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FLORA OF THE BELASSITSA MOUNTAIN

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Abstract

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As a result of the floristic investigations of Belassitsa Mt carried out between 2011 and 2012, 1515 species belonging to 517 genera and 106 plant families were recorded. The most numerous representatives were from the families *Asteraceae* (183), *Poaceae* (121), *Fabaceae* (113), *Lamiaceae* (83), *Caryophyllaceae* (80), *Scrophulariaceae* (79), *Brassicaceae* (77). There are 41 Balkan endemic species and 4 Bulgarian endemic species in the flora of investigated area.

Key words: Belassitsa Mt, vascular plants, flora

Introduction

Information on the plant and animal world of the Belassitsa Mountain were first found in the travel notes of Evliya Çelebi (1972) from the mid-17th century, where he described the mountain plane, poplars, white oak, turkey oak, elm, beech and chestnut, which grow around the entire mountain.

Stojanov (1921) reported 1347 species, varieties, and forms on the flora of Belassitsa. He studied the mountain vegetation and drew a floristic map of the following formations: chestnut forest, beech forest, deciduous shrubs and mixed forest, eternal green shrubs (on the south and southwest slopes), sub-Alpine meadows with *Juniperus depressa* and separate localities of *Olea europaea* L., *Abies alba* Miller, *Juniperus excelsa* Bieb., *Pinus laricio* Poir., and *Buxus sempervirens* L.

Becker (1924) described a new species, *Viola stojanowii*. Chronologically, what came up next was the book of Blagoev (1925) on the mountain's physiographic characteristics and its surroundings. The author presented the flora and vegetation on the southern and northern slopes and according to his studies the mountain was a phytogeographic border between the Mediterranean and temperate continental floristic regions.

Further data on the flora of the Belassitsa Mountain were found in the book of Turrill (1929).

Stojanoff (1930) provided information on the beech belt in the Belassitsa Mountain.

Stefanoff & Jordanoff (1931) reported data on the floral diversity of the mountain.

Ahtarov (1939) reported chorological and ecological data on the representative of Genus *Poa* L. in the Belassitsa Mountain.

According to Stojanov (1941), the Belassitsa Mountain falls into the floristic region of Northeastern Macedonia.

Phytogeographic data on the flora of the Belassitsa Mountain were found in the studies of Stefanov (1943).

Information on the beech forest in the Belassitsa Mountain was found in the works of Marinov, Nedjalkov & Naumov (1961).

In his graduation paper, Popov (1966) investigated the chestnut forest in Belassitsa Mountain and Ograzhden Mountain.

Panov (1975) reported *Bunias erucago* L. on the flora of mountain

Bondev, Ganchev, Boyadzhiiski & Slavova (1976) reported 11 new species on the mountain flora.

Kochev (1976) described the chestnut occurrence in Bulgaria.

A vegetation map of the Belassitsa Mountain, scale 1: 1 000 000, was drawn by Bondev (1978). According to him, there was a potential and secondary plant formation in the Bulgarian part of the mountain. Among the potential vegetation formations are *Fagus sylvatica* L., *Fagus sylvatica* subsp. *moesiaca* (K. Maly) Hjelmquist, *Castanea sativa* Mill., *Quercus pubescens* Willd., and *Quercus virgilliana* (Ten.) Ten. Among the secondary vegetation formations are *Carpinus orientalis* Mill., *Juniperus deltoides* R. P. Adams *Juni-*

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perus pygmaea C. Koch, *Festuca poaeformis* Host, *Festuca varia* Hke, and *Nardus stricta* L.

Andreev (1979) described the plant biodiversity of the Blagoevgrad district and its protection.

Bondev (1991) specified the composition of the sub-Alpine vegetation in the mountain and added *Nardeta strictae*, *Festuceta validae*, *Bellardiochloeta validae*, and *Agrostideta capillaris* to the acidophilic grass formations and all of the formations of *Juniperus sibirica* in combination with secondary shrubs and grass species like *Chamaecytiseta absinthioides*, *Vaccineta myrtylli*, *Vaccineta vitis-idaeae*, *Vaccineta uliginosi*, *Nardeta strictae*, *Festuceta validae* and al. In the the river valley, the right tributaries of the Strumeshnitsa River indicate formations of Oriental Plane with Black Alder *Plataneta orientalis* and *Alnus glutinosa*. To the north-east, under Tumba Peak, there are mixed forests of *Abies alba* and *Fagus sylvatica*.

Data on glacial relicts like *Picea abies* (L.) Karst and *Abies alba* Mill. in the Belassitsa Mountain during the last 15 000 years can be found in article of Bozilova and Tonkov (1982).

Delipavlov and Cheshmedzhiev (1984) reported tree news species from the flora of the mountain. Those were *Clypeola jonthlaspi* L., *Crassula tillea* Lest.-Garl., and *Saxifraga rotundifolia* L. subsp. *chrysosplenifolia* (Boiss.) Webb.

Bondev and Lyubenova (1984) reported *Medicago carstiensis* Wulfen.

Panov (1975) reported *Bunias erucago* L.

Panov (1985) reported five new species from the flora of the mountain. Those were *Briza maxima* L. f. *maxima*, *Ostrya carpinifolia* Scop., *Silene cretica* L., *Papaver hybrida* L., and *Saxifraga graeca* Boiss.

Data on the mountain flora and vegetation were found in work of Velchev and Tonkov (1986), Strid (1986), and Velchev, Bondev, Kochev, Roussakova, Vassilev, Meshinev, Nikolov, Georgiev and Valchev (1989).

Delipavlov (1988) reported two new species from Belassitsa: *Soldanella hungarica* Simk. and *Campanula cervicaria* L.

Denchev, Dimitrov and Sharkova (1997) reported two new species on the flora of mountain: *Mycropyrum tenellum* (L.) Link and *Muscari vandasii* Velen.

Delipavlov (1990) reported a new species, *Linaria brachyphylla* Delip., from the vicinity of Tumba Peak.

Panovska, Bozilova and Tonkov (1992) studied the glacial history of the vegetation in the western part of the Belassitsa Mountain.

In her graduation paper, Kostadinova (1998) made a floristic analysis on the northern (Bulgarian) slopes of the mountain.

Physiographic data, information on plant and animal world, routes, resorts, huts and cultural- historical heritage of the entire territory of Belassitsa was provided by Dinchev and Atanassov (1998).

Nineteen new species from the flora of the mountain were reported by Zhelev and Gougushev (2000).

Data on the distribution of *Castanea sativa* Mill. and its protection in Bulgaria was reported by Velev, Bratanova-Doncheva and Vaceva (2000).

Tree new species from the flora of mountain were reported by Dimitrov & Pavlova (2000): *Psilurus incurvus* (Gouan) Schinz and Thell., *Cardamine acris* Griseb. and *Nepeta nuda* L. subsp. *albiflora* (Boiss.) Gams.

Bergmeier and Dimopoulos (2001) studied the beech forest in the Greek part of the mountain based on syntaxonomy and gradient analysis.

Ancev (2001) reported taxonomical, phytogeographic and evolutionary trends of the *Brassicaceae* Burnett Family in the Belassitsa Mountain.

Kostadinova and Dimitrov (2002) reported 86 new species from the flora of mountain.

Fotiadis (2004) conducted a phytocoenological research on the forests in the Greek part of Belassitsa Mountain and Krusha Mountain.

In articles of Bratanova-Doncheva and Mihailov (1995), Bratanova-Doncheva, Lyubenova, Ignatova, Chipev, Fikova, Ovcharov,, Mirchev, Grozeva, Tsenkova, Ivancheva, Naumova and Peneva (2005), Dimitrova, Lyubenova and Bratanova-Doncheva (2005), Dimitrova, Lyubenova, Bratanova and Chavdarova (2005), and Tsonev, Lyubenova, Hinkov and Karakiev (2011) was reported information on the status of the Sweet Chestnut *Castanea sativa* Mill. formation

Dimitrov and Vutov (2005) reported *Silene roemeri* Friv. from the flora of the Belassitsa Mountain based on P. Panov's materials.

Tzonev, Dimitrov, Chytry, Roussakova, Dimova, Gussev, Pavlov,Vulchev, Vitkova, Gogoushev, Nikolov, Borisova and Ganeva (2006) reported five form forest beech communities from the vegetation of Belassitsa Mountain: *Luzulo-Fagetum sylvaticae*, *Geranium macrorhizum* - *Fagus sylvatica*, *Abies alba – Fagus sylvatica*, *Asperulo odoratae – Fagetum sylvaticae*, *Aremonio agrimonoides* - *Fagetum sylvaticae*, and *Violetosum reichenbachianae*.

From the Macedonian part of the Belassitsa Mountain Dimitrov (2007) reported *Blechnum spicant* (L.) Rothof.

Fotiadis and Athanassiadis (2008) reported 79 new vascular plants from the forest and shrub communities of the Krusha Mountain and the Belassitsa Mountain.

Protected plants from the flora of the Belassitsa Mountain are the subject of Ancev and Goranova (2009), Assyov

and Denchev (2009), Dimitrova (2009), Evstatieva (2009), Genova (2009), Ignatova (2009), Ivanova (2009), Meshinev (2009), Petrova (2009), Petrova and Vladimirov (2009), and Stoyanov (2009).

Assenov and Pavlova (2009) described the high serpentine flora of the Belassitsa Mountain. They reported 12 new species: *Ligusticum mutellina* (L.) Crantz, *Cerastium decalvans* Schloss. subsp. *macedonicum* (T.Georg.) Stoj.et Stef., *Sedum annuum* L., *Thymus callieri* Borbas ex Velen.subsp. *urumovii* Velen., *Thymus thracicus* Velen., *Festuca picturata* Pils., *Poa media* Schur, *Armeria alpina* Willd., *Thesium alpinum* L., *Veronica orbelica* (Peev) Peev, *Anthemis tenuiloba* (DC.) R.Fern., and *Lotus angustissimus* L.

Data on Balkan floristic elements in mountain flora were found in Petrova and Vladimirov (2010).

Topalova (2006) studied the flora and vegetation of the Belassitsa Mountain, status history of the forest, trends and management recommendation about protected natural territories. She focused on the priority of protected habitats in the sub-Alpine zone and the chestnut forest. Then she analyzed the geo-element distribution in the flora of the mountain (the Bulgarian part). According to her, those were mostly sub-Mediteranean (13.98%), followed of Euro-Asian (13.04%), Euro-Mediterranean (10.66%). European, Boreal, Euro-Siberian ones are 7.8% each, and Balkan floral elements are 4.34%. As a supplement in the end, there is systematic list of vascular flora of the Belassitsa Mountain. It lacks some data and is not quite exact: in the flora of the mountain so far, *Diphasiastrum alpinum* (L.) Holub, *Asplenium cuneifolium* Viv., *Barbarea balcana* Pancic, *Sedum kostovii* Stef., *Lamium bifidum* Cyr., *Galanthus elwesii* Hook.f. are not known yet. A total of 6 species of Genus *Atriplex* L. are missing, and Genus *Chenopodium* L. is represented just by *Chenopodium bonus-chenricus* L. Twelve more mountain species are missing. *Kochia scoparia* (L.) Schrad. and *Polycnemum arvense* L., *Silene gigantea* L. are Balkan-Anatolian elements, not only Balkan.

Data on the flora of mountain and rich-color photographs of 200 vascular plant species from Belassitsa are found in the book of Topalova-Zhezhiha, Gougushev, Ivanova and Kostadinova- Ilkova (2010). Each and every species has its own description: biological type, altitude, floral element, medicinal or poisonous properties. The protected plants are marked with the respective symbols according to the Red List of Bulgarian Vascular Plants (Petrova and Vladimirov, 2009) and the relevant directives and conventions: CITES, the Bern Convention, and Natura 2000.

Strid and Raus (2012) reported two new species from the sub-Alpine belt in the Greek part of the Belassitsa Mountain: *Soldanella chrysostricta* Kres. subsp. *chrysostricta* and *Drymocallis rupestris* (L.) Sojak (*Potentilla rupestris* L.). Two species are long ago known from the northern slopes in the Bulgarian part of Belassitsa.

Topalova-Zhezhiha (2012) studied the flora and vegetation of the Belassitsa Mountain in the tree border territories: Bulgaria, Macedonia and Greece. It provides additional information on the protected areas, cultural-historical heritage, and landmarks.

Spiridonov, Gussev, Assyov and Goesheva (2012) described in general the flora of the Belassitsa Mountain as an important place for plants in Bulgaria. Some important species from Red Data book of Republic Bulgaria were reported: *Ilex aquifolium* L., *Taxus baccata* L., *Acer heldreichii* Orph., *Lilium albanicum* Griseb., *Platanus orientalis* L. Among the forest habitats reported: 92C0- Forest of *Platanus orientalis*, 91W0-Moesiac beech forest. The entire Bulgarian part of the mountain falls in Natura 2000 BG 0000167 zone, with an area of 11 587.77 ha.

Materials and Methods

The field research was conducted during May – September 2011 and June – October 2012. The transect method was selected for observations in the study area. Specimens were determined according to Kozhuharov (1992), Delipavlov and Cheshmedzhiev (2003) and the Flora of PR Bulgaria (Jordanov, 1963-1979; Velčev, 1982, 1989; Kožuharov, 1995).

Results and Discussion

The vascular flora of Belassitsa Mountain, isolated as an independent floristic region, hosts 1515 species from 517 genera and 106 families. The taxonomy shows species from *Asteraceae* 183, *Poaceae* 121, *Fabaceae* 113, *Lamiaceae* 83, *Caryophyllaceae* 80 *Scrophulariaceae* 79, *Brassicaceae* 77, *Rosaceae* 73, *Liliaceae* 62, *Apiaceae* 56, *Cyperaceae* 47, *Boraginaceae* 41, *Ranunculaceae* 38, *Orchidaceae* 32, *Rubiaceae* 24, *Chenopodiaceae* 20, *Polygonaceae* 20, *Juncaceae* 16, *Campanulaceae* 16, *Crassulaceae* 15, *Dipsacacea* 14, *Onagraceae* 14, *Papaveraceae* 14, *Violaceae* 14, *Euphorbiaceae* 13, *Iridaceae* 13, *Primulaceae* 13, *Geraniaceae* 12, *Saxifragaceae* 11,*Valerianaceae* 10, *Fagaceae* 9, *Hypericaceae* 9, *Malvaceae* 9, *Solanaceae* 9, *Salicaceae* 8, *Aspidiaceae* 7, *Aspleniaceae* 7, *Betulaceae* 7, *Caprifoliaceae* 7, *Cistaceae* 7, *Aceraceae* 6, *Amaranthaceae* 6, *Plantaginaceae* 6, *Asclepiadaceae* 5, *Orobanchaceae* 5, *Pinaceae* 5, *Santalaceae* 5, *Convolvulaceae* 4, *Cuscutaceae* 4, *Equisetaceae* 4, *Polygalaceae* 4, *Alismataceae* 3, *Araceae* 3, *Aristolochiaceae* 3, *Celastraceae* 3, *Cupressaceae* 3, *Ericaceae* 3, *Lemnaceae* 3, *Linaceae* 3, *Loranthaceae* 3, *Poly-*

podiaceae 3, *Tiliaceae* 3, *Potamogetonaceae* 3, *Typhaceae* 3,*Urticaceae* 3, *Athyriaceae* 2, *Cornaceae* 2, *Gentianaceae* 2, *Thelipteridaceae* 2, *Ophioglossaceae* 2, *Portulacaceae* 2, *Pyrolaceae* 2, *Resedaceae* 2, *Rhamnaceae* 2, *Ulmaceae* 2, *Moraceae* 2, *Adoxaceae* 1, *Apocynaceae* 1, *Aquifoliaceae* 1, *Araliaceae* 1, *Balsaminaceae* 1, *Berberidaceae* 1, *Butomaceae* 1, *Cannabaceae* 1, *Dioscoreaceae* 1, *Hypolepidaceae* 1, *Juglandaceae* 1, *Juncaginaceae* 1, *Lythraceae* 1, *Menyanthaceae* 1, *Najadaceae* 1, *Phytolaccaceae* 1, *Plumbaginaceae* 1, *Selaginellaceae* 1, *Sinopteridaceae* 1, *Smilacaceae* 1, *Sparganiaceae* 1, *Staphilleaceae* 1, *Taxaceae* 1, *Verbenaceae* 1, *Zannichelliaceae* 1, *Zygophyllaceae* 1, *Ephedraceae* 1, *Anacardiaceae* 1, *Monotropaceae* 1 and *Vitaceae* 1 (Figure 1).

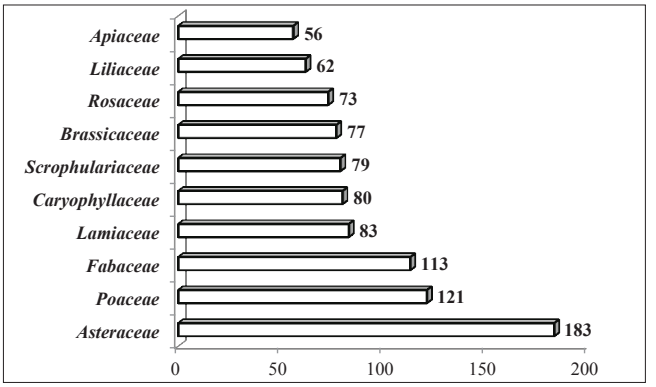

Fig. 1. Families with the greatest participation of species and genera in the flora of Belassitsa Mt

The range of most numerous genera from the vascular flora of Belassitsa Mountain goes like: *Carex* 34, *Trifolium* 26, *Veronica* 25, *Ranunculus* 21, *Silene* 21, *Vicia* 19, *Centaurea* 18, *Rosa* 17, *Lathyrus* 16, *Viola* 14, *Bromus* 13, *Hieracium* 13, *Galium*13, *Campanula* 12, *Chenopodium* 12, *Epilobium* 12, *Euphorbia* 12, *Festuca* 12, *Potentilla* 12, *Myosotis* 12, *Poa* 12, *Geranium* 11, *Verbascum* 11,*Ornithogalum* 11, *Achillea* 10, *Allium* 10, *Cardamine* 10, *Orchis* 10, *Chanaecytisus* 9, *Senecio* 9, *Sedum* 9, *Hypericum* 9, *Euphrasia* 9, *Stachys* 9, *Crepis* 8, *Cirsium* 8, *Medicago* 8, *Juncus* 8, *Luzula* 8, *Gagea* 8, *Alchemilla* 8, *Saxifraga* 8, *Thymus* 8, *Valerianella* 8, *Anthemis* 7, *Inula* 7, *Alyssum* 7, *Rorippa* 7, *Quercus* 7, *Crocus* 7, *Scutellaria* 7, *Dianthus* 7, *Muscari* 7, *Rumex* 7, *Rubus* 7, *Linaria* 7, *Cirsium* 6, *Acer* 6, *Amaranthus* 6, *Thlaspi* 6, *Atriplex* 6, *Plantago* 6, *Koeleria* 6, *Asperula* 6, *Chaerophyllum* 5, *Asplenium* 5, *Artemisia* 5, *Carduus* 5, *Taraxacum* 5, *Sisymbrium* 5, *Scleranthus* 5, *Stellaria* 5, *Knautia* 5, *Genista* 5, *Lamium* 5, *Mentha* 5, *Dactylorhiza* 5, *Orobanche* 5, *Alopecurus* 5, *Persicaria* 5, *Polygonum* 5, *Salix* 5, *Melampyrum* 5, *Scrophularia* 5, *Solanum* 5, *Teucrium* 5, *Anthriscus* 4, *Arctium* 4, *Doronicum* 4, *Echinops* 4, *Lactuca* 4, *Tanacetum* 4, *Onosma* 4, *Arabis* 5, *Astragalus* 4, *Lepidium* 4, *Minuartia* 4, *Cuscuta* 4, *Scabiosa* 4, *Equisetum* 4, *Fumaria* 4, *Galeopsis* 4, *Polygonatum* 4, *Corydalis* 4, *Papaver* 4, *Hordeum* 4, *Setaria* 4, *Polygala* 4, *Pyrus* 4, *Sorbus* 4, *Thesium* 4, *Digitalis* 4, *Bupleurum* 3, *Heracleum* 3, *Peucedanum* 3, *Seseli* 3, *Torilis* 3, *Vincetoxicum* 3, *Dryopteris* 3, *Polystichum* 3, *Leontodon* 3, *Matricaria* 3, *Scorzonera* 3, *Sonchus* 3, *Xanthium* 3, *Alkanna* 3, *Buglossoides* 3, *Cynoglossum* 3, *Echium* 3, *Pulmonaria* 3, *Arenaria* 3, *Herniaria* 3, *Lychnis* 3, *Evonymus* 3, *Juniperus* 3, *Pycreus* 3, *Mercurialis* 3, *Coronilla* 3, *Lotus* 3, *Onobrychis* 3, *Gladiolus* 3, *Iris* 3, *Acinos* 3, *Ajuga* 3, *Calamintha* 3, *Asparagus* 3, *Prunella* 3, *Linum* 3, *Lonicera* 3, *Malva* 3, *Cephalaria* 3, *Epipactis* 3, *Elymus* 3, *Eragrostis* 3, *Phleum* 3, *Polypodium* 3, *Potamogeton* 3, *Lysimachia* 3, *Thalictrum* 3, *Fragaria* 3, *Cruciata* 3, *Populus* 3, *Rhinanthus* 3, *Tilia* 3, *Typha* 3, *Umbilicus* 3, *Berteroa* 3, *Alisma* 2, *Pastinaca* 2, *Arum* 2, *Aristolochia* 2, *Aster* 2, *Bidens* 2, *Carlina* 2, *Conyza* 2, *Erigeron* 2, *Filago* 2, *Hypochaeris* 2, *Omalotheca* 2, *Petasites* 2, *Pulicaria* 2, *Corylus* 2, *Heliotropium* 2, *Lappula* 2, *Barbarea* 2, *Brassica* 2, *Hesperis* 2, *Lunaria* 2, *Jasione* 2, *Sambucus* 2, *Viburnum* 2, *Petrorhagia* 2, *Saponaria* 2, *Helianthemum* 2, *Calystegia* 2, *Convolvulus* 2, *Cornus* 2, *Sempervivum* 2, *Holoschoenus* 2, *Cephalaria* 2, *Dipsacus* 2, *Vaccinium* 2, *Ononis* 2, *Melilotus* 2, *Trigonella* 2, *Centaurium* 2, *Glechoma* 2, *Lycopus* 2, *Marrubium* 2, *Milium* 2, *Lemna* 2, *Lilium* 2, *Ruscus* 2, *Scilla* 2, *Althaea* 2, *Ophrys* 2, *Abies* 2, *Pinus* 2, *Aegilops* 2, *Agrostis* 2, *Avena* 2, *Brachypodium* 2, *Calamagrostis* 2, *Cistus* 2, *Crataegus* 2, *Cynosurus* 2, *Melica* 2, *Vulpia* 2, *Anagalis* 2, *Androsace* 2, *Primula* 2, *Anemone* 2, *Ulmus* 2, *Clematis* 2, *Consolida* 2, *Reseda* 2, *Cotoneaster* 2, *Erysimum* 2, *Geum* 2, *Kickxia* 2, *Odontites* 2, *Thelipteris* 2, *Fritillaria* 2, *Helleborus* 2, *Phlomis* 2, *Urtica* 2, *Valeriana* 2, *Adoxa* 1, *Sagittaria* 1, *Astrantia* 1, *Berula* 1, *Bifora* 1, *Caucalis* 1, *Conium* 1, *Daucus* 1, *Eryngium* 1, *Huetia* 1, *Ligusticum* 1, *Myrrhoides* 1, *Orlaja* 1, *Physospermum* 1, *Pimpinella* 1, *Sanicula* 1, *Scandix* 1, *Selinum* 1, *Silaum* 1, *Smyrnium* 1, *Tordylium* 1, *Trinia* 1, *Vinca* 1, *Ilex* 1, *Hedera* 1, *Asarum* 1, *Asclepias* 1, *Gymnocarpium* 1, *Ceterach* 1, *Phyllitis* 1, *Adenostyles* 1, *Anthennaria* 1, *Bellis* 1, *Bombycilaena* 1, *Carthamus* 1, *Chondrilla* 1, *Cichorium* 1, *Cnicus* 1, *Crupina* 1, *Dracunculus* 1, *Eupatorium* 1, *Filaginella* 1, *Galinsoga* 1, *Gnaphalium* 1, *Lapsana* 1, *Leucanthemum* 1, *Mycelis* 1, *Onopordum* 1, *Ptilostemon* 1, *Telekia* 1, *Tragopogon* 1, *Tussilago* 1, *Xeranthemum* 1, *Athyrium* 1, *Cystopteris* 1, *Impatiens* 1, *Berberis* 1, *Alnus* 1, *Betula* 1, *Ostrya* 1, *Asperugo* 1, *Cerinthe* 1, *Lithospermum* 1, *Lycopsis* 1, *Nonnea* 1, *Symphytum* 1, *Aethionema* 1, *Alliaria* 1, *Alyssoides* 1,

Arabidopsis 1, *Aurinia* 1, *Bunias* 1, *Calepina* 1, *Capsella* 1, *Cardaria* 1, *Clypeola* 1, *Coronopus* 1, *Descurainia* 1, *Draba* 1, *Erophila* 1, *Myagrum* 1, *Nasturtium* 1, *Neslia* 1, *Raphanus* 1, *Sinapis* 1, *Butomus* 1, *Asyneuma* 1, *Legousia* 1, *Humulus* 1, *Agrostemma* 1, *Cucubalus* 1, *Gypsophila* 1, *Holosteum* 1, *Moehringia* 1, *Moenchia* 1, *Myosoton*, *Paronychia* 1, *Sagina* 1, *Spergula* 1, *Spergularia* 1, *Vaccaria* 1, *Viscaria* 1, *Kochia* 1, *Polycnemum* 1, *Fumana* 1, *Rhodax* 1, *Tuberaria* 1, *Crassula* 1, *Jovibarba* 1, *Bryonia* 1, *Bolboschoenus* 1, *Cyperus* 1, *Eleocharis* 1, *Eriophorum* 1, *Isolepis* 1, *Scirpus* 1, *Tamus* 1, *Arctostaphylos* 1, *Anthyllis* 1, *Chamaespartium* 1, *Colutea* 1, *Dorycnium* 1, *Galega* 1, *Lens* 1, *Pisum* 1, *Robinia* 1, *Castanea* 1, *Fagus* 1, *Erodium* 1, *Globularia* 1, *Pteridium* 1, *Juglans* 1, *Triglochin* 1, *Ballota* 1, *Clinopodium* 1, *Leonurus* 1, *Melissa* 1, *Mellitis* 1, *Micromeria* 1, *Origanum* 1, *Sideritis* 1, *Ziziphora* 1, *Spirodella* 1, *Utricularia* 1, *Colchicum* 1, *Convallaria* 1, *Erythronium* 1, *Paris* 1, *Arceutobium* 1, *Loranthus* 1, *Viscum* 1, *Lythrum* 1, *Abutilon* 1, *Alcea* 1, *Hibiscus* 1, *Lavatera* 1, *Menyanthes* 1, *Najas* 1, *Fraxinus* 1, *Ligustrum* 1, *Circaea* 1, *Oenothera* 1, *Botrychium* 1, *Ophioglossum* 1, *Gymnadenia* 1, *Himanthoglossum* 1, *Limodorum* 1, *Listera* 1, *Neottia* 1, *Spiranthes* 1, *Oxalis* 1, *Glaucium* 1, *Parietaria* 1, *Phytolacca* 1, *Picea* 1, *Armeria* 1, *Aira* 1, *Anthoxanthum* 1, *Apera* 1, *Arrhenatherum* 1, *Beckmannia* 1, *Bellardiochloa* 1, *Catabrosa* 1, *Chrysopogon* 1, *Crypsis* 1, *Cynodon* 1, *Dactylis* 1, *Danthonia* 1, *Dasypyrum* 1, *Deschampsia* 1, *Digitaria* 1, *Echinochloa* 1, *Eleusine* 1, *Holcus* 1, *Hordelymus* 1, *Lerchenfeldia* 1, *Micropyrum* 1, *Nardus* 1, *Phragmites* 1, *Psilurus* 1, *Sesleria* 1, *Sieglingia* 1, *Sorghum* 1, *Taeniatherum* 1, *Tragus* 1, *Trisetum* 1, *Ventenata* `1, *Pleuropteropyrum* 1, *Montia* 1, *Portulaca* 1, *Cyclamen* 1, *Orthilia* 1, *Pyrola* 1, *Actaea* 1, *Adonis* 1, *Hepatica* 1, *Isopyrum* 1, *Nigella* 1, *Agrimonia* 1, *Aremonia* 1, *Filipendula* 1, *Spiraea* 1, *Sanguisorba* 1, *Crucianella* 1, *Sherardia* 1, *Comandra* 1, *Chrysosplenium* 1, *Parnassia* 1, *Ribes* 1, *Chaenorhinum* 1, *Gratiola* 1, *Lathraea* 1, *Misopates* 1, *Parentucellia* 1, *Pedicularis* 1, *Selaginella* 1, *Cheilanthes* 1, *Smilax* 1, *Atropa* 1, *Datura* 1, *Hyosciamus* 1, *Physalis* 1, *Sparganium* 1, *Staphyllea* 1, *Taxus* 1, *Verbena* 1, *Zannichellia* 1, *Tribulus* 1, *Bruckenthalia* 1, *Cyonura* 1, *Hedypnois* 1, *Rhagadiolus* 1, *Taphroseris* 1, *Teesdalia* 1, *Lupinus* 1, *Hippocrepis* 1, *Ornithopus* 1, *Spartium* 1, *Ficus* 1, *Jasminum* 1, *Olea* 1, *Phyllirea* 1, *Monotropa* 1, *Aphanes* 1, *Celtis* 1, *Bunium* 1, *Geocaryum* 1, *Malabaila* 1, *Vitis* 1, *Dracunculus* 1, *Piptatherum* 1, *Asphodelus* 1.

Most weakly distribution in Belassitsa has representatives of Gymnospermae – 10 species (0.66%) follow Pteridophyta with 30 species (1.98%). Representatives of Angiospermae are most groups on the flora of Belassitsa. Monocotyledonae are 305 species (20.13%) and of class Dicotyledonae are 1167 species (77.02%).

Spectrum of species of vascular plants on the flora of Belassitsa mountain on biological type show predominating of perennial grass plants (hemicriptophytes) whos are 872 (56.44%), followed annuals species (therophyte) 342 (22.13%), trees species are 50, shrubs- threes are 20, shrubs species are 77, semishrubs and perennial plants up semishrubs are 12, as phanerophytes are commonlyкато 159 (10.29%), biennial species are 50 (3.24%), annual up biennial species are 69 (4.46%) biennial up perennial grass species are 36 (2.33%), annual up biennial up perennial grass species are 17 (1.10%).

In terms of species relation to humidity mesoxerophytes prevailed and accounted for 40.28% (593 species), followed by xeromesophytes – 20.53% (373 species), typically mesophytic species – 8.76% (139 species), higrophytes – 8.69% (128 species), higromesophytes – 6.10% (91 species), typically xerophytic species – 5.84% (86 species) and mesohygrophytes – 4.21% (62 species).

The spectrum of floristic elements of the flora of mountain is following (see Figure 2):

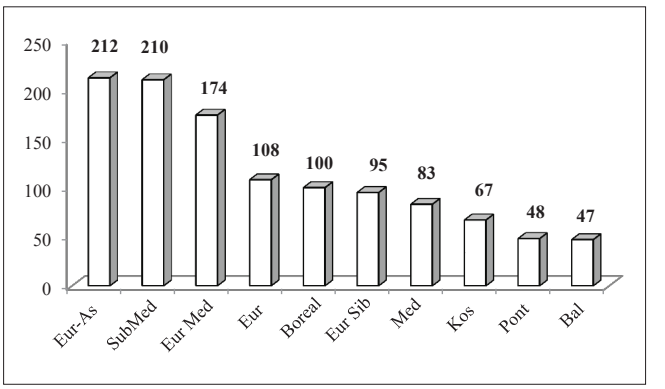

Fig. 2. Correlation of the most presented floristic elements in the investigated flora

Eur-As	212 (13.99%)
SubMed	210 (`13.86%)
Eur Med	174 (11.48%)
Eur	108 (7.13%)
Boreal	100 (6.60%)
Eur Sib	95 (6.27%)
Med	83 (5.48%)
Kos	67 (4.42%)
Pont	48 (3.17%)
Bal	47 (3.10%)
Eur-Sub Med	25 (1.65%)
Adv	22 (1.45%)
Bal-Anat	16 (1.05%)
Pont	15 (0.99%)

Med-CAs	14 (0.92%)
Bal-Dac	13 (0.85%)
Eur-OT	11 (0.73%)
SPont	10 (0.66%)
Alp-Carp-Bal	9 (0.59%)
Arct-Alp	6 (0.39%)
Ap –Bal	6 (0.39%)
subBal	6 (0.39%)
Pont-Sub Med	6 (0.39%)
Eur-CAs	5 (0.33%)
Sub Med –As	5 (0.33%)
Bul	5 (0.33%)
Pont-CAs	5 (0.33%)
Pann-Bal	5 (0.33%)
SubMed-CAs	4 (0.26%)
Alp-Carp	3 (0.19%)
Bal-Anat	3 (0.19%)
EMed	3 (0.19%)
SSib	3 (0.19%)
Pont-OT	3 (0.19%)
Pont-As	3 (0.19%)
Pont-Sib	3 (0.19%)
Med-As	2 (0.13%)
Eur-NAm	2 (0.13%)
Alp-Med	2 (0.13%)
Ap-Bal	2 (0.13%)
SubMed-Sib	2 (0.13%)
Eur-Med-CAs	2 (0.13%)
Alp-Bal	2 (0.13%)
Pont-Bal	2 (0.13%)
Med-OT	2 (0.13%)

By one species (0.06%) have 14 floristic elements and one hybride representative: Eur-Am, Med-Anat, Med-Atl, Med-Ch, Alp-Med, Bal-OT, SubMed-Anat, Bal-Aeg, Bal-Ap, Eur-Pont, CAs, SEux, Pann-Pont, Hybr.

From spectrum of the floristic elements are see, that by almost equally with bigges percent in the flora of Belassitsa are included Euro-Asiatic and Sub Mediterranean elements: 13.99 and 13.86%. If sum up elements with commonly distribution in mediterranean and submediterranean regions, shall see, that they predominate in elementary flora of mountain: 360 species and 30.82%. Adventive species are 22 (1.45%), who show, that flora of mountain still is preserve of his rush.

In the floristic complex of Belassitsa mountain participate 4 bulgarian endemic: *Cnicus bulgaricus* Panov, *Linaria brachyphylla* Delip., *Veronica krumovii* (Peev) Peev and *Veronica orbelica* (Peev) Peev.

Balkan endemic are 41: *Acer heldreichii* Orph., *Heracleum verticillatum* Pancic, *Pastinaca hirsuta* Pancic, *Pastinaca argyrophylla* Delip., *Peucedanum oligophyllum* (Griseb.) Vandas, *Achillea clypeolata* Sm., *Achillea pseudopectinata* Janka, *Centaurea tuberosa* Vis., *Senecio macedonicus* Griseb., *Asyneuma pichleri* (Vis.) D. Lakusic & F. Conti, *Campanula moesiaca* Velen., *Cerastium decalvans* Schloss., *Cerastium petricola* Pancic, *Cerastium rectum* Friv., *Dianthus moesiacus* Vis.& Pancic, *Lychnis subintegra* (Hayek) Turrill, *Silene frivaldszkyana* Hampe, *Silene waldsteinii* Griseb., *Scabiosa triniifolia* Friv., *Trifolium pignantii* Fauche & Chaub., *Crocus veluchensis* Herbert, *Stachys plumosa* Griseb., *Fritillaria gussichiae* (Deg.& Dorfl.) Rix, *Lilium albanicum* Griseb., *Abies borisii-regis* Mattf., *Armeria rumelica* Boiss., *Sesleria latifolia* (Adamovic) Degen, *Polygala rhodopea* (Velen.) Janch., *Soldanella rhodopaea* F.K.Mey, *Galium macedonicum* Krendl, *Digitalis viridiflora* Lindl., *Pedicularis leucodon* Griseb., *Scrophularia aestivalis* Griseb., *Verbascum adamovicii* Velen., *Viola speciosa* Pant., *Viola stojanowii* Becker, *Festuca hirtovaginata* Acht.) Markgr.-Dann., *Festuca riloensis* (Hack.ex Hayek) Markgr.-Dann., *Festuca valida* (Uechtr.) Penzes, *Soldanella pindicola* Hausskn., *Campanula spatulata* Sm (see Figures 3, 4 and 5).

Vegetation of mountain is group in vour vertical vegetation belts: xerothermic oak-hornbeam forest – by 500 m a.s.l., м надм.в., mesoxerotermic oak forest by 700 m a.s.l., beech forest by 1700 m a.s.l. and subalpic belt, who put on ridge of mountain with high punct peak Radomir (Kalabak) 2029 m a.s.l. Many characteristic for vegetation of Belassitsa is presence in the first two floristic belts of forest from *Castanea sativa* – habitat 92CO. Here in order with dominant species chestnut participate and species: *Tilia tomentosa* Moench, *Ostrya carpinifolia* Scop., *Corylus avellana* L., *Lathyrus venetus* (Mill.) Wohlf., *Lathyrus laxiflorus* (Desf.) Kuntze, *Asplenium adianthum – nigrum* L., *Huetia cynapioides* (Guss.) P.W.Ball, *Poa nemoralis* L.

On the humid valley of river Luda Mara, Leshnishki Dol, Ivanik, Kameshnitsa, Yavornishka Reka, Kljuchka Reka, Remeshnitsa and Gabrenska Reka have forest of Platanus orientalis- habitat 92CO.

Ridge parts of mountain are occupied of Rich of species Mat-grass communities on silicious terrain in the mountains-habitat 6230.

Interesting are association of rear and endemic species on serpentinite rocks in region of the pass Demir Kapiya (Iron Gate): *Senecio papposus*, *Lilium albanicum* (100 individuals), *Vaccinium vitis-idaea*, *Juniperus sibirica*, *Bruckenthalia spiculifolia*, *Chamaespartium sagittale*, *Vaccinium myrtillus*, *Luzula italica*, *Potentilla erecta*, *Calamagrostis arundinacea*, *Lerchenfeldia flexuosa*, *Polygala major*, *Epilobium angustifolium*, *Senecio procerus*, *Fragaria vesca*, *Lamium garganicum* f.*alba*.

Fig. 3. *Cerastium decalvans* Schlosser

Fig. 4. *Campanula moesiaca* Velen

Fig. 5. *Crocus veluchensis* Herbert

Fig. 6. *Senecio macedonicus* Griseb

On the highest point of Mountain pic Radomir (Kalabak) is seen association of *Lilium albanicum* Griseb.: *Festuca dalmatica*, *Minuartia recurva* subsp.*orbelica*, *Genista depressa*, *Plantago subulata*, *Anthemis carpatica*, *Luzula spicata*, *Pleuropteropyrum undulatum*, *Thlaspi perfoliatum*, *Euphorbia barrelieri, Cerastium decalvans, Lilium albanicum, Thymus callieri*, *Sempervivum marmoreum*, *Senecio procerus*, *Rumex acetosella*, *Polygala major.*

Easthern from peak Tumba in subalpic meadows have association of *Lilium albanicum* of 180 individuals: *Veronica officinalis* f. *alba*, *Lilium albanicum*, *Bruckenthalia spiculifolia*, *Luzula luzuloides*, *Vaccinium vitis-idaea*, *Festuca picturata*, *Rosa pendulina*, *Lerchenfeldia flexuosa*, *Chamaespartium sagittale*, *Galium album*, *Juniperus sibirica*, *Thesium alpinum*.

Vegetation on the southern slopes of mountain are characterize with participation of typical mediterranean species as *Olea europaea* subsp. *oleaster*(Hoffm.& Link) Negodi, *Ficus carica* L., *Phillyrea latifolia* L.,*Crataegus orientalis* Pall.ex M. Bieb., *Stefanoffia daucoides* (Boiss.) H. Wolff, *Urtica pilulifera* L., *Malabayla graveolens* (M.Bieb.) Hoffm., *Cionura erecta* (L.) Griseb., *Ephedra phoeminea* Forssk., *Cistus creticus* L., *Hedypnois cretica* (L.) Dum. Cours., *Hypochaeris cretensis* (L.) Bory & Chaub., *Rhagadiolus stellatus* (L.) Gaertn., *Umbilicus luteus* (Huds.) Webb & Berthel., *Lupinus angustifolius* L., *Teucrium capitatum* L., *Spartium junceum* L., *Chamaecytisus triflorus* (Lam.) Skalicka, *Trifolium angustifolium* L., *Hippocrepis emerus* subsp. *emeroides* (Boiss.& Spruner) Lassen, *Dracunculus vulgaris* Schott, *Asparagus acutifolius* L., *Fritillaria pontica* Wahlenb., *Buxus sempervirens* L.

Plants with nature protected value on the flora of mountain are 27 species. Of them 4 are with category Critically Endangered: *Lilium albanicum* Griseb. CR B 1ab(ii) + 2ab(ii),

Linaria brachyphylla Delip. CR B 2ab(ii); E, *Viola speciosa* Pant. CR B 2ab(iii), *Viola stojanowii* W.Becker CR B 1ab(iii) + 2ab(iii).

On the category Endangered are 9 species: *Ilex aquifolium* L. EN A1c; B1ab(iii) + 2ab(ii), *Aristolochia rotunda* L. EN B2ab(ii,iii), *Menyanthes trifoliata* L. EN B1ab(ii,iii,iv,v) + 2ab(ii); C2a(i), *Dactylorhiza incarnata* (L.) Soo EN B2b(ii,v) c (iv), *Epipactis palustris* (L.) Crantz EN B2ab (ii,iii,iv,v), *Digitalis laevigata* Waldst.& Kit. EN A2bc; B2ab(ii); C2b, *Taxus baccata* L. EN B1ab(ii,iii,iv,v) + 2ab(ii,iii,iv,v);C2a(i), *Crassula tillea* Lest.-Garl. EN B1ab(iii) + 2ab(iii), *Medicago carstiensis* Wulfen EN B1ab(ii,iii) + 2ab(ii,iii).

On the category Vulnerable are 10 species: *Acer heldreichii* Orph. VU B2ab(ii), *Echium russicum* J.F.Gmel. VU B2ab(iii), *Alyssum stribrnyi* Velen. VU B1ab (ii,iii) + 2ab(ii,iii), *Hesperis sylvestris* Crantz VU B1ab(ii,iii), *Anacamptis pyramidalis* (L.) Rich. VU A2c;B2ab(ii,iii,iv), *Himanthoglossum caprinum* (M.Bieb.) Spreng. VU B2b (ii,iv) c(iv), *Limodorum abortivum* (L.) Sw. VU B2 (iv)c(iv), *Ophrys cornuta* Steven VU B2b(ii,iv)c(iv), *Ophrys mammosa* Desf. VU B2ab (ii,iv), *Primula acaulis* L.) L. subsp.*rubra* (Sm.) Greuter & Burdet VU B1ab(ii,iii,v).

On the category Near Threatened are *Pyrus bulgarica* Kut. & Sachokia NT and *Polygala rhodopea* (Velen.) Janch. NT.

On the category of species with Data Deficient are: *Soldanella chrysostricta* Kress DD, and *Typha schuttleworthii* Koch & Sond DD.

To Bern convention come species: *Fritillaria gussichiae* (Degen & Dorfler) Rix, *Himantoglossum caprinum* (M.Bieb.) Spreng., *Typha shuttleworthii* Koch & Sond. and *Vaccinium arctostaphylos* L.

From Convention CITES are 31 species: *Cyclamen hederifolium* Ait., *Anacamptis pyramidalis* (L.) Rich., *Cephalanthera damassonium* (Mill.) Druce, *Cephalanthera longifolia* (L.) Fritsch, *Cephalanthera rubra* (L.) Rich, *Dactylorhiza cordigera* (Fries) Soo, *Dactylorhiza incarnata* (L.) Soo, *Dactylorhiza romana* (Sebastiani & Mauri) Soo, *Dactylorhiza saccifera* (Brongn.) Soo, *Dactylorhiza sambucina* (L.) Soo, *Epipactis helleborine* (L.) Crantz, *Epipactis palustris* (L.) Crantz, *Gymnadenia conopsea* (L.) R. Br., *Himanthoglossum caprinum* (M.Bieb.) Spreng., *Limodorum abortivum* (L.) Sw., *Listera ovata* (L.) R.Br., *Neottia nidus-avis* (L.) Rich, *Ophrys cornuta* Stev., *Ophrys mammosa* Desf., *Orchis coriophora* L., *Orchis elegans* Heuff., *Orchis morio* L., *Orchis ovalis* F. W.Schmidt ex Mayer, *Orchis pallens* L., *Orchis purpurea* Huds., *Orchis simia* L., *Orchis tridentata* Scop., *Orchis ustulata* L., *Platanthera bifolia* (L.) Rchb., *Platanthera chlorantha* (Cust.) Rchb., and *Spiranthes spiralis* Koch.

Conclusion

In conclusion can sayng, that flora and vegetation of Belassitsa Mountain is not more completely investigated. This is treat seseverely for its territory in Greece and Macedonia. Two neighbouring countries must be following Bulgarian example and be announced for protected terrytories of the mountain belong in her country bourders. Basic threateneds on the biodiversity are in xerothermic oak belt and in beech belt, where is situated and biggest formation of Sweet Chestnuts in Bulgaria. Guard of Nature park Belassitsa must strict be following on the each disturbance on his territory as a illegal felling, damage of chestnuts tree durring of gather in crops, controll on visitor impact in the markeing routhes to the peaks Radomir, Toumba, Kongur, Debelo Bardo, Lozen, appearance on mushrooms illness on chestnut trees, presence of kalamitets of insects, damage tree species and others. Effort of the future researchs must by direct to many steep rock partsin the upper streams of rivers, right tributaries of Strumeshnitsa river, whos are unstudied so far.Interesting and incomplete investigated is rock flora on the vertical and steep rocks on the ridge in subalpic zone of mountain in the part between the peaks Kongor, Radomir, and Toumba. During the Second world war ridges parts of mountain were mine the so called defence line Metaksas. By our investigation 1997- 1998 year many of this vertical and steep rocks terrains can not by investigated, because our gids frontier gards known where are dangerous mine places and warn in time. Necesery is also detailed phytocoenological investigation of different kind habitats in Lower Mountain, Middle Mountain and subalpic belts.

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