian endemism (*Cephalaria radiata*,

Allium ammophilum and *Salvia transsilvanica*), and as well as the endemic *Astragalus peterfii* species. This is present on clay soils, especially in the southwestern part of the reservation. There is a presence of two circumpolar species (*Koeleria macrantha* and *Agropyron repens*).

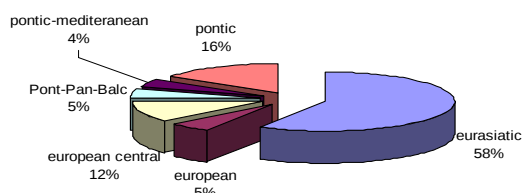


Fig. 5. Floristic elements in Suatu 1 Reserve

On the terraces, underneath the reserve, two shrub species were identified *Rosa canina* and *Prunus spinosa*, as well as the species *Anthericum ramosum*, *Salvia verticillata* and *Stipa pumilla*.

In Suatu 2 Reserve, called by locals " *La Țigle* " (*At the Tiles*), there have been identified many of the species previously listed in the first reserve, climatic and soil conditions in the two reserves being similar. On the pastures at the reserve foothills many species characteristic of the mesophilic grassland present on the colline level are found.

Table 2

Species inventory in Suatu 2 Reserve

No	Scientific name	Botanical family	T	U	R	bioforms	Floristic elements
1.	<i>Agrimonia eupatoria</i>	Rosaceae	3	2	4	H	Eua
2.	<i>Astragalus dasyanthus</i>	Fabaceae	4	3	3.5	H	Pont-Pan
3.	<i>Brassica elongata</i>	Brassicaceae	3.5	1	3.5	TH-H	Eua (Cont)
4.	<i>Briza media</i>	Poaceae	0	0	0	H	Eua
5.	<i>Campanula sibirica</i>	Campanulaceae	3.5	2	3.5	H	Eua (Cont)
6.	<i>Centaurea micranthos</i>	Asteraceae	3	1.5	3.5	H-TH	Eur (Cont)
7.	<i>Cephalaria uralensis</i>	Dipsacaceae	3.5	1	4	H	Pont-Pan
8.	<i>Coronilla varia</i>	Fabaceae	3	2	4	H	Euc (Med)
9.	<i>Crataegus monogyna</i>	Rosaceae	3.5	2.5	3	M	Eua
10.	<i>Dactylis glomerata</i>	Poaceae	0	2.5	0	H	Eua (Med)
11.	<i>Diploxys muralis</i>	Brassicaceae	4	2	4	Th-TH	Med.
12.	<i>Dorycnium herbaceum</i>	Fabaceae	3.5	1.5	4.5	Ch	Eua (Med)
13.	<i>Ephedra distachya</i>	Ephedraceae	4	1.5	4	N	Eua (Cont)
14.	<i>Echium vulgare</i>	Boraginaceae	3	2	4	Th	Pont-Pan
15.	<i>Erigeron annuus</i>	Asteraceae	0	4	4	Th-TH	Adv.
16.	<i>Eryngium campestre</i>	Apiaceae	3.5	1.5	4	H	Pont (Med)
17.	<i>Equisetum arvense</i>	Equisetaceae	3	3	0	G	Cosm.
18.	<i>Festuca rupicola</i>	Poaceae	3.5	1.5	4	H	Eua (Cont)
19.	<i>Filipendula hexapetala</i>	Rosaceae	3.5	2	0	H	Eua

20.	<i>Galium album</i>	Rubiaceae	2.5	2.5	3	H	Eur
21.	<i>Hypericum perforatum</i>	Hypericaceae	0	2	0	H	Eua
22.	<i>Inula ensifolia</i>	Asteraceae	4	3	1	H	Pont-Pan
23.	<i>Inula germanica</i>	Asteraceae	3	1.5	3.5	H	Pont-Pan
24.	<i>Inula hirta</i>	Asteraceae	3	3	1.5	H	Eua (Cont)
25.	<i>Jurinea mollis</i> ssp. <i>transylvanica</i>	Asteraceae	3	1.5	3.5	H	Pont. rara
26.	<i>Leontodon asper</i>	Asteraceae	3.5	1.5	3.5	H	Carp-Cauc.
27.	<i>Leucanthemum vulgare</i>	Asteraceae	0	3	0	H	Eua
28.	<i>Linum catharticum</i>	Asteraceae	0	0	0	Th (H)	Eur (Med)
29.	<i>Linum flavum</i>	Linaceae	3.5	1.5	3.5	H	Pont-Pan-Balc
30.	<i>Linum perenne</i>	Linaceae	3.5	0	3.5	H	Eua (Cont)
31.	<i>Linum tenuifolium</i>	Linaceae	3.5	3	4.5	H	Pont-Pan-Balc
32.	<i>Lotus corniculatus</i>	Fabaceae	0	2.5	0	H	Eua
33.	<i>Onobrychis viciifolia</i>	Fabaceae	3.5	1.5	3.5	H	Eua
34.	<i>Onosma pseudoarenarium</i>	Boraginaceae	4	1.5	4	H	Eur (Cont)
35.	<i>Oxytropis pilosa</i>	Fabaceae	3.5	0.5	3.5	H	Eua (Cont)
36.	<i>Ononis hircina</i>	Fabaceae	4	3	0	Ch-H	Eua (Cont)
37.	<i>Medicago lupulina</i>	Fabaceae	2.5	3	4	Th -H	Eua
38.	<i>Plantago lanceolata</i>	Plantaginaceae	0	3	0	H	Eua
39.	<i>Plantago media</i>	Plantaginaceae	3.5	0	2	H	Eua
40.	<i>Prunus spinosa</i>	Rosaceae	2.5	0	0	M	Eua (Med)
41.	<i>Ranunculus acris</i>	Ranunculaceae	0	3.5	0	H	Eua (Med)
42.	<i>Rhinanthus glaber</i>		0	0	0	Th	Eua
43.	<i>Rosa canina</i>	Rosaceae	3	2	3	N	Eur
44.	<i>Salvia transsylvanica</i>	Lamiaceae	3	1	3.5	H	Dac-End rara
45.	<i>Scorzonera austriaca</i>	Asteraceae	3.5	1.5	4	H	Eua (Med)
46.	<i>Serratula radiata</i>	Asteraceae	3	1.5	4	H	Pont-Pan
47.	<i>Senecio doria</i> var. <i>biebersteinii</i>	Asteraceae	2.5	3	0	H	Eua (Cont)
48.	<i>Stachys recta</i>	Lamiaceae	3	1.5	4	H	Pont-Med
49.	<i>Stipa lessingiana</i>	Poaceae	4	0.5	4	H	Pont-Med
50.	<i>Stipa pulcherrima</i>	Poaceae	4	0.5	4	H	Eua (Med)
51.	<i>Tymus glabrescens</i>	lamiaceae	4	2	0	Ch	Pont-Med
52.	<i>Teucrium montanum</i>	Lamiaceae	3.5	0.5	4.5	Ch	Euc-Med
53.	<i>Teucrium chamaedris</i>	Lamiaceae	3	1	4	H	Euc-Med
54.	<i>Thymus marschalianus</i>	Lamiaceae	0	2	2.5	Ch	Eua (Cont)

In the Suatu 2 reserve mesothermal species predominate (56%), followed by eurythermal species (20%) and moderately thermophile species (17%). A small percentage of microthermal species is also present (7%).

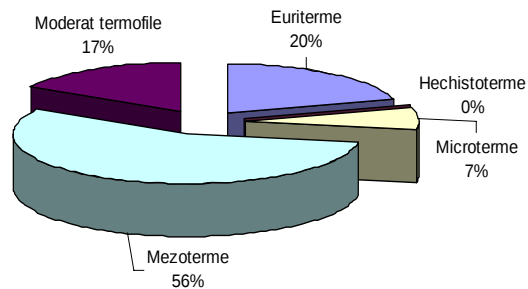


Fig. 6. Temperature indices in Suatu 2 Reserve

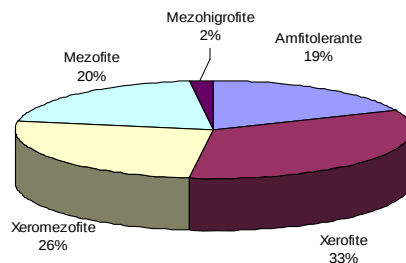


Fig. 7. Reserve moisture indices Suatu 2

Xerophyte and xeromezophyte species predominate in the Suatu 2 reserve with 33% respectively 26 %, a number of mesophilic species are also present (20%).

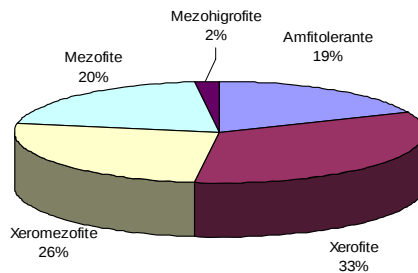


Fig. 8. Soil reaction to Reserve Suatu 2

The soil reaction analysis presents the following data: 36% of the species are weak acid-neutrophils, and 28% are acid-neutrophil and amphytolerant. Very acidophilic and acidophilic species present a very small percentage (4%).

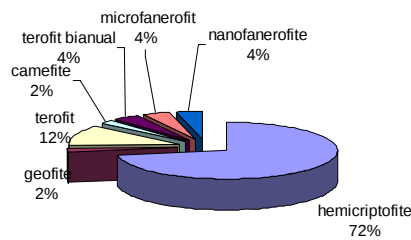


Fig. 9. Bioforms Suatu 2 reserve

According to biomorph analysis hemicryptophytes and pterophytes species are predominant (72%) respectively (12%). Nano and microfanerophytes species are also present (4%).

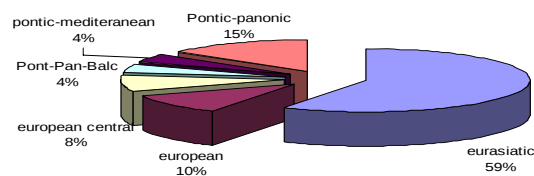


Fig. 10. Floristic elements in Suatu 2 reserve

The phytogeographical spectrum in Suatu 2reserve is as follows: 59% Eurasian elements, Pontic-Pannonian 15%, European 10%, 8% Central European, Ponto-Pannonian-Balkan and Mediterranean Pontic elements 4%. The large number of Pontic and Pontic Mediterranean elements indicates xerophyte vegetation. Dacian element is present through the *Salvia transsilvanica* species (endemic), the carpatho-caucasian element is present through the species *Leontodon asper*, and the Mediterranean species *Diploaxis muralis*.

CONCLUSIONS

- On a small area species from different geographical areas are present together.

- In both reserves the Eurasian element is dominant, represented by the species: *Agrimonia eupatoria*, *Artemisia campestris*, *Bromus erectus*, *Briza media*, *Campanula sibirica*, *Brassica elongata*, *Leucanthemum vulgare*, *Falcaria sioides*, *Festuca rupicola*, *Galium verum*, *Leontodon asper*, *Nonea pulla*, *Medicago falcata*, *Senecio doria var. bieberstienii* etc.

- Temperature spectrum reflects the European Central macroclimatic conditions present in the two reserves, through the dominance of mesothermal species. However one can notice the presence of moderately

thermophilic species favored by a more gentle climate characteristic of the Transylvanian Plateau and the south-facing slopes of the Suatu 1 reserve.

- The large number of xerophyte and xeromezophyte species is favored by the continentally influenced macroclimate and the southerly incline of the slopes. Another important factor is represented by the south-facing slopes, especially for reserve Suatu 1.

- The species index analysis regarding soil reaction clearly shows that for both reserves neutrophile conditions with slight acidification tendencies are the norm. One can notice the total absence of any basic reaction indicators.

- The large number of hemicryptophytes species, in contrast to the small number of annual therophyte species indicates the presence of stable grasslands and favorable environmental conditions as well as sufficient rainfall and a low human impact. Geophytes may be favored by the short spring growing season, often followed by periods of summer drought, indicating the influence of continental climate. Camephytes are fairly well represented even though this is an area without heavy snows. Fanerophytes are represented by a small number of species, nevertheless favorable development conditions are present, and consequently there is a danger of expansion and triggering phenomenon of species succession, especially in the case of grasslands underutilization through grazing or mowing. This danger is all the more obvious since in the Suatu 1 Reserve extensive *Prunus spinosa* populations are present on unused land.

- The study of geoelements does not highlight the suitability for endemic species, given the large number of species with large areas (Eurasian, European, and Central European), however the presence of Pontic Pannonian, Balkan, Mediterranean species is rare for studied the geographic region.

REFERENCES

1. Ciocârlan V., 2000, Flora ilustrată a României, Ed. Ceres, București
2. Cristea V., Denaeyer S., Herremans J.P., Goia I., 1996, Ocrotirea naturii și protecția mediului în România, Ed. Cluj University Press, Cluj-Napoca
3. Kovacs J.A., 1979, Indicatorii biologici, ecologici și economici ai florei păștilor, Redacția de propagandă tehnică agricolă
4. Resmeriță I., 1971, Rezervația botanică de la Suatu, Ocrotirea Naturii, București, 15(2):129-138. 5.
5. Sanda V., Biță D.C., Barabaș N., 2004, Flora cormofitelor spontane și cultivate din România, Ed. "Ion Borcea", Bacău
6. Vârban Rodica, Păcurar F., 2011, Dicționar de botanică, praterologie și agroecologie, Ed. Academic Press Cluj-Napoca
7. * * *, 2001, Rezervațiile de la Suatu, Agenția de Protecție a Mediului Cluj