

SUBCONTINENTAL PERI-PANNONIC SCRUB FROM GEOPARK PLATEAU MEHEDIŢI (ROMANIA)

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Abstract. This paper presents one priority natural habitat from Geopark Plateau MehediŃi: 40A0* Subcontinental peri-Pannonic scrub. The research was conducted with the occasion of the monitoring of species and habitats from Geopark Plateau MehediŃi, with the purpose of improving management to achieve the biodiversity conservation objectives. The presentation used as diagnostic elements: code and name NATURA 2000, correspondence with the Romanian habitats, EMERALD, CORINE, PALAEARCTIC HABITATS, and EUNIS classification, general description, stationary particularities, variability and distribution in the territory, phytosociological correspondence, physiognomy and structure, contact habitats, ecological and biological value. It also presents the habitat status, the disturbing factors, the potential threats and the management.

Keywords: priority habitats, MehediŃi, Oltenia, Romania.

Rezumat. Tufărişuri subcontinentale peripanonice din Geoparcul Platoul MehediŃi (România). Articolul prezintă un habitat natural prioritar din Geoparcul Platoul MehediŃi: 40A0* Tufărişuri subcontinentale peripanonice. Cercetările s-au efectuat cu ocazia monitorizării speciilor și habitatelor din Geoparcul Platoul MehediŃi, în scopul îmbunătățirii managementului și atingerii obiectivelor de conservare a biodiversității. Prezentarea utilizează ca elemente de diagnoză: cod și nume NATURA 2000, corespondență a habitatului românesc și clasificările EMERALD, CORINE, PALAEARCTIC HABITATS și EUNIS, descriere generală, particularități staționale, variabilitate și distribuție în teritoriu, corespondențe fitosociologice, fizionomie și structură, habitate în contact, valoarea ecologică și biologică. Se prezintă, de asemenea, starea habitatului, factorii perturbatori, amenințările potențiale și cadrul de management.

Cuvinte cheie: habitat prioritar, MehediŃi, Oltenia, România.

INTRODUCTION

The studied area is represented by the calcareous area and “cornete” from Geopark Plateau MehediŃi. The subcontinental peri-Pannonic shrub are installed at the limestone hillocks called “cornete” (which marks the Jurassic limestone alignment of the Danubian Autochthonous, developed in the northeast - southwest direction) placed between the plateau-unit (east) and the depression (centre) of MehediŃi Plateau. This limestone area is crossed by many rivers, such as the Coșuștea, the Topolnița, the Camena, which formed gorges and other limestone formations, known as “cornets”, the most impressive and most popular being: Cornetul Cerboanii (810 m), Cornetul Babelor (770 m) and Cornetul Bălții (701 m); others have lower altitude (about 575 m), and we mention here the formations from Ponoarele: Răiculești, Băluța and Gărdăneasa. The vegetation of these hillocks is represented by the southeast Carpathian lilac (*Syringa vulgaris*) and manna ash (*Fraxinus ornus*) thickets along with the dominant species, *Cornus mas*, which also gave the name of these formations – the species Romanian name is “corn” and, thus, it resulted “cornete”.

MATERIAL AND METHODS

The research concerning the inventory and monitoring of the natural habitats were performed in 2010-2013. We performed a Level III monitoring, monitoring which applies only to priority habitats and effectively capitalizes data collected in the field (CANDREA BOZGA et al., 2009).

The study methods are the classical ones. In order to identify and characterize habitats we used the methodology proposed by CRISTEA et al. (2004), DONIȚĂ et al. (2005, 2006), GAFTA & MOUNTFORD (2008).

The presentation used as diagnostic elements: code and name NATURA 2000, correspondence with the Romanian habitats, EMERALD, CORINE, PALAEARCTIC HABITATS, and EUNIS classification, general description, stationary particularities, variability and distribution in the territory, phytosociological correspondence, physiognomy and structure, contact habitats, ecological and biological value. It also presents the habitat status, the disturbing factors, the potential threats and the management.

There have been used previously published data related to this type of vegetation (MALOȘ & FIRESCU, 1971; MALOȘ, 1976; MĂGĂLIE, 1970; POPESCU et al., 2006; POPOVA-CUCU, 1970, 1971; POPOVA-CUCU & POPESCU, 1975), previously published data by the authors of this article, related to the flora of the Geopark (CIORTAN & NEGREAN, 2012; NEGREAN & CIORTAN, 2012, 2013), and data from the Final Report 2007. We also used National Red Lists: BOȘCAIU & al., 1994; DIHORU & DIHORU, 1994; OLTEAN et al., 1994. Generally, the nomenclature of the species was given after Flora of Romania (SĂVULESCU, 1952-1976), Flora Europaea (TUTIN et al., 1964-1980, TUTIN et al., 1996).

RESULTS

Habitat 40A0* Subcontinental peri-Pannonic scrub, represented in the area by the Romanian habitats, that corresponds to the European classification systems as it follows:

- R3116 Southeast Carpathian elm-leaf *Spiraea* (*Spiraea chamaedryfolia*) deciduous thickets: EMERALD - 31.8B South-eastern deciduous thickets; CORINE - 31.8B South-eastern sub-Mediterranean deciduous thickets (schibljak); PAL. HAB. 31.8B142 Carpathian elm-leaf *Spiraea* thickets; EUNIS F3.17 *Corylus* thickets.

- R3123 Southeast Carpathian lilac (*Syringa vulgaris*) with *Genista radiata* thickets and R3124 Southeast Carpathian lilac (*Syringa vulgaris*) with *Asplenium ruta-muraria* thickets: EMERALD - 31.8B South-eastern deciduous thickets; CORINE - 31.8B3 Greek sub-Mediterranean deciduous thickets; PAL. HAB. - 31.8B322 Danubian lilac thickets; EUNIS – Moesian lilac thickets.

- R3126 Southeast Carpathian manna ash (*Fraxinus ornus*) thickets: EMERALD - 31.8B South-eastern deciduous thickets; CORINE - 31.8B South-eastern sub-Mediterranean deciduous thickets (schibljak); PAL. HAB. - 31.8.B Balkano - Hellenic deciduous thickets, EUNIS - F3.2431 Moesian oriental hornbeam thickets.

- R3127 Southeast Carpathian lilac (*Syringa vulgaris*) and manna ash (*Fraxinus ornus*) thickets: EMERALD - 31.8B South-eastern deciduous thickets; CORINE - 31.8B South-eastern sub-Mediterranean deciduous thickets; PAL. HAB. - 31.8B3222 Lilac manna ash thickets, EUNIS - F3.2431 Moesian oriental hornbeam thickets.

General description. According to the Interpretation Manual of Natura 2000 habitats in Romania, the habitat is represented by the deciduous scrub with continental and sub-Mediterranean affinities of the Pannonia basin and neighbouring regions including the eastern Alpine periphery, the southern periphery of the Northwestern Carpathians, the Transylvanian plateau and the adjacent foothills and valleys of the Eastern and Southern Carpathians and the Apuseni Mountains, the southern periphery of the Pannonia basin, the Moravian plateau and the hills and valleys of the northern Balkan Peninsula. The habitat forms a mosaic-like vegetation with steppe grassland (6210) and forest-steppe elements or plants of the rupicolous Pannonian grasslands (6190) often along the fringes of woodlands, as it can be noticed from the lists of species that we present for each of the habitat area variants.

Stationary particularities. The habitat is well represented, accompanying the Jurassic limestone of the Danubian Autochthonous, oriented northeast-southwest. The substrate it installs on is represented by limestone [sedimentary structures of Mesozoic age, and Miocene age (Ponoarele) - in the form of a narrow strip (STROE & PEPTEANU, 2011), marl-limestone intercalation], with carbonate humic soils:

a) Southeast Carpathian elm-leaf *Spiraea* (*Spiraea chamaedryfolia*) deciduous thickets are installed on the rocky steeply inclined slopes, with sunny or shady exhibition; the substrate is represented by calcareous conglomerates in large blocks with superficial soils formed between the scattered blocks (e.g. at Coșuștea, Camena);

b) Southeast Carpathian lilac (*Syringa vulgaris*) with *Genista radiata* thickets are installed on the sunny rocky slopes, steeply to moderately inclined; the substrate is represented by gray limestone; neutral to weakly alkaline soils - rendzinas - often developed only in the cracks of the rocks;

c) Southeast Carpathian lilac (*Syringa vulgaris*) with *Asplenium ruta-muraria* thickets are installed on the steep slopes, rocky vertical walls, with S, SW, SE orientation, along the rivers; the substrate is represented by the calcareous rocks at the surface of which it may appear protorendzina in reduced proportion;

d) Southeast Carpathian manna ash (*Fraxinus ornus*) thickets are installed on the slopes with high inclination and southern (southeastern and southwestern) exhibition; the substrate is represented by limestone cliffs with varying sizes, with thickness reduced and sometimes even absent; soils are rendzinas rich in calcic humus;

e) Southeast Carpathian lilac (*Syringa vulgaris*) and manna ash (*Fraxinus ornus*) thickets are located at the bottom of the slope (e.g. at Ponoarele) or of plates, immediately above them (e.g. at Camena); the substrate is represented by limestones, calcareous sandstones; soils are preluvisols, terra rossa, type rendzina, in a thin but continuous layer, with a large amount of skeleton.

Phytosociological correspondence, variability and distribution in the territory. The habitat is well represented, accompanying the Jurassic limestone strip of the Danubian Autochthonous, oriented northeast-southwest.

We describe the most representative phytocoenosis of the habitat taking into account the richness in rare and endemic species from the sub-Mediterranean type, namely:

a) R3116 Southeast Carpathian elm-leaf *Spiraea* (*Spiraea chamaedryfolia*) deciduous thickets edified by as. *Calamagrostio-Spiraeetum ulmifoliae* Resmeriță et Csűrös 1966. Identified at Camena, Coșuștea Piedmont, and Vârtoape Forest;

b) R3123 Southeast Carpathian lilac (*Syringa vulgaris*) with *Genista radiata* thickets and R3124 Southeast Carpathian lilac (*Syringa vulgaris*) with *Asplenium ruta-muraria* thickets edified by as. *Syringo-Genistetum radiatae* Maloș 1972. Identified at Camena and Piatra Pinului;

c) R3124 Southeast Carpathian lilac (*Syringa vulgaris*) with *Asplenium ruta-muraria* thickets edified by as. *Aspleno-Syringetum vulgaris* Jakucs et Vida 1959. Identified at Ponoarele from Cornetul Răiculești, at the top of the slope of Cornetul Gărdăneasa, at Râienilor Valley (POPOVA-CUCU & POPESCU, 1975), at Topolnița Gorges, Gura Prosăcului, Găurinți.

d) R3126 Southeast Carpathian manna ash (*Fraxinus ornus*) thickets edified by as. *Corno-Fraxinetum orni* Pop et Hodișan 1964 [described at Ponoarele by MĂGĂLIE, (1970), with the lack of the Oriental Hornbeam]. Identified at Ponoarele, between Giurgiani and Vintilani - Balta, Cornetul Babelor and Cornetul Cerboaniei;

e) R3127 Southeast Carpathian lilac (*Syringa vulgaris*) and manna ash (*Fraxinus ornus*) thickets edified by as. *Syringo-Fraxinetum orni* Borza 1958 m. Resmeriță 1972 (syn. *Syringo-Fraxinetum orni coryletosum columnae* Borza 1958)]. Identified at Topolnița – Cornetul Prosăcului, Cornetul Coșuștei, Piatra Coșuștei ridge, Cornetul Balta, Cornetul Piatra Încălecată, Piatra Pinului, Camena, and Isverna).

Physiognomy and structure

a) **R3116 Southeast Carpathian elm-leaf *Spiraea* (*Spiraea chamaedryfolia*) deciduous thickets** are fragmented throughout the territory of the Geopark. The phytocoenosis identified at Piatra Coșuștei ridge – the species from the phytocoenosis structure are characteristic to the beech forests that encompass this phytocoenosis. The edifying species are: *Spiraea chamaedryfolia*, *Lonicera xylosteum*, *Rosa pendulina*, and characteristics: *Spiraea chamaedryfolia* and *Calamagrostis arundinacea*.

The trees layer: sporadic trees species in young stages: *Abies alba*, *Betula pendula*, *Fagus sylvatica*.

The shrubs layer: *Spiraea chamaedryfolia*, *Syringa vulgaris*, alongside that is also growing: *Corylus avellana*, *Cotoneaster pyrenaicus* (*integerrimus*), *Fraxinus ornus*, *Lonicera xylosteum*, *Rosa pendulina*, *Salix caprea*.

The herbaceous layer: *Angelica sylvestris*, *Athyrium filix-femina*, *Calamagrostis arundinacea*, *Campanula rapunculoides*, *Carlina vulgaris* s. l., *Digitalis grandiflora*, *Dryopteris filix-mas*, *Epilobium collinum*, *Fragaria vesca*, *Glechoma hirsuta*, *Luzula luzuloides*, *Solidago virgaurea*, *Poa nemoralis*, *Sedum telephium* subsp. *maximum*, *Polystichum setiferum*.

The phytocoenosis identified in Vârtoape Forest is installed in the beech forest with *Geranium macrorrhizum*, on a slope with northeastern exhibition, overshadowed most of the day; it has the following structure and physiognomy:

The trees layer: *Abies alba*, *Acer platanoides*, *Acer pseudoplatanus*, *Fagus sylvatica*, *Tilia platyphyllos*, *Ulmus glabra*.

The shrubs layer: *Fraxinus ornus*, *Spiraea chamaedryfolia*, *Rubus hirtus*.

The herbaceous layer: *Aconitum moldavicum*, *Anemone nemorosa*, *Asarum europaeum*, *Aremonia agrimonoides*, *Arum maculatum*, *Asperula taurina*, *Brachypodium sylvaticum*, *Calamagrostis arundinacea*, *Chaerophyllum aromaticum*, *Dentaria bulbifera*, *Digitalis grandiflora*, *Galium odoratum*, *Geranium macrorrhizum*, *Euphorbia amygdaloides*, *E. platyphyllos*, *Helleborus purpurascens*, *Heracleum sphondylium* s. l., *Melica uniflora*, *Mercurialis perennis*, *Parietaria officinalis*, *Symphytum tuberosum*, *Tanacetum macrophyllum*, *Urtica dioica*.

At Camena, at altitudes between 650 and 1100 m, the phytocoenoses are installed on the sunny slopes (with NE exhibition), the major habitat being embedded from the southeast Carpathian lilac (*Syringa vulgaris*) and manna ash (*Fraxinus ornus*) thickets.

The trees layer: absent, only *Sorbus aucuparia*, rarely of average heights, more than younger stages.

The shrubs layer: *Spiraea chamaedryfolia*; there also grow *Cotoneaster tomentosus*, *Sorbus graeca*, *S. borbasii*, *Syringa vulgaris*, *Rosa pendulina*.

The herbaceous layer: *Alyssoides utriculata*, *Leontodon crispus* subsp. *crispus*, *Poa nemoralis*, *Sesleria rigida*, *Polygala comosa*.

b) **R3123 Southeast Carpathian lilac (*Syringa vulgaris*) with *Genista radiata* thickets** - phytocoenoses are fragments of the sub-Mediterranean vegetation, edified from mostly southern and south-eastern Dacian subendemic, thermophilic, xerophilic, calcifile species, located at high altitude for them. The edifying species are: *Syringa vulgaris*, *Genista radiata*, and characteristic: *Syringa vulgaris*, *Genista radiata*, *Cotinus coggygia*.

At Piatra Pinului, at altitudes above 860 m, the habitat has the following structure and physiognomy:

The trees layer: *Acer campestre*, *Betula pendula* (sporadic), *Fraxinus ornus*, *Juglans regia*, *Pinus nigra* subsp. *banatica*.

The shrubs layer: *Cotinus coggygia*, *Cotoneaster tomentosus*, *Euonymus verrucosus*, *Lonicera xylosteum*, *Prunus mahaleb*, *Rhamnus saxatilis* subsp. *tinctorius*, *Sorbus borbasii*, *S. cretica*, *S. torminalis*, *S. umbellata* subsp. *banatica*, *Syringa vulgaris*.

Undergrowth layer: 20–40 cm: *Genista radiata*, *Teucrium chamaedrys*, *T. montanum*, *Micromeria pulegium*.

The herbaceous layer: *Achnatherum calamagrostis*, *Acinos arvensis*, *Allium flavum* subsp. *flavum*, *A. oleraceum*, *Alyssum petraeum*, *Arabis procurrens*, *A. turrata*, *Asplenium ruta-muraria*, *A. scolopendrium*, *Asperula tinctoria* subsp. *ciliata*, *Atamantha turbit* subsp. *hungarica*, *Bromus riparius*, *Calamagrostis arundinacea*, *Campanula rapunculoides*, *Carex digitata*, *Clematis vitalba*, *C. recta*, *Cystopteris fragilis*, *Dianthus petraeus*, *Draba lasiocarpa*, *Erysimum odoratum*, *Euphorbia amygdaloides*, *Festuca xanthina*, *Galium album* subsp. *album*, *Geranium macrorrhizum*, *Hedera helix*, *Laserpitium latifolium*, *Linum uncinatum*, *Moehringia muscosa*, *Neottia nidus-avis*, *Peucedanum oreoselinum*, *Piptatherum virescens*, *Poa nemoralis*, *Polygonatum multiflorum*, *P. odoratum*, *Prenanthes purpurea*, *Primula auricula* subsp. *serratifolia*, *Quercus petraea*, *Rubus canescens*, *R. idaeus*, *Saxifraga adscendens* f. *ramosissima*, *S. rotundifolia*, *Scabiosa columbaria* subsp. *columbaria*, *Seseli libanotis*, *S. rigidum* s. l., *Silene flavescens*, *Solidago virgaurea*, *Stachys patula*, *Tamus communis* subsp. *communis*, *Taraxacum officinale*, *T. hoppeanum*, *Teucrium montanum*, *Veronica spicata* s. l., *Viburnum lantana*, *Vincetoxicum hirundinaria*.

At Camena - eastern wall of the first two ridges (E→W) and the plateau from the last ridges from the W, at altitudes between 800 and 950 m.

The trees layer: *Sorbus aucuparia*, *S. borbasii*.

The shrubs layer: *Abies alba* (juvenile), *Cotinus coggygria*, *Cotoneaster tomentosus*, *Fraxinus ornus*, *Juniperus sabina*, *Euonymus verrucosus*, *Rhamnus saxatilis* subsp. *tinctorius*, *Rosa pendulina*, *Sorbus aria*, *S. graeca* (*S. cretica*), *Syringa vulgaris*, *Viburnum lantana*.

The shrubs layer: *Clematis vitalba*, *Cytisus ratisbonensis*, *Genista radiata*.

The herbaceous layer: *Alyssodes utriculata*, *Asperula capitata*, *Asplenium ceterach*, *A. ruta-muraria*, *Atamantha turbiti* subsp. *hungarica*, *Carex digitata*, *Centaurea atropurpurea*, *C. triniifolia*, *Cerastium banaticum*, *Dactylorhiza sambucina* f. *bracteata*, *D. sambucina* f. *purpurea*, *Delphinium fissum* subsp. *fissum*, *Dianthus banaticus*, *Draba lasiocarpa*, *Edraianthus graminifolius*, *Erysimum odoratum*, *Euphrasia illyrica*, *Euphorbia epithymoides*, *Festuca xanthina*, *Galium album* subsp. *album*, *G. rubioides*, *Geranium macrorrhizum*, *Helianthemum nummularium* s. l., *Hypericum rochelii*, *Iris* sp., *Isatis tinctoria*, *Jovibarba heuffelii*, *Jurinea glycacantha*, *Orchis mascula* subsp. *signifera*, *Peucedanum oreoselinum*, *Polygala vulgaris*, *Polygonatum multiflorum*, *Potentilla reptans*, *Saxifraga paniculata*, *Seseli libanotis* subsp. *intermedium*, *S. rigidum* subsp. *rigidum*, *Sesleria rigida*, *Senecio jacobaea* subsp. *jacobaea*, *Silene pusilla*, *Teucrium chamaedrys*, *T. montanum*, *Thlaspi dacicum* subsp. *dacicum*, *Thalictrum aquilegifolium*, *T. foetidum*, *Thymus comosus*, *Trifolium montanum*, *Veronica austriaca*, *V. crassifolia*.

c) R3124 Southeast Carpathian lilac (*Syringa vulgaris*) with *Asplenium-ruta-muraria* thickets - pioneer phytocoenosis, edified from Eurasian species with many southern, sub-thermophilic, mesoxerophilic, calcifile elements. The edifying species are: *Syringa vulgaris*, *Fraxinus ornus*, *Carpinus orientalis*, and characteristics: *Syringa vulgaris*, *Asplenium ceterach*, *A. ruta-muraria*, *Cotinus coggygria*, *Micromeria pulegium*.

The trees layer: phytocoenosis grows as a thicket dominated by scattered bushes of *Fraxinus ornus* and *Carpinus orientalis* to 2–3 m height, which provides a covering to 40–60%.

The shrubs layer: *Cotinus coggygria*, *Syringa vulgaris*.

Undergrowth layer: is characteristic of the limestone rocks exposed to sunlight: *Alyssum petraeum*, *Asplenium ceterach*, *A. ruta-muraria*, *A. trichomanes* subsp. *quadrivalens*, *Cerastium banaticum*, *Chondrilla juncea*, *Draba lasiocarpa*, *Euphorbia epithymoides*, *Galium album* subsp. *album*, *Koeleria macrantha*, *Mercurialis ovata*, *Micromeria pulegium*, *Moehringia muscosa*, *Mycelis muralis*, *Piptatherum virescens*, *Poa nemoralis*, *Peucedanum oreoselinum*, *Scabiosa columbaria* subsp. *columbaria*, *Seseli rigidum* subsp. *rigidum*, *Silene vulgaris*.

d) R3126 Southeast Carpathian manna ash (*Fraxinus ornus*) thickets, edified by the *Fraxinus ornus*, and characteristic species *Cornus mas*.

The trees layer: *Fraxinus ornus*

The shrubs layer: *Cotinus coggygria*, *Cornus mas*, *Crataegus monogyna*, *Cytisus nigricans*, *Juniperus communis*, *Prunus spinosa*, *Rhamnus saxatilis* subsp. *tinctorius*, *Syringa vulgaris*, *Viburnum lantana*.

At Cornetul Babelor, Cornetul Cerboaniei and Cornetul Pietra Încălecată, *Cornus mas* form a belt at the basal part of the hillocks. At Ponoarele (in the northern part of Zaton Lake) the observed three layers are: the first consists of *Prunus spinosa*, the following of *Cornus mas*, while the hillock peak is covered by *Fraxinus ornus*. On Cornetul Babelor and Cornetul Cerboaniei, the shrub layer is so dense that it forms an impenetrable thicket. These hillocks are the greatest centres for the wildness of the Geopark.

The herbaceous layer: *Achillea millefolium*, *Alliaria petiolata*, *Anemone ranunculoides*, *Asplenium trichomanes*, *Brachypodium sylvaticum* subsp. *sylvaticum*, *Capsella bursa-pastoris*, *Carex caryophylla*, *Corydalis intermedia*, *Eryngium campestre*, *Galanthus nivalis*, *Geranium rotundifolium*, *Geum urbanum*, *Glechoma hederacea*, *Helleborus purpurascens*, *Hepatica nobilis*, *Isopyrum thalictroides*, *Lathyrus vernus*, *Oxalis stricta*, *Pteridium aquilinum*.

e) R3127 Southeast Carpathian lilac (*Syringa vulgaris*) and manna ash (*Fraxinus ornus*) thickets located at the base of the slopes or above them, on the plateaus. The edifying species are *Syringa vulgaris* and *Fraxinus ornus*, and characteristic: *Fraxinus ornus*, *Cotinus coggygria*, *Syringa vulgaris*.

At Pietra Coșuștei it was identified the habitat with the following composition:

The trees layer: *Fagus sylvatica*, *Fraxinus ornus*, *Juglans regia*, *Prunus cerasus*, *Prunus mahaleb*, *Quercus dalechampii* (rare).

The shrubs layer: *Cornus mas*, *Corylus avellana*, *Juniperus communis*, *Euonymus europaeus*, *E. verrucosus*, *Lonicera xylostemum*, *Syringa vulgaris*.

The herbaceous layer: *Achnatherum calamagrostis*, *Allium oleraceum*, *Arabis hirsuta*, *Asparagus tenuifolius*, *Asplenium ceterach*, *Campanula grossekii*, *Carduus candicans*, *Carex polyphylla*, *Convolvulus arvensis*, *Echinops bannaticus*, *Erysimum odoratum*, *Galanthus nivalis*, *Inula conyza*, *Lychnis coronaria*, *Micromeria pulegium*, *Moehringia muscosa*, *Mycelis muralis*, *Peltaria alliacea*, *Phleum phleoides*, *Poa nemoralis*, *Rosa* sp., *Scabiosa columbaria*, *Seseli libanotis*, *Tamus communis* subsp. *communis*, *Veronica austriaca*.

At Camena one such habitat has the following physiognomy and structure:

The trees layer: *Acer pseudoplatanus*, *Fraxinus ornus*,

The shrubs layer: *Chamaecytisus ratisbonensis*, *Cotinus coggygria*, *Cotoneaster tomentosus*, *Juniperus sabina*, *Euonymus europaeus*, *E. verrucosus*, *Sorbus borbasii*, *Syringa vulgaris*, *Viburnum lantana*.

The herbaceous layer: *Achnatherum calamagrostis*, *Allium oleraceum*, *Alyssoides utriculata*, *Anthriscus nemorosa*, *Arabis hirsuta*, *Asplenium ceterach*, *A. ruta-muraria*, *A. trichomanes quadrivalens*, *Aster amellus*, *Athamanta turbith*, *Campanula grossekii*, *Carduus candicans*, *Carex polyphylla*, *Cerastium banaticum*, *Centaurea triniifolia*, *Clematis vitalba*, *Convolvulus arvensis*, *Delphinium fissum* subsp. *fissum*, *Draba lasiocarpa*, *Echinops bannaticus*, *Euphrasia illyrica*, *Erysimum odoratum*, *Ferula heuffelii*, *Festuca xanthina*, *Galium album* subsp. *album*, *Galium purpureum*, *Hypericum rochelii*, *Inula conyza*, *Juniperus sabina*, *Jovibarba heuffelii*, *Jurinea glycantha*, *Laserpitium latifolium*, *Linum uninerve*, *Lunaria annua* subsp. *pachyrhiza*, *Micromeria pulegium*, *Moehringia muscosa*, *Mycelis muralis*, *Peltaria alliacea*, *Peucedanum oreoselinum*, *Phleum phleoides*, *Poa nemoralis*, *Polygala vulgaris*, *Potentilla chrysantha*, *Rosa canina*, *Saxifraga paniculata*, *Scabiosa columbaria*, *Scutellaria altissima*, *Senecio jacobaea* subsp. *jacobaea*, *Seseli libanotis* subsp. *sibiricum*, *Silene flavescens*, *S. pusilla*, *Sisymbrium strictissimum*, *Symphandra wanerii*, *Tamus communis* subsp. *communis*, *Teucrium montanum*, *Thalictrum aquilegifolium*, *Veronica austriaca*, *V. crassifolia*, *Vincetoxicum hirundinaria*.

At Cornetul Prosăcului.

The trees layer: *Carpinus betulus*, *Fraxinus ornus*. It is also encountered sporadically: *Quercus cerris*, *Sorbus torminalis*, *Tilia cordata*, *T. platyphyllos*.

The shrubs layer: *Carpinus orientalis*, *Cornus sanguinea*, *Corylus avellana*, *Cotinus coggygria*, *Crataegus monogyna*, *Clematis vitalba*, *Euonymus verrucosus*, *Hedera helix*, *Rhamnus saxatilis* subsp. *tinctorius*, *Rosa canina*, *R. obtusifolia*, *R. tomentosa*, *Spiraea cana*, *Syringa vulgaris*.

The herbaceous layer: *Achillea crithmifolia*, *Allium flavum*, *A. fuscum*, *Alyssum petraeum*, *Arabis turrita*, *Anthriscus nemorosa*, *Aremonia agrimonoides*, *Asplenium ceterach*, *A. ruta-muraria*, *A. trichomanes* subsp. *quadrivalens*, *Botriochloa ischaemum*, *Brachypodium sylvaticum*, *Campanula grossekii*, *C. persicifolia*, *Cardaminopsis arenosa*, *Carthamus lanatus*, *Centaurea apiculata* subsp. *spinulosa*, *Chondrilla juncea*, *Draba lasiocarpa*, *Dentaria bulbifera*, *Fagopyrum convolvulus*, *Festuca rupicola*, *Galium album*, *Galium schultesii*, *Galium verum*, *Geranium robertianum*, *Erophila verna*, *Erysimum odoratum*, *Euphorbia myrsinites*, *Festuca rupicola*, *Hepatica nobilis*, *Himantoglossum jankae*, *Linaria genistifolia*, *Inula coniza*, *Isopyrum thalictroides*, *Lamium galeobdolon*, *Lathyrus venetus*, *L. vernus*, *Lilium martagon*, *Lithospermum purpureocaeruleum*, *Lunaria annua* subsp. *pachyrhiza*, *Lychnis coronaria*, *Melica ciliata*, *M. uniflora*, *Melittis melissophyllum*, *Mercurialis perennis*, *Micromeria pulegium*, *Mycelis muralis*, *Origanum vulgare*, *Petrorhagia saxifraga*, *Phyllitis scolopendrium*, *Piptatherum virescens*, *Poa nemoralis*, *Polypodium vulgare*, *Polygonatum odoratum*, *Primula veris*, *Sedum hispanicum*, *S. maximum*, *S. sexangulare*, *Seseli rigidum*, *Sesleria rigida*, *Silene flavescens*, *S. vulgaris*, *Teucrium chamaedrys*, *Tragopogon balcanicus*, *Vincetoxicum hirundinaria*.

At Isverna - "Potcoavă" the habitat has the following physiognomy and structure:

The trees layer: *Fraxinus ornus*, *Prunus mahaleb*, *Sorbus aucuparia*, *S. torminalis*.

The shrubs layer: *Cornus sanguinea*, *Corylus avellana*, *Cotinus coggygria*, *Cotoneaster integerrimus*, *Crataegus monogyna*, *Clematis vitalba*, *Euonymus verrucosus*, *Genista radiata*, *Juniperus sabina*, *Lonicera xylosteum*, *Rhamnus saxatilis* subsp. *tinctoria*, *Rosa pendulina*, *R. tomentosa*.

The herbaceous layer: *Acinos alpinus*, *A. rotundifolius*, *Allium fuscum*, *Asperula capitata*, *Asplenium ceterach*, *A. ruta-muraria*, *Athamanta turbith* subsp. *hungarica*, *Campanula trachelium*, *Centaurea atropurpurea*, *Delphinium fissum* subsp. *fissum*, *Dianthus petraeus*, *Draba lasiocarpa*, *Edraianthus graminifolius*, *Epipactis atrorubens*, *E. helleborine*, *Ferula heuffeli*, *Festuca xanthina*, *Geranium macrorrhizum*, *Himantoglossum jankae*, *Hordelymus europaeus*, *Inula conizae*, *I. ensifolia*, *I. hirta*, *Jovibarba heuffeli*, *Lathyrus hallersteinii*, *L. vernus*, *Libanotis montana*, *Lunaria annua* subsp. *pachyrhiza*, *Micromeria pulegium*, *Scutellaria altissima*, *Sedum hispanicum*, *S. maximum*, *Seseli rigidum*, *Silene pusilla*, *Peltaria alliacea*, *Phleum phleoides*, *Primula veris* subsp. *columnae*, *P. auricula* subsp. *serratifolia*, *Rosa gallica*, *Teucrium chamaedrys*, *Thymus pulegioides*, *Tragopogon balcanicus*.

At Epuran Cave, such a phytocoenosis preserves species as *Micromeria pulegium*, *Kengia serotina*, *Allium flavum*, *Linum uninerve*.

At Ponoarele, it is located one of the largest and most beautiful habitats with lilac of the Geopark – 20 ha. The Cornetul Răiculești, Cornetul Băluța, Cornetul Gărdăneasa presents a representative phytocoenosis of as. *Syringo-Fraxinetum orni* (POPOVA-CUCU & POPESCU, 1975). Also, POPESCU et al. (2004) published the species lists from Lilac Ponoarele Forest.

The trees layer: *Acer campestre*, *A. tataricum*, *Carpinus orientalis*, *Fagus sylvatica* (rare), *Fraxinus ornus*, *Quercus frainetto*, *Q. dalechampii*, *Prunus mahaleb*.

The shrubs layer: *Cornus mas*, *Crataegus monogyna*, *Euonymus verrucosus*, *Rosa corymbifera*, *Syringa vulgaris*, *Viburnum lantana*.

The herbaceous layer: *Achillea crithmifolia*, *A. millefolium*, *Acinos alpinus* subsp. *majoranifolius*, *A. arvensis*, *Agrostis capillaris*, *Ajuga genevensis*, *Alyssum alyssoides*, *A. desertorum*, *Arenaria serpyllifolia*, *Asperula taurina* subsp. *leucanthera*, *Asplenium ceterach*, *A. ruta-muraria*, *A. trichomanes* subsp. *quadrivalens*, *Astragalus glycyphyllos*, *Bellis perennis*, *Brachypodium sylvaticum*, *Calystegia sylvatica*, *Cardamine hirsuta*, *Cardaminopsis arenosa*, *Carex caryophylla*, *Carlina biebersteinii* subsp. *brevibracteata*, *Carduus nutans*, *Centaureum erythraea*, *Cerastium fontanum* subsp. *triviale*, *Cerastium pumilum* subsp. *glutinosum*, *Clinopodium vulgare*, *Convolvulus arvensis*, *Coronilla varia*, *Corydalis solida*, *Crepis foetida* subsp. *rhoeadifolia*, *Cruciata laevipes*, *C. pedemontana*, *Cystopteris fragilis*, *Digitalis*

grandiflora, *Epilobium angustifolium*, *Erodium cicutarium*, *Erophila verna*, *Erythronium dens-canis*, *Eryngium campestre*, *Festuca rupicola* subsp. *saxatilis*, *F. valesiaca*, *Filipendula vulgaris*, *Fragaria vesca*, *F. viridis*, *Galium verum* subsp. *verum*, *Geranium columbinum*, *G. lucidum*, *Geum urbanum*, *Glechoma hederacea*, *Isopyrum thalictroides*, *Lactuca serriola*, *Lapsana communis*, *Lathyrus sphaericus*, *Luzula campestris*, *Lychnis coronaria*, *Hypochaeris maculata*, *Medicago minima*, *Melica uniflora*, *Melittis melissophyllum*, *Moehringia muscosa*, *Myosotis stricta*, *Mycelis muralis*, *Pimpinella saxifraga*, *Poa bulbosa* subsp. *bulbosa*, *Potentilla micrantha*, *Prunella laciniata*, *Pteridium aquilinum*, *Ranunculus acris*, *Rubus canescens*, *R. idaeus*, *Scleranthus annuus*, *S. perennis*, *Sedum acre*, *S. hispanicum*, *Saxifraga rotundifolia*, *S. tridactylites*, *Scutellaria altissima*, *Sherardia arvensis*, *Silene italica*, *Stachys germanica*, *Polygonatum odoratum*, *Rorippa sylvestris*, *Viola tricolor* subsp. *tricolor*, *Tamus communis*, *Teucrium chamaedrys*, *Thymus comosus*, *Trifolium arvense*, *T. aureum*, *T. montanum*, *Valerianella locusta*, *Verbena officinalis*, *Veronica arvensis*, *V. chamaedrys*, *V. serpyllifolia*, *V. triphyllus*, *Vincetoxicum hirundinaria*, *Vulpia myuros*.

Contact habitats: 6190 Rupicolous Pannonic grasslands; 6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*); 8160* Medio-European calcareous scree of hill and mountain levels; 8210 Calcareous rocky slopes with chasmophytic vegetation; 9150 Medio-European limestone beech forest of the *Cephalanthero-Fagion*; 91K0 Illyrian *Fagus sylvatica* forests (*Aremonio-Fagion*); 91L0 Illyrian oak hornbeam forest (*Erythronio-Carpinion*); these habitats have in common a series of species, for example:

- common species from rupicolous Pannonic or semi-natural dry grasslands and scrubland facies on calcareous substrates (like is the case at Topolnița, Ponoarele, Camena): *Achillea crithmifolia*, *Acinos arvensis*, *Alyssum alyssoides*, *A. desertorum*, *Anthemis tinctoria*, *Brachypodium sylvaticum* subsp. *sylvaticum*, *B. pinnatum*, *Bromus riparius*, *Carex caryophylla*, *Chondrilla juncea*, *Dactylorhiza sambucina* f. *bracteata*, *D. sambucina* f. *purpurea*, *Dianthus giganteus*, *Erysimum odoratum*, *Festuca rupicola* subsp. *saxatilis*, *F. valesiaca*, *Galium album* subsp. *album*, *G. verum* subsp. *verum*, *Koeleria macrantha*, *Lolium perenne*, *Dianthus giganteus*, *Himantoglossum jankae* (Mount Fața Satului-Isverna, Topolnița-La Varnițe), *Hypericum perforatum*, *Hypochaeris maculata*, *Isopyrum thalictroides*, *Lychnis coronaria*, *Orchis mascula* subsp. *signifera* (Mount Fața Satului-Isverna), *O. militaris* (Mount Fața Satului), *Prunella laciniata*, *Ranunculus acris*, *Pteridium aquilinum*, *Stachys germanica*, *Teucrium chamaedrys*, *Tragopogon balcanicus*, *Trifolium arvense*, *T. aureum*, *T. montanum*, *Verbascum phlomoides*, *Verbena officinalis*, *Veronica arvensis*, *V. austriaca*.

- transgressive species from the nearby forests: *Acer campestre*, *A. platanoides*, *A. pseudoplatanus*, *Anemone ranunculoides*, *Angelica sylvestris*, *Athyrium filix-femina*, *Calamagrostis arundinacea*, *Campanula rapunculoides*, *Corydalis* sp., *Isopyrum thalictroides*, *Lathyrus vernus*, *Lithospermum purpureocaeruleum*, *Luzula luzuloides*, *Melittis melissophyllum*, *Neottia nidus-avis*, *Mycelis muralis*, *Phyllitis scolopendrium*, *Piptatherum virescens*, *Poa nemoralis*, *Polygonatum odoratum*, *P. multiflorum*, *Polystichum setiferum*, *Potentilla micrantha*, *Prenanthes purpurea*, *Pteridium aquilinum*, *Rubus canescens*, *R. idaeus*, *Saxifraga rotundifolia*, *Scabiosa columbaria* subsp. *columbaria*, *Sorbus aucuparia*, *Stachys patula*, *Tamus communis* subsp. *communis*, *Veronica spicata* s. l., *Viburnum lantana*, *Vincetoxicum hirundinaria*.

- characteristic species from calcareous rocky slopes with chasmophytic vegetation: *Asplenium ceterach*, *A. ruta-muraria*, *Atamantha turbitt* subsp. *hungarica*, *Cerastium banaticum*, *Delphinium fissum* subsp. *fissum*, *Dianthus petraeus*, *Draba lasiocarpa*, *Primula auricula* subsp. *serratifolia*, *Seseli rigidum* s. l., *Sesleria rigida*, *Silene flavescens*.

- characteristic species from Medio-European calcareous scree of hill and mountain levels: *Achnatherum calamagrostis*, *Micromeria pulegium*, *Moehringia muscosa*.

Ecological and biological value – high conservation value; habitat with many endemic and rare species.

The criterion Aii corresponding plant species for selecting types of Natura 2000 sites: European endangered species listed in the Habitats Directive Annexes IIb and IVb + Bern Convention – App I, whose conservation requires the designation of Special Areas of Conservation – SAC: *Galanthus nivalis* and *Himantoglossum jankae*.

The criterion Aiii corresponding plant species for selecting types of Natura 2000 sites: endemic and endangered species – National Red Lists (CR, EN, and V), not included in the Ai and Aii categories: *Atamantha turbitt* subsp. *hungarica*, *Edraianthus graminifolius*, *Pinus nigra* subsp. *banatica*, *Primula auricula* subsp. *serratifolia*, *Sorbus borbasii*, *Thlaspi dacicum* subsp. *dacicum*.

The criterion Aiv b corresponding plant species for selecting types of Natura 2000 sites: plant species listed in Annex II b - sub-endemic and endangered species - **National Red Lists** (CR, EN, and V) not included in the Ai, Aii and Aiii categories: *Micromeria pulegium*.

Species from the National Red Lists: *Abies alba*, *Alyssoides utriculata*, *Centaurea atropurpurea*, *C. triniifolia*, *Cerastium banaticum*, *Dactylorhiza sambucina*, *Delphinium fissum* subsp. *fissum*, *Dianthus banaticus*, *Draba lasiocarpa*, *Euphrasia illyrica*, *Festuca xanthina*, *Genista radiata*, *Hepatica nobilis*, *Hypericum rochelii*, *Jovibarba heuffelii*, *Juniperus sabina*, *Jurinea glycantha*, *Linum uncinerve*, *Mercurialis ovata*, *Neottia nidus-avis*, *Orchis mascula* subsp. *signifera*, *O. militaris*, *Peltaria alliacea*, *Petrorhagia saxifraga*, *Piptatherum virescens*, *Seseli rigidum* subsp. *rigidum*, *Silene flavescens*, *S. saxifraga*, *Sorbus graeca*, *Teucrium montanum*, *Tragopogon balcanicus*, *Veronica crassifolia*.

DISCUSSIONS

The association *Syringo-Genistetum radiatae* Maloș 1972 is considered by SANDA et al. (2001) as sub-association of *Syringo-Fraxinetum ornii* Borza 1958 m. Resmeriță 1972, and associations that edify habitats R3124, R3126 and R3127 are treated as synonyms of it. Also, for the subas. *cotinetosum* Ciocârlan 1968, Schrött 1968 the same authors indicate the following syn.: *Syringo-Cotinetum coggygriae* (Borza 1931 n.n.) Resmeriță 1972; for subas. *juniperetosum sabinae* (Gergely 1958) Jakucs 1959 same SANDA et al. (2001) indicates syn. as. *Syringeto-Juniperetosum sabinae* Gergely 1958) and subas. *ceterosum* Jakucs et Vida 1959. The *Genista radiata* species is present in all of the three associations.

In the area we noticed the following situation: *Genista radiata* not so frequent (only two choronyms in the Geopark). On the northeastern side of the first ridge of Camena it occurs with high constancy, on fairly large surface, sometimes resulting 90% coverage (similar situation observed on the Țesna Valley). These phytocoenoses, where *Genista radiata* is dominant, and *Fraxinus ornus* is rare, may be considered under as. *Syringo-Genistetum radiatae* Maloș 1972; on the second ridge of Camena Mount, on the eastern slope, the situation is different: *Genista radiata* occurs quite often, but the bushes are scattered. Here, *Fraxinus ornus* constitutes a shrub layer; those phytocoenoses could be considered a subas. of the as. *Syringo-Fraxinetum ornii* Borza 1958 m. Resmeriță 1972, namely subas. *genistetosum radiatae* (Maloș 1972) Popescu & Sanda 1990.

Regarding the other phytocoenoses, where the *Genista radiata* does not appear, we believe that it could be treated as subas. of the large as. *Syringo-Fraxinetum ornii* Borza 1958 m. Resmeriță 1972, namely:

- subas. *cotinetosum* Ciocârlan 1968 to which shall be assignable some phytocoenoses from Camena (plateau), Topolnița Gorges and Cornetul Coșuștei. Those phytocoenoses occur as clumps on the rocky limestone. Around these rocks, there are many species such as *Bromus riparius*, *Achnatherum calamagrostis*, *Festuca rupestris*, *Teucrium chamaedrys* and numerous characteristic species of the communities from the Southeast Carpathian limestone cliffs with *Asplenium trichomanes* subsp. *quadrialeans* and *Poa nemoralis*.

- subas. *juniperetosum sabinae* (Gergely 1958) Jakucs 1959 to which shall be assignable some phytocoenoses from Camena.

Data from the specialized literature, field observations (structure and physiognomy of the associations, the fact that the main edifying species is *Fraxinus ornus*, and *Genista radiata*, *Cotinus coggygria* and *Juniperus sabina*, which are characteristic species, are at least present in the phytocoenosis that edifies their associations or subassociations) only serve to strengthen our conviction that the classification of these types of vegetation in one type of habitat is justified. Also, the substrate type, altitude and slope orientation these species prefer are similar in all areas, and the phytocoenoses of different Romanian subtypes of habitat are intercalated, sometimes indistinguishable. For e.g. on the Mount Camena, there can be met all the variants of the habitat 40A0, the phytocoenosis are intermingled, succeeding according to altitude and slope aspect. The same thing happens to Topolnița and Cornetul Coșuștei, where the variant with *Genista radiata* is not present.

Disturbing factors of such a habitat are represented by the degradation from grazing, when the habitat is in contact with grassland, deforestation for increasing the pasturelands areas or cultures, arson, the entrance in succession (in the case of secondary habitat), the harvesting blooming lilac twigs for marketing, uncontrolled tourism.

CONCLUSION

1. From the above mentioned aspects it is confirmed that the habitat is represented by the mosaic vegetation composed of steppe meadows (6210) and forest steppe floristic elements or species of plants from rupicolous Pannonian grasslands (6190).

2. The habitat is well represented, accompanying the Jurassic limestone alignment of the Danubian Autochthonous.

3. The status of this habitat is favourable in the examined area. There have not been identified potential threats to the habitat, have not been noticed any parasitic fungi attacks.

4. Under natural conditions the habitat, with its various subtypes, does not require special management. Natural habitats are located on the Natura 2000 site - protected areas.

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