

Final Project Report(to be submitted by 30th September 2016)

Instructions:

- Document length: maximum 10 pages, excluding this cover page and the lastpage on project tags.
- Start with an abstract (max 1 page).
- Final report text: Do not forget to mention your methodology; the people involved (who, how many, what organization they are from – if applicable); and the expected added value for biodiversity, society and the company. Finally, state whether the results of your project can be implemented at a later stage, and please mention the ideal timing and estimated costs of implementation.
- Annexes are allowed but will not be taken into account by the jury and must be sent separately.
- Word/PDF Final Report files must be less than 10 MB.
- If you choose to submit your final report in your local language, you are required to also upload your final report in English if you wish to take part in the international competition.
- To be validated, your file must be uploaded to the [Quarry Life Award website](#) before **30th September 2016** (midnight, Central European Time). To do so, please log in, click on 'My account' / 'My Final report'.
- In case of questions, please liaise with your national coordinator.

1. Contestant profile

Contestant name:	Mariana NICULESCU
Contestant occupation:	Prof. assoc. Dr.
University / Organisation	University of Craiova, Romania
E-mail:	
Phone (incl. country code):	
Number of people in your team:	1

2. Project overview

Title:	DIVERSITATEA, DISTRIBUȚIA ȘI ECOLOGIA COMUNITĂȚILOR VEGETALE ȘI A HABITATELOR DIN CARIERA BICAZ CHEI
Contest:	The Quarry life award competition, Romania
Quarry name:	Bicaz Chei
Prize category: (select all appropriate)	<input checked="" type="checkbox"/> Education and Raising Awareness <input checked="" type="checkbox"/> Habitat and Species Research <input checked="" type="checkbox"/> Biodiversity Management <input checked="" type="checkbox"/> Student Project <input checked="" type="checkbox"/> Beyond Quarry Borders

ABSTRACT

The thematic area provided in this project, inbuilt part of the Hăşmaş Mountains, it is a very important area by point of view geographically, flora and fauna, landscape, cultural and course economic. The quarry mine Bicaz Gorges is situated in the North-East part of Romania, close to the established and spectacular gorges-Cheile Bicazului.

Within this project had been aimed the identification, description, diversity, ecological analysis and monitoring of the herbal and wooden vegetal communities, which belong to the Natura 2000 habitats and implicitly of the rare plant species, jeopardized, vulnerable, endemic within Quarry Bicaz Gorges and from the immediate vicinity, considering that it can be found by the contact limit of 2 protected areas: ROSCI0033Cheile Șugăului-Munticelu and Parcul Național Cheile Bicazului-Hăşmaş.

In floristic point of view have been identified a number of 648 taxons and infrataxons, which indicates the floristic richness from that area, in special from the neighboring territories, where with certainty can be found over 1000 vegetal species, but the time was too short to develop such a research. This fact attests that the cormoflora from this area has a good condition to can, the anthropical impact being dropped. Both the quarry's perimeter and in close proximity have been identified an array of rare species, jeopardized, vulnerable, endemic and representative for the limestone substrate and the mountain stage. As to the phytocoenology I have identified and analyzed a number of 45 vegetal communities. A big part of those vegetal communities represent the basis for the edification of some important Natura 2000 habitats, with a community or priority interest. It has been made a study in order to see the distribution, diversity, dynamic, ecological and the can mode of those. According to the targets of this project, a very important place I gave to the complex study of the habitats 91Q0 și 7220*, and also to the Leucobryo - Pinetum Matuszkiewicz 1962 Cratoneuretum filicino-commutati (Kuhn 1937) Oberd plant communities. 1977 from this area (Annex 1). Considering the place where the study had been located to, the eco-pedo-cymatic conditions and the antropic term exerted I have considered that is necessary to develop some ecological studies (adjacency, diversity index, ecotone, fragmentation, connectors, aggregation etc.) and using statistical methods (UPGMA si WPGMA, STYN-TAX 2000) for the plants's communities from the quarry mine Bicaz Gorges and the nearby territories. In the available time limit from the vegetatio season in 2016 I succeeded some achievements about this study. For a good ecologic discharge to an area where the studies about anthropic impact and the can mode of the species and habitats are required. I tried to succeed this study by writing the type and the intensity of the current pressures and the next threats.

All of these studies are the basis to an accession of the constant resource from Bicaz Gorges's quarry and the other areas harness, to make sure that it will conserve the species and the natural habitats, and also maintaining a right landscape.

Also I accomplished a study about the ecologic rehabilitation of the area where the mine exploration ended. For a good rehalabilatio in this area I kept in my mind the type of the native established vegetation from here and nearby, to avoid the fragmentation of the habitats, and also the existence of one „wish” to some species to blossom and to conquer new territories in this area.

I gave a big part of my attention also to the informatization and awerness porcess on the ecologic rehabilitation of a quarry mine. This point had made 3 plans, with the teenagers's engagement, inside of the „Projects for environment” National Contest and also to some National Conferences.

INTRODUCTION

The conservation of biodiversity from a mine's quarry is required, regardless of where it is. For a good rehabilitation in a mine's quarry is necessary first to know the biodiversity from that area, with all the complexity, including also the substrate on which it is developing. We have to know: the vegetation's type, the ecologic conditions, the pressures, the threats, the conservation mode, rehabilitation possibilities. To succeed, the ecologic rehabilitation from the Cheile Bicazului Quarry have to follow the best methods to remake the vegetal communities and also for the animals, and to restore the landscape, major events with a big importance in preserving biodiversity. This fact can't be made if there is no good collaboration with the company, which owns the mine. During this project, I followed the achievements of the proposed objectives and also the enrichment and multiplying of this, the objects presented above.

RESEARCH METHODS

Studies will start by a good bibliographic documentation about the physical and geographical conditions: relief, geology, hydrography, soil and local climate conditions. To identify the species and the infrataxons it will be used: Romanian's Flora and Flora Europaea. In studying the vegetation we will use phytosociology research methods in the way of central European school. The vegetal communities, which establish the habitats, will be described based on their own observations considering several syntheses. Regarding the classification of vegetal associations it will be used the synthetic work written by JS Rodwell et al (2002). To identify the habitat will be used: Romanian Manual for interpretation of Eu habitats and Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora. A very big importance we will give to the complex ecological studies for plant's communities, in special for: Leucobryo - Pinetum Matuszkiewicz 1962 and Cratoneuretum filicino-commutati Oberd. 1977. And also to the Bray-Curtis's index determination and to achieve dendograms using method Group Average (UPGMA) and Simple method average (WPGMA) using SYN-TAX 2000 program. To determine the type and degree of intensity of current and future threats pressures we used List Threats, Pressures and Activities (final version).

RESULTS

Research on biodiversity of flora found in Carrer Bicaz Keys and surroundings the analyzed area were used inventory and monitoring studies of flora, plant communities and habitats Natura 2000. Flora found in the quarry's area is specific to the limestone substrate from the mountains, with local climatic influences. In the quarry's area and in the immediate vicinity were identified a very rich and diverse flora. Along with the large number of species and many cormophyte species, we identified macrocysts, and bryophytes. Macrocytete species thrives very well in arborets of pine, and also of spruce, in the spruce mixed with beech forests. So, we discovered a series of macrocysts species within the pale of the woody plant communities: Leucobryum - Pinetum Matuszkiewicz 1962 Hieracio rotundati-Piceetum Pawl. et Br.- Bl. 1939 Leuchanthero walsteinii-Fagetum (Soó 1964) Tauber 1987. Species's list is shown in Annex 2. In the analyzed area, in the floristic structure of plant communities there are important species of bryophytes (Annex 2). Most bryophytes species, of particular importance are an integral part of the habitat 7220 *. Also, a number of bryophytes species are found in the forest's habitats or grassland and rocky habitats. Cormoflora encountered in mining career perimeter Bicaz Keys and neighboring territories is represented by a large number of taxons and infrataxons. So, cormoflora of investigated area is represented by a number of 648 taxons and infrataxons, including a number of species, rare, vulnerable and endangered (systematic list of species - Annex 2). From the rare endemic plant species identified in the quarry we remembered *Aconithum moldavicum*, *Androsace villosa* subsp. *arachnoidea*, *Astragalus pseudopurpureus*, *Campanula carpatica*, *Cardamine glanduligera*, *Centaurea triumfetti* subsp. *pinnatifida*, *Dianthus spiculifolius*, *Dianthus tenuifolius*, *Doronicum carpaticum*, *Erysimum witmannii* subsp. *transsilvanicum*, *Festuca porcii*, *Gypsophila petraea*, *Helictotrichon decorum*, *Hepatica transsilvanica*, *Gentiana phlogifolia*, *Hieracium pojoritense*, *Jovibarba sobolifera*, *Larix decidua* subsp. *carpatica*, *Leontopodium alpinum*, *Onobrychis montana* subsp. *transsilvanica*, *Primula elatior* subsp. *leucophylla*, *Scabiosa lucida* subsp. *barbata*, *Silene nutans* subsp. *dubia*, *Phyteuma vagneri*, *Poa rehmannii*, *Ranunculus carpaticus*, *Sesleria bielzii*, *Sesleria heufflerana*, *Silene zawadzkii*, *Symphytum cordatum*, *Thymus bihoricensis*, *Thymus comosus*, *Thymus jankae*, *Thymus pulcherrimus*, *Viola jooi*. (Annex 2, 3). A number of species of orchids can be found in the forest and grassland habitats: *Platanthera bifolia*, *P. chlorantha*, *Neottia nidus-avis*, *Listera ovata*, *L. cordata*, *Orchis tridentata*, *Epipactis helleborinae*, *Epipactis atrorubens*, *Cephalanthera damasonium*, *Nigritella rubra*, *Cypripedium calceolus*, *Gymnadenia conopsea*, *G. odoratissima*, *Dactylorhiza maculata* (Annex 2, 3). Orchids species were encountered even in the quarry and in the immediate vicinity of the exploiting, at an altitude of 780 m. Given the research we have done in quarries: Lespezi and Băița-Crăciunești, by comparing the cormoflora identified in all of these 3 quarry, I can say that each present their particularities. In every quarry I worked, I encountered absolutely outstanding and spectacular things. So, if in Lespezi quarry, orchids delighted us with a large number of species, in Băița-Crăciunești quarry - there are some particular species - *Dictamnus albus*,

Bicaz Chei quarry is represented by Campanulaceae. Many species of Campanula are found both in career and in the surrounding areas, in grassland habitats, forestry and rocky. Also, some species of Campanula are found on the rocky substrate, dens and wasted lands in in quarry, characterized by a tremendous blossom and conquest of new territories, increasingly larger. A particular endemic species found everywhere in quarry with a power of regeneration and large blossom is Campanula Carpatica (Annex 2, 3). From the quarry's perimeter can be listed here:

Campanula cervicaria L.
Campanula glomerata L. f. *aberans*
Campanula napuligera Schur.
Campanula kladniana (Schur.) Witasek
Campanula polymorpha Witasek
Campanula patula L.ssp. *patula*
Campanula patula L. ssp.*abietina*
Campanula persicifolia L.
Campanula rapunculoides L.
Campanula rotundifolia L.
Campanula trachelium L. (Anexa foto).

Considerations regarding the vegetation from the Bicaz Keys Quarry and surrounding areas

Herbaceous vegetation (Annex 4, 5) is represented by: saxicola vegetation, debris vegetation, grassland vegetation of tall grasses, hygrophile vegetation, ruderal vegetation, limestone tuff vegetation. Every vegetal communities from here are important. But a special role is represented by the most important plant communities are rocky and meadows. Saxicola vegetation has an important pedogenetic eco-community role and is represented by the following plant communities: *Asplenio viridae-Cystopteridietum fragilis* Oberd. (1936) 1949; *Thymo pulcherrimi-Poëtum rehmanii* Coldea (1986) 1990, *Sedo fabariae-Geraniuetum machrorizum* Boşcaiu et Täuber 1077; *Asplenio trichomano-rutae murariae* Tx. 1937; *Poetum nemoralis calcicolum* Pop si Hodisan (1959) 1967 (Syn. *Sedo hispanici- Poetum nemoralis* Pop et Hodisan 1985); *Helictotrichetum decori* Domin 1932; *Helictotricho decori-Festucetum pallentis* (Soó 1944) Gergely 1972; *Artemisio erianthae Gypsophiletum petraeae* Puscaru et al. 1956; *Thymo comosi-Festucetum rupicolae* (Csűrös et Gergely 1959) Pop et Hodisan 1985; *Calamagrostio arundinacea – Digitalietum grandiflora*; *Seslerio bielzii-Caricetum serpervirentis* Puscaru et al. 1956 (Syn. *Seslerietum bielzii transsilvanicum* Borhidi 1958); *Seslerietum heuffleriana-Caricetum semperfurentis* Coldea 1984. Grassland vegetation presents an important role in terms of flora, environmental and economic. Plant communities are the following: *Brachypodio pinnati-Festucetum rupicolae* Ghişa 1962; *Festuco rubrae-Agrostetum capillaris* Csűrös-Káptalan 1964 (Syn. *Festucetum rubrae-Agrostietum capillaris* Horv. 1951; *Festuco rubrae-Cynosuretum* auct. roman., *Festucetum rubrae et Agrostis capillaris* auct. roman.) (Annex 4); *Festucetum pratensis* Soó (1938) 1955, 1969(Annex 4); *Festucetum saxatilis* Domin 1933; *Poëtum pratensis* Răvăruț et al 1956 (Syn. *Trifolio-Poëtum pratensis* (Răvăruț et al. 1956) Resmeriță 1958); *Arrhenatheretum elatioris* Br.-Bl. ex Scherrer 1925; *Seslerio-Festucetum versicoloris* Beldie 1967; *Anthoxantho-Agrostetum capillaris* Sillinger 1933, Jurko 1969 (Annex 4); Plant community with *Melica ciliata*, *Agrostetum stoloniferae* (Ujvárosi 1941) Burduja et al. 1956. Also, the plant community *Cratoneuretum filicino-commutati* (Kuhn 1937) Oberd. 1977 (Syn.: *Cratoneuron commutatum* Pușcaru et al. 1967) (Annex 4,5)) is having a big role because it edifies the priority habitat 7220 *. This community was identified even within the perimeter career, which proves that human impact is reduced. Ruderal vegetation is found everywhere and is represented by: *Sambacetum ebuli* (Kaiser 1926) Felföldy 1942; *Tussilaginetum farfarae* Oberd. 1949 (Syn. *Poo-Tussilaginetum* Tx. 1931) (Anexa 4); *Urticetum dioicae* Steffen 1931; *Poëtum annuae* Gams 1927; *Carduetum acanthoides* Morariu 1939; *Bidentetum tripartiti* W. Koch 1926 (Syn. *Polygono hidropiperi-Bidentetum* Lohm. 1950). Colonizing vegetation is represented by the phytocoenosis *Clinopodio vulgaris-Pteridietum aquilinii* Dihoru 1975 (Syn. Ass. *Pteridietum aquilinum* Raclaru 1967 p.p.; *Pteridium aquilinum* Şerbănescu 1957). The higrophylous vegetation is represented by: *Cyperetum flavescentis* Koch ex Aichinger 1933; *Telekio-Petasitetum hybridii* (Morariu 1967) Resmeriță et Rațiu 1974 (syn.: *Petasitetum hybridii* auct. rom., *Aegopodio-Petasitetum hybridii* auct. rom., *Telekio-Petasitetum albae* Beldie 1967, *Petasitetum albae* Dihoru 1975, *Petasiteto-Teleketum speciosae* Morariu 1967); *Scirpetum sylvatici* Ralski 1931 em. Schwich 1944(Annex 4); *Juncetum bufonii* Morariu 1956, Philippi 1968; *Carici remotae-Calthetum laetae* Coldea (1972) 1978 plant communities.

Woody vegetation is the vegetation of forests and thickets, especially characteristic limestone substrate. The main forest plant associations found here are: *Leucobryo - Pinetum Matusz.* 1962 (Syn.: *Myrillo-Pinetum* Burduja et Ștefan 1982 (art. 29); *Betulo-Pinetum* Burduja et Ștefan 1982) (Anexa 4, 5); *Hieracio rotundati-Piceetum* Pawl. et Br.- Bl. 1939 (Anexa 4, 5) ; *Sympyto cordati-Fagetum* Vida (1959) 1963(Anexa 4);

Pulmonario rubrae-Fagetum (Soó 1964) Täuber 1987 (Anexa 4, 5); *Leuchanthermo walsteinii-Fagetum* (Soó 1964) Täuber 1987; *Coryletum avellanae* Soó 1927; *Salicetum albae* Issler 1924; *Salicetum purpureae* (Soó 1934 n.n.) Wendelbg.-Zelinky 1952; *Telekio speciosae-Alnetum incanae* Coldea (1986) 1990 (Anexa 4). From the shrubs vegetation we can mention: phytocoenosis with *Rubus idaeus*, formations with *Juniperus communis* in limestone areas or meadows, and phytocoenosis assigned to plant community *Juniperetum sabinae* Csuros 1958. The most important woody plant community is *Leucobryo - Pinetum* Matusz. 1962 from the quarry and in the surrounding areas and represents the basis of building habitat : 91Q0 Western Carpathian calcicolous *Pinus sylvestris* forests. Another extremely important vegetable association identified in quarry and in the surrounding areas and is requiring the preservation measures is the plant community *Cratoneuretum filicina-commutati* (Kuhn 1937) Oberd. 1977 (Syn.: *Cratoneuron commutatum* Pușcariu et al. 1967), asociație edificatoare pentru habitatul 7220* Petrifying springs with tufa formation (*Cratoneurion*). In this project we managed to achieve 15 tables phytosociologic for some of the 45 identified plant communities, working time was too short. For such a study would be needed and yet a growing season because vegetation in this area is far too complex the structure and is very diversified.

Habitats found in mining quarry Bicaz Chei and surrounding areas

Natural habitat types identified in the quarry and the surrounding areas are classified into the following categories: forest habitats, grassland habitats, habitats of rocky habitats of tall grasses, streams habitats, streams mineralized inlaid training saddle tuff habitats.

Forest habitats. From the perimeter and in the surrounding areas career were identified the following types of habitats: 91Q0 Western Carpathian calcicolous *Pinus sylvestris* forests - CLAS. PAL.: 42.542, 42.5C8, edified for the plant community *Leucobryo - Pinetum* Matuszkiewicz 1962, very important habitat for this area; 9410 Acidophilous *Picea* forests of the montane to alpine levels (*VaccinioPiceetea*), CLAS. PAL.: 42.21 până la 42.23, 42.25; 91E0* Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*) - CLAS. PAL.: 44.3, 44.2 și 44.13 edified for the - *Salicetum fragilis* Passarge 1957; *Telekio-Alnetum incanae* Coldea (1986) 1990 plant communities; 9180* *Tilio-Acerion* forests of slopes, screes and ravines - CLAS. PAL.: 41.4, Habitat that is not found in the quarry, but only in Munticelu area; 91V0 Dacian Beech forests (*SympytoFagion*) - CLAS. PAL.: 41.1D2 (Anexa 6).

Herbacous and Shrubs habitats

From the perimeter of the quarry and in the surrounding areas were identified the following types of habitats: 3220 – Alpine rivers and the herbaceous vegetation along their banks - CLAS. PAL.: 24.221 și 24.222; 5130 –*Juniperus communis* formations on heaths or calcareous grasslands - CLAS. PAL.: 31.88; 6190 Rupicolous Pannonic grasslands (*Stipo-Festucetalia pallentis*)- CLAS. PAL.: 34.35 in the Quarry Bicaz Chei; 6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometea*) (*important orchid sites) - CLAS. PAL.: 34.31 până la 34.34 edified by *Brachypodio pinnati-Festucetum rupicolae* Ghișa 1962 ; 6430 - Hydrophilous tall-herb fringe communities of plains and of the montane to alpine levels - CLAS. PAL.: 37.7 și 37.8; 6440 Alluvial meadows of river valleys of the *Cnidion dubii* - CLAS. PAL.: 37.2; 6510 Lowland hay meadows (*Alopecurus pratensis*, *Sanguisorba officinalis*) - CLAS. PAL.: 38.2, edified by the plant community *Arrhenatheretum elatioris* Br.-Bl. ex Scherrer prezenta la limita carierei; 6520 Mountain hay meadows- CLAS. PAL.: 38.31; 8120 Calcareous and calcashist screes of the montane to alpine levels (*Thlaspietea rotundifoliae*) -CLAS. PAL.: 61.2; 8220 Siliceous rocky slopes with chasmophytic vegetation; CLAS. PAL.: 62.2; 8240* Limestone pavements. Cel mai important habitat din cariera Bicaz Chei este habitatul 7220* Petrifying springs with tufa formation (*Cratoneurion*)- CLAS. PAL.: 54.12. În this area is edified by plant community *Cratoneuretum filicina-commutati* (Kuhn 1937) (Anexa 6).

Ecologic studies achieved in perimeter of the Bicaz Chei quarry and the surrounding areas

The analysis of the landscape's diversity index from Bicaz Chei quarry and the surrounding areas

Between landscape and ecosystem there is a tight connection, the landscape components's richness correlates with species's richness of quarry and surrounding areas. To establish the index of landscape's diversity of quarry and the surrounding area I have considered three indices: the domination, distribution and size of the fragments. The dominance indicates the degree of which species dependent on a single habitat and if they can fill the landscape. So, the quarry's perimeter, and also the surrounding areas, the degree where the land is covered by the dominant high landscape types, which shows that once the ending of landscape analyze there are chances for rehabilitation. The spread index is the extent to which types of landscape components are aggregated or grouped. The degree of spread index can be of two types of high and low. In the quarry's perimeter the spread index grade is high, while in the surrounding areas is below. The size of the fragments measure the complexity form of patches. Where the man has altered the landscape, structure and the size of patches is even smaller. The level of this index can be of two types of high and low. In the quarry's perimeter, and also in the surrounding areas, the level of this indicator is down, which proves the existence of human

impact intensity from weak to average around the area (because of all the pressures and threats in local tourism, mismanaged stands, pastored).

The analysis of the Contiguity index in the Bicaz Keys Quarry and surrounding areas.

The Contiguity is an indicator that shows how connected are the elements of a landscape (corridors, networks or arrays) measuring process by which subpopulations at a landscape / SCI are interconnected in a functional demographic unit. So, we can say that contiguity is inversely correlated with the hostility between clumps of habitats. This involves –high hostility = contiguity reduced, that hostility between clumps of habitats impedes flow or relationships between different sub-populations in those clusters. Throughout this area, quarry or surrounding areas, the degree of contiguity is high, the explanation is that in this region there are functional corridors. The landscapes with a high contiguity can provide a higher probability of survival of isolated populations. This can be seen in the habitats 91Q0, 9410, 91V0, the level of such habitat with functional corridors, the degree of contiguity for these functional corridors within these habitats are high. So, the forest management within the area helps to maintain a low to medium level of degradation of forest habitats, 91Q0, and 9410, 91V0 and maintain connectivity. The forestry in this area, and all stakeholders in the management of trees have a duty to ensure the conservation of mammals and to provide favorable habitats for them. Regarding grassland habitats, the degree of contiguity to the habitat 6520 is high at this habitat there are a number of corridors functional connectivity can be influenced to a very small extent by a slight infrastructure development represented several homes housing or shelters, grazing and to a lesser extent, mining indirectly, without fragmentation of habitats and without creating a barrier to the migration of wildlife in the area, connectivity is not affected. Regarding the habitat 7220* from the quarry's perimeter has a low degree of contiguity. In this habitat there are hot spots or barriers anthropogenic or fragmentation of habitat due to insufficient water source or clogging springs, a process that can be remedied by restoring the water flow on slopes, deforestation of woody vegetation in the habitat, given the importance of this habitat priority. However, that this habitat was identified in the quarry's perimeter means a lot (Annex).

The study of ecotones (edges) in the Bicaz Chei Quarry and surrounding areas

The ecotone is the area of overlap between the two ecosystems, the transition zone between the two communities, the old high productivity that facilitates the exchange of nutrients between neighboring communities and species (Annex 7). The ecotone's effect can be considered both a self-contained habitat and habitat border. The territory researched the density of the ecotones in the landscape is quite high. So, there are the following types of ecotones: the boundary between forest ecosystems and grassland ecosystems; the boundary between terrestrial ecosystem and aquatic ecosystem, represented by the Bicaz river, Șugău; the boundary between forest ecosystems and chasmophytic vegetation ecosystem; the boundary between grassland ecosystem and agricultural ecosystem, represented by orchards. The ecotones from the quarry's area are characterized by a large stability (resistance to disturbances), elasticity (quickness to its initial state after a confrontation with a disturbance), energy (dominant organisms production), functional contrast (the difference between variables functional ecotones and those of adjacent ecosystems) and porosity ability of ecotones to exchange rate or flow direction environmentally. Concerning the 91Q0 habitat in the investigated area, the icons are formed at the boundary between this adjacent habitat and grassland habitats, from those and the chasmophytic vegetation and habitat 8210, 8240 *, and between it and other forest habitats - from the 9410 and 91V0 from quarry. So, the density of the ecotone from the 91Q0 habitat is high. Concerning the 6520 habitat, from the investigated area, the ecotones take place at the boundary between this habitat and adjacent forest habitats, between it and 6430 tall herb habitat and between the agricultural ecosystem, represented by the orchard area, between it and habitats 6440, 6510, 3220, 91E0 *. So, the density of the ecotone from the 6520 habitat is high. Concerning the 7220 * habitat in the quarry, the ecotones take place at the boundary between this habitat and adjacent forest 91V0 habitat. So, the 7220 * habitat has a low density of ecotones, compared to other habitats.

The study of fragments's density level of the habitat from Bicaz Chei quarry and surrounding areas

Fragmentation is characterized by the emergence of discontinuities / habitats gaps in the a protected area. The effects of this is isolating and reducing and also decreasing the biodiversity and natural habitats from the landscape. The small fragments of habitat causes a reduction in populations, increasing the risk of extinction. The fragmentation involves removing the affected resettlement and distance between fragments of the population nucleus may become too high. Concerning the type of fragmentation from the Bicaz Keys quarry and the surrounding areas the fragmentation is structured for the meadows ecosystems and the geographical fragmentation for the forest ecosystems, 91Q0, 91E0 *, 91V0, 9410 habitats, the impact of disturbances is acting both on edge and on the inside of habitat, the vulnerability is quite high. The index that measures the density of fragments is in close correlation with the size of fragments is called size fractions and is a measure of the complexity of the patch. The index degree of the fractions size can be of two types: high or low. In the protected

area of Munticelu Sugaului Gorge – the index degree of the fractions size is high. So higher fragmentation gives a lower spread of specialized species, favoring the spread of generalist species. The dispersion of population increases with the degree of fragmentation of habitats, especially forests, in our case Esteba These include 91Q0 habitat. In the investigated the index degree of the fractions size for 6520 haabitat is high. This type of habitat is interlocked with other vegetal communities grassy vegetation, meadows less valuable, ruderal vegetation, with bushes as Juniperus communis. The Quarry's path fragments this type of habitat. In some areas of grassland can occur excess moisture which causes the formation of 6430, 6440, 6520 habitats, leading to habitat's fragmentation and so increasing the density AEST fragments habitat. Concerning the second of high priority habitat from the quarry, the index degree of the fractions size for the 7220 habitat is high. The phytocoenosis of this habitat are very vulnerable. The habitat can be fragmented when spring flow that formed decreases or other disturbing factors arise, such as dust from mining career. Given that the floristic composition of this habitat there is a number of species of bryophytes, and that shows an increased sensitivity to pollution due to dust from the quarry can increase irreversible fragmentation and so increase the density of 7220* habitat fragments in this area.

The analysis connectance index in the landscape of the entire territory: quarry and surrounding areas.

The connectance degree is called degree of connection (continued). The degree of connection measure the physically connect of the bands. In the analyzed area the degree of connection was determined based on images of the pitch. In this area to determine the connection to the landscape were considered the following elements of the landscape: the bodies of forest, meadows, orchards, rocky springs, bed creeks in the area. So, the degree of connection in this area is high. The degree of connection for 91Q0 habitat was determined based on images of the pitch. So, the degree of connection in this area is high. Between forest's bodies within 91Q0, 91V0, 9410, 91E0 * habitats and grassland habitats, rocky and tall grasses observed a high degree of connectivity. As regards the level of connection 7220* habitat is much lower. The phytocoenosis which build between 7220* habitat and surrounding phytocoenosis habitats, there is a lower degree of connection.

The analysis of aggregation index at the landscape of the entire territory: quarry and surrounding areas.

The aggregation or adjacency index called and contagion index and represents the extent to which land cover types are aggregated or grouped. The degree of aggregation index can be of two types of high and low. In the analyzed area: quarry and surrounding areas the aggregation index level is below. In the protected area Sugaului-Munticelu Gorge the degree of aggregation index of 9410, 91V0, 91E0 * forest habitats is low, except in 91Q0 habitat is high. The phytocoenosis which builds the first 3 types of habitats are well grouped, while those of the 91Q0 habitat are poorly grouped. In the studied area , the degree of aggregation index level of 6520, 6440, 6430, 6510 habitats is below. The phytocoenosis that modify these grasslands are well grouped. For the other habitats the index aggregation require more time to establish the studies. The time limit for this project has enabled a much broader ecological study, on the whole the proposed indexes.

Due to the location of the territory under study the eco-pedo-cymatic conditions and anthropogenic factors gave a big part that made me feel they needed to conduct studies environmental statistics using methods (UPGMA and WPGMA, Styne-TAX 2000) for the most important community of forestry vegetation that is representative of this area: Leucobryo - Pinetum Matusz. 1962. So, the investigations on the basis of data processing and realization dendrogramelor was found of reports which are grouped into two clusters so by analyzing the coefficient Bray-Curtis, using the method Group Average (UPGMA) and coefficient Sorenson, using WPGMA by (fig . 1. 2). Bray-Curtis index is an index quantitatively dendrogram showing the highest value obtained for the survey of 2 - which is in the lowest intensity of human pressure, the number of species in the floristic composition is optimal (Fig. 1). Regarding Sorenson coefficient, it is a distance factor that takes into account only the presence / absence of species, highlighting the role of combinations of species delimitation main groups. Only the survey of two separate and this shows it on the line transition and evolution of sindinamică intensity increased due to anthropogenic pressure value (Fig. 2).

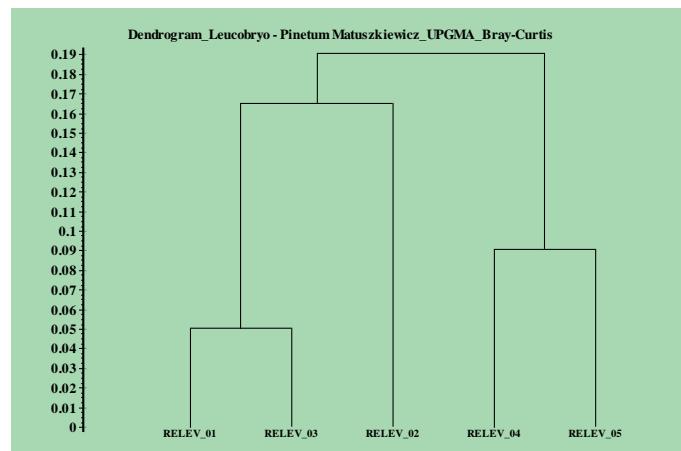


Fig. 1

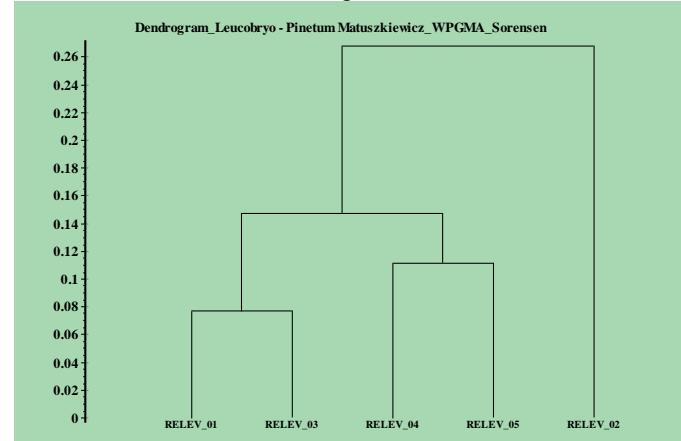


Fig. 2

It also performed an analysis of the surface of the sample using the quantitative ratio Complete linkage and - Similarity ration. Following the completion dendrogram was observed in grouping of reports in terms of quantity, depending on the number of species in each area of the sample, depending on the eco-pedo-climatic and anthropogenic. Thus, the groups of reports 1 and 3 and quantitatively index value is too low due to anthropogenic action on the respective sample surfaces, of this high intensity of human pressures signaling (Fig. 3). The same situation was observed in the following areas ordering probation, according to Euclidean coefficient (Fig. 4). This shows that the intensity of anthropogenic maintain of a moderate intensity, influencing more or less biodiversity.

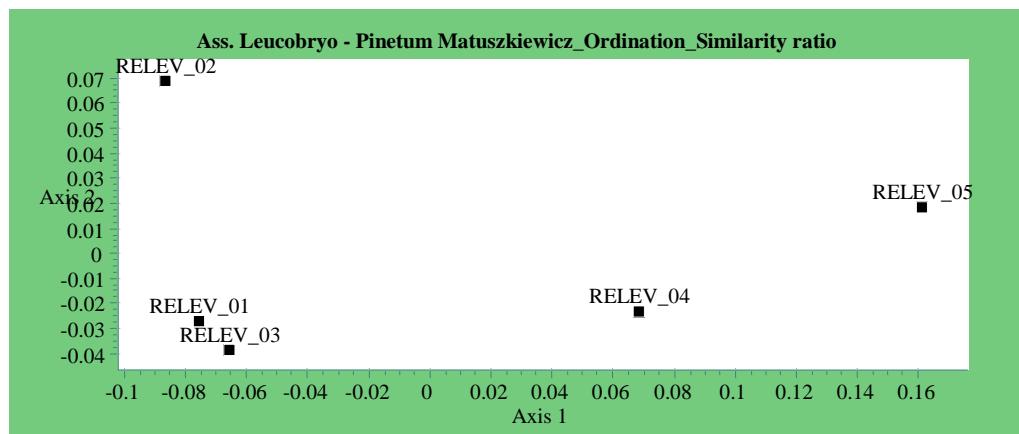


Fig. 3

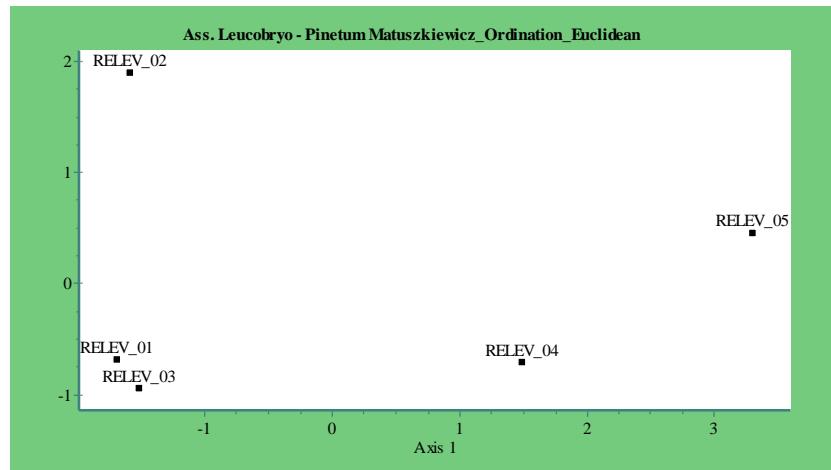


Fig. 4

Threats, Pressures in the Quarry Bicaz Chei and surrounding area

from studies conducted in quarry and surrounding areas have noted the type and menace pressures on habitats and their intensity. So, according to the guide - List Threats, Pressures and Activities (final version) I noted:

A. Current Pressures: A04.01.05 - intensive mixed animal grazing- M (Medium intensity); B02- Forest and Plantation management & use - L (Low intensity); A03.01- intensive mowing or intensification - M (Medium intensity); G01.03- motorised vehicles - L (Low intensity); G01.04 - mountaineering, rock climbing, speleology - L (Low intensity); I01 - invasive non-native species- L (Low intensity); G05.07 - missing or wrongly directed conservation measures – H (Major intensity); H01.09 - diffuse pollution to surface waters due to other sources not listed- M (Medium intensity); J02.06 - Water abstractions from surface waters - H (Major intensity) (afecteaza habitatul 7220*); M02.01 - habitat shifting and alteration - L (Low intensity); H05.01 - garbage and solid waste - H (Major intensity).

B. Future Threats: G05.07 - missing or wrongly directed conservation measures – H (Major intensity); G01.03-motorised vehicles - L (Low intensity); A04.01.05 - intensive mixed animal grazing- M (Medium intensity); A03.01- intensive mowing or intensification - H (Major intensity); J02.06 - Water abstractions from surface waters - H (Major intensity) (affects the habitat 7220*) ; M02.01 - habitat shifting and alteration - L (Low intensity); H05.01 - garbage and solid waste - H (Major intensity).

Considerations of the ecological rehabilitation in the Bicaz Chei quarry

In this project we also executed a study of ecological rehabilitation of the area in which completed mining. In order to achieve a good restoration of this area have been taken into account the type of native vegetation, existing here and in the surrounding area, in order to avoid the fragmentation of habitats, as well as the existence of a "wishlist" obvious species to knock and to conquer new lands in this area. Very important, I realized a study with the degree of the striking root (grip) and adaptability of cormoflora in the Bicaz-Chei Quarry (table no 2). I gave the species notes from 1 to 10 after the with the degree of the striking root (grip) and adaptability in this area. I realized this after I noticed the „desire,, of the species to occupy this (Table no. 1, Annex 8). This demonstrates that there are sufficient conditions for quarry restoration of natural habitats and the degree of pollution is low enough (or it can be reduced to a minimum, without great effort). Of the species with a wide grip and power regeneration can refer to 2 species of utmost importance: *Campanula carpatica* and *Pinus sylvestris*. Here was a very high power of germination and regeneration from seeds of the species *Pinus sylvestris*-species for native vegetation in the area, pollute the species for Habitat 91Q0.

I tried also restoring „ex situ“ plant communities. The experiment succeeded both in pots and on ground vegetation skeletal (Annex 8).

Several species were collected, planted a few flower pots, using soil samples from both a career and a good soil fertility, taken from a different region. It was found a very good evolution of these species on both soil types, a great vitality, they thrived and even seized without any problems (Annex 8). This demonstrates once again that in the area there is a tremendous potential for ecological rehabilitation with natural regeneration of native species, the species also has a great potential, and anthropic pressure, obviously have a low intensity. The only thing I recommend is to spray with water regularly go on moving trucks with material on its way to siphoned Crusher. This would reduce dust and would be a much better development of vegetation, but also a development and an expansion of the Habitat 7220* (who is affected and because of dust, in addition to other disruptive factors).

Another study relating to ecological rehabilitation was achieved at the level of the step at which the exploitation rights were concluded. Thus, taking into account the native vegetation from the surrounding area of this steps, the observations with regard to the power of pine seed germination, viability, growth of the young trees already emerging, ecological conditions and other major factors, we proposed a scheme of afforestation which has the core species species *Pinus sylvestris*, presented in the table no. 1. Thus, for this area we can apply successfully the following reforestation scheme (Table No. 1). The planting distance was set at 2 x 1 m. We can see the basic species *Pinus sylvestris*, a genuine species forming a plant community right next to the wooded area. In addition to this species we've also used mix species having the role to support the other ones. This species I noticed that has an excellent grip here. For an area of 100 m² - 50 seedlings were necessary compared to 4/1 meaning a number of 40 of *Pinus sylvestris* and 10 mixed species. Mixing species were: *Fagus sylvatica*, *Picea excelsa* and *Acer pseudoplatanus*. Viability, increases, the degree of regeneration and plant's health of the trees in the area, legally justify way the introduction of sylvester pine in this area and in this type of resort. The weakening of the vitality is relatively good in the area Bicaz Chei Quarry for the arborets. In this area the trees vegetatează in soil conditions with yellowish brown podzolic soil acid, skeletal system, poor in humus thickness on the physiological 20-30 cm. In order to rehabilitate the area through arborets of pine after afforestation scheme proposed it was first conducted a complex study in terms of station, typological, silvobiologic, silvicultural, taxonomic, phytosanitary, databases fitting. The nature and intensity of the degradation of the land does not affect too much the development of the first *Pinus sylvestris* than 5-10 years. Soil conditions does not affect too much the development of the species *Pinus sylvestris*. It has a fairly good growth in heavy soil conditions such as rocky areas and very strong soils and heavily eroded even if they are superficial. The only problem is the soil clayey, but in the area of the Bicaz Quarry is not the case, so the *Pinus sylvestris* has good soil conditions for rehabilitation here. However, in the case of rehabilitation by planting the *Pinus sylvestris*, a good preparation of the land leading to a lifting of the rate and increases grip in the early years. Ecological rehabilitation in this area, using native species, the zone has a characteristic important for Habitat deosebită 91Q0 refacearea (species), but also for the fact that pine trees provides good protection of the soil, soil improvement, ground stabilisation, particularly in his youth. These the forest of *Pinus sylvestris* presents a very large role in terms of mat. *Pinus sylvestris* is characterizează and that of naturally regenerated. This has been observed in Bicaz Chei Quarry. This phenomenon occurs in areas of stâncărie, grohotișuri, stabilized slopes where this species has part of the light and has no competition from other woody species.

Tabel nr. 1

1	2	3	4	5	6	7	8	9	10
Pi	Pi	Pi	Pi	Pi	Pi	Pi	Pi	Pi	Pi
Pi	Pi	Pi	Pi	Pi	Pi	Pi	Pi	Pi	Pi
Pi	Pi	Pi	Pi	Pi	Pi	X-Fa	X-Mo	X-Fa	Pi
Pi	Pi	Pi	Pi	Pi	Pi	X-Mo	X-Fa	X-Pa	Pi
Pi	Pi	Pi	Pi	Pi	X-Pa	X-Fa	X-Pa	X-Pa	Pi

Legend:

Pi - *Pinus sylvestris*

1-10 no. rows

X – amestec specii

S=100 m²

Pa – *Acer pseudoplatanus*

Mo – *Picea excelsa*

Fa – *Fagus sylvatica*

In conclusion, *Pinus sylvestris* is the main species indicated to rehabilitate the area because it gives very good results at reămpădurirea degraded lands from the forest area, especially for subarea and the lower part of the fagului subzone molidului such as in our case.

Information and awareness actions

We gave particular attention to the process of computerization and awareness on environmental rehabilitation of mining quarries. So, this was carried out on three levels:

1. On the occasion of Environment Day -5 June in the International Student Symposium, organized by Agroforest Students Association, that we coordinate in the Faculty of Agronomy, University of Craiova, were presented aspects of ecological restoration in a quarry mining;

2. Participation my son to an important national contest "Environmental projects", organized in collaboration with the University of Iasi. My son made and presented the project,, MINING AND QUARRY-BISTRITA Biodiversity (VÂLCEA COUNTY). I coordinated the entire string of activities for accomplishing this project, which was awarded.

3. I attended to International E.S.N.A. Conference, organized by the University of Belgrade, Serbia, within which we presented "Diversity, distribution, ecology of the woody plant communities in the Bicaz Gorge Quarry" (Anexa 9).

CONCLUSIONS

"Recovery of landscape and ecosystem regaining the status of an area is mined phenomena of major importance in biodiversity conservation"

Bicaz Keys Quarry is a complex quarry in all aspects, with the likely ecological rehabilitation and restoration of the landscape. For good ecological rehabilitation in mining careers it is necessary first to know biodiversitatea in the area in all its complexity. Environmental issues in mining requires a systematic approach and sustainable environmental management techniques must be applied as fairly mining areas around the world. It is necessary to establish strategic principles and elements for ensuring sustainable development in a mining quarry. Biodiversity conservation is extremely important for me personally means the continuance of life on Earth, knowing and protecting biodiversity in all its complexity, involving several aspects: scientific, educational, social, economic, political, ethical, cultural. Local authorities need to do more and we all with them.

"We will never be grateful to the land that gave us everything" (C. Brâncuși)

Mention the ideal timing and estimated costs of implementation.

The investigated area including quarry mining Bicaz Chei is characterized by highly complex eco-pedo-climatic, geographic, flora and fauna, landscape, with a potential agro-tourist great around and with a population that preserves the traditions of the life that day day. To achieve such a study are required a minimum of 3 years. In this area the possibilities for ecological restoration, rehabilitation of biodiversity and landscape are very high. The substrate, climate and the current state of biodiversity conservation are elements that may positively influence this reconstruction. Estimated costs to realize such a project can reach approx. EUR 80,000

ACKNOWLEDGEMENTS

We would like to thank the Quarry Life project for supporting this work, and staff at CarepatCement Romania for their help and support during the project.

To be kept and filled in at the end of your report

Project tags (select all appropriate):

This will be used to classify your project in the project archive (that is also available online)

<p>Project focus:</p> <p>X Biodiversity management <input type="checkbox"/> Cooperation programmes <input checked="" type="checkbox"/> Education and Raising awareness <input checked="" type="checkbox"/> Endangered and protected species <input checked="" type="checkbox"/> Invasive species <input checked="" type="checkbox"/> Landscape management - rehabilitation <input checked="" type="checkbox"/> Rehabilitation <input checked="" type="checkbox"/> Scientific research <input checked="" type="checkbox"/> Soil management <input checked="" type="checkbox"/> Urban ecology <input checked="" type="checkbox"/> Water management</p> <p>Flora:</p> <p>X Conifers and cycads <input checked="" type="checkbox"/> Ferns <input checked="" type="checkbox"/> Flowering plants <input checked="" type="checkbox"/> Fungi <input checked="" type="checkbox"/> Mosses and liverworts</p> <p>Fauna:</p> <p><input checked="" type="checkbox"/> Amphibians <input checked="" type="checkbox"/> Birds <input type="checkbox"/> Dragonflies & Butterflies <input type="checkbox"/> Fish <input checked="" type="checkbox"/> Mammals <input checked="" type="checkbox"/> Reptiles <input type="checkbox"/> Spiders <input checked="" type="checkbox"/> Other insects <input checked="" type="checkbox"/> Other species</p>	<p>Habitat:</p> <p><input type="checkbox"/> Cave <input checked="" type="checkbox"/> Cliffs <input type="checkbox"/> Fields - crops/culture <input checked="" type="checkbox"/> Forest <input checked="" type="checkbox"/> Grassland <input checked="" type="checkbox"/> Human settlement <input checked="" type="checkbox"/> Open areas of rocky grounds <input checked="" type="checkbox"/> Recreational areas <input checked="" type="checkbox"/> Scree <input checked="" type="checkbox"/> Shrub & groves <input checked="" type="checkbox"/> Soil <input checked="" type="checkbox"/> Wander biotopes <input checked="" type="checkbox"/> Water bodies (flowing, standing) <input type="checkbox"/> Wetland</p> <p>Stakeholders:</p> <p><input type="checkbox"/> Authorities <input checked="" type="checkbox"/> Local community <input type="checkbox"/> NGOs <input checked="" type="checkbox"/> Schools <input checked="" type="checkbox"/> Universities</p>
---	---

Annex 1



Fig. 1. Quarry Bicaz Chei - The woody vegetation



Fig. 2. Quarry Bicaz Chei - The herbaceous vegetation dominated by species of *Campanula*

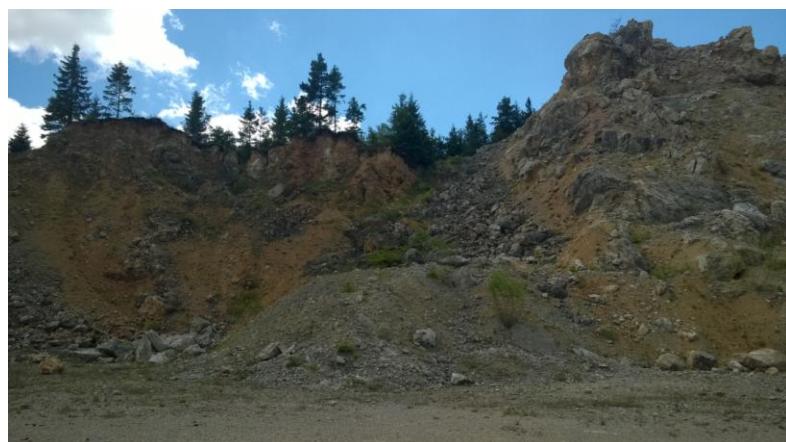


Fig. 3. In this area we found solutions for the restoration of habitats by maintaining structural diversity (both vertical and horizontal).



Fig. 4. Aspect de vegetație din teritoriul cercetat

ANNEX 2

FLORA FROM BICAZ CHEI QUARRY AND SURROUNDING AREAS MACROMYCETES

1. *Armillaria mellea* (Vahl.) Quélet Tr.
2. *Crepidoporus variabilis* (Schaeff.) Staude
3. *Coprinus disseminatus* (Pers.) J.E.Lange
4. *Coprinus lagopus* (Fr.) Redhead, Vilgalys & Moncalvo
5. *Coriolus versicolor* (L.) Quél. (*Trametes versicolor* (L.ex.Fr.) Fr.)
6. *Cortinarius anomalus* (Pr) Pr
7. *Cortinarius lepidotoides* T.S. Jeppesen & Frøslev
8. *Cortinarius purpurascens* Fr.
9. *Cortinarius sanguineus* (Wulfen) Gray
10. *Cortinarius varius* (Schaeff.) Fr.
11. *Flamulina velutipes* (Curtis) Singer
12. *Ganoderma lucidum* P.Karst
13. *Gymnoporus brassicola* (Schaeff.) Fr.
14. *Lactarius piperatus* (Scop.) S.F.Gray
15. *Laccaria amethystina* (Huds.) Cooke
16. *Laccaria laccata* (Scop.) Cooke
17. *Lactarius deterrimus* Gröger
18. *Lepista panaeolus* (Fr.) P. Karst.
19. *Mycena leptocephala* (Pers.) Gillet
20. *Pitoporus betulinus* (Bull. ex. Fr.) Karst.

21. *Pleurotus ostreatus* (Jacq.) P. Kumm.
22. *Polyporus squamosum* (Huds.) Quélet
23. *Pseudotrometes gibbosa* (Pers.) Bond. et Sing.
24. *Ramaria flava* (Schaeff.) Quél.
25. *Russula cyanoxantha* (Schaeff.) Fr.
26. *Russula emetica* (Schaeff.) Pers.
27. *Russula paludosa* Britzelm.
28. *Schizophyllum commune* Fr. (Syn. *S. alneum* (L.) Schroet.)
29. *Stereum hirsutum* (Willd: ex.Fr) S.F. Gray *Tremella mesenterica* Retz. ex Hook
30. *Trametes hirsuta* (Wulf.ex. Fr.) Pil (Syn. *Coriolus hirsutus*) (Wulf ex.Fr.) Quél.
31. *Tricholoma terreum* (Schaeff.) P.Kumm.
32. *Xerula radicata* (Rehman) Dörfelt

BRYOPHYTA

1. *Bryum pseudotriquetrum* (Hedw.) Gaertn. et. al.
2. *Cratoneuron commutatum* (Bird.) G. Roth. (Syn. *Palustriella commutata* Ochyra)
3. *Cratoneuron filicinum* Spruce
4. *Dicranum majus* Turner
5. *Dicranum scoparium* Hedwig
6. *Homalothecium* sp.
7. *Hylocomium splendens* (Hedw.) W.P. Schimp.
8. *Hypnum cupressiforme* Hedwig
9. *Leucobryum glaucum* Ångström in Fries
10. *Philonotis calcarea* (Bruch, Schimp. & W.Gümbel) Schimp.
11. *Philonotis fontana* Hedwig
12. *Philonotis seriata* Mitt.
13. *Pleurozium schreiberi* (Brid) Mitt.
14. *Rhizomium punctatum* Hedwig
15. *Sphagnum girgensohnii* Russow

PTERIDOPHYTA

1. *Asplenium ruta-muraria* L.
2. *Asplenium viride* Hudson
- 3 *Asplenium trichomanes* L.
4. *Athyrium filix-femina* (L.) Roth
5. *Cystopteris fragilis* (L.)
6. *Ceterach officinarum* Willd.
7. *Dryopteris filix-mas* (L.) Schott
8. *Dryopteris disjuncta* (Rupr.) Morton
8. *Equisetum aevense* L.
9. *Equisetum palustre* L.
10. *Equisetum sylvaticum* L.
11. *Equisetum telmateia* Ehrh. (*E. maximum* Lam.)
12. *Gymnocarpium dryopteris*(L.) Newman (*Dryopteris disjuncta* (Rupr.) Norton)
13. *Gymnocarpium robertianum* (Hoffman) Newman (*Dryopteris robertiana* (Hoffm.) Christensen, *Phegopteris robertiana* (Hoffm.) Al. Br.)
14. *Lycopodium selago* (L) Bernh. (*Huperzia selago* L.)
15. *Polypodium vulgare* L, G, Cp(Bor)
16. *Pteridium aquilinum* (L.) Kuhn
17. *Phyllitis scolopendrium*
18. *Selaginella helvetica* (L.) Spring.

SPERMATOPHYTA

PINOPHYTINA (GYMNOSPERMAE)

1. *Abies alba* Miller (*A. pectinata* (Lam.) DC).
2. *Juniperus communis* L.

3. *Juniperus sabina* L.
4. *Larix decidua* subsp. *carpathica*
5. *Picea abies* (L.) Karsten (*Picea excelsa* Lam., *Pinus abies* L.)
6. *Pinus nigra* Arnold (cultivat)
7. *Pinus sylvestris* L.
8. *Taxus baccata* L.

MAGNOLIOPHYTINA (ANGIOSPERMAE)

DICOTYLEDONEAE

1. *Aconithum firmum* Reichenb.
2. *Aconithum moldavicum* Hacq.
3. *Aconithum romanicum* Woloszczak (Lit.)
4. *Aconithum toxicum* Reichenb.
5. *Asarum europaeum* L.
6. *Aristolochia clematitis* L.
7. *Actaea spicata* L.
8. *Anemone nemorosa* L. ssp. *nemorosa*
9. *Anemone ranunculoides* L.
10. *Aquilegia nigricans* Baumg.
11. *Hepatica transsylvanica* Fuss.
12. *Helleborus purpurascens* Waldst. et Kit.
13. *Clematitis alpina* vitalba L.
14. *Ranunculus acris* L.
15. *Ranunculus auricomus* L.
16. *Ranunculus bulbosus* L.
17. *Ranunculus carpathicus*
18. *Ranunculus ficaria* L. (*Ficaria verna* Hudson)
19. *Ranunculus repens* L..
20. *Ranunculus sceleratus* L.
21. *Thalictrum aquilegiifolium* L.
22. *Trollius europaeus* (Lit.)

PAPAVERACEAE

23. *Chelidonium majus* L.
24. *Papaver rhoeas* L.

FUMARIACEAE

25. *Corydalis cava* Schweigg. Et Koerte (*C. bulbosa* auct.)
26. *Corydalis capnoides* (brebenei) (L.)

ULMACEAE

27. *Ulmus laevis* Pallas (*U. Effusa* Wild.)
28. *Ulmus glabra* Huds. (*Ulmus montana* Stokes, *Ulmus scabra* Miller).

CANNABINACEAE

29. *Humulus lupulus* L.

URTICACEAE

30. *Urtica dioica* L.
31. *Urtica urens* L.
32. *Parietaria officinalis* L. (*P. erecta* Mert. et Koch)

JUGLANDACEAE

34. *Juglans regia* L.

FAGACEAE

35. *Fagus sylvatica* L.

36. *Quercus petraea* (Matt.) Liebl.

BETULACEAE

- 37. *Alnus glutinosa* (L.) Gaertn.
- 38. *Alnus incana* (L.) Moench
- 39. *Betula pendula* Roth (*Betula verrucosa* Ehrh.)
- 40. *Carpinus betulus* L.

CORYLACEAE

- 41. *Corylus avellana* L.

PORTULACACEAE

- 42. *Portulaca oleracea* L.

CARYOPHYLLACEAE

- 43. *Arenaria biflora* L.
- 44. *Arenaria serpyllifolia* L.
- 45. *Cerastium arvense* L. ssp. *calcicollum* (Schur) Borza
- 46. *Cucubalus baccifer* L.
- 47. *Dianthus armeria* L.
- 48. *Dianthus carthusianorum* L.
- 49. *Dianthus spiculifolius* Schur.
- 50. *Dianthus tenuifolius* Schur.
- 51. *Gypsophyla muralis* L.
- 52. *Gypsophila petraea* (Baumg.) Reichenb.
- 53. *Lychnis flos-cuculi* L. Greut. Et Burd.
- 54. *Lychnis viscaria* L.
- 55. *Sagina saginoides* (L.) Karsten.
- 56. *Spergularia rubra* (L.) J. et C. Presl.
- 57. *Moehringia muscosa* L.
- 58. *Moehringia trinervia* (L.) Clairv.
- 59. *Silene alba* (Mill) E. H. L. Krause
- 60. *Silene heuffeli* Soo.
- 61. *Silene nutans* ssp. *dubia* (Herb.) Zapal.
- 62. *Silene zawadzkii* Herbich.
- 63. *Scleranthus annuus* L.
- 64. *Stellaria graminea* L.
- 65. *Stellaria holostea* L.
- 66. *Stellaria media* (L.) Vill.
- 67. *Stellaria nemorum* L.
- 68. *Saponaria officinalis* L.

CHENIPODIACEAE

- 69. *Chenopodium album* L.
- 70. *Chenopodium foetidum* Lam.

POLYGONACEAE

- 71. *Polygonum aviculare* L.
- 72. *P. convolvulus* L. (*Fagopyrum convolvulus* (L.) H. Gross.)
- 73. *P. dometorum* L. (*Fagopyrum dometorum* (L.) Schreb.)
- 74. *P. hydropiper* L.
- 75. *P. lapathifolium* L.
- 76. *P. persicaria* L.
- 77. *Rumex acetosa* L.
- 78. *R. crispus* L.
- 79. *R. obtusifolius* L.

SAXIFRAGACEAE

80. *Jovibarba globifera* (L.) J. Parnell (*Sempervivum globiferum* L.)
81. *Jovibarba sobolifera* (J. Sims) Opiz.
82. *Sedum annum* L.
83. *Sedum hispanicum* L.
84. *Sedum vulgare* (Haw.) Link. (*S. fabaria* Koch) Koch.
85. *Sedum maximum* (L.) Hoffm. (*Sedum telephium* L. ssp. *maximum* (L.) Krocker)
86. *Sedum telephium* L. s.str. (*S. telephium* ssp. *telephium*; *S. purpureum* (L.) Schultes; *S. purpurascens* Koch)
87. *Sempervivum zeleborii* Schott (*S. ruthenicum* aucz. Non Scitisp. Et C.B. Lehm.)
88. *Saxifraga aizoides* L.
89. *Saxifraga cuneifolia* L.
90. *Saxifraga luteo - viridis* L.
91. *Saxifraga paniculata* Miller (*Saxifraga aizoon* Jacq.)
92. *Parnassia palustris* L.

GROSSULARIACEAE

93. *Ribes nigrum* L. (Lit.)

ROSACEAE

94. *Agrimonia eupatoria* L.
95. *Alchemilla vulgaris* L. emd. Frohner (*A. acutiloba* Opiz; *A. vulgaris* L. ssp. *acutangulata* (Buser))
96. *Crataegus monogyna* Jacq. s.l.
97. *Filipendula ulmaria* (L.) Maxim.
98. *Filipendula vulgaris* Moench (*Filipendula hexapetala* Gilib.)
99. *Fragaria vesca* L.
100. *Fragaria viridis* Duch.
101. *Geum rivale* L.
102. *Geum urbanum* L.
103. *Malus sylvestris* Mill.
104. *Potentilla anserina* L.
105. *Potentilla argentea* L.
106. *Potentilla reptans* L.
107. *Prunus avium* L. (*Cerasus avium* (L.) Moench.)
108. *Prunus padus* L. (*Cerasus padus* (L.) Delarbret)
109. *Prunus spinosa* L.
110. *Pyrus piraster* Burgsd.
111. *Rosa canina* L.
112. *Rubus candicans* Weihe
113. *Rubus hirtus* W. et K.
114. *Rubus fruticosus* L. (*R. plicatus* Weihe et Nees)
115. *Sanguisorba minor* Scop.
116. *Sorbus aucuparia* L.
117. *Spiraea chamaedryfolia* L. (*Spiraea ulmifolia* Scop.)

FABACEAE

118. *Anthyllis vulneraria* L.
119. *Astragalus cicer* L.
120. *A. glycyphyllos* L.
121. *Astragalus pseudopurpureus* Gusul.
122. *Astragalus römeri* Simonkai
123. *Chamaecytisus hirsutus* (L.) Link (*Cytisus hirsutus* L. ssp. *hirsutus*, *Cytisus leucotrichus* Schur)
124. *Chamaecytisus albus* (Hacq.) Rothm.
125. *Dorycnium herbaceum* Vill.
126. *Genistella sagittalis* L. (*Genista sagittalis* L.; *Chamaespartium sagittale* (L.) P. Gibbs)
127. *Genista tinctoria* L. (incl. *Genista oligosperma* Simonkai)
128. *Lathyrus aphaca* L.
129. *Lathyrus pratensis* L.

- 130. *Lathyrus sylvestris* L.
- 131. *Lathyrus vernus* (L.) Bernh.
- 132. *Lotus corniculatus* L.
- 134. *Medicago lupulina* L.
- 135. *Medicago sativa* L.
- 136. *Melilotus albus Medicus*
- 137. *Melilotus officinalis* (L.) Pall.
- 138. *Onobrychis montana* subsp. *transsilvanica*
- 139. *Ononis spinosa* L.
- 140. *Oxytropis carpatica* Uechtr.
- 141. *Robinia pseudocacia* L.
- 142. *Trifolium medium*
- 143. *Trifolium montanum* L.
- 144. *Trifolium pannonicum* Jacq.
- 145. *Trifolium pratense* L.
- 146. *Trifolium repens* L.
- 147. *Vicia cracca* L.
- 148. *Vicia hirsutum* (L.) S.F..Gray.
- 149. *Vicia grandiflora* Scop.

ONAGRACEAE

- 150. *Circaea lutetiana* L.
- 151. *Epilobium alsinifolium* Vill.
- 152. *Epilobium angustifolium* (L.) Scop. (*Chamaenerion angustifolium* (L.) Scop.)
- 153. *Epilobium hirsutum* L.

LYTRACEAE

- 154. *Lytrum salicaria* L.
- 155. *Lytrum virgatum* L.

ACERACEAE

- 156. *Acer campestre* L.
- 157. *Acer platanoides* L.
- 158. *Acer pseudoplatanus* L.

OXALIDACEAE

- 159. *Oxalis acetosella* L.
- 160. *Oxalis corniculata* L.

LINACEAE

- 161. *Linum catharticum* L.

GERANIACEAE

- 162. *Erodium cicutarium* (L.) L'Heritier
- 163. *Geranium macrorhizum* L.
- 164. *Geranium phaeum* L.
- 165. *Geranium robertianum* L.
- 167. *Geranium sylvaticum* L.

BALSAMINACEAE

- 168. *Impatiens glandulifera* Royle (*Impatiens roylei* Walpers)
- 169. *Impatiens noli-tangere* L.

POLYGALACEAE

- 170. *Polygala amara* L.
- 171. *Polygala major* Jacq
- 172. *Polygala vulgaris* L.

CELASTRACEAE

- 173. *Euonymus europaea* L.
- 174. *Euonymus verrucosa* Scop.
- 175. *Frangula alnus* Mill.
- 176. *Loranthus europaeus* Jacq.

SIMAROUBACEAE

- 177. *Ailanthus altissima* (Miller) Swingle

EUPHORBIACEAE

- 178. *Euphorbia amygdaloides* L.
- 179. *Euphorbia cyparissias* L
- 180. *Mercurialis perennis* L.

THYMELAEACEAE

- 181. *Daphne mezereum* L.
- 182. *Daphne cneorum* L.

ARALIACEAE

- 183. *Hedera helix* L.

APIACEAE (UMBELLIFERAEE)

- 184. *Aegopodium podagraria* L.
- 185. *Angelica archangelica* L.
- 186. *Angelica sylvestris* L.
- 187. *Astrantia major* L.
- 188. *Bupleurum falcatum*
- 189. *Carum carvi* L.
- 191. *Chaerophyllum aromaticum* L.
- 192. *Chaerophyllum hirsutum* L. (*C. cicutaria* Vill.)
- 193. *Cicuta virosa* L.
- 194. *Cnidium dubium* (Schkuhr) Thell.
- 195. *Conium maculatum* L.
- 196. *Conioselinum tataricum*
- 198. *Daucus carota* L.
- 199. *Heracleum sphondylium* L.
- 200. *Peucedanum oreoselinum* (L.) Moench
- 201. *Pimpinella major* (L.) Huds.
- 202. *Pimpinella saxifraga* L.
- 203. *Sanicula europaea* L.
- 204. *Seseli libanotis* L.
- 205. *Selinum carvifolia* (L.) L.

HYPERICACEAE

- 206. *Hypericum hirsutum* L.
- 207. *H. perforatum* L.

VIOLACEAE

- 208. *Viola arvensis* Murray
- 209. *Viola biflora* L
- 210. *Viola canina* L.
- 211. *Viola dacica* Borbas.
- 212. *Viola declinata* Waldst. et Kit.
- 213. *Viola joói* Janka

- 214. *Viola montana* L.
- 215. *Viola reichenbachiana* Jord. (*V.sylvestris* Lam.pro parte)
- 216. *Viola tricolor* L.s.l.

CISTACEAE

- 217. *Helianthemum nummularium* (L.) Mill.

TAMARICACEAE

- 218. *Myricaria germanica* (L.) Desv.

BRASSICACEAE

- 219. *Alliaria petiolata* (Bieb.) Cavara et Grande (*A.officinalis* Andrz.)
- 220. *Arabis alpina* L.
- 221. *Alyssum repens* L.
- 222. *Cardaria draba* (L.) Desv. (*Lepidium draba* L.)
- 223. *Capsella bursa –pastoris* (L.) Medicus
- 224. *Cardamine amara* L.
- 225. *Cardamine impatiens* L..
- 226. *Cardamine pratensis* L.
- 227. *Cardaminopsis arenosa* (L.) Hayek
- 228. *Dentaria bulbifera* L. (*Cardamine bulbifera* (L.) Cr.)
- 229. *Dentaria glandulosa* W. et K. (*Cardamine glanduligera* Schw.)
- 230. *Descurainia sophia* (L.) Webb (*Sisymbrium sophia* L.)
- 231. *Draba kotschy* Stur.
- 232. *Erophila verna* (L.) Chevall. (*Draba verna* L.)
- 233. *Erysimum wittmanni* ssp. *transsilvanicum*
- 234. *Hesperis matronalis* L.
- 235. *Lepidium campestre* (L.) R.Br.
- 236. *Rorippa austriaca* (Cr.)Bess.
- 237. *R. sylvestris* (L.) Bess.
- 238. *Sisymbrium officinale* (L.) Scop.
- 239. *Thlaspi arvense* L.
- 240. *Thlaspi perfoliatum* L.

SALICACEAE

- 241. *Populus alba* L.
- 242. *Populus nigra* L.
- 243. *Populus tremula* L.
- 244. *Salix alba* L.
- 245. *Salix caprea* L.
- 246. *Salix fragilis* L.
- 247. *Salix purpurea* L.
- 248. *Salix triandra* L.

CUCURBITACEAE

- 249. *Bryonia alba* L.

TILIACEAE

- 250. *Tilia platyphyllos* Scop.
- 251. *T. tomentosa* Moench

MALVACEAE

- 252. *Malva sylvestris* L. (*Malva erecta* C.Presl)

CORNACEAE

- 253. *Cornus mas* L.
- 254. *C. sanguinea* L.

ERICACEAE

- 255. *Monotropa hypopytis*
- 256. *Vaccinium myrtillus* L.-Car. Vaccinio-Piceetalia; (nPh) Ch, Cp(bor); 2n=24, D; U0T2R1.
- 257. *Vaccinium vitis-idaea* L.- Car. Vccinio-Piceetalia; (nPh) Ch, Cp; 2n=24, D; U3T2R1.

PYROLACEAE

- 258. *Moneses uniflora* (L.) A.Gray (*Pyrola uniflora* L.)
- 259. *Orthilia secunda* (L.) House (*Pyrola secunda* L.)

PRIMULACEAE

- 260. *Androsace villosa* L. ssp. *arachnoidea*
- 261. *Lysimachia nummularia* L.
- 262. *Lysimachia vulgaris* L.
- 263. *Primula veris* L.em Huds (*P. officinalis* (L.) Hill)
- 264. *Primula elatior* (L.) Hill.ssp. *leucophylla*
- 265. *Soldanella hungarica* Simk. ssp.*major* (Neilr.)

GENTIANACEAE

- 266. *Gentiana asclepiadea* L.
- 267. *Gentiana cruciata* L.
- 267. *Gentiana lutea* L.
- 268. *Gentiana phlogifolia* Schott. et Kotschy
- 269. *Gentiana pneumonanthe* L.

APOCYNACEAE

- 270. *Vinca minor* L.

ASCLEPIADACEAE

- 271. *Vincetoxicum hirundinaria* Medicus (*Cynanchum vincetoxicum* (L.) Pers.)

RUBIACEAE

- 272. *Asperula capitata* Kit.
- 273. *Asperula taurina* L.
- 274. *Cruciata glabra* (L.) Ehrend. (*Galium vernum* Scop.)
- 275. *Galium album* Mill. (*G.erectum* Hudson)
- 276. *Galium anisophyllum* Vill.
- 277. *Galium aparine* L.
- 278. *G. kitaibelianum* Schultes et Schultes
- 279. *Galium mollugo* L.
- 280. *Galium odoratum* (L.) Scop. (*Asperula odorata* L.)
- 281. *Galium rotundifolium*
- 282. *Galium schultesii* Vest
- 283. *Gallum verum* L.

OLEACEAE

- 284. *Fraxinus excelsior* L.
- 285. *Ligustrum vulgare* L.
- 286. *Syringa vulgaris* L.

DIPSACALES

CAPRIFOLIACEAE

- 287. *Lonicera xylosteum* L.
- 288. *Sambucus ebulus* L.
- 289. *Sambucus nigra* L.
- 290. *Sambucus racemosa* L.

- 291. *Viburnum lantana* L.
- 292. *Viburnum opulus* L.

VALERIANACEAE

- 293. *Valeriana officinalis* L.
- 294. *Valerianella locusta* (L.) Laterrade

DIPSACACEAE

- 295. *Dispacus fullonum* L.
- 296. *Knautia arvensis* (L.) Coul.
- 297. *K. dipsacifolia* Kreutzer (*K. sylvatica* (L.) Duby nom. ambig.)
- 298. *Scabiosa lucida* Vill. ssp. *barbata*
- 299. *Scabiosa ochroleuca* L.

CONVOLVULACEAE

- 300. *Calystegia sepium* (L.) R.Br.
- 301. *Convolvulus arvensis* L.

CUSCUTACEAE

- 302. *Cuscuta epithymum* (L.) L. (*Cuscuta alba* C.Presl; *Cuscuta trifolii* Bab.)

SOLANACEAE

- 303. *Atropa bella-donna* L.
- 304. *Datura stramonium* L.
- 305. *Lycium barbarum* L. (*L. halimifolium* Miller)
- 306. *Physalis alkekengi* L.
- 307. *Solanum dulcamara* L.
- 308. *Solanum nigrum* L.

BORAGINACEAE

- 309. *Anchusa officinalis* L.
- 310. *Echium vulgare* L.
- 311. *Myosotis alpestris* F.W.Schmidt
- 312. *M. sparsiflora* Mikan., Th, Eua(Cont)
- 313. *Myosotis sylvatica* (Ehrh.) Hoffm.
- 314. *Pulmonaria officinalis* L.
- 315. *Pulmonaria rubra* Schott
- 316. *Symphytum cordatum* W. et K.
- 317. *Symphytum officinale* L.

SCROPHULARIACEAE

- 318. *Digitalia grandiflora* Mill.
- 319. *Euphrasia stricta* D.Wolff
- 320. *Lathraea squamaria* L.
- 321. *Linaria vulgaris* Mill.
- 322. *Melampyrum arvense* L.
- 323. *Melampyrum saxosum* Baumg.
- 324. *Melampyrum sylvaticum* L.
- 325. *Rhinanthus minor* L.
- 326. *Rhinanthus rumelicus* Velen.
- 327. *Rhynanthus alectorolophus*
- 328. *Scrophularia heterophylla* ssp. *laciniata*
- 329. *Scrophularia nodosa* L.
- 330. *Verbascum lanatum* L.
- 331. *Verbascum nigrum* L.
- 332. *Verbascum phlomoides* L.

- 333. *Verbascum phoeniceum* L.
- 334. *Veronica anagallis-aquatica* L.
- 335. *Veronica beccabunga* L.
- 336. *Veronica chamaedrys* L.
- 337. *V. hederifolia* L. Th, Eua(Med), U2,5T3R4, 2n-54, P.
- 338. *Veronica officinalis* L.
- 339. *Veronica urticifolia* Jacq.

PLANTAGINACEAE

- 340. *Plantago lanceolata* L.
- 341. *Plantago major* L.

VERBENACEAE

- 342. *Verbena officinalis* L.

LAMIACEAE

- 345. *Ajuga genevensis* L.
- 346. *Ajuga reptans* L.
- 347. *Ballota nigra* L.
- 348. *Calamintha acinos* (L.) Clairv.
- 349. *Clinopodium vulgare* L. (*Calamintha clinopodium* Bentham)
- 350. *Galeopsis speciosa* Mill.
- 351. *Glechoma hederacea* L.
- 352. *Lamium galeobdolon* (L.) L.
- 353. *Lamium maculatum* L.
- 354. *Lamium purpureum* L.
- 355. *Leonurus cardiaca* L.
- 356. *Lycopus europaeus* L.
- 357. *Mentha longifolia* (L.) Hudson.
- 358. *Origanum vulgare* L.
- 359. *Prunella vulgaris* L.
- 360. *Salvia glutinosa* L.
- 361. *Salvia nemorosa* L.
- 362. *Salvia pratensis* L.
- 363. *Stachys germanica* L.
- 364. *Stachys sylvatica* L.
- 365. *Teucrium chamaedrys* L.
- 366. *Thymus bihorensis* Jalas.
- 367. *Thymus balcanus* Borbas (T. *praecox* Opiz ssp. *skorpilii* (Velen.) Jalas)
- 368. *Thymus comosus* Heuffel.
- 369. *Thymus jankae* Cel.
- 370. *Thymus pulcherimus* Schur.
- 371. *Thymus pulegioides* L.

CAMPANULACEAE

- 372. *Campanula carpatica* Jacq.
- 373. *Campanula cervicaria* L.
- 374. *Campanula glomerata* L. f. *aberans*
- 375. *Campanula napuligera* Schur.
- 376. *Campanula kladniana* (Schur.) Witasek
- 377. *Campanula polymorpha* Witasek
- 378. *Campanula patula* L. ssp. *patula*
- 379. *Campanula patula* L. ssp. *abietina* (Gris.) Simonkai
- 380. *Campanula persicifolia* L.
- 381. *Campanula rapunculoides* L.
- 380. *Campanula rotundifolia* L.
- 381. *Campanula trachelium* L.

382. *Phyteuma vagneri* A. Kerner

ASTERACEAE

- 383. *Achillea crihtmifolia* W. et K.
- 384. *Achillea distans* W. et K.
- 385. *Achillea millefolium* L.
- 386. *Achillea ptarmica* L.
- 387. *Achillea schurii* Sch. Bip.
- 388. *Arctium lappa* L.
- 389. *Arctium tomentosum* Miller.
- 390. *Artemisia absinthium* L.
- 391. *Bellis perennis* L.
- 392. *Bidens cernua* L.
- 393. *Bidens tripartitus* L.
- 394. *Carduus acanthoides* L.
- 395. *Carlina vulgaris* L. ssp. *brevibracteata*
- 396. *Centaurea atropurpurea* Waldts. Et Kit.
- 397. *Centaurea cyanus* L.
- 397. *Centaurea nigrescens* Willd.
- 398. *Centaurea triumfetti* subsp. *pinnatifida*
- 399. *Centaurea phrygia* L. ssp. *phrygia* (*C.austriaca* Willd.)
- 400. *Centaurea rhenana* Boreau.
- 401. *Cichorium intybus* L.
- 402. *Cirsium arvense* (L.) Scop.
- 403. *Cirsium canum* (L.) All.
- 404. *Cirsium furiens* Gris. et Sch.
- 405. *Cirsium oleraceum* (L.) Scop.
- 406. *Cirsium vulgare* (Savi) Ten. (*Cirsium lanceolatum* (L.) Scop.)
- 407. *Cirsium candelabrum* Griseb.
- 408. *Conyza canadensis* (L.) Cronq. (*Erigeron canadensis* L.)
- 409. *Crepis biennis* L.
- 410. *Crepis paludosa* (L.) Moench.
- 411. *Doronicum carpathicum* (Gr. et Sch.) Nym.
- 412. *Erigeron annus* (L.) Pers. (*Stenactis annua* (L.) Nees)
- 413. *Erigeron acris* L.
- 414. *Eupterium cannabinum* L.
- 415. *Filago arvensis* L. (*Logfia arvensis* (L.) J. Holub)
- 416. *Galinsoga parviflora* Cav.
- 417. *G. ciliata* (Rafin.) Blake (*G. quadriradiata* Ruiz et Pavon).
- 418. *Aposeris foetida* L.
- 419. *Hieracium aurantiacum* L.
- 420. *Hieracium bauhini* Besser
- 421. *Hieracium murorum* L. (*Hieracium sylvaticum* (L.) Grubf.)
- 422. *Hieracium pilosella* L.
- 423. *Hieracium pojoritense* Woloszczak
- 424. *Hieracium rotundatum* Kit. (*H. transsilvicum* Heuffel)
- 425. *Homogyne alpina* (L.) Cass.
- 426. *Inula britannica* L.
- 427. *Inula ensifolia* L.
- 428. *Inula salicina* L.
- 429. *Inula conyza* DC.
- 430. *Lapsana communis* L.
- 431. *Leontodon hispidus* L.
- 432. *Leontopodium alpinum* Cass.
- 433. *Leucanthemum vulgare* Lam. (*Chrysanthemum leucanthemum* L.)
- 434. *Leucanthemum waldsteinii* (Schultz Bip.) Pouzar (*Chrysanthemum rotundifolium* W. et K.)
- 435. *Matricaria perforata* Mérat (*Matricaria inodora* L. nom. illegit, *Tripleurospermum inodorum* Schultz-Bip)

- 436. Matricaria recutita L. (*Chamomilla recutita* (L.) Rauschert)
- 437. Mycelis muralis (L.) Dumort
- 438. Petasites albus (L.) Gaertn.
- 439. Petasites hybridus (L.) P.Gaertner, B.Meyer et Schreb.
- 440. Picris hieracioides L.
- 441. Pulicaria dysenterica (L.) Bernh.,
- 444. Senecio erucifolius L.
- 445. Senecio vernalis Waldst.et Kit.
- 446. Senecio viscosus L.
- 447. Senecio vulgaris L.
- 448. Serratula tinctoria L.
- 449. Solidago virgaurea L.
- 450. Sonchus arvensis L.
- 451. Sonchus oleraceus Gou.
- 452. Tanacetum corymbosum (L.) Schultz Bip.(*Fischer ex Reichenb.*) Heywood (*Crysanthemum corymbosum* L. var.*clusii* (*Fischer*) Posp.)
- 453. Tanacetum vulgare L.
- 454. Taraxacum officinale Agg. Weber
- 455. Telekia speciosa (Schreb.) Baumg.
- 456. Tragopogon pratensis L.
- 457. Tusilago farfara L.
- 458. Xanthium strumarium L.
- 459. Scorzonera rosea L.

LILIOPSIDA

ALISMATACEAE

- 460. Alisma plantago-aquatica L.

DIOSCOREACEAE

- 461. Tamus communis L.

LILIACEAE

- 462. Polygonatum latifolium (Jacq.) Desf.
- 463. Polygonatum odoratum (Mill.) Druce
- 464. Polygonatum verticillatum (L.) All.
- 465. Scilla bifolia L.
- 466. Veratrum album L.
- 467. Colchicum autumnale L.
- 468. Lilium martagon L.
- 469. Gagea minima (L.) Ker. Gaweler.

IRIDACEAE

- 470. Crocus vernus (L.) Hill (*Crocus heuffelianus* herb.)
- 478. Gladiolus imbricatus L.

ALLIACEAE

- 479. Allium ursinum L.
- 480. Allium flavum L.

AMARYLLIDACEAE

- 481. Galanthus nivalis L.
- 482. Leucojum vernum L.

ORCHIDACEAE

- 483. Cephalanthera damasonium (Miller.) Druce.
- 484. Cephalanthera rubra (L.) L. C. Richard
- 485. Coeloglossum viride (L.) Hartman.

- 486. *Cypripedium calceolus* (Lit.)
- 487. *Dactyloriza maculata* (L.) Soó (*Orchis maculata* L.)
- 488. *Epipactis helleborine* (L.) Cr.
- 489. *Epipactis atrorubens* (Hoffm.) Besser.
- 490. *Gymnadenia conopsea* (L.) R.Br.
- 491. *Gymnadenia odoratissima* L.
- 492. *Listera ovata* (L.) R.Br.
- 493. *Listera cordata* (L.) R.Br.
- 494. *Neottia nidus-avis* (L.) L.C.M.Rich.
- 495. *Nigritella rubra* (Lit.)
- 496. *Orchis tridentata* Scop.
- 497. *Platanthera bifolia* (L.) L.C.M.Rich.
- 498. *Platanthera chlorantha* (Custer) Reinchenb.
- 499. *Pseudorchis albida* (L.) A.et D.Löve

JUNCACEAE

- 500. *Juncus bufonius* L.
- 501. *Juncus effusus* L.
- 502. *Juncus tenius* Willd.
- 503. *Juncus thomasii* Ten.
- 504. *Luzula campestris* (L.) DC.
- 505. *Luzula luzuloides* (Lam.) Dandy et Wilmott
- 506. *Luzula sylvatica* (Huds.) Gaud.

CYPERACEAE

- 507. *Carex appropinquata* Scumacher
- 508. *Carex caryophyllea* Latourr.
- 509. *Carex digitata* L.
- 510. *Carex elongata* L.
- 511. *Carex flava* L.
- 512. *Carex hirta* L.
- 513. *Carex humilis* Leysser.
- 514. *Carex pilosa* Scop.
- 515. *Carex remota* L.
- 516. *Carex riparia* Curt.
- 517. *C. sempervirens* Vill.
- 518. *Carex sylvatica* Huds.
- 519. *Carex vulpina* L.
- 520. *Eleocharis palustris* (L.) Roemer et Schultes
- 521. *Scirpus sylvaticus* L.

TYPHACEAE

- 522. *Typha latifolia* L.

POACEAE

- 523. *Agrostis capillaris* L. (*A.tenuis* Sibth.)
- 524. *Agrostis stolonifera* L. (*Agrostis alba* auct.)
- 525. *Alopecurus pratensis* L.
- 526. *Anthoxanthum odoratum* L.
- 527. *Arrhenatherum elatius* (L.) Beauv.
- 528. *Botriochloa ischaemum* (L.) Keng.
- 529. *Brachypodium pinnatum* (L.) Beauv.
- 530. *Brachypodium sylvaticum* (Huds.) Beauv.
- 531. *Briza media* L.
- 532. *Bromus arvensis* L.
- 533. *Bromus sterilis* L.
- 534. *Calamagrostis arundinacea* (L.) Roth

- 535. *Catabrosa aquatica* (L.) Beauv.
- 536. *Chrysopogon gryllus* (L.) Trin.
- 537. *Cynodon dactylon* (L.) Pers.
- 538. *Cynosurus cristatus* L.
- 539. *Dactylis glomerata* L.
- 540. *Danthonia decumbens* (L.) DC.
- 541. *Deschampsia caespitosa* (L.) Beauv.
- 542. *Deschampsia flexuosa* (L.) Trin.
- 543. *Digitaria sanguinalis* (L.) Scop.
- 544. *Festuca arundinacea* Schreb.
- 545. *Festuca drymeia* Mert. et Koch
- 546. *Festuca gigantea* (L.) Vill.
- 547. *Festuca nigrescens* Lam. (*Festuca rubra* L. ssp. *commutata* Gaudin)
- 548. *Festuca ovina* L.
- 549. *Festuca pallens* Host.
- 550. *Festuca porcii* Hackel.
- 551. *Festuca scoparia* ssp. *lutea*
- 552. *Festuca pratensis* Huds.
- 553. *Festuca rubra* L.
- 554. *Festuca rupicola* Heuff.
- 555. *Festuca valesiaca* Scheicher
- 556. *Festuca versicolor* Tausch.
- 557. *Helictotrichon versicolor* (Vill.) Pilger (*Avenula versicolor* (Vill.) Lainz)
- 558. *Helictotrichon decorum* (Janka.) Henrard
- 559. *Holcus lanatus* L.
- 560. *Hordeum murinum* L.
- 561. *Lolium perenne* L.
- 562. *Melica uniflora* Retz.
- 563. *Melica ciliata* L. (Janka.) Henrard
- 564. *Phalaris arundinaceae* L. (*Typhoides arundinaceae* (L.) Moench)
- 565. *Phleum pratense* L.
- 566. *Poa annua* L.
- 567. *Poa nemoralis* L.
- 568. *Poa pratensis* L.
- 569. *Poa rehmannii* (A. et G.) Woloszczak
- 570. *Poa trivialis* L.
- 571. *Sesleria bielzii* Schur.
- 572. *Sesleria coerulans* Friv.
- 573. *Trisetum macrotrichum*

ARACEAE

- 574. *Arum maculatum* L. s.l. (an *Arum alpinum* Schott et Kotschy)

LEMNACEAE

- 575. *Lemna minor* L.

Annex 3



Fig. 1. *Mycena leptocephala* (Pers.) Gillet



Fig. 2. *Laccaria amethystina* (Huds.) Cooke



Fig. 3. *Inula ensifolia*



Fig. 4. *Primula elatior* subsp. *leucophylla*



Fig. 5. *Epipactis atrorubens*



Fig. 6. *Campanula carpatica*



Fig. 7. *Campanula rapunculoides*



Fig. 8. *Campanula persicifolia*



Fig. 9. *Campanula patula* ssp. *abietina*



Fig. 10. *Thymus jankae*

ANNEX NO. 4

Ass. *Leucobryo - Pinetum* Matuszkiewicz
Table no. 1

No. of relevée	1	2	3	4	5	K
Altitude m.o.s. (x 10 m)	82	80	85	95	100	
Exposure	V	S	NE	SE	NE	
Inclination (in grades)	20	35	15	40	5	
Canopy (%)	0,6	0,6	0,6	0,6	0,6	
Coverage of herbaceous layer (%)	30	45	35	50	60	
Area (m ²)	400	400	400	400	400	
Char. ass.						
<i>Pinus sylvestris</i>	4	4	4	4	4	V
<i>Hypnum cupressiforme</i>	1	1	1	1	1	V
Pino-Quercion						
<i>Calamagrostis arundinacea</i>	+	-	+	+	+	IV
<i>Chamaecytisus hirsutus</i>	+	+	+	+	+	V
<i>Veronica officinalis</i>	+	-	+	+	-	III
Seslerio rigidae-Pinion						
<i>Helianthemum nummularium</i>	+	+	+	1	1-2	V
<i>Teucrium chamaedrys</i>	+	+	+	1-2	2	V
Fagetalia						
<i>Epilobium montanum</i>	+	+	+	+	+	V
<i>Oxalis acetosella</i>	-	-	+	+	+	III
<i>Gentiana asclepiadea</i>	+	-	+	-	+	III
<i>Mycelis muralis</i>	+	+	+	+	+	V
Querco - Fagetea						
<i>Poa nemoralis</i>	1	1	1	1	1	III
<i>Solidago virgaurea</i>	+	+	+	+	+	V
Vaccinio – Piceatalia						
<i>Picea abies</i>	+	-	+	-	-	II
<i>Vaccinium myrtillus</i>	+	-	+	+	-	III
<i>Deschampsia flexuosa</i>	+	-	-	+	+	III
<i>Calamagrostis arundinacea</i>	+	+	+	+	+	V
<i>Chamaenerion angustifolia</i>	+	-	+	+	-	III
Variae Syntaxa						
<i>Anthemis carpatica</i>	+	+	-	-	-	II
<i>Achillea distans</i>	-	-	-	+	+	II
<i>Jovibarba heuffelii</i>	+	+	+	+	+	V
<i>Sedum maximum</i>	+	-	+	+	+	IV
<i>Diverse specii briofite</i>	+	+	+	+	+	V

Place and data of the relevés: Bicaz Chei Quarry, Surduc Peak, Munticelu,
Bicazul Ardelean:1-5 -21-22.VII.2016

**Hieracio rotundati-Piceetum Pawl. et Br.-Bl. 1939 plant community
Table no. 2**

No. of relevée	1	2	3	4	5	K
Altitude m.o.s. (x 10 m)	110	120	125	115	125	
Exposure	SV	S	SE	SV	NE	
Inclination (in grades)	10	10	10	5	20	
Canopy (%)	0,8	0,8	0,8	0,8	0,8	
Coverage of herbaceous layer (%)	30	20	25	30	30	
Area (m ²)	400	400	400	400	400	
Char. ass.						
<i>Picea abies</i>	5	5	5	5	5	V
<i>Hieracium rotundatum</i>	+	+	+	+	+	V
Vaccinio-Piceion						
<i>Homogyne alpina</i>	+	+	+	+	+	V
<i>Soldanella hungarica ssp. major</i>	+	+	+	+	+	V
<i>Blechnum spicant</i>	+	+	-	-	+	III
<i>Dryopteris dilatata</i>	+	+	+	+	+	V
<i>Gymnocarpium dryopteris</i>	+	+	+	-	+	IV
Vaccinio-Piceetalia						
<i>Vaccinium myrtillus</i>	1-2	1-2	2	2	2	V
<i>Vaccinium vitis-idaea</i>	-	+	+	+	-	III
<i>Huperzia selago</i>	+	+	+	-	+	IV
<i>Lycopodium annotinum</i>	-	-	+	-	+	II
<i>Soldanella hungarica ssp. major</i>	-	-	+	-	+	II
<i>Deschampsia flexuosa</i>	+	+	+	+	+	V
Sympyto – Fagion						
<i>Sympyton cordatum</i>	-	-	-	-	+	I
<i>Pulmonaria rubra</i>	+	+	-	-	+	III
<i>Dentaria glandulosa</i>	+	+	+	-	-	III
Fagetalia						
<i>Fagus sylvatica</i>	-	-	-	+	+	II
<i>Epilobium montanum</i>	-	+	+	+	+	IV
<i>Euphorbia amygdaloides</i>	+	-	-	+	+	III
<i>Galium odoratum</i>	-	+	+	+	-	III
<i>Luzula luzuloides</i>	+	+	+	+	+	V
<i>Veronica urticifolia</i>	+	-	+	+	-	III
Querco – Fagetea						
<i>Athyrium filix-femina</i>	-	+	-	+	+	III
<i>Galium schultesii</i>	+	-	+	-	-	II
<i>Poa nemoralis</i>	-	+	+	+	-	III
<i>Viola reichenbachiana</i>	+	-	+	+	-	III
Variae Syntaxa						
<i>Geranium robertianum</i>	+	-	-	+	-	II
<i>Mycelis muralis</i>	+	-	-	+	+	III
<i>Oxalis acetosella</i>	+	+	+	+	1	V
<i>Campanula patula ssp. abietina</i>	+	+	+	+	+	V
<i>Gentiana asclepiadea</i>	+	-	+	-	-	II
<i>Solidago virgaurea</i>	+	-	-	-	-	I
<i>Lathraea squamaria</i>	-	+	-	-	-	I
<i>Rubus idaeus</i>	-	+	+	-	+	III
<i>Diverse specii de briofita</i>	+	+	+	+	+	V

Place and data of the relevés: Bicaz Chei Quarry, Bicazul Ardelean: 1-5 -21.VII.2016

Ass. *Telekio speciosae-Alnetum incanae* Coldea (1986) 1990

Table no. 3

No. of relevée	1	2	3	4	5	K
Altitude m.o.s. (x 10 m)	65	65	68	68	70	
Exposure	0,7	0,7	0,7	0,8	0,7	
Inclination (in grades)	75	80	65	85	90	
Canopy (%)	400	400	400	400	400	
Char. ass.						
<i>Alnus incana</i>	5	5	5	5	5	V
<i>Telekia speciosa</i>	1-2	1	1	1	1	V
Alno – Ulmion						
<i>Stellaria nemorum</i>	1	1	1	1	1	V
<i>Matteucia struthiopteris</i>	+	+	+	+	+	V
<i>Festuca gigantea</i>	+	1	+	+	+	V
<i>Circea lutetiana</i>	+	+	+	+	+	V
<i>Impatiens noli-tangere</i>	+	+	+	+	+	V
<i>Stachys sylvatica</i>	-	+	+	-	+	III
Fagetalia						
<i>Myosotis sylvatica</i>	-	+	+	-	-	II
<i>Stachys sylvatica</i>	+	+	+	+	+	V
<i>Cardamine impatiens</i>	-	-	+	+	+	III
<i>Carex sylvatica</i>	+	-	+	+	+	V
<i>Luzula luzuloides</i>	+	+	+	+	+	V
<i>Veronica urticifolia</i>	+	-	+	+	+	IV
<i>Circaeaa lutetiana</i>	+	+	+	+	+	V
<i>Athyrium filix-mas</i>	+	+	+	+	+	V
<i>Mycelis muralis</i>	+	+	+	+	+	V
<i>Galium odoratum</i>	+	-	+	-	+	III
<i>Symphytum cordatum</i>	+	-	+	+	-	III
<i>Dentaria bulbifera</i>	+	-	+	+	+	IV
<i>Anemone ranunculoides</i>	+	+	+	-	+	IV
<i>Isopyrum thalictroides</i>	+	+	+	+	+	V
<i>Dentaria glandulosa</i>	+	+	+	+	+	V
Querco – Fagetea						
<i>Brachypodium sylvaticum</i>	+	-	+	+	+	IV
<i>Carex digitata</i>	+	-	+	+	+	IV
<i>Spiraea chamaedrifolia</i>	-	+	+	+	+	IV
<i>Corylus avellana</i>	+	+	+	-	+	IV
<i>Geum urbanum</i>	+	+	+	+	+	V
<i>Ranunculus ficaria</i>	+	+	+	+	+	IV
<i>Dryopteris filix-mas</i>	+	+	+	+	+	V
Epilobietea angustifolii						
<i>Rubus idaeus</i>	-	+	+	+	+	IV
<i>Fragaria vesca</i>	+	+	+	+	+	V
Molinio-Arrhenatheratea						
<i>Agrostis stolonifera</i>	-	+	+	+	+	IV
<i>Holcus lanatus</i>	-	+	+	+	+	IV
<i>Lysimachia nummularia</i>	+	+	+	+	+	V
Variae Syntaxa						
<i>Petasites albus</i>	-	-	-	+	+	II
<i>Urtica dioica</i>	+	+	+	+	+	V
<i>Carduus personata</i>	+	+	+	+	+	V
<i>Mentha longifolia</i>	+	+	+	+	+	V
<i>Geum urbanum</i>	+	+	+	+	+	V

<i>Lycopus europaeus</i>	+	-	+	-	-	II
<i>Senecio fuchsii</i>	-	-	+	+	+	III
<i>Rumex obtusifolius</i>	-	-	+	+	-	II
<i>Luzula sylvatica</i>	+	-	+	-	-	II
<i>Campanula trachelium</i>	-	+	+	-	+	III
<i>Eupatorium cannabinum</i>	-	+	+	+	+	IV
<i>Galeopsis speciosa</i>	-	-	+	+	-	II
<i>Lysimachia vulgaris</i>	-	+	-	+	-	II

Place and data of the relevés: Bicaz Chei Quarry, Bicazul Ardelean: 1-5 -21.VII.2016

Ass. *Pulmonario rubrae-Fagetum* (Soó 1964) Täuber 1987

Table no. 4

No. of relevée	1	2	3	4	5	K
Altitude m.o.s. (x 10 m)	90	95	90	90	90	
Exposure	V	SE	NE	SV	E	
Inclination (in grades)	10	10	10	20	15	
Canopy (%)	0,7	0,8	0,8	0,7	0,7	
Coverage of herbaceous layer (%)	20	20	35	30	35	
Area (m ²)	400	400	400	400	400	
Char. ass.						
<i>Fagus sylvatica</i>	3	3	4	4	4	V
<i>Abies alba</i>	2	3	2	2	2	V
<i>Pulmonaria rubra</i>	+	+	+	+	+	V
Symphyto-Fagion						
<i>Symphytum cordatum</i>	-	+	+	-	+	III
<i>Festuca drymeia</i>	-	+	+	-	+	III
<i>Dentaria glandulosa</i>	+	+	+	+	+	V
<i>Dentaria bulbifera</i>	-	+	+	+	-	III
Fagetalia						
<i>Luzula luzuloides</i>	-	-	+	-	+	III
<i>Daphne mezereum</i>	-	+	+	-	+	III
<i>Anemone ranunculoides</i>	+	+	+	+	+	V
<i>Anemone nemorosa</i>	-	-	+	-	-	II
<i>Isopyrum thalictroides</i>	-	-	+	-	+	III
<i>Actaea spicata</i>	-	+	+	-	+	III
<i>Paris quadrifolia</i>	+	-	-	+	-	II
<i>Asarum europaeum</i>	-	+	+	+	+	IV
<i>Circea lutetiana</i>	-	+	+	+	-	III
<i>Epilobium montanum</i>	-	-	+	+	+	III
<i>Helleborus purpurascens</i>	-	+	+	-	+	III
<i>Dryopteris dilatata</i>	+	+	+	+	+	V
<i>Prenanthes purpurea</i>	+	+	-	-	-	II
<i>Rubus hirtus</i>	-	+	+	+	+	IV
<i>Symphytum tuberosum</i>	-		+	+	+	III
<i>Galeopsis speciosa</i>	+	+	+	+	+	V
<i>Calamagrostis arundinacea</i>	1	2	1	1	+	V
Querco-Fagetea						
<i>Athyrium filix-femina</i>	-	-	+	+	+	III
<i>Dryopteris filix-mas</i>	-	+	+	-	+	III
<i>Poa nemoralis</i>	+	+	+	+	+	V
<i>Viola reichenbachiana</i>	+	-	+	-	-	II
<i>Brachypodium sylvaticum</i>	-	+	+	+	+	IV
<i>Platanthera bifolia</i>	-	-	+	-	+	II

Acerion s.l.						
<i>Acer pseudoplatanus</i>	+	-	+	-	-	II
<i>Polystichum aculeatum</i>	+	+	-	+	-	III
<i>Epilobietea angustifolii</i>						
<i>Rubus idaeus</i>	+	+	+	-	-	III
<i>Fragaria vesca</i>	-	+	+	+	-	III
Vaccinio-Piceetalia						
<i>Campanula patula</i> ssp. <i>abietina</i>	-	+	-	+	-	II
<i>Picea abies</i>	+	-	+	-	-	II
<i>Sorbus aucuparia</i>	-	+	+	+	+	IV
<i>Hieracium rotundatum</i>	-	-	+	-	+	II
<i>Vaccinium myrtillus</i>	+	-	+	-	-	II
<i>Soldanella hungarica</i> ssp. <i>major</i>	+	+	-	+	-	III
<i>Saxifraga cuneifolia</i>	+	+	+	+	+	IV
<i>Geranium sylvaticum</i>	-	-	-	+	+	II
<i>Dicranum scoparium</i>	+	+	-	-	-	II
Variae Syntaxa						
<i>Geranium robertianum</i>	+	+	+	+	+	V
<i>Mycelis muralis</i>	+	+	+	+	+	V
<i>Polypodium vulgare</i>	+	+	+	+	+	IV
<i>Urtica dioica</i>	-	-	-	+	+	II
<i>Oxalis acetosella</i>	+	+	-	-	-	II
<i>Diverse specii briofite</i>	+	+	+	+	+	V

Place and data of the relevés: Bicaz Chei Quarry, Surduc, Bicazul Ardelean:
1-5 - 21.VII.2016

Ass. *Sympyto cordati-Fagetum* Vida (1959) 1963

Table no. 5

No. of relevée	1	2	3	4	5	K
Altitude m.o.s. (x 10 m)	70	75	70	70	75	
Exposure	SV	S	V	SV	SV	
Inclination (in grades)	7	10	10	15	10	
Canopy (%)	0,7	0,7	0,7	0,7	0,8	
Coverage of herbaceous layer (%)	30	30	35	30	40	
Area (m ²)	400	400	400	400	400	
Char. ass.						
<i>Fagus sylvatica</i>	4	4	4	4	4	V
<i>Sympyton cordatum</i>	1	2	2	3	2	V
Sympyto – Fagion						
<i>Dentaria bulbifera</i>	+	+	+	+	+	V
<i>Dentaria glandulosa</i>	+	+	+	+	+	V
<i>Carex sylvatica</i>	+	+	+	+	+	V
<i>Festuca drymeia</i>	-	+	+	-	+	III
<i>Carex pillosa</i>	+	+	+	+	+	V
Carpinion						
<i>Carpinus betulus</i>						
<i>Galium schultesii</i>	+	-	+	+	+	IV
<i>Acer pseudoplatanus</i>	-	+	+	+	+	IV
<i>Cerasus avium</i>	-	+	+	-	+	III
<i>Pteridium aquilinum</i>	+	+	+	+	+	V
<i>Ranunculus auricomus</i>	+	+	+	+	+	V
Fagetalia						
<i>Circea lutetiana</i>	+	+	+	-	-	III
<i>Veronica urticifolia</i>	-	+	+	+	+	IV

<i>Pulmonaria rubra</i>	-	+	+	-	+	III
<i>Viola reichenbachiana</i>	+	+	+	+	+	V
<i>Lilium martagon</i>	-	-	+	+	+	III
<i>Epilobium montanum</i>	+	-	+	+	+	IV
<i>Sanicula europaea</i>	-	+	-	+	+	III
<i>Isopyrum thalictroides</i>	+	+	+	+	+	V
<i>Helleborus purpurascens</i>	+	+	+	+	+	V
<i>Acer platanoides</i>	+	-	-	+	-	II
<i>Galium odoratum</i>	+	+	+	+	+	V
<i>Galeopsis speciosa</i>	+	-	+	-	+	III
<i>Actaea spicata</i>	+	-	+	-	-	II
<i>Euphorbia amygdaloides</i>	-	+	+	+	+	IV
Querco – Fagetea						
<i>Dryopteris filix-mas</i>	+	+	+	+	+	V
<i>Luzula luzuloides</i>	+	+	-	-	+	III
<i>Anemone ranunculoides</i>	+	+	+	+	+	V
<i>Poa nemoralis</i>	+	+	+	+	+	V
<i>Brachypodium sylvaticum</i>	-	+	+	+	+	IV
<i>Scilla bifolia</i>	-	-	+	+	+	III
<i>Carex digitata</i>	+	+	+	+	+	V
<i>Corylus avellana</i>	+	+	+	+	-	IV
<i>Athyrium filix-femina</i>	+	+	+	+	+	V
Epilobietea angustifolii						
<i>Rubus idaeus</i>	-	+	+	+	+	IV
<i>Fragaria vesca</i>	+	-	-	+	+	III
Variae Syntaxa						
<i>Oxalis acetosella</i>	+	+	-	-	+	III
<i>Urtica dioica</i>	+	-	-	-	+	II
<i>Veronica chamaedrys</i>	-	-	+	+	+	III

Place and data of the relevés: Bicaz Valley, Bicazul Ardelean: 1-5 -21.VII.2016

Cratoneuretum filicina-commutati Oberd. 1977

Table no. 6

No. of relevée	1	2	3
Altitude m.o.s. (x 10 m)	75	75	75
Exposure	SE	SE	SE
Inclination (in grades)	90	90	90
Coverage (%)	85	90	90
Area (m ²)	4	4	4
Char. ass.			
Cratoneuron commutatum	3-4	3-4	4
Cratoneurion commutati			
Cratoneuron filicinum	1	1	1
Cardamino-Montio et Montio Cardaminetalia			
Epilobium alsinifolium	+	+	+
Cardamine amara	+	+	+
Plilonotis calcarea	1	1	+
Scapania undulata	1	1	1
Bryum pseudotriquetrum	1	1-2	1
Brachythecium rivulare	+	+	+
Variae Syntaxa			
Cardamine rivularis	-	+	+
Parnassia palustris	+	+	-

Valeriana officinalis	+	+	-
Carex echinata	+	+	-
Mnium punctatum	+	+	+
Crepis paludosa	+	+	+
Conocephalum conicum	+	+	+
Drepanocladus sp.	+	+	+
Achillea schurii	+	+	+
Acrocladium cuspidatum	+	+	+

Place and data of the relevés: Bicaz Chei Quarry: 1-3 -23.VII.2016

Ass. *Asplenio -Cystopteridetum fragilis* Oberd. (1936) 1949

Table no. 7

No. of relevée	1	2	3	4	5	K
Altitude m.o.s. (x 10 m)	100	95	95	110	98	
Exposure	NE	S	N	NV	S	
Inclination (in grades)	70	70	60	40	40	
Coverage (%)	70	70	60	40	45	
Area (m ²)	4	4	4	2	2	
Char. ass.						
Asplenium viride	2	3	3	2	2	V
Cystopteris fragilis	1	1	1	1	1	V
Cystopteridion et Potentilletalia						
Asplenium ruta-muraria	+	+	1	+	+	V
Saxifraga paniculata	-	-	-	1	1	III
Moehringia muscosa	+	+	+	-	+	IV
Carex brachystachys	+	+	+	-	-	III
Asplenietea rupestris						
Asplenium trichomanes	+	+	+	+	+	V
Polypodium vulgare	-	-	+	+	+	III
Poa nemoralis	+	+	+	+	+	V
Valeriana tripteris	+	+	-	-	-	II
Saxifraga cuneifolia	1	+	1	+	+	V
Sedum maximum	+	+	-	-	-	II
Dianthus spiculifolius	+	+	+	-	-	III
Campanula carpatica	+	+	+	-	-	III
Seslerietalia						
Galium anysophyllum	1	+	+	1	1	V
Melica ciliata	+	+	+	+	+	V
Dianthus tenuifolius	+	-	-	+	+	II
Thymus pulcherrimus	+	+	+	-	+	IV
Myosotis alpestris	+	-	+	+	-	III
Jovibarba sobolifera	+	+	+	+	+	V
Jovibarba globifera	+	+	+	+	+	V
Thlaspietalia rotundifolii						
Cardaminopsis arenosa	-	-	+	+	-	II
Polystichum lonchitis	+	+	-	+	-	III
Galium album	-	+	-	-	+	II
Fagetalia						
Veronica urticifolia	+	+	-	-	-	II
Senecio ovatus	-	+	+	-	-	II
Variae Syntaxa						
Clematis alpina	-	+	+	-	-	II

Sedum hispanicum	+	+	-	-	-	II
Valeriana officinalis	+	+	-	-	-	II
Silene nutans ssp. dubia	+	+	-	-	-	II
Sempervivum zeleborii	+	+	-	-	-	II
Briofite diverse specii	2	1	2	1	1	V

Place and data of the relevés: Bicaz Chei Quarry, Surduc: 1-5 -23.VII.2016

Ass. Asplenietum trichomano-rutae-murariae Tx. 1937

Table no. 8

No. of relevée	1	2	3	4	5	K
Altitude m.o.s. (x 10 m)	140	145	155	160	160	
Exposure	N	SE	V	N	N	
Inclination (in grades)	70	50	80	80	90	
Coverage (%)	70	60	65	60	50	
Area (m ²)	4	2	2	2	2	
Char. ass.						
Asplenium ruta-muraria	2	2-3	2	2	2	V
Asplenium trichomanes	1	1	2	2	1	V
Cystopteridion et Potentilletalia						
Moehringia muscosa	+	+	+	-	-	III
Saxifraga paniculata	+	-	-	1	1	III
Saxifraga cuneifolia	1	+	+	1	1	V
Cystopteris fragilis	+	+	+	-	-	III
Campanula carpatica	+	+	+	-	-	III
Asplenietea rupestris						
Sedum maximum	-	+	+	-	-	II
Polypodium vulgare	+	+	+	-	-	III
Poa nemoralis	1	+	+	+	+	V
Sedum maximum	+	+	+	-	-	III
Dianthus tenuifolius	+	+	-	-	+	III
Dianthus spiculifolius	+	+	+	+	+	V
Seslerietalia						
Minuartia verna	+	+	1	+	+	V
Thymus pulcherrimus	+	+	-	-	+	III
Melica ciliata	+	+	+	+	+	V
Scabiosa lucida	+	-	+	+	-	III
Saxifraga adscendens	+	-	+	+	-	III
Myosotis alpestris	-	+	+	-	-	II
Jovibarba sobolifera	+	+	+	+	+	V
Thlaspietalia rotundifolii						
Galium anysophyllum	1	+	+	1	1	V
Polystichum lonchitis	+	+	-	-	-	II
Koeleria macrantha	1	+	+	1	1	V
Variae Syntaxa						
Hieracium umbellatum	+	+	-	-	-	II
Sedum hispanicum	+	-	+	+	-	III
Silene nutans ssp. dubia	+	+	+	+	+	V
Briofite diverse specii	2	2	2	1	1	V

Place and data of the relevés: Bicaz Chei Quarry, Surduc: 1-5 -23.VII.2016

Ass. *Scirpetum sylvatici* Schwick 1944

Table no. 9

No. of relevée	1	2	3	4	5	6	7	8	K
Coverage (%)	100	100	100	100	100	95	90	100	
Area (m ²)	100	50	50	100	100	50	50	50	
Char. ass.									
Scirpus sylvaticus	4	5	4-5	5	4	4	4	4	V
Phragmitetea									
Lythrum salicaria	-	-	-	-	+	+	+	+	III
Galium palustre	+	-	+	-	+	+	+	+	IV
Lycopus europaeus	+	-	+	-	+	+	+	-	IV
Equisetum palustre	+	-	-	+	+	+	+	+	IV
Carex brizoides	-	-	+	+	-	-	-	+	III
Plantaginetea majoris									
Plantago major	+	-	+	-	-	-	-	-	II
Lolium perenne	-	-	-	-	+	-	-	-	I
Mentha longifolia	+	+	1	-	+	+	+	+	V
Ranunculus repens	1	1	+	+	1	1	1	1	V
Molinietalia									
Juncus conglomeratus	-	-	-	+	1	-	+	+	II
Juncus inflexus	-	+	-	+	+	+	-	-	II
Agrostis stolonifera	+	+	-	+	1	+	+	1	V
Caltha palustris ssp. laeta	2	+	1	1	+	1	1	1	V
Cirsium oleraceum	-	+	-	-	-	1	1	-	II
Molinio-Arrhenatheretea									
Poa trivialis	+	-	+	+	+	+	+	+	V
Festuca pratensis	-	-	+	-	+	-	-	+	III
Trifolium pratense	+	-	-	+	-	-	-	+	III
Trifolium repens	-	-	+	-	-	-	-	-	II
Lychnis flos-cuculi	+	-	+	-	+	-	+	-	III
Leucanthemum vulgare	-	+	-	-	+	-	-	+	II
Poa pratensis	+	-	+	-	+	-	-	+	III
Vicia cracca	+	-	-	+	-	-	-	+	II
Stellaria graminea	+	-	+	+	+	+	-	+	IV
Plantago lanceolata	-	-	-	-	+	+	-	-	II
Magnocaricion ealatae									
Carex vulpina	+	-	+	-	+	1	1	1	IV
Carex hirta	-	+	+	-	+	+	+	+	IV
Carex rostrata	-	-	-	+	+	-	+	-	II
Secalietea									
Equisetum arvense	+	-	+	-	+	+	+	+	IV
Cirsium arvense	+	-	+	-	-	-	-	-	II
Alno-Ulmion									
Carex remota	+	+	+	+	+	+	+	+	V
Telekia speciosa	+	-	+	-	+	-	-	+	II

Place and data of the relevés: Bicaz Valley, Bicaz Chei Quarry, Bicazul Ardelean: 1-5 -21.VII.2016

Ass. *Agrostetum stoloniferae* (Ujvárosi 1941) Burduja et al. 1956
Table no. 10

No. of relevée	1	2	3	4	5	6	7	
Coverage (%)	90	80	100	100	100	100	80	K
Area (m ²)	80	85	95	100	95	100	85	
Car. ass.								
Agrostis stolonifera	4	4	4-5	4-5	4-5	4	3	IV
Agrostion stoloniferae								
Inula britannica	+	+	-	-	-	+	-	III
Inula ensifolia	+	-	-	+	+	-	-	III
Potentilla reptans	+	-	-	-	-	-	-	I
Ranunculus repens	1	1	2	2	2	1	+	V
Alopecurus pratensis	+	+	+	+	+	+	+	V
Verbena officinalis	+	-	+	+	-	-	-	III
Carex vulpina	+	+	+	+	+	+	+	V
Dipsacus laciniatus	+	+	+	+	+	+	+	V
Mentha longifolia	+	+	+	+	+	+	+	V
Elymus repens	+	+	+	+	+	+	+	V
Molinietalia								
Trifolium hybrydum	+	+	+	+	+	+	+	V
Mentha arvensis	+	+	+	+	+	+	+	V
Plantagineta majoris et								
Polygonion aviculare								
Trifolium repens	+	+	+	+	+	+	+	V
Lolium perenne	+	+	+	+	+	+	+	V
Taraxacum officinale	+	-	+	+	-	+	+	IV
Cichorium intybus	-	-	+	+	-	+	-	III
Plantago major	+	-	+	-	-	-	-	II
Poa annua	-	-	-	-	+	-	-	II
Polygonum aviculare	-	-	-	-	+	-	-	I
Matricaria recutita	-	-	-	-	-	-	-	I
Molinio-Arrhenatheretea								
Lotus corniculatus	+	1	+	+	+	+	+	V
Medicago lupulina	-	+	+	+	1	-	-	III
Trifolium pratense	+	+	+	+	+	+	+	V
Prunella vulgaris	+	+	+	+	+	+	+	V
Plantago lanceolata	+	+	+	+	+	+	+	V
Myosotis arvensis	-	+	-	-	-	-	-	I
Achillea millefolium	-	+	-	-	-	-	-	I
Vicia cracca	-	+	+	-	-	-	-	I
Poa pratensis	-	.	-	-	-	-	+	I
Galium mollugo	-	+	-	-	-	-	-	I
Lythrum salicaria	+	1	+	+	+	+	+	V
Leucanthemum vulgare	+	1	+	+	+	+	+	V
Festuco-Brometea								
Achillea setacea	-	-	+	+	-	+	-	III
Potentilla argentea	-	-	-	-	-	+	+	I
Echium vulgare	+	-	-	-	+	-	-	I
Galium verum	+	1	+	+	+	+	+	V
Artemisia absinthium	+	1	1	1	+	+	+	V
Cirsium arvense	+	+	+	1	1	+	+	V
Melilotus officinalis	+	+	+	+	+	+	+	V

Place and data of the relevés: Bicaz Valley, Bicaz Chei Quarry: 1-5 -22.VII.2016

Ass. Anthoxantho-Agrostetum capillaris Sillinger 1933. Jurko 1969

Table no. 11

No. of relevée	1	2	3	4	5	K
Altitude m.o.s. (x 10 m)	65	65	70	78	70	
Exposure	-	E	SE	SE	SV	
Inclination (in grades)	-	10	7	5	5	
Coverage (%)	100	95	100	100	100	
Area (m ²)	100	100	50	100	50	
Char. ass.						
<i>Anthoxanthum odoratum</i>	3	2	3	3	4	V
<i>Agrostis capillaris</i>	3	4	4	3-4	2	V
Molinietalia						
<i>Agrostis stolonifera</i>	+	+	-	-	-	II
<i>Trifolium hybridum</i>	-	-	+	-	+	II
<i>Alopecurus pratensis</i>	+	-	-	+	-	II
Molinio-Arrhenatheretea						
<i>Briza media</i>	+	+	+	+	-	IV
<i>Poa pratensis</i>	-	+	-	+	-	II
<i>Trifolium pratense</i>	+	-	+	+	-	III
<i>Trifolium repens</i>	+	+	-	+	+	IV
<i>Vicia cracca</i>	-	-	+	-	+	II
<i>Medicago lupulina</i>	+	-	+	-	-	II
<i>Festuca pratensis</i>	-	+	+	-	-	II
<i>Centaurea austriaca</i>	+	-	-	+	-	II
<i>Ranunculus acris</i>	-	+	+	-	+	III
<i>Dactylis glomerata</i>	+	+	-	+	-	III
<i>Poa trivialis</i>	-	+	+	-	-	II
<i>Stellaria graminea</i>	-	+	-	+	-	II
<i>Luzula campestris</i>	+	+	-	+	+	IV
<i>Ononis arvensis</i>						
<i>Polygala vulgaris</i>	+	-	-	+	+	IV
<i>Lychnis flos-cuculi</i>	+	-	-	+	+	III
<i>Rumex acetosa</i>	-	+	-	+	-	II
<i>Achillea millefolium</i>	+	-	+	-	-	II
<i>Leucanthemum vulgare</i>	+	+	-	-	1	II
Arrhenatheretalia						
<i>Cynosurus cristatus</i>	-	+	+	1	+	IV
<i>Rhinanthus rumelicus</i>	+	-	+	+	+	IV
<i>Carum carvi</i>	+	-	-	+	-	II
<i>Festuca rubra</i>	1	-	+	+	-	III
<i>Campanula patula</i> ssp. <i>patula</i>	+	+	-	+	+	IV
Festuco-Brometea						
<i>Carex caryophyllea</i>	-	+	-	-	+	II
<i>Festuca rupicola</i>	-	-	1	+	+	III
<i>Medicago falcata</i>	-	-	-	+	+	II
<i>Galium verum</i>	+	+	1	+	+	V
<i>Danthonia provincialis</i>	+	-	+	-	-	II
<i>Potentilla argentea</i>	-	+	-	+	-	II
<i>Prunella laciniata</i>	-	+	-	+	-	II
<i>Hypericum perforatum</i>	+	-	-	+	-	II
Variae Syntaxa						
<i>Vicia tetrasperma</i>	+	+	-	-	-	II
<i>Veronica chamaedrys</i>	-	+	-	-	+	II
<i>Vicia sativa</i>	+	+	-	-	-	II

<i>Lychnis viscaria</i>	-	-	-	+	+	II
<i>Cirsium arvense</i>	-	+	+	-	-	II
<i>Potentilla reptans</i>	-	-	+	+	+	III
<i>Prunella vulgaris</i>	+	-	-	+	+	II
<i>Brio-fîte diverse specii</i>	+	+	+	+	+	V

Place and data of the relevés: Bicaz Valley, Bicaz Chei Quarry, Munticelu, Surduc: 1-5 -22.VII.2016

Ass. *Festucetum rubrae-Agrostietum capillaris* Csürös-Káptalan 1964

Table no. 12

No. of relevée	1	2	3	4	5	K
Altitude m.o.s. (x 10 m)	78	85	78	80	75	75
Exposure	5	10	10	15	10	7
Inclination (in grades)	SE	SE	S	SV	E	E
Coverage (%)	100	100	100	100	100	100
Area (m ²)	100	100	100	100	100	100
Char. ass.						
<i>Festuca rubra</i>	4	5	4	4	4	V
<i>Agrostis capillaris</i>	2	1	2	1-2	1	V
Molinio-Arrhenatheretea						
<i>Briza media</i>	+	+	-	-	-	II
<i>Anthoxanthum odoratum</i>	-	+	-	+	+	III
<i>Poa pratensis</i>	+	+	+	-	-	III
<i>Trifolium pratense</i>	+	+	-	+	-	III
<i>Trifolium montanum</i>	-	-	-	+	+	II
<i>Trifolium repens</i>	+	+	+	-	-	III
<i>Vicia cracca</i>	-	+	+	+	-	III
<i>Medicago lupulina</i>	+	-	+	-	+	III
<i>Ranunculus acris</i>	-	+	+	-	-	II
<i>Dactylis glomerata</i>	+	+	+	+	+	V
<i>Stellaria graminea</i>	+	-	+	+	-	III
<i>Phleum pratense</i>	+	-	+	+	+	IV
<i>Betonica officinalis</i>	-	+	-	+	+	III
<i>Luzula campestris</i>	+	+	+	+	+	V
<i>Ononis arvensis</i>	+	+	-	-	-	II
<i>Lychnis flos-cuculi</i>	-	+	+	+	-	III
<i>Rumex acetosa</i>	-	-	+	+	-	II
<i>Rhinanthus minor</i>	+	-	+	-	-	II
<i>Achillea millefolium</i>	+	+	+	-	-	III
<i>Leontodon autumnalis</i>	+	+	-	-	+	III
<i>Plantago lanceolata</i>	-	+	-	+	-	II
<i>Leucanthemum vulgare</i>	-	+	+	+	+	IV
<i>Ranunculus repens</i>	+	-	-	+	-	II
Arrhenatheretalia						
<i>Cynosurus cristatus</i>	-	+	+	+	-	III
<i>Carum carvi</i>	-	-	+	+	+	III
<i>Veronica chamaedrys</i>	-	+	-	+	-	II
<i>Trifolium dubium</i>	-	+	+	+	+	IV
<i>Arrhenatherum elatius</i>	+	+	-	-	+	III
<i>Viola tricolor</i>	-	-	+	+	-	II
<i>Campanula patula</i> ssp. <i>patula</i>	-	+	+	+	+	IV
<i>Genistella sagittalis</i>	+	+	1	+	-	IV
<i>Viola canina</i>	-	-	+	+	+	III
<i>Hypericum maculatum</i>	-	-	-	-	+	+

Festuco-Brometea						
Galium verum	+	+	+	+	+	V
Galium mollugo	-	-	+	+	-	II
Lotus corniculatus	+	+	+	-	+	IV
Coronilla varia	-	+	-	+	+	III
Dianthus carthusianorum	+	+	+	+	-	IV
Fragaria viridis	+	-	+	+	-	III
Potentilla argentea	+	-	-	+	+	III
Peucedanum oreoselinum	-	+	+	-	+	III
Helianthemum nummularium	-	-	+	+	+	III
Gentiana cruciata	-	-	+	+	-	II
Filipendula hexapetala	-	-	+	+	-	II
Campanula cervicaria	-	-	+	+	-	II
Variae Syntaxa						
Rorippa sylvestris	-	+	+	+	-	IV
Lychnis viscaria	-	-	+	+	-	II
Prunella vulgaris	-	+	+	+	-	III
Valerianella locustris	-	-	+	+	-	II
Brioite diverse specii	+	+	+	+	+	+

Place and data of the relevés: Bicaz Valley, Bicaz Chei Quarry, Surduc, Munticelu, Șugăului Valley:
1-5 -22.VII.2016

Ass. *Sambucetum ebuli* (Kraiser 1926) Felföldy 1942

Table no. 13

No. of relevée	1	2	3	4	5	K
Altitude m.o.s. (x 10 m)	65	75	70	72	78	
Exposure	E	E	SE	S	-	
Inclination (in grades)	5	7	5	10	-	
Coverage (%)	100	90	90	100	100	
Area (m ²)	100	50	50	100	50	
Char. ass.						
Sambucus ebulus	5	4	5	5	4	V
Chenopodieta						
Solanum nigrum	-	+	-	+	+	III
Sonchus arvensis	+	-	+	-	+	II
Malva sylvestris	-	+	+	-	+	II
Artemisia vulgaris	-	-	-	+	+	II
Cirsium vulgare	-	-	-	+	+	IV
Calystegion sepium						
Calystegia sepium	+	+	+	-	+	III
Rubus caesius	+	+	-	-	1	IV
Eupatorium cannabinum	+	+	+	+	-	IV
Artemisietea						
Ballota nigra	-	+	+	-	-	III
Rumex obtusifolius	-	+	+	-	+	III
Leonurus cardiaca	+	+	-	-	-	II
Urtica dioica	-	+	+	+	+	V
Festuco-Brometea						
Galium verum	+	+	+	-	-	III
Lotus corniculatus	-	+	-	+	-	III
Fragaria viridis	+	-	+	+	-	IV
Ajuga genevensis	-	+	+	+	-	IV
Molinio-Arrhenatheretea						

Trifolium pratense	+	+	+	-	+	IV
Vicia cracca	+	+	+	+	+	V
Poa pratensis	-	+	+	+	+	V
Achillea millefolium	+	+	-	+	+	IV
Taraxacum officinale	+	+	-	+	+	IV
Variae Syntaxa						
Lycopus europaeus	+	+	+	-	+	IV
Geum urbanum	+	+	-	+	+	V
Glechoma hederacea	+	+	-	+	+	V
Agrimonia eupatoria	-	+	-	-	+	III

Place and data of the relevés: Bicaz Valley, Bicaz Chei Quarry: 1-5 -22.VII.2016

Ass. *Tussilaginetum farfarae* Oberd. 1949

Table. No. 14

No. of relevée	1	2	3	4	5	K
Altitude m.o.s. (x 10 m)	70	65	90	90	50	
Exposure	-	5	-	10	-	
Inclination (in grades)	-	SV	-	SE	-	
Coverage (%)	80	85	75	85	90	
Area (m ²)	25	25	50	25	25	
Char. ass.						
Tussilago farfara	4	4	4	4	5	V
Artemisieta et Artemisieta						
Arctium lappa	-	+	-	-	+	II
Urtica dioica	+	+	-	-	+	III
Rumex obtusifolius	-	-	+	+	-	II
Chenopodietea						
Elymus repens	-	-	+	-	-	I
Bromus sterilis	+	+	-	-	+	III
Daucus carota	-	-	+	+	-	II
Echium vulgare	+	+	+	-	-	III
Capsella bursa-pastoris	+	+	-	-	-	II
Plantaginetea majoris						
Lolium perenne	+	+	-	-	-	II
Polygonum aviculare	+	+	-	-	-	II
Mentha longifolia	-	+	+	+	-	III
Plantago major	+	+	+	-	+	IV
Poa annua	+	+	-	+	-	III
Ranunculus repens	+	+	+	-	+	IV
Lysimachia nummularia	+	-	-	-	+	II
Rorippa sylvestris	+	+	-	-	-	II
Secalietea						
Equisetum arvensis	+	+	1	1	+	V
Cirsium arvense	+	+	-	-	+	III
Molinio-Arrhenatheretea						
Agrostis stolonifera	+	-	+	-	+	III
Dactylis glomerata	+	+	-	-	-	II
Poa trivialis	-	+	+	-	-	II
Variae Syntaxa						
Deschampsia caespitosa	-	+	+	+	-	III
Ajuga reptans	+	+	-	-	-	II
Equisetum telmateja	+	+	-	-	-	II
Calamagrostis arundinacea	-	+	+	+	-	III

Place and data of the relevés: Bicaz Valley, Bicaz Chei, Surduc, Quarry: 1-5 -22.VII.2016

Ass. *Arrhenatheretum elatioris* Br.-Bl. ex Scherrer 1925

Table no. 15

No. of relevée	1	2	3	4	5	K
Altitude m.o.s. (x 10 m)	48	55	58	60	65	68
Exposure	-	2	5	-	-	
Inclination (in grades)	-	SE	E	-	-	
Coverage (%)	100	100	100	100	100	100
Area (m ²)	100	100	100	100	100	100
Char. ass.						
Arrhenatherum elatius	4	3	3	3	3-4	V
Festuca rubra	2	1	+	+	1	V
Molinio-Arrhenatheretea						
Briza media	+	1	1	1	+	V
Anthoxanthum odoratum	+	+	-	-	+	II
Poa pratensis	+	1	1	1	+	V
Trifolium pratense	+	+	-	+	-	III
Trifolium montanum	+	+	-	+	+	IV
Trifolium repens	+	+	+	-	-	III
Vicia cracca	-	+	+	+	-	+
Medicago lupulina	+	1	1	1	+	V
Ranunculus acris	+	+	-	-	+	II
Dactylis glomerata	+	1	1	1	+	V
Stellaria graminea	+	+	-	-	+	II
Phleum pratense	+	-	+	-	+	III
Ononis arvensis	+	+	-	-	-	II
Rumex acetosa	-	-	+	+	-	II
Rhinanthus rumelicus	+	-	+	-	-	II
Achillea millefolium	+	+	+	-	-	III
Leucanthemum vulgare	-	+	+	+	+	V
Ranunculus repens	+	-	+	+	-	III
Arrhenatheretalia						
Cynosurus cristatus	+	1	1	1	+	V
Veronica chamaedrys	+	+	+	1	+	V
Trifolium dubium	+	+	-	-	+	II
Viola tricolor	-	-	+	+	-	II
Campanula patula ssp. patula	+	+	+	+	+	V
Campanula patula ssp. abietina	+	+	+	1	+	V
Hypericum maculatum	+	+	-	-	+	II
Festuco-Brometea						
Carex caryophyllea	+	+	+	+	+	V
Galium verum	+	+	+	+	+	V
Galium mollugo	+	+	+	+	+	V
Lotus corniculatus	+	+	+	+	+	V
Coronilla varia	+	+	+	+	+	V
Dianthus carthusianorum	+	+	+	+	+	V
Fragaria viridis	+	+	+	+	+	V
Potentilla argentea	+	+	+	+	+	V
Helianthemum nummularium	+	-	+	-	+	III
Gentiana cruciata	+	+	+	+	+	V
Filipendula hexapetala	+	+	+	+	+	V
Variae Syntaxa						
Rorippa sylvestris	+	+	+	+	+	V
Prunella vulgaris	+	+	+	+	+	V
Valerianella locustris	-	-	+	+	+	III

Carex tomentosa	-	-	+	+	+	III
Campanula glomerata	+	+	-	-	+	II
Stachys officinalis	-	-	+	+	-	II
Calamintha acinos	+	+	+	+	+	V
Brioite diverse specii	+	+	+	+	+	V

Place and data of the relevés: Bicaz Valley, Bicaz Chei Quarry, Surduc: 1-5 -22.VII.2016

ANNEX 5



Fig. 1. *Leucobryo - Pinetum* Matuszkiewicz 1962

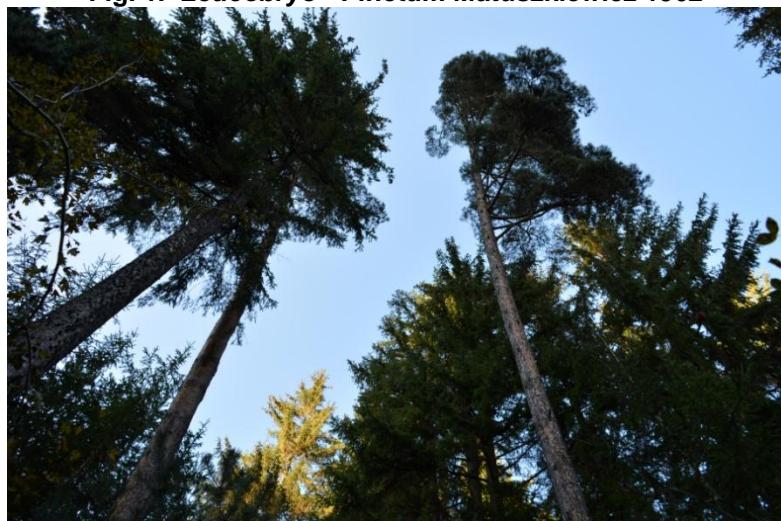


Fig. 2. *Pinus sylvestris* plant community



Fig. 3. Ass. *Hieracio rotundati-Piceetum* Pawl. et Br.-Bl. 1939
in the Bicaz Chei Quarry



Fig. 4. *Juniperus sabina* plant community

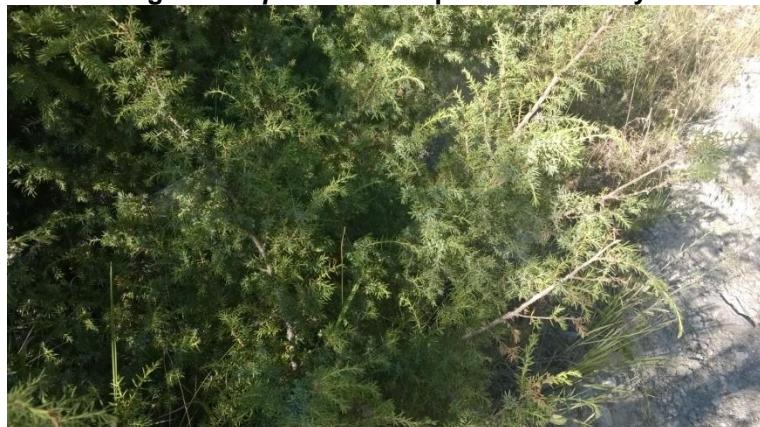


Fig. 5. *Juniperus communis* plant community



Fig. 6. Ass. *Coryletum avellanae* Soó 1927



Fig. 7. Ass. *Festuco rubrae-Agrostetum capillaris* Csürös-Káptalan 1964



Fig. 8. Ass. *Brachypodio pinnati-Festucetum rupicolae* Ghișa 1962

Annex 6



Fig.1. Habitat 6510



Fig. 2. Habitat 7220*

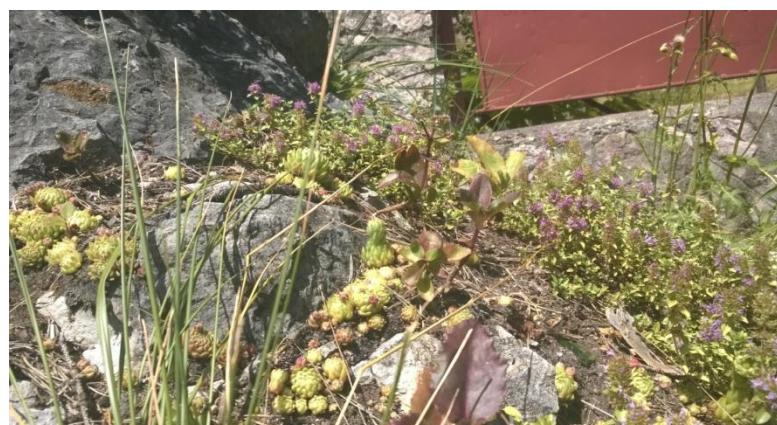


Fig. 3. Habitat 8220



Fig. 4. Habitat 91V0



Fig. 5. Habitat 6190

FAUNA found within the quarry is rich



Fig. 6.



Fig. 7.



Fig. 8



Fig. 9



Fig. 10

Annex 7



Fig. 1. Formation of ecotoanelor between the two habitats: 8220-91Q0



Fig. 2. Formation of ecotoanelor between the two habitats.: 91V0-6520

ANNEX No. 8

Table no. 1

Gradul de infiripare și adaptabilitate a speciilor de cormoflora în Cariera Bicaz-Chei
The degree of the striking root (grip) and adaptability of cormoflora in the Bicaz-Chei Quarry

No.	Species	Family	Biologic forms	Phyto-geographic elements	Ecologic gropup: U, T, R (after Zolyomi,1966)	The degree of the striking root (grip) and adaptability (scal 1-10)
1	<i>Campanula carpatica</i> Jacq.	Campanulaceae	H	Carp(End)	U3T2,5R4	10
2	<i>Thymus jankae</i> Cel.	Lamiaceae	Ch	Balc.	U2,5T3R4	10
3.	<i>Thymus comosus</i> Heuffel	Lamiaceae	Ch	Carp(End)	U2T3,5R4,5	
4.	<i>Pinus sylvestris</i> L.	Pinaceae	MPH	Eua	U0T0R0	10

5.	<i>Anthyllis vulneraria L.</i>	Fabaceae	H	E	U2T0R4	10
6	<i>Centaurea rheana</i> Bureau.	Asteraceae	TH-H	Ec(Med.)	U2T3,5R4,5	9
7	<i>Echium vulgare L.</i>	Boraginaceae	TH	Eua	U2T3R4	9
8	<i>Tussilago farfara L.</i>	Asteraceae	G-H	Eua	U3,5T0R4,5	9
9.	<i>Betula pendula</i> Roth.	Betulaceae	MPh- mPh	Eua	U3T2R2	9
10.	<i>Chaenorhinum minus</i> (L.) Willk. et Lange.	Scrophulariaceae	Th	Ec-Med.	U2,5T3,5R4,5	9
11.	<i>Artemisia absinthium L.</i>	Asteraceae	Ch-H	Eua(Med.)	U2T3,5R0	8
12.	<i>Leucanthemum waldsteinii</i> (Schultz Bip.) Pouzar (Chrysanthemum rotundifolium W. et K.)	Asteraceae	H	Carp(End)	U4T2R3	8
13.	<i>Galinsoga ciliata</i> (Rafin.) Blake	Asteraceae	Th	Adv	U2,5T4R3	8
14.	<i>Melilotus albus Medicus.</i>	Fabaceae	Th-TH	Eua	U2,5T3R0	8
15.	<i>Scabiosa columbaria L.</i>	Dipsacaceae	H	E(Med)	U2,5T3R4,5	7
16.	<i>Salvia nemorosa L.</i>	Lamiaceae	H	Ec	U2,5T4R5	7
17.	<i>Galium pumillum Murr.</i>	Rubiaceae	H	Atl-Med-Ec	U2,5T3R2,5	6
18.	<i>Silene nutans</i> ssp. <i>dubia</i> (Herb.) Zapal.,	Caryophyllaceae	H	Carp-End	U2T3R0	6
19.	<i>Populus tremula L.</i>	Salicaceae	MPh- mPh	Eua	U3T2R2	5
20.	<i>Calamagrostis villosa</i> (Chaix) J.F.Gmel.	Poaceae	H	Eua	U4T2,5R1,5	5
21.	<i>Sambucus ebulus L.</i>	Caprifoliaceae	H	Eua(Med)	U3T3R4,5	4
22.	<i>Plantago lanceolata L.</i>	Plantaginaceae	H	Eua	U0T0R0	4
23.	<i>Chamaenerion angustifolia</i> (L.) Scop.)	Scrophulariaceae	H	Cp	U4T1,5R0	4
24.	<i>Helianthemum numularia</i> (L.) Mill.	CISTACEAE	Ch-H	Ec(Med)	U2T3R4	3
25.	<i>Mentha arvensis L.</i>	Lamiaceae	H-G	Cp	U3T3R0	3
26.	<i>Salix fragilis L.</i>	Salicaceae	MPh- mPh	Eua	U4T5R4	3
27.	<i>Carlina vulgaris L.</i>	Asteraceae	TH-H	Eua(Med)	U2,5T3R0	3
28.	<i>Linaria vulgaris</i> Mill.	Scrophulariaceae	H(TH)	Eua	U2T3R4	3
29.	<i>Melica ciliata</i> L. ssp. <i>ciliata</i>	Poaceae	H	Ec-Balc	U1,5T4R4	3
30.	<i>Lotus corniculatus L.</i>	Fabaceae	H	Eua	U2,5T0R0	2
31.	<i>Campanula kladniana</i> (Schur.) Witasek.	Campanulaceae	H	Carp.	U2,5T2R0	2
32.	<i>Cichorium intybus</i>	Asteraceae	H-TH	Eua	U2,5T3,5R4,5	2

	L.				
33.	<i>Verbascum nigrum</i> L.	Scrophulariaceae	TH-H	Eua	U2T3R4 1
34.	<i>Primula elatior</i> (L.) Hill. ssp. <i>leucophylla</i>	Primulaceae	H	Med. (E)	U3T3R4 1



Fig. 1 – *Campanula carpatica*



Fig. 2 – *Centaurea rheana*



Fig. 3. *Leucanthemum waldsteinii*



Fig. 4 – *Echium vulgare*



Fig. 5 - *Scabiosa columbaria*



Fig. 7- *Silene nutans* ssp. *dubia*



Fig. 8. *Thymus jankae*

Abbreviations used:

bioforms:

Ch - cameophytes
 MPh - megaphanerophytes
 mPh - mesophanerophytes
 NPh - nanophanerophytes
 Ph-I – lianas
 H – hemicryptophytes
 Th – annual terrophytes
 TH – bi-annual terrophytes
 Hh – helohidatophytes

-for phyto-geographic elements

Cp - circumpolar
 Bor - boreal
 Cosm - cosmopolite
 Adv - adventive
 Eua - Eurasian
 E- European
 Ec - central-European
 Alp - alpine
 Arct - arctic
 Atl - Atlantic
 Med - Mediterranean
 sM – sub-Mediterranean
 Cont - continental
 Pont - pontic
 Pan - panonic
 Carp - Carpathian
 End - endemic
 Cauc - Caucasian
 Anat - anatolic
 Sudet – sudetic
 Dac - Dacian
 Balc – Balkan
 Apen. – Apennine
 As-N. – North-Asian

Ecologic indexes:

U-humidity;
 1-1.5 = xerophyle
 2-2.5 = xero-mesophyle
 3-3.5 = mesophyle
 4-4.5 = meso-hygrophyle
 5-5.5 = hygrophyle
 6 = hydrophyle
 0 = amphotolerant (eurihide)

T-temperature;
 1-1.5 = criophyle (heikistothermic)
 2-2.5 = microthermic
 3-3.5 = micromesothermic
 4-4.5 = moderately thermophyle
 5-5.5 = thermophyle
 0= amphotolerant (eurithermic)

R – soil reaction
 1-1.5 = highly acidophyle
 2-2.5 = acidophyle
 3-3.5 = acido-neutrophyles
 4-4.5 = slab acid-neutrophyles
 5-5.5 = neutro-basophyle
 0 = amphotolerant (euriionic)



Fig. 8. *Dianthus spiculifolius* „ex situ„,



Fig. 9. *Habitat saxicol* „ex situ„,



Fig. 10. Refacerea „ex situ„, a vegetației din carieră
Restoring „ex situ„, of the vegetation from the Bicaz Chei Quarry

ANNEX 9

Acțiuni de informatizare și conștientizare
Aspect for the informing and awareness activities



Fig. 1- Activități de informatizare într-o carieră minieră cu fiul meu
Informing and awareness activities in a Mining Quarry with my son



Fig. 2. Concursul Național „Proiecte de Mediu,”
National contest for „Environmental Projects,”



Fig. 3. Conferința internațională E.S.N.A.

Annex 10

REFERENCES

1. ALTMAN, D., G, 1991. Practical statistics for medical research. Chapman and Hall, London.
2. CRISTEA, V., GAFTA, D., PEDROTTI, F. – 2004, Fitosociologie. Ed. Presa Universitară Clujană
3. CRISTEA, V., 2006, Conservarea si protectia biodiversității, în contextul dezvoltării durabile și al integrării României în U.E. Environment & Progress-6/2006, Cluj-Napoca: 89-98
4. DAMIAN, I., 1978, Împăduriri, Ed. Did. și Ped. București, 374 p.
5. GAFTA, D., MOUNTFORD, O. Coord., 2008. Romanian Manual for interpretation of Eu habitats, ED. Risoprint, Cluj-Napoca, pp. 101
- 7.MOUNTFORD O., GAFTA D., ANASTASIU Paulina, BĂRBOS M., NICOLIN Alma, NICULESCU Mariana & OPREA Ad., 2008. Natura 2000 in Romania. Habitat Fact Sheets. Available on: <http://www.anpm.ro>
8. MOUNTFORD O., GAFTA D., ANASTASIU Paulina, BĂRBOS M., NICOLIN Alma, NICULESCU Mariana & OPREA Ad., 2008. Natura 2000 in Romania. SpeciesFact Sheets. Available on: <http://www.anpm.ro>
9. PODANI, J., 2001. SYN-TAX 2000. Computer programs for data analysis in ecology and systematics. User's manual. Scientia, Budapest, HU
10. RODWELL, J.S., J.H.J. SCHAMINÉE, J.H.J., MUCINA, L., S. PIGNATTI, S., DRING, MOSS, J. D., 2002. The Diversity of European Vegetation, Raport EC-LNV nr. 2002/054
11. TUTIN, T.G., HEYWOOD, V.H., BURGES, N. A., MOORE, D.M., VALENTINE, D.H., WALTERS, S.M. & WEBB, D.A. (eds), 1964-1980, Flora Europaea, Vols. 1-5, Cambridge, Cambridge University Press
12. TRACI, C. – 1985, Împădurirea terenurilor degradate, Ed. Ceres, București, 282 p.
13. ZOLYOMI, B. et al. - 1966, Einreihung von 1400 Arten der ungarischen Flora in okologischen Gruppen nach TWR-Zahlen, Fragmenta Bot. Mus. Hist. Hung., IV, F. 1-4, Budapest
14. ***-1952-1976, Flora României, vol. I-XIII, Edit. Acad. Române, București
15. ***- 1960, Monografia geografică a R.P.R., vol.I, Ed. Acad. R.P.R., București
16. *** Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora, Annex I (Habitats Directive)
17. ***List Threats, Pressures and Activities (final version)
18. ***http://bd.eionet.europa.eu/activities/Reporting/Article_17/reference_portal
19. ***http://www.umass.edu/landeco/teaching/landscape_ecology/schedule/chapter9_metrics.pdf