„Babes-Bolyai" University Cluj-Napoca
Faculty of Biology and Geology

Mihai-Tudor CRĂCIUNAȘ

PHYTOECOLOGIC STUDY OF SIBIU AND THE SUBURBAN AREA

Summary of the PhD Thesis

Scientific coordinators:
Prof. Ioan HODIȘAN, PhD
Prof. Vasile CRISTEA, PhD

CLUJ-NAPOCA
2013

TABLE OF CONTENTS

Keywords

Flora

Vegetation

Botanical research

Gușterița

Sibiu municipality

Transilvania

România

INTRODUCTION

The urban space is less generous in what the flora and vegetation survey is concerned, and apparently poorer in terms of biodiversity. Urban and suburban areas are today, more than ever, subject to human impact by eliminating the natural ecosystems and transforming them into surfaces with a maximum degree of artificialisation.

Sibiu has the privilege of being well studied in terms of its flora over the last 200 years. After the close botanical researches of Ferdinand Schur and Michael Fuss in the middle of the nineteenth century, Erika Scheneider - Binder and Constantin Drăgulescu during the second half of the twentieth century, researches undertaken around Sibiu, my predecessors recorded here over 1300 plant taxa and around 200 coenotaxa . This is a good reference when you want to do a phytoecological study of a territory. Our study aimed to assess multiple aspects of the flora and vegetation from the administrative territory of Sibiu. For this we have established the following objectives:

– to draw up a complete floristic inventory from the researched area, including a database of potential flora (total number of species found), the present-day flora and those species which were not found again.

– to process the taxonomic, chronologic, biologic, ecologic, phytogeographic, and sozologic information contained in the database;

– to establish the degree of the territory's anthropization through the study of chormoflora;

– to do a coenotaxa inventory of the studied area;

– to accomplish an ecological and phytogeographical analysis of vegetation classes;

– to identify the areas from Sibiu and surroundings where major anthropic changes have led to changes in flora and vegetation.

I. THE PHYSICAL-GEOGRAPHICAL CHARACTERIZATION OF SIBIU AND ITS SUBURBAN AREA

Sibiu Depression is in contact with Cindrelului Mountains (Cibin) and the Lotru Mountains, with Târnavelor Plateau, Plateau subdivisions represented by Secaşelor and Hârtibaciu.

Sibiu depression occupies the central part (Fig. 1) along the alluvial plain of the river Cibin forming "Great Meadow" range of more than 5 km, situated on terraces 10-15 m and 20-30 m of its north is bordered by steep Guşteriţa.

The general appearance of the territory of Sibiu is an amphitheater, with openings to the north and dreams corridor Cibinului Valley in the southern.

Sibiu Depression is located at 45 ° 38'10 "and 45 ° 51'30" N and 23 ° 56'28 "and 24 ° 17'08" east longitude and Sibiu is located at the intersection of the parallel 45 ° 48 'north latitude and the meridian of 24 ° 09 'east longitude.

The northern boundary of the territory under study is the Hill Ocnei a watershed low altitude, which makes the transition between Sibiu Depression and the Great Valley corridor Târnavei dreams. The largest settlements are preserved alignment Sura Mica - Sura Mare.

Eastern boundary and north - eastern Hârtibaciu is given, represented by a series of hills (Padina empty Padina Pope, Padina TEIS, Guşteriţa), which as the name suggests are relatively flat surfaces sliding interspersed between waves. This powerful model and fragmented abruptly left tributaries of Cibinului is further subject to intense anthropogenic influences (grazing, mining materials in quarries).

Southern boundary and south - east is the valley soap, the lower part of Sevis stream, bypassing Forest Grove. Minor Forest Grove enters as a spur to the town inari, Sibiu territory reaching through her extreme southern limit. Cindrelului Mountains are creeping into the territory of Sibiu by Cisnadia Piedmont and Cibin Piedmont.

Western boundary alignment is carried out almost entirely directed from N to S, being also the western boundary of Forest Grove, crossing the "Great Meadow" to Cibinului, E68 road, stream and brook Ruscior angle.

Administrative limit is given by the borders with neighboring settlements: Sura Mare, Hamba, new, Daia, Casolt, Bungard, Şelimbăr Cisnădie Cisnădioara, Răşinari, Poplaca, Cristian, Ruscior, Sura Mica and Ocna Sibiu.

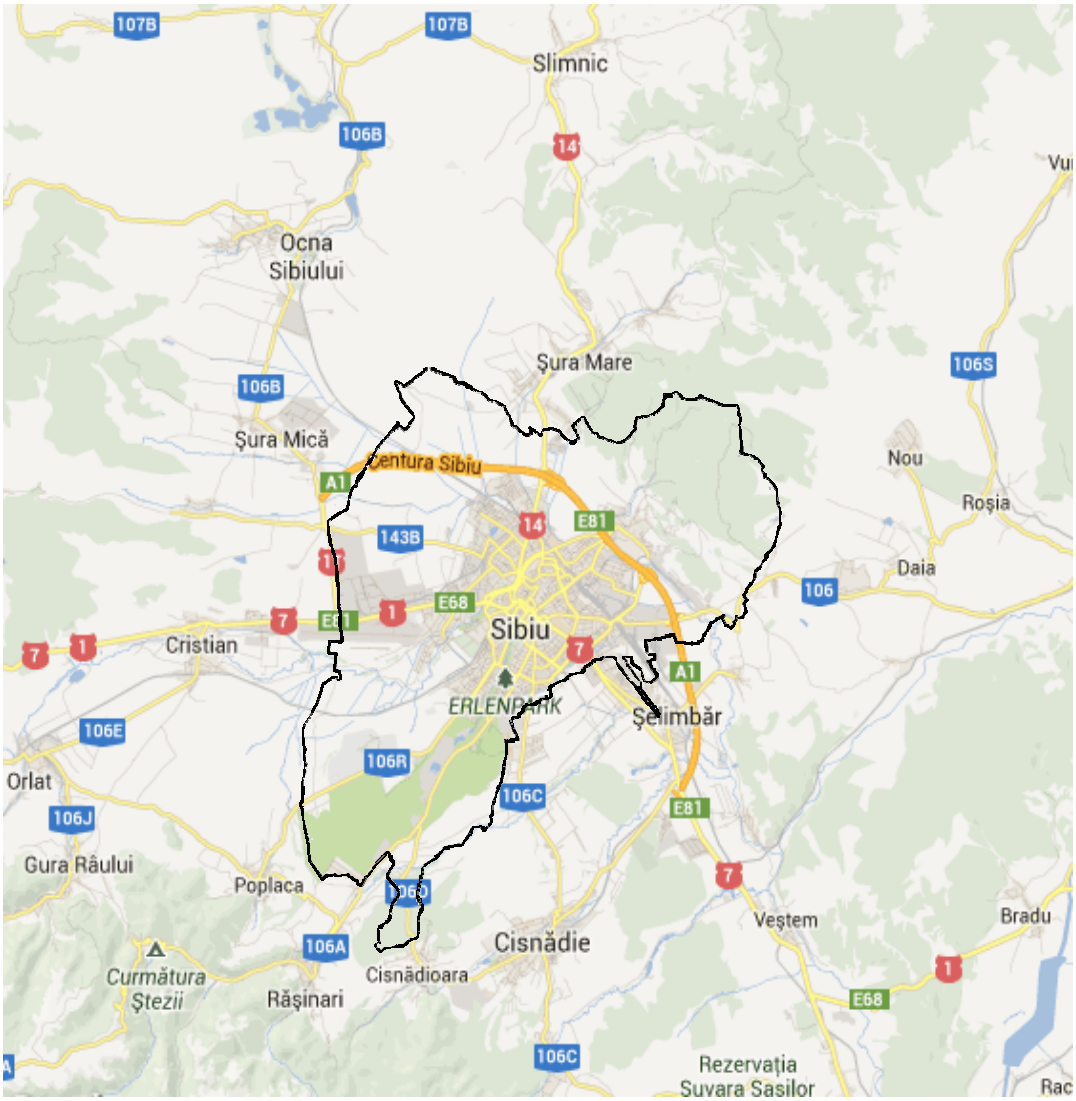

Fig. 1 Sibiu and the suburbs in 2013 (https://maps.google.ro).

Sibiu Depression has an area of 331 km ². Sibiu occupies an area of 121.63 km ², which represents more than one-third of the basin and 2.2% of the county, it represents and the area in the study of this work.

In terms of geomorphologic administrative territory of Sibiu overlaps three separate units of relief: depression, sub-mountainous and plateau, ranging from minimum altitude of 410 m and a maximum of 650 m.

The main river that drains Sibiu Depression is Cibin, part of the basin of Olt.

Soils belonging to 5 classes pedogenesis: luvisoils, cernisoils, protisoils, hidrisoils, antrisoils.

String weather observations from Sibiu is one of the longest in the country. The first regular observations were made from 1 December 1850 by Professor L. Reissemberger.

Sibiu territory falls within a general climate temperate continental moderate.

In the central area of the basin, where it is located and the weather station, annual average temperature, calculated as the average of monthly average temperatures for the period 1961-2012 is 8.8 ° C.

The average yearly rainfall in Sibiu is 644.96 mm / year.

The frequency and wind speed values are maximum in NW-SE direction.

II. METHOD OF PRESENTATION AND ANALYSIS OF FLORA AND VEGETATION

Floristic database construction

The database is indexed to the family, and the family indexing is done according to species. It contains the following fields: chorology, bioforms, geoelements, ecological indices U, T, R, N, L, species status (p-present p * - current signal again, d - not found), and associations where the species is present.

After processing the data contained in database tables resulting synthetic types bioforms, geoelemente, ecological indices and categories for flora sozological potential, current and missing flora of the researched territory.

Presentation of the chormoflora

The scientific names of taxa and systematic classification were made after Ciocârlan (2009) with some updates after Sarbu, Stephen and Oprea (2013).

Ecological indices (UTR) bioforms, phytogeographic elements, were taken by Sanda and Smith (1998).

Plant preferences related environmental indices for light (L) and soil mineral nitrogen (N) were taken after Sarbu, Stephen and Oprea (2013).

For the classification in sozological categories was used Dihoru and Negrean's work (2009).

In this paper, the species are presented in alphabetical order, and the order database systematic listing of plant species is after Ciocârlan (2009).

The analysis of the phytogeographic elements, bioforms and ecological preferences (UTRNL) graphs are based on percentage values by dividing each category by the total number of species analyzed. In analyzing bioforms were calculated: altitude and aridity index Ka1 and botanical aridity index Iba.

Presentation and analysis of the vegetation

Vegetation is shown after Grabherr, Mucina, Ellmauer et Wallnöfer (1993), Romania vegetation adapted system by Sanda, et Öllerer Burescu (2008) and after Chifu, Manzu and Zamfirescu (2006).

Phytocenologic data were taken from literature (264 surveys phytocenologic), some were made together with Prof. C. Drăgulescu (83 surveys) and some are lifting their phytocenologic (24 surveys). Identification was based on the characteristic and differential species.

Surveying performed were grouped in cenotaxon plant associations and senior classes are summarized in the corresponding tables of vegetation identified in the investigated area. Based on the presence-absence of species in the spectra of reports were made to the main indices ecological preferences, namely light, soil nitrogen concentration and UTR indices (moisture, temperature and soil reaction). Also on floristic lists were drawn bioforms spectra and the phytogeographic elements.

To watch coenotaxon plant layout along environmental gradients (UTR indices) was done ordering the 13 vegetation classes based on the aggregate value of each of the three indices. This was calculated by summing the products between steps indices and percentages of each category separately.

III. THE CHORMOFLORA AND ITS DYNAMICS

Taxonomic analysis of the chormoflora

he 1453 inventory cormophyte species over time, belonging to 119 families and represent potential flora researched territory. Overall, intraspecific diversity is high, as evidenced by the 547 sub-species, varieties and forms, as well as the 54 hybrid species. From Sibiu flora 102 species disappeared between the quotes by various authors, representing 7.02% of the species in the 200 years of research floristic

The analysis of the ecological requirements of chormophytes

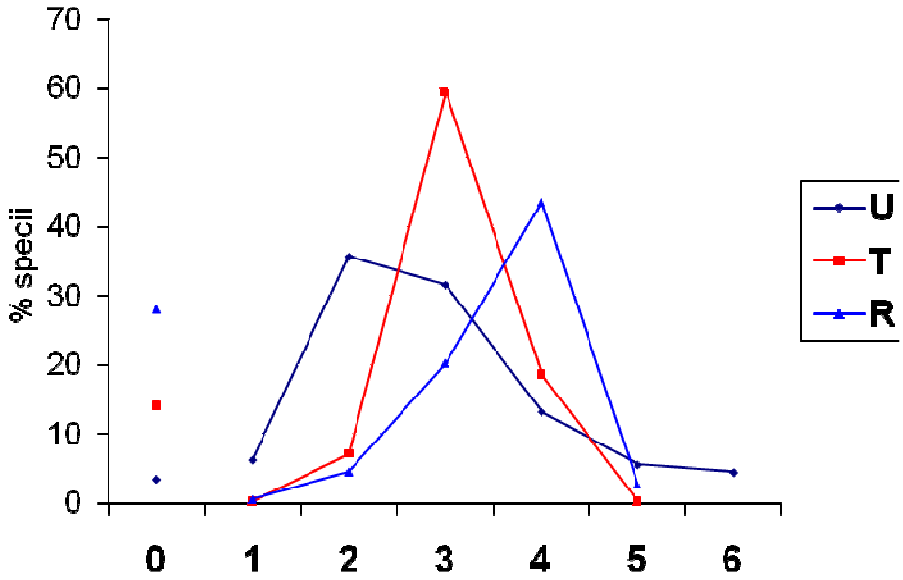

Fig.2 Spectrum of ecological categories (UTR) for chormoflora Sibiu

Flora from Sibiu and suburban area has a xero - mesophilic to mesophilic character, mesothermal, low acid- neutrophilic , with a high percentage of euryionic plants. In the studied area prevail the heliophilic species, with a relatively balanced distribution of categories of preference for the amount of nitrogen in the soil (with more indifferent species and plants on soils low in nitrogen);

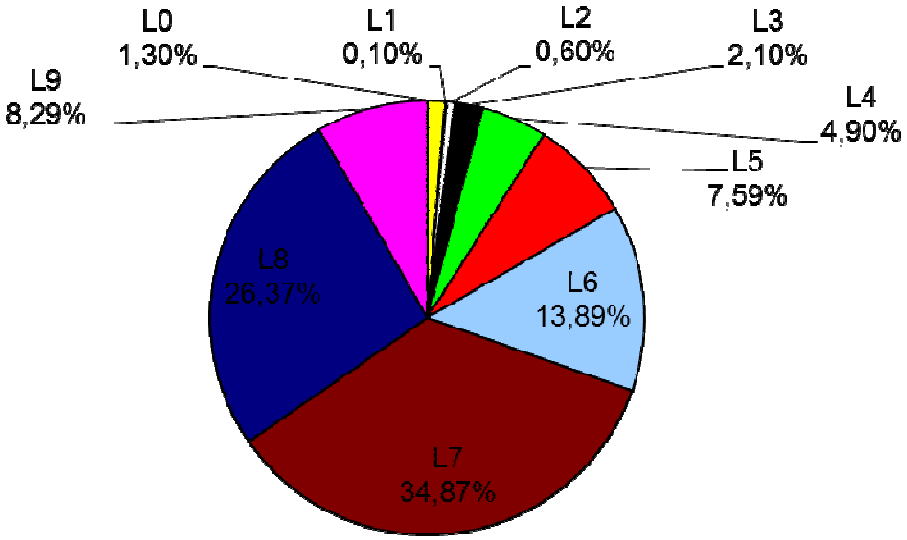

Fig. 3 Preferences to the light spectrum of flora species studied

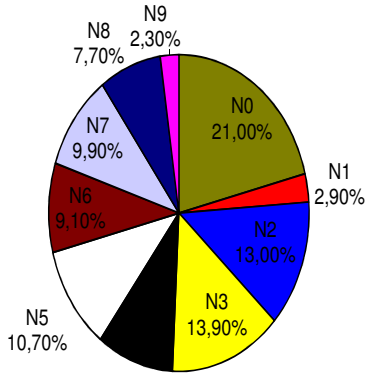

Fig. 4 Preference to nitrogen spectrum of flora species studied

There is a relatively balanced distribution between categories of preference for the amount of nitrogen in the soil (with more indifferent and plants on soils low in nitrogen).

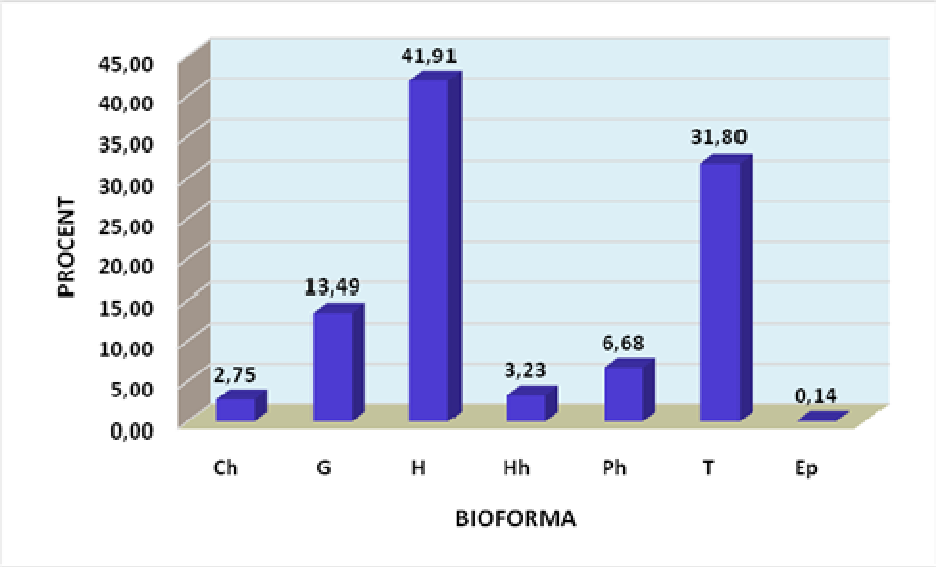

Fig. 5 Chormoflora bioforms spectrum of the studied region

Regarding changes in the current analysis bioforms flora they are immaterial.

From the analysis of bioforms hemicryptophytes high percentage (42.29%) and terrophytes (31.80%). The large share of hemicryptophytes show a good agreement with temperate continental climate of the territory studied. Terrophytes illustrates the sharp antrophic territory, especially in depression.

The two categories of bioelements together (74,09), shows large share of herbaceous species, predominantly grassy associations in depression and sunny shores of the hills bordering the basin to the N and NE.

Considering all the data (all species listed in the bibliography and identified) , the values are : KA1 = 75.86 , and Iba = 58.87 . These values indicate low altitude towards depression and a medium to high aridity .

Study floristic elements spectrum reflects the large share of the Eurasian species (37.92 %) , European (14.93 %) and Central European (12.71 %). Significant percentages of elements southern circumpolar and eastern reflects the transition of the territory and the intersection of the areas investigated . Cosmopolitan species and adventitious aggregate (9.59 %) , showing their great adaptive capacity dynamic urban conditions .

The altitude and aridity index (Ka1 = 75.86) and botanical index of aridity (Iba = 58.87) indicates values of predicted altitude of 200-300 m, below the actual altitude of Sibiu (450 m),

which is interpreted as an increase aridisation correlated with urbanization and increase in antrophic impact in the investigated area;

In recent years there have been major changes in the proportion of natural and human ecosystems through territorial expansion of Sibiu, by creating new infrastructure, the mining of construction materials (Gusterita Hill and Cibinului meadow), by the draining actions taken (Valea Aurie = Golden Valley, Cibinului meadow);

New taxons for the chormoflora in the studied area

Nr.crt.	New species reported	Corology
1	***Thuja orientalis*** L.	New species reported the bastions (eg Soldisch Bastion, Bastion Haller) and walls (School Goga) city
2	***Sedum sarmentosum*** Bunge	Sibiu Sub Arini Park on the bridge
3	***Sedum spurium*** M.Bieb	Sibiu city walls
4	***Duchesnea indica*** (Andrews) Focke	Sibiu
5	***Oenothera erythrosepala*** Borbas (*O. glazioviana* Micheli):	Sibiu Cibinului to Turnişor bank and the station
6	***Ailanthus altissima*** (Miller) Swingle	Sibiu-station
7	***Acer negundo***L.:	Sibiu, Sub Arini Park
8	***Oxalis dillenii*** Jacq. (O. corniculata var.*dillenii* (Jacq.) Trelease):	Sibiu-station
9	***Impatiens glandulifera*** Royle (*I. roylei* Walp.)	Sibiu, V. SEVIS between Sibiu and Cisnădie, V. Ştezii between Sibiu and Rasinari
10	***Impatiens parviflora*** DC.	Sibiu-station
11	***Euphorbia maculata*** L. *(Chamaesyce maculata* (L.) Small	Sibiu-station
12	***Lepidium virginicum***L	Sibiu-station
13	***Thladiantha dubia*** Bunge	Sibiu
14	***Asclepias syriaca*** L.	Sibiu
15	***Ambrosia artemisifolia*** L.	Sibiu
16	***Aster lanceolatus*** Willd.	Sibiu, Turnişor
17	***Bidens vulgata*** E.L. Greene	Sibiu in V. Aurie
18	***Panicum capillare L.***	Sibiu-station
19	***Panicum dichotomiflorumL.***	Sibiu-station

Phytotaxons with a sozological importance present in Sibiu and in the suburban area

Our study confirmed the presence of the investigated ten species of these. Most of these species have been cited since the nineteenth century and have been recently found.

Chimaphila umbellata (L.) **-** (CR).

Corydalis pumila (Host) Rchb. - (DD).

Elatine hexandra (Lapierre) DC. - (CR).

Juncus bulbosus L**.-** (CR).

Onosma arenaria ssp. Pseudoarenaria Waldet Kit .

Plantago maxima Juss. Ex Jack. - (EN).

Scolymus hispanicus L. - (VU)

Veronica catenata Pennell - (LR)

Carex supina Willd. ex Wahlenb - (LR).

Liparis loeselii (L.) Rich.

IV.THE VEGETATION OF SIBIU AND OF THE SUBURBAN AREA

The conspectus of vegetal associations with their corology

Hydrophitic vegetation

LEMNETEA MINORIS de Bolós et Masclans 1955

LEMNETALIA MINORIS de Bolós et Masclans 1955

Lemnion minoris de Bolós et Masclans 1955

1. ***Lemnetum minoris*** Oberd. ex T. Müller et Görs 1960: între Sibiu şi Cristian (C.Drăgulescu, 2004,2007,!), Pâr. Ruşciori-Pâr. Strâmb (E.Schneider-Binder,1970,1974,1976, C.Drăgulescu,2007,!), Sibiu (E.Schneider-Binder,1974,1976, C.Drăgulescu, 2004,2007,!), Turnişor (E.Schneider-Binder,1974,1976, C.Drăgulescu, 2004,2007,!)
2. ***Ricietum fluitantis*** Slavnić 1956: Sibiu-Turnişor (C.Drăgulescu, 2007)

UTRICULARIETALIA Den Hartog et Segal 1964

Utricularion vulgaris Passarge 1964

3. ***Lemno-Utricularietum*** Soó (1928) 1947: Turnişor (C.Drăgulescu, 2004,2007,!)

POTAMOGETONEA (POTAMETEA) R. Tx. et Preising 1942

POTAMOGETONETALIA (POTAMETALIA) Koch 1926

Potamion pectinati (Koch 1926) Görs 1977 (sin. Magnopotamion Vollmar 1947 et Parvopotamion Vollmar 1947)

4. ***Myriophyllo-Potametum lucentis*** Soó 1934 (sin. Myriophylletum verticillati Gaudet 1924):

- *myriophylletosumverticillati* Soó 1957: Turnişor (C.Drăgulescu, 2007)
- *myriophyletosum spicati* Soó 1957 (sin. Myriophylletum spicati Soó 1927): Sibiu-V. Aurie (C.Drăgulescu, 2007)

5. ***Potametum crispi***Soó 1927: Dumbrava Sibiului (E.Schneider-Binder,1974,1976, C.Drăgulescu, 2007), Pâr. Strâmb-Pâr. Ruşcioru (E.Schneider-Binder,1970,1974, 1976, C.Drăgulescu,2007,!), Turnişor (E.Schneider-Binder,1974,1976, C.Drăgulescu, 2004,2007,!)

6. ***Potametum nodosi*** Segal 1964: Pâr. Ruşcior (!), Sibiu-V. Aurie, Dumbrava (C.Drăgulescu, 2007)

7. ***Potametum pusilli*** Soó 1927: Sibiu-Pâr. Ruşcior (C.Drăgulescu, 2007), Turnişor (C.Drăgulescu, 2007)

Nymphaeion albae Oberd. 1957

8. ***Potametum natantis*** Soó 1934 (sin. Potametum natantisSoó 1927, Polygono-Potametum natantis Soó 1964, Polygonetum amphibii Soó 1927):

- *potametosum natantis* Soó 1964: Sibiu-Cristian (E.Schneider-Binder, 1974, 1976, C.Drăgulescu, 2004,2007,!), Turnişor (E.Schneider-Binder, 1974, C.Drăgulescu, 2007,!)
- *polygonetosum amphibii* Soó 1964: Sibiu- Cristian (E.Schneider-Binder, 1974, 1976, C.Drăgulescu, 2007), Ruşciori-V. Sălciilor (E.Schneider-Binder, 1974, 1976), Sibiu- Lacul Binder, Dumbrava (E.Schneider-Binder, 1974,1976, C.Drăgulescu,2007,!)

Ceratophylion demersi Soó 1927

9. ***Ceratophylletum demersi*** Hild 1956 (sin. Ceratophylletum demersi Eggler 1933, Ceratophylletum demersi Den Hartog et Segal 1964): Sibiu-Cristian (C.Drăgulescu, 2004, 2007,!), Pâr. Ruşcior (C.Drăgulescu,2007,!), Sibiu-Turnişor (C.Drăgulescu, 2004,2007,!)
10. ***Potamo-Ceratophylletum submersi*** I. Pop 1962 (sin. Ceratophylletum submersi Soó 1928, Ceratophylletum submersi Den Hartog et Segal 1964): Turnişor (C.Drăgulescu, 2007,!)

CALLITRICHO-BATRACHIETALIA Passarge 1964

Ranunculion aquatilis Pasarge 1964

11. ***Callitrichetum polymorphae*** Soó 1947: Sibiu- Cristian (C.Drăgulescu, 2007), Turnişor (C.Drăgulescu, 2007)

Marshland vegetation

PHRAGMITI-MAGNOCARICETEA in Klika et Novák 1941 (Phragmitetea R. Tx. et Preising 1942)

PHRAGMITETALIA Koch 1926

Phragmition communis Koch 1926

12. ***Phragmitetum vulgaris*** Soó 1927 (sin. Scirpo-Phragmiteum Koch 1926): Sibiu-Cristian (E.Schneider-Binder, 1974 sub Scirpo-Phragmitetum, C.Drăgulescu, 2004,2011,!), Pâr. Ruşciorului şi Pâr. Strâmb (E.Schneider-Binder, 1974, 1976 sub Scirpo-Phragmitetum, C.Drăgulescu, 2004,2011,!), Sibiu în Dumbravă (E.Schneider-Binder, 1974 sub Scirpo-Phragmitetum, C.Drăgulescu, 2004,2011,!), Sibiu-Şelimbăr (C.Drăgulescu, 2004,2011,!), Turnişor (C.Drăgulescu, 2004,2011,!)

- *rudbeckiosum*Schneider-B. 1976: lângă Ştrandul Dumbrava Sibiului în V. Rogojinii (E.Schneider-Binder, 1974, 1976 sub Scirpo-Phragmitetum var cu Rudbeckia, C.Drăgulescu, 2011), Sibiu-Şelimbăr (C.Drăgulescu, 2011)
- *schoenoplectosum lacustris* Soó 1957: Pâr. Ruşciorului şi Pâr. Strâmb (E.Schneider-Binder, 1974,1976, C.Drăgulescu, 2011)
-*typhosum latifoliae* Soó 1957: Pâr. Ruşciorului şi Pâr. Strâmb (E.Schneider-Binder, 1970, 1974, C.Drăgulescu, 2011)

13. ***Scirpetum lacustris*** Chouard 1924 (sin. Schoenoplectetum lacustris Eggler 1933): Sibiu-Cristian (C.Drăgulescu, 2011!), Pâr. Strâmb (E.Schneider-Binder, 1974, 1976 sub Scirpo-Phragmitetum, C.Drăgulescu, 2011,!), Turnişor (C.Drăgulescu, 2001,!)
14. ***Typhaetum angustifoliae*** Pignatti 1953 (sin. Typhaetum angustifoliae Soó 1927): Sibiu-Cristian (C.Drăgulescu, 2004,2011,!), Sibiu spre Ocna lg. calea ferată (C.Drăgulescu, 2011,!), Turnişor (C.Drăgulescu, 2004, 2011,!)
15. ***Typhaetum latifoliae*** Lang 1873 (sin. Typhaetum latifoliae Soó 1927): Sibiu-Cristian (C.Drăgulescu, 2011,!), Dumbrava Sibiului (C.Drăgulescu, 2011,!), Pâr. Ruşcior (C.Drăgulescu, 2011,!), Sibiu-Şelimbăr (C.Drăgulescu,2011,!), Turnişor (C.Drăgulescu, 2004, 2011,!)
16. ***Typhaetum laxmannii*** Nedelcu 1969: Turnişor (C.Drăgulescu, 2004, 2011)
17. ***Glycerietum maximae*** Hueck 1931: Sibiu-Bungard (E.Schneider-Binder, 1974), Sibiu-Cristian (E.Schneider-Binder, 1974, 1976, C.Drăgulescu, 2007, 2011,!), Dumbrava Sibiului (C.Drăgulescu, 2011), Lunca Ruşciorului şi Pâr. Strâmb (E.Schneider-Binder, 1970,1974, 1976, C.Drăgulescu, 2011,!), Sibiu inclusiv V. Rogojinii, Calea Nocrichului şi V. Aurie (E.Schneider-Binder, 1974, 1976, C.Drăgulescu, 2004, 2011,!), Sibiu-Şelimbăr (C.Drăgulescu, 2004, 2011,!), Turnişor (E.Schneider-Binder, 1974, C.Drăgulescu, 2011,!)
18. ***Acoretum calami*** Schulz 1941 (sin. Acoretum calami Eggler 1933): Sibiu-Cristian (E.Schneider-Binder, 1974, 1976, C.Drăgulescu, 2004, 2011). Cenoza a dispărut după construirea fermei de păsări.
19. ***Butomo-Alismetum lanceolati*** Segal et Westhoff 1969: Pâr. Strâmb la NV de Sibiu (C.Drăgulescu, 2011)

Oenanthion aquaticae Hejný ex Neuhäusl 1959

20. ***Oenantheto aquaticae-Roripetum amphibiae*** Lohmeyer 1950 (sin. Oenanthetum aquaticae Soó 1927; Eggler 1933): Sibiu-Cristian (C.Drăgulescu, 2004,2011!), Turnişor (C.Drăgulescu, 2004,2011,!)

BOLBOSCHOENETALIA MARITIMIHejny in Holub et al. 1967

Bolboschoenion maritimi Soó (1945) 1947

21. ***Bolboschoenetum maritimi*** Soó (1927) 1957: Sibiu în Lunca Ruşciorului (E.Schneider-Binder, 1974)

NASTURTIO-GLYCERIETALIA Pignati 1953

Sparganio-Glycerion fluitantis Br.-Bl. et Sissingh in Boer 1942

22. ***Glycerietum plicatae*** Kulczynski 1928 (sin. Glycerietum plicatae Oberd. 1954): Sibiu-Cristian (!), Guşteriţa (!), Pâr. Ruşcior (!), Turnişor (!)

23. ***Glycerietum fluitantis*** Eggler 1933 (sin. Glycerio-Sparganietum neglecti Koch 1926, Sparganio-Glycerietum fluitantis Br.-Bl. 1925): Sibiu-Cristian (E.Schneider-Binder 1974,1976,!), Sibiu, inclusiv Şesul Măcelarilor şi Lunca Ruşciorului (E.Schneider-Binder 1974,1976), Turnişor (E.Schneider-Binder 1974,1976)

24. ***Mentho-Beruletum erectae*** Nedelcu 1971: Sibiu-Cristian (!), Turnişor (!)

25. ***Leersietum oryzoidis*** Eggler 1933 (sin. Bidenti-Leersietum (Poli et J. Tx. 1960) Oberd. et al. 1967): Sibiu pe Pâr. Strâmb şi Ruşcioru spre Şura Mică (E.Schneider-Binder 1974,1976)

26. ***Eleocharitetum palustris*** Ubrizsy 1948 (sin. Eleocharitetum palustris Schennikow 1919, Alismato-Eleocharitetum Mathe et Kovács 1967): Sibiu-Cristian (C.Drăgulescu, 2011,!), între Pâr. Ruşciori şi Pâr. Strâmb (C.Drăgulescu, 2011,!), Turnişor (C.Drăgulescu, 2004,2011,!) (asociaţia este inclusă de unii fitocenologi în alianţa Oenanthion aquaticae din ordinul Oenanthetalia aquaticae)

Phalarido-Glycerion Passarge 1964 (Phalaridion arundinaceae Kopeck 1961)

27. ***Phalaridetum arundinaceae***Libbert 1931 (sin. Poo palustris-Phalaridetum arundinaceae Passarge 1955): Sibiu lg. canal paralel cu calea ferată spre Ocna Sibiului (C.Drăgulescu, 2011)

MAGNOCARICETALIA ELATAE Pignati 1953

Magnocaricion elatae Koch 1926

Caricenion rostratae (Bálátová-Tuláčková 1963) Oberd. et al. 1967 (sin. Caricenion appropinquatae Bálátová-Tuláčková 1960)

28. ***Caricetum vesicariae*** Chouard 1924 (sin. Caricetum vesicariaeRübel 1933, Caricetum inflato-vesicariae Koch 1926): Sibiu (E.Schneider-Binder, 1974, 1976, C.Drăgulescu, 2011),

între Sibiu şi Şura Mică pe dreapta drumului spre Ocna Sibiului (E.Schneider-Binder, 1974, C.Drăgulescu, 2011), Turnişor (E.Schneider-Binder, 1974, 1976, C.Drăgulescu, 2011).

Caricenion gracilis (Neuhäusl 1959) Oberd. et al. 1967

29. ***Caricetum acutiformis***Eggler 1933:

- *caricetosum melanostachyae*Soó 1957: Sibiu-Cristian (E.Schneider-Binder, 1974, 1976, C.Drăgulescu, 2011), Pâr. Strâmb-Lunca Ruşciorului (E.Schneider-Binder, 1970,1974, 1976, C.Drăgulescu, 2011);
- *caricetosum ripariae*Soó 1957: (sin. Galio palustris-Caricetum ripariae Bálátová-Tuláčková et al. in Grabherr et Mucina 1993, Caricetum ripariae Soó 1928, Caricetum acutiformis-ripariae Soó 1938): Sibiu- Cristian (E.Schneider-Binder, 1974, 1976, C.Drăgulescu, 2011), Pâr. Strâmb-Lunca Ruşciorului (E.Schneider-Binder, 1970, 1974, 1976, C.Drăgulescu, 2011), Turnişor (E.Schneider-Binder, 1974, C.Drăgulescu, 2011)

30. ***Caricetum gracilis*** Almquist 1929: Cristian în Lunca Mare (E.Schneider-Binder, 1974, C.Drăgulescu, 2011,!), Sibiu în Şesul Măcelarilor şi V. Rogojinii (E.Schneider-Binder, 1974, 1976,C.Drăgulescu, 2004,2011,!), între Sibiu şi Şura Mică, Lunca Ruşciorului şi Câmpul Rezului şi pe Pâr. Strâmb (E.Schneider-Binder, 1970, 1974, 1976, C.Drăgulescu, 2011,!), Turnişor (E.Schneider-Binder, 1974, 1976,C.Drăgulescu, 2011,!)

31. ***Caricetum vulpinae*** Soó 1927: Sibiu-Cristian (E.Schneider-Binder, 1974, 1976, C.Drăgulescu, 2004,2011,!), Lunca Ruşciorului (E.Schneider-Binder, 1976, C.Drăgulescu, 2011), Turnişor (E.Schneider-Binder, 1974, 1976, C.Drăgulescu, 2004,2011,!), Sibiu (E.Schneider-Binder, 1974, 1976,C.Drăgulescu, 2011,!) în Şesul Măcelarilor (C.Drăgulescu, 2011)

32. ***Poëtum palustris*** Resmeriţă et Raţiu 1974: Turnişor (C.Drăgulescu, 2011,!), Lunca Pâr. Ruşciori între Sibiu şi Şura Mică (C.Drăgulescu, 2011,!)

Pasture vegetation

MOLINIO-ARRHENATHERETEAR. Tx. 1937

MOLINIETALIA W. Koch 1926

Filipendulion Lohmeyer in Oberd. et al. 1967

33. ***Filipendulo-Geranietum palustris*** Koch 1926 : Dumbrava Sibiului (!), Pâr. Ruşcior (!)

Calthion palustris Tx. 1936 em. Oberd. 1957

34. ***Calthaetum laetae*** Krajina 1933: Sibiu –Parcul Arinilor (!)

35. ***Scirpetum silvatici*** Schwick 1944: Sibiu- Cristian (!), Sibiu (!)

36. ***Angelico-Cirsietum oleracei*** R. Tx. 1937: Lunca Ruşciorului (!)

Agrostion stoloniferae Soó (1943) 1971

37. ***Agrostetum stoloniferae*** (Ujvárosi 1941) Burduja et al. 1956: Lunca Rusciorului (E.Schneider-Binder, 1976), între Ruşciori şi Sibiu lângă Calea Şurei Mici (!), Sibiu (C.Drăgulescu, 2004) şi în V. Aurie (!), Turnişor (E.Schneider-Binder, 1976,!)

38. ***Festucetum pratensis*** Soó (1938) 1955 (sin. Agrostideto-Festucetum pratensis Soó 1949): Cristian (!), Sibiu (C.Drăgulescu, 2004,!), Sibiu-Şura Mică (E.Schneider-Binder, 1976,!), Lunca Ruşciorului (E.Schneider-Binder, 1974, 1976), Viile Sibiului (E.Schneider-Binder, 1974)

39. ***Alopecuretum pratensis*** Regel 1925, Nowinski 1928 (sin. Ranunculo repenti-Alopecuretum Ellmauer et Mucina 1993): Lunca Ruşciorului (E.Schneider-Binder, 1974, 1976), Pâr. Ruşcior (E.Schneider-Binder, 1974, 1976,!), Sibiu inclusiv Şesul Măcelarilor (E.Schneider-Binder, 1974, 1976,!), Şura Mică (!), Turnişor (E.Schneider-Binder, 1974, C.Drăgulescu, 2004);

- *caricetosum melanostachyae*Soó 1947: Lunca Ruşciorului lângă Sibiu (E.Schneider-Binder, 1974,1976);
- *plantaginetosum maximae* Markov 1938 em. E.Schneider-Binder 1970: Lunca Ruşciorului lângă Sibiu (E.Schneider-Binder, 1974, 1976);

ARRHENATHERETALIA Pawl. 1928

Arrhenatherion elatioris (Br.-Bl. 1925) W. Koch 1926

40. ***Arrhenatheretum elatioris*** Br.-Bl. ex Scherrer 1925: Lunca Ruşciorului (E.Schneider-Binder, 1974, 1976), Pâr. Ruşcior (!), de-a lungul căii ferate Sibiu-Ocna Sibiului (C.Drăgulescu, 2004,!), Sibiu spre Daia (!), Şelimbăr (E.Schneider-Binder, 1974, 1976,!), Şura Mare (!)

41. ***Poëtum pratensis*** Răvăruţ et al. 1956 (sin. Trifolio-Poëtum pratensis (Răvăruţ et al. 1956), Resmeriţă1975):Sibiu-Cristian (!)

Cynosurion cristati Br.-Bl. et Tx. 1943

42. ***Anthoxantho-Agrostietum capillaris*** Sillinger 1933: între Ruşciori şi Sibiu lângă Calea Şurei Mici (!)

43. ***Lolio-Cynosuretum*** Br.-Bl. et de Leeuw 1936 em. R. Tüxen 1937: Sibiu-Turnişor, în lunca Cibinului (!)

44. ***Festuco rubrae-Agrostietum capillaris*** Horvat 1951, Csűrös-Káptalan 1964: lângă Păd. Catrina (E.Schneider-Binder, 1974), Turnişor (E.Schneider-Binder, 1974), V. Guşteriţei (E.Schneider-Binder, 1974), V. Sevişului (E.Schneider-Binder, 1974)

45. *Agrostio-Festucetum rupicolae* Csűrös-Káptalan (1962) 1964): Guşterita (E.Schneider-Binder, 1974, 1976,!), Pâr. Ruşcioru (!), Sibiu (E.Schneider-Binder, 1974,1976), Turnişor (E.Schneider-Binder, 1976) (asociaţia este inclusă de unii fitocenologi laclasa Festuco-Brometea, ordinul Festucetalia valesiacae, alianţa Festucion valesiacae)

POTENTILLO-POLYGONETALIA R. Tx. 1947

Potentillion anserinae R. Tx. 1937

46. ***Potentilletum anserinae*** Felföldy 1942: Turnişor (!)

47. ***Ranunculetum repentis*** Knapp ex. Oberdorfer 1957:Sibiu (!),Turnişor (!)

Juncenion effusi Westhoff et van Leeuwen ex Hejny et al. 1979

48. ***Juncetum effusi*** (Eggler 1933) Soó 1949: Sibiu-Cristian (E.Schneider-Binder, 1974, 1976,!), Guşteriţa (!), Sibiu (!), Turnişor (!)

49. ***Junco inflexi-Menthetum longifoliae*** Lohm. 1953: Pâr. Ruşcior (!), Sibiu (!), Turnişor (!)

50. ***Holcetum lanati*** Issler 1936 em. Passarge 1964: Sibiu (C.Drăgulescu, 2004, !), V. Sevişului (!)

DESCHAMPSIETALIA CAESPITOSAEHorvatič 1956

Deschampsion caespitosae (Horvatič 1930) Soó 1971

51. ***Agrostio-Deschampsietum caespitosae*** Ujvarosi 1947: Bungard (E.Schneider-Binder, 1974, 1976), Şura Mică în Lunca Ruşciorului (E.Schneider-Binder, 1974, 1976), Turnişor (!);

- *caricetosum paniceae*Horvatić 1930: Lunca Ruşciorului (E.Schneider-Binder, 1974, 1976)

FESTUCO-BROMETEA Br.-Bl. etTx. 1943

FESTUCETALIA VALESIACAE Br.-Bl. et Tx. 1943

Festucion valesiacae Klika 1931 (Festucion rupicolae Soó (1940) 1964)

52. ***Festucetum valesiacae-rupicolae*** Csűrös et Kovacs 1962 (sin. Onobrycheto-Festucetum valesiacae-rupicolae Resmeriţă 1971): Ruşciori (E.Schneider-Binder, 1974, 1976), Sibiu în Ţiglari (E.Schneider-Binder, 1974, 1975, 1976), Turnişor (E.Schneider-Binder, 1974, 1975, 1976), Viile Sibiului (E.Schneider-Binder, 1974, 1975, 1976)

53. ***Botriochloetum ischaemi*** (Kristiansen 1937) Pop 1977: Dumbrava Sibiului (!), Guşteriţa (E.Schneider-Binder, 1974, 1976)

54. ***Stipetum capillatae***(Hueck 1931) Krausch 1961: Guşteriţa (E.Schneider-Binder, 1974, 1976)

Danthonio-Stipion stenophyllae Soó 1947

55. ***Stipetum stenophyllae*** Soó 1949: Guşteriţa (E.Schneider-Binder, 1974, 1976)

Stipion lessingianae Soó 1947

56. ***Stipetum pulcherrimae*** Soó 1942: Guşteriţa (E.Schneider-Binder, 1974, 1975, 1976)

BROMETALIA ERECTI Br.-Bl. 1931

Cirsio-Brachypodion Hadač et Klika 1944. em. M. Krausch 1961

57. ***Carici humilis -Brachypodietum pinnati*** Soó (1942) 1947

- *astragal(et)osum onobrychis*E. Schneider-B. 1971: Guşteriţa (E.Schneider-Binder, 1971,1974, 1976);
- *centaur(et)osum atropurpureae* Borza 1959: V. Guşteriţei (E.Schneider-Binder, 1974, 1976)

BRACHYPODIO-CHRYSOPOGONETALIA (Horvatic 1958) Boşcaiu 1972

Danthonio-Brachypodion Boşcaiu 1970

58. ***Festuco rupicolae-Danthonietum provincialis*** Csűrös et al. 1961: Dumbrava Sibiului-Seviş (E.Schneider-Binder, 1971, 1974, 1976)

Segetal and ruderal vegetation

STELLARIETEA MEDIAE R. Tx. et al. ex von Rochow 1951

CENTAURETALIA CYANI R. Tx., Lohm. et Preising in R. Tx. 1950

Caucalidion lappulae (R. Tx. 1950) von Rochow 1951

59. ***Adonieto-Delphinietum*** Br.-Bl. 1970: între Sibiu şi Guşteriţa (!)

Panico-Setarion Sissingh. in Westhoff et al. 1946

60. ***Echinochloo-Setarietum pumilae*** Felföldy 1942 em. Mucina 1993: Sibiu (!)

CHENOPODIETALIA ALBI R. Tx. (1937) 1950

Scleranthion annui (Kruseman et Vlieger 1939) Sissingh. in Westhoff et al. 1946

61. ***Spergulo-Aperetum spicae-venti*** Soó (1953) 191962: Sibiu între calea ferată şi Şura Mare (!), Turnişor (E.Schneider-Binder, 1974, 1976,!)

ERAGROSTIETALIA J. Tx. 1961 ex Poli 1966

Amarantho-Chenopodion albi Morariu 1943

62. ***Amarantho-Chenopodietum albi*** Morariu 1943: Sibiu spre Turnişor (!)

63. ***Xanthietum spinosi*** Felföldy 1942: Turnişor (!)

SISYMBRIETALIA J. Tx. in lohm. Et al. 1962

Sisymbrion officinalis Tx., Lohn. et Prsg. In R. Tx. 1950

64. ***Hordeetum murini*** Libbert 1932 em. Passarge 1964: Guşteriţa (E.Schneider-Binder, 1974,!), Sibiu (E.Schneider-Binder, 1974,!), Turnişor (E.Schneider-Binder, 1974,!)

65. ***Atriplicetum tataricae***(Borza 1926) Ubrizsy 1949: Sibiu (!), Şura Mică (!)

66. ***Malvetum pusillae*** Morariu 1943: Sibiu (!)

67. ***Capsello-Descurainetum sophiae*** Mucina 1993: Guşteriţa (!), Pâr. Ruşcior (!), Sibiu (!)

PLANTAGINETEA MAJORIS Tx. et Prsg. 1950

PLANTAGINETALIA MAJORIS R. Tx. et Prsg. in R. Tx. 1950

Lolio-Plantagion R. Tx. 1947

68. ***Lolio-Plantaginetum*** (Linkola 1921) Beger 1930 em. Sissingh 1969: Sibiu spre Şelimbăr (!)

69. ***Poëtum annuae*** Gams 1927 (sin. Sclerochloo-Polygonetum avicularis (Gams 1927) Soo 1940: Sibiu (!)

70. ***Polygonetum avicularis*** Gams 1927: Sibiu (!), Şelimbăr (!), Turnişor (!)

ARTEMISIETEA Lohm., Prsg. et Tx. 1950

ONOPORDETALIA Br.-Bl. et Tx. 1943 em. Görs 1966

Onopordion acanthii Br.-Bl. 1926

71. ***Onopordetum acanthii*** Br.-Bl. et al. 1936: Sibiu spre Şelimbăr (!), Turnişor (E.Schneider-Binder, 1974, 1976,!)

72. ***Carduetum acanthoidis*** Felföldy 1942: Guşteriţa (!), Sibiu (!)

Brachyaction ciliatae I. Pop et Viţalariu 1971

73. ***Ambrosietum artemisiifoliae*** Viţalariu 1973: Sibiu-gară (!), Halta Turnişor (!)

Tussilaginion (Szabo 1971 n.n.) Popescu et Sanda 1988

74. ***Tussilaginetum farfarae*** Oberd. 1949: Guşteriţa (!), Pâr. Ruşcioru (!), Sibiu (!), Turnişor (!)

Arction lappae Tx. 1937 em. Siss. 1946

75. ***Arctietum lappae*** Felföldy 1942 (sin. Arctio-Ballotetum nigrae (Felföldy 1942) Morariu 1943: Sibiu (!), Turnişor (!)

76. ***Tanaceto -Artemisietum vulgaris*** Sissingh 1950: Guşteriţa (!), Sibiu (!), Turnişor (!)

77. ***Conietum maculati*** I. Pop 1968 : Pâr. Ruşcior (!), Sibiu (!)

78. ***Artemisietum annuae*** Morariu 1943 em. Dihoru 1970 : între Ruşciori şi Sibiu lângă Calea Şurei Mici (!), Sibiu (!), Turnişor (!)

79. ***Helianthetum tuberosi*** (Moor 1958) Oberdorfer 1967: Sibiu-Guşteriţa pe malul Cibinului (!)

AGROPYRETALIA REPENTIS Oberdorfer et al. 1967

Convolvulo arvensi-Agropyrion repentis Görs 1966

80. ***Convolvulo - Agropyretum repentis*** Felföldy 1943: între Sibiu şi turnişor (!)

81. ***Lepidietum drabae*** Timár 1950**:** Guşteriţa (!), Sibiu (!)

82. ***Polygono avicularis-Amaranthetum crispi*** Vicol , Schneider-B., Tauber 1971: Sibiu pe Calea Poplăcii (!)

GALIO-URTICETEA Passarge 1967 em. Kopecky 1969

LAMIO ALBI-CHENOPODIETALIA BONI-HENRICI Kopecky 1969

Galio-Alliarion Lohm. Et Oberd. 1967

83. ***Sambucetum ebuli*** Felföldy 1942: Guşteriţa şi Turnişor (E.Schneider-Binder, 1974, 1976,!)

Aegopodion podagrariae R. Tx. 1967

84. ***Urtico –Aegopodietum*** R. Tx. et Görs 1963: Sibiu pe malul Cibinului(!)

CONVOLVULETALIA SEPIUM R. Tx. 1930 em. Mucina 1993

Senecion fluviatilis R. Tx. 1952

85. ***Astero -Rubietum caesii*** Kárpáti 1962: Guşteriţa (!), Pâr. Ruşcioru (!), Turnişor (!)

86. ***Helianthetum decapetali*** Morariu 1967:între Ruşciori şi Sibiu pe Calea Şurei Mici (!),Turnişor (!)

87. ***Polygonetum cuspidati*** R. Tüxen et Raabe 1950 apud Oberdorfer 1967:Sibiu (1981,!), Turnişor (!)

88. ***Rorippetum austriacae*** Oberd. 1957:Sibiu, loc viran în oraş (!)

BIDENTETEA TRIPARTITI Tx., Lohm. et Prsg. 1950

BIDENTETALIA TRIPARTITI Nordh. 1940

Bidention tripartiti Nordh. 1940

89. ***Bidenti-Polygonetum hydropiperis*** Lohmeyer in R. Tüxen 1950 (sin. Bidentetum tripartiti W. Koch 1926, Polygono hydropiperi-Bidentetum): Sibiu (E.Schneider-Binder, 1974, 1976,!), Sibiu în Lunca Ruşciorului şi Pâr. Strâmb (E.Schneider-Binder, 1974, 1976) şi în V. Aurie (!),Turnişor (!)

90. ***Xanthietum italici***Morariu 1943: Sibiu în V. Aurie (!)

Woodland vegetation

QUERCO-FAGETEA Br.-Bl. et Vlieger 1937 em. Soó 1964

FAGETALIA SILVATICAE (Pawl. 1928) Tx. et Diem. 1936

Alno-Padion Knapp 1942 em. Medwecka-Kornaš 1957, 1959

91. ***Aegopodio podagrariae-Alnetum glutinosae*** Kárpáti et Jurko 1964 (sin. Stellario nemori-Alnetum glutinosae (Kästner 1938) Lohmeyer 1957): Sibiu inclusiv Dumbrava (E.Schneider-Binder, 1974, 1976, !)

QUERCETALIA ROBORI-PETRAEAE Tx. 1931

Carpinion betuli (Issler 1931 p.p.) Soó 1962

92. ***Carpino-Quercetum petraeae*** Borza 1941 (sin. Querco petraeae-Carpinetum Soó et Pócs 1957): Păd. Catrinei-Cisnădioara (E.Schneider-Binder, 1973, 1974, 1976), Păd. Dumbrava Mică (E.Schneider-Binder, 1973, 1974, 1976)

93. ***Quercetum robori-petraeae*** Borza (1928) 1959: Guşteriţa (E.Schneider-Binder, 1974, 1976)

94. ***Querco robori-Carpinetum*** Borza 1937:Păd. Catrinei (E.Schneider-Binder, 1974, 1976), Păd. Dumbrava-Sibiu (E.Schneider-Binder, 1973, 1974, 1976,!)

Veronico officinalis-Quercion I. Pop 1971

95. ***Luzulo luzuloidis-Quercetum petraeae*** Hilitzer 1932, Passarge 1953 em. R. et Z. Neuhäusl 1967 (sin. Genisto tinctoriae-Quercetum petraeae Klika 1932): Sibiu-Cristian (E.Schneider-Binder, 1974), Sibiu (E.Schneider-Binder, 1973, 1974, 1976)

RHAMNO-PRUNETEA Rivas Goday et Borja Carbonell 1961

PRUNETALIA R. Tx. 1952

Prunion spinosae Soó (1930) 1940

96. ***Pruno spinosae-Crataegetum*** (Soó 1927) Hueck 1931: Guşteriţa (E.Schneider-Binder, 1974, 1976,!), Sibiu (E.Schneider-Binder, 1974, 1976,!), (346,920,980,!), Turnişor (E.Schneider-Binder, 1974, 1976,!)

Prunion fruticosae R. Tx. 1952

97. ***Prunetum tenellae*** Soó (1946) 1959 (sin. Prunetum nanae Borza 1931 n.n., Amygdaletum nanae): Guşteriţa (E.Schneider-Binder, 1974, 1976)

98. ***Crataego-Prunetum fruticosae***Soó (1927 p.p.) 1947, 1951: Guşteriţa (E.Schneider-Binder, 1974)

SALICETEA PURPUREAE Moor 1958

SALICETALIA PURPUREAE Moor 1958

Salicion albae Soó (1930) Müller et Görs 1958

99. ***Salicetum albae*** Issler 1924 (Salicetum albae-fragilis Issler 1926 em. Soó 1957): Guşteriţa (E.Schneider-Binder, 1974,!), Sibiu (!), Turnişor (!), V. Sevişului (E.Schneider-Binder, 1974)

Salicion triandrae Müller et Görs 1958

100.*Salicetum triandrae* Malcuit 1929: Sibiu (!)

101.*Saponario-Salicetum purpureae* (Br.-Bl. 1930) Tschou 1946:Sibiu (!), Turnişor (!)

Acoretum calami associations disappeared.

Very rare associations are groups Adonieto-Delphinietum, Crataego-Prunetum fruticosae, Prunetum tenellae, Stipetum capillatae, Stipetum pulcherrimae, Stipetum stenophyllae.

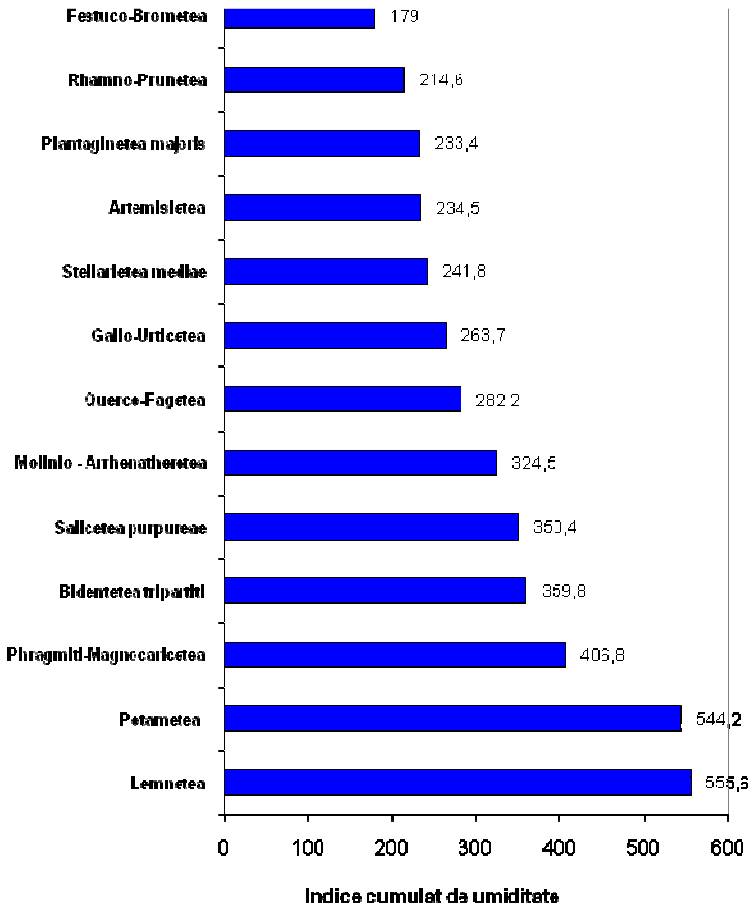

Fig. 6 Ordering studied vegetation classes based on cumulative moisture index value (ICU)

Throughout the moisture gradient are two classes have phytocoenosis aquatic vegetation, a strong hydrophilic character starring Lemnetea. Among the driest wood phytocoenosis are hedges, and at the end of the interval are positioned dry grasslands.

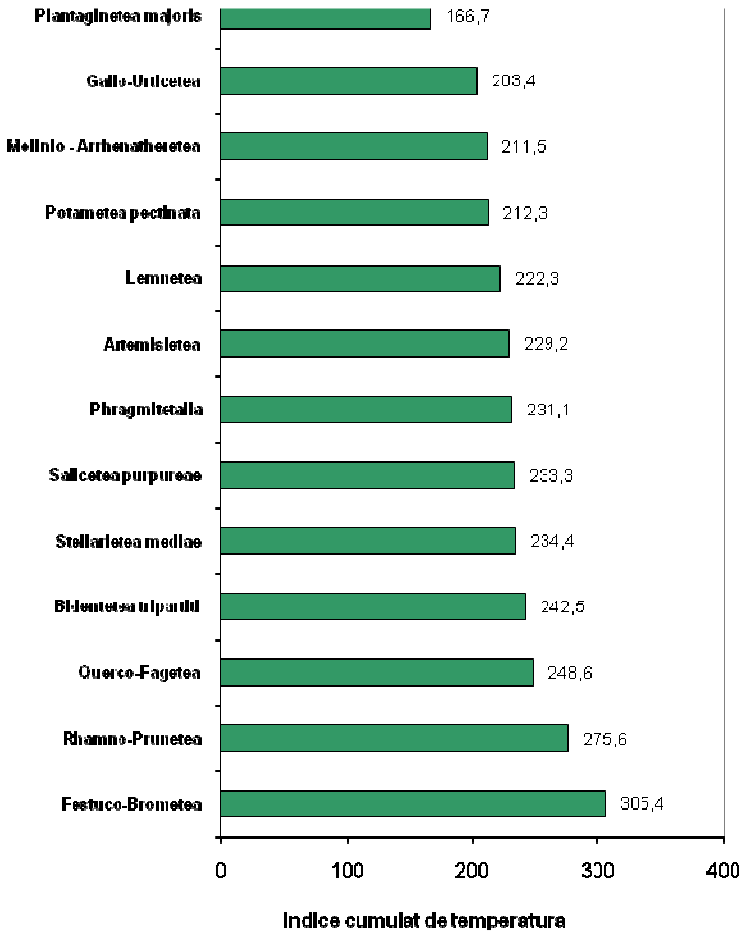

Fig.7 Ordering vegetation classes studied by cumulative index value of temperature (ITU).

Along the temperature gradient thermophilic position is occupied by grasslands xerofile Festuco-Brometea class, followed by woody vegetation classes (fig. 7). Aquatic vegetation classes are located in the second half of the variation, the extreme position being occupied by weeds on compacted soils. In general preferences for low moisture associated with preference to the heat, but there are exceptions, as in the case of class Plantaginetea Majoris.

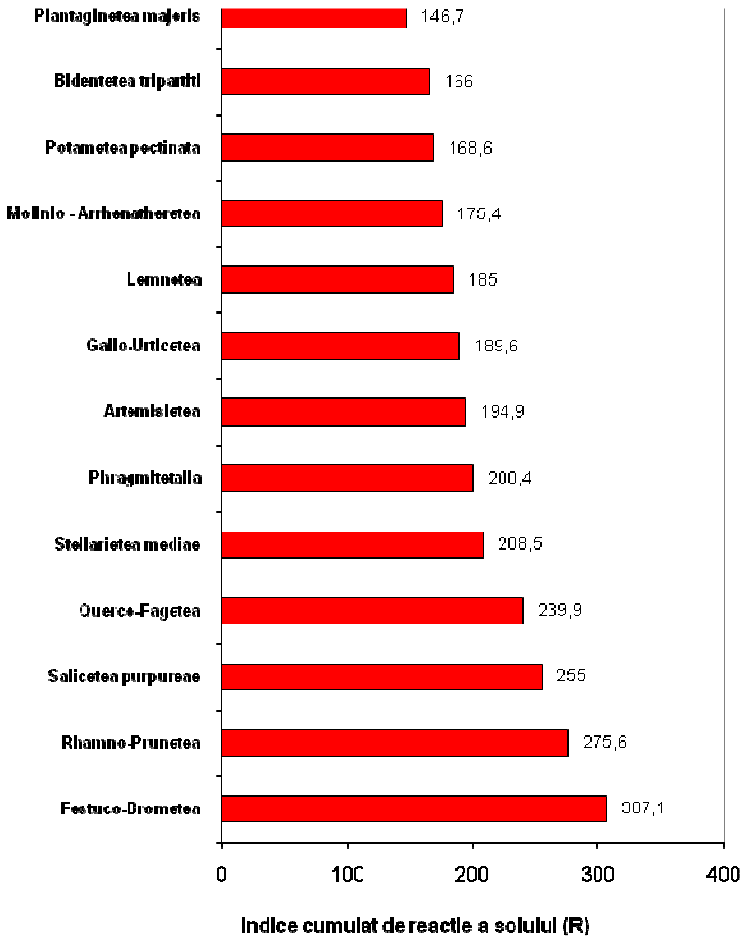

Fig.8 Ordering vegetation classes studied by cumulative index value of soil reaction (IRU).

The reaction of the soil along the gradient of the extreme positions is occupied by the same class, that is Festuco-Brometea neutral or slightly acidic to water and acid soils Plantaginetea Majoris (Fig. 9). Among these associations prefer a lower pH water while wood phytocoenosis have weak acidic or neutral preferences. In this case, high humidity is associated with low pH and vice versa, with some exceptions. Meadows, although it is characterized by a high humidity receive a rich alien material so that the pH is increased.

CONCLUSIONS

The results of my research over the past 17 years is reflected in the following:

– in Sibiu municipality and suburban areas have been identified, based on field observations and literature, 1453 chormophyte species belonging to 119 families;

– a total of 102 species mentioned in the literature have not been found again, representing 7.02% of the total species recorded by botanists in more than 200 years of floristic research;

– my investigations complete the floristic inventory drawn up during the years 1960-80 by Mrs. Erika Schneider- Binder, with 19 species, most of them adventive;

– as the area has been well studied both in the nineteenth century and the twentieth century, thus my main concern was not the identification of new species and associations, but the emphasys of qualitative changes and transformations of the phytocenosis, their degradation by erosion, drainage, exploitation of natural resources. Phytogeographically important plant species were replace with others, especially adventive species, some of them invasive;

– areas where the probability of discovering new species within the study area is highest, are networks of railways, road communication routes;

– flora from Sibiu and suburban area has a xero - mesophilic to mesophilic character, mesothermal, low acid- neutrophilic , with a high percentage of euryionic plants. In the studied area prevail the heliophilic species, with a relatively balanced distribution of categories of preference for the amount of nitrogen in the soil (with more indifferent species and plants on soils low in nitrogen);

– hemicryptophytes and terrophytes make a total of 74.09 %, in line with continental climate and severe antrophic impact in the researched territory;

– altitude and aridity index (KA1 = 75.86) and botanical index of aridity (Iba = 58.87) indicates values of predicted altitude of 200-300 m, below the actual altitude of Sibiu (450 m), which is interpreted as an increase aridisation correlated with urbanization and increase in antrophic impact in the investigated area;

– in recent years there have been major changes in the proportion of natural and human ecosystems through territorial expansion of Sibiu, by creating new infrastructure, the mining of

construction materials (Gusterita Hill and Cibinului meadow), by the draining actions taken (Valea Aurie = Golden Valley, Cibinului meadow);

– the vegetation from the territory under study is characterized by great diversity, being identified 101 plant associations;

– among the vegetation classes present in the study area the highest diversity in terms of identified species was Querco - Fagetea. In the survey plots from the phytocoenosis belonging to this class, there were identified in total 230 species. In coenotaxonomic terms the most diverse class is Phragmiti - Magnocaricetea, that lists 21 identified plant associations;

– the aquatic vegetation is represented by two classes, Lemnetea and Potamogetonetea. The phytodiversity is higher in the second. It increases with the surface of the water table and plant age groups;

– aquatic coenosis have greatly reduced their area. In the eighteenth and nineteenth centuries they formed a belt of several tens of hectares around the city of Sibiu, while today they account for one hectare (in dry years), up to two (in the rainy years);

– the ecological structure (in terms UTR spectrum, spectrum of light, nitrogen and bioforms) and the phytogeographical structure of the phytocoenosis are similar within the two classes. The ecological structure is dominated by helohydrophytes and the geographic structure is dominated by species with large ranges (circumpolar and cosmopolitan);

– the paludous vegetation is represented by phytocoenosis belonging to a single class, namely Phragmiti - Magnocaricetea. It has a small ratio in the whole and semi-natural vegetation in the investigated area, a consequence of the fact that there are few lakes, ponds and swamps and reduced in size. Compared to half a century ago, some plant groups disappeared due to the drainage of drained, but some new ones appeared. Because drainage one of the plant associations (Acoretum calamities) disappeared, others have more restricted surfaces. A ban on drainage and drainage of swamps that preserve rare species such as *Carex appropinquata, Carex melanostachya, Peucedanum palustre, Iris sibirica, Orchis incarnata, Orchis laxiflora ssp. elegans* and others should be imposed;

– the ecological structure of swamp phytocoenoses is characterized by reduction of helohydrophytes ratio, which involves the changing of moisture curve with the maximum left. the number of phytogeographic elements is greater compared to the water phytocoenoses , increasing the share of items with limited distribution;

– the diversity of phytogeographic elements and the fact that there are present all the categories of preference to the soil concentration of nitrogen is in part a result of the high specific diversity of the phytocoenosis from this class (142 species were identified) and in part of the fact that the environment which they occupy presents a sort of ecotone nature;

– Sibiu suburban meadows are used for grazing (mostly) and hayfields. Depending on soil moisture regime the meadows around Sibiu are grouped in hygro - mesophilic and mesophilic meadows, classified as Arrhenatheretea Molinio class and xerophilic meadows of Festuco - Brometea class;

– the ecological structures of the phytocoenoses from the two classes differ mainly by moisture preferences. The vegetation in the class Festuco - Brometea is characterized by the lowest moisture preferences, the highest temperature, and highest pH values;

– weed communities are well represented in the study area, due to strong anthropogenic impact manifested by human activity. They belong to two groups: segetal and ruderal . In the first category are classified the phytocenosis belonging to class Stellarietea mediae, while ruderal weed phytocenosis are grouped into four classes: Plantaginetea majoris, Artemisietea, Galio-Urticetea and Bidentetea tripartiti. In general weed phytocenosis have low species diversity and their phytogeographical structure is characterized by the high ratio of adventive species;

– the woody vegetation includes forests classified as Querco - Fagetea vegetation class, shrubs Rhamno - Prunetea class, and riverside forests - Salicetea purpurea. Species diversity is high, especially in the forest, where we have both a complex and varied arboreal and shrub layer, and a diverse grass layer. Especially in the shrubs the herbaceous species are characteristic for Festuco - Brometea class;

– the willow coppices in the study area suffered greatly in recent years in the sense that most of *Salix* specimens were cut or burned. In some places the banks were concreted, which involved removing the willows. It also noted the proliferation, both in number of species, and especially in the coverage of adventive invasive species such as *Rudbeckia laciniata, Echinocystis lobata, Solidago canadensis* or *Impatiens glandulifera*.

Major changes that have led to changes in flora and vegetation

- Drainage of Rusciorului floodplain resulted in the disappearance or reduction of the surface occupied by hydrophilic coenosis. The biggest loss is the disappearance of the *Plantago maxima* population, the only one in Romania. Draining works around Sibiu, executed in the last 50 years have led to the disappearance of more than 70 % of aquatic vegetation and swamp.

- Transformation of Butchers Plain (Fleischerwiese), a mesophilic and hygro - mesophilic meadow, in vegetable gardens. This meant the loss of the meadow with the highest phytodiversity around Sibiu and the only *Fritillaria meleagris* population. From the same place disappeared also *Hottonia palustris*. Hectars of meadows were turned into cultivated fields or became urban areas, with the extension of Sibiu. Dozens of species of plants have disappeared together with the grasslands where they once grew.

- Planting the Guşteriţei Hill with *Larix decidua* and other forest species for southern slope stabilization resulted in the loss of the "island of steppe", a true "botanical garden" (F. Schur, 1866).

- Degradation of Cibinului floodplain between Sibiu and Turnişor by depositing debris on several acres and building a motorcycle track. Plant species characteristic for meadows and coppices were lost.

- Great meadow with daffodils (*Narcissus radiiflorus*) from Dumbrava Sibiului (the Narcissus herbarium contains sheets with plants collected from this place between 1790 to 1908) disappeared under the influence of natural factors, namely the stand development that resulted in the groundwater lowering.

BIBLIOGRAPHY (selection)

1. Anastasiu, Paulina, Negrean, G., 2007, *Invadatori vegetali în România*, Ed. Univ. din Buc., Bucureşti.
2. Badea, L., Caloianu, N., Dragu, Gh., 1971, *Judeţul Sibiu*, Ed. Acad. Bucureşti
3. Baumgarten, J.Ch.G., 1816, *Enumeratio stirpum Magno transsilvaniae principatui praeprimis indigenarum in usum nostrarum botaniphilorum conscripta inque ordinem sexuali- naturalem concinnata,* I-III, Vindobonae (incl. IV, 1840 Sibiu auct. M. Fuss)
4. Berbecel, O., Stancu, M., coord., 1970, *Agrometeorologie*, Ed. Ceres, Bucureşti.
5. Borza, Al., 1947, 1949, *Conspectus Florae Romaniae regionumque affinium*, I-II, Cluj
6. Borza, Al., Boşcaiu, N., 1965, *Introducere în studiul covorului vegetal*. Ed. Acad., Bucureşti.
7. Boşcaiu,N., Coldea, Gh., Horeanu, C., 1994, Lista roşie a plantelor vasculare dispărute, periclitate, vulnerabile şi rare din flora României, *Ocrot. nat. med. înconj*., Bucureşti, 38, 1:45-56.
8. Bucşa, C., Costea Marioara, (edit.), 2011, *Repere ecologice*, Ed. Univ. „Lucian Blaga", Sibiu.
9. Ciobanu, Rodica, 2002, *Depresiunea Sibiului. Studiu geologic,* Ed. Univ. „Lucian Blaga", Sibiu.
10. Ciocârlan, V., 2009, *Flora ilustrată a României. Pteridophyta şi Spermatophyta*, Edit. Ceres, Bucureşti.
11. Ciulache, S., 1997, *Clima Depresiunii Sibiului*, Ed. Univ. din Buc, Bucureşti.
12. Chifu, T., Mânzu, C., Zamfirescu, Oana, 2006*, Flora şi vegetaţia Moldovei (România), I. Flora*, *II. Vegetaţia*, Ed. Univ. „Alexandru Ioan Cuza", Iaşi.
13. Coldea, Gh., 1996, Contribuţii la studiul vegetaţiei României (I), *Contrib. Bot*., Cluj-Napoca: 1-8.
14. Costea, Sanda, 2002, Unele corelaţii geografice în Depresiunea Sibiului, *Geo-Carpathica*, Univ. Creştină „Dimitrie Cantemir" Fac. Geogr. Turism., Sibiu, anul II, nr. 2: 191-196.
15. Crăcea, T., 2008, *Dinamica peisajului geografic reflectetă în documentele cartografice în Depresiunea Sibiului,* Ed. Univ. „Lucian Blaga", Sibiu.
16. Crăcea, T., Crăcea, A., 2010, Depresiunea Sibiului. Evoluţia arealelor forestiere începând cu a doua jumătate a secolului al XVIII-lea, *Geo-Carpathica*, Univ. Creştină „Dimitrie Cantemir" Fac. Geogr. Turism. Sibiu, anul X, nr. 10: 141-152.
17. Crăciunaş, M., 2004, Studiu ecologic al cormofitelor municipiului Sibiu şi zonei suburbane, *St. şi com*. Muz. Brukenthal Sibiu, *Şt. nat*., 29: 55-71.
18. Crăciunaş, N., Crăciunaş, M., 2006, Contribution to the phytocoenologic and floristic study from the lawns of the outdoor „Astra" Museum of Sibiu, *Brukenthal Acta musei I.3,* Sibiu/Hermannstadt: 71-77
19. Cristea, V., 1991, *Fitocenologie şi vegetaţia României, îndrumător de lucrări practice*, litografiat, Univ. "Babeş Bolyai", Cluj Napoca.
20. Cristea, V., Baciu, C., Gafta, D. (edit.), *Municipiul Cluj-Napoca şi zona periurbană – Studii ambientale*, Ed. Accent, Cluj-Napoca.
21. Cristea, V., Gafta, D., Pedrotti, F., 2004, *Fitosociologie*, Ed. Presa Universitară Clujeană, Cluj-Napoca.

22. Curtean-Bănăduc, Angela, 2005, *Râul Cibin – caracterizare ecologică*, Ed. Univ. „Lucian Blaga", Sibiu.
23. Dihoru, Gh., Dihoru, A., 1994, Plante rare, periclitate şi endemice în flora României - Lista roşie, *Act. Bot. Hort. Buc*.:173-197
24. Dihoru, Gh., Negrean, G., 2009, *Cartea roşie a plantelor vasculare din România*, Ed. Acad. Rom. , Bucureşti.
25. Doltu, M.I., Schneider-Binder, Erika, 1970, Plante colectate şi prelucrate de Ferdinand Schur aflate în colecţia de herbarii a Muzeului Brukenthal, *St. şi com*. Muz. Brukenthal Sibiu, *Şt. nat*., 15, 215-262
26. Drăgulescu, C., 1978, Originea şi corologia speciei Narcissus poeticus L. s.l., *St. şi com*. Muz. Brukenthal Sibiu, *Şt. nat*., 22, 105-128
27. Drăgulescu, C., 1987, Die Coenologie der Narzisse (Narcissus poeticus L. subsp. stellaris (Haw.) Dost.) in den Karpaten im Vergleich zu ihrer Vergesellschaftung in anderen Teilen Europas, *Tuexenia*, NS, 7, Göttingen: 233-243
28. Drăgulescu, C., 1996, Die rote Liste der Kormophyten im Hermanstadter Kreis (Siebenburgen), *Staphia*, Linz, 45: 171-180
29. Drăgulescu, C. (coord.), 1996, *Arii naturale protejate în judeţul Sibiu*. Ed. Constant, Sibiu
30. Drăgulescu, C., Sârbu, I., 1997, *Practicum de fitocenologie*, Univ. „Lucian Blaga" Sibiu.
31. Drăgulescu, C., 2000, Phytogeographische Untersuchungen der Flora im Kreis Hermannstadt, Naturw. Forsch. u. Siebenburg., VI, *Bohlau Verlag* Koln-Weimar-Wien: 37-41
32. Drăgulescu, C., 2000, Specii rare şi dispărute din flora Transilvaniei meridionale, *Lucr. Celei de a 5 –a Conferinţe naţionale pentru protecţia mediului*, Braşov, 52-54
33. Drăgulescu, C., 2001, Bibliografia botanică a judeţului Sibiu, *Acta oecologia,* Sibiu, VIII, 1-2: 35-84
34. Drăgulescu, C., 2003, *Cormoflora judeţului Sibiu*, Edit. Pelecanus, Braşov
35. Drăgulescu, C., 2004a, The vegetation of the Cibin Valley (Southern Transylvania), *Kanitzia,* Szombathely, 12: 25-42
36. Drăgulescu, C., 2004c, Uncertain species in the cormoflora from Sibiu county*, Contrib. Bot*. Cluj-Napoca, XXXIX: 13-19
37. Drăgulescu, C., 2004d, Analiza comparativă a florei judeţului Sibiu şi a României, *St. şi com*. Muz. Brukenthal Sibiu, *Şt. nat.*, 29: 73-83
38. Drăgulescu, C.,Rösler, R., 2005, Zur Chorologie der Orchideen des Regierungsbezirkes Sibiu (Hermannstadt) in Siebenbürgen (Rumänien), *Journal Europäischer Orchideen*, Stuttgart, 37, 3: 651-703.
39. Drăgulescu, C., 2007a, Some reflections on the phytodiversity of the former daffodil (Narcissus radiiflorus) field of Dumbrava Sibiului, *Studii şi cercetări*, *Biology*, 12, Complexul muzeal Bistriţa-Năsăud, Bistriţa: 55-58
40. Drăgulescu, C., 2007b, Contributions to the knowledge of Sibiu County's aquatic vegetation, *Acta oecologica* XIV, 1-2, Sibiu: 25-40
41. Drăgulescu, C., 2009, Date corologice spaţiale şi temporale referitoare la plantele adventive din judeţul Sibiu, în: Rakosy, L., Momeu, Laura (edit.), 2009, *Neobiota din Romania*, Presa Universitară Clujană, Cluj-Napoca: 34-49

42. Drăgulescu, C., 2010a, *Cormoflora judeţului Sibiu*, Ediţia a II-a, Ed. Univ. „Lucian Blaga", Sibiu.
43. Drăgulescu, C., 2011a, Study of vegetation of Phragmitetalia order in the range of Sibiu county, *Romanian Journal of Aquatic Ecology*, 19-44
44. Drăgulescu, C., 2011b, The coenology and chorology of vegetation from order Magnocaricetalia Pignatti 1953 în Sibiu county (Transylvania, Romania),*Transylvanian review of systematical and ecological research, 12, The Wetlands Diversity*, Sibiu: 15-38
45. Dumitrescu-Jippa, A., Nistor, N., 1976, *Sibiul şi ţinutul în lumina istoriei I*, Ed. Dacia, Cluj-Napoca
46. Filipaş, L.,2007, *Flora şi vegetaţia municipiului Cluj-Napoca*, Teză de doctorat, Univ. „Babeş-Bolyai", Cluj-Napoca.
47. Fuss, M., 1853, *Bericht uber den Stand der Kenntnis der Phanerogamen Flora Siebenburgens mit dem Schlusse des Jahres 1853*, Programm d. Gymnas. A.C. zu Hermannsradt f. d. Schuljahr 1851-1852, Sibiu, 1-31.
48. Fuss, M., 1854, Zur Flora Siebenburgens, *Verh. u. Mitt. d. siebenb. Ver. f. Naturwiss. zu Hermannstadt*, V, 3, 59.
49. Fuss, M., 1855, Zur Flora Siebenburgens (neue von Schott, Nymann und Kotschy beschreibene siebenburgische Pflanzen), *Ver. u. Mitt. d. siebenb. Ver. f. Naturwiss. zu Hermannstadt, VI*, 155-158.
50. Fuss, M., 1862, Zur Flora Siebenburgens, *Verh. u. Mitt. d. siebenb. Ver. f. Naturwiss. zu Hermannstadt*, XIII, 175-180, 199-203.
51. Fuss, M., 1866, *Flora Transsilvaniae Excursoria*, Sibiu.
52. Gafta, D., 2002, Influenţa antropo-zoogenă asupra pădurilor periurbane, în Cristea V., Baciu, C., Gafta, D. (edit), 2002, *Municipiul Cluj-Napoca şi zona periurbană. Studii ambientale*, Ed. Accent, Cluj-Napoca: 241-274.
53. Grabherr G., Mucina, L., Ellmauer, T., Wallnöfer, S., 1993, *Die Pflanzengesellschaften Osterreichs*, I-III, Gustav Fischer Verlag Jena, Stuttgart, New York.
54. Hayek, A., 1916, *Die Pflanzendecke Oesterreich- Ungarns* I, Leipzig und Wien.
55. Holhoş, I. şi colab., 1981, *Judeţele patriei. Sibiu. Monografie*, Edit. Sport-turism, Bucureşti.
56. Irimie, Daniela, Extinderea teritorială şi evoluţia funcţională a Municipiului Sibiu, 2009, *Geo-Carpathica*, Univ. Creştină „Dimitrie Cantemir" Fac. Geogr. Turism., Sibiu, anul IX, nr.9: 95-116.
57. Nyárady, A., 1965, Contribuţii la flora României I, *Notulae bot. Inst. agron*. Cluj, I: 45-48.
58. Oprea, A., 2005, *Lista critică a plantelor vasculare din România*, Ed. Univ. Al. I. Cuza, Iaşi.
59. Pop, E., 1970, Etapa istorică pregătitoare a Societăţii Ştiinţelor Naturale din Sibiu, *St. şi com*. Muz. Brukenthal Sibiu, *Şt. nat*., 15: 13-35.
60. Popescu, A., Sanda, V., 1998, Conspectul florei cormofitelor spontane din România, *Acta Bot. Hort. Bucurest.*, Bucureşti.
61. Posea, Gr. (coord.), 1982, *Enciclopedia geografică a României*, Ed. ştiinţifică şi enciclopedică Bucureşti.
62. Rákosy, L., Momeu, Laura, (edit) 2009*, Neobiota din Romania*, Presa Univ. Clujeană, Cluj-Napoca.

63. Reissenberger, L., 1854, *Uebersicht der zu Hermannstadt im Jahre 1853 gemachten meteorologischen Beobachtungen, Verh. u. Mitt. d. siebenb. Ver. f. Naturwiss. zu Hermannstadt*, V: 110-127.
64. Reissenberger, L., 1855, *Uebersicht der zu Hermannstadt im Jahre 1854 gemachten meteorologischen Beobachtungen und einiger Erscheinungen im Leben einzelner Thiere und Pflanzen, Verh. u. Mitt. d. siebenb. Ver. f. Naturwiss. zu Hermannstadt*, VI: 127-154.
65. Sanda, V., Popescu, A.,Doltu, M, I., Doniţă, N., 1983 Caracterizarea ecologică şi fitocenologică a speciilor spontane din flora României, *St. şi com*. Muz. Brukenthal, Sibiu, St. nat. Supl.25
66. Sanda, V., Öllerer, Kinga, Burescu, P., 2008, *Fitocenozele din România, sintaxonomie, structură, dinamică şi evoluţie*, Edit. Ars Docendi, Univ. Din Buc. Bucureşti.
67. Sandu, Maria, 1998, *Culoarul depresionar Sibiu - Apold, studiu geomorfologic*, Ed. Acad., Bucureşti.
68. Schneider-Binder, Erika, 1970, Vegetaţia acvatică şi palustră dintre pârâul Strâmb (Râsloavele) şi Ruşciorul, *St. şi com*. Muz. Brukenthal Sibiu, *Şt. nat*., 15: 187-214.
69. Schneider-Binder, Erika, Stamp, H. M., 1970, Societatea Ardeleană de Ştiinţe Naturale în cei 100 de ani de existenţă, *St. şi com*. Muz. Brukenthal Sibiu, *Şt. nat*., 20: 37-67.
70. Schneider-Binder, Erika, 1971, Pajiştile xeromezofile din depresiunea Sibiului şi colinele ei marginale, *St. şi com*. Muz. Brukenthal Sibiu, *Şt. nat*., 16: 135-172.
71. Schneider- Binder, Erika, 1972, Tufişurile alianţei Prunion fruticosae Tx. 1952 şi Prunion spinosae Soo (1930 n.n.) 1940 din zona colinelor marginale ale depresiunii Sibiului, *St. şi com*. Muz. Brukenthal Sibiu, *Şt. nat*., 17: 183-208.
72. Schneider-Binder, Erika, 1973, Pădurile din depresiunea Sibiului şi dealurile marginale I, *St. şi com*. Muz. Brukenthal Sibiu, *Şt. nat*., 18: 71-108.
73. Schneider-Binder, Erika, 1974, Flora şi vegetaţia Depresiunii Sibiului şi a dealurilor marginale, Teză doctorat, Univ. „Babeş-Bolyai" Cluj.
74. Schneider-Binder, Erika, 1975, Pajiştile xeroterme din Ord. Festucetalia valesiacae Br.-Bl. et Tx. 1943 în zona colinelor marginale ale depresiunii Sibiului, *St. şi com*. Muz. Brukenthal Sibiu, *Şt. nat*., 19: 95-120.
75. Schneider-Binder, Erika, 1976, Caracterizare generală a vegetaţiei Depresiunii Sibiului şi a dealurilor marginale, *St. şi com*. Muz. Brukenthal Sibiu, *Şt. nat*., 20: 15-46.
76. Schneider-Binder, Erika, 1977, Consideraţii asupra asociaţiilor din alianţa Stipion lessingianae Soo 1947 în România, *St. şi com*. Muz. Brukenthal Sibiu, *Şt. nat*., 21: 91-113.
77. Schneider-Binder, Erika, 1978, Zur Verbreitung, Okologie und Zonologie des Riesenwegerich (Plantago maxima Juss.), *St. şi com*. Muz. Brukenthal Sibiu, *Şt. nat*., 22: 137-172.
78. Schneider-Binder, Erika, 1979, Analiza florei din Depresiunea Sibiului şi dealurile marginale, *St. şi com*. Muz. Brukenthal Sibiu, *Şt. nat*., 23: 99-119.
79. Schneider, Erika, 1998, Die Auen im Hügelland Siebenbürgens aus ökologisch-vegetationskundlicher Sicht, *Mauritiana Altenburg*, 16, 3: 481-497.
80. Schur, F., 1851, Ueber die siebenburgische Pflanzengattung Scleranthus, *Verh. u. Mitt. d. siebenb. Ver. f. Naturwiss. zu Hermannstadt*, II: 9-13.

81. Schur, F., 1852, Beitäge zur Kenntniss der Flora von Siebenbürgen. IV. Verzeichniss von sammtlichen bis jetzt in Siebenburgen entdecken Euphorbien- Arten, nebst deren Varietaten oder Formen, *Verh. u. Mitt. d. siebenb. Ver. f. Naturwiss. zu Hermannstadt*, III, 8: 122-125.
82. Schur, F., 1858, Die siebenburgischen Farne, *Oesterr. Bot. Zeitschr*. Wien, VIII: 133-135, 192-196, 322-329.
83. Schur, F., 1859, 1860, Beobachtungen in der Flora von Siebenburgen, *Oesterr. Bot. Zeitschr*. Wien, IX: 9-16, 43-52, 154-160, 323-329 şi X, 70-77.
84. Schur, F., 1860, 1861, Zur Flora Siebenburgen, *Oesterr. Bot. Zeitschr*. Wien, X: 177-185, 225-229, 248-253,324-328, 352-358 şi XI, 20-23, 42-45, 289-293, 395-364.
85. Schur, F., 1866, *Enumeratio plantarum Transsilvaniae*, Vindobonae.
86. Sigerus, E., 1930*, Cronica oraşului Sibiu. 1100-1929*, Ed. Episcopiei Evanghelice C.A. din România, Sibiu.
87. Sîrbu, C. (coord), Oprea, A., 2011, *Plante adventive în flora României*, Ed. „Ion Ionescu de la Brad" Iaşi.
88. Sârbu, I., Ştefan, N., Oprea, A., 2013, , *Plante vasculare din România, Determinator ilustrat de teren*, Ed.Victor B. Victor, Bucureşti.
89. Simonkai, L., 1886, *Enumeratio florae transsilvanicae vasculosae critica*, Budapest.
90. Ungar, K., 1925*, Die Flora Siebenburgens*, Hermannstadt.
91. *** l952-1976, *Flora Republicii Populare Române (Flora Republicii Socialiste România) I- XIII*, Edit. Acad. Bucureşti
92. *** 2008, *Studiu de fundamentare în domeniul mediului al planului urbanistic general al Municipiului Sibiu2009*, Univ. „Lucian Blaga", Sibiu
93. * * * (1987), *Geografia României. Carpaţii şi Depresiunea Transilvaniei*, Ed. Acad., Bucureşti.
94. *** *Studiu pedologic complex. Teritoriul Sibiu*, 1975. Of. de st. ped. şi agrochim. Braşov.
95. *** PATZ Sibiu, 2005 – 2006, Urban Proiect, Bucureşti
96. *** PATJ Sibiu, 2003 - 2004,Urban Proiect, Bucureşti.
97. *** PUG Sibiu, Studiu de fundamentare şi strategia de dezvoltare durabilă a întregului oraş, Planwerk, Cluj-Napoca

Published papers, concerning the thematic of the thesis:

1. Crăciunaş, M., 2004, Studiu ecologic al cormofitelor municipiului Sibiu şi zonei suburbane, *St. şi com*. Muz. Brukenthal Sibiu, *Şt. nat*., 29: 55-71.
2. Crăciunaş, N., Crăciunaş, M., 2006, Contribution to the phytocoenologic and floristic study from the lawns of the outdoor „Astra" Museum of Sibiu, *Brukenthal Acta musei I.3,* Sibiu/Hermannstadt: 71-77