CONTRIBUTIONS TO THE STUDY OF FLORA IN THE ORĂŞTIE RIVER BASIN (CENTRAL-WESTERN ROMANIA)

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Abstract

In this paper we attempt at a statistical study of the cormophytes in the Orăştie river basin and showcase the relict, endemic, rare, vulnerable and protected flora, thus contributing to a better comprehension of the vascular flora spreading area. Even as there had previously been conducted botanical researches long ago in the studied territory, yet out of a total number of 919 taxa we have identified, 291 are floristic novelties for the Orăştie river basin. We think this study has a significant importance for the preservation and protection of our natural assets. Some of the cormophytes identified here should be listed officially and subjected to a special supervision.

Key words: Orăştie river basin, rare species, endemics, glacial relicts, Tertiary relicts, *Senecio sarracenicus* L.

INTRODUCTION

The Orăştie river basin lies between the corresponding ones of Strei (to the south and west) and of Cugir (to the east). To the north the studied river basin ends up in the Mureş river, whose tributary is the river Orăştie, in fact (Fig. 1).

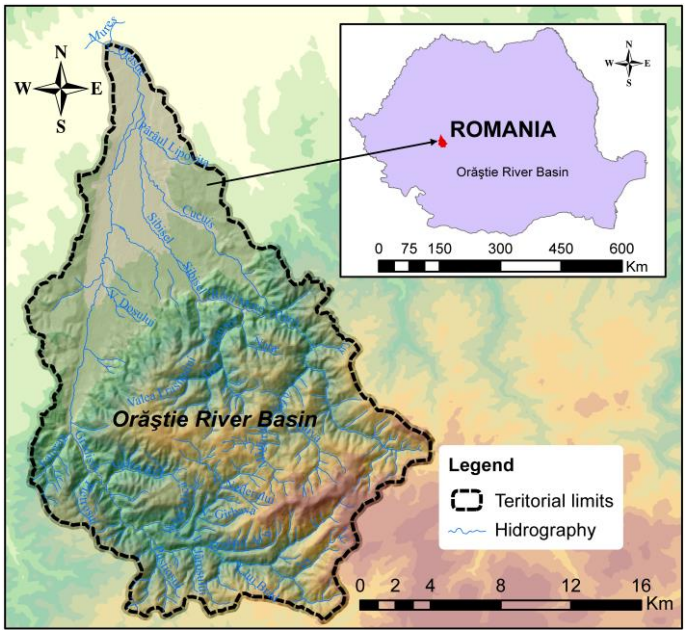

Fig. 1 Position of Orăstie River Basin in Romania

From the geographical viewpoint, there are three zones in the Orăştie river basin, each one showing a distinct geographical landscape: the mountainous zone (the west-north-western sector of the Sureanu Mountains), the foothills zone (the Şureanu Piedmont) and the depressionary zone (the Orăştie Corridor).

The territory under analysis is part of the temperate climatic zone of its continental type, its maritime influenced climatic sector, the Southern Carpatians subdivision, the complex topoclimate of the Orăştie lowlands and Parâng highlands (Pătru I. et al., 2006).

The thermal differences between the outskirts of the mountains and the high ridges are of roughly 10 degrees Celsius on average. Towards their north-western limits, due to warm air incursions from the Banato-Crisana plains, the average temperatures range from 9 to 10 degrees Celsius. In winter, the average temperatures vary between minus 2 and minus 7 degrees Celsius, in spring they rise by 6 to 12 degrees, in summer they reach 8 degrees on the mountain tops and over 19 degrees on the outskirts, while in autumn the average temperatures decrease by 5.5 to 7 degrees as compared to those in the summer months (Trufaş V., 1986).

The rainfall amounts in multiannual average to approximately 550-600 mm in the outskirts and to over 1000 mm in the high altitude central parts. In the whole of Transylvania the rainfall quantum is 500 to 700 mm per year (Pătru I. et al., 2006).

A real contribution to the comprehension of flora in the Orăştie river basin is brought by Fuss M., 1866, who takes down a number of 527 taxa, of which we noticed 404. Out of the species identified by Fuss we record: *Adonis aestivalis* L., *Adonis vernalis* L., *Aster sedifolius* L., *Caltha palustris* L., *Campanula persicifolia* L., *Centaurea cyanus* L., *Narcissus radiiflorus* Salisb.. Schur J. F., 1866, identifies 40 taxa in the territory we studied, such as: *Androsace maxima* L., *Calamintha menthifolia* Host, *Echinops ruthenicus* (Fisch.) M. Bieb., *Narcissus radiiflorus* Salisb.. Simonkai L., 1886, is yet another outstanding botanist who investigated the Orăştie area, identifying 198 taxa, 128 of which being noticed by us too in our research. Out of the species taken down by Simonkai L., 1866, at Orăştie and Grădiştea Muncelului we mention: *Acer tataricum* L., *Adonis vernalis* L., *Cirsium furiens* Griseb. et Schenk, *Corydalis cava* (L.) Schweigg. et Körte, *Corydalis solida* (L.) Clairv., *Dentaria glandulosa* Waldst. et Kit., *Doronicum hungaricum* (Sadl.) Rchb.. In Flora României vol. I – XII, 1952-1972, there appear 191 fitotaxa, of which we found 122, such as: *Acer tataricum* L., *Astragalus vesicarius* L., *Cyperus fuscus* L., *Doronicum hungaricum* (Sadl.) Rchb.. Boşcaiu N. et al., 1972, notice 132 taxa, 128 also found by us, such as: *Achillea setacea* Waldst. et Kit., *Carex hirta* L., *Festuca valesiaca* Schleich. ex Gaudin, *Juncus inflexus* L., *Mentha aquatica*

L., *Orchis laxiflora* Lam. subsp. *elegans* (Heuff.) Soó. The most recent botanical studies were performed by Balazs M., 1993, who mentions 258 species, some of which being uncertain: *Alnus viridis* (Chaix) DC., *Alyssum murale* Waldst. et Kit., *Cardamine resedifolia* L., *Galium flavescens* Borbás.

MATERIALS AND METHODS

The conspectus and analysis of flora in the Orăştie river basin were based upon our own research conducted between 2009 – 2013, as well as upon the data collected from the herbariums at the Sibiu Natural History Museum. To this we may add the information from the specialized bibliography: Fuss M,1866, Schur J. F., 1866, Simonkai L., 1886, Flora României, 1952 – 1976, Boşcaiu et al.,1972, Balazs M, 1993.

Identification of taxa was performed based on specialized determiners: Flora României (1952-1976), Illustrated Flora of România (Ciocârlan V., 2009), Wildpflanzen Siebenbürgens (Speta E., Rákosy L., 2010), Vascular Plants of România – Field-trip Illustrated Determiner (Sârbu I. et al., 2013). The systematical framing of taxa was done according to the phylogenetic system implemented by Pop I. et al.,1983. The nomenclature of species and infrataxa is in accordance with that of Ciocârlan V., 2009.

The inclusion of fitotaxa into one of the categories: relict plants, endemics, rare, protected, endangered and vulnerable plants, was done according to Flora României vol. XIII, 1976, Boşcaiu N. et al, 1994, Dihoru G., Dihoru A., 1994, Oltean M., 1994, Ciocârlan V., 2009.

RESULTS AND DISSCUSIONS

Out of a total number of 919 fitotaxa identified by us, 291 are floristic novelties for the Orăştie river basin, respectively 278 species and 13 subspecies. As a result of field-trip investigations, there were not found a number of 220 fitotaxa identified by previous written studies. A number of three species are glacial and Tertiary relicts, six species are Carpathian endemics, three species are endemic to the Romanian Carpathians, 33 species are rare, vulnerable and endangered, and three taxa belong to the non-endangered category.

Glacial and Tertiary relicts, after Flora României vol. XIII,1976, Ciocârlan V., 2009: *Blechnum spicant* (L) Roth (Tertiary), *Dryopteris cristata* (L.) A. Gray (glacial), *Sanicula europaea* L. (Tertiary).

Endemic plants, after Flora României vol. XIII, 1976, Ciocârlan V., 2009: *Campanula rotundifolia* L. subsp. *polymorpha* (Witašek) Tacik (Carpathian Endemism), *Campanula serrata* (Kit.) Hendrych (Carpathian

Endemism), *Dentaria glandulosa* Waldst. et Kit. (Carpathian), *Heracleum palmatum* Baumg. (Carpathian Endemism), *Hypericum richeri* Vill. subsp. *transsilvanicum* (Čelak.) Ciocârlan (Romanian Carpathian Endemism), *Leucanthemum waldsteinii* (Sch.-Bip.) Pouzar (Carpathian Endemism), *Silene nutans* L. subsp. *dubia* (Herb.) Zapal. (Carpathian Endemism), *Symphytum cordatum* Waldst. et Kit. (Carpathian Endemism), *Thymus comosus* Heuffel (Romanian Carpathian Endemism) (Fig. 2).

Fig. 2 *Thymus comosus* Heuffel,
upstream Costeşti-Cabană (16.07.2012)

Plants considered rare, protected, vulnerable and endangered by Flora României vol. XIII, 1976, Boşcaiu N. et al., 1994, Dihoru G., Dihoru A., 1994, Oltean M. et al., 1994: *Abies alba* Mill. (endangered), *Adonis vernalis* L. (vulnerable), *Agrostema githago* L. (vulnerable), *Angelica archangelica* L. (rare and protected), *Cephalanthera rubra* (L.) Rich. (rare), *Dactylorhiza fuchsii* (Druce) Soó (rare), *Dactylorhiza maculata* (L.) Soó subsp. *maculata (*rare), *Dactylorhiza sambucina* (rare), *Dictamnus albus* L. (rare), *Echinops ruthenicus* (Fisch.) M. Bieb. (rare), *Epilobium alsinifolium* Vill., (rare), *Epilobium nutans* F. W. Schmidt (rare), *Epipactis atrorubens* (Hoffm.) Besser (rare), *Epipactis palustris* (L.) Crantz (rare), *Hyoscyamus niger* L. (rare), *Iris sibirica* L. (vulnerable/rare), *Larix decidua* Mill. subsp. *carpatica* (Domin) Šiman (var. *polonica* auct.) (rare), *Leucojum vernum* L. (rare), *Listera ovata* (L.) R.Br. (rare), *Menyanthes trifoliata* L. (rare), *Monotropa hypopitys* L. (rare), *Najas marina* L. (vulnerable), *Narcissus radiiflorus* Salisb. (vulnerable/rare), *Neotia nidus-avis* (L.) Rich. (rare), *Orchis laxiflora* Lam. subsp. *elegans* (Heuff.) Soó (rare), *Orchis militaris* L.

(rare), *Orchis morio* L. subsp. *morio* (rare), *Pinus sylvestris* L. (rare), *Platanthera bifolia* (L.) Rich. (rare), *Salix elaeagnos* Scop. (rare), *Senecio sarracenicus* L. (rare), *Valeriana simplicifolia* (Rchb.) Kabath (rare), *Veronica bachofenii* Heuff. (rare).

To these taxa we may add the species non-endangered, which are not found in any of the categories mentioned above (Oltean et al., 1994):

Cephalanthera longifolia (L.) Fritsch (non-endangered), *Cirsium furiens* (non-endangered), *Galanthus nivalis* L. (non-endangered).

New taxa for the flora of Orăştie river basin. Across the Orăştie river basin we identified a number of 291 taxa, of which 278 species and 13 subspecies, which represent floristic novelties for this territory. They are as follows:

Acer platanoides L., *Achillea collina* Becker ex Rchb., *Alisma plantago-aquatica* L., *Allium oleraceum* L., *Alopecurus aequalis* Sobol. *Alopecurus geniculatus* L., *Amaranthus retroflexus* L., *Angelica archangelica* L., *Anthericum ramosum* L., *Aposeris foetida* (L.) Less., *Arctium lappa* L. *Aremonia agrimonoides* (L.) DC., *Arenaria serpyllifolia* L., *Artemisia absinthium* L., *Artemisia vulgaris* L., *Asclepias syriaca* L., *Asparagus officinalis* L., *Asplenium scolopendrium* L., *Asplenium septentrionale* (L) Hoffman, *Asyneuma canescens* (Waldet. et Kit.) Griseb. et Schenk, *Atriplex patula* L,. *Atropa belladona* L., *Balota nigra* L. subsp. *nigra*, *Berula erecta* (Huds.) Coville, *Bidens frondosa* L., *Bidens tripartita* L., *Blechnum spicant* (L) Roth, *Brachypodium sylvaticum* (Huds.) Beauv., *Brassica nigra* (L.) W. D. J., *Bromus squarrosus* L., *Bromus sterilis* L., *Bruckenthalia spiculifolia* (Salisb.) Rchb., *Calamagrostis arundinacea* (L.) Roth, *Calamagrostis epigejos* (L.) Roth, *Calamagrostis pseudophragmites* (Haller fil.) Koeler, *Calamagrostis villosa* (Chaix) J.F. Gmel., *Calystegia sepium* (L.) R.Br., *Campanula abietina* Griseb., *Campanula bononiensis* L., *Campanula rotundifolia* L. subsp. *polymorpha* (Witašek) Tacik, *Campanula serrata* (Kit.) Hendrych, *Carduus acanthoides* L., *Carex acuta* L. subsp. *acuta*, *Carex brizoides* L., *Carex caryophyllea* Latourr., *Carex divulsa* Stokes, *Carex flava* L., *Carex humilis* Leyss., *Carex nigra* (L.) Reichard, *Carex pallescens* L., *Carex pilosa* Scop., *Carex remota* L., *Carex riparia* Curtis, *Carex rostrata* Stokes, *Carlina acaulis* L., *Carlina biebersteinii* Bernh. ex Hornem. subsp. *brevibracteata*, *Centaurea jacea* L., *Cephalanthera longifolia* (L.) Fritsch, *Cephalanthera rubra* (L.) Rich., *Cerastium pumilum* Curtis, *Chaerophyllum aromaticum* L., *Chelidonium majus* L., *Chenopodium album* L., *Chenopodium bonus-henricus* L., *Chenopodium glaucum* L., *Chenopodium hybridum* L., *Cicerbita alpina* (L.) Wallr., *Circaea alpina* L., *Cirsium candelabrum* Griseb., *Cirsium oleraceum* (L.) Scop., *Cirsium palustre* (L.) Scop., *Cirsium rivulare* (Jacq.) All., *Cirsium vulgare* (Savi) Ten., *Cirsium waldsteinii* Rouy, *Clinopodium*

vulgare L., *Conium maculatum* L., *Convolvulus arvensis* L., *Conyza canadensis* (L.) Cronquist, *Crepis paludosa* (L.) Moench, *Crocus vernus* (L.) Hill, *Cystopteris fragilis* (L.) Bernh., *Dactylis polygama* Horv., *Dactylorhiza fuchsii* (Druce) Soó, *Danthonia decumbens* (L.) DC., *Daphne mezereum* L., *Dianthus trifasciculatus* Kit., *Digitaria sanguinalis* (L.) Scop., *Diplotaxis tenuifolia* (L.) DC., *Dipsacus pilosus* L., *Doronicum columnae* Ten., *Dryopteris carthusiana* (Vill.) H. P. Fuchs, *Dryopteris cristata* (L.) A. Gray, *Echinochloa crus-galli* (L.) Beauv., *Echinocystis lobata* (Michx.) Torr. et Gray, *Elymus hispidus* (Opiz) Melderis subp. *hispidus*, *Elymus repens* (L.) Gould, *Epilobium collinum* C.C.Gmel., *Epilobium alsinifolium* Vill., *Equisetum telmateia* Ehr., *Eriophorum latifolium* Hoppe, *Eriophorum vaginatum* L., *Euphorbia helioscopia* L., *Euphorbia platyphyllos* L., *Euphorbia seguieriana* Necker, *Falcaria vulgaris* Bernh., *Festuca altissima* All., *Festuca arundinacea* Schreb., *Festuca drymeja* Mert. et W.D.J. Koch, *Festuca gigantea* (L.) Vill., *Festuca heterophylla* Lam., *Festuca nigrescens* Lam., *Filago arvensis* L., *Filago minima* (Sm.) Pers., *Filago vulgaris* Lam., *Filipendula ulmaria* (L.) Maxim., *Fraxinus excelsior* L., *Fraxinus ornus* L., *Fumaria schleicheri* Soy.-Will., *Gagea lutea* (L.) Ker. Gawl., *Gagea pratensis* (Pers.) Dumort., *Galanthus nivalis* L., *Galeopsis ladanum* L., *Galeopsis tetrahit* L., *Galinsoga parviflora* Cav., *Galium album* Mill., *Galium glaucum* L., *Galium schultesii* Vest, *Geranium columbinum* L., *Geranium dissectum* L., *Geranium palustre* L., *Glechoma hirsuta* Waldst. et Kit., *Glyceria nemoralis* (R.Uechr.) R.Uechr. et Körn., *Glyceria notata* Chevall., *Gymnocarpium dryopteris* (L.) Newman, *Gymnocarpium robertianum* (Hoffm.) Newman, *Heracleum palmatum* Baumg., *Hieracium aurantiacum* L., *Hieracium bauhini* Schult., *Hieracium lactucella* Wallr., *Hieracium laevigatum* Wild., *Hippophaë rhamnoides* L., *Homogyne alpina* (L.) Cass., *Hypericum humifusum* L., *Hypericum maculatum* Crantz, *Hypericum richeri* Vill. subsp. *transsilvanicum* (Čelak.) Ciocârlan, *Inula helenium* L., *Iris sibirica* L., *Juglans regia* L., *Juncus articulatus* L., *Juncus compressus* Jaq., *Lactuca saligna* L., *Larix decidua* Mill. subsp. *carpatica* (Domin) Šiman (var. *polonica* auct.), *Lathraea squamaria* L., *Leersia oryzoides* (L.) Sw., *Lemna minor* L., *Leontodon autumnalis* L., *Lilium martagon* L., *Lunaria rediviva* L. *Luzula luzuloides* (Lam.) Dandy et Wilmon subsp. *luzuloides*, *Luzula sylvatica* (Huds.) Gaudin, *Lycopodium annotinum* L., *Lycopodium clavatum* L., *Lycopsis arvensis* L., *Maianthemum bifolium* (L.) F.W.Schm., *Malus sylvestris* (L.) Mill., *Malva neglecta* Wallr., *Malva pusilla* Sm., *Matteuccia struthiopteris* (L.) Tod., *Melampyrum sylvaticum* L., *Melica uniflora* Retz., *Mentha arvensis* L., *Milium effusum* L., *Moehringia trinervia* (L.) Clairv., *Molinia caerulea* (L.) Moench, *Myosoton aquaticum* (L.) Moench, *Myricaria germanica* (L.) Desv., *Myriophyllum spicatum* L., *Najas*

marina L., *Nardus stricta* L., *Oenothera biennis* L., *Onobrychis arenaria* (Kit.) DC., *Oxalis corniculata* L., *Oxalis fontana* Bunge, *Papaver rhoeas* L., *Petasites albus* (L.) Gaertn., *Petasites hybridus* (L.) P.Gaertn., B.Mey. et Scherb., *Phalaris arundinacea* L., *Phegopteris connectilis* (Mich.) Watt, *Phleum alpinum* L., *Phleum montanum* K. Koch, *Phragmites australis* (Cav.) Steud., *Picea abies* (L.) H. Karst., *Pimpinella major* (L.) Huds., *Poa compressa* L., *Poa sylvicola* Guss., *Polygonum aviculare* L., *Polygonum cuspidatum* Sieb. et Zucc., *Polygonum dumetorum* L., *Polygonum hydropiper* L., *Polygonum lapathifolium* L., *Polygonum persicaria* L., *Polypodium vulgare* L., *Polystichum aculeatum* (L.) Roth, *Populus nigra* L., *Populus tremula* L., *Potentilla reptans* L., *Prenanthes purpurea* L., *Prunella grandiflora* (L.) Scholler, *Prunus cerasifera* Ehrh, *Pteridium aquilinum* (L.) Kuhn, *Pulicaria dysenterica* (L.) Bernh., *Quercus petraea* Liebl., *Quercus polycarpa* Schur, *Ranunculus aquatilis* L., *Ranunculus sceleratus* L., *Rorippa amphibia* (L.) Besser, *Rosa gallica* L., *Rosa micrantha* Sm., *Rubus caesius* L., *Rubus plicatus* Weihe et Nees., *Rubus sulcatus* Vest ex Tratt., *Rumex arifolius* All., *Rumex obtusifolius* L., *Salix caprea* L., *Salix elaeagnos* Scop., *Salix purpurea* L., *Salix silesiaca* Willd., *Saxifraga cuneifolia* L.subsp. *robusta* D.A.Web, *Schoenoplectus lacustris* (L.) Palla, *Scirpus sylvaticus* L., *Sclerochloa dura* (L.) Beauv., *Scrophularia umbrosa* Dumort, *Sedum hispanicum* L., *Senecio ovatus* (P. Gaertn., B.Mey. et Scherb.) Willd., *Senecio sarracenicus* L., *Seseli osseum* Cranz em. Simonk, *Setaria pumila* (Poir.) Roem et Schult., *Setaria viridis* (L.) Beauv., *Sherardia arvensis* L., *Silene dioica* (L.) Clairv., *Silene heuffelii* Soó, *Sisymbrium officinale* (L.) Scop., *Sium latifolium* L., *Solidago canadensis* L., *Sonchus arvensis* L., *Sonchus oleraceus* L., *Sorbus torminalis* (L.) Crantz, *Sorghum halepense* (L.) Pers., *Sparganium erectum* L. em. Rchb. subsp. *neglectum* (Beeby) K.Richt., *Stachys alpina* L., *Stachys annua* (L.) L., *Stachys palustris* L., *Stachys recta* L., *Stachys sylvatica* L., *Stellaria alsine* Grimm., *Stellaria media* (L.) Vill., *Syringa vulgaris* L., *Thlaspi arvense* L., *Thymelaea passerina* (L.) Coss. et Germ., *Thymus comosus* Heuffel, *Trifolium ochroleucon* Huds., *Typha angustifolia* L., *Ulmus minor* Mill., *Urtica urens* L., *Vaccinum vitis-idaea* L., *Valeriana simplicifolia* (Rchb.) Kabath, *Valeriana tripteris* L., *Veratrum album* L. subsp. *album,Veratrum album* L. subsp. *lobelianum* (Bernh.) Arcang., *Veronica anagallis-aquatica* L., *Veronica persica* Poir., *Veronica serpyllifolia* L., *Viola arvensis* Murray,*Viola biflora* L., *Viola declinata* L. Waldst. et Kit., *Vulpia myuros* (L.) C.C.Gmel., *Xanthium italicum* Moretti, *Xanthium strumarium* L..

CONCLUSIONS

As a result of the research conducted in the Orăştie river basin, out of a total number of 919 fitotaxa, 48 fitotaxa are taken down on *The Red List of Vascular Plants of România*, and 291 fitotaxa are floristic novelties for Orăştie. We consider that our research in this territory benefitted the better comprehension of the spreading area of some vascular plants as well as the identification of glacial and Tertiary relicts, of endemic, rare and endangered plants, pending their protection and preservation.

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