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TAXONOMY AND VARIABILITY OF SOME PLANT SPECIES IN THE ROMANIAN FLORA

V. CIOCĂRLAN*

Summary: the author has analyzed the variability at 3 (three) plant species, namely: *Silene supina* Bieb., *Alkanna tinctoria* Tausch, *Himantoglossum hircinum* (L.) Spreng. After this analyze, there are two new subspecies, depicted here for the first time: *Silene supina* Bieb. subsp. *longicarpa* Ciocărlan subsp. nova și *Alkanna tinctoria* Tausch subsp. *petrosa* Ciocărlan subsp. nova. As concerning *Himantoglossum*, there is a mention that in the flora of Romania is growing *H. hircinum* subsp. *caprinum* (Bieb.) Sunderm., and not *H. hircinum* subsp. *hircinum*. In this paper, is showed that a synonymization of the species *S. supina* Bieb. with *S. spergulifolia* (Willd.) Bieb. is an error ! The same is the situation of the synonymy between *Himantoglossum hircinum* (L.) Spreng. și *H. caprinum* (Bieb.) Sunderm.

Key words: variability - *Silene supina* - *Alkanna tinctoria* - *Himantoglossum hircinum* – Romania.

The infraspecifically variability at the vascular plant species in the Romanian flora, has been relied, in a large measure, on the leaf features, i. e. just on that organ which is the most plastic one, as well as the most variable one. The fruit's features, as well as the seed's features, are more constantly, having a larger sistematic value, but they have been less used. It has been described a very large number of varieties and forms of plant species. In the lately *Floras*, often, the infraspecifically variability is stopped at the level of subspecies and, rarely, at varieties.

In this paper, it has been analyzed the variability at 3 (three) plant species, namely: *Silene supina* Bieb., *Alkanna tinctoria* Tausch, and *Himantoglossum hircinum* (L.) Spreng.. The results are the next ones:

1. *Silene supina* Bieb.

This species has been described, more or less unitary in all the *Floras*; only the calyx is depicted, within great differences, thus:

- Schischkin (Flora of U. R. S. S., 1936): the calyx has a longer of 14-20 mm;
- Klovov (Flora of Ukraine, 1952): the calyx has a longer of 17-24 mm;
- Chater & Walters (Flora Europaea, 1964): the calyx has a longer of 17-20 mm;
- Chater, Walters & Akeroyd (Flora Europaea, 1993): the calyx has a longer of 11-20 mm;
- Jordanov & Panov (Flora of Bulgaria, 1966): the calyx has a longer of 12,5-14,5 mm.

In all the references sources, the capsule is more or less equally in length, having a pubescent carpophore.

Our samples has been collected from Dealul Pietros – Agighiol, Tulcea county; the calyx is of 17-23 mm in length, the capsule is of 8-10 mm in length, equally in length with the carpophore, which is of 7-12 mm in length; it means that all of these data are alike with those ones from the reference material.

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In change, the samples from the Flora Romaniae Exsiccata, No. 1933, collected from Muntele Iacob-Deal, Tulcea county, has smaller flowers, with the calyx of 18 mm in length, and the capsule is twice as longer as the carpophore. The same type of samples exist also on Muntele Suluc, Tulcea county (Herb. Univ. București).

At a careful and comparatively investigation over the two samples, there are other differences, which led us to describe a new plant subspecies. Here are the differences of those 2 (two) plant subspecies:

1.a. *Silene supina* Bieb. subsp. *supina*

The capsule is of 8-10 mm in length, and 3 mm in wide, equally to the carpophore in length, and equally to the calyx. The capsule is opened through 6 (six) teeth.

1.b. *Silene supina* Bieb. subsp. *longicarpa* Ciocârlan subsp. nova

The capsule is of 10-12 mm in length, and 4 mm in wide, twice as longer as the carpophore, which is of 5-6 mm in length. The capsule is exerted from the calyx with 2-4 mm in length, is opened by 3 (three) teeth, which, rarely is splitting down.

Habitat: The Mountains of Pricopan, Tulcea county; the altitude is ca. 350 m. s. l.

(*Capsula 10-12 mm longa et 4 mm lata, dupla longior quam carpophorum 5-6 mm longum. Capsula exserta calycis 2-4 mm. Dehiscencia capsulae tridentibus; dentes rarior bifidis*).

Habitat: Montes Pricopan, districtus Tulcea, alt. cca. 350 m s.m.

Affinities: *Silene supina* Bieb. subsp. *longicarpa* is closed to *S. cretacea* Fisch. from Ukraine, but it has the stem glabrous in the upper part, the calyx is hairy only on the nerves, and the carpophore is glabrous.

Comment: *Silene supina* Bieb. has been synonymized with *S. spergulifolia* (Willd.) Bieb. (in Chater, Walters & Akeroyd, 1933); this synonymization has been taken over in the romanian reference material. But, we think this synonymization is an error !. Schischkin (1936), Coode & Cullen (1966), show that the two taxa are separated, the main difference is at the level of calyx (5-12 mm, cf. Schischkin, 1936), towards 11 mm (cf. Coode & Cullen, 1966) for *S. spergulifolia*, while *S. supina* has the calyx of 17-24 mm in length. The smaller lengths of the calyx, 12.5-14.5 mm at *S. supina* (Jordanov & Panov, 1966), is possible to refer to *S. supina* subsp. *pruinosa* (Boiss.) Chowdh.

2. *Alkanna tinctoria* Tausch is present in the Romanian flora on psammosoils, being cited from the South of Moldavia, accordingly older data (Grițescu I., 1960), from where this species seems to be extinct nowadays (Răvăruț M., 1949), and from the South and South-West of Oltenia, where the populations of *A. tinctoria* are in regress. We have identified this plant species in Dobrudja (Ciocârlan, 1970), on stony substratum, partly grassed. This new population is different from the one from the sands of Oltenia; this led us to describe a new plant subspecies. Here are the difference features of the two plant subspecies:

2.a. *Alkanna tinctoria* Tausch subsp. *tinctoria* (Fig. No 1A)

Plants having dense bristles, which give them a white-grey-greenish colour. The stem is branched out from the base of it, with branches more or less spreading on the ground. The form of the fruit, as well as the adornment, are characteristic. The surface of the pericarp is strong reticulate-tuberculated.

Habitat: on sands

2.b. *Alkanna tinctoria* Tausch subsp. *petrosa* Ciocârlan subsp. nova (Fig. No. 1B)

Plant greenish, having rare bristles. The stem is slightly branched, ascendent-upright. The form of the fruit, as well as the adornment, are characteristic. The surface of the pericarp is reticulate-tuberculated, with dense and slender tubercles.

Habitat: on rocks, in Constanța county, at: Valea Șipote, near the village of Șipote.
? Endemit.

The holotype is conserved in Herb. Univ. Șt. Agron. București (BUAG).

Planta subviridis, cum setis raris. Caulis ascendens-erectus. Forma fructus et ornatio pericarpi specifica. Superficies pericarpi reticulato-tuberculatus cum tuberculis coniformis, densis, gracilibus.

Habitat: in saxosis, districtus Constanța, Vallis Șipote, prope Pagum Șipote. Alt. cca. 100 m s.m. ? Endemit.

Holotipus in Herb. Univ. Șt. Agron. (BUAG) conservatur.

3. *Himantoglossum hircinum* (L.) Spreng.

In the Flora of Romania (Pauă, 1972), this plant species has in synonymy *H. caprinum* (Bieb.) Spreng. (accurate is *H. caprinum*), not having an infraspecific variability. Sundermann H. (1973) has published the variability of *H. hircinum* in Europe, with 3 (three) subspecies. All of those data have been taken over in the European reference material (Flora Europaea, Moore, 1980). Analyzing the herbarium samples, led me to the conclusion that, in the Romanian flora, is growing *H. hircinum* subsp. *caprinum* (Bieb.) Sunderm., not *H. hircinum* subsp. *hircinum*. Thus, the synonymization in the Flora of Romania is an error !.

Between those two plant subspecies are only few morphologic features which are different; at these features we must add the spreading area of them.

3.a. *H. hircinum* (L.) Spreng. subsp. *hircinum*

This subspecies has ellipsoidal tubercles, inflorescence with 15-80 flowers, the side-lobes of the labellum are of 5-10 mm in length, and the median lobe is slightly notched or bidentate; the spur is conical, of ca. 4 mm in length.

Central and South-West Europe.

3.b. *H. hircinum* (L.) Spreng. subsp. *caprinum* (Bieb.) Sunderm.

This subspecies has ovoid-globulose tubercles, inflorescence with 10-24 (-40) flowers, the side-lobes of the labellum are of 8-16 mm in length, and the median lobe is divided into two linear lobes of 12-25 mm in length.

South-East Europe.

The 3rd subspecies, *H. hircinum* subsp. *calcaratum* (G. Beck) Soó has the side-lobes of the labellum of 12-20 mm in length and the spur is of 7-12 mm in length.

The description in the "Flora of Romania", as well as the iconography, are more alike of *H. hircinum* subsp. *caprinum*.

We make a mention, that all the three plant species presented here are registered in the so-called "red lists". *Silene supina* is a rare plant species, and the other two are endangered.

Conclusions

1. It is described a new subspecies, *Silene supina* Bieb. subsp. *longicarpa* Ciocârlan; it is showed that the synonymization of the species *S. supina* with *S. spergulifolia* (Willd.) Bieb. is an error; also, there is added a new locality for *S. supina*, namely Dealul Pietros-Agighiol, Tulcea county;
2. It is described a new subspecies, *Alkanna tinctoria* Tausch subsp. *petrosa* Ciocârlan, from Dobrogea, on rocky substratum;

3. It is showed that the synonymization of the species *Himantoglossum hircinum* with *H. caprinum* is an error (Pauă, 1972); more, in the Romanian flora is growing *H. hircinum* subsp. *caprinum*, and not *H. hircinum* subsp. *hircinum*.

References

1. CHATER A. & WALTERS S., 1964 – Genul *Silene* în Flora Europaea 1, Cambridge.
2. CHATER A., WALTERS S. & AKEROYD J., 1993 – Genul *Silene* în Flora Europaea 1, Cambridge.
3. CIOCĂRLAN V., 1970 – Stud. și cerc. Biol., seria Botanică T 22(5): 371-381.
4. COODE M. & CULLEN J., 1966 – Genul *Silene* în Flora Turciei II, Edinburgh.
5. GRINȚESCU I., 1960 – Genul *Alkana* în Flora R.P. Române VII, București.
6. GUȘULEAC M., 1953 – Genul *Silene* în Flora R.P. Române II, București.
7. JORDANOV D. & PANOV P., 1966 – Genul *Silene* în Flora Reipublicae Popularis Bulgaricae III, Sofia.
8. KLOKOV M., 1952 – Genul *Silene* în Flora Ucrainei IV, Kiev.
9. KOŽUHAROV S., 1972 – Genul *Alkana* în Flora Europaea 3, Cambridge.
10. MOORE D., 1980 – Genul *Himantoglossum* în Flora Europaea 5, Cambridge.
11. PAUCĂ A., 1972 – Genul *Himantoglossum* în Flora R.S. România XII, București.
12. RĂVĂRUȚI M., 1949 – Anal. Acad. R.P. Române. Seria A, Tom. II, Mem. 29, București.
13. SCHISCHKIN B., 1936 – Genul *Silene* în Flora URSS VII. Moskva-Leningrad.
14. SUNDERMANN H., 1973 – Acta Bot. Acad. Sci. Hung. 19: 367-374 (1973), Budapest.



Fig. 1A Fructul la *Alkanna tinctoria* subsp. *tinctoria* (orig.)

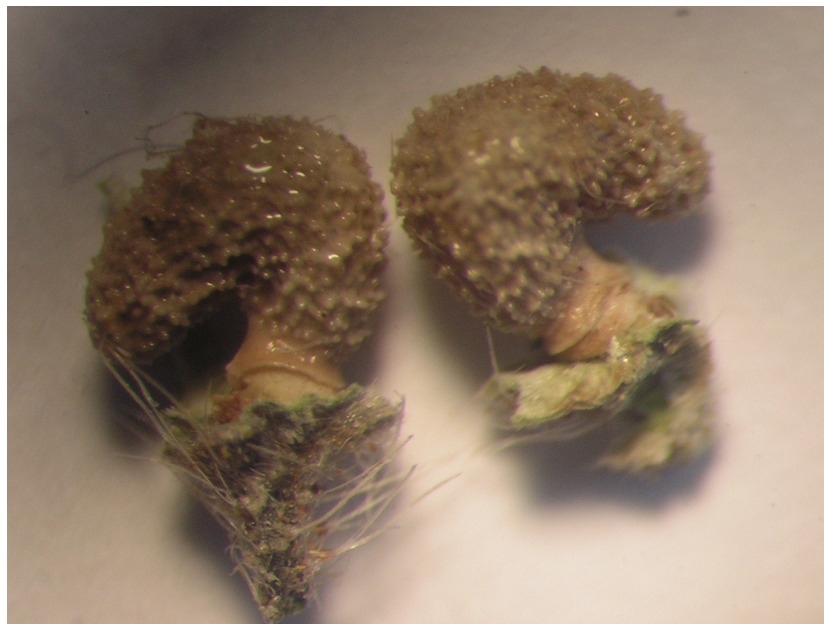


Fig. 1B Fructul la *Alkanna tinctoria* subsp. *petrosa* (orig.)

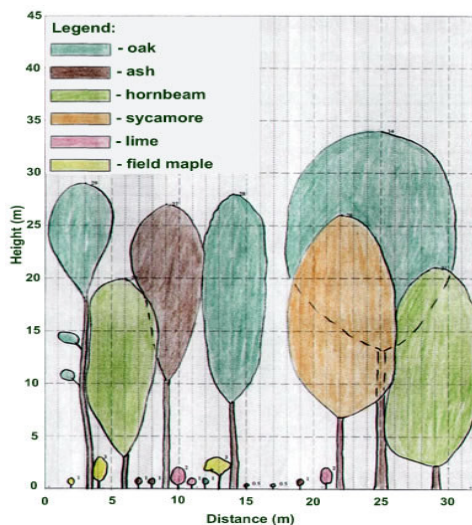
THE ASSOCIATION *FRAXINO ANGUSTIFOLIAE-QUERCETUM PEDUNCULIFLORAE* CHIFU ET AL. 1998, FROM THE RIVER SUCEAVA BASIN

C. V. TOMESCU, T. CHIFU*

Summary: As a result of the researches carried out in 2003 in the river Suceava basin (the forests in the area of Pătrăuți), we identified phytocoenoses of the association *Fraxino angustifoliae-Quercetum pedunculiflorae* Chifu et al. 1998. An analysis of their structure and composition made evident the trees relatively even-aged character and various composition, all the layers (arborescent, shrubs, herbaceous) being well represented. The spectre of the bioforms is numerically outshone by hemicryptophytes but dominated by the phanerophytes when it comes to the biomass. Phytogeographically, the European elements are definitely prevalent. The value of the overground phytomass of the trees (obtained after surveys on spot) highlight the dominance of the biomass of the stems, followed by that of the branches.

Key words: even-aged, abundance-dominance, phanerophytes, hemicryptophytes, Euroasian elements, overground phytomass.

Phytocoenoses of this association have been identified and described by T. Chifu et al. in the valley of the river Prut (8), the natural reservation of Medeleni and then in the plateau of Bârlad (9).



Graph. 1 Vertical profile

In 2003, as a result of the researches made in the river Suceava basin, we identified this association in the forest near Pătrăuți. The unity of relief is represented by the plateau of Suceava, having as subunity the plateau of Dragomirna, with an average attitude of 450 m.

The phytocoenoses of this association occupy flat plots of land, at an altitude of 350 m. The arborescent layer covers 80-90% of the surfaces and is made up of *Quercus pedunculiflora* și *Fraxinus angustifolia* (illustrative species), *Carpinus betulus*, *Fraxinus excelsior*, *Quercus robur*, *Tilia cordata*, *Acer pseudoplatanus*, *Ulmus glabra*, *Cerasus avium*, *Acer platanoides* and *Fagus sylvatica*. This layer is ranged in tiers according to the different species and ages of the crowns; thus there are

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dominant trees, codominant trees and dominated (subdominant trees) (graph. 1).

The layer of bushes and shrubs is not very well represented, covering 10% of the surface or less. When it is the case, the shrubs are represented by the following species: *Corylus avellana*, *Crataegus monogyna*, *Acer campestre*, *Evonymus europaeus*, *Ligustrum vulgare* și *Rubus hirtus*. The regenerative layer is not very well represented either, especially by plantlets or sapling of the main species.

The herbaceous layer covers from 50 % to 90 %, due to the degree of opening of the crowning (table I).

Table I
As. Fraxino angustifoliae-Quercetum pedunculiflorae Chifu et al. 1998

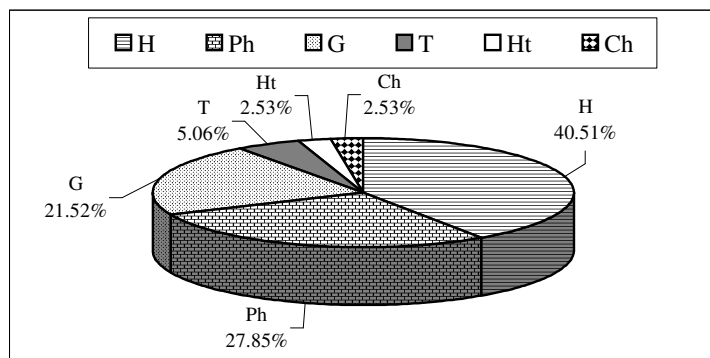
No. of survey	1	2	3	4	5	K
Altitude (m.s.m.)	350	350	350	350	350	
Exposition	-	-	-	-	-	
Angle of slope (degrees)	0	0	0	0	0	
Covering – the layer (%)	80	90	90	80	90	
Covering – shrubs + sapling (%)	10	10	0	0	0	
Covering – herbaceous layer (%)	60	70	30	90	90	
Surface (m ²)	1000	1000	1000	1000	1000	
No. of species	60	44	39	34	54	
Ass. charact.						
<i>Fraxinus angustifolia</i>	+	+	-	+	-	III
Alnion incanae						
<i>Aegopodium podagraria</i>	1	1	1	1	2	V
<i>Geranium phaeum</i>	+	+	+	+	+	V
<i>Stachys sylvatica</i>	1	1	+	+	+	V
<i>Circaea lutetiana</i>	+	+	+	+	+	V
<i>Ulmus minor</i>	+	+	+	-	+	IV
<i>Ulmus glabra</i>	+	-	-	-	+	II
<i>Urtica dioica</i>	+	+	-	+	-	III
<i>Viburnum opulus</i>	+	-	+	-	-	II
<i>Rumex sanguineus</i>	+	+	-	-	-	II
<i>Impatiens noli-tangere</i>	-	+	-	+	-	II
<i>Alliaria petiolata</i>	-	-	-	+	+	II
<i>Stellaria nemorum</i>	-	-	-	+	+	II
Galio schultesii-Carpinenion						
<i>Carpinus betulus</i>	1	1	1	1	1	V
<i>Tilia cordata</i>	+	+	-	-	+	III
<i>Stellaria holostea</i>	+	+	+	+	1	V
<i>Galium schultesii</i>	+	-	+	-	-	II
<i>Cerasus avium</i>	+	-	+	+	+	IV
<i>Carex pilosa</i>	+	-	-	-	+	II
<i>Dactylis polygama</i>	+	+	-	-	+	III
<i>Ranunculus cassubicus</i>	-	-	-	-	+	I
<i>Campanula trachelium</i>	+	-	-	-	-	I
Symphyto-Fagion						
<i>Lathyrus venetus</i>	+	+	+	-	+	IV
<i>Acer pseudoplatanus</i>	+	+	-	-	1	III
Fagetalia						
<i>Acer platanoides</i>	+	+	1	+	+	V
<i>Asarum europaeum</i>	1	1	1	-	1	IV
<i>Euphorbia amygdaloides</i>	+	+	+	-	+	IV
<i>Paris quadrifolia</i>	+	+	+	-	+	IV
<i>Galium odoratum</i>	1	-	+	-	1	III
<i>Fagus sylvatica</i>	+	-	+	-	-	II
<i>Rubus hirtus</i>	+	+	-	-	-	II

<i>Salvia glutinosa</i>	+	-	-	+	+	III
<i>Lamium galeobdolon</i>	+	-	+	-	+	III
<i>Milium effusum</i>	+	+	-	-	+	III
<i>Hordelymus europaeus</i>	+	-	-	-	+	II
<i>Mercurialis perennis</i>	+	-	+	1	2	IV
No. of survey	1	2	3	4	5	K
<i>Daphne mezereum</i>	-	-	-	-	+	I
<i>Lathyrus vernus</i>	+	+	-	-	-	II
<i>Carex sylvatica</i>	+	+	-	-	+	III
<i>Aposeris foetida</i>	-	+	-	-	+	II
<i>Anemone nemorosa</i>	-	-	-	-	+	I
<i>Dryopteris carthusiana</i>	+	-	-	-	-	I
<i>Maianthemum bifolium</i>	-	-	-	-	+	I
Quercus-Fagetea						
<i>Quercus robur</i>	2	2	1	2	2	V
<i>Corylus avellana</i>	2	+	-	-	-	II
<i>Crataegus monogyna</i>	+	+	+	+	+	V
<i>Fraxinus excelsior</i>	+	+	+	1	+	V
<i>Glechoma hirsuta</i>	+	1	1	1	1	V
<i>Dryopteris filix-mas</i>	+	+	+	+	+	V
<i>Dentaria bulbifera</i>	+	-	+	+	-	III
<i>Pulmonaria obscura</i>	1	1	+	-	1	IV
<i>Brachypodium sylvaticum</i>	+	-	-	-	-	I
<i>Athyrium felix-femina</i>	+	+	-	-	-	II
<i>Hepatica nobilis</i>	+	-	+	-	+	III
<i>Acer campestre</i>	+	+	+	+	+	V
<i>Evonymus europaeus</i>	+	+	+	-	+	IV
<i>Geum urbanum</i>	+	-	+	+	+	IV
<i>Polygonatum latifolium</i>	+	+	+	+	+	V
<i>Carex praecox</i>	+	+	-	-	-	II
<i>Pulmonaria officinalis</i>	+	+	-	-	+	III
<i>Ranunculus auricomus</i>	+	-	+	-	+	III
<i>Scrophularia nodosa</i>	+	-	-	-	-	I
<i>Fragaria vesca</i>	+	+	-	-	-	II
<i>Ajuga reptans</i>	+	+	-	+	+	IV
<i>Viola reichenbachiana</i>	-	-	+	-	+	II
<i>Neottia nidus-avis</i>	-	-	+	-	-	I
<i>Convallaria majalis</i>	-	-	-	+	-	I
<i>Geranium robertianum</i>	-	-	-	-	+	I
Quercetea pubescentis						
<i>Quercus pedunculiflora</i>	+	+	+	+	+	V
<i>Polygonatum odoratum</i>	+	-	+	+	-	III
<i>Viburnum lantana</i>	+	-	-	+	+	III
<i>Ligustrum vulgare</i>	-	+	-	-	+	II
<i>Prunus spinosa</i>	-	+	-	+	-	II
<i>Vinca minor</i>	-	+	-	+	-	II
<i>Arum orientale</i>	-	-	+	+	+	III
Companions						
<i>Galeopsis tetrahit</i>	+	+	-	-	-	II
<i>Galeopsis speciosa</i>	-	-	+	-	+	II
<i>Anthriscus sylvestris</i>	-	-	+	+	+	III
<i>Silene dioica</i>	-	-	-	+	-	I

Localization and date of surveys: 1 – Pătrăuți, near the natural reservation Quercetum (7.08.2003); 2-5 - Pătrăuți, near the natural reservation Quercetum (15.08.2003);

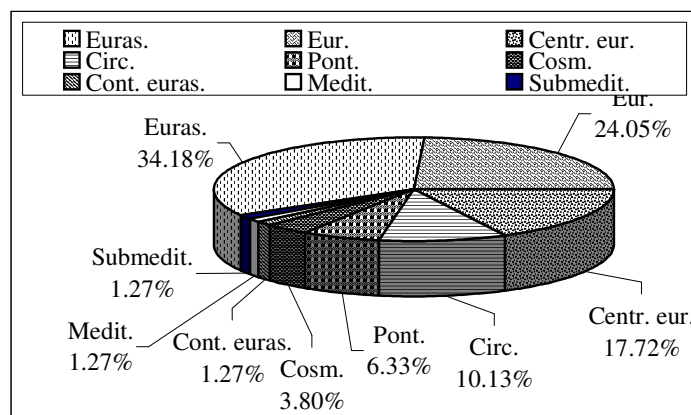
In all the five surveys we identified 79 species, with an average of 46 species per survey. Survey 1 has the greatest number of species (60 species), and survey 4 is at the opposite pole, with 34 species (here, however, the herbaceous layer is richer than the first).

The spectre of the bioforms (graph 2) is numerically dominated by the hemicryptophyte species (40.51 %), followed by the phanerophyte species (27,85 %). Geophyte species (21,52 %) are represented by numerous vernal and estival species.



Graph. 2. The spectre of the bioforms of the association *Fraxino angustifoliae-Quercetum pedunculiflorae* Chifu et al. 1998

One can notice in the analysis of the distribution of the floristic elements (graph. 3) the dominance of the elements with a northern character: the Euroasian elements (34.18 %), the European elements (24.05 %) and the Central-European elements (17.72 %), resulting 75.95 % of the total of species. Relatively well represented as follows: the circumpolar elements (10.13 %) and the pontic elements (6.33 %).

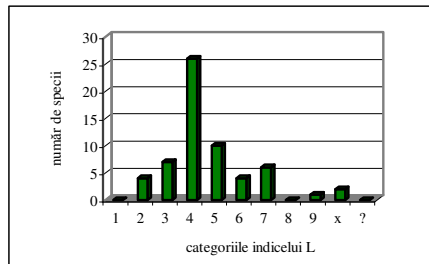


Graph. 3. The spectre of the floristic elements of the *Fraxino angustifoliae-Quercetum pedunculiflorae* Chifu et al. 1998

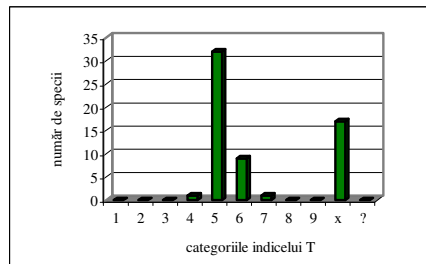
The analysis of the distribution of species according to the six ecological indexes (H, Ellemberg - L, T, K, F, R, N) (14), emphasized general features of the spectre of the vegetal species from the surveys under study, as well as different ecological land corological characteristics of the entire association, irrelated with the preferences of the

species for different factors. All these finally express the ecological characteristics of the stations where the phytocoenoses under study develop. Thus, we can draw the following conclusions:

- as far as the analysis of the preferences of the species for the light (graph. 4), the best represented is the intermediary category between the semiombrophile species and the sciaphile species;



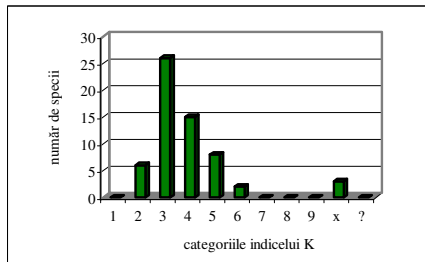
Graph. 4. Distribution of the species in relation to light (L)



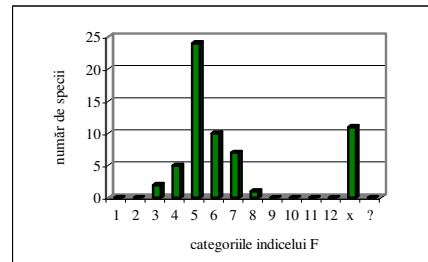
Graph. 5. Distribution of the species in relation to temperature (T)

- as for the preferences for temperature (graph. 5), the greatest proportion belongs to the mesothermic species (category 5), followed by the eurithermic species (category x);

- as far as the continentalism of the species is concerned (graph. 6), the greatest proportion belongs to the intermediary category between the species preferring the oceanic climate and those from suboceanic areas (category 3), as well as the species from areas with suboceanic climate (category 4);



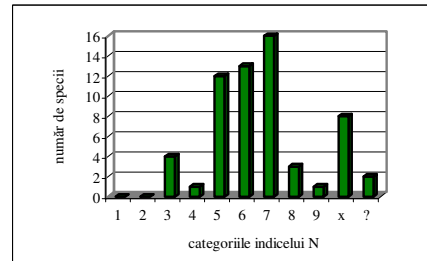
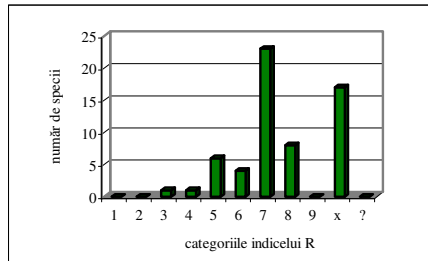
Graph. 6. Distribution of species in relation to continentality (K)



Graph. 7. Distribution of the species in relation to moisture content (F)

- regarding the moisture content (graph. 7), the greatest proportion belongs to the category of mezoxerophile species, followed by the category of euriphytes (amphitolerant);

- from the distribution of the species according to their reaction to the soil (graph. 8), we deduce that the majority is made up of neutrophile species (category 7), followed by the euriacide species;



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aph. 8. Distribution of species in relation to their reaction of the soil (R)

Graph. 9. Distribution of the species in relation to the amount of nitrogen available in the soil (N)

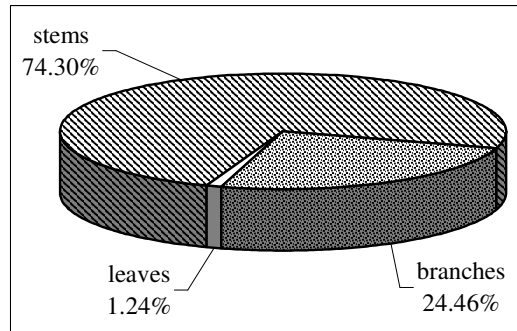
- regarding the distribution of the species in relation to the amount of nitrogen available in the soil (graph 9), the category of the nitrophile species (category 7) has the greatest proportion, followed by the mezonitrophile species and the intermediary between the two;

The phytomass was calculated according to the date gathered on spot, in order to establish diameters and densities (table II). Initially it was calculated for the representative average phytoindividual for the species and the total phytomass was obtained according to the density of the trees. For this association, in the phytocoenosis under study (that is in the area of Pătrăuți) we got a final overground phytomass of 503.7 t/ha for the arorescent layer.

Table II
Indexes of phytomass in a phytocoenosis of the association
Fraxino angustifoliae-Quercetum pedunculiflorae Chifu et al. 1998

Species	Stage	Average diameter (cm)	Density (arb./ha)	Phytomass (kg)				Total phytomass (kg/ha)			
				stems	branches	leaves	total	stems	branches	leaves	total
oak	young high forest	32.69	124	444.8	143.5	8.2	596.5	55160.9	17789.6	1010.8	73961.4
	high forest	49.34	176	1576.1	503.8	26.5	2106.5	277401.8	88670.3	4663.3	370735.4
ash	pole stage	19.27	20	158.9	56.7	2.6	218.2	3178.3	1133.5	52.6	4364.4
	young high forest	29.25	36	519.1	206.9	4.8	730.8	18687.6	7448.4	174.4	26310.4
	high forest	44.02	4	906.3	394.9	10.8	1312.0	3625.0	1579.8	43.3	5248.1
hornbeam	pole stage	20	12	188.9	85.5	3.1	277.5	2266.8	1026.0	37.2	3330.0
	young high forest	29.64	32	435.0	173.8	8.2	617.0	13920.3	5562.1	261.5	19743.8
total phytomass								374240.8	123209.6	6243.1	503693.5

This overground phytomass of the arborescent layer is made up of the phytomass of the stems (74.30 % - fig. 110), the phytomass of the branches (24.46 %) and the phytomass of the leaves (1.24 %).



Graph. 10. Spectre of phytomass – distribution of vegetative organs

Bibliography

1. BELDIE AL., 1977-1979 – *Flora României – Determinator ilustrat al plantelor vasculare*, Ed. Acad. R.S.R., vol. I-II, București;
2. BORZA AL., BOȘCAIU N., 1965 – *Introducere în studiul covorului vegetal*, Ed. Acad. R.P.R., București;
3. CHIFU T., ȘTEFAN N., 1979-1980 – Vegetația din bazinul râului Suceava (IV), *St. com. Muz. Șt. Nat. Bacău*, p. 199-208;
4. CHIFU T., ȘTEFAN N., 1982 – Vegetația din bazinul râului Suceava (VI), *St. com. vol. II*, S. S. B. Filiala Reghin, p. 101-111;
5. CHIFU T., ȘTEFAN N., 1994 – Recherches phytocenologiques dans les hêtraies collinaires du Plateau de Suceava, *An. șt. Univ. „Al. I. Cuza”, Iași*, t. XL, s. II a, Biol. veget., p. 71-80;
6. CHIFU T., ȘTEFAN N., FLOREA DANIELA, 1973 – Vegetația din bazinul râului Suceava (I), *Lucr. șt. Staț. Exper. Agr. Suceava*, p. 305-315;
7. CHIFU T., ȘTEFAN N., FLOREA DANIELA, 1973 – Vegetația din bazinul râului Suceava (II), *St. cerc. Biol., seria Bot.*, t. 25, nr. 4, București, p. 303-312;
8. CHIFU T., SĂRBU I., ȘTEFAN N., 1998 – *Phytocoenoses de l'ordre Quercetalia pubescentis Br.-Bl. 1931 em. Soó 1964 sur le territoire Moldave (Roumanie)*, Colloques phytosociologiques: 115 – 131;
9. CHIFU T., ȘTEFAN N., SĂRBU I., MĂNZU C., ȘURUBARU B., 2002 – Nouvelles contributions a l'étude phytosociologique des forêts de Moldova, *An. Șt. Univ. „Al. I. Cuza” Iași*, t. XLVIII, s. II a, Biol. veget., Iași; p. 103-118;
10. CIOCĂRLAN V., 1988-1990 – *Flora ilustrată a României*, vol I-II, Ed. Ceres, București;
11. CIOCĂRLAN V., 2000 – *Flora ilustrată a României - Pteridophyta et Spermatophyta*, Ed. Ceres, București;
12. COLDEA GH., 1991 – *Prodrome des associations vegetales des Carpates du Sud-Est (Carpates Roumaines)*, Documents phytosociologiques, Serie nouă, Vol. XIII, Camerino;
13. CRISTEA V., 1993 – *Curs de Fitosociologie și Vegetația României*, Univ. „Babeș-Bolyai” Cluj-Napoca;
14. ELLENBERG H., 1974 – *Indicator values of vascular plants in Central Europe*, Scripta Geobotanica, Band 9, Göttingen;
15. MITITELU D., CHIFU T., PASCAL P., 1989 – *Flora și vegetația județului Suceava*, Anuar Muz. Jud. Suceava, Șt. Nat. X, p. 93-120;
16. MITITELU D., CHIFU T., ȘTEFAN N., 1987 – Contribuție la studiul vegetației din județul Suceava, *Anuar șt. com. Muz. Naț. Bucovina*, Suceava, p. 51-60;
17. SANDA V., 2002 – *Vademecum ceno-structural privind covorul vegetal din România*, Ed. Vergiliu, București;
18. ȘTEFAN N., CHIFU T., 1974-1975 – The Vegetation in the Suceava River Basin (III), *Lucr. Staț. „Stejarul”, Ecologie terestră și Genetică*, p. 113-121;

19. ȘTEFAN N., CHIFU T., 1982 – Vegetația din bazinul râului Suceava (V), *Culeg. st. art. Biol.*, Univ. „Al. I. Cuza” Iași - Grăd. Bot., nr. 2, p. 258-263;
20. *** 1952-1976 — *Flora R. S. România*, vol. I-XIII, București;

**CONTRIBUTIONS TO THE STUDY OF VEGETATION FROM THE
DRANOV AND BELCIUG LAKES AREA
(DANUBE DELTA BIOSPHERE RESERVE) II**

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Resumé: The authors are presenting 21 associations from *Potamogetonetea pectinati* R.Tx. et Prsg. 1942, *Phragmitetea australis* R. Tx. et Prsg. 1942 and *Alnetea glutinosae* Br.-Bl. et Tx. ex Westhoff et al. 1946 Classes, identified in Dranov and Belciug Lakes area, in Danube Delta Biosphere Reserve.

Key words: Danube Delta Biosphere Reserve, Dranov Lake, Belciug Lake, aquatic vegetation, swampy vegetation, wooden vegetation.

Introduction

This paper continues presenting the 1996-2000 research results, done in Dranov Lake and Bleciug Lake Area, from Danube Delta Biosphere Reserve.

About the 9 associations described in the previous paper [11], in the investigated area there were identified 21 more associations, 12 of them including aquatic phytocoenosis, 8 are included in swampy vegetation and 1 combines forestry phytocoenosis.

MATERIAL AND METHOD

Outlining the associations has been made using classic methods (Braun-Blanquet School), for describing of the associations being made phytocoenological tables on the characteristic, dominant and differential species. For making coenotaxonomical framing we used the works of Gh. Coldea et al. [8], V. Sanda et al. [2, 3, 4, 5].

RESULTS AND DISCUSSIONS

The 21 associations described in this paper can be included in the following coenosystem:

Potamogetonetea pectinati R. Tx. et Prsg. 1942

Potamogetonetalia pectinati Koch 1926

Potamogetion lucentis Rivas Martinez 1973

1. *Elodeetum canadensis* Eggler 1933; 2. *Ceratophyllo demersi* – *Elodeetum nuttallii* Ciocârlan et al. 1997; 3. *Najadetum marinae* (Oberd. 1957) Fukarek 1961; 4. *Potamogetonetum lucentis* Hueck 1931; 5. *Potamogetonetum trichoides* J. et R. Tx. in R.

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Tx. 1965; 6. *Potamogeton perfoliati* Koch 1926 em. Pass. 1964; 7. *Potamogeton crispus* Soó 1927; 8. *Potamogeton pectinati* Carsten 1955
Nymphaeion albae Oberd. 1957
9. *Nymphaeetum albo – candidae* Pass. 1957; 10. *Nymphaeetum albae* Vollmar 1947; 11. *Trapa natantis* V.Kárpáti 1963; 12. *Myriophyllo verticillati – Nuphar luteae* Koch 1926

Phragmitetea australis R. Tx. et Prsg. 1942

Phragmitetalia Koch 1926

Phragmition Koch 1926

13. *Scirpo – Phragmitetum* Koch 1926; 14. *Thelypterido – Phragmitetum* Kuiper 1958; 15. *Typhetum angustifoliae* Pignatti 1953; 16. *Glycerietum maximae* Hueck 1931

Bolboschoenetalia maritimi Hejny in Holub et al. 1967

Cirsio brachycephali – Bolboschoenion (Pass. 1978) Mucina 1993

17. *Bolboschoenetum maritimi* Egger 1933

Oenanthetalia aquaticae Hejny ex Kopecky ex Hejny 1965

Oenanthion aquaticae Hejny ex Neuhäusl 1959

18. *Eleocharitetum palustris* Schennikov 1919; 19. *Oenanthe – Rorippetum* Lohmeyer 1950

Magnocaricetalia Pignatti 1953

Magnocaricion elatae Koch 1926

20. *Caricetum elatae* Koch 1926

Alnetea glutinosae Br.-Bl. et Tx. ex Westhoff et al. 1946

Alnetalia glutinosae Tx. 1937

Alnion glutinosae Malcuit 1939

21. *Thelypteridi – Alnetum* Klica 1926

1. *Elodeetum canadensis* Egger 1933 (tab. 1 – I) – *Elodea canadensis*, the characteristic species is also the dominant one, having 70 – 90% coverage. This association's phytocoenosis are developing especially towards the riverbanks, at 70 – 85 cm depth. The phytocoenosis are relatively poor in species; at the surface of the water we can find also floating plants, which have no constant presence (*Potamogeton natans*, *Nuphar lutea*, *Lemna minor*, *Salvinia natans*, *Hydrocharis morsus-ranae*).

2. *Ceratophyllo demersi – Elodeetum nuttallii* Ciocârlan et al. 1997 (tab. 1 – II) – This association has been described relatively recent (1), from the Rotund Lake area and also Cernovca River Island area. The phytocoenosis of this association are almost pure, with the dominance of *Elodea nuttallii*. From the submersed accompanying species *Ceratophyllum demersum*, *Potamogeton trichoides* are noticed. The presence of floating species (*Nuphar lutea*, *Trapa natans*, *Lemna minor*) is not strictly connected to the *Elodea nuttallii* communities. The association is developing in more eutrophic waters, with 95 – 130 cm depth.

3. *Najadetum marinae* (Oberd. 1957) Fukarek 1961 (tab. 1 – III) – The submersed phytocoenosis enlightened by *Najas marina* are developing in shallow waters (35 – 45 cm),

having a coverage of 55 – 60%. Along with the characteristic and dominant species, there can be found other submerse species (*Elodea canadensis*, *E. nuttallii*, *Potamogeton crispus*, *P. trichoides*, *P. pectinatus*, *Ceratophyllum demersum*). The floating vegetation is poorly represented (*Nuphar lutea*, *Nymphaea candida*, *Nymphoides peltata*, *Lemna minor*, *Salvinia natans*), having small coverage.

4. *Potamogetonetum lucentis* Hueck 1931 (tab. 1 – IV) – The association is located towards the margin of the lakes, with the water depth of 120 – 150 cm. The characteristic species is also the dominant one, having coverage up to 70 – 75%. There are not too many species found in this association that includes some submerse plants (*Elodea nuttallii*, *Myriophyllum verticillatum*, *Potamogeton trichoides*, *Ceratophyllum demersum*), but also floating plants (*Lemna minor*, *Nymphaea alba*).

5. *Potamogetonetum trichoides* J. et R. Tx. in R. Tx. 1965 (tab. 2 – I) – The characteristic and dominant species, *Potamogeton trichoides*, forms submerse phytocoenosis, having a 70 – 90% coverage. The phytocoenosis species number is relatively low, the most frequent of the submerse being *Elodea nuttallii*, *Potamogeton perfoliatus*, *P. pectinatus*, *Myriophyllum spicatum*. The floating species are *Nymphaea alba*, *N. candida*, *Lemna minor*, *Salvinia natans*.

6. *Potamogetonetum perfoliati* Koch 1926 em. Pass. 1964 (tab. 2 – II) – The association that is developing in 110 – 130 cm depth water is dominated by *Potamogeton perfoliatus*. There are also other submerse species participating to the making up of those phytocoenosis, like *Elodea canadensis*, *Elodea nuttallii*, *Potamogeton trichoides*, *P. pectinatus*, *Ceratophyllum demersum*.

7. *Potamogetonetum crispum* Soó 1927 (tab. 2 – III) – The phytocoenosis of this association have a 70 – 80% coverage and are relatively homogeneous, most of the species being characteristic for *Potamogetonetea pectinati* and *Lemnetea* classes. Important parts have also *Potamogeton pectinatus*, *Ceratophyllum demersum*, *Lemna minor*, along with the dominant and characteristic species, *Potamogeton crispus*.

8. *Potamogetonetum pectinati* Carsten 1955 (tab. 2 – IV) – The phytocoenosis are located towards the bank of the lakes, in 100 – 150 cm depth of water. The submerse vegetation is almost pure, being dominated by *Potamogeton pectinatus*, while the floating vegetation is represented by species like *Nuphar lutea*, *Nymphaea alba*, *N. candida*, *Lemna minor*.

9. *Nymphaetum albo – candidae* Pass. 1957 (tab. 3 – I) – The phytocoenosis of this association make a 70 – 85 % coverage, being dominated by *Nymphaea candida* and *Nymphaea alba*, accompanied more frequently by *Trapa natans*, *Elodea nuttallii*, *Ceratophyllum demersum*, *Potamogeton perfoliatus*, *P. trichoides*, *P. pectinatus*, *Lemna minor*, *Salvinia natans*.

10. *Nymphaetum albae* Vollmar 1947 (tab. 3 – II) – The floating layer of this association's phytocoenosis is dominated by *Nymphaea alba*; at the 80 – 85 % coverage also participate *Trapa natans*, *Lemna minor*, *L. trisulca*, *Salvinia natans*. In the phytocoenosis structure also appear submerse species (*Myriophyllum verticillatum*, *Elodea nuttallii*, *Potamogeton trichoides*), and swampy species (*Phragmites australis*, *Cicuta virosa*, *Lycopus europaeus*, *Stachys palustris*).

11. *Trapa natans* V. Kárpáti 1963 (tab. 3 – III) – Inhabiting waters having 120 – 200 cm of depth, the phytocoenosis are dominated by *Trapa natans*, which, along with *Nymphaea alba*, *N. candida*, *Potamogeton trichoides*, *Lemna minor*, *Salvinia natans*, are making a 70 – 90% coverage.

12. *Myriophyllo verticillati* – *Nupharetum luteae* Koch 1926 (tab. 3 – IV) – The floating layer of the association's phytocoenosis is dominated by *Nuphar lutea*, while the submerse layer is dominated by *Myriophyllum verticillatum*. The submerse species like *Elodea nuttallii*, *Potamogeton trichoides*, or floating plants (*Lemna minor*, *Salvinia natans*) have an important contribution to the association's physiognomy.

13. *Scirpo* – *Phragmitetum* Koch 1926 (tab. 4 – I) – The phytocoenosis of this hydrophilic association occupy the banks of the lakes, the vegetation coverage on the sample surfaces varying between 70 – 90%. The dominant species is *Phragmites australis*, accompanied by *Scirpus lacustris*, *Typha angustifolia*, *Ranunculus lingua*, *Iris pseudacorus*, *Carex elata*, *Carex riparia* etc.

14. *Thelypterido* – *Phragmitetum* Kuiper 1958 (tab. 4 – II) – The association inhabits the floating islands from the studied area. The characteristic species of the *Phragmitetea australis* class and of the subordinated coenotaxons (*Phragmitetalia* order, *Phragmition* alliance) are illustrating for this vegetation, with the dominance of *Phragmites australis*, which has 40 – 70% coverage. The association's characteristic is the presence of *Thelypteris palustris*, having a 10 – 30% coverage, which makes it the codominant species.

15. *Typhetum angustifoliae* Pignatti 1953 (tab. 4 – III) – At the edge of the reed thicket, this association forms a variable width strip, the vegetation coverage being 75 – 95%. Along with the dominant and characteristic species, *Typha angustifolia*, most of the species that outline the phytocoenosis physiognomy belong to the *Phragmitetea australis* class and to its inferior coenotaxons (*Phragmites australis*, *Oenanthe aquatica*, *Butomus umbellatus*, *Rorippa amphibia*, *Galium palustre*, *Stachys palustris*, *Carex acutiformis*, *C. riparia*, *C. elata*, *Cicuta virosa* etc.).

16. *Glycerietum maximae* Hueck 1931 (tab. 4 – IV) – Situated near the banks, the phytocoenosis of this association are dominated by *Glyceria maxima*; along this species there are others, hydrophilic or hygrophilic, characteristic for the *Phragmitetea australis* class: *Phragmites australis*, *Typha angustifolia*, *Sparganium erectum*, *Iris pseudacorus*, *Carex riparia* etc.

17. *Bolboschoenetum maritimi* Eggler 1933 (tab. 5 – I) – The phytocoenosis of this association settle down on moist soils, poorly halophytic, making 80 – 95% coverage. Along the dominant species, *Bolboschoenus maritimus*, more frequent are *Juncus gerardi*, *Aster tripolium* ssp. *pannonicus*, *Phragmites australis* ssp. *humilis*, *Carex rostrata* etc.

18. *Eleocharitetum palustris* Schennikov 1919 (tab. 5 – II) – This association is encountered in small depressions or towards the banks, its phytocoenosis having 70 – 75% coverage. The dominant and characteristic species, *Eleocharis palustris*, is accompanied more frequently by *Bolboschoenus maritimus*, *Rorippa amphibia*, *Sparganium erectum*, *Galium palustre*, *Mentha aquatica*, *Myosotis scorpioides* etc.

19. *Oenanthe* – *Rorippetum* Lohmeyer 1950 (tab. 5 – III) – The association develops on easily flooded plots of land during spring, often on halophytic soils. The characteristic species, *Oenanthe aquatica* and *Rorippa amphibia*, are accompanied by some hydro – hygrophilic species, like: *Bolboschoenus maritimus*, *Carex elata*, *Butomus umbellatus*, *Scirpus lacustris*, *Typha angustifolia*, *Phragmites australis* ssp. *humilis*, *Alisma plantago-aquatica*, *Carex acutiformis*, *Galium palustre* etc.

20. *Caricetum elatae* Koch 1926 (tab. 5 – IV) – The dominant and characteristic species, *Carex elata*, taking a compact bush form on the higher ground surfaces, makes the so-called “islet of mush thicket”. The covering of the soil, up to 70 – 85%, is made in combination with: *Phragmites australis* ssp. *humilis*, *Carex rostrata*, *Galium palustre*, *Gratiola officinalis*, *Glyceria maxima* etc.

21. *Thelypteridi* – *Alnetum* Klica 1926 (tab. 6) – This type of phytocoenosis brings together phytocoenosis subjected to periodical floods. The tree layer is dominated by *Alnus glutinosa*, along with *Salix cinerea* or *Fraxinus angustifolius*. The characteristic species *Thelypteris palustris* has also an important coverage. Along with *Alnetea glutinosae* class characteristic species, at the floristic composition also participate an important number of species characteristic to the *Phragmitetea australis* class, situation that can be explained by the variable hydric character of these phytocoenosis.

Bibliography

1. CIOCĂRLAN V., SÂRBU I., ȘTEFAN N., MARIAN T., 1997 – *Elodea nuttallii* (Planchon) St. John – specie nouă în flora României, Bul. Grăd. Bot. Iași, **6** (1): 213 – 215
2. POPESCU A., SANDA V., OROIAN SILVIA, 1997 – Vegetația Deltei Dunării, Marisia, Muz. Jud. Mureș, Studii și materiale, **XXV** (Supl.): 10 – 30, 88 – 90
3. SANDA V., POPESCU A., BARABAȘ N., 1998 – *Cenotaxonomia și caracterizarea grupărilor vegetale din România*, Stud. și Comunic., Biol. veget., **14**, Bacău: 68 – 88, 225 - 228
4. SANDA V., POPESCU A., DOLTU M. I., NEDELCU G., 1979 – Conspectul vegetației acvatice și palustre din România, Stud. și Comunic., Șt. Nat., Muz. Brukenthal, Sibiu, **23**: 119-162
5. SANDA V., POPESCU A., STANCU DANIELA ILEANA, 2001 – *Structura cenotică și caracterizarea ecologică a fitocenozelor din România*, Ed. Comphis: 20 – 31, 38 – 59, 266 – 267
6. SÂRBU I., ȘTEFAN N., OPREA AD., ZAMFIRESCU OANA, 2000 – Flora și vegetația Rezervației Naturale Grindul Lupilor (Rezervația Biosferei Delta Dunării), Bul. Grăd. Bot. Iași, **9**: 91 – 124
7. ȘTEFAN N., CHIFU T., HANGANU J., COROI M., 1995 – Cercetări fitocenologice asupra vegetației acvatice și palustre din Balta Somovei (Jud. Tulcea), Bul. Grăd. Bot. Iași, **5**: 133 – 152
8. ȘTEFAN N., COLDEA GH., 1997 – Classe *Potametea*, Classe *Phragmitetea*, in Coldea Gh. (edit.), Sanda V., Popescu A., Ștefan N. – *Les associations végétales de Roumanie*, **1**, *Les associations herbacées naturelles*, Presses Univ. de Cluj: 36 – 94
9. ȘTEFAN N., HANGANU J., COROI M., COROI ANA-MARIA, OPREA A., 1997 – The vegetation of Babina River Island, An. Șt. Univ. “Al. I. Cuza” Iași, t. **XLIII**, s II a, Biol. veget.: 79 – 96
10. ȘTEFAN N., OPREA AD., 2001 – Vegetația Ostrovului Cernovca (I), Bul. Grăd. Bot. Iași, **10**: 123 – 138
11. ȘTEFAN N., SÂRBU I., MÂNZU C., 2003 – Contributions to the study of vegetation from the Dranov and Belciug Lakes area (Danube Delta Biosphere Reserve) (I), Stud. și Cerc., Biol., **7**, Univ. Bacău (under press)
12. ȘTEFAN N., SÂRBU I., OPREA AD., ZAMFIRESCU OANA, 2001 – Contribuții la cunoașterea vegetației grindurilor Chituc și Saele-Istria, Bul. Grăd. Bot. Iași, **10**: 99 – 122

Table no. 1
Associations from *Potamogeton lucentis* Rivas Martinez 1973 alliance

Vegetal association	I		II			III		IV		
Survey number	1	2	3	4	5	6	7	8	9	10
Depth of water (cm)	70	85	130	95	120	45	35	120	120	150
Vegetation coverage (%)	90	70	70	75	80	60	55	75	70	85
Sample surface (m ²)	10	12	20	30	25	4	5	6	9	4
Potamogeton lucentis										
<i>Elodea canadensis</i>	5	4	-	-	-	+	-	-	-	-
<i>Elodea nuttallii</i>	-	+	4	4	4	-	+	-	1	+
<i>Myriophyllum verticillatum</i>	-	-	+	-	-	-	-	-	+	+
<i>Potamogeton perfoliatus</i>	-	-	-	+	-	-	-	-	-	-
<i>Potamogeton crispus</i>	-	+	-	-	-	+	+	-	+	-
<i>Najas marina</i>	-	-	-	-	+	3	3	-	-	-
Potamogetonetalia pectinati										
<i>Potamogeton nodosus</i>	-	+	-	+	-	+	-	-	-	-
<i>Potamogeton lucens</i>	-	-	+	-	-	-	-	4	3	4
<i>Potamogeton trichoides</i>	+	-	-	+	1	+	1	-	+	1
<i>Potamogeton pectinatus</i>	+	-	+	-	-	1	+	+	-	-
<i>Potamogeton natans</i>	-	+	-	-	-	-	+	-	-	-
<i>Ceratophyllum demersum</i>	+	-	-	+	+	-	+	+	1	-
<i>Ranunculus trichophyllus</i>	-	+	-	+	-	-	-	-	+	-
<i>Vallisneria spiralis</i>	+	-	-	-	-	-	-	-	-	-
Potamogetonetalia										
<i>Nuphar lutea</i>	+	-	-	-	-	+	-	-	-	-
<i>Nymphaea alba</i>	-	-	+	+	-	-	-	+	-	+
<i>Nymphaea candida</i>	-	-	-	+	-	-	+	-	-	-
<i>Nymphoides peltata</i>	-	-	-	-	-	+	-	+	-	-
<i>Polygonum amphibium</i>	+	-	-	-	-	-	+	-	-	-
<i>Trapa natans</i>	-	-	+	-	+	-	-	-	-	-
Lemnetea										
<i>Lemna minor</i>	+	+	+	+	+	-	+	+	-	+
<i>Spirodela polyrhiza</i>	-	+	-	-	-	+	-	-	+	-
<i>Wolffia arrhiza</i>	-	-	-	-	-	-	-	-	+	-
<i>Salvinia natans</i>	+	-	+	-	-	1	+	-	-	-
<i>Utricularia vulgaris</i>	-	-	-	-	-	+	+	-	-	-
<i>Stratiotes aloides</i>	-	-	-	-	+	-	-	-	-	-
<i>Hydrocharis morsus-ranae</i>	-	+	-	-	-	-	-	-	+	-
Phragmitetea										
<i>Phragmites australis</i>	-	-	+	-	-	+	+	-	-	+
<i>Typha angustifolia</i>	+	-	+	-	-	-	-	+	-	-
<i>Lythrum salicaria</i>	-	-	-	-	-	+	-	-	-	-
<i>Oenanthe aquatica</i>	-	+	-	-	-	-	-	-	-	-
<i>Carex pseudocyperus</i>	-	-	-	-	-	-	-	+	-	-
<i>Rorippa amphibia</i>	-	+	-	-	-	-	-	-	+	-
<i>Alisma plantago-aquatica</i>	-	-	-	-	-	-	+	-	-	-
<i>Mentha aquatica</i>	-	-	+	-	-	-	-	-	-	-
<i>Sparganium erectum</i>	-	-	-	-	+	-	+	-	-	-

Vegetal association: I – *Elodeetum canadensis* Egler 1933; II – *Elodeetum nuttallii* Ciocărlan et al. 1997; III – *Najadetum marinae* (Oberd.1957) Fukarek 1961; IV – *Potamogetonetum lucentis* Hueck 1931
Sample's location: Zătonul Mic (1, 3, 5, 8, 9); Zătonul Mare (2); Belciug (4, 10); Meleaua Sf. Gheorghe (6, 7)

Table no. 2
Associations from *Potamogetion lucentis* Rivas Martinez 1973 alliance

Vegetal association	I				II			III			IV			
Survey number	1	2	3	4	5	6	7	8	9	10	11	12	13	
Depth of water (cm)	170	150	120	170	130	110	85	70	90	140	150	100	120	
Vegetation coverage (%)	70	90	85	70	70	80	80	75	70	85	90	75	80	
Sample surface (m ²)	10	6	20	15	6	4	2	4	6	8	8	10	15	
<i>Potamogetion lucentis</i>														
<i>Elodea canadensis</i>	-	-	+	-	+	-	-	-	+	-	-	-	-	
<i>Elodea nuttallii</i>	-	+	+	+	-	+	+	-	-	+	-	-	+	
<i>Myriophyllum verticillatum</i>	-	-	-	-	-	-	+	+	-	-	-	-	-	
<i>Potamogeton perfoliatus</i>	-	+	-	+	4	5	-	-	+	+	-	-	+	
<i>Potamogeton crispus</i>	-	-	+	-	-	-	4	4	3	-	+	+	+	
<i>Potamogetonetalia pectinati</i>														
<i>Potamogeton lucens</i>	-	-	+	-	-	-	+	+	-	-	-	-	+	
<i>Potamogeton trichoides</i>	4	5	4	4	+	-	+	-	+	4	5	4	4	
<i>Potamogeton pectinatus</i>	-	-	1	+	-	+	-	1	1	+	-	+	-	
<i>Ceratophyllum demersum</i>	-	-	+	-	+	-	+	-	1	-	-	-	-	
<i>Myriophyllum spicatum</i>	-	+	-	+	-	-	-	-	-	-	-	-	-	
<i>Potamogetonetalia</i>														
<i>Nuphar lutea</i>	+	-	-	-	-	-	+	-	-	1	-	-	+	
<i>Nymphaea alba</i>	+	+	-	-	-	+	-	-	+	-	1	1	+	
<i>Nymphaea candida</i>	+	-	+	+	-	-	-	+	+	+	-	1	1	
<i>Polygonum amphibium</i>	-	-	-	-	-	-	-	-	1	-	-	-	-	
<i>Trapa natans</i>	-	-	+	-	-	-	-	-	1	-	-	+	-	
<i>Hippuris vulgaris</i>	-	-	-	-	+	-	-	-	-	-	-	-	-	
<i>Lemnetea</i>														
<i>Lemna minor</i>	-	+	+	+	+	-	1	+	1	+	+	+	1	
<i>Spirodela polyrhiza</i>	+	+	-	-	-	-	-	+	-	+	-	-	-	
<i>Salvinia natans</i>	+	+	-	-	+	-	-	+	-	-	-	+	-	
<i>Utricularia vulgaris</i>	-	-	-	-	-	-	-	-	-	-	-	-	+	
<i>Stratiotes aloides</i>	-	-	+	-	-	-	-	-	-	-	-	-	-	
<i>Hydrocharis morsus-ranae</i>	-	-	-	-	+	+	-	-	-	-	-	-	-	
<i>Phragmitetea</i>														
<i>Phragmites australis</i>	-	+	+	-	+	-	-	+	-	+	-	-	+	
<i>Oenanthe aquatica</i>	+	-	-	-	-	-	+	-	-	-	-	-	-	

<i>Cicuta virosa</i>	-	-	-	-	-	+	-	-	+	-	-	-	-
<i>Rorippa amphibia</i>	-	-	-	-	-	-	-	-	-	-	-	+	-
<i>Stachys palustris</i>	-	+	+	-	-	-	-	-	-	-	-	-	-
<i>Alisma plantago-aquatica</i>	-	-	-	-	+	-	-	-	-	-	+	-	-
<i>Sparganium erectum</i>	+	-	-	-	-	+	-	-	-	+	-	-	-

Vegetal association: I – *Potamogetonetus trichoides* J. et R. Tx. in R. Tx. 1965; II – *Potamogetonetus perfoliati* Koch 1926 em. Pass. 1964; III – *Potamogetonetus crispus* Soó 1927; IV – *Potamogetonetus pectinati* Carsten 1955
Sample's location: Zătonul Mic (21); Zătonul Mare (12, 17, 19, 22); Belciug (11, 18, 20); Canal Crasnicol (13, 14, 23); Dranov (15, 16)

Table no. 3
Associations from *Nymphaeion albae* Oberd. 1957 alliance

Vegetal association	I				II		III					IV					
Survey number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Depth of water (cm)	140	120	110	180	210	230	200	120	120	170	160	190	200	220	110	150	100
Vegetation coverage (%)	85	75	80	70	80	85	80	90	80	75	90	70	65	75	70	75	80
Sample surface (m ²)	50	65	50	80	25	30	100	50	50	65	100	100	100	50	80	25	100
<i>Nymphaeion albae</i>																	
<i>Nymphaea alba</i>	1	1	2	2	4	5	1	-	+	1	+	-	+	-	-	-	-
<i>Nymphaea candida</i>	4	3	3	3	-	-	+	+	1	+	-	+	-	-	-	-	1
<i>Nuphar lutea</i>	-	-	-	-	-	-	-	+	-	-	+	3	3	4	3	4	2
<i>Nymphoides peltata</i>	-	+	-	-	-	-	-	-	+	-	-	-	+	-	-	-	+
<i>Polygonum amphibium</i>	+	-	-	-	+	-	+	-	+	-	-	-	-	-	-	-	+
<i>Potamogeton natans</i>	-	-	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-
<i>Trapa natans</i>	-	+	-	+	+	+	4	5	4	4	5	-	+	-	+	+	+
<i>Potamogetonetea</i>																	
<i>Potamogeton perfoliatus</i>	+	-	-	+	-	-	-	+	+	-	-	-	-	-	-	-	-
<i>Myriophyllum verticillatum</i>	-	+	-	-	+	+	-	-	-	+	-	2	1	1	2	1	3
<i>Elodea nuttallii</i>	+	-	-	+	+	+	-	-	-	-	-	-	1	+	-	+	-
<i>Ceratophyllum demersum</i>	+	-	+	-	-	-	+	-	-	-	-	+	-	-	-	-	-
<i>Potamogeton trichoides</i>	-	+	-	+	+	-	-	+	+	+	+	+	1	+	1	+	-
<i>Potamogeton pectinatus</i>	-	-	+	+	-	-	+	-	-	+	-	-	-	-	-	+	+
<i>Potamogeton crispus</i>	-	-	+	-	+	-	-	-	-	+	-	-	+	-	+	-	-
<i>Polygonum amphibium</i>	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Ranunculus rionii</i>	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
<i>Lemnetea</i>																	
<i>Lemna minor</i>	+	2	+	+	1	+	+	-	+	+	-	1	1	+	+	+	1
<i>Lemna trisulca</i>	+	-	+	-	+	+	-	-	-	+	-	-	-	-	+	-	-

<i>Spirodela polyrhiza</i>	-	+	-	+	-	-	-	-	-	-	-	-	+	+	-	-	-
<i>Utricularia vulgaris</i>	-	-	+	-	+	-	-	-	-	-	-	+	-	+	+	+	-
<i>Salvinia natans</i>	1	+	1	-	1	-	1	+	+	-	+	-	-	+	-	+	+
Phragmitetea																	
<i>Phragmites australis</i>	+	-	+	-	+	-	-	-	-	-	-	-	-	-	-	+	+
<i>Scirpus lacustris</i>	-	+	+	-	-	-	-	-	+	-	-	-	-	-	-	-	-
<i>Typha angustifolia</i>	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-
<i>Cicuta virosa</i>	-	-	-	-	-	+	-	-	-	-	-	-	+	-	-	-	-
<i>Lycopus europaeus</i>	-	-	-	-	+	-	+	-	+	-	-	-	-	-	-	-	-
<i>Stachys palustris</i>	-	+	-	-	-	+	-	-	-	-	-	-	-	-	+	+	-
<i>Iris pseudacorus</i>	+	-	-	-	-	-	+	-	+	-	-	-	-	-	-	-	-
<i>Sparganium erectum</i>	-	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Carex elata</i>	-	-	-	+	-	-	-	+	-	+	+	-	-	-	-	-	-
<i>Alisma plantago-aquatica</i>	-	-	-	-	-	-	-	-	-	-	-	+	+	-	-	-	+
<i>Butomus umbellatus</i>	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	+
<i>Mentha aquatica</i>	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	+
<i>Alisma lanceolatum</i>	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-

Vegetal associations: I - *Nymphaeetum albo – candidae* Pass. 1957; II - *Nymphaeetum albae* Vollmar 1947; III - *Trapaetum natantis* V. Kárpáti 1963; IV - *Myriophyllo verticillati – Nupharetum luteae* Koch 1926
Sample's location: Belciug Lake (1, 2, 5, 9, 12, 13); Zătonul Mic (3, 6, 10, 16); Zătonul Mare (4, 7, 11, 17); Dranov (8, 14, 16)

Table no. 4
Associations from *Phragmition* Koch 1926 alliance

Vegetal association	I					II			III				IV				
Survey number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Vegetation coverage (%)	70	90	90	80	80	85	75	85	80	95	75	90	90	95	85	90	80
Sample surface (m ²)	100	100	100	100	100	50	65	50	100	25	60	50	25	40	100	50	50
Phragmition																	
<i>Phragmites australis</i>	4	5	5	4	4	4	3	3	1	+	1	+	+	+	1	+	+
<i>Scirpus lacustris</i>	+	+	-	+	+	+	-	-	-	-	+	-	-	-	-	-	-
<i>Oenanthe aquatica</i>	+	-	-	-	+	-	-	-	-	+	-	+	-	-	-	-	-
<i>Butomus umbellatus</i>	-	+	-	-	-	+	-	+	+	-	+	+	-	+	-	-	-
<i>Typha angustifolia</i>	+	+	-	1	+	-	-	+	4	5	4	5	-	+	-	+	+
<i>Typha latifolia</i>	-	-	+	+	-	+	+	-	+	-	-	-	-	-	-	-	+
<i>Ranunculus lingua</i>	+	+	-	-	+	+	-	+	-	+	+	-	-	-	+	-	-
<i>Rorippa amphibia</i>	-	-	-	+	-	-	+	-	+	-	+	+	+	-	-	-	+

<i>Polygonum hydropiper</i>	+	+	-	-	+	-	-	-	-	+	-	-	-	-	-
<i>Polygonum lapathifolium</i>	-	-	-	+	-	-	+	-	-	-	-	-	-	-	-
<i>Alopecurus ventricosus</i>	-	-	-	-	+	-	-	-	-	-	-	-	-	-	+
<i>Carex distans</i>	+	+	+	-	+	+	-	-	-	-	-	-	-	-	-
<i>Samolus valerandi</i>	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Bidens tripartita</i>	-	-	-	+	-	-	-	-	-	-	-	-	+	-	-
<i>Pulicaria dysenterica</i>	+	-	+	-	+	+	-	-	-	-	-	-	-	-	-
<i>Puccinellia convoluta</i>	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Lythrum virgatum</i>	-	+	+	-	+	-	-	-	-	-	-	-	-	-	-
<i>Althaea officinalis</i>	-	-	-	+	-	+	+	-	+	-	-	-	-	+	-
<i>Agrostis stolonifera</i>	1	1	+	+	+	-	+	-	-	-	-	+	-	+	+
<i>Vicia biensis</i>	-	-	-	-	-	+	-	+	-	-	-	-	+	-	-
<i>Mentha pulegium</i>	+	-	+	-	-	-	-	-	-	-	-	-	-	-	-
<i>Rorippa sylvestris</i>	-	+	-	+	-	-	-	-	-	-	-	-	-	-	-
<i>Carex distans</i>	-	-	+	-	-	+	+	-	-	-	-	-	-	-	-

Vegetal associations: I - *Bolboschoenetum maritimi* Egger 1933; II - *Eleocharitetum palustris* Schennikov 1919; III - *Oenanthe – Rorippetum* Lohmeyer 1950; IV - *Caricetum elatae* Koch 1926

Sample's location: Tărăța Channel (1, 5, 13, 14); Zătonul Mic (2, 8, 9, 12); Belciug Channel (3, 6, 7, 15); Zătonul Mare (4, 10, 11)

Table no. 6
Thelypteridi – Alnetum Klika 1926

Survey number	1	2	3	4
Covering of tree stratum (%)	25	40	45	50
Covering of grassy stratum (%)	70	65	50	50
Sample surface (m ²)	100	80	65	80
Sample's location	Belciug Lake			
<i>Association's characteristics</i>				
<i>Alnus glutinosa</i>	2	3	3	3
<i>Thelypteris palustris</i>	3	3	2	2
Alnion glutinosae				
<i>Solanum dulcamara</i>	+	-	+	+
<i>Symphytum officinale</i>	+	-	+	-
<i>Carex elongata</i>	-	+	-	-
<i>Humulus lupulus</i>	-	-	-	+

<i>Alnetea glutinosae</i>				
<i>Salix cinerea</i>	1	+	+	+
<i>Fraxinus angustifolius</i>	-	1	-	+
<i>Lycopus europaeus</i>	+	+	+	-
<i>Galium palustre</i>	-	-	+	-
Phragmitetea				
<i>Phragmites australis</i>	1	+	+	1
<i>Carex riparia</i>	2	+	1	+
<i>Carex elata</i>	-	1	2	2
<i>Berula erecta</i>	+	+	-	-
<i>Scutellaria galericulata</i>	-	+	+	-
<i>Mentha aquatica</i>	-	1	+	+
<i>Typha latifolia</i>	-	-	+	-
<i>Rumex hydrolapathum</i>	-	-	+	-
<i>Iris pseudacorus</i>	-	+	-	+
<i>Typha angustifolia</i>	-	-	-	+
Companions				
<i>Calystegia sepium</i>	+	-	-	-
<i>Urtica dioica</i>	-	+	+	+
<i>Bidens tripartita</i>	-	-	+	-
<i>Salix triandra</i>	-	-	+	-
<i>Eupatorium cannabinum</i>	-	-	-	+

EXOTIC USEFUL PLANTS CULTIVATED IN THE GREENHOUSE COMPLEX OF THE BOTANICAL GARDEN FROM IAȘI (NOTE II)

VIOLETA FLORIA TĂNĂȘESCU*, GEORGETA TEODORESCU*

Abstract: The paper presents fifty-eight different exotic species of medical interest cultivated within the Greenhouse Complex of the Botanical Garden from Iași. The classification of the species has been made according to the family, the origin, the lifetime, the type of greenhouse and the harvested part of the plant. The medicinal properties of the species known only as decorative are presented too.

Key words: medicinal plants, exotic plants, greenhouse, Botanical Garden

Introduction

In the Greenhouse Complex of the Botanical Garden from Iași are cultivated many tropical and subtropical plants with different usage. Among these, in the first paper (note) have been presented the plants used as food supplement (forty-five species).

As a results of the previous observations, this study contains information about the plants with medicinal properties, the majority being decorative.

The Phytotherapy, which has already overcome the area of popular medicine, is accepted today as an alternative therapy to the modern medicine. Lately, in our country and abroad, too, people tend to use a greater number of herbal products which contain either the herbal drugs or the extracts obtained from its.

It is a great opportunity to be able to do research, to present and inform the specialists and the visitor public about the herbs with therapeutic properties.

The exotic tropical and subtropical plants with medicinal properties are generously represented in dendro-horticultural collections.

Insufficient detailed information concerning the classification criteria, the producing technology or the breeding process especially for the exotic taxons grown in our climate conditions motivates our research.

Knowing the proven pharmacological activity we emphasized the aspect of the harvested part of the plant and the utilization of the herbal drug or the preparations obtained from its in therapy.

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Materials and methods

We have based our study research on the fifty-eight exotic tropical and subtropical plants with medicinal properties available in the collections in the Greenhouse Complex of the Botanical Garden from Iași.

The sources of the material come from international and internal exchange (seeds and cuttings) or from donations (plants and seeds).

All the species are listed in the alphabetical order of the latin names, along with information concerning: the origin, the lifetime, the type of greenhouse and the harvested part of the plant.

We presented, also, information about the uses of the herbal products, both in popular and modern medicine, in their origin area.

Results and discussions

The medical interest on the herbal products is increasing, mainly due to the frequent notes in mass-media lately.

It is considered today, in the world, that around 70% of mankind uses phytotherapy to treat most different diseases. In Romania the phytotherapy comes back up to date.

If the native plants are more or less known, the exotic plants considered mainly decorative are presented as described by foreign botanists and pharmacists.

So far it is known that out of the 200.000 species studied as medicinal herbs at least 20.000 are already researched and the list is not finished yet.

The continuing improvement of the researches in the field and even the reevaluated empiric old cures has given during the years great surprises.

Today it is known that the resin product “*Mastix*”, extract of *Pistacia lentiscus*, it is used to obtain the dental cement, and *Carica papaya* it is prescribed in intestinal worm control.

In the followings there are presented some of the medicinal uses of the studied exotic species: tonic, astringent: *Pastinaca lentiscus*; antidiarrhoeal: *Psidium guajava*, *Opuntia ficus-indica*; antibacterial: *Hedera helix*; in pulmonary diseases: *Areca catechu*; antiviral: *Eucalyptus globulus*; form uterus contraction after birth: *Acacia nilotica*; in the nervous system diseases: *Prunus laurocesalus*, *Passiflora incarnata*; in the circulatory diseases: *Cupressus sempervirens*, *Lavandula latifolia*, *Nerium oleander*; diuretics: *Arbutus unedo*, *Camellia sinensis*, *Ruscus aculeatus*; stimulants: *Alpinia officinarum*; hallucinogens: *Lophophora williamsii*, *Ipomaea violacea*; analgesic and bactericidal in stomatology: *Syzygium aromaticum*; for the obtaining of synthetic steroidal hormones: *Dioscorea batatas*, *Agave americana*; as food (supply): *Elettaria cardamomum*, *Dioscorea bulbifera*, *Ceratonia siliqua*, *Persea americana*, *Stevia rebaudiana*, *Theobroma cacao*; antiplatelet agents: *Abrus precatorius*, *Ananas comosus*, *Myrtus communis*; laxative: *Aloë ferox*, *Ficus carica*, *Ilex aquifolium*; vitamin supplements: *Citrus limon*, *C. paradisi*, *C. reticulata*, *C. sinensis*, *Punica granatum*; in liver diseases: *Olea europaea*, *Mangifera indica*, *Oryza sativa*, *Piper nigrum*, *Carica papaya*; immunomodulators: *Saccharum officinarum*; in respiratory diseases: *Drosera rotundifolia*, *Cinnamomum camphora*.

The studied plants belong to thirty-six botanic families.

The 58 taxons with medicinal properties cultivated in the Greenhouse Complex of the Botanical Gardens from Iași (table no.1) have been systematized according to the

lifetime: trees, shrubs, sub-shrubs (41 taxons) and herbaceous plants (17 taxons), out of which 14 are perennial and 3 are annual plants.

The culture of medicinal greenhouse plants is directly influenced by the pedo-climatic conditions in which the plants have grown.

Considering the origin of the 58 taxons involved in the study and accordingly with special demands, a cultivation repartition can be made: in cold greenhouses (24 taxons), in temperate greenhouses (14 taxons), in warm greenhouses (20 taxons).

In the first greenhouse category, during the winter-time, the temperature is between 5-12⁰C; during summer-time the temperature is maintained at 16-20⁰C.

The plants of the temperate greenhouses need in winter a temperature between 8-10° C, in summer, the temperature is 18-20° C; and the plants of the warm greenhouses need a temperature of 18-20° C in winter and 20-25° C in summer.

The plants in warm greenhouses have special demanding cultivation similar to those of the temperate greenhouses, with the distinction that the last need a higher humidity in the atmosphere.

In general, the plant watering is accordingly with the vegetation period meaning that it is less in the winter, more frequent in the spring and abundant in the summer (the active time). In the autumn the decreasing of watering program coincides with the slowing down of the vital functions, except the plants with hibernal vegetation.

During the summer-time some of the taxons (*Arbutus unedo*, *Buxus sempervirens*, *Camellia sinensis*, *Ilex aquifolium*, *Nerium oleander*) grown in flower pots or tubs are taken out in the garden, but kept away from direct sunlight.

Our own experiments have shown that the best soil mixture, for a good growth of the involved taxons in greenhouse conditions, is made out garden soil, leaves soil, coniferous soil, manure and sand (2:2:1:1:1).

Complex fertilizers NPK (solved in water, in a concentration of 0,3-0,5% - nutritive solution on the soil) have been used once a week in the summer time. Also, it is necessary to provide a good draining for the culture pots (flower ceramic pots, wooden tubs).

The multiplication of these plants as seeds and can be realized through: seeds (*Cassia fistula*, *Cassia angustifolia*, *Coffea arabica*, *Theobroma cacao*, *Eucalyptus globulus*, *Stevia rebaudiana*, *Abrus precatorius*, *Punica granatum* etc). Vegetative multiplication is possible through: cuttings (*Coffea arabica*, *Olea europaea*, *Rosmarinus officinalis*, *Passiflora incarnata*, *Piper nigrum*, *Hedera helix*, *Buxus sempervirens*, *Vanilla planifolia* etc.); suckers (*Agave americana*, *Aloë ferox*, *Elettaria cardamomum*); grafting (*Citrus limon*, *C. maxima*, *C. paradisi*, *C. reticulata*, *C. sinensis*).

The cultivation in greenhouse conditions. Some of these plants have fructified: all species of *Citrus* sp., *Aloë barbadensis*, *A. succotrina*, *Passiflora incarnata*, *Abrus precatorius*, *Agave americana*, *Coffea arabica*, *Drosera rotundifolia*, *Opuntia ficus-indica*, *Punica granatum*, *Oryza sativa*, *Theobroma cacao*.

For each herb only the richest parts in active compounds are harvested (table no.1).

Conclusions

1. This paper presents 58 taxons of exotic plants with medicinal properties from the culture collection of the Greenhouses Complex of the Botanical Gardens from Iași.
2. The study material includes 36 botanical families. The majority (41 species) are trees, 14 are perennial herbaceous plants and 3 are annual herbaceous plants.
3. We have realized the classification of these plants, listing them in the alphabetical order of their latin names, according with their origins, the lifetime, the type of greenhouse and the harvested parts.
4. For some of the species cultivated only as decorative, there are listed its medicinal properties.
5. As the study has shown that the tropical and subtropical plants have adapted quite-well to protected spaces, meaning that they bloom and fructify.

References

1. BRUMMITT K.R., Powell E.C., 1992 – *Authors of plant names*, Royal Botanic Gardens, KEW.
2. CIULEI I., GRIGORESCU EM., STĂNESCU URSULA, 1993 – *Plante medicinale, fitochimie și fitoterapie I-II*. Edit. Medicală, București
3. ENCKE F., 1958-1961 – *Pareys Blumengartnerei*, **1,2**, Index, P. Parey Verlag, Berlin, Hamburg
4. GRIGORESCU EM., LAZĂR M., STĂNESCU URSULA, CIULEI I., 2001 – *Index fitoterapeutic*. Edit. Cantes, Iași
5. JACOBSEN H., 1970 – *Das Sukkulenten Lexicon*. VEB Gustav Fischer Verlag, Jena
6. SCHULTES R. E., HOFFMANN A., 1980 – *Pflanzen der Gatter*. Halwg Verlag, Bern
7. TEODORESCU GEORGETA, 2003 – *Secția „Complexul de Sere”* în: „Grădina Botanică Anastasie Fătu” Ghid (ediția a 4-a). Edit. Univ. “Alex. I. Cuza”, Iași: 17-35
8. TEODORESCU GEORGETA, TOMA C., MITITIUC M., 1998 – *Observații privind colecția de ficuși cultivați în Complexul de Sere al Grădinii Botanice din Iași*. Bul. Grăd. Bot. Iași, **7**: 131-140
9. TEODORESCU GEORGETA, TONIUC ANGELA, VERDEȘ CAMELIA, 1999 – *Plante utile exotice cultivate în serele Grădinii Botanice din Iași (Nota I)*. Lucr. Șt., Univ. Agron. Iași, Ser. Hort., **1**(42):: 265-273



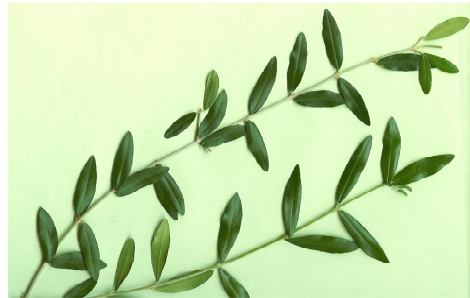
Cassia angustifolia Vahl



Elettaria cardamomum (L.) Maton



Olea europaea L.



Arbutus unedo L.



Ficus carica L.



Lophophora williamsii (Lem. ex Salm-Dyck) Coult



Oryza sativa L.



Rosmarinus officinalis L.



Theobroma cacao L.

Table 1
Exotic taxons having medicinal properties

Nr. crt.	Latin name	Family	Origin	Life form	Greenhouse type	Harvest edparts
1.	<i>Abrus precatorius</i> L.	Fabaceae s. l.	Africa, Asia, Central America	shrub, liane	warm	leaves, roots, whole plant, seeds
2.	<i>Acacia nilotica</i> (L.) Delile	Fabaceae s. l.	Africa, Tropical Asia	tree	temperate	leaves, fruits, bark
3.	<i>Adiantum capillus-veneris</i> L.	Adiantaceae	Tropical America	perennial	cold	fronde
4.	<i>Agave americana</i> L.	Agavaceae	Central America	perennial	temperate	leaves
5.	<i>Aloë barbadensis</i> Mill.	Liliaceae	South Europe, Canare Islands, South America	low shrub	temperate	aerian part
6.	<i>Aloë ferox</i> Mill.	Liliaceae	South Africa	tree	temperate	leaves
7.	<i>Aloë succotrina</i> Lam.	Liliaceae	South Africa	shrub	temperate	aerian part
8.	<i>Alpinia officinarum</i> Hance	Zingiberaceae	South China	perennial	warm	roots
9.	<i>Ananas comosus</i> (L.) Merr.	Bromeliaceae	Brasil	perennial	warm	leaves, stems, fruits
10.	<i>Arbutus unedo</i> L.	Ericaceae	South Europe	shrub	cold	leaves and roots
11.	<i>Areca cathechu</i> L.	Arecaceae	Malaysian arhipelago	tree	warm	leaves, fruits, seeds
12.	<i>Buxus sempervirens</i> L.	Buxaceae	Mediterranean Region	low shrub	cold	root, leaves
13.	<i>Camellia sinensis</i> (L.) Kuntze	Theaceae	Japan, China, Korea	shrub, tree	cold	leaves
14.	<i>Carica papaya</i> L.	Caricaceae	Mexic, Molluce Islands	tree	warm	fruct, whole tree
15.	<i>Cassia angustifolia</i> Vahl	Fabaceae s. l.	Tropical Africa	shrub	warm	fruits, leaves
16.	<i>Cassia fistula</i> L.	Fabaceae s. l.	Tropical Asia	tree	warm	fruits, leaves, roots
17.	<i>Ceratonia siliqua</i> L.	Fabaceae s. l.	Mediterranean Region	shrub	cold	fruits, seeds
18.	<i>Cinnamomum camphora</i> (L.) Siebold	Lauraceae	China, Japan	tree	warm	roots, whole aerian part
19.	<i>Citrus limon</i> (L.) Burm.	Rutaceae	South-East Asia	tree	cold	fruits
20.	<i>Citrus maxima</i> (Burm.) Merr.	Rutaceae	Malaysian Arhipelago	tree	cold	fruits
21.	<i>Citrus paradisi</i> Macfarl	Rutaceae	South-West Asia	tree	cold	leaves, fruits
22.	<i>Citrus reticulata</i> Blanco	Rutaceae	China, Indonezia	shrub-tree	cold	fruit
23.	<i>Citrus sinensis</i> (L.) Pers.	Rutaceae	China, Indonezia, Birmania, India	shrub	cold	fruits, leaves, flowers
24.	<i>Coffea arabica</i> L.	Rubiaceae	Tropical Africa	tree	warm	seeds
25.	<i>Cupressus sempervirens</i> L.	Cupressaceae	Mediterranean Region	tree	cold	immature cones, alive branches
26.	<i>Dioscorea batatas</i> Decne.	Dioscoreaceae	China, Korea, Japan	perennial herbaceous, liane	warm	buds, tubercles, seeds

27.	Dioscorea bulbifera L.	Dioscoreaceae	Tropical regions	perennial herbaceous, liane	warm	buds, tubercles, seeds
28.	Drosera rotundifolia L.	Droseraceae	Temperate Europe	perennial	cold	aerian parts
29.	Elettaria cardamomum (L.) Maton	Zingiberaceae	Sri Lanka, India	perennial	warm	seeds
30.	Eucalyptus globulus Labill.	Myrtaceae	Australia	tree	temperate	leaves
31.	Ficus carica L.	Moraceae	Mediterranean Region	shrub	cold	fruits
32.	Hedera helix L.	Araliaceae	Europa	perennial, liane, herbaceous	cold	leaves, stem
33.	Ilex aquifolium L.	Aquifoliaceae	Central Europe and the South, North Africa, West of Asia to China	shrub-tree	cold	root, leaves
34.	Ipomoea violacea L.	Convolvulaceae	Tropical America	annual grabbing	temperate	seeds
35.	Laurus nobilis L.	Lauraceae	Mediterranean Region	shrub	cold	leaves, fruits
36.	Lavandula latifolia (L.) Medik.	Lamiaceae	Mediterranean part	low shrub	temperate	flowers
37.	Lophophora williamsii (Lem. ex Salm-Dyck) Coult.	Cactaceae	S.U.A., Mexic	perennial	temperate	aerian part
38.	Mangifera indica L.	Anacardiaceae	India	tree	warm	bark, leaves, fruits, seeds
39.	Myrtus communis L.	Myrtaceae	Mediterranean Region	shrub	cold	leaves, seeds
40.	Nerium oleander L.	Apocynaceae	Mediterranean Region	shrub	cold	leaves, roots
41.	Olea europaea L.	Oleaceae	Mediterranean Region	tree	cold	leaves, fruits
42.	Opuntia ficus-indica (L.) Mill.	Cactaceae	Tropical America	shrub	temperate	flowers, fruits
43.	Oryza sativa L.	Poaceae	Indochina, Indonezia, Filipine	annual	temperate	seeds, roots
44.	Panax ginseng C.A. Meyer	Araliaceae	Far East	perennial	cold	root
45.	Passiflora incarnata L.	Passifloraceae	South Regions of U.S.A.	perennial, herbaceous, liane	temperate	aerian parts
46.	Persea americana Mill.	Lauraceae	Central America	shrub	warm	fruits, bark
47.	Piper nigrum L.	Piperaceae	Tropical India (Malabar coast)	shrub, liane	warm	fruits
48.	Pistacia lentiscus L.	Anacardiaceae	Mediterranean Region	shrub	temperate	stem
49.	Prunus laurocerasus L.	Rosaceae	South-East Europe, Middle East	shrub	cold	leaves
50.	Psidium guajava L.	Myrtaceae	Tropical America	tree	warm	seeds

51.	Punica granatum L.	Punicaceae	South and East Europe to Hymalaia	shrub-tree	cold	bark roots and stem, fruits, seeds
52.	Rosmarinus officinalis L.	Lamiaceae	Mediterranean region	low shrub	cold	leaves, blooming
53.	Ruscus aculeatus L.	Liliaceae	South Europe, North Africa	low shrub	cold	root, rhizoms
54.	Saccharum officinarum L.	Poaceae	Tropical India	perennial	warm	stem
55.	Stevia rebaudiana (Bertoni) Hemsl.	Asteraceae	Brasil, Paraguay	annual	temperate	aerian part
56.	Syzygium aromaticum (L.) Merr. et L.M.Perry (sin. Eugenia caryophyllata Thunb.)	Myrtaceae	Sonde Arhipelago, Mauritius Island, Madagascar	tree	warm	flower-buds
57.	Theobroma cacao L.	Sterculiaceae	South and Central America	shrub	warm	seeds
58.	Vanilla planifolia Andrews	Orchidaceae	Tropical America	perennial, herbaceous, lians	warm	fruits

**IS JASIONE HELDREICHII BOISS. ET ORPH. SYNONYM
TO J. JANKAE NEILR.?
V. CIOCÂRLAN***

Summary: In the „Flora of Romania” *Jasione jankae* is presented as a synonym name at *J. heldreichii* Boiss. et Orph. After an analysis of some samples collected from the “locus classicus” (Mountain Treșcovăț, Banat), we are demonstrating that *J. heldreichii* and *J. jankae* are two separated plant species, point of view backed by Janka & Hayek.

Key words: *Jasione heldreichii*, synonymy, *Jasione jankae*.

This taxa is spread in Caraș-Severin and Mehedinți counties, between Gura Văii and Svinița, on a distance of ca. 70 Km, along the Danube river, on rocky fields (3).

In the botanical reference material, this taxa has various values and names, thus:

1. *J. montana* L. var. *dentata* A. DC. (1);
2. *J. dentata* (DC.) Hel. (2, 3, 6);
3. *J. jankae* Neilr. (5);
4. *J. heldreichii* Boiss. et Orph. (incl. *J. jankae* Neilr.) (7, 8).

In herbariums, there are the same differences between authors:

1. *J. jankae* Neilr. Herb. BUAG, the Mountain of Treșcovăț, Janka, 1870;
2. *J. jankae* Neilr. Herb. Cluj, Vârciorova, Prodan, 1909;
3. *J. jankae* Neilr. var. *subulata* Simk. Herb. BUCA, between Vârciorova and Gura Văii, Prodan, 1919;
4. *J. dentata* (DC.) Hel., Fl. Rom. Exs., 3278, Borza and colab., 1941, Tricule prope Svinița.

In July, 2003, the author of this paper, has collected from the Mountain of Treșcovăț some specimens of *Jasione*, which, after an analyzing of them, proved to be *J. jankae*, and not *J. heldreichii*. These two taxa must be considered as separated plant species, like Hayek proceeded to (5), thus existing herbarium materials collected by Janka and Prodan.

Here are the difference features of the two taxa:

Jasione heldreichii Boiss. et Orph. (*J. dentata* (A. DC.) Halácsy) (Fig. No. 1) is an annual-biannual species, without steril and leaved offsprings; rarely exists basal leaves in rosettes. The stem is of 20-40 cm in height. The whole plant has hispid hairs; sometimes, the plant is glabrous or nearly glabrous. The leaves are linear-lanceolate, those on the stem are sesil, distanced dentated, of 15-30 mm longer and 2-4 mm wide. The involucrel hypsophylla are lanceolated, distanced and deeply dentated, having acuminate-aristated teeth. $2n = 12$ (8).

Spread in Romania: between Gura Văii (Mehedinți county) and Svinița (Caraș-Severin county), also at Băile Herculane, on rocky fields (3).

General area: Albania, Bulgaria, Greece, Yugoslavia, Romania (8). Inside of this area is included, also, *J. jankae* (8). Accordingly Hayek (5), this species is spreaded only in Bulgaria, Thracia, Macedonia, and Thesalia.

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J. jankae Neilr. (Fig. No. 2) is a perennial plant species, having sterile and leaved offsprings at the base of plant. There are numerous stems, glabrous in the higher part, of 20-40 cm in height. The leaves are narrow-linear, of 1-2 mm wide, those on the stems are sessile, of 2-3 cm in length, those of the sterile offsprings are of 3-7 cm in length, being long-petiolated. The lamina is sparing and distanced dentated. The involucreal hypsophylla are lanceolated, distanced dentated, having acuminate teeth.

Spread in Romania: in rocky fissures, on the Mountain of Treșcovăț, Vârciorova, between Vârciorova and Gura Văii.

General area: Serbia, Bulgaria, Macedonia (5); thus, this species has a northern area in comparison with *J. heldreichii*.

Discussion concerning the diagnosis: the description of this species in Flora of Romania, tome no. IX (3), as well as the iconography from the Plate no. 24, Fig. no. 4, is corresponding, in a great part, to the one of the taxon *J. jankae*, which is a perennial plant species, and *J. heldreichii* is annual (7) or biannual one (8). The height of this species is 20-40 cm for both of the taxa, not of 10-22 cm in height (3). The spread and the ecology are not different, due to the fact that the author synonymize the two taxa. In *Flora Europaea*, Tome no. 4 (8), there is a nuance concerning the synonymy of those two taxa, cited *J. heldreichii* inclusively *J. jankae*. This statement draw the attention over the taxonomical interpretation of the two taxa.

In conclusion, we consider, as Hayek do it already (59), the taxa *J. heldreichii* and *J. jankae* are not synonymous, and, therefore, they must be treated as different plant species.

In Romania, there are growing both of the species. The material from Fl. Rom. Exs. no. 3278 is *J. heldreichii*, and our material from the Mountain of Treșcovăț, is *J. jankae*.

References

1. BOISSIER E., 1875 – Flora Orientalis III, Genevae et Basileae
2. BORZA AL., 1949 – Conspectus Florae Romaniae, f. II. Cluj
3. GHIȘA E., 1964 – Genul *Jasione* în Fl. RPR IX. București
4. HALÁCSY E., 1902 – Conspectus Florae Graecae II. Lipsiae
5. HAYEK A., 1931 – Prodrromus Florae Peninsulae Balcanicae 2. Dahlem bei Berlin
6. PRODAN I., 1939 – Flora pentru determinarea și descrierea plantelor ce cresc în România. I, II. Cluj
7. STOJANOV N. ET STEFANOV B., 1948 – Flora na Bălgaria, Sofia
8. TUTIN T., 1976 – Genul *Jasione* în Flora Europae 4. Cambridge



Fig. 1 – *Jasione heldreichii* Boiss. ex Orph.



Fig. 2 – *Jasione jankae* Neilr.

CONSPECTUS OF THE VASCULAR FLORA FROM THE LEFT SIDE OF THE IZVORU MUNTELUI-BICAZ RESERVOIR

ZAMFIRESCU OANA*

Abstract: In the natural ecosystems from the left side of the Izvoru Muntelui-Bicaz reservoir, we identified 768 vascular species, belonging to 358 genera and 97 families.

Keywords: vascular flora, natural ecosystems, floristic conspectus

Introduction

The study area – the left side of the Izvoru Muntelui-Bicaz reservoir – is a part of the middle drainage basin of the Bistrița River, which belongs to the Oriental Carpathians. Existing in the fish unit, in the mixed forest level (coniferous and deciduous forests) and extending over approximately 144km², the study area was relatively poorly studied, given that most of the information was published in general works on Neamț County.

Material and Method

The research began in 1996 and finished in 2001. Initially, we carried out an extensive research in order to get a general idea about the target area. Secondly, followed an intensive stage that consisted in repeated identifications of the vascular species along several transects. This transects included all the relief forms and vegetation types in the area. Vascular species identification was performed according to prestigious works such as: Ciocârlan V., 2000 – Flora ilustrată a României, Pteridophyta et Spermatophyta, Prodan I., 1939-1044 - Flora pentru determinarea și descrierea plantelor ce cresc în România, Săvulescu, Tr. 1952-1976 – Flora R.P.R.-R.S.R., I-XIII, etc.

Results and Discussions

Fam. *Lycopodiaceae*: *Lycopodium annotinum* L.: Potoci, Hangu; *L. selago* L.: Potoci, Hangu, Grozăvești; Fam. *Equisetaceae*: *Equisetum arvense* L.: Potoci, Ruginești; *E. hyemale* L., Ruginești, Hangu, *E. palustre* L., Hangu, Poiana Largului; *E. sylvaticum* L., Hangu, *E. telmateia* Ehrh., Grozăvești; Fam. *Ophioglossaceae*: *Botrychium lunaria* (L.) Swartz, Potoci, Hangu, *Ophioglossum vulgatum* L., Hangu; Fam. *Polypodiaceae*: *Polypodium vulgare*, L., Potoci, Grozăvești, Hangu; Fam. *Dennstaedtiaceae*: *Pteridium aquilinum* (L.) Kuhn., Potoci, Ruginești, Grozăvești, Hangu; Fam. *Aspleniaceae*: *Asplenium ramosum* Hudson, Buhalnița, *A. trichomanes*, L., ssp. *trichomanes*, Ruginești, *Athyrium distentifolium* Tausch. ex Opiz., Ruginești, *A. filix-femina* (L.) Roth., Potoci, Hangu, *Cystopteris fragilis* (L.) Bernh., Potoci, Ruginești, Hangu, *C. montana* (Lam.) Desv., Grozăvești, *Dryopteris carthusiana* H.P. Fuchs, Potoci, Ruginești, *D. dilatata*

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(Hoffman) A. Gray, Potoci, *D. filix-mas* (L.) Schott, ssp. *filix-mas*, Dealul Frasinului, Potoci, Ruginești, Buhalnița, Hangu, *Gymnocarpium dryopteris* (L.) Newman, Hangu, *G. robertianum* (Hoffm.) Newman, Ruginești, *Polystichum aculeatum* (L.) Roth., Grozăvești, *P. braunii* (Spenner) Fée., Grozăvești, *P. lonchitis* L. (Roth.), Potoci, Ruginești, *P. setiferum* (Forskal) Woynar, Hangu; Fam. *Pinaceae* (*Abietaceae*): *Abies alba* Miller, Dealul Frasinului, Potoci, Ruginești, Hangu, Buhalnița, Grozăvești, Poiana Largului, *Picea abies* (L.) Karsten, Dealul Frasinului, Potoci, Ruginești, Hangu, Buhalnița, Grozăvești, Poiana Largului, Petru Vodă, *Larix decidua* Miller, ssp. *carpatica* (Dom.) Šiman Hangu, *Pinus sylvestris* L., Potoci, Ruginești, Buhalnița, Grozăvești, Poiana Largului; Fam. *Cupressaceae*: *Juniperus communis* L., ssp. *communis*, ienupăr, M., Circ., U2 R0 T0, 2n=22, Hangu; Fam. *Berberidaceae*: *Berberis vulgaris* L., Potoci; Fam. *Aristolochiaceae*: *Aristolochia clematitis* L., Hangu; *Asarum europaeum* L., Dealul Frasinului, Potoci, Ruginești, Buhalnița, Hangu; Fam. *Ranunculaceae*: *Aconitum degenii* Gayer, Ruginești, A. moldavicum Hacq., ssp. *moldavicum*, Hangu, *A. vulparia* Reichenb. ex Besser, ssp. *vulparia*, Hangu, *Actea spicata* L., orbalt, Potoci, Hangu, *Aquilegia vulgaris* L., Buhalnița, *Caltha palustris* L., Hangu, *Consolida regalis* S.F. Gray, ssp. *regalis*, Potoci, Ruginești, Hangu, *Isopyrum thalictroides* L., Potoci, *Trollius europaeus* L., ssp. *europaeus*, Ruginești, Hangu; *Anemone nemorosa* L., Ruginești, *A. ranunculoides* L., Ruginești, *A. sylvestris* L., Hangu, *Clematis alpina* (L.) Miller, Hangu, *C. recta* L. Grozăvești; *C. vitalba* L., Poiana Largului, *Hepatica nobilis* Schreber, Hangu, *H. transilvanica* Fuss., Hangu, *Ranunculus acris* L., ssp. *acris*, Hangu, *R. auricomus* L., H., Ruginești, *R. cassubicus* L., Ruginești, *R. ficaria* L., ssp. *bulbifer* (Albert) Lawalree, Dealul Frasinului, Potoci, Ruginești, *R. platanifolius* L., Ruginești, *R. polyanthemos* L., ssp. *polyanthemoides* (Boreau) Ahlfvengren, Hangu, Petru Vodă, *R. repens* L., Potoci, Ruginești, *R. sardous* Crantz, Potoci, Grozăvești, Hangu, *R. sceleratus* L., Potoci, Hangu, *R. strigosus* Scruv., Hangu, *Thalictrum flavum* L., Potoci, Ruginești, Hangu, *T. lucidum* L., Hangu, *T. minus* L., ssp. *minus*, Hangu; Fam. *Papaveraceae*: *Chelidonium majus* L., Potoci, Ruginești; Hangu, *Papaver dubium* L., ssp. *dubium*, Potoci; Fam. *Fumariaceae*: *Corydalis cava* (L.) Schweigg. et Koerte, ssp. *marschalliana* (Pallas) Hayek, Potoci, Ruginești, Hangu, *Fumaria schleicheri* Soy.-Willem., Hangu; Fam. *Ulmaceae*: *Ulmus glabra* Hudson, Hangu, *U. minor* Miller, Hangu; Fam. *Cannabaceae*: *Humulus lupulus* L., Grozăvești; Fam. *Urticaceae*: *Urtica dioica* L., Potoci, Ruginești, Grozăvești, Hangu, *U. urens* L., Dealul Frasinului, Potoci, Ruginești; Fam. *Fagaceae*: *Fagus orientalis* Lipsky, Potoci, *F. sylvatica* L., ssp. *sylvatica*, Dealul Frasinului, Potoci, Ruginești, Buhalnița, Hangu, Poiana Largului, *Quercus petraea* (Mattuschka) Liebl., Grozăvești; Fam. *Betulaceae*: *Alnus glutinosa* (L.) Gaertner, Potoci, Buhalnița, *A. incana* (L.) Moench., Potoci, Buhalnița, Hangu, *Betula pendula* Roth., Potoci, Ruginești, Buhalnița, Hangu; Fam. *Corylaceae*: *Carpinus betulus* L., Dealul Frasinului, Hangu, *Corylus avellana* L., Dealul Frasinului, Potoci, Ruginești, Buhalnița, Grozăvești, Hangu, Poiana Largului; Fam. *Portulacaceae*: *Portulaca oleracea* L., Hangu, Chirițeni; Fam. *Caryophyllaceae*: *Arenaria serpyllifolia* L., Potoci, *Cerastium arvense* L., Potoci, *C. fontanum* Baumg., ssp. *fontanum*, Potoci, *C. holosteoides* Fries. ampl. Hyl., Ruginești, *C. semidecandrum* L., Hangu, *Dianthus armeria* L., ssp. *armeria*, Chirițeni, *D. carthusianorum* L., Ruginești, Hangu, *D. superbus* L., Hangu, *D. tenuifolius* Schur., Hangu, *Lychnis flos-cuculi* L., Ruginești, *L. viscaria* L., ssp. *viscaria*, Ruginești, *Minuartia setacea* (Thuill.) Hayek. ssp. *setacea*, Chirițeni, *Moehringia trinervia* (L.) Clairv., Potoci, *Sagina procumbens* L., Hangu, *Silene alba* (Miller) E.H.L. Krause, Hangu, Poiana Largului, *S. heuffelii* Soó., Hangu, *S. nutans* (Herbich.) Zapol., ssp. *nutans*, Hangu, *S. otites* L. Wib., ssp. *otites*, Ruginești, *S. vulgaris* (Moench.) Garcke, ssp. *vulgaris*, Ruginești, Hangu, *S. zawadzkyi* (Herbich.) A. Braun, Hangu, Chirițeni, *Stellaria graminea* L.,

Ruginești, *S. holostea* L., iarbă moale, *S. media* (L.) Vill., Ruginești, *S. nemorum* L., Potoci, *Herniaria glabra* L., Chirițeni, *H. incana* Lam., Ruginești, Grozăvești; Fam. *Amaranthaceae*: *Amaranthus crispus* (Lesp. et Thév.) N. Terracc., Potoci, Hangu; Fam. *Chenopodiaceae*: *Chenopodium album* L., var. *album*, Hangu, *C. bonus-henricus* L., Ruginești, *C. foliosum* (Moench.) Ascherson, Hangu; Fam. *Polygonaceae*: *Polygonum amphybium* L., Buhalnița, *P. aviculare* L., Potoci, Ruginești, Grozăvești, Hangu, *P. bistorta* L., Buhalnița, Hangu, *P. hydropiper* L., Hangu, *P. lapathifolium* L., ssp. *lapathifolium*, Potoci, Hangu, *Rumex acetosa* L., Potoci, Ruginești, Hangu, Poiana Largului, *R. acetosella* L., ssp. *acetosella*, Poiana Largului, *R. crispus* L., Ruginești, Grozăvești, *R. hydrolapathum* Hudson, Potoci, Ruginești, Hangu, *R. obtusifolius* L., ssp. *obtusifolius* Hangu, ssp. *sylvestris* (Wallr.) Čelak, , Ruginești, *R. palustris* Sm., Potoci, Hangu, *R. sanguineus* L., Motel Cristina, Ruginești, *R. stenophyllus* Ledeb., Potoci, Hangu; Fam. *Grossulariaceae*: *Ribes petraeum* Wulfen in Jacq., Potoci, Ruginești, *R. uva-crispa* L., Potoci, Ruginești, Hangu; Fam. *Crassulaceae*: *Sedum acre* L., Poiana Largului, *S. annuum* L., Potoci, *S. hispanicum* L., Ruginești, *S. maximum* (L.) Hoffm., Potoci, Hangu; Fam. *Saxifragaceae*: *Chrysosplenium alternifolium* L., Hangu, *Parnasia palustris* L., Potoci, Hangu, *Saxifraga paniculata* Miller., Ruginești, Grozăvești; Fam. *Rosaceae*: *Agrimonia eupatoria* L., ssp. *eupatoria*, Potoci, Ruginești, Grozăvești, *Alchemilla vulgaris* L. emend. Fröhner, Potoci, Ruginești, *Filipendula ulmaria* (L.) Maxim, Hangu, *F. vulgaris* Moench., Ruginești, Hangu, *Fragaria vesca* L., Dealul Frasinului, Potoci, Ruginești, Grozăvești, Hangu, Chirițeni, *F. viridis* Weston, ssp. *viridis*, Grozăvești, Hangu, *Geum allepicum* Jacq., Hangu, *G. rivale* L., Hangu, *G. urbanum* L., Dealul Frasinului, Motel Cristina, Potoci, Ruginești, Grozăvești, Hangu, *Potentilla anserina* L., Hangu, Poiana Largului, *P. arenaria* Borkh., ssp. *arenaria*, Ruginești, *P. argentea* L., ssp. *argentea*, Potoci, Ruginești, Hangu, *P. erecta* (L.) Rausch., Ruginești, Grozăvești, Hangu, *P. recta* L., ssp. *recta*, Motel Cristina, *P. reptans* L., Ruginești, Poiana Largului, *P. supina* L., Grozăvești, *Rosa canina* L., Potoci, Buhalnița, Hangu, *R. corymbifera* Borkh., Grozăvești, *R. pendulina* L., Buhalnița, *Rubus caesius* L., Ruginești, Grozăvești, Hangu, *R. candicans* Weihe ex Reichenb., ssp. *candicans*, Hangu, *R. hirtus* Waldst. et Kit, ssp. *hirtus*, Dealul Frasinului, Potoci, Ruginești, Hangu, *R. idaeus* L., Potoci, Ruginești, Hangu, *R. vestii* Focke, Hangu, *Sanguisorba minor* Scop., ssp. *minor*, Hangu, *Spiraea chamaedrifolia* L., Potoci, Ruginești, Hangu, *Crataegus monogyna* (Poiret) D.C., ssp. *monogyna*, Dealul Frasinului, Potoci, Ruginești, Hangu, *Malus sylvestris* (L.) Miller, Grozăvești, Chirițeni, Hangu, *Sorbus aucuparia* L., ssp. *aucuparia*, Potoci, Hangu, *S. torminalis* (L.) Crantz., Potoci, - *Cerasus avium* (L.) Moench., var. *sylvestris* Dealul Frasinului, Potoci, Ruginești, Buhalnița, Chirițeni, Hangu, *Padus avium* (Lam.) Gilib., ssp. *avium*, Hangu; Fam. *Fabaceae*: *Anthyllis vulneraria* L., ssp. *vulneraria*, Potoci, Ruginești, Buhalnița, Hangu, *Astragalus cicer* L., Grozăvești, Hangu, *A. glycyphyllos* L., Hangu, *A. onobrychis* L., ssp. *onobrychis*, Ruginești, *Chamaecytisus hirsutum* (L.) Link, ssp. *hirsutus*, Hangu, *Coronilla varia* L., Potoci, Hangu, *Cytisus nigricans* L., Hangu, *Dorycnium pentaphyllum* Scop., ssp. *herbaceum* (Vill.) Bonnier et Layens, Ruginești, *Genista tinctoria* L., ssp. *tinctoria*, drobiță, Eur., Ch.-N., U2,5 T3 R2, 2n=48, Potoci, Ruginești, Hangu, *Lathyrus niger* (L.) Bernh., Buhalnița, *L. pratensis* L., Buhalnița, Poiana Largului, *L. sylvestris* L., Grozăvești, *L. venetus* (Miller) Wohlff., Hangu, *L. vernus* (L.) Bernh., Hangu, Poiana Largului, *Lotus corniculatus* L., Potoci, Ruginești, Grozăvești, Hangu, *Medicago falcata* L., Potoci, Ruginești, Buhalnița, Grozăvești, Hangu, *M. lupulina* L., Potoci, Hangu, Poiana Largului, *M. sativa* L., Potoci, Hangu, Poiana Largului, *Melilotus albus* Medik., Grozăvești, *M. officinalis* Lam., Hangu, *Onobrychis viciifolia* Scop., Potoci, Ruginești, Hangu, *Ononis arvensis* L., Ruginești, *Robinia pseudacacia* L., Buhalnița, *R. viscosa* Vent, Buhalnița, *Trifolium alpestre* L., Potoci,

Ruginești, Buhalnița, Hangu, *T. arvense* L., ssp. *arvense*, Hangu, *T. aureum* Pollich., Hangu, *T. campestre* Schreber, Ruginești, Hangu, *T. hybridum* L., ssp. *hybridum*, Potoci, Hangu, *T. medium* L., ssp. *medium*, Ruginești, Grozăvești, *T. montanum* L., Hangu, Chirițeni, *T. ochroleucon* Hudson, Potoci, Hangu, *T. pannonicum* Jacq., Motel Cristina, Potoci, Ruginești, Buhalnița, Hangu, *T. pratense* L., ssp. *pratense*, Potoci, Ruginești, Hangu, *T. repens* L., ssp. *repens*, Potoci, Ruginești, Hangu, Poiana Largului, *T. spadiceum* L., Ruginești, Hangu, *Vicia cracca* L., Potoci, Hangu, *V. dumetorum* L., Hangu, Poiana Largului, *V. grandiflora* Scop., ssp. *grandiflora*, Potoci, Ruginești; *V. hirsuta* F. Gray, Grozăvești, Hangu, *V. sativa* L., ssp. *cordata* (Wulfen ex Hoppe) Battand, Ruginești, Buhalnița, Hangu, *V. sepium* L., Ruginești, Grozăvești, Buhalnița, Hangu, *V. sylvatica* L., Hangu, *V. tetrasperma* Schreber; Fam. *Lytraceae*: *Lytrum salicaria* L., Potoci, Ruginești, Hangu; Fam. *Onagraceae*: *Chamerion angustifolium* L. (Holub), Hangu; *C. Dodonaei* (Vill.) Holub, Potoci, *Circaea alpina* L., Buhalnița, Hangu, *C. lutetiana* L., Potoci, Hangu, *Epilobium collinum* C.G. Gmelin, Ruginești, Hangu, *E. hirsutum* L., Potoci, Ruginești, *E. montanum* L., Hangu, *Oenothera biennis* L., Hangu; Fam. *Elaeagnaceae*: *Hippophaë rhamnoides* L., ssp. *carpatica*, Potoci, Hangu; Fam. *Thymaceae*: *Daphne mazereum* Ruginești, Grozăvești, Hangu; Fam. *Cornaceae*: *Cornus mas* L., Dealul Frasinului, Potoci, Ruginești, Chirițeni, Hangu, Poiana Largului, *C. sanguinea* L., Potoci, Ruginești, Hangu, Fam. *Santalaceae*: *Thesium dollineri* Murb., ssp. *dollineri*, Potoci, Fam. *Loranthaceae*: *Viscum laxum* Boiss. et Reuter ssp. *abietis* (Wiesb.) O. Schwarz, Potoci, Hangu; Fam. *Celastraceae*: *Euonymus europaeus* L., Dealul Frasinului, Potoci, Ruginești, Fam. *Euphorbiaceae*: *Euphorbia agraria* Bieb., Hangu, *E. amygdaloides* L., Potoci, Ruginești, Grozăvești, Hangu, *E. carniolica* Jacq., Buhalnița, *E. cyparissias* L., Potoci, Ruginești, Hangu, *E. esula* L., Hangu, *E. platyphyllos* L., Potoci, Hangu, *E. stricta* L., Potoci, Ruginești, Buhalnița, Hangu, *E. villosa* Waldst. et Kit ex Willd., ssp. *villosa*, Hangu, *Mecurialis perennis*, Potoci, Hangu, Fam. *Rhamnaceae*: *Frangula alnus* Miller, Potoci, Ruginești, Hangu; Fam. *Aceraceae*: *Acer campestre* L., ssp. *campestre*, Dealul Frasinului, Potoci, Ruginești, Grozăvești, Hangu, *A. negundo* L., Dealul Frasinului, Potoci, Ruginești, Buhalnița, *A. platanoides*, Potoci, Ruginești, Buhalnița, Grozăvești, Hangu, *A. pseudoplatanus* L., Dealul Frasinului, Potoci, Ruginești, Buhalnița, Chirițeni, Hangu; Fam. *Oxalidaceae*: *Oxalis acetosella* L., Ruginești, Buhalnița, Hangu; Fam. *Geraniaceae*: *Erodium cicutarium* (L.) L'Hérit, Potoci, Ruginești, Grozăvești, Hangu, *Geranium palustre* L., Ruginești, *G. phaeum* L., Potoci, Ruginești, Chirițeni, *G. pratense* L., Potoci, Ruginești, Hangu, *G. robertianum* L., Dealul Frasinului, Potoci, Ruginești, Hangu, *G. sanguineum* L., Potoci, Ruginești, *G. sylvaticum* L., ssp. *sylvaticum*, Ruginești, Hangu; Fam. *Balsaminaceae*: *Impatiens noli-tangere* L., Hangu; Fam. *Linaceae*: *Linum austriacum* L., Potoci, Ruginești, Grozăvești, Hangu, *L. catharticum*, ssp. *catharticum*, Potoci, Ruginești, Grozăvești, Hangu, *L. flavum* L., Potoci, Hangu, *L. hirsutum* L., Potoci, Hangu; Fam. *Polygalaceae*: *Polygala amara* L., Hangu, *P. amarella* Crantz., Hangu, *P. comosa* Schkuhr, ssp. *comosa*, Ruginești, Hangu, *P. major* Jacq., Potoci, Hangu, *P. vulgaris* L., ssp. *vulgaris*, Potoci, Hangu; Fam. *Araliaceae*: *Hedera helix* L., Potoci, Ruginești, Hangu; Fam. *Apiaceae*: *Astrantia major* L., ssp. *major*, Ruginești, Hangu, Poiana Largului, *Eryngium campestre* L., Potoci, Ruginești, Hangu, *E. planum* L., Potoci, Hangu, *Sanicula europaea* L., Potoci, Grozăvești, Hangu; *Aegopodium podagraria* L., Potoci, Ruginești, *Angelica sylvestris* L., ssp. *sylvestris*, Hangu, *Bupleurum falcatum* L., ssp. *falcatum*, Potoci, Ruginești, *Carum carvi* L., chimen, Potoci, Ruginești, Buhalnița, Grozăvești, Hangu, *Chaerophyllum aromaticum* L., Ruginești, Buhalnița, Hangu, *C. aureum* L., Hangu, *C. bulbosum* L., ssp. *bulbosum*, Hangu, Poiana Largului, *C. hirsutum* L., Grozăvești, Hangu, *C. temulum* L., Buhalnița, Hangu, *Cnidium dubium* (Schkuhr) Thell., Ruginești, Buhalnița,

Hangu, *Conium maculatum* L., Ruginești, Buhalnița, *Daucus carota* L., ssp. *carota*, Potoci, Ruginești, Buhalnița, Grozăvești, Hangu, Chirițeni, Hangu, Poiana Largului, *Falcaria vulgaris* Bernh., Ruginești, *Ferulago campestris* (Besser) Grec., Hangu, *F. sylvatica* (Besser) Reichenb. Potoci, Hangu, *Heracleum sphondylium* L., ssp. *spondylium*, Potoci, Ruginești, Buhalnița, Hangu, *Laserpitium latifolium* L., Potoci, Hangu, *L. prutenicum* L., Potoci, Ruginești, *Pastinaca graveolens* Bieb., Hangu, *Peucedanum alsaticum* L., Potoci, Buhalnița, Hangu, *P. cervaria* (L.) Lapeyr., Hangu, *P. oreoselinum* (L.) Moench., Hangu, *Pimpinella major* (L.) Hudson, ssp. *rubra*, Ruginești, Hangu, *P. saxifraga* L., ssp. *saxifraga*, Potoci, Hangu, *Seseli annuum* L., Hangu, *S. libanotis* (L.) Koch., ssp. *libanotis*, Hangu; Fam. *Hypericaceae* (*Guttiferae*, *Clusiaceae*): *Hypericum hirsutum* Hangu, *H. maculatum* Crantz, ssp. *maculatum*, Hangu, *H. perforatum* L., Potoci, *H. tetraspermum* Fries, Potoci, Ruginești, Hangu; Fam. *Tiliaceae*: *Tilia cordata* Miller, Dealul Frasinului, Potoci, Poiana Largului; Fam. *Malvaceae*: *Althaea officinalis* L., ssp. *officinalis*, Hangu, *Lavatera thuringiaca* L., Hangu, *Malva sylvestris* L., ssp. *sylvestris*, nalbă, Ruginești, Hangu; Fam. *Violaceae*: *Viola arvensis* Murray, Potoci, Ruginești, Hangu, *V. canina* L., ssp. *canina*, Potoci, Ruginești, Buhalnița, Hangu, Chirițeni, Poiana Largului, *V. elatior* Fries, Potoci, Hangu, *V. odorata* L., Hangu, Poiana Largului, *V. reichenbachiana* Jordan ex Boreau, Potoci, Ruginești, Buhalnița, Hangu, *V. tricolor* L., ssp. *tricolor*, Potoci, Buhalnița; Fam. *Cistaceae*: *Helianthemum nummularium* (L.) Miller, ssp. *nummularium*, Hangu; Fam. *Tamaricaceae*: *Myricaria germanica* (L.) Desv., Hangu, Poiana Largului; Fam. *Brassicaceae*: *Alliaria petiolata* (Bieb.) Cavara et Grande, Potoci, Ruginești, Buhalnița, Hangu, *Alyssum alyssoides* (L.) L., Hangu, *A. desertorum* Stapf, bărbișoară, Hangu, *Arabis hirsuta* (L.) Scop, Grozăvești, Hangu, *A. turrata* L., Grozăvești, *Barbarea vulgaris* R. Br., ssp. *arcuata*, Potoci, *Berteroa incana* (L.) D.C., Potoci, Ruginești, Hangu, *Biscutella laevigata* L., ssp. *laevigata*, Hangu, *Bunias orientalis* L., Potoci, Ruginești, Hangu, *Camelina microcarpa* Andez. ex D.C., Hangu, *Capsella bursa-pastoris* (L.) Medik, Potoci, Ruginești, Grozăvești, Buhalnița, Hangu, *Cardamine amara* L., ssp. *amara*, Potoci, Ruginești, Hangu, *C. flexuosa* With. in Stokes, Hangu, *C. hirsuta* L., Potoci, Hangu, *C. impatiens* L., Potoci, Buhalnița, *C. pratensis* L., ssp. *pratensis*, Hangu, Poiana Largului, *Cardaminopsis arenosa* (L.) Hayec, ssp. *arenosa*, Hangu, *Cardaria draba* (L.) Desv., Potoci, Ruginești, Grozăvești, Hangu, *Dentaria bulbifera* L., Grozăvești, Hangu, *D. glandulosa* Waldst. et Kit., Potoci, Grozăvești, Hangu, *Descurainia sophia* (L.) Webb ex Prantl, Hangu, *Diplotaxis muralis* (L.) D.C., Potoci, *Draba nemorosa* L., Potoci, Ruginești, *Erysimum cuspidatum* (Bieb.), D.C., Hangu, *E. odoratum* Ehrh., Potoci, Hangu, *Isatis tinctoria* L., ssp. *tinctoria*, Hangu, *Lepidium campestre* (L.) R. Br., Hangu, *L. perfoliatum* L., Potoci, Hangu, *L. ruderales* L., Potoci, *Rorippa austriaca* (Crantz) Besser, Ruginești, Buhalnița, Hangu, *R. sylvestris* (L.) Besser, ssp. *sylvestris*, Potoci, Ruginești, Hangu, *Sinapis arvensis* L., Buhalnița, Grozăvești, Chirițeni, *Sisymbrium loeselii* L., Hangu, *S. officinale* (L.) Scop., Hangu, *S. orientale* L., Hangu, *S. strictissimum* L., Buhalnița, *Thlaspi arvense* L., Potoci, Ruginești, Buhalnița, Hangu, *T. perfoliatum* L., Hangu; Fam. *Resedaceae*: *Reseda lutea* L., Potoci, Fam. *Salicaceae*: *Populus tremula* L., Ruginești, Hangu, Poiana Largului, *Salix alba* L., Potoci, Ruginești, Buhalnița, Hangu, *S. aurita* L., Potoci, *S. caprea* L., Buhalnița, Hangu, *S. cinerea* L., Buhalnița, Hangu, *S. fragilis* L., Buhalnița, Grozăvești, Hangu, *S. purpurea* L., ssp. *purpurea*, Potoci, Hangu; Fam. *Ericaceae*: *Vaccinium myrtillus* L., Hangu, *V. vitis-idaea* L., Grozăvești, Hangu; Fam. *Pyrolaceae*: *Orthilia secunda* (L.) House, Potoci, Grozăvești, Hangu, *Pyrola rotundifolia* L., Potoci; Fam. *Monotropaceae*: *Monotropa hypopitys* L., Hangu; Fam. *Primulaceae*: *Lysimachia nummularia* L., Potoci, Ruginești, Hangu, *L. punctata* L., Hangu, *L. vulgaris* L., Potoci, *Primula elatior* (L.) L., ssp. *elatior*, Potoci, Ruginești, Buhalnița, Grozăvești,

Hangu, Poiana Largului, *P. veris* L., ssp. *veris*, Potoci, Ruginești, Buhalnița, Grozăvești, Hangu, Chirițeni, Poiana Largului; Fam. *Gentianaceae*: *Centaurium erythraea* Rafin, ssp. *erythraea*, Potoci, Ruginești, *Gentiana asclepiadea* L., Potoci, Hangu, *G. cruciata* L., Hangu, *G. utriculosa* L., Ruginești, *G. verna* L., Potoci, Buhalnița, Hangu, *Gentianella austriaca* J. Holub, Potoci, *G. lutescens* (Velen) J. Holub, Ruginești, Hangu, Chirițeni, *Gentianopsis ciliata* (L.) Ma., Potoci; Fam. *Apocynaceae*: *Vinca herbacea* Waldst. et Kit, Potoci, Ruginești, Buhalnița, Hangu, Chirițeni; Fam. *Asclepiadaceae*: *Vincetoxicum hirundinaria* Medikus, ssp. *hirundinaria*, Ruginești, Buhalnița, Hangu; Fam. *Oleaceae*: *Fraxinus excelsior* L., Potoci, Buhalnița, Hangu, *Ligustrum vulgare* L., Potoci, Hangu; Fam. *Solanaceae*: *Atropa belladonna* L., Potoci, Ruginești, Buhalnița, Grozăvești, Hangu, Chirițeni, *Hyoscyamus niger* L., Potoci, Ruginești, Grozăvești, Hangu, *Physalis alkekengi* L., Dealul Frasinului, Potoci, Ruginești, Hangu, *Solanum dulcamara* L., Potoci, Ruginești, Grozăvești, Hangu, *S. nigrum* L., Potoci, Buhalnița; Fam. *Convolvulaceae*: *Convolvulus arvensis* L., Potoci, Ruginești, Buhalnița, Grozăvești, Hangu, Chirițeni; Fam. *Cuscutaceae*: *Cuscuta epithymum* (L.) L., ssp. *trifolii* (Bab.) Berher, Potoci, Hangu, *C. europaea* L., ssp. *europaea*, Potoci, Hangu; Fam. *Menyanthaceae*: *Menyanthes trifoliata* L., Ruginești; Fam. *Boraginaceae*: *Anchusa gmelinii* Ledeb, Potoci, Hangu, *A. ochroleuca* Bieb., Potoci, Hangu, *Cerintho minor* L., ssp. *minor*, Potoci, Ruginești, Hangu, *Cynoglossum officinale* L., Hangu, *Echium vulgare* L., Potoci, Ruginești, Hangu, Chirițeni, *Lappula squarrosa* (Retz.) Dumort, Buhalnița, *Lithospermum arvense* L., Ruginești, Buhalnița, Hangu, *L. officinale* L., Potoci, Buhalnița, Hangu, *Myosotis arvense* Hill., ssp. *arvensis*, Ruginești, Buhalnița, Grozăvești, Hangu, Chirițeni, Poiana Largului, *M. caespitosa* C.F. Schultz, Buhalnița, Hangu, *M. scorpioides* L., Potoci, Ruginești, Hangu, Poiana Largului, *M. sylvatica* Ehrh. ex Hoffm., Potoci, Hangu, *Nonea pulla* D.C. in Lam. et D.C., Hangu, *Pulmonaria mollis* Wulfen ex Hornem, ssp. *mollissima*, Hangu, *P. officinalis* L., Potoci, Ruginești, Grozăvești, Hangu, *P. rubra* L., Dealul Frasinului, Potoci, Buhalnița, Hangu, *Symphytum cordatum* Waldst. et Kit, Dealul Frasinului, Potoci, Ruginești, Buhalnița, Hangu, Chirițeni, *S. officinale* L., ssp. *officinale*, Potoci, Ruginești, Hangu, *S. tuberosum* L., ssp. *tuberosum*, Hangu; Fam. *Verbenaceae*: *Verbena officinalis* L., Grozăvești; Fam. *Lamiaceae* (*Labiatae*): *Acinos alpinus* (L.) Moench., Potoci, Hangu, *A. arvensis* (Lam.) Dandy, Potoci, Hangu, *Ajuga chamaepytis* (L.) Schreber, ssp. *chamaepytis*, Potoci, Hangu, *A. genevensis* L., Hangu, *A. reptans* L., Ruginești, Buhalnița, Hangu, *Ballota nigra* L., ssp. *nigra*, Ruginești, Hangu, Chirițeni, *Clinopodium vulgare* L., Buhalnița, Chirițeni, *Galeopsis ladanum* L., Potoci, *G. speciosa* Miller, Potoci, Ruginești, Hangu, *G. tetrahit* L., Potoci, Ruginești, Buhalnița, Hangu, *Glechoma hederacea* L., Potoci, Ruginești, Buhalnița, Grozăvești, Hangu, *G. hirsuta* Waldst. et Kit, Potoci, Ruginești, Buhalnița, Grozăvești, Hangu, *Lamium album* L., Dealul Frasinului, Potoci, Ruginești, Buhalnița, Hangu, Poiana Largului, *L. galeobdolon* (L.) L., ssp. *galeobdolon*, Potoci, Ruginești, Buhalnița, Grozăvești, Hangu, Chirițeni, Poiana Largului, *L. maculatum* L., ssp. *maculatum*, Potoci, Ruginești, Buhalnița, Hangu, Chirițeni, Poiana Largului, *L. purpureum* L., Potoci, Hangu, *Leonurus cardiaca* L., ssp. *villosus*, Potoci, Ruginești, Hangu, *Lycopus europaeus* L., Potoci, Ruginești, Buhalnița, Hangu, *Marrubium peregrinum* L., Hangu, *Mentha aquatica* L., Potoci, Ruginești, Buhalnița, Hangu, Poiana Largului, *M. longifolia* (L.) Hudson, Potoci, Ruginești, Buhalnița, Hangu, *Nepeta nuda* L., Potoci, *Origanum vulgare* L., Dealul Frasinului, Potoci, Ruginești, Buhalnița, Grozăvești, Hangu, Chirițeni, *Phlomis tuberosa* L., Hangu, Chirițeni, *Prunella grandiflora* (L.) Scholler, Buhalnița, Hangu, *P. laciniata* (L.) L., Hangu, *P. vulgaris* L., Potoci, Buhalnița, Grozăvești, Hangu, Chirițeni, Poiana Largului, *Salvia austriaca* Jacq., Hangu, *S. glutinosa* L., Potoci, Ruginești, *S. nemorosa* L., ssp. *nemorosa*, Dealul Frasinului, Potoci, Ruginești, Hangu, Chirițeni, *S. pratensis* L., Dealul Frasinului,

Potoci, Ruginești, Buhalnița, Grozăvești, Hangu, Chirițeni, *S. verticillata* L., Potoci, Ruginești, Buhalnița, Grozăvești, Hangu, Chirițeni, Poiana Largului, *Scutellaria altissima* L., Potoci, *Stachys germanica* L., Dealul Frasinului, Potoci, Ruginești, Hangu, Chirițeni, *S. officinalis* (L.) Trev., Potoci, Hangu, *S. palustris* L., Potoci, Ruginești, Buhalnița, Hangu, *S. recta* L., Potoci, Ruginești, Hangu, *S. sylvatica* L., Dealul Frasinului, Potoci, Buhalnița, Grozăvești, Hangu, *Teucrium chamaedrys* L., Potoci, Ruginești, Hangu, *Thymus pannonicus* All., Potoci, Ruginești, Grozăvești, Hangu, Chirițeni, *T. pulegioides* L., ssp. *pulegioides*, Potoci, Ruginești, Buhalnița, Grozăvești, Hangu, Chirițeni, Poiana Largului; Fam. *Callitrichaceae*: *Callitriche cophocarpa* Sendtner, Hangu; Fam. *Plantaginaceae*: *Plantago lanceolata* L., Dealul Frasinului, Potoci, Ruginești, Buhalnița, Grozăvești, Hangu, Poiana Largului, *P. major* L., ssp. *major*, Potoci, Ruginești, Buhalnița, Grozăvești, Hangu, Chirițeni, Poiana Largului, *P. media* L., Potoci, Ruginești, Hangu, Poiana Largului; Fam. *Scrophulariaceae*: *Digitalis grandiflora* Miller, Buhalnița, Hangu, *Euphrasia hirtella* Jordan, Hangu, *E. officinalis* Schübler et Martens, ssp. *pratensis* Schübler et Martens, Ruginești, Buhalnița, Hangu, Chirițeni, *E. stricta* D. Wolff, ssp. *stricta*, Potoci, Buhalnița, Hangu, *Lathraea squamaria* L., Dealul Frasinului, Potoci, Ruginești, Buhalnița, Hangu; Chirițeni, *Linaria vulgaris* Miller, Potoci, Ruginești, Buhalnița, Grozăvești, Hangu, *Melampyrum arvense* L., Potoci, Ruginești, Buhalnița, Grozăvești, Hangu, *Melampyrum bihariense* A. Kerner, Dealul Frasinului, Ruginești, Buhalnița, Hangu; Chirițeni, *M. cristatum* L., Potoci, Hangu, *M. sylvaticum* L., Ruginești, Hangu, *Pedicularis exaltata* Besser, Hangu, *Rhinanthus angustifolius* C.C. Gmelin, ssp. *angustifolius*, Potoci, Ruginești, Buhalnița, Hangu, Chirițeni, Poiana Largului, *R. minor* L., Dealul Frasinului, Potoci, Ruginești, Grozăvești, Hangu, Chirițeni, Poiana Largului, *R. rumelicus* Velen., Potoci, Buhalnița, Hangu, Chirițeni, *Scrophularia nodosa* L., Potoci, Buhalnița, Hangu, Poiana Largului, *Verbascum alpinum* Turra, Hangu, *V. blattaria* L., Potoci, Ruginești, Buhalnița, Hangu; Chirițeni, Poiana Largului, *V. lychnitis* L., Hangu, *V. nigrum* L., ssp. *nigrum*, Dealul Frasinului, Potoci, Ruginești, Buhalnița, Hangu, Chirițeni, *V. phoeniceum* L., Hangu, *Veronica anagallis-aquatica* L., Ruginești, Hangu, *V. austriaca* L., ssp. *dentata* (F.W. Schmidt) Watzl H., Hangu, ssp. *austriaca*, Potoci, Ruginești, Buhalnița, Hangu, Chirițeni, Hangu, *V. beccabunga* L., Dealul Frasinului, Potoci, Ruginești, Buhalnița, Hangu, *V. chamaedrys* L., ssp. *chamaedrys*, Dealul Frasinului, Potoci, Ruginești, Buhalnița, Hangu, *V. hederifolia* L., ssp. *hederifolia*, Ruginești, Hangu, ssp. *triloba* (Opiz) Čelak, Hangu, *V. montana* L., Potoci, Hangu, *V. officinalis* L., Hangu, *V. orchidea* Crantz., Dealul Frasinului, Potoci, Ruginești, Buhalnița, Hangu, Chirițeni, *V. prostrata* L., Potoci, Ruginești, Hangu, *V. spicata* L., ssp. *spicata*, Ruginești, Hangu, *V. teucrium* L., ssp. *teucrium*, Hangu, *V. urticifolia* Jacq., Potoci; Fam. *Orobanchaceae*: *Orobanche alba* Stephan ax Willd., Hangu; Fam. *Campanulaceae*: *Campanula abietina* Griseb, Dealul Frasinului, Potoci, Ruginești, Buhalnița, Hangu, Chirițeni, Poiana Largului, *C. carpatica* Jacq., Hangu, Chirițeni, *C. cervicaria* L., H., Hangu, *C. glomerata* L.: ssp. *glomerata*, Dealul Frasinului, Potoci, Ruginești, Buhalnița, Grozăvești, Hangu, Chirițeni, Poiana Largului, ssp. *hispidata* (Witašek) Hayek, Hangu, *C. patula* L., Potoci, Ruginești, Grozăvești, Buhalnița, Hangu, Chirițeni, *C. persicifolia* L., Potoci, Ruginești, Hangu, *C. rapunculoides* L., Dealul Frasinului, Potoci, Ruginești, Buhalnița, Grozăvești, Hangu, Chirițeni, Poiana Largului, *C. rotundifolia* L., ssp. *rotundifolia*, Potoci, Hangu, Chirițeni, *C. serrata* (Kit) Hendrych, Potoci, *C. sibirica* L., ssp. *sibirica*, Potoci, Hangu, *C. trachelium* L., Dealul Frasinului, Potoci, Ruginești, Buhalnița, Hangu, Poiana Largului, *Phyteuma orbicularis* L., Hangu; Fam. *Rubiaceae*: *Asperula cynanchica* L., Potoci, *Cruciata glabra* (L.) Ehrend, Potoci, Ruginești, Buhalnița, *C. laevipes* Opiz, Potoci, Hangu, *Galium aparine* L., Dealul Frasinului, Potoci, Ruginești, Buhalnița, Hangu, Chirițeni, Poiana Largului, *G. mollugo* L.,

Potoci, Ruginești, Buhalnița, Grozăvești, Hangu, Poiana Largului, *G. octonarium* (Klokov) Pobed, Hangu, *G. odoratum* (L.) Scop., Dealul Frasinului, Potoci, Ruginești, Hangu, *G. palustre* L., ssp. *palustre*, Buhalnița, Hangu, *G. rubioides* L., ssp. *rubioides*, Ruginești, *G. schultesii* Vest, Potoci, Ruginești, Buhalnița, Hangu, Chirițeni, *G. verum* L., Dealul Frasinului, Potoci, Ruginești, Grozăvești, Hangu, Chirițeni, Poiana Largului; Fam. *Caprifoliaceae*: *Lonicera xylosteum* L., Potoci, Ruginești, Buhalnița, Hangu, Poiana Largului, *Sambucus ebulus* L., Dealul Frasinului, Potoci, Ruginești, Buhalnița, Hangu, Poiana Largului, *S. nigra* L., Dealul Frasinului, Potoci, Ruginești, Buhalnița, Hangu, Chirițeni, Poiana Largului, *S. racemosa* L., Ruginești, Hangu, Chirițeni, *Viburnum lantana* L., Dealul Frasinului, Potoci, Ruginești, Buhalnița, Hangu, Chirițeni, *V. opulus* L., Potoci, Ruginești, Hangu, Poiana Largului; Fam. *Adoxaceae*: *Adoxa moschatelina* L., Hangu; Fam. *Valerianaceae*: *Valeriana officinalis* L., Ruginești, Hangu, Chirițeni, *V. sambucifolia* (Reichenb.) Kabath., Buhalnița, *V. tripteris* L., Potoci, Ruginești, Buhalnița, Hangu, Chirițeni; Fam. *Dipsacaceae*: *Dipsacus fullonum* L., Potoci, Ruginești, Buhalnița, Hangu, Chirițeni, Poiana Largului, *D. laciniatus* L., Buhalnița, Poiana Largului, *D. pilosus* L., Hangu, *Knautia arvensis* (L.) Coulter, ssp. *arvensis*, Dealul Frasinului, Potoci, Ruginești, Buhalnița, Grozăvești, Hangu, Chirițeni, Poiana Largului, *Scabiosa columbaria* L., ssp. *columbaria*, Buhalnița, Hangu, *S. ochroleuca* L., sipică, Dealul Frasinului, Potoci, Ruginești, Buhalnița, Hangu, Chirițeni, Poiana Largului, *Succisa pratensis* Moench., Ruginești, Buhalnița, Hangu; Fam. *Asteraceae*: *Achillea collina* J. Becker, Potoci, Ruginești, *A. distans* Waldst. et Kit., ssp. *distans*, Potoci, Ruginești, Hangu, *A. millefolium* L., ssp. *millefolium*, Dealul Frasinului, Potoci, Ruginești, Buhalnița, *A. setacea* Waldst. et Kit, Potoci, Ruginești, Hangu, *A. stricta* (Koch.) Schleicher ex Greml, Hangu, *Adenostyles alliariae* (Gonon) A. Kerner, Hangu, *Antennaria dioica* (L.) Gaertner, Potoci, Ruginești, Buhalnița, Hangu, Chirițeni, *Anthemis tinctoria* L., ssp. *tinctoria*, Potoci, Hangu, ssp. *fussii* (Griseb.) Beldie, Potoci, Ruginești, Hangu, ssp. *subtinctoria* (Dobroc.) Soó., Hangu, *Arctium lappa* L., Dealul Frasinului, Potoci, Ruginești, Buhalnița; Hangu, *A. minus* Bernh., Potoci, *A. nemorosum* Lej., Potoci, Buhalnița, Hangu, Chirițeni, *A. pubens* Bab., Hangu, *A. tomentosum* Miller, Ruginești, Buhalnița, *Arnica montana* L., Grozăvești, *Artemisia absinthium* L., Dealul Frasinului, Potoci, Ruginești, Grozăvești, *A. annua* L., Hangu, *A. vulgaris* L., Potoci, Hangu; *Aster amellus* L., Potoci, Buhalnița, Hangu, Poiana Largului, *Bellis perennis* L., Dealul Frasinului, Potoci, Ruginești, Buhalnița, Grozăvești, Hangu, Chirițeni, Poiana Largului, *Bidens tripartita* L., Potoci, Ruginești, Hangu, *Carduus acanthoides* L., Potoci, Ruginești, Buhalnița, Hangu, *C. crispus* L., ssp. *crispus*, Ruginești, Hangu, *C. hamulosus* Ehrh., Hangu, *C. personatus* (L.) Jacq., ssp. *personatus*, Hangu, *Carlina acaulis* L., ssp. *acaulis*, Dealul Frasinului, Potoci, Ruginești, Buhalnița, Grozăvești, Hangu, *C. vulgaris* Potoci, Hangu, *Centaurea apiculata* L., ssp. *spinulosa* Hangu, *C. biebersteinii* D.C., Hangu, *C. indurata* Janka, Ruginești, Buhalnița, *C. jacea* L., Potoci, *C. phrygia* L., Potoci, Ruginești, Buhalnița, Hangu, Poiana Largului, *C. scabiosa* L., Dealul Frasinului, Potoci, Ruginești, Buhalnița, Grozăvești, Hangu, Chirițeni, Poiana Largului, *C. solstitialis* L., Potoci, Ruginești, Hangu, *Cirsium arvense* (L.) Scop, Dealul Frasinului, Potoci, Ruginești, Buhalnița, Hangu, Poiana Largului, *C. erisithales* (Jacq.) Scop., Potoci, Buhalnița, Hangu, Chirițeni, *C. furiens* Griseb. et Schrenk, Potoci, Ruginești, *C. oleraceum* (L.) Scop, Dealul Frasinului, Potoci, Ruginești, Hangu, Poiana Largului, *C. palustre* (L.) Scop, Buhalnița, Hangu, *C. pannonicum* (L. fil.) Link, Buhalnița, Hangu, *C. rivulare* (Jacq.) All., Potoci, Buhalnița, Hangu, *C. vulgare* (Savi.) Ten., Dealul Frasinului, Ruginești, Hangu, *Doronicum austriacum* Jacq., Potoci, Buhalnița, Hangu, *Echinops sphaerocephalus* L., Hangu, *Erigeron acer* L., ssp. *acer*, Ruginești, Hangu, *E. annuus* (L.) Pers, ssp. *annuus*, Potoci, Buhalnița, Hangu, Chirițeni, Poiana Largului, *Eupatorium*

cannabinum L., Potoci, Hangu, *Filago arvensis* L., Buhalnița, Hangu, *Galinsoga ciliata* (Rafin.) Blake, Buhalnița, *G. parviflora* Cav., Dealul Frasinului, Potoci, Ruginești, Buhalnița, Grozăvești, Hangu, Poiana Largului, *Homogyne alpina* (L.) Cass, Buhalnița, Hangu, *Inula britannica* L., Potoci, Ruginești, Hangu, *I. ensifolia* L., Ruginești, Hangu, *I. helenium* L., Ruginești, *I. hirta* L., Ruginești, Hangu, Poiana Largului, *I. salicina* L., ssp. *aspera* (Poiret) Hayek, Potoci, Ruginești, *Leucanthemum vulgare* Lam., ssp. *vulgare*, Dealul Frasinului, Potoci, Buhalnița, Grozăvești, Hangu, Poiana Largului, *L. waldsteinii* (Schultz Bip) Ponzar, Dealul Frasinului, Potoci, Ruginești, Buhalnița, Hangu, Poiana Largului, *Matricaria perforata* Mérat, Buhalnița, *M. recutita*, Potoci, Ruginești, Buhalnița, Hangu, Poiana Largului, *Petasites albus* (L.) Gaertner, Dealul Frasinului, Potoci, Ruginești, Hangu, Poiana Largului, *P. hybridus* (L.) P. Gaertner, Buhalnița, *Senecio doria* L., Potoci, Hangu, *S. erucifolius* L., Potoci, Buhalnița, *S. ovatus* (P. Gaertner, B. Meyer et Scherb.) Willd., Ruginești, *S. squalidus* L., Potoci, Hangu, *S. sylvaticus* L., Potoci, *S. vernalis* Waldst. et Kit, Buhalnița, Hangu, *Serratula radiata* (Waldst. at Kit.) Bieb., Potoci, Hangu, *S. tinctoria* L., Potoci, Ruginești, Buhalnița, Hangu, *Solidago virgaurea* L., ssp. *virgaurea*, Potoci, Ruginești, Hangu, *Tanacetum corymbosum* (L.) Schultz Bip., ssp. *corymbosum*, Potoci, Ruginești, Buhalnița, Grozăvești, Hangu, Poiana Largului, *T. vulgare* L., Ruginești, Hangu, *Telekia speciosa* (Schreber) Baumg., Potoci, Ruginești, Buhalnița, Hangu, *Tussilago farfara* L., Dealul Frasinului, Potoci, Ruginești, Buhalnița, Hangu, Chirițeni, Poiana Largului; *Aposeris foetida* (L.) Less., Hangu, *Cicerbita alpina* (L.) Wallr., Hangu, *Cichorium intybus* L., ssp. *intybus*, Dealul Frasinului, Potoci, Ruginești, Buhalnița, Grozăvești, Hangu, Chirițeni, Poiana Largului; *Crepis biennis* L., Potoci, Ruginești, Buhalnița, Hangu, Chirițeni, Poiana Largului, *C. foetida* L., ssp. Hangu, *Hieracium aurantiacum* L., Buhalnița, Hangu, Chirițeni, *H. bauhini* Besser., Potoci, Hangu, *H. bifidum* Kit ex Hornem, ssp. *bifidum*, Potoci, Hangu, *H. lactucella* Wallr., Hangu, *H. murorum* L., Buhalnița, *H. pilosella* L., Potoci, Buhalnița, *H. piloselloides* Vill., Buhalnița, Hangu, *H. sabaudum* L., Hangu, *H. transsylvanicum* Heuffel, Ruginești, Hangu, *Hypochoeris maculata* L., Dealul Frasinului, Ruginești, Hangu, *H. radicata* L., Ruginești, Buhalnița, Hangu, *Lapsana communis* L., ssp. *communis*, Dealul Frasinului, Potoci, Buhalnița, Hangu, Chirițeni, Poiana Largului, *Leontodon autumnalis* L., Potoci, Ruginești, Buhalnița, *L. hispidus* L., ssp. *hispidus*, Potoci, Buhalnița, Hangu, Chirițeni, *Mycelis muralis* (L.) Dumort, Potoci, Ruginești, *Picris hieracioides* L., ssp. *hieracioides*, Potoci, Ruginești, Buhalnița, *Scorzonera rosea* Waldst. et Kit, Buhalnița, *Sonchus arvensis* L., ssp. *arvensis*, Potoci, Ruginești, Buhalnița, Hangu, Chirițeni, Poiana Largului, *S. oleraceus* L., Potoci, *S. palustris* L., Hangu, *Taraxacum officinale* Weber ex Wiggers, Dealul Frasinului, Potoci, Ruginești, Buhalnița, Grozăvești, Hangu, Poiana Largului, *Tragopogon dubius* Scop, Potoci, Ruginești, Buhalnița, Grozăvești, Hangu, Chirițeni, Poiana Largului, *T. pratensis* (L.) Celak, ssp. *orientalis*, Hangu; Fam. *Alismataceae*: *Alisma plantago-aquatica* L., Potoci, Ruginești, Hangu; Fam. *Butomaceae*: *Butomus umbellatus* L., Potoci, Hangu; Fam. *Potamogetonaceae*: *Potamogeton natans* L., Ruginești, Hangu; Fam. *Trilliaceae*: *Paris quadrifolia* L., dalac, H., Eua., U3,5 T0 R4, 2n=20, Potoci, Buhalnița, Hangu; Fam. *Liliaceae*: *Veratrum album* ., ssp. *album*, Dealul Frasinului, Hangu, *Colchicum autumnale* L., Potoci, Ruginești, Buhalnița, Grozăvești, Hangu, Chirițeni, Poiana Largului, - *Anthericum ramosum* L., Buhalnița, *Gagea lutea* (L.) Ker.-Gawl., Hangu, *Lilium martagon* L., Hangu, *Scilla bifolia* L., ssp. *bifolia*, Dealul Frasinului, Potoci, Ruginești, Buhalnița, Hangu, *Muscari tenuiflorum* Tausch., Hangu, *Asparagus officinalis* L., Dealul Frasinului, Potoci, Buhalnița, Hangu, *A. tenuifolius* Lam., Potoci, Hangu, *Convallaria majalis* L., Dealul Frasinului, Potoci, Ruginești, Grozăvești, Hangu, *Polygonatum latifolium* (Jacq.) Desf., Dealul Frasinului, Potoci, Ruginești, Buhalnița, *Polygonatum odoratum* (Miller)

Druce, Potoci, Ruginești, Grozăvești, Hangu, Chirițeni; Fam. *Alliaceae*: *Allium paniculatum* L., Hangu, *A. rotundum* L., ssp. *rotundum*, Potoci, Ruginești; Fam. *Amaryllidaceae*: *Galanthus nivalis* L., Potoci, Hangu; Fam. *Iridaceae*: *Crocus vernus* (L.) Hill., Potoci, *Gladiolus imbricatus* L., Potoci, Ruginești, Hangu; Fam. *Orchidaceae*: *Cypripedium calceolus* L., 2n=20, *Anacamptis pyramidalis* (L.) L.C.M. Richard, Potoci, Ruginești, Hangu, Chirițeni; *Cephalanthera damasonium* (Miller) Druce, Potoci, Hangu, *C. longifolia* (L.) Fritsch., Hangu, *C. rubra* (L.) L.C.M. Richard, Potoci, Ruginești, Hangu, *Dactylorhiza fistulosa* (Reichenb.) P.F. Hunt et Summerhayes, Hangu, *D. incarnata* (L.) Soó., ssp. *incarnata*, Potoci, Ruginești, Grozăvești, Hangu, *D. maculata* (L.) Soó., ssp. *maculata*, Ruginești, Hangu, *Epipactis helleborine* (L.) Crantz., mlăștiniță, Potoci, Hangu, *E. palustris* (L.) Crantz., Hangu, *E. purpurata* Sm., Buhalnița, *Gymnadenia conopsea* (L.) R.Br., Ruginești, Buhalnița, Hangu, *Listera ovata* (L.) R.Br., Hangu, *Neottia nidus-avis* (L.) L.C.M. Richard, Dealul Frasinului, Ruginești, Hangu, *Orchis coriophora* L., ssp. *coriophora*, Potoci, *O. laxiflora* Lam., ssp. *elegans* (Heuffel) Soó., Potoci, Ruginești, *O. militaris* L., Potoci, Ruginești, Grozăvești, Hangu, *O. morio* L., ssp. *morio*, Dealul Frasinului, Potoci, Ruginești, Buhalnița, Hangu, Chirițeni, *O. ustulata* L., Hangu, *Platanthera bifolia* (L.) L.C.M. Richard, Potoci, Hangu; Fam. *Juncaceae*: *Juncus articulatus* L., Potoci, Ruginești, Buhalnița, Hangu, *J. bufonius* L., Hangu, *J. effusus* L., Potoci, Ruginești, Buhalnița, Hangu, *J. gerardi* Loisel, Hangu, *J. inflexus* L., Potoci, Ruginești, Buhalnița, Hangu, *J. tenuis* Willd., Hangu, *Luzula campestris* (L.) D.C., Hangu, *L. luzuloides* (Lam.) Dandy et Willmonnt, ssp. *luzuloides*, Potoci, Ruginești, Hangu; Fam. *Cyperaceae*: - *Bolboschoemus maritimus* (L.) Palla, ssp. *maritimus*, Potoci, Ruginești, Hangu, *Eriophorum latifolium* Hoppe, Potoci, Ruginești, Hangu, *Scirpus sylvaticus* L., Potoci, Ruginești, Buhalnița, Hangu, *Carex acutiformis* Ehrh., Hangu, *C. digitata* L., Hangu, *C. distans* L., Ruginești, Hangu, *C. divulsa* Stokes, ssp. *divulsa*, Buhalnița, Hangu, *C. flacca* Schreber, ssp. *flacca*, Potoci, Hangu, *C. flava* L., Buhalnița, Ruginești, Hangu, Chirițeni, *C. hirta* L., Hangu, *C. montana* L., Dealul Frasinului, Potoci, Ruginești, Buhalnița, Hangu, Chirițeni, *C. ovalis* L., Hangu, *C. pallescens* L., Ruginești, Hangu, *C. paniculata* L., Hangu; *C. pendula* Hudson, H., Hangu, *C. pilosa* Scop., Hangu, *C. remota* L., Ruginești, Hangu, *C. riparia* Curtis, Hangu, *C. spicata* Hudson, Hangu, *C. sylvatica* Hudson, Potoci, Hangu, *C. tomentosa* L., Hangu, *C. vesicaria* L., Hangu, Chirițeni, *C. vulpina* L., Potoci, Ruginești, Hangu; Fam. *Poaceae* (*Gramineae*): *Briza media* L., Potoci, Ruginești, Buhalnița, Hangu, Chirițeni, Poiana Largului, *Catabrosa aquatica* (L.) Beauv., Hangu, *Cynosurus cristatus* L., Potoci, Ruginești, Grozăvești, Hangu, Chirițeni, Poiana Largului, *Dactylis glomerata* L., Dealul Frasinului, Potoci, Ruginești, Buhalnița, Hangu, Chirițeni, *D. polygama* Horvátovszky, Buhalnița, Hangu, *Festuca arundinacea* Schreber, Potoci, Hangu, *F. gigantea* (L.) Vill., Hangu, *F. pratensis* Hudson, Dealul Frasinului, Potoci, Ruginești, Buhalnița, Hangu, Chirițeni, Poiana Largului, *F. rubra* L., ssp. *rubra*, Potoci, Ruginești, Hangu, *F. rupicola* Heuffel, ssp. *rupicola*, Dealul Frasinului, Hangu, *F. valesiaca* Schleicher ex Gaudin, Potoci, Ruginești, Buhalnița, Hangu, Chirițeni, Poiana Largului, *Lolium perenne* L., Dealul Frasinului, Potoci, Ruginești, Buhalnița, Grozăvești, Hangu, Chirițeni, Poiana Largului, *Poa annua* L., Potoci, Hangu, *P. compressa* L., ssp. *compressa*, Ruginești, Buhalnița, *P. nemoralis* L., Ruginești, Hangu, *P. palustris* L., Hangu, *P. pratensis* L., Dealul Frasinului, Potoci, Ruginești, Buhalnița, Hangu, Poiana Largului, *P. trivialis* L., Hangu, *Melica nutans* L., Ruginești, *M. uniflora* Retz., Potoci, Hangu, Chirițeni, *Glyceria notata* Chevall., Hangu, *G. plicata* Fries., Potoci, Ruginești, Buhalnița, Hangu, *Bromus arvensis* L., ssp. *arvensis*, Potoci, Buhalnița, *B. commutatus* Schrader, Dealul Frasinului, Potoci, Ruginești, Buhalnița, Hangu, Chirițeni, Poiana Largului, *B. erectus* Hudson, ssp. *erectus*, Potoci, Hangu, *B. hordeaceus* L., Buhalnița,

Hangu, *B. sterilis* L., Potoci, Ruginești, *Brachypodium pinnatum* (L.) Beauv., ssp. *pinnatum*, Dealul Frasinului, Potoci, Buhalnița, Grozăvești, Hangu, Poiana Largului, *B. sylvaticum* (Hudson) Beauv., Dealul Frasinului, Potoci, Ruginești, Hangu, *Elymus caninus* (L.) L., ssp. *caninus*, Ruginești, Hangu, *E. hispidus* (Opiz) Melderis, ssp. *hispidus*, Hangu, *E. repens* (L.) Gould, Hangu, *Hordelymus europaeus* (L.) C.O. Harz, Buhalnița, Hangu, *Hordeum murinum* L., Dealul Frasinului, Potoci, Ruginești, Buhalnița, Grozăvești, Hangu, Chirițeni, Poiana Largului, *Agrostis capillaris* L., ssp. *capillaris*, Potoci, Grozăvești, Hangu, *A. stolonifera* L., ssp. *stolonifera*, Potoci, Buhalnița, Hangu, Chirițeni, *Alopecurus arundinaceus* Poiret, Potoci, Ruginești, Hangu, *A. geniculatus* L., Potoci, Ruginești, Grozăvești, Hangu, *A. pratensis* L., ssp. *pratensis*, Potoci, Ruginești, Hangu, *Anthoxanthum odoratum* L., Potoci, Grozăvești, Hangu, *Arrhenaterum elatius* (L.) Beauv., ssp. *elatius* Potoci, Ruginești, Buhalnița, Hangu, Chirițeni, *Calamagrostis arundinacea* (L.) Roth., Ruginești, Hangu, Chirițeni, *C. canescens* (Weber) Roth, Ruginești, Buhalnița, Hangu, *C. epigeios* (L.) Roth., Potoci, *Dechampsia caespitosa* (L.) Beauv., ssp. *caespitosa*, Potoci, Ruginești, Buhalnița, Hangu, Chirițeni, *Holcus lanatus* L., Ruginești, Hangu, Chirițeni, *Phleum phleoides* (L.) Karsten, Potoci, Ruginești, Hangu, *P. pratense* L., ssp. *pratense*, Dealul Frasinului, Potoci, Ruginești, Buhalnița, Grozăvești, Hangu, Chirițeni, Poiana Largului, *Trisetum flavescens* (L.) Beauv., ssp. *flavescens*, Hangu, *Molinia caerulea* (L.) Moench., ssp. *caerulea*, Hangu, *Nardus stricta* L., Potoci, Grozăvești, Hangu, *Dichanthium ischaemum* (L.) Roberty, Hangu; Fam. *Sparganiaceae*: *Sparganium erectum* L., ssp. *erectum*, Potoci, Hangu; Fam. *Typhaceae*: *Typha angustifolia* L., Hangu, *T. latifolia* L., Ruginești, Hangu, *T. shuttleworthii* Koch et Sonder, Potoci, Hangu; Fam. *Araceae*: *Arum orientale* Bieb., Dealul Frasinului, Potoci, Ruginești, Buhalnița, Grozăvești, Hangu, Chirițeni; Fam. *Lemnaceae*: *Lemna minor* L., Ruginești, Hangu.

Bibliography

1. BELDIE AL., 1977-1979 – *Flora României determinant ilustrat al plantelor vasculare, vol. I-II*, Ed. Acad. R.S.R., București, 412, 406
2. CHIFU T., MITITELU D., DĂSCĂLESCU D., 1989 – Flora și vegetația județului Neamț, *Mem. Sect. șt. Acad. Rom., X, Nr. 1 (1987)*, București
3. CHIFU T., ZAMFIRESCU OANA, MĂNZU C., ȘURUBARU B, 2001 – *Botanica sistematică*, Ed. Univ. "Al. I. Cuza" Iași, 536
4. CIOCĂRLAN V., 2000 – *Flora ilustrată a României, Pteridophyta et Spermatophyta*, Ed. Ceres, București, 1139
5. PRODAN I., 1939-1044 – *Flora pentru determinarea și descrierea plantelor ce cresc în România, t. I-II*, Tipografia "Cartea Românească", Cluj-Napoca, 713
6. SĂRBU I. ET COLAB., 2001 – *Flora ilustrată a Plantelor Vasculare din Estul României, vol. I-II*, Ed. Univ. "Al. I. Cuza" Iași,
7. SĂVULESCU TR. (RED. PRINC.) ȘI COLAB., 1952-1976 – *Flora R.P.R.-R.S.R., I-XIII*, Ed. Acad. R.P.R.-R.S.R., București

**THE VARIABILITY OF SPECIES
CAREX SECALINA WILLD. EX WAHLENB.
V. CIOCÂRLAN***

Summary: the autor is showing the variability of the species *Carex secalina* and is depicted here a new subspecies, as well a new variety, both of them being new for science.

Key words: *Carex secalina*, variability

In the botanical reference material (1, 2, 3, 4, 5), *Carex secalina* does not present any sistematic infraspecific units. From ecological point of view, the same botanical reference material is unitary, keeping – wet and slightly salted meadows.

Contrary to these statements, inside the Danube Delta, on Caraorman Sand Bank, I have discovered on the baren sands, at the base of a dune, a small population of *Carex secalina*. Analysing this material, having particularly morphologic and ecologic features, led us to describe a new taxon for the science, namely *Carex secalina* subsp. *sabulosa* (Fig. No 2).

Also, on Letea Sand Bank (Danube Delta), on wet and slightly salted meadows, between Letea and C. A. Rosetti, I have identified some phytoindividuals of *Carex secalina*, having particularly morphologic features, namely female spikelets arranged on secondary axis, tightly, as glomerules. We consider these typical features represent a new variety, namely *C. secalina* var. *glomerata* (Fig. No. 1).

In conclusion, we present here the variability of species *Carex secalina* and the diagnosis of the infraspecific taxon:

Carex secalina Willd. ex Wahlenb.

– subsp. *secalina* – plants of 10-30 (-40) cm in height, having male spikelets 2-3 in number, the female spikelets 2-5 in number, inserted by one in a row, distanced, on stems, or are inserted tightly, 2-5 in a row on secondary branches;

var. *secalina* – female spikelets grouped one in a row, on the stem;

var. *glomerata* Ciocârlan var. nova (Fig. No 1) – female spikelets situated on secondary axis (peduncles), 2-5 in a row, making glomerules;

var. *glomerata* Ciocârlan var. nova (Fig. 1) – *spiculae femineae supra axes secundarios, 2-5 in glomerulis*

– subsp. *sabulosa* Ciocârlan subsp. nova (Fig. No. 2) – low plants, of 5-8 cm in height, with a radicular system quite developed, of ca. 12-15 mm in length; male spikelets 1, with peduncle of 2-3 cm in length; female spikelets 1-3, of ca. 8-10 mm in length and 3-4 mm wide; small utricles, of 4,5-5 mm in length; it is growing on low wet sands, at the base of the sand dunes.

On Caraorman Sand Bank, inside the Danube Delta.

– *subsp. sabulosa* Ciocârlan subsp. nova (fig. 2)- *plantae pumilae, 5-8 cm. Radices longissimae, 12-15 cm. Spicula mascula 1, cum pedunculo 2-3 cm. Spiculae femineae 1-3, 8-10 mm longa et 3-4 mm lata. Utriculi 4,5-5 mm longi. Delta Danubii, Romania, Grindul Caraorman, in sabulosis ad basem arenae. Holotypus in Herb. Univ. Șt. Agron. București conservatur.*

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References

1. BÄSSLER M., 2002 – Genul *Carex* in Rothmaler - Exkursionsflora von Deutschland. Berlin
2. HEGI G., 1925 – Genul *Carex* in Illustrierte Flora von Mitteleuropa, II. München
3. OSWALD K., 1994 – Genul *Carex* in Exkursionsflora von Österreich. Stuttgart und Wien
4. ȘERBĂNESCU I., 1960 – Genul *Carex* în Flora R. S. România XI. București
5. SOÓ R., 1980 – Genul *Carex* in Conspectus Florae Vegetationisque Hungariae. Budapest



Fig. 1 – *Carex secalina* Willd. ex Wahlenb. ssp. *secalina* var. *glomerata* Ciocârlan var. *nova*



Fig. 2 – *Carex secalina* Willd. ex Wahlenb. ssp. *sabulosa* Ciocârlan ssp. *nova*

FLORISTIC CONTRIBUTIONS

I. COSTACHE*

Abstract: The paper represents a part of the research carried out in a five-year period (within my Ph.D. paper called: "The Flora and the Vegetation of the Lower Hydrographic Basin of the River Motru", coordinated by Professor V. CIOCĂRLAN, Ph.D.). The material contains additional information for the diagnosis of the taxa: *Agróstitis canína* L. subsp. *canína*, *Cirsium créticum* (L.) D' Urv.; it suggests a new variety for the species *Trifólium stríctum* L. var. *pubéscens* Costache var. *nova*; the following species are noticed to be new for the region of Oltenia: *Achilléa roseo-álba* Ehrend., *Cárex guestphálica* (Boenn. ex Rchb.) Boenn. ex O. Lang (with taxonomic considerations), *Galinsóga quadriradiáta* Ruiz & Pav., *Xánthium saccharátum* Wallr.

Key words: taxa, diagnosis, chorology, the Romanian flora.

Introduction

Following a thorough analysis of the identified species in the territory under research, certain morphological characters were emphasized as not corresponding to the diagnosis of the dichotomy keys for certain taxa. Given this situation, we considered their mentioning as being a proper thing to do, in order to complete at least the diagnosis, without hurrying in creating new sub-specific taxa, which are subject to variability.

Within this context, the following taxa are taken into consideration, being presented alphabetically: *Agróstitis canína* L. subsp. *canína*, *Cirsium créticum* (L.) D' Urv.

According to some constant and obvious quality characteristics, we have suggested a new variety for *Trifólium stríctum* L. var. *pubéscens* Costache var. *nova*.

On the other hand, the following species are to be considered as new ones for the region of Oltenia: *Achilléa roseo-álba* Ehrend., *Cárex guestphálica* (Boenn. ex Rchb.) Boenn. ex O. Lang (with taxonomic considerations), *Galinsóga quadriradiáta* Ruiz & Pav., *Xánthium saccharátum* Wallr., from the territory under research.

We have to mention that both the schemes, scannings and the photos taken with a digital camera, with a binocular lens, are based on original material (the text of the pictures does not contain this specification). For the pictures coming from the specialty literature, we have mentioned, in the text, their author and the year.

Taxonomic Observations

Agróstitis canína L. subsp. *canína*

The analyzed material (alive and then preserved) comes from meso-hydrophyte places in the Buicești Village (Mitulani), in the spreading area for the forests of Turkey oak (*Quercus cérris*) and Hungarian oak (*Q. fraínetto*), alt. 140-150 m, collected 19. VI. 2003; locality of Ciochiuța (Strehaia), alt. 180-200 m, 01.VII. 2003.

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The features which were pointed out at the collected material in the territory under research best correspond to the diagnosis given by Tutin 1980, in Flora Europaea Vol. 5.

- The ratio of work/lemma = 1/2 – 1/3.

Revealing the unmentioned features in the diagnosis of the species in The Romanian Flora Vol. XII (Beldie 1972):

- stemy leaves of about 1-2 mm, either plain or involute (fig. 1), scabres (features mentioned only by Tutin 1980) at the analyzed material, on its both surfaces;

- in transversal section (fig. 1.) one can notice, through the leaf under the panicle,

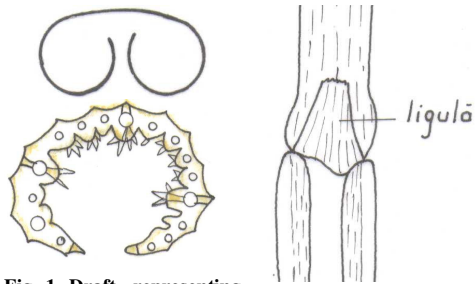


Fig. 1. Draft representing the involute shape and a transversal section through the leaf under the panicle.

Fig. 2. The draft of the transversal section through the ligule.

the presence of the sclerenchyma both under the lower epidermis and under the lower one, better developed at the level of three nervures (something that resembles the section performed at *Agróstitis gigantéa* Roth. subsp. *gigantéa* by Dihoru 1980 -Pl. III. fig. 11, but without talking about the same taxon);

- the ligule of the last leaf of about 2 mm is truncated and not acute - fig. 2 - (characteristic mentioned in every diagnosis);

- the glumes (of about 2-2.2 mm) present thin aculeoles on the whole surface - fig. 3 - (and not only ciliary on the bottom, a feature met in all the diagnoses);

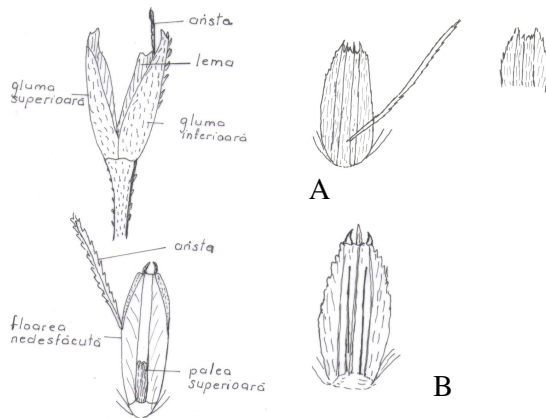


Fig. 3. Draft representing the little ear and the flower

Fig. 4. Draft representing lemma shapes: with arista (A) and without arista (B).

- in the same panicle we have both little ears with flowers where the lemma is with aristae, and little ears with flowers where the lemma is without aristae (characteristics also mentioned in The Romanian Flora at subsp. *canina*, var. *canina* f. *canina*);

- the arista is geniculated, inserted in the lower half of the lemma - fig. 4 - (feature mentioned by Tutin



Fig. 5. Lema, according to Zangheri 1976



**Hunds-S. - *A. canina*
0,20-0,60 2l 6-8

Fig. 6. *A. canina* according to Rothmaler 2000

1980). In the Romanian Flora, Beldie 1972, and in the Flora Italica, Zangheri 1976, it is specified that the arista is inserted in the middle or above the middle of the lemma (fig. 5.);

- the lemma for the little ears with arista presents two lateral denticles (a characteristic that appears in the diagnosis) and another 4 denticles which can be noticed in extension to the nervures (unspecified characteristic) - fig. 4 (A);

- the lemma for the little ears without aristae presents three nervures, two laterals and a median one, which continue with noticeable denticles, and two nervures which do not reach the top of the lemma - fig. 4 (B) - (unspecified characteristic);

- in all the cases, the lemma presents delicate aculeoles at the surface (unspecified characteristic);

- at the basis of the lemma, the callose presents a tuft of delicate hairs (characteristic which appears only in Flora Europaea, Tutin 1980); at the Ciochiuța material, with little ears without aristae (corresponding to *A. canina* var. *mútica* Gaud.), the callose at the basis of the lemma does not present thin hairs.

***Cirsium créticum* (L.) D' Urv. [*C. polyáthemum* auct., non (L.) Spreng.]**

In The Romanian Flora, the species is mentioned just in few localities: Cs: Orșova; MH: In the Danube River Meadow, near the Drobeta-Turnu Severin City; in the Motru River Meadow at Broșteni Village (Strehaia); OT: Cileni (Corabia) (Grecescu 1898, Nyárády 1964, Beldie 1979, Ciocârlan 1990, 2000), being included in the Red National Lists.

In the lower basin of the Motru River, the species was identified in low, swampy areas, both in the meadows and in the hilly areas, in all localities (Costache 2004).

After analyzing the collected material in several stations, we have pointed out the variability of the following features:

- the roots are spindly-shaped tuberized (fig. 7) and they are not as thin as it appears in the species diagnosis;

- the leaves range from a narrow to a broad, lanceolate, pinnate-partite shape, and not only with a narrow, lanceolate, deeply pinnate-sectional shape (fig. 8, 9);

- the antodies are solitary, with a long peduncle but they are grouped (two or three) in sessile or sub-sessile raceme (fig. 10);

In Flora Europaea Vol. 4 (Verner 1976) there is no mention of these features.

We have to follow, in the future, whether it is about another sub-specific taxonomic unit or not.



Fig. 7. Tuberized roots at the same plants.



Fig. 8. The shape of the leaves at the plants in swampy places



Fig. 9. The shape of the leaves at the plants in moist places



Fig. 10. Detail regarding the inflorescence.

***Trifolium strictum* L. [*T. laevigatum* Poir.]** (fig. 11)

Comparing the material collected by us to the plants collected from the Olimp Mountain, the locality of Orșova (CS) - Leg. et det. E. I. Nyárády - F.R.E. Nr. 562/30. V. 1923, we have noticed the following differences:

All the plants collected by E. I. Nyárády have glabrous stems and the pods with two lenticular seeds, of a brown-blackish color (L. = 1-1,1 mm and width = 0,8-09 mm) (fig. 12, A); the pedicels of the inflorescences are hairy adpressed (fig. 13).

Looking into the specialty bibliography, in the species diagnosis (Nyárády A. 1957, Coombe 1968, Zángheri 1976, Beldie 1977, Ciocârlan 1999, 2000) the plants are glabrous, and the pods have two seeds.

In The Bulgarian Flora (Cozhukharov 1976) we have in the diagnosis of the species glabrous plants, and pods with one or two seeds.



Fig. 11. *Trifolium strictum*



Fig. 12. The calyx, the pod, and the seeds:
A-*Trifolium strictum*; **B**-*Trifolium strictum* L. var. *pubescens* Costache var. *nova*

T. strictum L. var. *pubescens* Costache var. *nova* in Add.

The stems have short, thick hairs (fig. 14), disposed more or less patently, while the pods have a globulous-ellipsoidal seed, of a lighter colour (L. = 1,2 mm and width = 0,7 mm), (fig. 12, B).

Ecology: brown, mesobasic soils with a weak acid-neutral reaction – mesoxerophilic, calcifugal, subthermophilic.

Cenotaxonomic belonging: Festuco-Brometea, Festucetalia valesiacae.

Localities: MH: Strehaia, Ciocîiuța, in the meadows of *Festuca rupicola*, alt. about 200 m.s.m., 01. VII. 2003.

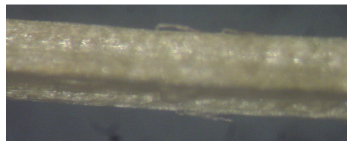


Fig. 13. Detail of the inflorescence peduncle, where one can notice the adpressed hairs at *Trifolium strictum*.

Achilléa roseo-álba Ehrend.

(fig. 15)

The collected material corresponds to the description made by Morariu I. & Nedelcu G. 1978, being also identified f. *violacea* Morariu & Nedelcu with violet-purple flowers which differ from the pale-reddish or white flowers characteristic to this type.

The possibility for the taxon to have a hybrid origin between *A. asplenifolia* Vent. x *A. setacea* Waldst. & Kit. (Richardson 1976), is rather doubtful because, both in *Flora Italica* (Zángheri 1976) and in *Exkursionsflora von Deutschland* (Rothmaler 1994, 2000, 2002) *A. asplenifolia* Vent. it is not mentioned, the only mentioned being *A. setacea* Waldst. & Kit and *A. roseo-álba* Ehrend.

At a national level, it is mentioned as rare in ruderalized meadows around the city of Constanța (Morariu & Nedelcu 1978; Ciocârlan 1990, 2000).

Stations. MH: Stângăceaua (between the villages of Poșta Veche and Pârlogeni), alt. 180, 09.VII.2003; Slătinecul Mare, alt. 180, 09.VII.2003; Gura Motrului, alt. 150-200, 15.VIII.2001 (Costache 2004).

At the analyzed material, the following features were mentioned, regarding the leaves and the antodies (fig. 16, 17):

- uniformly silky, hairy leaves, 0.5-0.7 mm in width, resembling those of *A. setacea*;
- the rachis: 0.8-0.9 mm, crenated;
- narrowed segments, similar to those of *A. setacea*;

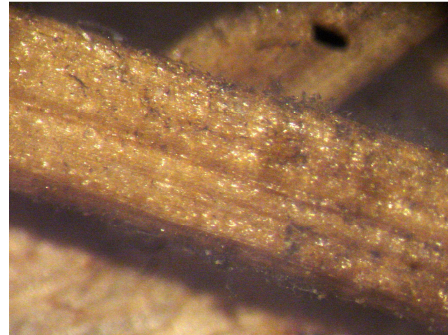


Fig. 14. Detail of the stem, to point out the hairiness at *Trifolium strictum* L. var. *pubescens* Costache var. *nova*



Fig. 15. *Achillea roseo-álba*

- the antody with L.= about 4 mm and width = about 2 mm;
- involucrel hypsophilis, with scarce hairs, without obvious edge.

Cárex guestphálica (Boenn. ex Rchb.) Boenn. ex O. Lang [*C. polyphýlla* Kar. & Kir., *C. leérsii* F. W. Schultz non Willd., *C. pairéi* F.W. Schultz var. *leérsii* (F. W. Schultz) Kükenth., *C. muricáta* L. var. *leérsii* Kneuck., *C. chábértii* F. W. Schultz, *C. leersiána* Rauschert, *C. divúlsa* subsp. *leérsii* (Kneuck.) W. Koch].

The process of differentiating the taxa within the **muricáta** group seems to raise some difficulties.

This question was raised because of the difficulty given by the framing of our collected material, in the territory under research, at one of the three taxa:

- *Cárex divúlsa* Stokes subsp. *chabértii* (F. W. Schultz) Asch. & Graebn. [*C. chabértii* F. W. Schultz] - fig. - 19, B - (collected material MH: Comănești (common oak glades), alt. 300-380 m, 04.VI. 2000) according to Ciocârlan 2000;

- *Cárex polyphýlla* Kar. & Kir. [*C. divúlsa* subsp. *leérsii* (Kneuck.) W. Koch] - fig. 19, A - (collected material MH: Butoiești (Dl. Ștefanu, in the meadows near the skirt of the Turkey oak and Hungarian oak forest), alt. 200m, 10.VI.2001; Buicești (Sat Mitulani), alt. 160-250 m, 10. VI. 2001) according to: Dihoru 1970, Beldie 1979, Ciocârlan 2000, Rothmaler 2000 (fig. 18);

- *Cárex pairéi* F. W. Schultz var. *leérsii* (F. W. Schultz) Kükenth. - (collected material MH: Dl. Cerângani, alt. 300-347 m, 16.IV.2000) - according to Șerbănescu 1966.

These difficulties appear because of the similar characteristics regarding the length of the inflorescence, the disposition of the little ears, the disposition, dimensions and the morphological characteristics of the utricles and the width of the leaves.

In *Exkursionsflora von Deutschland*, Band 9, Rothmaler 2002 reconsiders the **muricáta** group and rethinks the systematic position of the taxa *Cárex polyphýlla* Kar. & Kir., passing it in synonymy at *Cárex guestphálica* (Boenn. ex Rchb.) Boenn. ex O. Lang, next to the taxa: *C. leérsii* F. W. Schultz non Willd., *C. chabértii* F. W. Schultz, *C. leersiána* Rauschert; *C. divúlsa* Stokes subsp. *chabértii* (F. Schultz) Asch. & Graebn.

Although we do not possess all the information that Rothmaler uses to present the taxa, we can be sure that it is based on the International Nomenclatural Code.

Regarding the differentiating characteristics and the diagnosis of the two taxa: *Cárex pairéi* F. W. Schultz (fig. 20, 21-left) and *Cárex guestphálica* (Boenn. ex Rchb.) Boenn. ex O. Lang (fig. 19, A and B; 21-right), we must say that they remain the same according to Ciocârlan 2000.

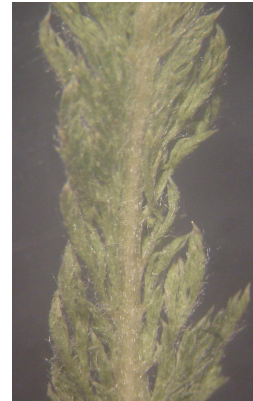
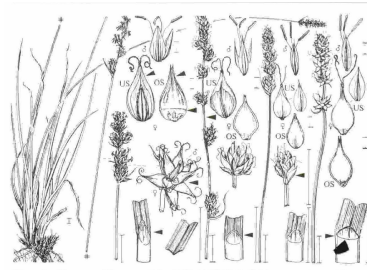


Fig. 16. Leaf fragment, at *Achillea roseo-álba*



Fig. 17. The antody at *Achillea roseo-álba*



*Spartige Segge – *Carex muricáta* 0,20–0,60 m (Sp meist braun bis rot braun). Von L. nach R.: *C. spicáta*, *C. divúlso* (Sp blaßbraun), *C. pairæi*, *C. leérzii*

Fig. 18. Group *muricáta* (Rothmaler 2000).



Fig. 21. *Carex pairæi* (left); *Carex*



A B

Fig. 19. *Carex guestphálica* [A - *C. polyphýlla* (*C. pairæi* var. *leérzii*); B - *C. divúlso* subsp. *chabértii*].

Fig. 20. *Carex pairæi* (Scanned according to the herbarium material: Leg. & det. Erik Asplund, 6. VII. 1927 Mus.Botan. Stokholm. Flora Suecica.

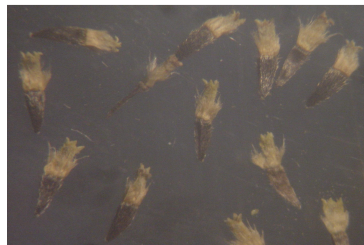


Fig. 22. Detail where one can notice the involucral squamæ which are shorter than the calyx at *Galinsóga quadriradiáta*.

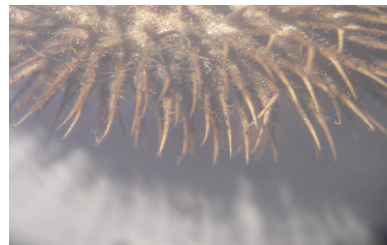


Fig. 23. Detail where one can notice the fructiferous involucre thorns, with 80% not uncinat and 20% uncinat, glandulous almost to the tip at *Xánthium saccharátum*.

Galinsóga quadriradiáta Ruiz & Pav., **Xánthium saccharátum** Wallr., it is only mentioned their identification in the lower basin of the Motru River, the presentation of the two species being made by Ciocárlan 2004.

Stations for: *Galinsóga quadriradiáta* (fig. 22): MH: Strehaia (Lunca Huşniţei), alt. about 180 m, 06.VIII.2003; GJ: Glogova (Lunca Motrului), alt. about 200 m, 15.X.2000; *Xánthium saccharátum* (fig. 23) is also identified in the lower basin of the Motru River, between Negoeşti and Gura Motrului, in mezohygrophilic places, on barren, ruderalized agricultural areas.

Conclusions

The paper presents original floristic contribution in the direction of diagnosis completion for the taxa: *Agróstitis canína* L. subsp. *canína*, *Cirsium créticum* (L.) D' Urv.; it suggests a new variety in the case of the species *Trifólium strictum* L. var. *pubéscens* Costache var. nova; the following are noticed to be new for the region of Oltenia: *Achilléa roseo-álba* Ehrend., *Cárex guestphálica* (Boenn. ex Rchb.) Boenn. ex O. Lang (with taxonomic considerations); *Galinsóga quadriradiáta* Ruiz & Pav., *Xánthium saccharátum* Wallr. (without taxonomic considerations, being processed and presented by Ciocârlan 2004.

ADDENDA

DIAGNOSES PLANTARUM NOVARUM

***Trifólium strictum* L. var. *pubéscens* Costache var. nova.**

Caulis ± minute patento-pubescentibus. Fructus unio seminibus (raro 2). Seminibus formatura ± globosus, roseis, 1,2 mm longis, 0,7 mm latis. Oltenia, Distr. Mehedinți. In pratis "Festucion valesiaca" prope pagum Ciochiuța (Strehaia). Alt. cca. 200 m., 01. VII. 2003.

Bibliography

1. BELDIE AL., 1977, 1979 – *Flora României. Determinator ilustrat al plantelor vasculare*. Vol. I, II. București: Edit. Academiei Române 412 pp., 406 pp.
2. CIOCÂRLAN V., 1988, 1990 – *Flora ilustrată a României. Determinarea și descrierea speciilor spontane și cultivate*. Vol. I, II. București, Edit. Ceres, 512, 597
3. CIOCÂRLAN V., 2000 – *Flora ilustrată a României. Pteridophyta et Spermatophyta*. București, Edit. Ceres, 1138 pp.
4. CIOCÂRLAN V., 2004 – Contribuții la cunoașterea Florei României. *Bul. Grăd. Bot. Iași*, 12: 5-7
5. COSTACHE I., 2004 – *Ecologia, corologia și cenologia speciilor rare și vulnerabile din Bazinul inferior al Motrului/The Ecology, Chorology and Coenology of the Rare and Vulnerable Species in the Inferior Basin of the River Motru*. Analele Univ. din Craiova, Fac. de Horticultură, Volum Omagial/Annals of the University of Craiova, Vol. VII(XLIII). Cluj-Napoca, Edit. Eurodidact, P-ța Karl Liebknecht nr. 2.: 239-257
6. COZHUKHAROV S. (EDS.), 1976 – *Trifolium*. Pp. 327-441. In: D. Iordanov. *Flora Republicae Popularis Bulgaricae* VI. Serdicae in Aedibus Academiae Scientiarum Bulgaricae
7. DIHORU G. & DONIȚĂ N., 1970 – *Flora și vegetația podișului Babadag*. București, Edit. Academiei Române, 438 pag.
8. DIHORU G., 1980 – Două specii de *Agrostis* gigantea. *Stud. Cercet. Biol., Biol. Veg.*, **32**(1):19-26
9. MORARIU I. & NEDELĂCU G., 1978 – O nouă specie de *Achillea* în Flora României. *Stud. Cercet. Biol., Biol. Veg.*, **30**(2): 123-124
10. NYÁRÁDY E. I., 1964 – *Cirsium*. Pp. 712. In Tr. Săvulescu & al. (ed.). *Flora României*. Vol. IX. București, Edit. Academiei Române.
11. PRODAN I., 1931 – *Achillee României*. Monographie. Tipografia "Cartea Românească", Cluj. 68 pag. + 43 Tabulis et 4 Chartis
12. PRODAN I. & NYÁRÁDY E. I., 1964 – *Achillea*. Pp. 362-410. In: Tr. Săvulescu & al. (ed.). *Flora României*. Vol. IX. București, Edit. Academiei Române
13. RICHARDSON I. B., 1976 – Pp. 163 *Achillea*. In: T.G. Tutin & al. (eds). *Flora Europaea*. Vol. 4. Cambridge, Cambridge University Press., i-xxx, 1-439 pp. + 5 maps.
14. ROTHMALER W., 1994 – *Exkursionsflora von Deutschland*. Band 4. Gefäßpflanzen: Kritischer Band. Gustav Fischer Verlag Jena – Stuttgart. 811 pp.
15. ROTHMALER W., 1999 – *Exkursionsflora von Deutschland*. Band 2. Gefäßpflanzen: Grundband. Spektrum Akademischer Verlag Heidelberg - Berlin. 640 pp.
16. ROTHMALER W., 2000 – *Exkursionsflora von Deutschland*. Band 3. Gefäßpflanzen: Atlasband. Spektrum Akademischer Verlag Heidelberg - Berlin. 754 pp.

17. ROTHMALER W., 2002 – *Exkursionsflora von Deutschland*. Band 9. Gefäßpflanzen: Kritischer Band. Spektrum Akademischer Verlag Heidelberg - Berlin. Pp. 813
18. ȘERBĂNESCU I., 1966 – *Carex*. Pp. 723. In: Tr. Săvulescu & al. (ed.). *Flora României*. Vol. XI. București, Edit. Academiei Române
19. ZĂNGHERI P., 1976 – *Flora Italica (Pteridophyta-Spermatophyta)*. A Chiavi Analitiche Corredate Da 7750 Illustrazioni In 210 Tavolex per la determinazione delle piante spontanee indigene, naturalizzate, avventizie e delle più largamente coltivate. Con la collaborazione Aldo J. B. Brilli-Cattarini. I Testo. Padova Cedam-Casa Editrice Dott. Antonio Milani. 210 pp.
20. ZĂNGHERI P., 1976 – *Flora Italica (Pteridophyta-Spermatophyta)*. A Chiavi Analitiche Corredate Da 7750 Illustrazioni In 210 Tavolex per la determinazione delle piante spontanee indigene, naturalizzate, avventizie e delle più largamente coltivate. Con la collaborazione Aldo J. B. Brilli-Cattarini. II Testo. Padova Cedam -Casa Editrice Dott. Antonio Milani. 1157 pp.

LATHYRO AUREI – FAGETUM (DOBRESCU ET KOVACS 1973) CHIFU 1995 ASSOCIATION FROM THE VASLUI RIVER BASIN

IRINA BLAJ*

Abstract: The study analyzes the *Lathyro aurei – Fagetum* (Dobrescu et Kovacs 1973) Chifu 1995 association both phytocoenologically and from the viewpoint of the aerial phytomass of the arborescent layer and herbaceous layer it develops. The forests gathered in this association achieve a density of 548 trees/ha, a phytomass of the arborescent layer of 308639.24 Kg/ha and the herbaceous layer of 82.30 kg desiccated substance/ha.

Key words: phytocoenology, vegetation of forests, aerial phytomass

Study of the forest vegetation was based on the phytosociological method of Braun-Blanquet [6], while calculation of the aerial phytomass of the arborescent and herbaceous layer made use of working procedures taken over from the recent literature of the field [2,5,10,11].

The *Lathyro aurei – Fagetum* (Dobrescu et Kovacs 1973) Chifu 1995 association is part of the *Aro orientalis – Carpinenion* (Dobrescu et Kovacs 1973) Täuber 1991-1992 suballiance, the *Lathyro hallersteinii – Carpinion* Boșcaiu 1974 alliance, *Fagetalia sylvaticae* Pawlowski in Pawlowski et al. 1928 order, *Quercu – Fagetea* Br.-Bl. et Vlieger in Vlieger 1937 class (Table 1)[1,3,7,8,12].

This association has been mentioned by C. Dobrescu and collab. (1964) under the name of associations with *Fagus sylvatica-Carpinus betulus-Tilia tomentosa* [4].

It grows at average altitudes of 300m, on north-east or north-west oriented weakly sloped soils.

The floristic composition is quite rich and varied, including more than 88 species which belong to the *Quercu – Fagetea* class.

Trees' layer represents an average cover of 80%, *Fagus sylvatica* dominating, besides *Fagus taurica*, *Carpinus betulus*, *Tilia tomentosa*.

The average density of the arborescent layer is of 548 trees/ha, *Carpinus betulus* being predominant with 260 trees/ha, followed by *Tilia tomentosa* – 108 trees/ha and *Fagus sylvatica* (*F. taurica*) – 100 trees/ha (Table 3). The average diameter attained is of 27.64cm, the phytocoenosis belonging to that of the small-wood stage (with diameter between 21-36 cm) (Table 4).

As to the total aerial phytomass realized by the woody species, it amounts to 308639.24 kg/ha, of which trunks' phytomass represents 74.38% (229584.56 kg/ha), branches' phytomass – 24.36% (75212.74 kg/ha) and, finally, leaves' phytomass – 1.26% (3841.93 kg/ha). The main part of phytomass is brought by the *Carpinus betulus* species with 169419.87 kg/ha, *Fagus sylvatica* (*F. taurica*) species, with 48416.08 kg/ha and *Tilia tomentosa* species, with 48133.44 kg/ha (Table 5).

The bushy layer is weakly represented, while the herbaceous one – with an average coverage of 30% - is frequently composed of the following species: *Galium*

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odoratum, Salvia glutinosa, Viola reichenbachiana, Brachypodium sylvaticum, Euphorbia amygdaloides etc.

Aerial phytomass of the herbaceous layer has the amount of 82.30 kg desiccated substance/ha, of which, in the vernal season there was 60.40 kg desiccated substance/ha and in the aestival season there was 21.90 kg desiccated substance/ha (Table 2). The phytomass amount attained during the aestival season is quite low, due to unfavorable meteorological conditions represented by high temperatures and very low amounts of precipitations or even drought. The species with the most important contribution of desiccated substance during the vernal season is *Allium ursinum* ssp. *ucrainicum* and during the vernal season the herbaceous layer is almost inexistent.

Analysis of the bioforms: H-45.45%, Ph-29.55%, G-15.90%, T-4.55%, Ht-3.4%, Ch-1.15%.

Analysis of the phytogeographical elements: Eur.- 40.90%, Euras.-35.25%, Pont.-7.95%, Circ.-7.95%, Cosm.-3.4%, Adv.-3.4%, End. Carp.-1.15%.

Further on, analysis of the ecological indices points to the fact that the species forming the association's floristic composition are mesophyllic, mesothermal, mesohydrophylic, growing on neutral soils with a moderate content of mineral nitrogen.

Bibliography

1. CHIFU T. 1995 – Contributions à la syntaxonomie de la vegetation de la classe *Carpino – Fagetea* (Br.-Bl. et Vlieg. 1937) Jackus 1960 sur le territoire de la Moldavie (Roumanie). *An. Șt. ale Univ. "Al. I. Cuza" Iași, s. II a. (Biol. veget.)*, **41**: 61-66
2. CHIFU T., ȘTEFAN N. 1997 – Les hêtraies collinaires du nord-est de la Moldavie (Roumanie). *An. Șt. ale Univ. "Al. I. Cuza" Iași, s. II a. (Biol. veget.)*, **43**: 71-78
3. CHIFU T., ȘTEFAN N., SĂRBU I. 1996 – Contribuții la studiul vegetației din clasa *Carpino – Fagetea* (Br.-Bl. et Vlieg. 1937) Jackus 1960 de pe teritoriul Moldovei (România). *St. și Cercet., Muz. Piatra-Neamț*, **8**: 295-326
4. CHIFU T., SĂRBU I., ȘTEFAN N., ȘURUBARU B. 1999 – Contribuții la fitocenologia fâgetelor colinare și a cărpinetelor din Podișul Central Moldovenesc. *Bul. Grăd. Bot. Iași*, **8**: 49-69
5. CHIFU T., ȘTEFAN N., HUȚANU MARIANA, COROI M., COROI ANA-MARIA 1997 – Biomasse et productivité annuelle aériennes de la strate arborescente des hêtraies collinaires du Plateau Centrale Moldave. *St. și Cerc. de Biol., Ser. Biol. veg.*, **49** (1-2): 43-56
6. CRISTEA V. 1993 – *Fitosociologie și vegetația României* (litografiat), Univ. "Babeș-Bolyai" Cluj-Napoca
7. DOBRESCU C. BARCA C., LAZAR Maria. 1964 – Contribuții floristice și geobotanice referitoare la masivul forestier Bârnova-Repedea, Iași (II). *An. Șt. ale Univ. "Al. I. Cuza" Iași, s. II a. (Biol.)*, **10** (2): 322-355
8. DOBRESCU C., KOVÁCS ATT. 1973 – Contribuții la fitocenologia pădurilor de "Fagion" din Podișul Central Moldovenesc. *Rev. Păd.*, **88** (11): 592-599
9. ELLENBERG H. 1974 – Indicator values of vascular plants in Central Europe. *Scripta Geobotanica*, **IX**, Verlag Erich Goltze K.G., Göttingen: 1-97
10. IVAN Doina, DONIȚĂ N. 1975 – *Metode practice pentru studiul ecologic și geografic al vegetației*. Centr. de multiplicare a Univ. București
11. KESTEMONT P. 1973 – Production primaire de la strate arborée d'un hêtraie à fêtuques, *Bulletin de la Société Royale de Botanique de Belgique*, **106**: 305-316
12. WALLNÖFER SUSANNE, MUCINA L., GRASS V. 1993 – Quercu - Fagetea In: MUCINA L., GRABHERR G., WALLNÖFER SUSANNE - *Die pflanzengesellschaften Österreichs*, **III**: 85-236, Gustav Fischer Verlag Jena - Stuttgart - New York

Table 1. *Lathyro aurei* - *Fagetum* (Dobrescu et Kovacs 1973) Chifu 1995

Number of relevee	1	2	3	4	5	6	7	8	9	10	11	12	13	
Altitude (m)	340	350	340	250	300	200	200	180	300	380	380	300	380	
Exposition	E	NV	N	NE	NE	N	NE	E	V	NV	NV	NE	E	
Slopes degrees)	1	2	1	30	5	40	10	5	5	3	6	3	3	
Coverage of the arborescent layer (%)	90	85	80	75	80	80	80	90	90	85	80	80	75	
Coverage of the bushy and juvenile layer (%)	5	2	8	30	15	10	20	2	-	2	15	2	-	
Coverage of the herbaceous (%)	50	5	25	50	10	20	30	10	8	25	25	7	100	
Surface (m ²)							1000							
Number of species	46	17	27	24	22	21	28	23	21	20	23	22	8	K
Characteristic sp.														
<i>Fagus taurica</i>	+	-	-	-	-	-	+	-	-	-	-	+	-	II
<i>Aro orientalis-Carpinenion</i>														
<i>Carpinus betulus</i>	2	4	3	3	3	+	4	3	+	1	2	+	3	V
<i>Carpinus betulus</i> juv.	-	+	+	2	+	+	1	-	-	-	+	-	-	III
<i>Tilia tomentosa</i>	1	+	+	1	+	1	1	3	1	+	+	+	+	V
<i>Tilia tomentosa</i> juv.	-	-	-	-	+	+	+	+	-	+	-	-	-	II
<i>Lathyrus venetus</i>	+	-	-	-	-	-	-	-	-	-	-	-	-	I
<i>Lathyro hallersteinii-Carpinion</i>														
<i>Cerasus avium</i>	-	-	+	+	+	+	+	-	-	-	-	-	-	II
<i>Cerasus avium</i> juv.	+	-	-	-	-	-	-	-	-	+	+	-	-	II
<i>Tilia cordata</i>	+	2	-	+	+	-	-	-	-	-	-	+	-	II
<i>Dentaria glandulosa</i>	+	-	-	-	-	-	-	-	-	-	-	-	-	I
<i>Lathyrus vernus</i>	+	-	-	-	-	-	-	-	-	-	-	-	-	I
<i>Campanula trachelium</i>	-	+	-	-	+	-	-	-	-	-	-	-	-	I
<i>Stellaria holostea</i>	-	-	-	-	-	-	-	-	-	-	-	+	-	I
<i>Tilio platyphyllae-Aceri pseudoplatani</i>														
<i>Acer platanoides</i>	-	-	+	1	-	+	+	+	+	+	+	-	-	III
<i>Acer platanoides</i> juv.	+	-	+	+	-	+	1	+	-	+	-	+	-	III
<i>Geranium robertianum</i>	+	-	+	+	-	-	+	-	-	-	-	-	-	II
<i>Acer pseudoplatanus</i>	-	-	-	-	-	+	+	-	-	-	-	-	-	I
<i>Acer pseudoplatanus</i> juv.	+	-	-	1	-	-	1	-	-	-	-	-	-	II
<i>Dryopteris filix-mas</i>	-	-	+	-	-	-	-	-	-	-	-	-	-	I
<i>Symphyto cordati-Fagion</i>														
<i>Epipactis helleborine</i>	+	-	-	-	-	-	-	+	-	+	-	-	-	II
<i>Platanthera bifolia</i>	-	-	-	-	-	-	-	-	-	-	+	-	-	I
<i>Rubus hirtus</i>	+	-	-	-	-	-	+	-	-	-	-	-	-	I
<i>Dactylis glomerata</i>	+	-	+	-	-	-	-	-	-	-	-	-	-	I
<i>Alnion incanae</i>														
<i>Urtica dioica</i>	+	-	+	-	-	-	-	-	+	+	+	+	-	III
<i>Aegopodium podagraria</i>	3	-	1	-	+	-	-	-	-	-	-	-	-	II
<i>Geranium phaeum</i>	+	+	+	+	-	-	-	-	-	-	-	+	-	II
<i>Glechoma hederacea</i>	+	-	+	-	-	-	-	-	+	-	-	-	-	II
<i>Carex remota</i>	-	-	-	1	-	+	1	-	-	-	-	-	-	II
<i>Sambucus nigra</i>	-	+	-	-	-	-	-	-	-	-	-	+	-	I
<i>Pyrus piraster</i>	-	-	-	-	+	-	-	-	-	-	-	-	-	I
<i>Lamium maculatum</i>	-	-	-	-	-	-	+	-	-	-	-	+	-	I
<i>Rubus caesius</i>	-	+	-	-	-	-	-	-	-	-	-	-	-	I
<i>Humulus lupulus</i>	-	+	-	-	-	-	-	-	-	-	-	+	-	I
<i>Physalis alkekengi</i>	-	-	+	-	-	-	-	-	-	-	-	-	-	I
<i>Athyrium filix-femina</i>	-	-	+	-	-	-	-	-	-	-	-	-	-	I
<i>Alliaria petiolata</i>	-	-	-	-	-	-	-	-	1	-	-	-	-	I

Arctium nemorosum	-	-	-	-	-	-	-	-	-	-	-	-	+	-	I
Stellaria nemorum	-	-	-	-	-	-	-	-	-	-	-	+	-	-	I
Fagetalia															
Fagus sylvatica	2	1	1	1	2	3	1	1	4	4	3	4	1		V
Fagus sylvatica juv.	-	-	-	+	+	+	+	+	-	+	2	+	-		I
Galium odoratum	+	-	+	1	+	1	+	-	-	+	+	+	+		V
Euphorbia amygdaloides	+	-	-	-	-	+	1	+	+	+	+	-	-		III
Salvia glutinosa	+	+	+	-	-	-	1	+	+	+	+	-	-		III
Asarum europaeum	+	-	+	1	-	+	1	-	-	-	-	-	-		II
Dentaria bulbifera	1	-	-	-	-	-	-	+	-	-	-	-	+		II
Lamium galeobdolon	+	-	+	+	-	-	-	-	-	-	-	-	-		II
Stachys sylvatica	-	+	-	+	-	-	-	-	+	-	+	-	-		II
Geranium phaeum	-	-	-	-	-	-	-	+	-	-	+	+	-		II
Carex sylvatica	+	-	-	-	-	-	-	+	-	-	-	-	-		I
Allium ursinum															
ssp. ucrainicum	+	-	-	-	-	-	-	-	-	-	-	-	5		I
Carex pilosa	+	-	-	-	-	-	-	-	-	-	-	-	-		I
Anemone nemorosa	+	-	-	-	-	-	-	-	-	-	-	-	+		I
Mercurialis perennis	1	-	-	-	-	-	-	-	-	-	-	-	-		I
Pulmonaria obscura	+	-	-	-	-	-	-	+	-	-	-	-	-		I
Sanicula europaea	-	-	+	-	+	-	-	-	-	-	-	-	-		I
Anemone ranunculoides	1	-	-	-	-	-	-	-	-	-	-	-	-		I
Pulmonaria officinalis	-	-	-	-	-	+	+	-	-	-	-	-	-		I
Scrophularia nodosa	+	-	-	-	-	-	-	-	-	-	-	-	-		I
Epilobium montanum	-	-	-	-	-	-	-	-	-	-	+	-	-		I
Chaerophyllum temulum	-	-	-	-	-	-	-	-	-	-	+	-	-		I
Campanula rapunculoides	-	-	-	-	-	-	-	-	+	-	-	-	-		I
Lapsana communis	-	-	-	-	-	-	-	-	-	-	-	+	-		I
Quercu-Fagetia															
Viola reichenbachiana	+	-	1	1	+	+	1	+	+	+	+	+	-		V
Hedera helix	-	+	-	1	+	1	+	-	-	+	-	-	-		III
Mycelis muralis	-	+	-	-	+	+	-	+	+	-	+	+	-		III
Brachypodium sylvaticum	+	-	+	-	+	-	-	+	+	+	+	-	-		III
Ulmus minor	+	-	+	-	-	-	-	-	-	-	-	-	+		II
Ulmus minor juv.	+	-	-	-	-	-	-	-	-	-	-	-	-		I
Acer campestre	+	+	+	-	+	-	-	-	-	+	-	-	-		II
Acer campestre juv.	-	-	+	-	+	+	-	-	-	-	-	-	-		II
Fraxinus excelsior	-	-	-	-	+	-	-	+	+	+	-	1	-		II
Fraxinus excelsior juv.	+	-	-	-	-	+	+	-	-	-	+	+	-		II
Melica uniflora	+	-	-	-	-	-	-	+	-	-	+	-	-		II
Quercus dalechampii	+	-	-	+	-	-	-	-	-	-	-	-	-		I
Quercus dalechampii juv.	-	-	-	+	-	-	-	-	-	-	-	-	-		I
Convallaria majalis	+	-	-	-	-	-	-	-	-	-	-	-	-		I
Evonymus europaeus	+	-	-	-	-	-	-	-	-	-	-	-	-		I
Populus tremula	+	-	-	-	-	-	-	-	-	-	-	-	-		I
Quercus robur	-	-	-	-	+	-	-	-	+	-	-	-	-		I
Quercus petraea	-	-	-	-	-	1	-	-	-	-	-	-	-		I
Quercus petraea juv.	-	-	-	-	-	-	+	-	-	-	-	-	-		I
Fragaria vesca	-	-	-	-	-	-	+	-	-	-	-	-	-		I
Moehringia trinervia	-	-	-	-	-	-	-	+	-	-	-	+	-		I

Rosa canina	-	-	-	-	-	-	-	-	+	-	-	-	-	-	I
Lathraea squamaria	-	-	-	-	-	-	-	-	+	-	-	-	-	-	I
Geum urbanum	-	-	-	-	-	-	-	-	-	+	+	-	-	-	I
Crataegus monogyna	-	-	-	-	-	-	-	-	-	+	-	-	-	-	I
Corylus avellana	-	-	-	-	-	-	-	-	-	+	-	-	-	-	I
Viola odorata	-	-	-	-	-	-	-	-	-	+	-	-	-	-	I
Poa nemoralis	-	-	-	-	-	-	-	-	-	-	+	-	-	-	I
Quercetea pubescentis															
Polygonatum odoratum	+	-	+	-	-	-	-	-	-	-	-	-	-	-	I
Cornus mas	-	+	-	-	+	-	-	+	-	-	-	-	-	-	I
Acer tataricum	-	-	-	+	-	-	-	-	-	-	-	-	-	-	I
Cruciata laevipes	-	-	-	-	-	-	-	-	-	-	-	+	-	-	I
Agrimonia eupatoria	-	+	-	-	-	-	-	-	-	-	-	-	-	-	I
Variae syntaxa															
Galium aparine	+	-	-	-	-	-	-	-	+	-	-	-	+	-	II
Polygonum convolvulus	-	-	-	-	-	-	-	-	-	+	-	-	-	-	I
Ajuga reptans	-	-	-	+	-	-	-	+	-	-	-	-	-	-	I
Lunaria rediviva	-	-	-	+	-	-	-	-	-	-	-	-	-	-	I
Veronica chamaedrys	-	-	-	-	-	-	-	+	-	-	-	-	-	-	I

Place and date of the relevés: 1,3. Poiana cu Cetate, 11.06.2003, 17.07.2002; 2,5. Poieni, 23.08.2003; 4,6,7,12. Bârnova, 27.08.2002; 8. pd. Rotarilor, 12.07.2002; 9. dl. Coloneasa, 24.08.2003; 10,11,13. dl. Perjului, 23.08.2003, 6.05.2002

Tabel 2. Phytomass (kg/ha) of the herbaceous forest layer

Species	Desiccated substance (%)	Aerial phytomass (kg/ha)	
		Green	Anhydrous
a. Vernal phytomass			
Aegopodium podagraria	11.66	60	7
Allium ursinum ssp. ucrainicum	10.4	250	26
Pulmonaria sp.	16	20	3.2
Stellaria holostea	12.5	32	4
Lamium maculatum	42.85	7	3
Corydalis sp.	12.5	40	5
Dentaria bulbifera	12.4	50	6.2
Lathyrus sp.	13.07	26	3.4
Diverse specii	18.57	14	2.6
Total a.	-	499	60.4
b. Aestival phytomass			
Salvia glutinosa	18.75	32	6
Galium odoratum	19.09	22	4.2
Viola reichenbachiana	22.5	8	1.8
Carex sp.	40	10	4
Asarum europaeum	14.61	13	1.9
Euphorbia amygdaloides	22.85	14	3.2
Sanicula europaea	18.18	4.4	0.8
Total b.	-	103.4	21.9
Total a. + b.	-	602.4	82.3

Tabel 3. Average density (trees/ha) of the arborescent layer

Diameter (cm)	Tilia tomentosa	Carpinus betulus	Fagus sylvatica	Cerasus avium	Quercus dalechampii	Acer platanoides	Total
11-20	16	52	60	-	4	8	140
21-36	88	172	40	20	36	12	368
> 36	4	36	-	-	-	-	40
Total	108	260	100	20	40	20	548

Tabel 4. Average diameter (cm) of the arborescent layer

Diameter (cm)	Tilia tomentosa	Carpinus betulus	Fagus sylvatica	Cerasus avium	Quercus dalechampii	Acer platanoides	Average of phytocoenosis
11-20	19.07	13.46	17.34	-	20.00	18.11	17.60
21-36	29.48	29.27	24.42	31.35	29.63	24.00	28.83
> 36	44.00	41.39	-	-	-	-	41.66
Average of phytocoenosis	28.88	29.37	20.47	31.35	28.81	21.83	27.64

Tabel 5. Phytomass (kg/ha) of the arborescent layer, according to species of the *Lathyro aurei-Fagetum* association

Species	Density (trees/ha)	Average diameter (cm)	Phytomass (kg/ha)								
			Trunks	Branches					Leaves	Total	
				Total	5	4	3	2			1
<i>Tilia tomentosa</i>	16	19.07	2439.99	832.44	-	47.89	264.68	486.40	33.47	38.27	3310.70
	88	29.48	29781.00	10136.00	-	2627.41	3944.82	3298.32	265.45	267.74	40184.74
	4	44.00	3469.20	1122.80	51.80	427.60	348.00	248.60	46.80	46.00	4638.00
Total	108	28.88	35690.19	12091.24	51.80	3102.90	4557.50	4033.32	345.72	352.01	48133.44
<i>Carpinus betulus</i>	52	13.46	4649.73	1922.34	-	-	798.52	1067.04	56.78	100.03	6672.10
	172	29.27	84116.44	29486.95	-	5822.54	11682.92	10350.61	1630.88	1356.09	114989.48
	36	41.39	36775.73	10396.69	609.36	3288.78	2987.76	2750.96	759.81	615.87	47788.29
Total	260	29.37	125541.90	41805.98	609.36	9111.32	15469.20	14168.63	2447.47	2071.99	169419.87
<i>Fagus sylvatica</i>	60	17.34	14999.10	4010.94	-	-	1538.49	1996.11	476.34	462.36	19472.40
	40	24.42	21644.24	6870.00	-	-	3043.04	3291.00	535.96	429.44	28943.68
Total	100	20.47	36643.34	10880.94	-	-	4581.53	5287.11	1012.30	891.80	48416.08
<i>Cerasus avium</i>	20	31.35	7513.13	2571.01	-	747.65	997.06	761.77	64.53	63.18	10147.32
<i>Quercus dalechampii</i>	4	20.00	844.80	224.20	-	-	106.80	102.40	15.00	13.00	1082.00
	36	29.63	19441.80	6557.40	-	1542.60	2773.80	1850.40	390.60	388.80	26388.00
Total	40	28.81	20286.60	6781.60	-	1542.60	2880.60	1952.80	405.60	401.80	27470.00
<i>Acer platanooides</i>	8	18.11	1017.40	259.97	-	-	71.74	167.26	20.97	19.16	1296.53
	12	24.00	2892.00	822.00	-	-	408.00	368.40	45.60	42.00	3756.00
Total	20	21.83	3909.40	1081.97	-	-	479.74	535.66	66.57	61.16	5052.53
Total association	548	27.64	229584.56	75212.74	661.16	14504.47	28965.63	26739.29	4342.19	3841.94	308639.24

CONTRIBUTIONS TO THE KNOWLEDGE OF SOME RARE PLANT SPECIES IN THE FLORA OF ROMANIA

V. CIOCÂRLAN*

Summary: the autor is presenting here 43 rare plant species in the flora of Romania, discovered in various new localities. Most of them have been identified in Dobrudja, being included on different red lists (2, 5, 10). In order to make a distinction among those 3 (three) red lists, concerning their degree of threatening, I have inserted the IUCN indices for every registered plant species here. One can remark a large difference between these red lists, which requires a good collaboration between botanists, to achieve a unitary red list for Romania.

Key words: rare species, chorology, red lists.

The strong anthropogenic influence exerted over the vegetal cover, has induced deeply changings in the taxonomical diversity. These alterations led to a rarefaction, endangering and, even, disappearance of some species. An exact knowledge of the field situation over those rare, endangered plant species, though require great efforts, numerous field botanists, very skilled florists, represents a key point in order to supervene in an efficacious manner towards the direction of plant conservation.

In this paper, we present 2 (two) plant species and a subspecies, newly identified in the flora of Dobrudja, and a number of 40 rare plant species in the flora of Romania, which are registered in the so-called red lists, identified in other new localities.

Novelties in the Dobrudja flora

1. *Dryopteris carthusiana* (Vill.) H. P. Fuchs (*D. spinulosa* Watt.) – in presented in the whole country (6), but it has not been signaled out from Dobrudja till now. It has been discovered in Pricopan Mountains, Tulcea county;
2. *Stipa eriocaulis* Borbás, is a rare species in the Romanian flora, existing only in the next counties: Alba, Hunedoara, Caraș-Severin, and Mehedinți (8). It has been discovered in the Nature Reserve Alah Bair, near the village of Băltăgești, Constanța county;
3. *Trifolium medium* L. subsp. *banaticum* (Heuffel) Hendrych. This taxon is known to exist only surroundings of Cluj-Napoca, Tg. Mureș, and Orșova (9). It has been discovered in Pricopan Mountains, Tulcea county.

Rare plant species in the Romanian flora, registered into the Red Lists, discovered in other new localities

We make a statement that we shall mention only those new localities, without enumeration of the already known location in the references sources (1, 4, 11, 13). Also, we shall present at each plant species indices IUCN, accordingly of those 3 (three) red lists (2, 5, 10), in order to see those differences between author's opinions, and to draw a conclusion, namely, the need of a good collaboration of some florists which know the field,

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making possible a drawing up of a red list, credible and unitary on the level of the Romania, as a country. Using those items of the information from the “*Flora of Romania*” (having older data), must be completed and actualised with the realities from the field studies.

We present, in alphabetical order, the list of some rare plant species in the Romanian flora (on the right, there are new localities, as well the IUCN indices, accordingly Boşcaiu (2), Dihoru (5), Oltean (10).

1. **Achillea leptophylla** Bieb. – Tulcea county: Beştepe, Osman Summit – E R
 2. **Alchemilla straminea** Buser – the Mountains of Rodnei – – R
 3. **Arenaria rigida** Bieb. – Constanţa county: Ţepeş Vodă – Stâncile Miresii, Năvodari I E R
 4. **Astragalus contortuplicatus** L. – Dolj county: Calafat; Ialomiţa county: Borcea R V R
 5. **A. hamosus** L. – Constanţa county: Adamclisi, Lipniţa – – R
 6. **A. ponticus** Pallas – Tulcea county: Slava Rusă – Hliboca Hill – R V/R
 7. **Bufonia tenuifolia** L. – Tulcea county: Agighiol – – R
 8. **Bupleurum asperuloides** Heldr. ex Boiss. – Constanţa county: Alah Bair R V R
 9. **Carex depauperata** Gooden. – Constanţa county: Canaraua Fetii – R R
 10. **C. secalina** Wahlenb. – Galaţi county: Hanu Conachi – R(V) R
 11. **Celtis glabrata** Steven ex Planch. – Constanţa county: the forest of Şipote – E R
 12. **Centaurea gracilentă** Velen. – Tulcea county: Agighiol – R R
 13. **C. marschalliana** Spreng. – Tulcea county: Slava Rusă – V V(R)
 14. **Comandra elegans** (Rochel ex Rchb.) Rchb. – Constanţa county: Ostrov R R R
 15. **Convolvulus lineatus** L. – Tulcea county: Agighiol R R R
 16. **Coronilla scorpioides** (L.) Koch – Tulcea county: SE Visterna R R R
 17. **Dianthus campestris** Bieb. subsp. **serbanii** Prodan – Constanţa county: Ostrov R V R
 18. **D. pallens** Sibth. et Sm. – Giurgiu county: Ulmeni; Tulcea county: Slava Rusă R R R
 19. **Empetrum hermafroditum** Hagerup – the Mountains of Rodnei, Corongiş Peak – R R
 20. **Ferulago confusa** Velen. – Tulcea county: Sarica – R V/R
- Obs.: following the statements in Fl. Eur., taking over also by Beldie Al., Fl. Rom.
- I, this taxon is **F. sylvatica**, having leaves with setaceous laciniae, is groundless; the two taxa are plainly separated after the ripen fruits.
21. **Galium verticillatum** Danth. in Lam. – Tulcea county: Agighiol – E R
 22. **Hornungia petraea** (L.) Rchb. – Tulcea county: Agighiol – R R
 23. **Iris sintenisii** Janka – Constanţa county: Canaraua Fetii R R(V) R
 24. **Minuartia adenotricha** Schischkin – Tulcea county: Agighiol – I R
 25. **M. hybrida** (Vill.) Schischkin – Tulcea county: Agighiol – K/R R
 26. **M. viscosa** (Schreber) Schinz et Thell. – Tulcea county: Enisala – R R
 27. **Onobrychis gracilis** Besser – Constanţa county: Medgidia., Valul lui Traian R R R
 28. **Orchis simia** Lam. – Constanţa county: Canaraua Fetii – V R
 29. **Peucedanum tauricum** Bieb. – Tulcea county: Sarica R R R
 30. **Scandix australis** L. – Tulcea county: Agighiol R V R
 31. **Seseli peucedanifolium** (Spreng.) Besser – Tulcea county: Agighiol – R –
 32. **Silene compacta** Fischer – Tulcea county: Beştepe, Caugagia – V R
 33. **Stachys angustifolia** Bieb. – Constanţa county: Ţepeş Vodă – Stâncile Miresii R R R
 34. **Stipa eriocalis** Borbás (fore-cited) – R K
 35. **S. ucrainica** P. Smirnov – Tulcea county: Culmea Pricopan – V R
 36. **Trigonella gladiata** Steven ex Bieb. – Constanţa county: Alah Bair, Canaraua Fetii R R R
 37. **Veronica bachofenii** Heuffel – the Mountains of Lotrului - Valea Latorîtei, Valea Argeşului near the Lake of Vidraru – R R
 38. **Veronica multifida** L. subsp. **capsellicarpa** (Dubovik) A. Jelen – Tulcea county: Agighiol; Constanţa county: Gura Dobrogei – V R
 39. **Vicia dalmatica** A. Kerner – county Tulcea, Pricopan Summit; Constanţa county: Canaraua Fetii R V R

40. **Amaranthus x theveneau** Deg. et Thell. (*A. deflexus* x *crispus*), known only from Banat and Transilvania; it has been discovered also in Oltenia, at Calafat.

All of these plant species are inserted into the herbarium of Univ. of Agronomical Sciences, București (BUAG).

References

1. BELDIE AL., 1977-1979 – *Flora României I, II*. București
2. Boșcaiu N., Coldea Gh., Horeanu Climent, 1994 – Lista roșie a plantelor vasculare din Flora României. *Ocrot. nat. med. înconj.*, T 38, nr. 1, București
3. Cannon J., 1968 – Genul *Ferulago* în Flora Europaea 2. Cambridge
4. Ciocârlan V., 2000 – *Flora Ilustrată a României*. București
5. Dihoru Gh., Dihoru Alexandrina, 1994 – Plante rare, periclitare și endemice în flora României. Lista roșie. *Acta Bot. Hort. Bucurestiensis*, 1993-1994 – București
6. Grințescu Gh., 1952 – Familia *Polypodiaceae* în Flora RPR I. București
7. Morariu I., 1952 – Fam. *Amaranthaceae* în Flora RPR I. București
8. Morariu I., 1972 – Genul *Stipa* în Flora R.S. România. București
9. Nyárády A., 1957 – Genul *Trifolium* în Flora RPR V. București
10. Oltean M. și colab., 1994 – Lista roșie a plantelor superioare din România. *Stud., sinteze, docum. ecol. nr. 1, 1994*. Acad. Rom. Inst. Biol. București
11. Prodan I., 1935, 1936, 1939 – Conspectul florei Dobrogei. *Bul. Acad. Agron.* 3, 6, 7. Cluj
12. Răvăruț M., 1956 – Fam. *Crassulaceae* în Flora RPR IV. București
13. Săvulescu T. (ed.), 1952-1976 – *Flora RPR I-XIII*. București

ASPECTS OF MOLDOVIȚA RIVER'S BASIN VASCULAR FLORA (SUCEAVA COUNTY)

C. MÂNZU*, ISABELA MÂNZU**

Summary: The authors bring completions to the Moldovița River's basin vascular flora conspectus, identifying a total of 740 species and subspecies. These are analyzed from the view point of affiliation to different categories of endangered species (Red List, I. P. A. Categories, C. E. Directive no. 92/43/EEC from the 21 of may 1992, Bern Convention).

Key words: vascular flora, endangered categories, Moldovița River's Basin.

Introduction

In a previous paper [11] there have been presented the results of the research made between 2000 and 2003 in Moldovița River's basin. The studies have continued in year 2004 and besides the 624 species and 17 atypical subspecies, supplementary there were identified 87 species and 12 atypical subspecies.

Material and method

The epitome contains species identified by us and not quoted before, and also species that have been quoted and confirmed in our field-research. Some of these species have already been quoted in previous papers [8, 10, 11, 13, 18, 19], but the latest researches have completed the dates concerning their spreading in Moldovița River's basin. For the taxon's identification were used papers having the following authors: Flora R. P. R. – R. S. R. (1952-1976) [22], Beldie Al. (1977, 1979) [1], Ciocârlan V. (1988-1990, 2000) [2, 3], Sârbu I. and collaborators (2001) [21]. In this epitome, the species are depicted in the botanical family's systematic order, while within the families was used the alphabetical order. The used classification system is the one adopted by Ciocârlan V. [3]. For each species is specified the area within it was found, the locality's name being coded as following: 1 – Argel; 2 – Ciumârna; 3 – Ciumârna ("La Palmă"); 4 – Deia; 5 – Deia; 6 – Demăcușa; 7 – Dragoșa; 8 – Frumosu; 9 – Hoghia Mare; 10 – Hoghia Mică; 11 – lunca Moldoviței; 12 – Moldovița – Rașca; 13 – Moldovița; 14 – Paltin; 15 – Adânc rivulet; 16 – Lunguleț rivulet; 17 – Mic rivulet (Demăcușa); 18 – Petac rivulet (Demăcușa); 19 – Turculeț rivulet (Argel); 20 – Valcan rivulet; 21 – Poiana Calului (Ciumârna); 22 – Rașca; 23 – Rașca – Argel; 24 – Săcrieș; 25 – Seredna; 26 – Strâmtura; 27 – Strâmtura – Vama; 28 – "Trei Mobile"; 29 – Ciumârna rivulet; 30 – Vama; 31 – Vatra Moldoviței; 32 – Vatra Moldoviței – Ciumârna; 33 – Vatra Moldoviței – Paltin; 34 – Boul valley.

To establish the jeopardized level of the vascular flora, have been used both scientific papers and laws of the Romanian Government [4, 5, 15, 16, 20, 23, 24, 25 and 26].

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Results and discussions

Fam. *Aspleniaceae*: *Oreopteris limbosperma* (Bellardi ex All.) Holub: 32, 14; *Polystichum aculeatum* (L.) Roth: 32, 14; *Polystichum lonchitis* (L.) Roth: 32; Fam. *Cupressaceae*: *Juniperus communis* L. var. *communis*: 30, 3, 31; Fam. *Ranunculaceae*: *Isopyrum thalictroides* L.: 32, 33; *Anemone ranunculoides* L.: 20, 32; *Ranunculus acris* L. ssp. *strigosus* (Schur) Hyl.: 12; *Ranunculus auricomus* L. var. *binatus* (Kit.) Penev.: 32; *Ranunculus flammula* L.: 31; *Ranunculus trichophyllus* Chaix: 31; *Thalictrum aquilegifolium* L.: 31, 32, 20; Fam. *Papaveraceae*: *Chelidonium majus* L.: 31, 20, 7; Fam. *Ulmaceae*: *Ulmus glabra* Hudson: 32; Fam. *Betulaceae*: *Betula pendula* Roth.: 30, 31, 14; Fam. *Caryophyllaceae*: *Cerastium glomeratum* Thuill.: 31; *Dianthus barbatus* L. ssp. *compactus* (Kit.) Heuffel: 28; *Dianthus carthusianorum* L. ssp. *carthusianorum*: 30; *Lychnis viscaria* L. ssp. *viscaria*: 30; *Moehringia trinervia* (L.) Clairv.: 30, 32; *Spergularia rubra* (L.) J. et C. Presl.: 30; *Stellaria palustris* Retz.: 14; Fam. *Chenopodiaceae*: *Chenopodium bonus-henricus* L.: 28; Fam. *Polygonaceae*: *Polygonum aviculare* L.: 31, 20, 32, 28, 30; *Polygonum convolvulus* L.: 7; *Polygonum persicaria* L.: 31, 30; Fam. *Grossulariaceae*: *Ribes petraeum* Wulfen in Jacq.: 31; Fam. *Crassulaceae*: *Sedum annuum* L.: 31; Fam. *Rosaceae*: *Aruncus dioicus* (Walter) Fernald: 14; *Potentilla argentea* L. ssp. *argentea*: 8, 30; *Rosa corymbifera* Borkh.: 30; *Rosa nitidula* Besser: 30; *Rubus fruticosus* L.: 30; *Rubus nessensis* W. Hall: 30; *Sanguisorba minor* Scop. ssp. *minor*: 30; *Crataegus monogyna* Jacq. ssp. *monogyna*: 30, 14, 31, 6; *Malus sylvestris* (L.) Miller: 31, 20; *Pyrus pyraeaster* (L.) Burgsd.: 31, 14; Fam. *Fabaceae* (*Leguminosae*): *Anthyllis vulneraria* L. ssp. *polyphylla* (Kit.) Nym.: 30, 14; 31; *Astragalus glycyphyllos* L.: 14, 32; *Coronilla varia* L.: 30, 32; *Dorycnium pentaphyllum* Scop. ssp. *herbaceum* (Vill.) Bonnier et Layens: 30; *Genistella sagittalis* (L.) Gams: 30; *Lathyrus tuberosus* L.: 31; *Lathyrus vernus* (L.) Bernh.: 32; *Melilotus albus* Medik.: 6, 20; *Melilotus officinalis* Lam.: 6, 30, 4, 31, 32; *Trifolium aureum* Pollich: 30; *Trifolium dubium* Sm.: 31; *Trifolium hybridum* L. ssp. *elegans* (Savi) Ascherson et Graebner: 31; *Trifolium spadicum* L.: 1, 31; *Vicia sepium* L.: 31, 32; *Vicia villosa* Roth: 30; Fam. *Lythraceae*: *Lythrum salicaria* L.: 30, 32, 20, 31; Fam. *Onagraceae*: *Chamaerion angustifolium* (L.) Holub: 30, 8, 32; *Oenothera biennis* L.: 31; Fam. *Loranthaceae*: *Viscum laxum* Boiss. et Reuter ssp. *laxum*: 20; Fam. *Celastraceae*: *Evonymus europaeus* L.: 31, 14; Fam. *Euphorbiaceae*: *Euphorbia helioscopia* L.: 31; *Euphorbia villosa* Waldst. et Kit. ssp. *villosa*: 3; Fam. *Rhamnaceae*: *Frangula alnus* Miller: 14; Fam. *Geraniaceae*: *Erodium cicutarium* (L.) L'Hérit: 30, 31; *Geranium sylvaticum* L.: 30, 31, 8; Fam. *Linaceae*: *Linum austriacum* L.: 30; Fam. *Araliaceae*: *Hedera helix* L.: 30; Fam. *Apiaceae* (*Umbelliferae*): *Bupleurum falcatum* L.: 30, 31, 13; *Chaerophyllum aureum* L.: 30, 13, 1; *Conium maculatum* L.: 30; *Daucus carota* L. ssp. *carota*: 31; *Laserpitium latifolium* L.: 32; *Torilis japonica* (Houtt.) DC.: 30, 32, 14, 13, 7; Fam. *Tiliaceae*: *Tilia cordata* Miller: 31; Fam. *Malvaceae*: *Malva neglecta* Wallr.: 31; *Malva sylvestris* L. ssp. *sylvestris*: 13, 1; Fam. *Violaceae*: *Viola collina* Besser: 32; *Viola mirabilis* L.: 31, 14; Fam. *Cistaceae*: *Helianthemum nummularium* (L.) Mill. ssp. *obscurum* (Pers.) Holub: 30; Fam. *Brassicaceae* (*Cruciferae*): *Alliaria petiolata* (Bieb.) Cavara et Grande: 1; *Alyssum alyssoides* (L.) L.: 14; *Berteroa incana* (L.) DC.: 30; *Cardamine pratensis* L. ssp. *pratensis*: 8, 24; *Dentaria bulbifera* L.: 33, 32; *Descurainia sophia* (L.) Webb ex Prantl: 30; *Lepidium campestre* (L.) R. Br.: 7; *Lunaria rediviva* L.: 30; *Raphanus raphanistrum* L. ssp. *raphanistrum*: 30; *Rorippa pyrenaica* (L.) Reichenb.: 30; *Sinapis arvensis* L.: 31, 32; *Sisymbrium loeselii* L.: 31; *Sisymbrium officinale* (L.) Scop.: 20; Fam. *Resedaceae*: *Reseda lutea* L.: 30, 31; Fam. *Salicaceae*: *Populus tremula* L.: 30, 31, 14; *Salix alba* L. ssp. *alba*: 6, 30, 8; *Salix cinerea* L.: 8; *Salix elaeagnos* Scop.: 31, 30; *Salix fragilis* L.: 13, 31, 32, 6, 30, 8; *Salix purpurea* L. ssp. *purpurea*: 30, 8, 32, 34, 16, 6; *Salix silesiaca* Willd.: 34; *Salix triandra* L. emend. Ser. ssp. *triandra*: 13; *Salix viminalis* L.: 30; Fam. *Pyrolaceae*: *Moneses uniflora* (L.) A. Gray: 24, 14; *Orthilia secunda* (L.) House: 31, 34; Fam. *Monotropaceae*: *Monotropa hypopitys* L.: 28; Fam. *Primulaceae*: *Lysimachia punctata* L.: 32, 14, 13; *Lysimachia vulgaris* L.: 6, 13, 8, 32, 24, 14, 30; *Primula veris* L. ssp. *veris*: 32; Fam. *Gentianaceae*: *Gentianella austriaca* (A. et J. Kerner) Holub: 13, 1, 31, 8; Fam. *Oleaceae*: *Fraxinus excelsior* L.: 30; Fam. *Solanaceae*: *Hyoscyamus niger* L.: 31; *Solanum dulcamara* L.: 30; *Solanum nigrum* L. ssp. *nigrum*: 31, 30; Fam. *Convolvulaceae*: *Calystegia sepium* (L.) R. Br.: 30, 31; *Convolvulus arvensis* L.: 13, 30, 32, 31; Fam. *Cuscutaceae*: *Cuscuta epithymum* (L.) L. ssp. *trifolii* (Bab.) Berher var. *trifolii*: 3; var. *prodani* (Buia) Ciocârlan: 3; Fam. *Boraginaceae*: *Echium vulgare* L.: 30; *Pulmonaria obscura* Dumort.: 14; 31; *Symphytum officinale* L. ssp. *officinale*: 34, 6, 30, 31, 13, 8; Fam. *Verbenaceae*: *Verbena officinalis* L.: 31; Fam. *Lamiaceae*: *Ajuga genevensis* L.: 14, 32; *Clinopodium vulgare* L.: 31; *Elsholtzia ciliata* (Thunb.) Hyl.: 31; *Galeopsis bifida* Boenn.: 31; *Lamium album* L.: 13, 30, 7, 31, 32, 14; *Leonurus cardiaca* L. ssp. *villosus* (Desf. ex Sprengel): 7, 31, 13; *Lycopus europaeus* L.: 1, 8, 31, 14, 32; *Mentha arvensis* L. ssp. *austriaca* (Jacq.) Briq.: 31; *Origanum vulgare* L.: 31, 13, 30, 18; *Salvia verticillata* L.: 34, 2, 31; *Stachys germanica* L.: 31; *Thymus balcanus* Borb.: 30; Fam. *Scrophulariaceae*: *Digitalis grandiflora* Miller: 14, 34, 20, 32, 17; *Euphrasia officinalis* L. ssp. *monticola* Silverside: 14; *Lathraea squamaria* L.: 32; *Linaria vulgaris* Miller: 31, 13, 8, 7; *Melampyrum bihariense* A. Kerner: 32, 13; *Melampyrum sylvaticum* L.: 31; *Rhinanthus alectorolophus* (Scop.) Pollich: 30, 32; *Scrophularia nodosa* L.: 30, 13, 1, 32, 20, 14, 8, 7; *Verbascum nigrum* L. ssp. *nigrum*: 31, 13; *Veronica anagallis-aquatica* L.: 31; *Veronica serpyllifolia* L. ssp. *serpyllifolia*: 34, 31; *Veronica teucrium* L. ssp. *teucrium*: 31; Fam. *Orobanchaceae*: *Orobanche caryophyllacea* Sm.: 31; Fam. *Campanulaceae*: *Campanula cervicaria* L.: 31; *Campanula trachelium* L.: 14, 32; *Phyteuma orbiculare* L.: 31, 32; *Phyteuma tetramerum* Schur: 32, 14; *Phyteuma wagneri* A. Kerner: 14; Fam. *Rubiaceae*: *Asperula cynanchica* L.: 30; *Galium aparine* L.: 30; *Galium*

mollugo L.: 30, 32; Fam. *Caprifoliaceae*: *Sambucus ebulus* L.: 7, 14, 13; *Sambucus nigra* L.: 30, 8, 31, 32, 20, 14, 6; *Viburnum opulus* L.: 6; Fam. *Valerianaceae*: *Valeriana officinalis* L.: 30, 31, 32, 14; *Valeriana sambucifolia* Mikán fil.: 31; *Valeriana simplicifolia* (Reichenb.) Kabath: 30; *Valeriana tripteris* L.: 34; Fam. *Dipsacaceae*: *Scabiosa columbaria* L. ssp. *columbaria*: 32; *Scabiosa ochroleuca* L.: 30, 31, 13; Fam. *Asteraceae* (*Compositae*): *Achillea stricta* (Koch) Schleicher ex Grelli: 32, 14; *Arctium lappa* L.: 30, 7; *Arctium tomentosum* Miller: 13, 30, 7, 31, 14, 32, 20, 6; *Artemisia vulgaris* L.: 7, 31; *Carduus crispus* L. ssp. *crispus*: 13, 1; *Carlina vulgaris* L.: 1, 8, 34, 30, 31; *Centaurea scabiosa* L.: 30; *Cirsium decussatum* Janka: 31; *Echinops exaltatus* Schrader: 32; *Eupatorium cannabinum* L.: 30, 32; *Galinsoga ciliata* (Rafin.) Blake: 31; *Galinsoga parviflora* Cav.: 31, 30; *Inula helenium* L.: 14; *Matricaria perforata* Mérat: 30; *Senecio jacobea* L. ssp. *jacobea*: 30; *Senecio sylvaticus* L.: 30, 7; *Serratula tinctoria* L.: 24, 31, 32; *Xanthium spinosum* L.: 30; *Xanthium strumarium* L.: 30; *Cichorium intybus* L. ssp. *intybus*: 34, 2, 4, 31; *Hieracium flagellare* Willd. ex Schlecht: 14; *Hieracium lachenalii* C. C. Gmelin: 32, 28; *Hieracium lactucella* Wallr.: 30, 32, 14; *Hieracium murorum* L.: 32; *Hypochoeris maculata* L.: 31; *Leontodon hispidus* L. ssp. *hispidus*: 30, 31; ssp. *hastilis* (L.) Grelli: 30, 31, 28; *Scorzonera rosea* Waldst. et Kit.: 32; *Sonchus arvensis* L. ssp. *arvensis*: 31, 32; Fam. *Alismataceae*: *Alisma plantago-aquatica* L.: 1, 31, 32; Fam. *Liliaceae*: *Colchicum autumnale* L.: 34, 24; *Streptopus amplexifolius* (L.) DC.: 34; Fam. *Iridaceae*: *Sisyrinchium montanum* E. L. Greene: 14; Fam. *Orchidaceae*: *Dactylorhiza incarnata* (L.) Soó: 30; *Dactylorhiza maculata* (L.) Soó ssp. *maculata*: 30, 14, 7; *Dactylorhiza majalis* (Rchb.) Hunt et Sumerhayes: 30; *Dactylorhiza saccifera* (Brongn.) Soó: 14; *Neottia nidus-avis* (L.) L. C. M. Richard: 33; *Orchis coriophora* L. ssp. *fragrans* (Pollini) K. Richter: 14; *Pseudorchis albida* (L.) A. et D. Löve: 9, 10, 25; *Traunsteinera globosa* (L.) Reichenb.: 3, 14; Fam. *Juncaceae*: *Juncus conglomeratus* L.: 31, 13, 8; Fam. *Cyperaceae*: *Carex acuta* L. ssp. *acuta*: 4, 31; *Carex digitata* L.: 32; *Carex distans* L.: 30, 7; *Carex divulsa* Stokes: 30; *Carex echinata* Murray: 30, 31, 7; *Carex lepidocarpa* Tausch: 30; *Carex montana* L.: 34, 33; *Carex pairae* F. W. Schultz: 13; *Carex pallescens* L.: 30, 7, 32, 14, 9, 10, 25, 19; *Carex pilosa* Scop.: 32; *Carex viridula* Michx. ssp. *viridula*: 1; Fam. *Poaceae* (*Gramineae*): *Poa compressa* L. ssp. *compressa*: 4, 32; *Bromus hordeaceus* L.: 31, 32; *Alopecurus aequalis* Sobol.: 31; *Alopecurus geniculatus* L.: 14; *Alopecurus pratensis* L. ssp. *pratensis*: 34, 8, 31, 13; *Calamagrostis epigeios* (L.) Roth: 30, 8; *Milium effusum* L.: 24, 16, 18, 7; *Echinochloa crus-galli* (L.) Beauv.: 32; *Setaria pumila* (Poirét) Schultes: 30, 32; Fam. *Sparganiaceae*: *Sparganium erectum* L. ssp. *erectum*: 32, 31; Fam. *Typhaceae*: *Typha angustifolia* L.: 31.

On the basis of the research made between 2000 and 2004, the conspectus of the vascular flora from the natural ecosystems includes 740 species and subspecies, from which 711 species (3 hybrids) and 29 atypical subspecies, 124 species being represented by the type subspecies. To this conspectus, 9 varieties may also be added. All these systematic categories belong to 329 genera and 88 botanical families.

It comes out that 698 species and subspecies (94,32%) are not included in neither categories of the Red List, 42 species and subspecies (5,67%) being distributed by the following categories:

28 rare species and subspecies (**R**) (**3,78%**): *Athyrium distentifolium* (after Dihoru Gh., 1994); *Pinus sylvestris*; *Trollius europaeus* ssp. *europaeus* (**V**, after Dihoru Gh., 1994); *Dianthus barbatus* ssp. *compactus*; *Trifolium spadiceum*; *Salix aurita*; *Monotropa hypopitys*; *Trientalis europaea* (**E** – [5]); *Gentiana acaulis*; *Rhinanthus alectorolophus* (**V** – [5]); *Valeriana simplicifolia* [15]; *Scorzonera rosea*; *Streptopus amplexifolius*; *Gladiolus imbricatus* [5]; *Dactylorhiza incarnata* [15], *D. maculata* ssp. *maculata*, *D. maculata* ssp. *schurii*, *D. majalis*; *Epipactis helleborine*, *Goodyera repens*; *Gymnadenia conopsea* ssp. *conopsea*; *Listera ovata*, *Neottia nidus-avis*, *Orchis coriophora* ssp. *fragrans*; *Platanthera bifolia*; *Pseudorchis albida*; *Traunsteinera globosa*; *Luzula pallescens*;

2 vulnerable/rare species (**V/R**) (**0,27%**): *Anacamptis pyramidalis*; *Typha shuttleworthii* (**R** – [5]);

3 sub endemic/rare species (**bR**) (**0,40%**): *Ranunculus carpaticus*, *Phyteuma tetramerum*, *Ph. wagneri*;

3 species having rare European specific spreading area (**BR**) (**0,40%**): *Centaurea melanocalathia*, *Cirsium decussatum*, *Leucanthemum waldsteinii*;

1 vulnerable species (**V**) (**0,13%**): *Arnica montana*;

1 species endemic to Romania, rare (**AR**) (**0,13%**): *Primula elatior* ssp. *leucophylla* (**nt** – not endangered – [5]);

1 species endemic to Romania, not endangered (**A nt**) (**0,13%**): *Helictotrichon decorum*

1 species having endangered European specific spreading area (**BE**) (**0,13%**): *Abies alba*;

1 species not endangered (**nt**) (**0,13%**): *Galanthus nivalis*;

1 species having not endangered European specific spreading area (**B nt**) (**0,13%**): *Cirsium furiens* (**K** – undetermined – [5])

The implementation of the I.P.A. – Romania project requires the coverage of some steps, including drawing up national Red List, in accordance with the following criteria: **A** – endangered species (**Ai** – worldwide level endangered species; **Aii** – European level endangered species; **Aiii** – endemic and endangered species, not included in Ai and Aii categories; **Aiv** – sub endemic and endangered species, not included in Ai, Aii and Aiii categories); **B** – vegetal diversity (**Bi** – list of endangered types of habitats from Romania, not included yet in the Habitats Directive or in the Bern Convention; **Bii** – list of endemic, sub endemic, vulnerable, endangered, rare species); **C** – endangered habitats (**Ci** – list of habitats types from Romania, included as priority in the Habitats Directive and included in the Bern Convention; **Cii** – list of habitats types from Romania, included as non-priority in the Habitats Directive and acknowledged by the Bern Convention) [20].

In Moldovița's Basin have been identified 17 species that suit some of the enumerated criteria (Table no. 1).

Table no. 1 – Rare species from Moldovița' Basin, according to I. P. A. criteria [20]

Species	IPA - Criteria	Vulnerability level in Romania
<i>Lycopodium selago</i>	Aii	VU
<i>Lycopodium clavatum</i>	Aii	VU
<i>Lycopodium annotinum</i>	Aii	VU
<i>Galanthus nivalis</i>	Aii	VU
<i>Campanula abietina</i>	Aii	LR
<i>Campanula serrata</i>	Aii	LR
<i>Arnica montana</i>	Aii	VU
<i>Typha shuttleworthii</i>	Aii	LR
<i>Primula elatior ssp. leucophylla</i>	Aiii	LR
<i>Helictotrichon decorum</i>	Aiii	VU
<i>Taxus baccata</i>	Bii	VU
<i>Trientalis europaea</i>	Bii	VU
<i>Anacamptys pyramidalis</i>	Bii	VU
<i>Trollius europaeus</i>	Bii	R
<i>Dactylorhiza incarnata</i>	Bii	R
<i>Orchis coriophora</i>	Bii	R
<i>Traunsteinera globosa</i>	Bii	R

The C. E. Directive no. 92/43/EEC from the 21 of may 1992 regarding the conservation of natural habitats and wild flora and fauna, in the 5-th Annexe, concerning plant species of communitarian interest, the drawing and exploitation of witch are the

subject of management plans, specify at this category the species of *Lycopodium* genera (*Lycopodiaceae* family), *Galanthus nivalis* (*Amaryllidaceae* family) and *Arnica montana* (*Asteraceae* family), that can be found in the area we have studied. Among these, on the basis of own observations, we may consider that *Arnica montana* appears to be the most affected, at the end of August and beginning of September being very difficult to find a plant with the anthodium, since the inflorescences are collected for medicinal purposes.

Another species, considered rare in normative documents at European level is *Typha shuttleworthii*, included in the law for Romania's adhesion to the Convention regarding the conservation of wildlife and natural habitats in Europe, adopted at Bern in 19 September 1979, published in M. O. no. 62/25.03.1993.

Besides these species, in Bern's Convention (Appendix I, Annex I 1998), is also included *Campanula abietina*, and in Habitats Directive (Annex IVb), *Campanula serrata*, considered, in Annex IIb as a priority species [20].

Bibliography

1. BELDIE AL., 1977, 1979. *Flora României. Determinator ilustrat al plantelor vasculare, I, II*, Edit. Acad. Rom.: 412 p., 406 p.
2. CIOCÂRLAN V., 1988, 1990. *Flora ilustrată a României, I, II*, Edit. Ceres, București: 512 p., 598 p.
3. CIOCÂRLAN V., 2000. *Flora ilustrată a României. Pteridophyta et Spermatophyta*, Edit. Ceres, București: 1138 p.
4. COLDEA GH., NEGREAN G., SÂRBU I., SÂRBU ANCA (coord.). 2001. *Ghid pentru identificarea și inventarierea pajiștilor seminaturale din România*, Edit. alo, București!, București: 17 – 58
5. DIHORU GH., DIHORU ALEXANDRINA. 1994. Plante rare, periclitare și endemice în flora României – Lista Roșie, *Acta Bot. Horti Bucurestiensis*, București, **1993 – 1994**: 173 – 197
6. DIHORU GH., PÂRVU C. 1987. *Plante endemice în flora României*, Edit. Ceres, București: 181 p.
7. DOBRESCU C., VIȚALARIU GH. 1987. Noi contribuții la studiul vegetației din Moldova, *An. Șt. Univ. "Al. I. Cuza" Iași*, T. **XXXIII**, s II a (Biol.): 25-26
8. HERBICH FR., 1859. *Flora der Bucovina*, Verlag Von F. Volckmar., Leipzig: 460 p.
9. IONEL A., MANOLIU AL., ZANOSCHI V. 1986. *Cunoașterea și ocrotirea plantelor rare*, Edit. Ceres, București: 134 p.
10. LUCESCU T., 1987. Plante noi sau rare din flora Bucovinei, *Culegere de Stud. și Art. de Biol.*, Univ. "Al. I. Cuza" Iași, Grăd. Bot., **3**: 260 – 261
11. MÂNZU C. 2004. Contributions to the study of the vascular flora from the Moldovița river's area (Suceava county), *Bul. Grăd. Bot. Iași*, **12**: 75-80
12. MÂNZU C. 2004. The analysis of the vascular flora from the Moldovița's river basin (Suceava County), *An. Șt. Univ. "Al. I. Cuza" Iași*, t. **L**, s. II a Biol. veget.: 79 - 88
13. MITITELU D., CHIFU T., PASCAL P., 1989. Flora și vegetația Județului Suceava, *Anuar. Muz. Jud. Suceava*, **X**: 93 – 120
14. NEGREAN G. 1975. Protecția unor plante endemice rare din România, *Ocrot. Nat. și a Mediului Înconj.*, **19**, 2: 141 – 143
15. NEGREAN G. 2001. Lista Roșie a plantelor din România existente în pajiști, inclusiv endemite și subendemite (*Tracheophyta*), in Sârbu Anca (coord.). *Ghid pentru identificarea și inventarierea pajiștilor seminaturale din România*, Edit. „Alo, București!", București: 30 – 58
16. OLTEAN M., NEGREAN G., POPESCU A., ROMAN N., DIHORU G., SANDA V., MIHĂILESCU S.. 1994. Lista Roșie a plantelor superioare din România, *Stud., Sint., Docum. Ecol.*, **I/1994**, Acad. Rom., Inst. de Biol., București: 52 p.
17. OPRÎȘ T. 1990. *Plante unice în peisajul românesc*, Edit. Sport – Turism, București: 158 p.
18. PANAIT V., 1969. *Contribuții la studiul vegetației și îmbunătățirii pajiștilor naturale din bazinul Moldoviței, jud. Suceava*. Teză de doctorat, Inst. Agron. Iași, Facult. Agron.
19. RĂVĂRUȚ M., MITITELU D., TURENSCHI E., 1969. Contribuție la studiul geobotanic al pajiștilor din Bazinul Moldovei, *Lucr. Șt. Inst. Agr. "I. Ionescu de la Brad", Iași, I*, Agronom. – Hort.: 187 – 196
20. SÂRBU ANCA (coord.), COLDEA GH., SÂRBU I., CRISTEA V., NEGREAN G., OPREA AD., CRISTUREAN I., POPESCU GH. 2003. *Ghid pentru identificarea importantelor arii de protecție și conservare a plantelor din România*, Edit. alo, București!: 113 p.

21. SÂRBU I., ȘTEFAN N., IVĂNESCU LĂCRĂMIOARA, MÂNZU C., 2001. *Flora ilustrată a plantelor vasculare din Estul României, I, II*, Edit. Univ. „Al. I. Cuza” Iași: 781 p. + 354 pl.
22. ***, 1952-1976. *Flora R. P. R. - R. S. R., I-XIII*, Edit. Acad. R. P. R. – R. S. R., București
23. ***, Decret pentru promulgarea Legii privind aprobarea planului de amenajare a teritoriului național, Secțiunea a III-a – Zone protejate, M. O. nr. 152/12.04.2000
24. ***, Directiva C. E. nr. 92/43/EEC din 21 mai 1992 privind conservarea habitatelor naturale și faunei și florei sălbatice (Habitats Directive); Anexa V
25. ***, Lege pentru aderarea României la Convenția privind conservarea vieții sălbatice și a habitatelor naturale din Europa, adoptată la Berna la 19 septembrie 1979, M. O. nr. 62/25.03.1993
26. ***, O. U. Nr. 236/24.11.2000 privind regimul ariilor protejate, conservarea habitatelor naturale, a florei și faunei sălbatice, publicată în M. O. nr. 625/4.12.2000

**ASSOCIATIONS VEGETALES DE L'ORDRE
POTENTILLO – POLYGONETALIA R. TX. 1949 DU PLATEAU ET
DE LA PLAINE DU COVURLUI**

POPA DIDIA*, CHIFU T.**

Résumé: Les auteurs ont identifié deux associations végétales qui n'ont pas été mentionnés encore dans cette région: *Agrostietum stoloniferae* Burduja et al. 1956 et *Rorippo austriacae – Agropyretum repentis* (Timar 1947) R. Tx. 1950. Les associations sont décrites sous l'aspect corologique, des conditions stationnelles, de la composition floristique et de la structure phytosociologique.

Mots clé: ssociations végétales, composition phytosociologique, écologie

Les recherches effectuées pendant les années 2004 – 2005, ont mis en évidence le fait que le territoire étudié a été l'objet de l'attention particulière de certains chercheurs [2, 6, 7, 9, 10, 11].

En dépit des recherches intensives précédentes, nos recherches ont abouti à l'identification de deux associations qui n'ont pas été mentionnées dans les études antérieures.

Tenant compte de certains travaux récents de nomenclature et de classifications phytosociologique [1, 3, 4, 5, 8], les deux associations sont encadrées dans le phytosystème:

Classe *Molinio – Arrhenatheretea* R. Tx. 1937

Ordre *Potentillo – Polygonetalia* R. Tx. 1947

Alliance *Potentillion anserinae* R. Tx. 1947

Ass. *Agrostietum stoloniferae* Burduja et al. 1956

Ass. *Rorippo austriacae – Agropyretum repentis* (Timar 1947) R. Tx. 1950

Ass. *Agrostietum stoloniferae* Burduja et al. 1956

(Syn.: *Rorippo – Agrostietum stoloniferae* (Moor 1958) Oberd. et T. Müller 1961;

Rumici – Agrostietum stoloniferae Moor 1958)

Corologie. L'association a une répartition limitée; elle a été identifiée à Foltești, Schela vers Slobozia Conachi et Slobozia Oancea.

Conditions stationnelles. Les phytocoenoses édifiée par *Agrostis stolonifera* ont un développement optimal sur de terrains bas, plats, inondés périodiquement, situés au bord des ruisseaux, des mares, dans les plaines des rivières etc, à une altitude de 40-80m.

La composition floristique et phytosociologique. Du point de vue floristique l'association est relativement pauvre, comptant 72 espèces, avec une moyenne de 33 espèces par relevé (tableau 1). L'espèce caractéristique et édifiante, *Agrostis stolonifera*, est dominante, mais dans certaines phytocoenoses on trouve, à des indices

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d'abondance -dominance plus importants, les espèces: *Elymus repens*, *Trifolium fragiferum*, *Bromus arvensis*, *Cirsium vulgare*, *Melilotus officinalis* etc.

La structure phytocoenotique est complexe, près de 60% de ses espèces sont caractéristiques à l'alliance, à l'ordre et à la class *Molinio-Arrhenatheretea*, mais on trouve aussi, à un pourcentage élevé (près de 20%) des espèces appartenant aux classes *Artemisietea vulgaris* et *Stellarietea mediae*, qui s'ajoutent aux espèces de l'ordre *Plantaginietalia majoris*, ceci comme conséquence du pâturage intensif. On remarque, de même, la participation d'un groupe important d'espèces (environ 10%) appartenant à la class *Phragmiti-Magnocaricetea*, qui préfère les microdépressions plus humides.

Tableau 1
Ass. *Agrostietum stoloniferae* Burduja et al. 1956

Numéro du relevé	1	2	3	4	5	K
Altitude (m.s.m)	40	40	80	40	60	
Exposition	-	-	SV	-	-	
Pente (degrés)	-	-	2	-	-	
Recouvrement de la végétation (%)	85	80	100	100	100	
Caract d'ass.						
<i>Agrostis stolonifera</i>	3	3	4	5	4	V
<i>Potentillion anserinae</i>						
<i>Alopecurus geniculatus</i>	-	-	+	+	-	II
<i>Carex hirta</i>	+	+	-	+	+	IV
<i>Juncus inflexus</i>	-	-	+	-	+	II
<i>Mentha longifolia</i>	-	-	+	-	+	II
<i>Ranunculus repens</i>	-	-	-	+	-	I
<i>Ranunculus sardous</i>	+	-	+	-	-	II
<i>Rorippa austriaca</i>	+	+	+	+	+	V
<i>Rorippa sylvestris</i>	+	+	+	-	+	IV
<i>Rumex crispus</i>	-	+	+	+	-	III
<i>Potentillo-Polygonetalia</i>						
<i>Althaea officinalis</i>	-	-	-	+	-	I
<i>Bromus commutatus</i>	-	+	-	+	-	II
<i>Elymus repens</i>	+	1	+	+	1	V
<i>Inula britannica</i>	+	+	-	+	+	IV
<i>Mentha pulegium</i>	+	+	-	+	-	III
<i>Potentilla reptans</i>	+	+	+	+	+	V
<i>Trifolium fragiferum</i>	-	+	2	+	1	IV
<i>Arrhenatherion et Arrhenatheretalia</i>						
<i>Alopecurus pratensis</i>	-	+	-	-	-	I
<i>Crepis biennis</i>	-	-	+	-	-	I
<i>Dactylis glomerata</i>	+	-	+	+	-	III
<i>Daucus carota</i>	-	+	+	+	-	III
<i>Leontodon hispidus</i>	+	-	-	-	+	II
<i>Medicago lupulina</i>	+	+	+	+	+	V
<i>Odontites vernus ssp. serotinus</i>	-	+	-	-	-	I
<i>Taraxacum officinalis</i>	+	+	+	-	+	IV
<i>Trifolium campestre</i>	-	+	-	+	-	II
<i>Lolio-Plantaginion et Plantaginietalia majoris</i>						
<i>Cichorium intybus</i>	-	+	+	-	-	II
<i>Cynodon dactylon</i>	-	-	-	-	+	I
<i>Lepidium ruderalis</i>	+	-	-	-	-	I
<i>Lolium perenne</i>	-	-	+	+	+	III
<i>Matricaria perforata</i>	+	+	+	-	+	IV
<i>Plantago major</i>	+	+	+	+	+	V
<i>Polygonum aviculare</i>	-	-	-	+	-	I
<i>Verbena officinalis</i>	-	+	-	+	-	II

<i>Molinio-Arrhenatheretea</i>						
Lotus corniculatus	-	+	+	-	+	III
Lysimachia nummularia	+	-	-	-	+	II
Ononis arvensis	-	+	-	+	-	II
Plantago lanceolata	+	-	+	+	+	IV
Ranunculus acris	-	-	+	+	-	II
Rumex acetosa	+	-	+	-	-	II
Trifolium pratense	-	+	+	-	+	III
Trifolium repens	+	+	+	+	+	V
<i>Phragmiti-Magnocaricetea</i>						
Alisma plantago-aquatica	-	-	-	+	+	II
Bolboschoenus maritimus	-	-	-	+	-	I
Eleocharis palustris	-	-	-	+	-	I
Epilobium hirsutum	-	-	+	-	-	I
Lycopus europaeus	+	+	-	-	+	III
Lythrum salicaria	+	-	-	-	+	II
Phragmites australis	+	-	-	-	-	I
<i>Festuco-Brometea</i>						
Achillea setacea	+	+	+	-	+	IV
Galium humifusum	+	+	-	-	-	II
Medicago falcata	+	+	-	-	-	II
Potentilla argentea	+	-	-	-	-	I
<i>Artemisietea vulgaris et Stellarietea mediae</i>						
Anthriscus sylvestris	-	+	+	-	-	II
Arctium tomentosum	+	-	-	-	-	I
Artemisia vulgaris	-	+	-	-	-	I
Bromus arvensis	1	1	-	-	-	II
Cirsium arvense	-	+	-	-	-	I
Cirsium vulgare	2	+	+	-	+	IV
Consolida regalis	-	+	-	-	-	I
Conyza canadensis	+	-	-	-	-	I
Leonurus marrubiastrum	+	-	-	-	-	I
Melilotus albus	-	+	-	-	-	I
Melilotus officinalis	+	1	+	-	-	III
Sonchus arvensis	+	-	+	-	-	II
Tussilago farfara	-	-	+	-	-	I
Xanthium spinosum	-	-	-	+	-	I
Xanthium strumarium	+	+	+	+	+	V
<i>Variae syntaxa</i>						
Agrimonia eupatoria	+	-	-	-	-	I
Bidens tripartita	-	-	+	-	-	I
Centaureum erythraea	-	-	-	+	-	I
Juncus gerardi	-	-	-	+	+	II
Thalictrum aquilegifolium	+	-	-	-	-	I

Lieu et data des relevés:

1-2 – Foltești, 24.07.04; 3 – Schela, 09.07.05; 4-5 – Slobozia Oancea, 10.07.05

Le spectre des bioformes (Fig. 1) met en évidence la prédominance des espèces hemicriptophytes (48,6%) et des terrophytes (T et TH = 34,7%). Les hydrohelophytes sont significatives, elles - aussi (7%).

Le spectre des éléments floristiques (Fig. 2) est moins diversifié, indiquant la dominance nette des éléments eurasiatique (62,5%), parmi lesquels on trouve une participation significative des éléments circumpolaires (9,7%) et européens (7,0%).

Les spectre des indices écologiques (Fig. 3-4) montre la prédominance des espèces du lumière, mésothermes, souscontinentales (répandues dans l'Europe Centrale), mésophiles, qui peuplent des sols neutrophiles - basiphiles, ayant un contenu modéré – riche en azote.

La valeur économique. Les prairies de *Agrostis stolonifera* ont une valeur économique réduite, étant donné l'espèce édifiante et dominante qui a une valeur fourragère moyenne. D'autre part, suite au pâturage intensif, la prairie est envahie par une série d'espèces non fourragères, beaucoup d'entre elles épineuses et toxiques, les bonnes espèces fourragères *Alopecurus pratensis*, *Dactylis glomerata*, *Lolium perenne*, *Lotus corniculatus*, *Trifolium pratense*, *Trifolium repens* etc ayant une fréquence et un recouvrement relativement faible.

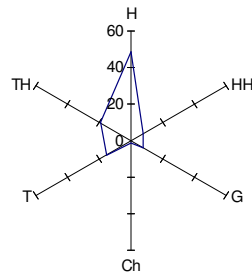


Fig. 1. Le spectre des bioformes de l'ass. *Agrostietum stoloniferae*

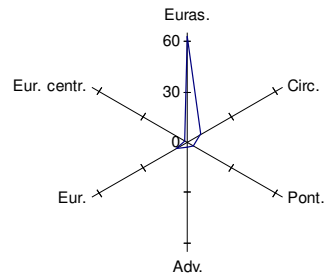


Fig. 2. Le spectre des éléments floristique de l'ass. *Agrostietum stoloniferae*

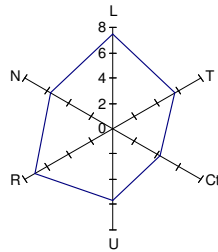


Fig. 3. Le spectre écologique de l'ass. *Agrostietum stoloniferae*

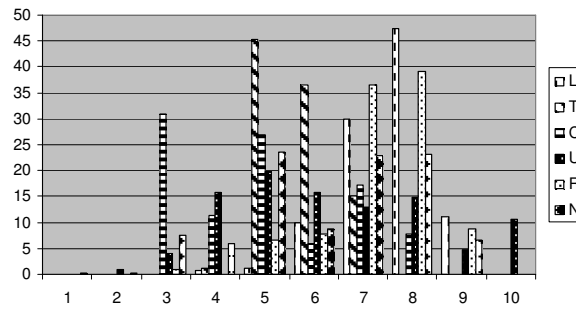


Fig. 4. Le spectre des indices écologiques de l'ass. *Agrostietum stoloniferae*

Ass. *Rorippa austriacae* – *Agropyretum repentis* (Timar 1947) R. Tx. 1950

Corologie. Les phytocoenoses de cette association ont été identifiées dans les prairies de Balintești, Cavadinești, Costache Negri, Crăiești et Foltești.

Conditions stationnelles. L'espèce édifiante, *Elymus repens*, forme des phytocoenoses caractéristiques dans les vallées inondables des ruisseaux, sur des terrains plats ou légèrement inclinés, modérément humides, à une altitude de 40-170m.

La composition floristique et phytosociologique. La composition floristique est moins riche, comptant 66 espèces, à une moyenne de 32 espèces par relevé (tableau 2).

L'espèce caractéristique, *Rorippa austriaca* est constante, tandis que l'espèce édifiante, *Elymus repens*, domine toutes les phytocoenoses. Dans certaines phytocoenose, les espèces *Agrostis stolonifera*, *Trifolium fragiferum*, *Trifolium repens*, *Poa angustifolia*, *Capsella bursa-pastoris*, *Lolium perenne* etc, ont une abondance – dominance significative.

D'autres espèces ont une constance élevée: *Rorippa sylvestris*, *Potentilla reptans*, *Alopecurus pratensis*, *Plantago lanceolata*, *Xanthium strumarium* etc.

A noter le pourcentage élevé (14-18%) de participation des espèces caractéristique aux classes *Festuco-Brometea*, *Artemisietea vulgaris* et *Stellarietea mediae*, aussi que certaines espèces de la classe *Puccinellio-Salicornietea* (*Juncus gerardi*, *Lotus glaber*, *Puccinellia distans* ssp. *limosa* etc), indiquant une légère salinité de la sousstrate.

Tableau 2

Ass. *Rorippa austriacae* – *Agropyretum repentis* (Timar 1947) R. Tx. 1950

Numéro du relevé	1	2	3	4	5	K
Altitude (m.s.m)	40	110	160	160	170	
Exposition	-	-	S	-	SV	
Pente (degrés)	-	-	2	-	2	
Recouvrement de la végétation (%)	100	100	80	90	75	
Caract d'ass.						
<i>Rorippa austriaca</i>	+	+	+	+	+	V
<i>Potentillion anserinae</i>						
<i>Carex hirta</i>	+	-	-	+	-	II
<i>Juncus inflexus</i>	-	-	+	-	+	II
<i>Mentha longifolia</i>	-	+	+	-	-	II
<i>Ranunculus repens</i>	-	+	-	+	-	II
<i>Ranunculus sardous</i>	+	-	-	+	+	III
<i>Rorippa sylvestris</i>	+	+	+	+	+	V
<i>Rumex crispus</i>	+	-	+	-	+	III
<i>Potentillo-Polygonetalia</i>						
<i>Agrostis stolonifera</i>	+	1	1	+	+	V
<i>Althaea officinalis</i>	+	-	+	-	+	III
<i>Bromus commutatus</i>	-	+	+	-	-	II
<i>Elymus repens</i>	5	4	3	4	3	V
<i>Inula britannica</i>	-	-	+	-	+	II
<i>Potentilla reptans</i>	+	+	+	+	+	V
<i>Trifolium fragiferum</i>	+	1	1	+	1	V
<i>Arrhenatherion et Arrhenatheretalia</i>						
<i>Alopecurus pratensis</i>	+	+	+	+	-	IV
<i>Crepis biennis</i>	-	-	-	+	-	I
<i>Dactylis glomerata</i>	-	+	-	-	+	II
<i>Daucus carota</i>	-	-	+	+	-	II
<i>Medicago lupulina</i>	-	-	+	+	+	III
<i>Taraxacum officinalis</i>	-	-	+	-	+	II
<i>Trifolium campestre</i>	+	-	+	-	-	II
<i>Lolio-Plantaginion et Plantaginetalia majoris</i>						
<i>Cichorium intybus</i>	-	+	-	+	+	III
<i>Cynodon dactylon</i>	-	+	-	+	-	II
<i>Erodium cicutarium</i>	-	+	+	-	-	II
<i>Hordeum murinum</i>	+	-	-	+	+	III
<i>Lepidium rudérale</i>	-	-	+	+	-	II
<i>Lolium perenne</i>	+	+	+	1	+	V
<i>Plantago major</i>	+	+	+	-	-	III
<i>Verbena officinalis</i>	-	-	+	-	-	I
<i>Molinio-Arrhenatheretea</i>						
<i>Lotus corniculatus</i>	+	-	+	+	-	III
<i>Ononis arvensis</i>	-	-	-	+	-	I
<i>Plantago lanceolata</i>	+	+	+	+	+	V
<i>Ranunculus acris</i>	-	+	-	+	-	II
<i>Rumex acetosa</i>	-	-	-	-	+	I
<i>Trifolium pratense</i>	+	-	+	+	-	III
<i>Trifolium repens</i>	1	+	+	+	1	V

Phragmiti-Magnocaricetea						
Bolboschoenus maritimus	+	-	-	-	-	I
Eleocharis palustris	-	-	-	-	+	I
Lycopus europaeus	+	-	-	-	-	I
Festuco-Brometea						
Achillea setacea	-	-	-	+	+	II
Alyssum desertorum	-	-	+	+	-	II
Artemisia austriaca	-	-	-	+	+	II
Eryngium campestre	-	-	+	-	-	I
Euphorbia cyparissias	-	+	-	-	-	I
Galium humifusum	+	+	-	-	-	II
Medicago falcata	-	+	-	+	-	II
Poa angustifolia	+	-	+	1	+	IV
Potentilla argentea	-	+	-	+	-	II
Puccinellio-Salicornietea						
Juncus gerardi	+	+	+	-	-	III
Lotus glaber	-	+	-	-	-	I
Matricaria recutita	-	-	+	-	-	I
Puccinellia distans ssp. limosa	-	+	-	-	-	I
Artemisietea vulgaris et Stellarietea mediae						
Bromus tectorum	+	+	-	-	-	II
Capsella bursa-pastoris	-	-	1	+	-	II
Cardaria draba	-	-	-	-	+	I
Carduus acanthoides	-	+	-	-	+	II
Carduus nutans	-	-	+	+	-	II
Chenopodium album	-	-	-	+	-	I
Cirsium vulgare	-	+	+	-	+	III
Lappula squarrosa	-	-	+	+	-	II
Vicia tetrasperma	+	-	-	-	-	I
Xanthium spinosum	-	-	-	-	+	I
Xanthium strumarium	+	+	+	+	+	V
Variae syntaxa						
Arenaria serpyllifolia	-	-	+	-	-	I
Bidens tripartita	+	-	-	-	-	I
Veronica chamaedrys	-	-	-	+	-	I

Lieu et data des relevés:

1- Foltești, 24.07.04; 2 – Costache Negri, 09.07.05; 3 – Crăiești, 09.07.05; 4- Balintești, 10.07.05; 5 - Caradinești, 10.07.05

Le spectre des bioforme (Fig. 5) montre la prédominance des hémicryptophytes (51,5%) et des terrophytes (36,4%), comme un indice de l'altération des ces prairies par le pâturage.

Le spectre des éléments floristique (Fig. 6) indique la dominance des éléments eurasiatique (63,7%), auxquels s'ajoutent avec un pourcentage significatif des éléments cosmopolites (13,6%), appartenant surtout à l'ordre *Plantaginetales majoris*.

Le spectre des indices écologiques (Fig. 7-8) montre la participation massive des espèces de lumière, mésothermes, souscontinentales, mésophiles et mésoxérophiles, des sols modérément humides, a réaction neutro – basique et un contenu modéré en azote.

La valeur économique de ces prairies est médiocre, étant donné le pourcentage réduit des espèces à valeur fourragère élevée et, en plus, suite au pâturage, les prairies ont assez de mauvaises herbes, les espèces nonfourragères étant fréquentes: *Xanthium strumarium*, *Cirsium vulgare*, *Cardaria draba*, *Juncus gerardi*, *Bromus tectorum*, *Capsella bursa-pastoris*, *Lappula squarrosa* etc.

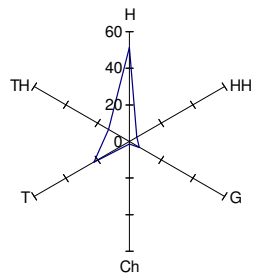


Fig. 5. Le spectre des bioformes de l'ass.
Rorippo austriacae-Agropyretum repentis

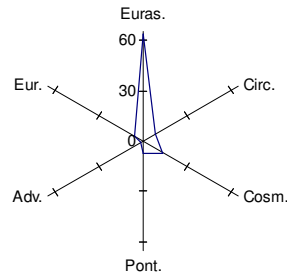


Fig. 6. Le spectre des éléments floristique de l'ass.
Rorippo austriacae-Agropyretum repentis

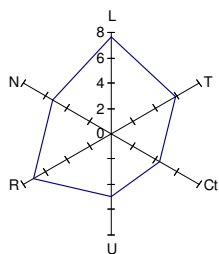


Fig. 7. Le spectre écologique de l'ass.
Rorippo austriacae-Agropyretum repentis

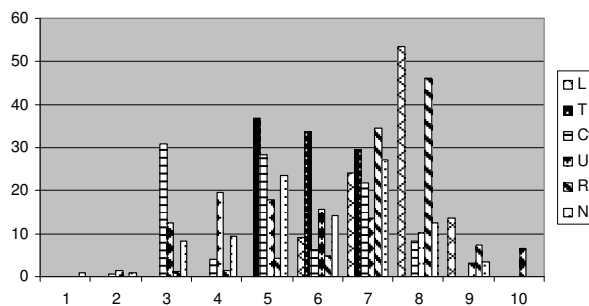


Fig. 8. Le spectre des indices écologiques de l'ass.
Rorippo austriacae-Agropyretum repentis

Bibliographie

1. ELLENBERG H., 1974 – Indicator values of vascular plants in Central Europe. *Scripta Geobotanica*, **IX**, Verlag Erich Goltze K.G., Göttingen: 5-97
2. MITITELU D., GOCIU Zoe, PATRASC Adriana, GHEORGHIU V., 1968 – Flora și vegetația pădurii – parc Gârboavele, jud. Galați. *An. Șt. Univ. „Al. I. Cuza” Iași, s. II a. Biol.*, **14** (1): 163-173
3. MUCINA L., GRAGHERR G, ELLMAUER T., 1993 – *Die Pflanzengesellschaften Österreichs, I*, Gustav Fischer Verlag Jena – Stuttgart – New York
4. MUCINA L., 1995 – Conspectus of Classes of European vegetation. *Folia Geobot. Phytotax.*, **32**: 140p.
5. OBERDORFER E., FREIBURG Br., 1983 – *Süddeutsche Pflanzengesellschaften, III*, VEB Gustav Fischer Verlag Jena
6. OPREA Ad., 1997 – Contribuții cenotaxonomice din Câmpia Tecuciului. *Bul. Grăd. Bot. Iași*, **6** (2): 433-440
7. OPREA Ad., 2003 – Vegetația arenarie din Câmpia Tecuciului. *Bul. Grăd. Bot. Iași*, **11**: 139-157
8. POTT R., 1995 – *Die Pflanzengesellschaften Deutschlands*. Verlag E. Ulmer Stuttgart
9. SANDA V., POPESCU A., STANCU Daniela Ileana, 2001– *Structura cenotică și caracterizarea ecologică a fitocenozelor din România*. Ed. Conphis
10. SÂRBU I., 1984 – Vegetația pajitilor xerofile din bazinul Chinejii. *Volum festiv. Muz. Ist. Nat. Iași*: 163-178
11. SÂRBU I., 1984 – Vegetația arenarie din bazinul Chinejii (jud. Galați). *Acta Bot. Horti Buc.*: 211-213

THE ANALYSIS OF THE VASCULAR FLORA FROM THE NATURAL PARK VÂNĂTORI – NEAMȚ

DARABAN MIHAELA*

Abstract: This article analyses the flora from The Natural Park Vânători – Neamț, in the aspect of the participation of different life - form categoriers, floristic elements and ecological indices.

Key words: vascular flora, life - forms, floristic elements, ecological indices.

Introduction

The results of the investigation developed between the years 2004-2005, as well as the existing literature data in the field, on the floristic diversity of the Park Vânători – Neamț, put into evidence the presence of **982** chormophyte species, belonging to 96 families and 311 genera [2, 3, 5, 6, 7, 8, 12, 13, 14, 15]

Material and method

The establishment of the life - forms and floristic elements was made on the basis of *Flora ilustrată a României. Pteridophyta et Spermatophyta*, by V. Ciocârlan (2000) [8], *Caracterizarea ecologică și fitocenologică a speciilor spontane din flora Românie*, by V. Sanda and colab. (1983) [15]. The ecological indices were noted by H. Ellenberg (1974) *Indicator values of vascular plants in Central Europe*. [10]

Results and discussions

a) The analysis of bioforms

Among the inventoried species from the Park Vânători – Neamț until now, 494 (53,29 %), belong to the hemicryptophytes (H), that are dominating in the life-form spectrum and contributes to the basic fund of the grassy vegetation from the studied area. (Tab. 1; Fig.1).

Statistical analysis of the life – forms indicates the dominance of the hemicryptophytes, a moderate climate and a high weight of grassy formations in the investigated area. The therophytes (T) are represented by 145 species (15,64 %) and are situated a great distance from H, in the life – form spectrum. The geophytes (G) represented by 117 species (12,62 %) represent mostly the prevernal and vernal grassy floristical carpet of the vegetal associations.

The participation of the phanerophytes (Ph) to the life – form spectrum is low 67 (7,23 %), because of the relative homogeneity of the forestry formations from the studied area.

The low percentage of the chamephytes (Ch) of 29 (3,13 %), may be considered normal, because this type of life – form characterizes the regions with frosty winters and

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abundant snow falls. Very low percentage also have the hydrophytes (Hd) 0,86 % and the hydrohelophytes (Hh) 0,32 % who occupied a small surface from the studied area. [1, 8, 9]

Tab. 1 – Statistical analysis of the life forms

Life form	No. of species	%
H.	494	53.29
T.	145	15.64
Ht.	63	6.80
G.	117	12.62
Ph.	67	7.23
Ep.	1	0.11
Ch.	29	3.13
Hd.	8	0.86
Hh.	3	0.32

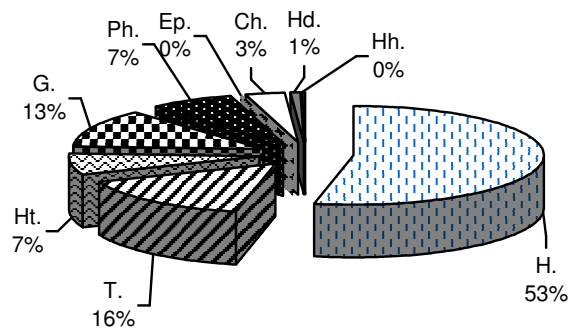


Fig. 1 – The life forms spectrum

b) The analysis of the floristic elements

The floristic elements from the Park Vânători – Neamț, indicate a large diversity :

- ◆ **The category of northern and western elements** represents 80,06 % such as : the Eurasiatic elements (Euras.) 31,30 %, the central European elements (Eur. Centr.) 14,58 %, the European elements (Eur.) 14,36 %. These elements are mostly majority and confirm that the Natural Park Vânători – Neamț belongs to central European region, the central European province. The circumpolar elements (Circ.) occur in ratio of 12,11 % and indicates the northern influence of these climatic conditions.
- ◆ **The category of oriental and steppe conditional elements** is represented by 4,61 % predominant by the Pontico – Panonic – Balcanic elements (1,18 %), followed by the Pontic elements (3,43 %).
- ◆ **The category of southern and endemic elements** is represented by 8,03 %, has the following composition: the Mediterranean and Submediterranean elements 1,71 %, the Panonic elements 0,32 %, the Atlantic elements 2,25 %, the Dacian elements 0,64 %, the Dacian – Balcanic elements 1,82%. The endemic elements (*Aconitum moldavicum*, *Hepatica transsilvanica*, *Symphytum cordatum* etc.) are represented by 1,29 %, a good percentage for the studied area.
- ◆ **The polycore elements** include the cosmopolite species (Cosm.) 5,79 %, also, the adventive elements (Adv.) 1,50 % indicates a low anthropic influence. (Tab. 2; Fig. 2) [1, 8, 9]

Tab. 2 – Statistical analysis of the floristic elements

The floristic element	No. of species or subspecies	%
<i>The northern and western elements</i>		
Euras.	292	31.30
Eur.	134	14.36
Eur.centr.	136	14.58
Cont.	56	6.00
Alpino-carpatic	16	1.71
Circ.	113	12.11
<i>The oriental and endemic elements</i>		
Pont.	32	3.43
Pont.-Balc. + Pont.-pan.-balc.	11	1.18
<i>The southern and endemic elements</i>		
Medit. + Submedit.	16	1.71
Atlantice	21	2.25
Pan.	3	0.32
Carp.-Balc.	17	1.82
Dacice	6	0.64
End.	12	1.29
<i>Polycore elements</i>		
Cosm.	54	5.79
Adv.	14	1.50

- ◆ **The soil's nitrogen content (N)** is well represented by the amphitolerant species 15,07 %, followed by the species that prefer soils poor in nitrogen 13,19 %. Also, a good percentage has the species that indicate the nitrogen presence 9,57 %. (Tab. 3; Fig. 3) [9, 10]

Tab. 3 – The statistical analyses of the ecological indexes

	The ecological indexes											
	L		T		C		U		R		N	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
0	13	1.87	225	32.85	78	11.30	64	9.14	221	31.89	104	15.07
1	1	0.14			1	0.14	1	0.14	1	0.14	15	2.17
2	13	1.87	3	0.44	62	8.99	17	2.43	13	1.88	91	13.19
3	27	3.87	14	2.04	209	30.29	81	11.57	31	4.47	82	11.88
4	59	8.46	35	5.11	135	19.57	139	19.86	31	4.47	57	8.26
5	61	8.75	218	31.82	139	20.14	149	21.29	44	6.35	82	11.88
6	107	15.35	127	18.54	31	4.49	90	12.86	30	4.33	62	8.99
7	523	33.72	50	7.30	32	4.64	61	8.71	154	22.22	80	11.59
8	144	20.66	9	1.31	3	0.44	56	8.00	149	21.50	66	9.57
9	37	5.31	2	0.29			27	3.86	18	2.60	21	3.04
10							10	1.43				
11							1	0.14				
12							3	0.43				
?			2	0.29	2	0.29	1	0.14	1	0.14	30	4.35

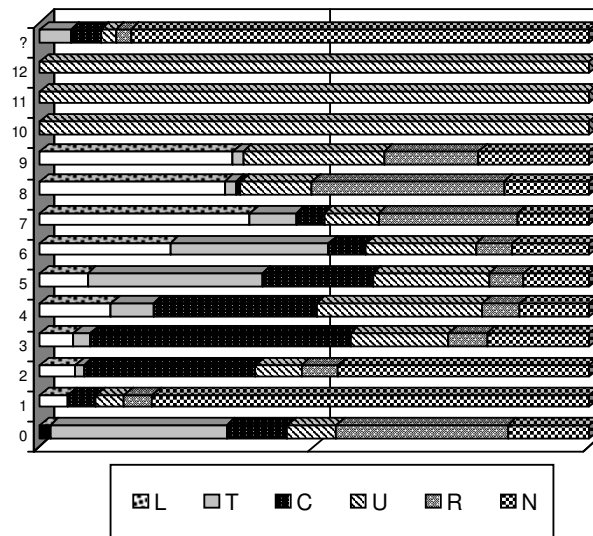


Fig. 3 – Ecological indexes spectrum

CONCLUZII

1. Most of life – forms are represented by hemicryptophytes (H).
2. The Eurasiatic elements are majoritary among floristic elements.
3. If we take a straight look of ecological indexes, we can easily notice that the most of plants prefer light, characterise a temperate climate with the main spreading in the entire central Europe. Taking into consideration humidity, best represented are the hygrophyllic species. Speaking of soil reaction and soil's nitrogen content most of plants are amphotolerants.

BIBLIOGRAFIE

1. BELDIE AL., 1977, 1979 - *Flora României. Determinator ilustrat al plantelor vasculare*, I, II, Edit. Acad. Rom., București
2. BRĂNDZĂ D., 1879-1883 - *Prodromul Florei Române*, Acad. Română, București
3. BURDUJA C., CHIFU T., 1974 - Flora și vegetația pădurii Dumbrava, Vânători-Neamț, St. cerc. șt., Geol.-Geogr.-Biol., Bot.-Zool., Muz. Șt. Nat., Piatra Neamț, II : 161 - 172
4. CHIFU T., DĂSCĂLESCU D., ȘTEFAN N., FLOREA DANIELA, 1972 - Contribuții la flora Moldovei, St. com., Muz. Șt. Nat. Dorohoi, Botoșani : 79 - 82
5. CHIFU T., MITITELU D., DĂSCĂLESCU D., 1987 - Flora și vegetația Județului Neamț, Mem. secț. șt., Acad. Rom., X, 1 : 281 - 302
6. CHIFU T., ȘTEFAN N., ONOFREI TR., 1974 - Conspectul plantelor cormofite din bazinul Pârâului Nemțșor, St. cerc., Geol.-Geogr.-Biol., Bot.-Zool., Muz. Șt. Nat., Piatra Neamț, II : 85 - 107
7. CHIFU T., ȘTEFAN N., SLONOVSKI V., ONOFREI TR., 1971 - Note floristice, Com. Bot., S.S.N.G., București, XII : 181-183
8. CIOCĂRLAN V., 2000 - *Flora ilustrată a României. Pteridophyta et Spermatophyta*, Edit. Ceres, București
9. CRISTEA V., GAFTA D., PEDROTTI FR., 2004 - *Fitosociologie*, Edit. Presa Universitară Clujeană, Cluj-Napoca
10. ELLENBERG H., 1974 - Indicator values of vascular plants in Central Europe, 9, Göttingen : 7 - 97
11. GRECESCU D., 1898 - *Conspectul florei României*, Tipografia Dreptatea, București.
12. MITITELU D., 1993 - Vegetația rezervațiilor forestiere eminesciene, St. cerc., Muz. Șt. Nat., Piatra Neamț, VII : 3 - 8
13. MITITELU D., MONAH F., NECHITA N., 1992 - Contribuții la studiul florei și vegetației higro-hidrofile din Județul Neamț, St. cerc., Muz. Șt. Nat., Piatra Neamț, VI : 44 - 60
14. MITITELU D., 1992 - Flora și vegetația din împrejurimile orașului Tg. Neamț, St. cerc., Muz. Șt. Nat., Piatra Neamț, VI : 65 - 81
15. SANDA V., POPESCU A., DOLTU M., DONIȚĂ N. 1983 - Caracterizarea ecologică și fitocenologică a speciilor spontane din flora României, Stud. și Com., Șt. nat., Muz. Brukenthal, 25 (Supl.) 5 – 126

**ERIOCHLOA VILLOSA (THUNB.) KUNTH (POACEAE)
IN THE ROMANIAN FLORA**

V. CIOCÂRLAN*, MARIA SIKE**

Summary: The presence of a new plant species is signaled out here, for the 1st time in Romania, by the authors of this paper. This plant - *Eriochloa villosa* (Thunb.) Kunth - is an invader one in the flora of Romania. It has been discovered inside the crops of flax, clover, sun flower, maize, at Livada, Satu Mare county. This species is a characteristic one for the rice crops, but it is growing also inside the wet meadows, along the river's meadows.

Key words: *Eriochloa villosa*, Romania

Sistemactical framing of the species:

Tribe Paniceae R. Br. 1814, in Flinders, Voy, Terra Austral. 2: 582, s. str.

Eriochloa* Kunth, 1816, in *Humb. et Bonpl. Nov. Gen. et Sp. 1: 94

X = 9

E. villosa (Thunb.) Kunth, 1829, Révis. Gram. 1:30 (*Paspalum villosum* *Eriochloa villosa* (Thunb.) Kunth Thunb.)

This species has been discovered in some crops of clover, sun flower, maize, at Livada, Satu Mare county. It is also growing in the wet meadows. This is a newly discovered genus in the flora of Romania.

Botanic description of the species: it is an annual herb, invaders, of 50-100 cm high, with stems, sheaths, and the lamina of the leaves being covered by very short hairs. Ligule (Fig. no 1A) is represented by a line of hairs. The inflorescence is made by a central axle, of 4-12 cm, on which there are 3-12 racems of 2-4 cm longer, and one-sided oriented. The spikelets are biflorate, the inferior flower being sterile. The spikelets are between 4,5-5 (-6) mm longer, being antero-posterior compressed, unaristated, downy, having a characteristic swelling (a bearer) (Fig. no 1B). The glumes are undeveloped and adhesive to the peduncle of the spikelets; the peduncle have long and dense hairs. The spikelets are to be falled down (disintegrated) under the swelling (the bearer). Caryopsis is compressed, whitish, and with longitudinal punctiform striae (Fig. no 1C). VII – VIII. 2n = 54 (2).

The occurrence and ecology: it is a meso-hygrophilous towards hygrophilous plant species, being spread mostly in crops of rice. In Romania, in Câmpia Livadei, it is spread in various crops, on podsols, well supplied by water, but also in wet meadows. It is originated from Eastern Asia, from where it was spreaded, into the rice crops, reaching to the South-East part of Russia, and into the Southern part of Ukraine (1), from where, most probable, attained our contry. In some places, this plant species, are growing also along the meadows of the rivers. But, in Russia and R. Moldova, there is growing an other species of

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Eriochloa, namely *E. succinta* (Trin.) Kunth, but along the meadows of the rivers. It is most probably to be discovered, also, in the flora of Romania.

A remark: the stem (the straw) at the *Poaceae* Family is, generally, unbranched; there is, however, some exceptions, which are specified into the botanical references, at: *Leersia*, and *Crypsis*. Beside these exceptions, we also found out, other genera in *Paniceae*, which have stems branched, mostly segetal weeds, for instance: *Echinochloa crus-galli*, *Setaria pumila*, *S. faberi*, *Digitaria sanguinalis*, and for now, *Eriochloa villosa*. At this last species, at the basis of internodes 2 – 4 (from the base upward), from the interposed meristems are made some secondary and tertiary branches, bearing terminal inflorescences. In this way, the number of the fruits is considerably larger, thus phasing the ripening, assuring the spreading and living of this plant species. We cannot say if this branching process is an effect of fertilising and irrigating of the soil, or/and of herbicides, or it is only an adaptation in the struggle of existence of the plant species. It is necessary a comparatively analyze of this plant species growing in the crops versus those growing in the natural meadows.

References

1. CLAYTON W., 1980 – Genul *Eriochloa*, în *Flora Europaea*, 5, Cambridge
2. TZVELEV N., 1976, 1976 – *Poaceae*. U. R. S. S. Leningrad

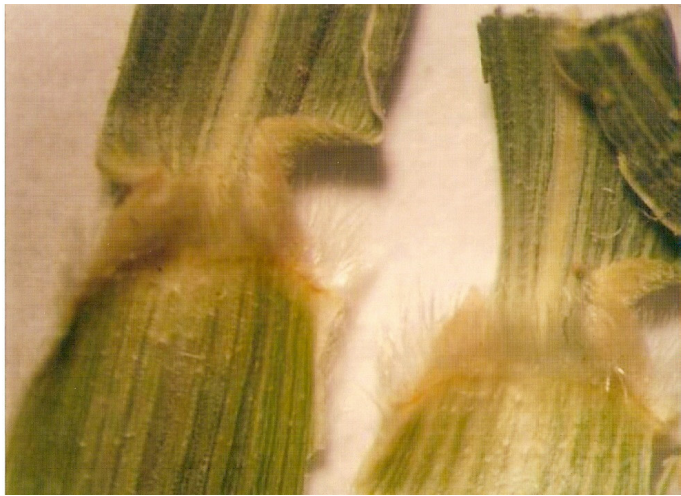


Fig. 1A



Fig. 1B



Fig. 1C

ENDEMIC SPECIES AND SPECIES OF FLORISTIC INTEREST IDENTIFIED IN THE CERNA OF OLTEȚ RIVER BASIN

RĂDUȚOIU DANIEL*

Summary: The present paper refers to several taxa, which were not known to belong to Oltenia flora, and to a part of the endemic species identified in the Cerna of Olteț River Basin. Our goal is to demonstrate the diversity of the flora in this region and the necessity of protection for some taxa.

Key words: endemic species, the Cerna of Olteț River Basin.

Introduction

Due to its geographical location, there are different forms of relief, on the territory under research, which are reflected by a flora with various phyto-geographic origins. Among these, the endemic species are also included.

In our country, many articles were written on the endemic plants and every paper focuses on the necessity of their protection [1,6,8,9,10,14,17,18]. In the Basin of the Cerna of Olteț River, 14 species were identified, but this paper does not contain all of them because they were published in previous papers. [15, 16].

Beside the endemic taxa, this paper also mentions several interesting species. When we speak about interesting species we refer not only to the rare or vulnerable species but also to the ones which were mentioned for the first time in Oltenia, having a different zoological grade (sporadic, frequent) at a national level. *Carex flacca*, *Orchis militaris*, *Trisetum flavescens*, *Myosurus minimus* s.a.

In the basin under research, there were also identified plants which are endangered at a European level and are included in the Habitat Directive or in the Bern Convention: *Campanula abietina*, *C. serrata*, *Lycopodium selago*, *L. annotinum*, *L. clavatum*, *Typha minima*, *T. shuttleworthii* s.a.

Results and Discussions

The systematic units which are to be taken into consideration will be presented alphabetically, being accompanied by references related to the spread in the territory under research and in Oltenia.

1. *Arnica montana* L. – It is rare in the flora of Oltenia, being known only in the Parâng Mountains [13]. It was collected on the Zăvidanu Peak in the Căpățâni Mountains.

2. *Carex flacca* Schreber – It is included in the red national lists [7]; it is frequent at a national level, still not mentioned up to present in the flora of Oltenia. In the territory under research, it was identified only in two localities: The Upper Giulești and Stroești – Dianu.

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3. *Carex strigosa* Hudson – Although at a national level it is a rare species [5], in Oltenia its spreading area is larger – we could affirm that it is still sporadic in this part of the country. It was collected in the following villages: Giulești and Roești.

4. *Cephalanthera rubra* (L.) L.C.M. Richard – It is included in the red national lists [7]. It has not been mentioned in Oltenia up to present. We have identified it only in one location: Dl. Măgura Slătioarei, the village of Slătioara.

5. *Dactylorhiza maculata* (L.) Soó subsp. *schurii* (Klinge) Soó – It is a Carpathian endemite, included in the red national lists [7], not mentioned in Oltenia. It was identified only in one location: Dl. Măgura Slătioarei, the village of Slătioara.

6. *Gladiolus imbricatus* L. – It is rare in Oltenia, being included in the red national lists [5]. In the basin, it was collected on Dl. Dumbrăvița, in the village of Cerna.

7. *Lathyrus setifolius* L. – Plant which is not mentioned in the flora of Oltenia; it was collected by us in the locality of Lădești, Dl. "La Șiță". It is present in the red national lists, being presented as a rare or insufficiently known species. [5,7].

8. *Luzula forsteri* (Sm.) DC. – A rare plant at a national level [7], which is found in several locations in Oltenia. It was collected by us in the following localities: Gârnăcet, Stănești – Valea Lungă.

9. *Minuartia verna* (L.) Hiern. subsp. *collina* (Neilr.) Domin – In the region of Oltenia this taxon is present only in some places in the Parâng and Mehedințului Mountains [14]. In the basin, it was collected only on the Zăvidanu Peak, in the Căpățâni Mountains.

10. *Myosurus minimus* L. – It is present just in few places in Oltenia. In the basin it is rare, being collected only in the locality of Giulești (Fig. 1).

11. *Orchis militaris* L. – Although, at a national level, it is a frequent species, it was included in some of the red national lists [7]. In Oltenia it has been mentioned in the village of Stroești-Dianu for the first time.

12. *Poa badensis* Haenke ex Willd. – It is a Balkan species, cited up to present only in one place in Oltenia: Boarneșul Peak in the Parâng Mountains [2]. In the territory under research, it was identified only on the Zăvidanu Peak in the Căpățâni Mountains. It is considered a rare species at a national level, also included in the red lists [7].

13. *Scabiosa lucida* Vill. subsp. *barbata* E.I. Nyárády – This taxon is a Romanian Carpathian endemite, which is present in some places in Oltenia. [2]. In the basin, it was collected from the Buciumu, Corșoru, Zăvidanu, La Nedei and Milescu Peaks in the Căpățâni Mountains. It is mentioned in the red national lists [5,7].

14. *Spiranthes spiralis* (L.) Chevall. – Plant which is known only in some localities in Oltenia [12]. In the basin, it is rare, being collected only in Gârnăcet – Șuiești village.

15. *Succisa pratensis* Moench – It is rather rare in Oltenia, being known only in Blahnița village – Gorj County (material for herbarium), where it was identified by M. Păun. In the basin, it is rare, being present only in the locality of Rugetu.

16. *Trisetum flavescens* (L.) Beauv. – This species has not been mentioned yet in Oltenia, although it is frequent at a national level. In the territory under research it is rare, being present only in the Stănești village.

Conclusions

The present paper contains 16 taxa. For each of them, we offered the spread in the basin under research and in Oltenia.

From the total number of species, six of them are mentioned for the first time in Oltenia, whereas the rest of them have received new chorological data.

Bibliography

1. BELDIE A., 1967 – Endemismele și elementele dacice din flora Carpaților României. *Com. bot. Soc. nat. geogr. România*. București: 113-129.
2. BUIA A. & al., 1963 – Materiale pentru flora Masivului Parâng. *Acta Bot. Horti Bucurest.* Fasc. 1. București: 267-297.
3. CIOCÂRLAN V., 2000 – *Flora ilustrată a României. Pteridophyta et Spermatophyta*. București. Edit. Ceres: 1138 pp.
4. DIHORU G. & PĂRVU C., 1987 – *Plante endemice în Flora României* București. Edit. Ceres: 180 pp.
5. DIHORU G. & DIHORU ALEXANDRINA, 1994 – Plante rare, periclitare și endemice în Flora României – Lista roșie. București. *Acta Bot. Horti Bucurest.*: 173-197.
6. NEGREAN G., 1975 – Protecția unor plante endemice rare din România. *Ocrot. nat. med. înconj.* **Tom 19**, nr. 2. București: 141-143.
7. OLTEAN M., 1994 – Lista roșie a plantelor superioare din România. *Studii, Sinteze, Documentații de Ecologie*. Acad. Română: 52 pp.
8. OPRÎȘ T., 1963 – Plante endemice din țara noastră și unele probleme ale darwinismului. *Natura*. **Tom 15**, nr. 1. București: 19-29.
9. POP E. & SĂLĂGEANU N., 1965 – *Monumente ale naturii din România*. București. Edit. Meridiane: 174 pp.
10. POPESCU A. & SANDA V., 1966 – Considerații corologice asupra plantelor endemice din România. *Stud. și cerc. biol. Seria botanică*, **Tom 18**, nr. 5. București: 237-446.
11. POPESCU GH., 1971 – Plante noi și rare pentru flora Olteniei identificate în bazinul Bistriței, jud. Vâlcea. *Anal. Univ. Craiova*, **vol. III (XIII)**: 35-42.
12. POPESCU G. & al., 2001 – Flora și vegetația Bazinului Jilț între localitățile Negomir și Turceni, Jud. Gorj. *Acta Bot. Horti Bucurest.* **29**: 171-197.
13. POPESCU G. & al., 2001 – Flora pajiștilor din nordul Olteniei (Cap. 3); in I. Ionescu (ed.). *Pajiștile permanente din nordul Olteniei*. 63-116. Edit. Universitaria, Craiova.
14. POPESCU G. & PĂUN M., 1973 – Date corologice asupra endemismelor floristice din Munții Olteniei. *Stud. Cercet. C.C.E.S. Râmnicu Vâlcea*: 87-92.
15. RĂDUȚOIU D., 2002 – Date preliminare cu privire la flora Bazinului Cernei de Olteț (Vâlcea) (I). *Acta Bot. Horti Bucurest.* (sub tipar).
16. RĂDUȚOIU D., 2004 – Date noi cu privire la flora Bazinului Cernei de Olteț (Vâlcea). *Anal. Univ. Craiova*: 127-147.
17. ȘTEFUREAC T., 1953 – Ocrotirea unor plante rare pe cale de dispariție în flora R.P.R. *Natura* **Tom 5**, nr. 6. București: 46-55.
18. ȚOPA E., 1960 Endemismele floristice în R.P.R. *Natura* **Tom 12**, nr. 4. București: 72-81.



Fig. 1. *Myosurus minimus* L. din Bazinul Cernei de Olteț

THE HISTORICAL OF BOTANICAL RESEARCHES REALIZED IN NEAGRA BROȘTENILOR RIVER BASIN

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Abstract: Having a relative small area of approximately 350 Km², the Neagra Broștenilor river basin has been studied from the botanical point of view by numerous romanian and foreign botanists. This paper contains an enumeration of the botanical studies realized in this territory in the period between 1788-first floristical mention and the 2005 years, and a short physical-geographical caracterization of this area.

Key words: botany, reserch, Neagra Broștenilor river

Having an approximately 42 Km length and a 350 Km² area of the hydrographical basin, Neagra Broștenilor represents an important tributary of Bistrița river. It springs from the Călimani Mountains (Măgura Peak), from 1300m altitude, crosswise traverse the Drăgoiasa Depression and Bistrița Mountains, on it's course existing a great naturale habitats variety characterized by diverse vegetation types: aquatic, swamps, peat-bogs forestry, grasslands and saxicolous vegetation. The relief is very variate, having the maximum altitude in the Iezerul Călimanului peak – 2033 m and the minimum altitude at Broșteni village – 627 m, resulting a altitude amplitude above 1400 m; the average altitude of the reception basin is 1220 m. The geological substratum is variate: the Eruptive in the western part constituted by andesites and basalts and the Cristaline in the eastern part constituted by cristaline schists; between these units is interposing the Drăgoiasa Depression. Here, there are geological deposits represented by conglomerates and gritstones. The most spread soil is the brown-acid soil, beside the spodosoils, lithomorphie soils and unevolved soil (lithosoils). The climate is specific to mountain climate unit, with the high-mountains (above 1700 m) and the middle and small mountains sub-units (800-1700m), with a yearly average of temperatures between 0°C in the alpine unit and +4°C in the boreal unit and a rainfalls average by 700 mm/year (Broșteni) and 1200 mm/year (Iezerul Călimanului peak). Every of these physical and geographical conditions have determined the installation of some very interesting plant communities studied by a series of botany, forest and even zoology scientists.

The first floristical information belongs to B. Hacquet, author who noted from Drăgoiasa the *Pinus cembra* species, wrongly identified, in fact *Pinus sylvestris f. turfosa*. Some decades later, M. Fuss published from the same place the *Ligularia sibirica* species and afterwards F. Porcius has identified the *Swertia perennis* species. The first romanian scientist presenting some more informations regarding this river basin flora is D. Brândză, author who had published cormophyte species from Broșteni, collected by A. Burri. These taxa have been assumed and their number ware been enriched by D. Grecescu. Other botanists who have contributed to this region study from floristical and phytogeographical point of view are: A. Procopianu-Procopovici, I. Borcea, G.P. Grințescu, M. Răvăruț, Z. Panțu, I. Prodan etc. Scientifical importance of the peat-bogs has called E. Pop attention; the author had studied the Drăgoiasa marsh from where he had identified numerous relict

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plants species. The same place has been studied by T. Ștefureac and his co-workers from here being recorded some very rare species for our country, highlighting the phytogeographic importance of this meadow. The most important contribution to the flora and vegetation of this zone study have been brought by Lucia Lungu, who had realized her doctor's degree thesis on the territory of the Criștor peat-bog and T. Seghedin by his doctor's degree thesis regarding the Bistrița Mountains. The part included in the Calimani Mountains of this river basin is less studied, summary informations existing in the articles published by Șt. Csuros, L. Gubesch, H. Chirilei.

Informations regarding the cormophytic flora of this area have been found in the papers containing studies on micromycetes, realized by I. C. Constantineanu, T. Săvulescu, O. Săvulescu, C. Sandu-Ville, E. Rădulescu and E. Docea. Also, the speciality literature contains an important number of synthesis papers presenting romanian distribution of certain taxa (V. Sanda, A. Popescu, G. Șerbănescu, F. Rațiu, L. Stoicovici), national monographies (Flora R.P.R.-R.S.R) or regional monographies (D. Mititelu, N. Barabaș, T. Chifu). All these synthesis papers contains informations regarding Neagra Broștenilor river basin.

Studies regarding the thalophytes species of this area are less numerous. Informations on algal flora have been found in Lucia Lungu and T. Ștefureac articles. Lichenological researches haven't been realized, some species being cited by A. Procopianu-Procopovici and Șt. Csürös. Mycological reserches are more numerous, from here being published numerous microscopic fungus species identified by I. C. Constantineanu, T. Săvulescu, O. Săvulescu, C. Sandu-Ville, E. Rădulescu, and some macromycetes species identified by A. Popovici, Gh. Silaghi etc. The most studied thalophytes are the bryophytes, numerous papers on this theme being published by Lucia Lungu, T. Ștefureac, E. Pop etc.

Further, we are presenting a bibliographical list of the botanical papers, studies and monographies containing informations regarding the flora and vegetation from Neagra Broștenilor river basin.

Bibliography

1. ANTONESCU G. P., 1926 – *Contribuțiuni la studiul distribuțiunii geografice a coniferelor din România*, Tipografia Națională, București, 120 pag.;
2. BELDIE AL., DIHORU GH., 1967 – Asociațiile vegetale din Carpații României, *Comunicări de botanică*, **6**, București: 135 – 234;
3. BELDIE AL., 1977 – *Flora României-determinator ilustrat al plantelor vasculare*, **I,II**, Editura Academiei R.S.R., București, 406 + 412 pag.;
4. BLIDERISANU PETRUȚA, 1996 – Plante rare, endemice și monumente ale naturii din colecția Muzeului de științe naturale Roman, *Studii și cercetări – Muzeul de științe naturale*, **8**, Piatra Neamț: 151–160;
5. BONTEA VERA, 1985-1986 – *Ciuperci parazite și saprofite din România*, **I, II**, Editura Academiei R.S.R., București, 586 + 469 pag.;
6. BORCEA I., 1912 – *Zoocecidii din Romania*, Inst. de arte grafice Carol Göbl, București, 96 pag.;
7. BORZA A., 1931 – Die vegetation und flora Româniens, Guide de la sixième excursion phytogéographique internationale, Roumanie, 1931, Éditeur Le Jardin Botanique de L' Université de Cluj, Cluj: 42;
8. BRÂNDZĂ D., 1883 – *Prodromul florei române sau enumerațiunea plantelor până astăzi cunoscute în Moldova și Valachia*, Tipografia Academiei Române, București: 568 pag.;
9. CHIFU T., DAVIDESCU G., CAZACU V., 1999 – Caracterisation des complexes phytocénologiques de la végétation de Moldavie (Roumanie), *Anuarul Muzeului Național al Bucovinei*, **15**, Suceava: 5–34;
10. CHIRILEI H., 1935 – Contribution à l' étude de la flore du district de Bârsa, *Annales scientifiques de l'Université de Jassy*, **21**: 456–467;
11. CIOCÂRLAN V., 2000 – *Flora ilustrată a României*, Editura Ceres, București, 1138 pag.;

12. CONSTANTINEANU I. C., 1920 – Urédinées de Roumanie, *Annales Scientifiques de L'Université de Jassy*, **10**, 3–4, Iași: 314–460;
13. COLDEA GH., SANDA V., POPESCU A., ȘTEFAN N., 1997 – *Les associations végétales de Roumanie*, **1**, Presses universitaires de Cluj, 261 pag.;
14. CRISTIAN – COMES I., 1979 – Tisa (*Taxus baccata* L.) la patru decenii de ocrotire în România, *Ocrotirea naturii și a mediului înconjurător*, Editura Academiei R.S.R., **23**, 2: 145–153;
15. CSÜRÖS Ș., 1951 – Cercetări floristice și de vegetație în Munții Călimani, *Studii și cercetări științifice*, 1-2, Ed. Academiei R.P.R., Cluj: 127–143;
16. CZOPPELT H., 1938 – Distribuția naturală a pinului silvestru pe domeniul forestier Broșteni, *Revista Pădurilor*, **9**, București: 765–777;
17. DIHORU G., PĂRVU C., 1987 – *Plante endemice în flora României*, Editura Ceres, București: 129;
18. DOBRESCU C., 1957 – Contribuții la studiul florei R.P.R., *Analele științifice ale Univ. "Al. I. Cuza" din Iași, s. II, a. Științe naturale – Geografie*, **3**, 1-2: 115;
19. FUSS M., 1866 – Flora Transsilvaniae Excusoria, Cibinii, 862 pag.;
20. ENCULESCU P., 1924 – *Zonele de vegetație lemnoasă din România*, Ed. "Cartea Românească", București, 338 pag.;
21. ELIADE EUGENIA, 1965 – Conspectul macromicetelor din România, *Act. Bot. Hort. Buc.*, București: 185–324;
22. GEORGESCU C. C., 1940 – Răspândirea orizontală a pinului silvestru în Carpații României, extras din *Anuarul Institutului de Cercetări și Experimentație Forestieră*, **V**, Imprimeria Națională, București: 11–12;
23. GRECESCU D., 1898 – *Conspectul florei României*, Tipografia Dreptatea, București, 836 pag.;
24. GRECESCU D., 1909 – *Suplement la Conspectul florei României*, Institutul de arte grafice Carol Göbl, București, 220 pag.;
25. GRINȚESCU G. P., 1907 – Enumerația plantelor din flora județului Neamțu și Suceava expuse în Pavilionul Armatei cu ocazia jubileului a 40 de ani de domnie a M. S. regelui în 1906, *Revista Farmaciei*, **19**, 3–4, București: 63–72;
26. GRINȚESCU G. P., 1934 – *Studiul genului Aconitum din România, partea I-a Aconitum anthora*, Tipografia ziarului "Universul", București: 26–27;
27. GRINȚESCU J., 1910 – *Monographie du genre Astrantia*, Genève, Imprimerie Reggiani & Renaud: 165–166;
28. GUBESCH L., 1969 – Excursii botanice în Munții Călimani, *Natura*, seria biologie, **4**, București: 54–60;
29. IFTENIA LUCIA, PASCAL P., 1973 – Contribuții la studiul plantelor medicinale din valea râului Bistrița între lacul Bicaz și Vatra Dornei, *Studii și Comunicări*. – Muz. Jud. Suceava, **3**, Suceava: 255–259;
30. LEANDRU V., 1963 – Stejarul pedunculat și speciile lui însoțitoare relictice din "faza molidișului cu stejăriș mixt și alun" din bazinul mijlociu al văii Bistrița, *Act. Bot. Hort. Buc.*, **II**, vol. festiv, Întreprinderea poligrafică "Grafica nouă", București: 937–943;
31. LEANDRU V., 1969 – Contribuții la cunoașterea originii molidișurilor de mică altitudine din județul Suceava, *Comunicări de botanică*, **11**, București: 119–122;
32. LUNGU LUCIA, 1967 – *Evonymus nanus* M. B. din mlaștina turboasă de la Cristișorul, Neagra Broștenilor, *Act. Bot. Hort. Buc.*, Întreprinderea poligrafică "Grafica nouă", București, pag. 325–330;
33. LUNGU, LUCIA, 1967 – Contribuții la cunoașterea speciilor genului *Orthotrichum* Hedwig din Republica Socialistă România, *Analele Universității București, s. Științele Naturii*, **16**, București: 105–111;
34. LUNGU, LUCIA, 1969 – Analiza areal – geografică a florei cormofitelor din mlaștinile turboase de la Cristișorul, Neagra – Broștenilor (Carpații Orientali), *Analele Universității București, s. Biologie vegetală*, București: 111–128;
35. LUNGU LUCIA, 1971 – Flora și vegetația mlaștinii turboase din lunca Negrei Broștenilor de la Cristișor (Munții Bistriței), rezumatul tezei de doctorat, București, 57 pag.;
36. LUNGU LUCIA, 1972 – Caracteristicile structurale ale populațiilor de *Alnus incana* L. și *Picea abies* (L.) Karst. ssp. *abies* din mlaștina turboasă de la Cristișor, Neagra Broștenilor (Carpații Orientali), *Act. Bot. Hort. Buc.*, Întreprinderea poligrafică "Grafica nouă", București: 519–523;
37. LUNGU LUCIA, 1973 – Importanța fitogeografică a mlaștinii turboase din lunca Negrei Broștenilor de la Cristișor, *Studii și comunicări de ocrotirea naturii*, **III**, Suceava
38. LUNGU LUCIA, 1973 – Analiza brioflorei din lunca borcutului de la Cristișor – Neagra Broștenilor (Carpații Orientali), *Analele Universității București, s. Biologie vegetală*, **22**, București: 69–76;
39. LUNGU LUCIA, 1977 – Vegetația ombrotrofă din lunca Negrei Broștenilor de la Cristișor (județul Suceava), *Studii și comunicări de Ocrotirea Naturii*, Suceava: 230–236;
40. LUNGU LUCIA, 1981 – Vegetația fontinală din lunca Neagra Broștenilor de la Cristișor (jud. Suceava), *Studii și comunicări de Ocrotirea Naturii*, Suceava: 413–419;
41. LUNGU LUCIA, 1983 – Evoluția vegetației postglaciare din lunca Neagra Broștenilor de la Cristișorul (jud. Suceava), *Studii și comunicări de ocrotirea naturii*, Suceava: 353–362;

42. LUNGU LUCIA, 1983 – *Evonymus nana* M.B. – relict preglaciatic în flora României, *Ocrotirea Naturii și a Mediului Înconjurător*, **27**, 1, București: 19–24;
43. LUPȘA VIORICA, 1977 – Răspândirea speciei *Aster alpinus* L. în Carpații Românești, *Studii și Cercetări de Biologie, seria biol. vegetală*, **29**, 1, București: 24;
44. MITITELU D., BARABAȘ N., 1972 – Completări la răspândirea unor plante în Moldova, *Studii și comunicări – Muzeul de științele naturii Bacău*, Bacău: 103–104;
45. MITITELU D., BARABAȘ N., ȘTEFAN N., MANCAȘ D., 1987 – Vegetația de pe valea Bistriței mijlocii, *Memoriile Secțiunii Științifice ale Academiei Române*, s. a IV-a, **3**, 1, București: 251–263;
46. MITITELU D., CHIFU T., PASCAL P., 1989 – Flora și vegetația județului Suceava, *Anuarul Muzeului Județean Suceava, s. Științele Naturii*, **10**, Suceava: 93–120;
47. MOHAN GH., 1998 – Catalogul briofitelor din România, *Act. Bot. Hort. Buc.*, București, 432 pag.;
48. NEGREAN G., OLTEAN M., 1989 – Endemite și zone endemoconservatoare din Carpații Sud – Estici, *Ocrotirea naturii și a mediului înconjurător*, **33**, 1, Editura Academiei R.S.R., București: 15–25;
49. PANȚU Z., 1915 – Orchidaceele din România – studiu monografic, Editura Academiei Române, București, 228 pag.;
50. PAPP C., 1940 – Răspândirea speciei *Pinus silvestris* L. în Carpații României, *Revista Științifică “V. Adamachi”*, vol. **XXVI**, Institutul Român de Arte Grafice “Brawo”, Iași: 118–119;
51. PAPP C., 1956 – Contribuții la sistematica și distribuția cryptogamelor vasculare din Moldova, *Analele Șt. Ale Univ. “Al. I. Cuza” Iași, s. II, științe naturale*, **1**, 1: 221;
52. PAX F., 1908 – *Grundzüge der pflanzenverbreitung in der Karpathen*, vol. II, Verlag von Wilhelm Engelmann, Leipzig, pag. 220–223;
53. PAX F., 1919 – *Pflanzengeographie von Rumänien*, Halle: 295–296;
54. POP E., 1954 – Studii botanice în mlaștinile noastre de turbă, *Buletin Științific – secțiunea de științe biologice, agronomice, geologice și geografice*, **6**, 1, București: 349, 383–386;
55. POP E., 1955 – Mlaștinile noastre de turbă și problema ocrotirii lor, *Ocrotirea Naturii*, **1**, Editura Academiei R.P.R., București: 57–105;
56. POP E., 1958 – Regiunea de mlaștini eutrofe Drăgoiasa – Bilbor – Borsec și importanța ei fitogeografică, *Ocrotirea Naturii*, **3**, Editura Academiei R.P.R., București: 17–22;
57. POP E., 1960 – *Mlaștinile de turbă din R.P.R.*, Editura Academiei R.P.R., București: 187–203, 291;
58. POP E., 1965 – Problema relictelor glaciare în mlaștinile de turbă din România, *Studii și Cercetări de Biologie, s. Botanică*, **17**, 4–5, București: 427–444;
59. POPESCU A., SANDA V., 1972 – Răspândirea speciilor *Geum montanum* L. și *Geum reptans* în România, *Studii și Cercetări de Biol., s. botanică*, **24**, 2, București: 103–115;
60. POPESCU A., SANDA V., 1993 – Caracterizarea și cenotaxonomia unor fitocenoză din Carpații Românești, *Studii și Cercetări de Biologie, s. biologie vegetală*, **45**, 1, București: 65–75;
61. POPESCU A., SANDA V., 1998 – Conspiciul florei cormofitelor spontane din România, *Act. Bot. Hort. Buc.*, Editura Universității din București, 336 pag.;
62. POPOVICI D., CHIFU T., CIUBOTARIU C., MITITELU D., LUPAȘCU GH., DAVIDESCU G., PASCAL P., 1996 – *Pajiștile din Bucovina*, Editura Helios, Iași: 22–30, 65–74;
63. POPP N., IOSEP I., PAULENCU D., 1973 – *Județul Suceava*, Editura Academiei R.S.R., București: 8–24;
64. PORCIUS, F., 1878 – *Enumeratio plantarum phanerogamicarum districtus quondam Naszódienis, Claudiopoli*: 40
65. PROCOPIANU – PROCOPOVICI A., 1906 – Caracterul general al florei de pe moșia regală Broșteni, Extras din “*Descrierea moșiei regale Broșteni*” de A. Popovici și G. Kirileanu, București: 1–10;
66. PRODAN I., 1930 – *Centaureele României*, Institutul de Arte Grafice “Ardealul”, Cluj: 206–208;
67. PRODAN I., 1939 – *Flora pentru determinarea și descrierea plantelor ce cresc în România*, **I**, Tipografia “Cartea Românească”, Cluj: 6, 24, 341;
68. RAȚIU FLAVIA, 1981 – Corologia speciei *Carex pauciflora* Lightf. în România, *Studii și Cercetări de Biologie, s. biologie vegetală*, **33**, 2, București: 141–178;
69. RĂDULESCU E., NEGRU AL., DOCEA E., 1973 – *Septoriozele din România*, Ed. Academiei R.S.R., București: 80–81;
70. RĂVĂRUȚ M., 1939 – Câteva cuvinte despre finetele și pășunile din munții Bistriței, *Revista Științifică “V. Adamachi”*, **XXV**, 3, Institutul Român de Arte Grafice “Brawo”, Iași: 1–8;
71. RĂVĂRUȚ M., 1945 – Contribuțiune la flora Moldovei, *Rev. Șt. “V. Adamachi”*, vol. **XXXI**, 3, Iași: 188–189;
72. RUGINĂ RODICA, MITITIUC M., 2003 – *Plante ocrotite din România*, Ed. Universității “Al. I. Cuza”, Iași: 80, 102, 134;
73. SANDA V., ERICA SCHNEIDER-BINDER, 1972 – Răspândirea speciei *Dianthus tenuifolius* Schur în România, *Act. Bot. Hort. Buc.*, București: 653–662;

74. SANDA V., POPESCU A., 1989 – Studiul cenotaxonomic al clasei Scheuchzerio – Caricetea nigrae (fuscae) Nordh. 36 de pe teritoriul României, *Studii și Cercetări de Biol., s. biologie vegetală*, **41**, 1, București: 15–23;
75. SANDA V., ȘTEFAN N., DRĂGULESCU C., POPESCU GH., BARABAȘ N., ȚUCRA I., NEGREAN G., PEICEA I., 1993 – Răspândirea genului Lycopodium L. în Carpații României, *Stud. și Cercet. de Biologie, s. biologie vegetală*, **45**, 1–2, București: 27–45, 145–160;
76. SANDA V., POPESCU A., BARABAȘ N., 1998 – Bibliografia fitocenologică a României, *Studii și comunicări – complexul muzeal de științele naturii Bacău*, Editura I. Borcea, Bacău, 144 pag.;
77. SANDA V., POPESCU A., BARABAȘ N., 1998 – Cenotaxonomia și caracterizarea grupărilor vegetale din România, *Studii și comunicări – complexul muzeal de științele naturii Bacău*, Editura I. Borcea, Bacău, 366 pag.;
78. SANDA V., POPESCU A., STANCU DANIELA, 2001 – *Structura cenotică și caracterizarea ecologică a fitocenozelor din România*, Editura Conphis, Pitești, 359 pag.;
79. SANDA V., 2002 – *Vandemecum ceno-structural privind covorul vegetal din România*, Editura Vergiliu, București, 331 pag.;
80. SANDA V., ȘTEFĂNUȚ S., 2003 – *Atlas florae Romaniae I–Pinophytina*, Editura Vergiliu, București: 11, 26, 45, 54;
81. SANDA V., ȘTEFĂNUȚ S., 2004 – *Atlas florae Romaniae II–Betulaceae*, Editura Vergiliu, București: 14, 27, 45, 51, 58;
82. SANDU – VILLE C., 1967 – *Ciupercile Erysiphaceae din România – studiu monografic*, Editura Academiei R.S.R., București: 317;
83. SĂLĂGEANU GH., ȘTEFUREAC TR., 1972 – Cercetări asupra macromicetelor găsite în unele mlaștini turboase din România, *Studii și cercetări de Biologie, s. Botanică*, **24**, 5, București: 391–394;
84. SĂVULESCU TR., 1953 – *Monografia uredinalelor din R.P.R., vol. I, II*, Editura Academiei R.P.R., București, 1166 pag.;
85. SĂVULESCU TR., 1957 – *Ustilaginele din R.P.R., vol. II*, Editura Academiei R.P.R., București, 613 pag.;
86. SEGHDIN T., 1980 – Istoricul cercetărilor cu privire la flora și vegetația munților din bazinele Moldovei și Bistriței, *Anuarul Muzeului Județean Suceava, f. Științele naturii*, **VI**, Suceava: 117–144;
87. SEGHDIN T., 1983 – Principalele asociații lemnoase din Munții Bistriței – considerații metodice, *Anuarul Muzeului Județean Suceava, f. Științele naturii*, **VII**, Suceava: 34–60;
88. SEGHDIN T., 1983 – *Rezervațiile naturale din Bucovina*, Editura Sport – Turism, București: 90–91;
89. SEGHDIN T., 1985 – Evoluția vegetației postglaciare din bazinul superior al văii Bistrița, *Anuarul Muzeului Județean Suceava, f. Științele naturii*, **VIII**, Suceava: 7–12;
90. SEGHDIN T., 1986 – *Flora și vegetația Munților Bistriței – teză de doctorat*, Iași, manuscris;
91. SEGHDIN T., 1989 – Noi asociații vegetale din Munții Bistriței, *Anuarul Muzeului Județean Suceava, f. Științele naturii*, **12**: 123 – 137;
92. SILAGHI GH., ȘTEFUREAC T., 1969 – Câteva macromicete din turbării noi pentru România, *Contribuții botanice*, Cluj: 89–95;
93. STOICOVICI LUCIA, 1982 – Răspândirea populațiilor relictare de *Ligularia sibirica* (L.) Cass. în R. S. România, *Studii și Cercetări de Biologie, s. biologie vegetală*, **34**, 1, București: 14–19;
94. ȘERBĂNESCU GH., 1970 – Corologia taxonilor *Gentiana clusii* Pers. et Song. și *Gentiana excisa* Presl în Carpații Românești, *Studii și cercetări de Biologie, s. botanică*, **22**, 6, București: 475–479;
95. ȘTEFUREAC T., 1962 – Relictes subarctiques dans la bryoflore du marais eutrophe de Drăgoiasa - Carpathes orientales, extrait de la Revue Bryologique et Lichénologique, **31**, 1-2, Paris: 68–73;
96. ȘTEFUREAC T., CRISTUREAN I., GRUIA L., 1963 – Contribuții la cunoașterea florei din mlaștina eutrofă de la Drăgoiasa, reg. Suceava, *Act. Bot. Hort. Buc., f. II, vol. festiv*, Întreprinderea poligrafică “Grafica nouă”, București: 937–943;
97. ȘTEFUREAC T., CRISTUREAN I., 1963 – Specii turficole ale genului *Carex* rare în flora țării, *Studii și cercetări de biologie – seria biologie vegetală*, **15**, 2, Editura Academiei Române, București: 227–237;
98. ȘTEFUREAC T., 1967 – Importanța rezervațiilor naturale din regiunea Suceava, *Comunicări de botanică – a V-a consfătuire de geobotanică*, Editura Academiei Române, București: 93–111;
99. ȘTEFUREAC T., RACLARU P., 1969 – Cartări de floră și vegetație din Bucovina, *Comunicări de botanică*, **11**, București: 111–117;
100. ȘTEFUREAC T., 1970 – Relicte și endemisme în flora rezervațiilor naturale din Bucovina, *Studii și comunicări de ocrotirea naturii*, Suceava: 21–39;
101. ȘTEFUREAC T., MIHAI GH., PASCAL P., BARABAȘ VICTORIA, 1973 – Conspectul briofitelor din Moldova, *Studii și comunicări*, Muzeul de științele naturii Bacău, 6, Bacău: 129–259;
102. ȘTEFUREAC T., 1973 – Cercetări ecologice asupra sinuziilor muscinale ale unor rezervații păduroase din Bucovina, *Studii și Comunicări de ocrotirea naturii*, **3**, Suceava: 152;

103. ȘTEFUREAC T., 1974 – Semnificația unor noi și valoroase briofite și angiosperme în rezervațiile naturale din județul Suceava și din unele ținuturi învecinate, *Studii și Cercetări de biologie*, **26**, 3. București: 165–170;
104. ȘTEFUREAC T., PASCAL P., 1981 – Conspectul briofitelor din Bucovina, *Studii și comunicări de Ocrotirea naturii*, **5**, Suceava: 471–543;
105. TACINĂ AURICA, POPESCU A., 1993 – Corologia speciilor genului *Cystopteris* Bernh. în România cu unele considerații taxonomice, *Studii și Cercet. de Biologie, s. biologie vegetală*, **45**, 2: 161–167;
106. ★★★, 1960 – Catalogul de semințe oferite pentru schimb de către Grădina Botanică a Universității “C. I. Parhon” din București, *Acta Bot. Hort. Bucurestiensis*: 202;
107. ★★★ 1952 – 1976 *Flora R.P.R. – R.S.R.*, vol. **I–XIII**, Editura Academiei, București;
108. ★★★ *Flora Europaea*, vol. **I–V**, University Press, Cambridge;
109. ★★★, 1980 – *Suceava* – monografie, Editura Sport – Turism, pag. 1–229;
110. ★★★, 1989 – Caracterizarea ecologică a unor pajiști din Munții Călimani, *Analele Șt. ale Univ. “Al. I. Cuza” Iași*, s. II, a-Biologie, **35**, supliment: 115–117;

CONTRIBUTIONS TO THE STUDY OF THE LICHEN FLORA FROM BISTRITA MOUNTAINS

POPA LOREDANA *

Abstract: In this paper, the results of the field-researches made between 2004-2005 in different places of Bistrița Mountains are presented. The lichen flora analysis had carried out to 115 taxa identification, belonging to Ascomycotina Class. The species have been analysed from the ecological point of view, on the values of ecological indexes (light, humidity, temperature and chemical reaction of the substrata) published by ElleMBERG et al (1992). 93,05% of the total number of species are common species and 6,95% are rare species (*Cladonia amaurocraea*, *C. rangiformis*, *C. sulphurina*, *Cetraria sepincola*, *Pheophyscia ciliata*, *Peltigera pretextata*). One species – *Collema subflaccidum* is for the second time cited in romanian lichenological flora.

Key words: lichen, flora, Bistrița Mountains

Introduction

The Bistrița Mountains are situated in the central-northern part of Eastern Carpathians between Bistrița river valley (to north and east), Bistricioara river valley (to south) and the series of Șarul Dornei-Drăgoiasa-Bilbor-Borsec Depressions (to west).

From the geological point of view, Bistrița Mountains are characterized by a complex structure constituted by cristaline schists, calcareous, porphyroid rocks and gritstones. The soil cover of these mountains is represented in over 50% proportions by brown-acide and brown podsolic soils. The climate of this region is characterized by cold and humid winters and cool and instable summers. The yearly temperature average oscillate between 0°C in the highest parts and 6°C in peripheral depressions and wider deeper valleys. The yearly average values of rainfalls are between 728-950mm and the most frequent are the western winds. The hidrographical network of these mountains is, in the most part, tributary to the Bistrița river.

Material and methods

For the lichen flora inventory realization, the material had been collected from the trees bark (corticolous species), rotted stumps, trunks and fallen branches (lignicolous species), variety types of rocks (saxicolous species), straight from the soil (terricolous species) and from the moss strata.

The lichen species have been identified in laboratory on the base of macro and microscopic observations regarding the form and colour of thallus, the fixing mode on substrata, the soralia and isidia presence, the structure of thallus, apothecia and perithecia, the spores shape, colour and structure.

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For these species identification I have used the next authors papers: Ciurchea Maria (2004), Dobson F. (1997), Moberg R (1977), Purvis A. (1992), Thomson J.W. (1984), Tibell L. (1980), Wirth V. (1995).

The species nomenclature had been brought up to date using Maria Ciurchea (2004) and Scholtz P. (2000) papers. For every taxa have been established: the ecological character (Ellenberg et al., 1992), the floristic elements (Maria Ciurchea. 2004), biological forms (Ciurchea Maria, Codoreanu V., Burlacu Lucia, 1968).

The lichenological material has been collected from different places of the Bistrita Mountains: 1-Arsita lui Macovei, 2-Neagra Brostenilor valley, 3-Paraul Caprei, 4-Barnar Keys, 5-Brosteni, 6-Zugreni, 7-Paraul Vacariei, 8-Budacu Mountain, 9-Pietrosul Bistritei peak, 10-Ortoaia, 11-Dorna Arini, 12-Cozanesti, 13-Barnar valley, 14-Rusca II, 15-Borca, 16-Holda.

The lichenological material has been verified and confirmed by dr. Katalin Bartok and dr. Florin Crisan.

Results and discussions

ORD. ARTHONIALES Henssen ex. D. Hawksw & O. Eriksson. *Fam. Arthoniaceae* Reichenb ex. Reichenb: *Arthonia radiata* (Pers.) Ach., corticolous, 1,2,3,4; *Fam. Chrysotrichaceae* Zahlbr.: *Chrysotrix candelaris* (L.) J.R. Laundon, corticolous, 1,5; *Chrysotrix chlorina* (Ach.) J.R. Laundon, saxicolous, 3,6; *ORD. CALICEALES* C. Bessey. *Fam. Caliceaceae* Chev.: *Calicium abietinum* Pers. corticolous, lignicolous, 3,7; *Fam. Coniocybaceae* Reinchenb.: *Chaenotheca chrysocephala* (Turn.) Th. Fr., corticolous, 5; *Chaenotheca furfuracea* (L.) Tibell lignicolous, 5,8; *ORD. GRAPHIDALES* C. Bessey (1907). *Fam Graphidaceae* Dumort. (1822): *Graphis scripta* (L.) Ach., corticolous, 1,2, 3,4,9; *Fam. Thelotremataceae* (Nyl.) Stizenb.(1862): *Diploschistes muscorum* (Scop.) R. Sant. & Hawksw., on mosses, terricolous, 8,10; *Thelotrema lepadinum* Ach., corticolous, 1; *ORD. LECANORALES* Nannf. (1932). *Fam Acarosporaceae* Zahlbr. (1906): *Acarospora fuscata* (Nyl.) Th. Fr., saxicolous, 3,4,9; *Fam Alectoriaceae* (Hue.) Tomas (1949): *Alectoria sarmentosa* (Ach.) Ach.corticolous, 9; *Bryoria bicolor* (Ehrh.) Brodo & D. Hawksw., on mosses, corticolous, 8,9; *Bryoria implexa* (Hoffm.) Brodo & D. Hawksw., corticolous, 8; *Bryoria fuscescens* (Gyelnik) Brodo & Hawksw., corticolous, 7; *Fam. Cladoniaceae* Zenker (1827): *Cladonia amaurocraea* (Florke) Schaer., terricolous, 9; *Cladonia arbuscula* (Wallr.) Flot., terricolous, 9,10,11,12; *Cladonia botrytes* (Hag.) Willd., terricolous, 10,12; *Cladonia carneola* (Fr.) Fr., on mosses, terricolous, 3,12; *Cladonia cervicornis* (Ach.) Flot. ssp. *verticillata* (Hoffm.) Ahti., terricolous, 9; *Cladonia coniocraea* auct., lignicolous, terricolous, 1, 3,5,6,7,9,12,13,14; *Cladonia deformis* (L.) Hoffm., terricolous, 9; *Cladonia digitata* (L.) Hoffm., on mosses, 1,3,5,6,8,9,11,12,13,14; *Cladonia fimbriata* (L.) Fr., lignicolous, terricolous, 1,2,3,5,6,8,9,12,13,14; *Cladonia foliacea* (Huds.) Wild., terricolous, 6,12; *Cladonia furcata* (Huds.) Schrad. ssp. *furcata*, terricolous, 2,5,9; *Cladonia furcata* (Huds.) Schrad. ssp. *subrangiformis* (Sandst.) Abbayes, terricolous, 5,8,10,11,12,13; *Cladonia glauca* Florke, on mosses, terricolous, 3; *Cladonia gracilis* (L.) Willd., terricolous, 9; *Cladonia macilenta* Hoffm ssp *macilenta.*, on mosses, terricolous, 3,12,5; *Cladonia macilenta* Hoffm. ssp. *floerkeana* (Fr.) V. Wirth, on mosses, 8; *Cladonia pleurota* (Florke) Schaer., lignicolous, 9; *Cladonia pyxidata* (L.) Hoffm., terricolous, lignicolous, 3,5,6,8,9,11,12,13,14; *Cladonia rangiferina* (L.) Weber ex F.H. Wigg., terricolous, 9,15; *Cladonia rangiformis* Hoffm., terricolous, 9; *Cladonia squamosa* (Scop.) Hoffm., on mosses, 3,9; *Cladonia subulata* (L.) Weber ex F.H.Wigg., on mosses, terricolous, 1,2,5,8,12,13,; *Cladonia sulphurina* (Michaux.) Fr., terricolous, 9; *Cladonia*

uncialis (L.) Webber ex F.H. Wigg., terricolous, 9; *Fam. Collemataceae* Zenker. (1827): *Collema flaccidum* (Ach.) Ach., saxicolous, 2,4,13; *Collema subflaccidum* Degel., saxicolous, 4; *Fam. Lecanoraceae* Korb.(1854): *Lecanora albella* (Pers.) Ach., corticolous, 13; *Lecanora allophana* (Ach.) Nyl., corticolous, 2,3; *Lecanora chlarotera* Nyl., corticolous, 13; *Lecanora gangaleoides* Nyl., saxicolous, 9; *Lecanora pulicaris* (Pers.) Ach., corticolous, lignicolous, 7,12; *Lecidella elaeochroma* (Ach.) M. Choisy., corticolous, 13; *Lecania cyrtella* (Ach.) Th. Fr., corticolous, 5; *Porpidia macrocarpa* (DC.) Hertel & A.J. Schwab., saxicolous, 4; *Fam. Ophioparmaceae* Rogers&Hafellner (1988): *Ophioparma ventosa* (L.) Norman, saxicolous, 9; *Fam. Parmeliaceae* Zenker (1827): *Cetraria aculeata* (Schreb.) Fr., terricolous, 9; *Cetraria islandica* (L.) Ach., terricolous, 9,15; *Cetraria sepincola* (Ehrh.) Ach., corticolous, 3; *Vulpicida pinastri* (Scop.) Mattson & M.J.Lai, corticolous, 9; *Cetrelia cetrarioides* (Del. Ex Duby) W. Culb.&C.Culb., lignicolous, 6; *Cetrelia olivetorum* (Nyl.) Culb.&C. Culb., on mosses, 5,8; *Evernia divaricata* (L.) Hue., corticolous, 2,3,8; *Evernia prunastri* (L.) Ach., corticolous, lignicolous, 1,2,3,4,5,6,7,8,9,10,12,13,14,16; *Hypogymnia physodes* (L.) Nyl., corticolous, lignicolous, 1,2,3,4,5,6,7,8,9,10,12,13,14,16; *Hypogymnia tubulosa* (Schaer.) Hav., corticolous, 5,8,9; *Hypogymnia vittata* (Ach.) Parr., on mosses, corticolous, 5,7,9,12,13; *Flavoparmelia caperata* (L.) Hale., corticolous, lignicolous, 5,7,8,12,13; *Menegazzia terebrata* (Hoffm.) Massal., saxicolous, 7; *Melanelia exasperatula* (Nyl.) Essl., corticolous, 6; *Melanelia glabra* (Schaer.) Essl., corticolous, 3; *Melanelia glabratula* (Lamy.) Essl., corticolous, 13,7,3; *Parmelia saxatilis* (L.) Ach., saxicolous, 9; *Parmelia sulcata* Tayl., corticolous, 3,7,12,13; *Xanthoparmelia conspersa* (Ach.) Hale, saxicolous, 2,6,13; *Pseudevernia furfuracea* (L.) Zopf., corticolous, lignicolous, 1,2,3,4,5,6,7,8,9,10,12,14,16; *Usnea cavernosa* Tuck., corticolous; *Usnea filipendula* Stirt., corticolous, 7,13; *Usnea florida* (L.) Weber. Ex F:H Wigg., 1,2,3,5,6,8,9,10,13,14; *Usnea glabrata* (Ach.) Vain., corticolous, 13; *Usnea hirta* (L.) Weber ex F.H.Wigg., corticolous, lignicolous, 1,2,6,7,9,10,11,12,14; *Usnea longissima* Ach., corticolous, 5; *Usnea subfloridana* Stirt., corticolous, 1; *Fam. Physciaceae* Zahlbr. (1898): *Buellia disciformis* (Fr.) Mudd., corticolous, 7; *Physcia adscendens* (Fr.) H. Olivier., corticolous, 5,12,17; *Physcia aipolia* (Ehrh. ex Humb.) Furnr., 2,12,13,16; *Physcia caesia* (Hofm.) Furnrohr, saxicolous, 13; *Physcia stellaris* (L.) Nyl., corticolous, 12,14; *Physcia tenella* (Scop.) DC., corticolous, 14; *Phaeophyscia ciliata* (Hoffm.) Moberg., corticolous, 13; *Phaeophyscia orbicularis* (Neck.) Moberg., corticolous, 12,17; *Fam. Ramalinaceae* Ag.(1821): *Ramalina fastigiata* (Pers.) Ach., corticolous, 13; *Fam. Rhizocarpaceae* M. Choisy. ex Hafellner (1984): *Rhizocarpon distinctum* Th Fr., saxicolous, 2,9; *Rhizocarpon geograficum* (L.) DC., saxicolous, 2,9,10; *Rhizocarpon obscuratum* (Ach.) Massal., saxicolous, 3,5; *Fam. Stereocaulaceae* Chev. (1826): *Stereocaulon dactylophyllum* Florke, 9; *Fam. Umbilicariaceae* Chev. (1826): *Umbilicaria cylindrica* (L.) Delise ex Duby., saxicolous, 9; *Umbilicaria deusta* (L.) Baumg., saxicolous, 9; *Umbilicaria proboscidea* (L.) Schrad., saxicolous, 9; *Licheni imperfecti*: *Lepraria incana* L. (Ach.), saxicolous, 3,9,10; *Lepraria lobificans* Nyl., corticolous, 5,6,8; *Thamnolia vermicularis* (Sw.) Schaer., terricolous, 9; **ORD. LEOTIALES** Carpenter (1988). *Fam. Baeomycetaceae* Dumort. (1829): *Baeomyces rufus* (Huds.) Rebt., saxicolous, 1,5,6,8,9,14; *Dibaeis baeomyces* (L.) Rambold & Hertel, terricolous, 12; *Fam. Icmadophilaceae* Rambold, Triebel&Hertel (1993): *Icmadophila ericetorum* (L.) Zahlbr., terricolous, 9; **ORD. OPEGRAPHALES** M.Choisy ex D. Hawskw.&Eriksson (1986). *Fam. Opegraphaceae* Stizenb. (1862): *Opegrapha varia* Pers., corticolous, 8; *Opegrapha viridis* (Pers.ex Ach.) Behlen ex Desberger., corticolous, 1; **ORD. PELTIGERALES** W. Watson. (1929). *Fam.Peltigeraceae* (1822): *Peltigera canina* (L.) Willd., terricolous, 11,15; *Peltigera degenii* Gyel., terricolous, 2,5; *Peltigera didactyla*

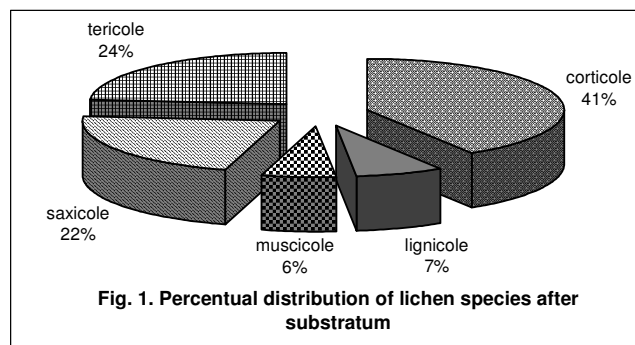
(With.) J.R.Laundon, terricolous, 3,4,12; *Peltigera horizontalis* (Huds.) Baumg., on mosses, terricolous, 3,8; *Peltigera polydactyla* (Neck.) Hoffm., terricolous, 1,3,8; *Peltigera praetextata* (Florke ex Sommerf) Zopf., on mosses, terricolous, 3,13; *Peltigera rufescens* (Weiss.) Humb., terricolous, 13; **ORD. PERTUSARIALES** M. Choisy ex D. Hawksw. & O. Eriksson (1986). *Fam. Pertusariaceae* Korb. Ex Korb. (1855): *Pertusaria chiodectonoides* Bagl. Ex Massal., saxicolous, 2; *Pertusaria hemisphaerica* (Flk.) Erichs., saxicolous, 3; **ORD. PYRENULALES** Fink. ex D. Hawksw.&O. Eriksson (1986). *Fam. Pyrenulaceae* Rabh. (1870): *Pyrenula nitida* (Wiegel.) Ach., corticolous, 1,2,7; **ORD. TELOSCHISTALES** D. Hawksw.&O. Eriksson (1986). *Fam. Teloschistaceae* Zahlbr. (1898): *Caloplaca flavescens* (Huds.) J.R.Laundon, saxicolous, 9; *Caloplaca saxicola* (Hoffm.) Nordin, saxicolous, 10; *Xanthoria parietina* (L.) Th. Fr., lignicolous, corticolous, terricolous, 5,10,12,13,16,17; **ORD. VERRUCARIALES** Mattik ex D. Hawksw.&O. Eriksson (1986). *Fam. Verrucariaceae* Zenker (1827): *Verrucaria muralis* Ach., saxicolous, 5; *Dermatocarpon minutum* (L.) Mann., saxicolous, 9.

Taxonomical analysis

From the total of 11 orders that we have identified, the best represented is the *Lecanorales* order including 14 families with 84 species and 3 subspecies. The families having the most numerous representants are: *Parmeliaceae* –27 species, *Cladoniaceae* –21 species and 3 subspecies, *Physciaceae* –8 species and *Peltigeraceae* –7 species. The botanical genus having the most numerous species is *Cladonia* –21 species and 3 subspecies followed by *Parmelia*, *Lecanora* and *Peltigera* –each of them represented by a number of 7 species.

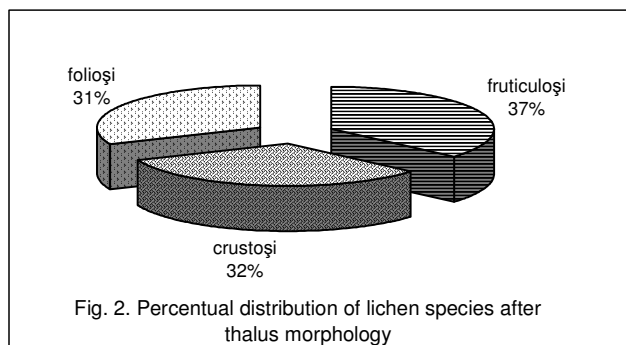
Thallus morphology analysis

The lichen flora of the studied zone is represented by fruticose lichens (37%), crustose lichens (32%) and foliose lichens (31%). (Fig. 1)

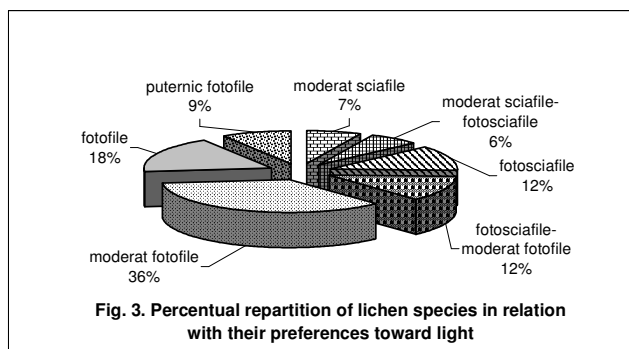


Ecological analysis

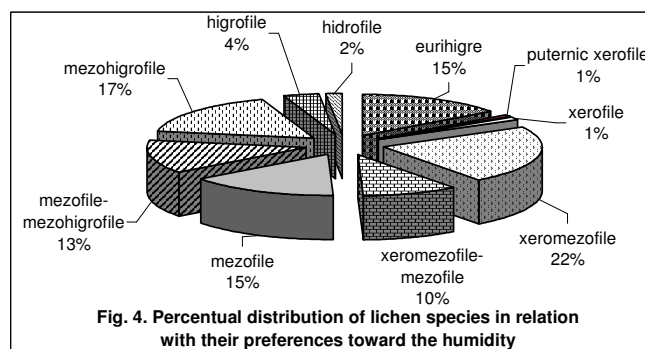
Percentual distribution of the lichen species from the substrata point of view show us the numerical predomination of corticolous lichen species (41%) followed by the terricolous lichens 24%, saxicolous lichens (22%), lignicolous lichens (7%) and situated on mosses lichens (6%) from the total number of the identified lichen species. (Fig. 2)



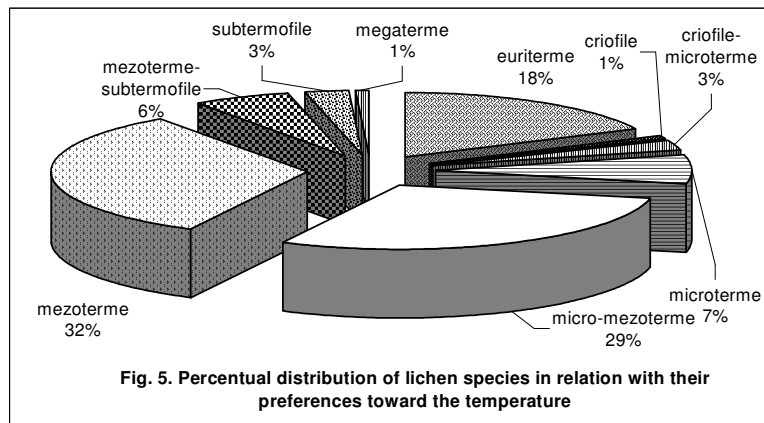
The analysis of the lichen flora in relation with the species preferences to the light (Fig. 3) indicates the predominance of moderate photophilous species (36%) followed by the photophilous species (18%), photo-ombrophilous – moderate photophilous species (12%), strong photophilous (9%), moderate ombrophilous (7%) and moderate ombrophilous – photo-ombrophilous species (6%).



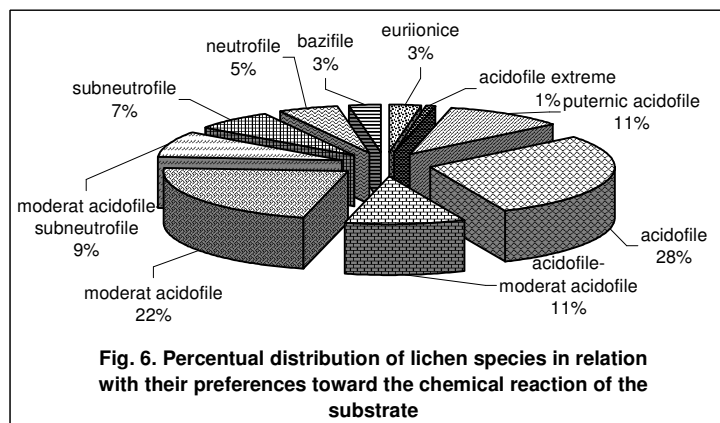
The analysis of lichen flora in relation with the species preferences to the humidity (Fig. 4) reveals the domination of xeromesophilous lichen species (22%) followed by mesohygrophilous species (17%), mesophilous species (15%), eury-hygrous species (15%) and xeromesophilous-mesophilous species (10%). Less represented are hygrophilous (4%), hydrophilous (2%), xerophilous (1%) and strong xerophilous (1%) species.



The lichen species preferences for the temperature (Fig. 5) is manifested by the increased proportion of mesothermophilous species (32%), micromesothermophilous (29%) and eurythermic species as a result of small altitudes from Dorna Arini, Cozanesti, Zugreni, Brosteni. The seven percent of microthermophilous species are probably the result of the high altitude from Pietrosul Bistritei and Budacu peaks. At these high altitudes we have met also cryophilous-microthermophilous species (3%) and cryophilous species (1%). In the locations having small altitudes we have collected some mesothermophilous – subthermophilous (6%), subthermophilous (3%) and megathermophilous (1%) species.



The lichen species preferences related to chemical reaction of the substratum (Fig. 6) shows increased values for the acidophilous (28%), moderate acidophilous (22%), strong acidophilous (11%) and moderate acidophilous – subneutrophilous (11%) categories. Smaller values are registered for sub-neutrophilous (7%) and neutrophilous (5%) species. The basiphilous (3%), eury-ionic and extreme acidophilous (1%) species are less represented.



Phytogeographical analysis

The analysis of the floristic elements of lichen flora from this region (table 1.) reveals that the most numerous species from the boreal-mediterranean category (24 species) followed by the boreal-mediterranean-montane (13 species) and the south-boreal-mediterranean and arctic-middle-european, each of them having 7 species. Less represented are the boreal-submediterranean (6 species), boreal-middleeuropean (6 species), arctic-middle-european (6 species), south boreal-middle-european-mediterranean (5 species) and arctic-boreal-montane (5 species) elements, the other categories having a very decreased number of species.

Table 1
The repartition of taxa in relation with floristic elements categories and type of substratum

Nr.	Geoelemente	corticolous	lignicolous	on mosses	saxicolous	tericolous	total
1.	Bor-med	12	4	3	3	2	24
2.	Bor-submed	-	-	-	3	3	6
3.	Bor-med-mo	7	2	-	3	1	13
4.	Bor-submed-mo	3	-	-	-	1	4
5.	Bor-mediueur	1	-	-	1	4	6
6.	Bor-mediueur-med	1	-	-	-	-	1
7.	Bor-mediueur-mo	2	-	-	-	2	4
8.	Bor-mediueur-subatl-med	1	-	-	-	-	1
9.	Bor-atl-submed	-	1	-	-	-	1
10.	Sud-mediueur-med	-	-	-	1	-	1
11.	Sud-bor-mediueur-med	3	-	-	1	1	5
12.	Sud-bor-med	4	-	1	1	1	7
13.	Sud-bor-med-mo	1	-	-	-	-	1
14.	Sud-bor-submed	-	-	-	-	1	1
15.	Sud-bor-subatl-med	-	-	2	-	-	2
16.	Sud-bor-subatl-med-mo	1	-	-	1	-	2
17.	Mediueur-subatl-med	1	-	-	1	1	3
18.	Mediueur-med	3	-	-	-	1	4
19.	Mediueur-med-mo	4	-	-	-	-	4
20.	Arcto-med	2	-	1	2	2	7
21.	Arcto-submed-mo	-	-	-	-	1	1
22.	Arcto-bor-med	1	-	-	2	-	3
23.	Arcto-bor-mo	-	-	-	3	2	5
24.	Arcto-mediueur	-	1	-	1	4	6
25.	Arcto-mediueur-med-mo	-	-	-	2	1	3
26.	Total	47	8	7	25	28	115

Bioform analysis

The general analysis of the bioform spectrum from the studied zone (table 2.) reveals that the most numerous lichen species are the fruticose lichens having an *Cladonia* type of thallus (Ch Cl -26 taxa: 18 terricolous species, 5 lignicolous species, 2 lichen species on mosses and one saxicolous species). From the same category we have identified epiphyte-hemicryptophytic species having an *Usnea* type of thalus (10 corticolous species and one on mosses).

The crustose lichens are represented by the epiphyte with external crust species (HE ex–15 species: 8 corticolous and 7 saxicolous species) followed by the hemicryptophyte with sorediate crust (H so–8 species: 5 corticolous, 2 lignicolous and one saxicolous species) and the lichens having an hypophloedic thallus (E hyp–4 species), the other categories having insignificant values.

The most numerous foliose lichens are the hemicryptophytic with an *Parmelia* type of thallus lichens (HE Pa–22 species: 15 corticolous species, 4 saxicolous species, 2 species on mosses and one lignicolous specie) followed by the hemicryptophytic with an *Peltigera* type of thallus (H Pe–7 species: 6 terricolous species and one on mosses specie) the other biologic forms having decreased values.

Table. 2.

The repartition of taxa in relation with bioforms and their preferences toward the substratum

Nr.	Bioforms	corticolous	lignicolous	on mosses	saxicolous	terricolous	Total
1.	H Pl	-	-	1	2	-	3
2.	H Pe	-	-	1	-	6	7
3.	H Co	-	-	-	2	-	2
4.	H Ba	-	-	-	1	2	3
5.	H So	5	2	-	1	-	8
6.	H ep. ex	-	-	-	3	-	3
7.	H ep. Um	-	-	-	4	-	4
8.	Ch Cl	-	5	2	1	18	26
9.	Ch Ce	2	-	-	-	1	3
10	HE Us	10	-	1	-	-	11
11	HE Ra	3	-	-	-	-	3
12	HE Pa	15	1	2	4	-	22
13	HE ex	8	-	-	7	-	15
14	HE So	-	1	-	-	-	1
15	E hyp	4	-	-	-	-	4

Conclusions

The study of the lichen flora realised in Bistrita Mountains has as result the identification of 115 taxa (112 species and 3 subspecies) belonging to 28 families and 11 orders.

Ecological analysis demonstrate that the most numerous are moderate photophilous species (36%), xeromezophilous (22%), mesothermophilous (32%) and acidophilous (28%) species of lichens.

References

1. BARBU, N., RUSU, C., LUPASCU, GH., TODERITA, M., 1984 – La couverture de sol des montagnes de Bistrița. *An. Șt. Univ. "Al. I. Cuza" Iași, ser. II, b. geol.-geogr.*, **30**: 71-77;
2. BARTÓK, KATALIN, CRIȘAN, F., COROI, ANA, MARIA, 2002 – The lichen genus *Chaenotheca* (Th. Fr.) Th. Fr. in Romania. *Contrib. Bot.*, Cluj-Napoca: 25-39;

3. BARTÓK, KATALIN, 1998 – *Mapping of Peltigera species in Romania*, Sauteria, **9**: 13-24;
4. BURLACU, LUCIA, 1969 – Contribuții la cunoașterea genurilor Alecatoria Ach. și Usnea Wigg. (fam. Usneaceae) din România. *An. Șt. Univ. "Al. I. Cuza" Iași, s. II-a. Biol.*, **15**, *1*: 199-201;
5. CIURCHEA, MARIA, 2004 – *Determinatorul lichenilor din România*. Edit. Bit, Iași;
6. CIURCHEA, MARIA, CODOREANU, V., BURLACU, LUCIA, 1968, Flora și vegetația lichenologică saxicolă dintre Cozla și Pescari (jud. Caraș Severin). *Contrib. Bot.*, Cluj: 129-148;
7. DOBSON, F., 1981. *Lichens. An illustrated Guide*. Richmond Publishing Co., Richmond, Surrey;
8. ELLEMBERG, H., WEBER, H., E., DÜLL, R., WIRTH, V., WERNER, W., PAULIßEN, D., 1992, *Indicator value of plants in Central Europe*. Scripta geobotanica, **18**: 215-257;
9. MOBERG, R., HOLMASEN, I., 1992, *Flechten von Nord-und Mitteleuropa, Ein Bestimmungsbuch*. Ed. Gustav Fischer Verlag, Stuttgart;
10. PURVIS, Q., W., COPPINS, B., J., JAMES, HAWKSWORTH, D., L., JAMES, P., W., MOORE, D., M., 1992, *The Lichen Flora of Great Britain and Ireland*. Natural History Museum Publications, London;
11. SCHOLZ, P., 2000, *Katalog der Flechten und flechtenbewohnender Pilze Deutschlands*. Bundesamt für Naturschutz, Bonn-Bad Godesberg, 342p.;
12. THOMSON, J., W., 1984, *American Arctic Lichens, I. The Macrolichens*. Columbia Univ. Press, New York;
13. TUDOSE, D., 1974, *Munții Bistriței, studiu geomorfologic*. Teza de doctorat (rezumat), Iași;
14. WIRTH, V., 1995, *Flechtenflora*. Verlag Eugen Ulmer, Stuttgart;