

# An investigation into the flora of the Shumen Heights

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Received: June 26, 2013 ▷ Accepted: March 05, 2014

**Abstract.** As a result of our investigations of the Shumen Heights in the period 1998–2012, 878 vascular plant species were identified, belonging to 432 genera and 107 families. Most families (66.36%) and genera (92.82%) were presented by a small number of species: from one to four. There were eight types of floristic elements divided into 49 groups. Of the life forms, most common were the cryptophytes (33.26%). The flora included mostly herbaceous perennials (53.42%). A total of 418 plants were medicinal (47.61%). There were 42 (4.78%) ornamental plants on the territory of the Heights. The antropophytes were 476 (54.21%). Eighty-six of the species (9.79%) had conservation status. Three species have been recorded for the first time in the floristic region of Northeast Bulgaria.

**Key words:** anthropophytes, endemics, floristic analysis, protected species, relics

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## Introduction

Shumen Heights refer to an area in the hills east of the Danubian Plain, which is under the protection of Natura 2000. The latter was determined by the role of the hills in support of biodiversity among large territories of scattered forests. The Shumen Heights are divided into three parts: Shumen Plateau (in the east), the Balkan (central part) and Fiseka (in the west). These three parts shape out an irregular rectangle, strongly stretched to the northwest-southeast. In the north, they border on the valleys of the river Pakusha and river Strazha. The western boundary is formed by the valleys of the river Pakusha and river Vrana. In the south and southeast, they border on river Golyama Kamchiya and its left-side tributary, river Vrana. In the east lies the Shumen area. The geographical boundary of the Heights is defined by river Strumba (Teke Dere). The Shumen Heights cover an area of 150 km<sup>2</sup>. It changes in width from 2 km westwards of peak Fiseka, to 9.5 km along the line between Kochovo village and Shumen. The highest point is Tarnov Tabiya in the west (502.4 m a.s.l.), followed by peak

Fiseka (500.5 m a.s.l.). The lowest point of the heights (200.0 m a.s.l.) lies southwards of peak Fiseka.

The eastern part of the Shumen Heights, the Shumen Plateau, was declared a National Park in 1980, with an area of 3929.9 ha (53%). In 2003, the park was recognized as a Nature Park. The regime of use and management of the park is determined by the Management Plan for Nature Parks (Andreev 1992) and the Protected Areas Act (1998).

Bukaka Reserve is located within the Shumen Plateau Nature Park. This is a forest area of 63.04 ha, protected due to the indigenous, centuries-old forest of *Fagus sylvatica* ssp. *moesiaca*. Any human activity is prohibited on the territory of the Reserve, except for its crossing on specifically marked trails.

The Shumen Plateau falls within the framework of Natura 2000 and has an estimated area of 4490.62 ha. It was designated in accordance with the Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora.

A unique combination of topographic characteristics, water resources, climate and soil conditions determines the plant species diversity in the area. In the

past, Velenovský and his collaborators, Hermengild Shkorpil and Anani Iavashev, began to study the flora of the Shumen Heights. In the 1880s, they collected the first botanical data in Northeast Bulgaria, including the area in the vicinity of Shumen (Stanev 2001). Their research was presented in *Flora Bulgarica* (Velenovský 1891) and its Supplement (Velenovský 1898). Davidov (1904) conducted his own research of the flora of Shumen and the territory around the town. Further information about some species distributed on the Shumen Heights can be found in Stoyanov & Stefanov (1924, 1925, 1933, 1948), Stoyanov & al. (1966, 1967) and in the *Flora of PR Bulgaria*, vols. 1–10 (1963–1995). Diversity of species of the *Orchidaceae* family has been studied by Radoslavova (2002). In the Management Plan for the Shumen Plateau National Park, 550 species of vascular plants (without mosses) are described. The flora in the eastern part of Shumen Heights was studied by Zahariev & Radoslavova (2010).

## Material and methods

Our study of the flora of Shumen Heights was conducted in 1998–2012 by the transect method. The names of taxa follow the *Flora of PR Bulgaria*, vols. 1–10 (Jordanov 1963–1979; Velčev 1982, 1989; Kožuharov 1995) and the *Conspectus of the Bulgarian Vascular Flora* (Assyov & Petrova 2012). Updating of the families is consistent with APG II (The Angiosperm Phylogeny Group 2003).

The life forms are given after Raunkier (Pavlov 2006). The *Flora of PR Bulgaria*, vols. 1–9 (Jordanov 1963–1979; Velčev 1982) and *Flora of R Bulgaria*, vol. 10 (Kožuharov 1995) are used for their determination.

The biological types follow Kožuharov (1992).

The floristic elements and endemics are given after Assyov & Petrova (2012).

The relics follow Gruev & Kuzmanov (1994), Peev & al. (1998), Peev (2001), Boža & al. (2005).

The conservation status is based on the following documents: Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora, Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention), Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), Red Data Book of the Re-

public of Bulgaria, vol. 1. Plants and Fungi (Peev & al. 2012), Red List of Bulgarian vascular plants (Petrova & Vladimirov 2009), Biological Diversity Act (2002), Order for a special regime for conservation and use of medicinal plants (Order RD-65 2013).

The anthropophytes are given after Stefanov & Kitanov (1962).

## Results and discussion

As a result of our investigations of the Shumen Heights, 878 species belonging to 432 genera and 107 families were identified. They constitute 22.96% of all species, 48.59% of all genera and 63.31% of all plant families in Bulgaria. The described species represent 39.09% of all species distributed in the 0–500 m altitude range, according to Peev & al. (1998).

*Lycopodiophyta* includes one family, one genus and one species. *Equisetophyta* is represented by one family, one genus and three species. *Polypodiophyta* is represented by five families, eight genera and 11 species. *Pinophytina* includes three families, nine genera and 15 species. *Magnoliophytina* is most numerous: 97 families, 413 genera and 848 species. Distribution of the taxa in them is as follows: *Dicotyledonae* – 79 families, 336 genera and 699 species; *Monocotyledonae* – 18 families, 77 genera and 149 species.

Almost all families, 91 (85.05%), are represented by one to four genera. Only 15 (14.95%) of them include five or more genera. The greatest number of genera is found in the families: *Asteraceae* (44), *Poaceae* (41), *Lamiaceae* (27), *Apiaceae* (26), *Fabaceae* (25), and *Brassicaceae* (23).

Most families, 71 (66.36%), have one to four species. Only 36 (33.64%) of them are represented by five or more species. Most species belong to the following families: *Asteraceae* (98), *Poaceae* (71), *Fabaceae* (69), *Lamiaceae* (60), *Rosaceae* (47), *Caryophyllaceae* (36), *Apiaceae* (35), *Brassicaceae* (35), *Scrophulariaceae* (33), *Ranunculaceae* (26), and *Orchidaceae* (20).

Almost all genera, 401 (92.82%), are represented by one to four species. Only 31 of the genera (7.18%) are represented by five or more species. Most species belong to the following genera: *Carex* (12), *Centaurea* (12), *Ranunculus* (11), *Galium* (10), *Euphorbia* (10), *Vicia* (10), *Campanula* (9), *Trifolium* (9), *Veronica* (9), and *Bromus* (9).

The established taxonomic diversity can be explained by the varied combinations of geomorphological, hydrological, climatic and soil conditions as a prerequisite for the variety of communities and habitats within the Shumen Heights.

The specific physiographic conditions of the Shumen Heights determine the considerable diversity of floristic elements. There are eight types of floristic elements divided into 49 groups. Circumboreals dominate (30.64%), followed by the European (26.42%) and the Mediterranean type (19.36%). Endemic element is relatively underrepresented (1.25%) and is considerably lower than average for Bulgaria – 12.8%, according to Petrova & Vladimirov (2010). It includes eight Balkan and three Bulgarian endemic taxa. The Balkan endemics are: *Achillea clypeolata*, *Koeleria simonkaii*, *Moehringia jankae*, *Onosma thracica*, *Salvia ringens*, *Scabiosa triniifolia*, *Sesleria latifolia*. The Bulgarian endemics are: *Anthemis regis-borisi*, *Campanula euxina*, *Myosotis aspera*.

Such distribution can be explained by the location of Shumen Heights in the trans-continental climate region. Proximity of the Heights to the border of a temperate region is the reason for prevalence of the Circumboreal and European floristic elements. Along with this, the impact of the Continental-Mediterranean region represented by the Black Sea and by karst topography create conditions for the development of a large number of Mediterranean species.

The flora of Shumen Heights includes a significant number of relic species: 38. They account for 4.33% of the total number of species. Most are Tertiary relics – 35 species (92.11% of the number of all relics). The Quaternary relics are represented by two species (5.26% of the number of all relics). One species is a Postglacial steppe relic (2.63% of the number of all relics).

The analysis of life forms has shown that all life forms are represented on the territory of Shumen Heights. Cryptophytes are the most common – 292 species (33.26%). This can be explained by predominance of forest habitats within the Heights. Many plants that form the grass floor are cryptophytes. There is a similar explanation for the high percentage of hemicryptophytes – 166 species (18.91%) and phanerophytes – 148 species (16.86%). Therophytes have also shown a significant number – 160 species (18.22%). This is related to the large number of rud-

eral and weed plants in this group and the anthropogenic impact, which is traced far back to ancient times and unfolds on a large scale nowadays. The transition group of therophytes–hemicryptophytes is underrepresented – 98 species (11.16%). Chamaephytes have the lowest number – 14 species (1.59%).

All subgroups of the cryptophytes are represented: geophytes, helophytes and hydrophytes. Of the geophytes, mention deserve the species that form the spring sinusium: *Anemone ranunculoides*, *Corydalis* spp., *Crocus flavus*, *Cyclamen coum*, *Galanthus elwesii*, *Galanthus nivalis*, *Isopyrum thalictroides*, *Scilla bifolia*. The helophytes are: *Alisma plantago-aquatica*, *Phragmites australis*, *Sparganium erectum*, and *Typha latifolia*. The hydrophytes are *Ceratophyllum demersum* and *Lemna minor*.

Widespread among the hemicryptophytes are: *Clinopodium vulgare*, *Eryngium campestre*, *Plantago lanceolata*, and *Taraxacum officinale*.

All subgroups of the phanerophytes are represented, with the exception of epiphytes and succulents: megaphanerophytes, mezophanerophytes, microphanerophytes, nanophanerophytes.

Most common of the megaphanerophytes are: *Acer pseudoplatanus*, *Fraxinus oxycarpa* and *Quercus cerris*. Most prevalent among the mezophanerophytes are: *Acer campestre*, *Carpinus betulus*, *Carpinus orientalis*, *Fagus sylvatica*, *Fraxinus ornus*, *Tilia tomentosa*, and *Ulmus minor*. The microphanerophytes are represented by numerous species, including: *Cotinus coggygria*, *Cornus mas*, *Cornus sanguinea*, *Crataegus monogyna*, *Paliurus spina-christi*, and *Rosa canina*. Most common among the nanophanerophytes are: *Helianthemum nummularium*, *Rubus caesius*, *Teucrium chamaedrys*, and *Teucrium polium*.

Common of the therophytes on Shumen Heights are: *Euphorbia helioscopia*, *Galium aparine*, *Lactuca serriola*, *Lamium purpureum*, *Orlaya grandiflora*, and *Xeranthemum annuum*.

One can witness the whole variety of biological types and all possible transitions between them. The results show that the group of perennial plants is the largest and includes 469 species (53.42%). It is followed by the annual plants – 160 species (18.22%), trees – 68 species (7.74%) and shrubs – 58 species (6.61%). Biennial plants and transition groups between the major biological types have a smaller number of species.

The largest number of perennial plants can be explained by the wide variety of communities and habitats within the Shumen Heights. A relatively large number of annual herbaceous plants results from the dry rocky terrain, mainly near rocks and slopes with shallow skeletal soils. Anthropogenic activity, which is particularly strong near the settlements, is an important factor for the arrival of new annual species into the Heights. A well-developed network of forest roads is a prerequisite for the spread of this group of plants.

Medicinal plants in the Shumen Heights number 418 species, belonging to 278 genera and 91 families. They account for 47.61 % of all species, 64.35 % of all genera and 85.05 % of all plant families on the Heights. They are distributed between the following categories: 45 trees (10.77 %), 47 shrubs (11.24 %), 232 perennial plants (55.50 %), 21 biennial plants (5.02 %), and 73 annual plants (17.46 %).

Of the 284 species of poisonous plants, 181 (63.73 %) find application in medicine.

An analysis of the obtained data shows that the populations of the following species have increased and are not endangered: *Anacamptis pyramidalis*, *Cyclamen coum*, *Galanthus nivalis*, *Himantoglossum caprinum*, *Lilium martagon*, and *Ruta graveolens*.

The species with conservation status total 86 (9.79 %). Two species are included in the Annex II of Directive 92/43/EEC. Three species are covered by the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention). Twenty-five species fall under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). The IUCN Red List for Bulgaria features 34 species in the following categories: Threatened – 14, Vulnerable – 10, Near Threatened – 5, and Least Concern – 5. Fourteen species are included in the Red Data Book of the Republic of Bulgaria in the category Endangered. There are 24 species included in the Biological Diversity Act in the category Protected (Annex 3) and 31 species in the category Under Protection and Controlled Use (Annex 4). Collecting of herbs from the natural habitats of 13 species is prohibited and other seven species are under controlled use.

The large number of species with conservation status confirms the importance of the Shumen Heights, part of which has been declared a protected area, in order to preserve Nature there in the future.

Three new species are new for the floristic region of Northeast Bulgaria: *Callitriche platycarpa*, *Clematis viticella*, and *Dryopteris carthusiana*.

Anthropogenic impact on the territory of Shumen Heights dates back to antiquity. The stone-built village within the Old Town alone has 3200 years of history. It is now difficult to determine what were the consequences of human activities in the past. Today, the Shumen Heights are encircled by the town of Shumen, its villa zone and nine villages. There are no settlements only along the western boundary of the Heights. Presumably, the size of settlements and the degree of anthropogenic impact exceed many times those of antiquity.

In the recent past, the following activities (now stopped) were carried out on the territory of the Shumen Heights: 1). Construction of military facilities. 2). Construction of Shumensko Pivo Brewery. 3) Construction of small hotels and chalets. 4). Building the Kioshkovete Forest Park back in 1897 in the eastern part of the Heights, which includes a number of ornamental species. 5). Construction of the Founders of the Bulgarian State Monument. 6). Planting of ornamental species in historical, tourist and cultural sites, and the road network. 7). Quarrying of sand and limestone blocks. 8). Disposal of construction waste in a landfill for which a separate road was built to the village Lozevo.

The activities, carried out today are: 1). Afforestation with atypical for the region or country species. 2). Lumbering. 3). Hay-making. 4). Collection of herbs. 5). Tourism. 6). Recreation. 7). The Annual Off-Road Rally. 8). Paragliding. 9). Maintenance of infrastructure and forest roads. 10). TV and radio retransmitters. 11). Disposal of household and construction waste in illegal dumps.

The ornamental plants on the territory of the Heights are 42 (4.78 %) and most of them could be found in the Kioshkovete Forest Park, in the area of the Old Town and around the Founders of the Bulgarian State Monument.

Due to human activity in the past and especially nowadays, there are many antropophytes – 476 (54.21 %): 30 trees, 36 shrubs, seven species from the transition group shrubs – trees and 375 herbaceous plants. There is a relatively small number of adventive and cosmopolitan species – 51 (5.81 %) and 36 (4.10 %).

**Appendix 1. Systematic list of species of vascular plants, established in Shumen Heights (Northeast Bulgaria).****Lycopodiophyta**

**Selaginellaceae:** *Selaginella helvetica* (L.) Spring.

**Equisetophyta**

**Equisetaceae:** *Equisetum arvense* L., *E. ramosissimum* Desf., *E. telmateia* Ehrh.

**Polypodiophyta**

**Aspidiaceae:** *Dryopteris carthusiana* (Vill.) H.P. Fuchs, *D. filix-mas* (L.) Schott, *Polystichum aculeatum* (L.) Roth.; **Aspleniaceae:** *Asplenium adiantum-nigrum* L., *A. ruta-muraria* L., *A. trichomanes* L., *Phyllitis scolopendrium* (L.) Newm.; **Athyriaceae:** *Athyrium filix-femina* (L.) Roth, *Cystopteris fragilis* (L.) Bernh.; **Dennstaedtiaceae:** *Pteridium aquilinum* (L.) Kuhn; **Polypodiaceae:** *Polypodium vulgare* L.

**Magnoliophyta****Pinopsida**

**Cupressaceae:** *Juniperus communis* L., *J. sabina* L., *J. virginiana* L., *Thuja orientalis* L.; **Pinaceae:** *Abies alba* Mill., *A. pinsapo* Boiss., *Cedrus atlantica* (Endl.) Carrière, *C. libani* A. Richard, *Larix europaea* L., *Picea abies* (L.) Karst., *P. pungens* Engelm., *Pinus nigra* Arnold, *P. sylvestris* L., *Pseudotsuga menziessii* (Mirbel) Franco; **Taxaceae:** *Taxus baccata* L.

**Magnoliopsida**

**Aceraceae:** *Acer campestre* L., *A. ginnala* Maxim., *A. hyrcanum* Fisch. & C.A. Meyer, *A. negundo* L., *A. platanoides* L., *A. pseudoplatanus* L., *A. tataricum* L.; **Amaranthaceae:** *Amaranthus hybridus* L., *A. retroflexus* L.; **Anacardiaceae:** *Cotinus coggygria* Scop., *Rhus typhina* L.; **Apiaceae:** *Aegopodium podagraria* L., *Angelica sylvestris* L., *Anthriscus cerefolium* (L.) Hoffm., *Berula erecta* (Huds.) Coville, *Bifora radians* M. Bieb., *Bupleurum affine* Sadler, *B. apiculatum* Friv., *B. praealtum* L., *B. rotundifolium* L., *Caucalis platycarpus* L., *Chaerophyllum byzantinum* Boiss., *C. temulentum* L., *Conium maculatum* L., *Daucus carota* L., *D. guttatus* Sm., *Eryngium campestre* L., *Ferulago campestris* (Besser) Grecescu, *F. sylvatica* (Besser) Rchb., *Heracleum sibiricum* L., *H. ternatum* Velen., *Laser trilobum* (L.) Borkh., *Laserpitium prutenicum* L., *Myrrhoides nodosa* (L.) Cannon, *Orlaya grandiflora* (L.) Hoffm., *Pastinaca sativa* L., *P. umbrosa* Steven & DC., *Phys-*

*ospermum cornubiense* (L.) DC., *Pimpinella peregrina* L., *Sanicula europaea* L., *Seseli rigidum* Waldst. & Kit., *S. tortuosum* L., *Tordylium maximum* L., *Torilis arvensis* (Hudson) Link, *Trinia ramosissima* (Trev.) Koch, *Turgenia latifolia* (L.) Hoffm.; **Apocynaceae:** *Vinca herbacea* Waldst. & Kit., *V. major* L., *V. minor* L.; **Araliaceae:** *Hedera helix* L.; **Aristolochiaceae:** *Aristolochia clematitis* L., *Asarum europaeum* L.; **Asclepiadaceae:** *Vincetoxicum hirundinaria* Medicus; **Asteraceae:** *Achillea clypeolata* Sm., *A. millefolium* L., *Anthemis regis-borisii* Stoj. & Acht., *A. ruthenica* M. Bieb., *A. tinctoria* L., *Arctium lappa* L., *Artemisia absinthium* L., *A. alba* L., *A. annua* L., *A. pedemontana* Balb., *A. vulgaris* L., *Bellis perennis* L., *Bidens tripartita* L., *Carduus acanthoides* L., *C. candicans* Waldst. & Kit., *C. crispus* L., *C. nutans* L., *C. thoermeri* Weinm., *Carlina acanthifolia* All., *C. vulgaris* L., *Carthamus lanatus* L., *Centaurea alba* L., *C. calcitrapa* L., *C. cyanus* L., *C. diffusa* Lam., *C. jacea* L., *C. marshalliana* Spreng., *C. pannonica* (Heuffel) Simonk., *C. phrygia* L., *C. rhenana* Boreau, *C. rutifolia* Sm., *C. scabiosa* L., *C. solstitialis* L., *Chamomilla recutita* (L.) Rauscher, *Chondrilla juncea* L., *Cichorium intybus* L., *Cirsium arvense* (L.) Scop., *C. canum* (L.) All., *C. ligulare* Boiss., *C. vulgare* (Savi) Ten., *Conyza canadensis* (L.) Cronquist, *Crepis foetida* L., *C. pannonica* (Jacq.) C. Koch, *C. setosa* Haller f., *Crupina vulgaris* Cass., *Doronicum hungaricum* Rchb., *D. orientale* Hoffm., *Echinops bannaticus* Schrad., *E. sphaerocephalus* L., *Erigeron acris* L., *E. annuus* (L.) Pers., *Eupatorium cannabinum* L., *Filago lutescens* Jord., *Helichrysum arenarium* (L.) Moench, *Hieracium cymosum* L., *H. hoppeanum* Schult., *H. pilosella* L., *H. virosum* Pallas, *Inula aschersoniana* Janka, *I. britanica* L., *I. conyza* L., *I. ensifolia* L., *I. germanica* L., *I. salicina* L., *Jurinea consanguinea* DC., *J. ledebourii* Bunge, *Lactuca quercina* L., *L. serriola* L., *L. viminea* (L.) J. & C. Presl., *Lapsana communis* L., *Leontodon hispidus* L., *Leucanthemum vulgare* Lam., *Matricaria perforata* Mérat, *Mycelis muralis* (L.) Dumort., *Onopordum acanthium* L., *Petasites hybridus* (L.) Gaertn., *Picris hieracioides* L., *Scorzonera austriaca* Willd., *S. hispanica* L., *S. laciniata* L., *Senecio jacobaea* L., *S. papposus* (Rchb.) Less., *S. vernalis* Waldst. & Kit., *Sonchus arvensis* L., *S. asper* (L.) Hill, *S. oleraceus* L., *Tanacetum corymbosum* (L.) Sch. Bip., *T. macrophyllum* (Waldst. & Kit.) Sch. Bip., *T. vulgare* L., *Taraxacum officinale*

Weber, *T. serotinum* (Waldst. & Kit.) Poir., *Tragopogon dubius* Scop., *T. porrifolius* L., *T. pratensis* L., *Tussilago farfara* L., *Xanthium spinosum* L., *X. strumarium* L., *Xeranthemum annuum* L.; **Berberidaceae**: *Berberis vulgaris* L., *Mahonia aquifolium* (Pursh) Nutt.; **Betulaceae**: *Betula pendula* Roth, *Carpinus betulus* L., *C. orientalis* Mill., *Corylus avellana* L., *C. colurna* L.; **Bignoniaceae**: *Catalpa bignonioides* Walt., *Paulownia tomentosa* (Thunb.) Steud.; **Boraginaceae**: *Anchusa azurea* Mill., *A. officinalis* L., *Buglossoides arvensis* (L.) I.M. Johnst., *B. purpureocaerulea* (L.) I.M. Johnst., *Cerinthe minor* L., *Echium italicum* L., *E. vulgare* L., *Heliotropium europaeum* L., *Myosotis arvensis* (L.) Hill., *M. aspera* Velen., *M. ramosissima* Rochel, *Nonea atra* Griseb., *N. pulla* (L.) DC., *N. ventricosa* (Sm.) Griseb., *Onosma arenaria* Waldst. & Kit., *O. thracica* Velen., *Pulmonaria mollis* Hornem., *P. officinalis* L., *Symphytum officinale* L., *S. ottomanum* Friv., *S. tuberosum* L.; **Brassicaceae**: *Alliaria petiolata* (M. Bieb.) Cavara & Grande, *Alyssum alyssoides* (L.) L., *A. tortuosum* Willd., *Arabis glabra* (L.) Bernh., *A. hirsuta* (L.) Scop., *A. sagittata* (Bertol.) DC., *A. turrata* L., *Aurinia saxatilis* (L.) Desv., *Berteroa incana* (L.) DC., *B. obliqua* (Sm.) DC., *Camelina rumelica* Velen., *C. sativa* (L.) Crantz, *Capsella bursa-pastoris* (L.) Medicus, *Cardamine bulbifera* (L.) Crantz, *C. quinquefolia* (M. Bieb.) Schmalh., *Cardaria draba* (L.) Desv., *Conringia orientalis* (L.) Dumort., *Descurainia sophia* (L.) Prantl, *Diplotaxis viminea* (L.) DC., *Draba aizoides* L., *Erophila verna* (L.) Chevall., *Erysimum crepidifolium* Rchb., *E. cuspidatum* (M. Bieb.) DC., *E. diffusum* Ehrh., *E. odoratum* Ehrh., *Fibigia clypeata* (L.) Medicus, *Hesperis tristis* L., *Isatis praecox* Tratt., *Lepidium graminifolium* L., *Lunaria annua* L., *Rorippa sylvestris* (L.) Besser, *Sinapis arvensis* L., *Thlaspi alliaceum* L., *T. arvense* L., *T. perfoliatum* L.; **Callitrichaceae**: *Callitriche platycarpa* Kütz.; **Campanulaceae**: *Campanula bononiensis* L., *C. euxina* (Velen.) Ančev, *C. grossekii* Heuff., *C. lingulata* Waldst. & Kit., *C. macrostachya* Waldst. & Kit., *C. persicifolia* L., *C. rapunculoides* L., *C. sibirica* L., *C. trachelium* L.; **Cannabaceae**: *Humulus lupulus* L.; **Caprifoliaceae**: *Lonicera maackii* Maxim., *L. tatarica* L., *Sambucus ebulus* L., *S. nigra* L., *Symphoricarpos albus* (L.) S.F. Blake, *S. orbiculata* Moench, *Viburnum lantana* L., *V. opulus* L.; **Caryophyllaceae**: *Arenaria leptoclados* (Rchb.) Guss., *A. serpyllifolia* L., *Cerastium banaticum* (Rochel) Heuff., *C. glomeratum* Thuill., *C. pumilum* Curtis, *C. semidecandrum* L., *Cucubalus baccifer* L., *Dianthus armeria* L., *D. giganteus*

*D'Urv.*, *D. membranaceus* Borbás, *Gypsophila paniculata* L., *Herniaria glabra* L., *H. hirsuta* L., *H. incana* Lam., *Lychnis coronaria* (L.) Desr., *Minuartia setacea* (Thuill.) Hayek, *Moehringia jankae* Janka, *M. trinervia* (L.) Clairv., *Petrorhagia prolifera* P.W. Ball & Heywood, *Queria hispanica* L., *Saponaria glutinosa* M. Bieb., *S. officinalis* L., *S. collinus* Opiz, *Scleranthus perennis* L., *Silene alba* (Mill.) E. Krause, *S. conica* L., *S. italica* (L.) Pers., *S. otites* (L.) Wibel., *S. viridiflora* L., *S. vulgaris* (Moench) Garcke, *Spergula arvensis* L., *Stellaria holostea* L., *S. media* (L.) Vill., *S. nemorum* L., *S. pallida* (Dumort.) Piré, *Viscaria vulgaris* Röhl.; **Celastraceae**: *Euonymus europaeus* L., *E. latifolius* (L.) Mill., *E. planipes* (Koehne) Koehne, *E. verrucosus* Scop.; **Ceratophyllaceae**: *Ceratophyllum demersum* L.; **Chenopodiaceae**: *Atriplex patula* L., *Beta trigyna* Waldst. & Kit., *Chenopodium album* L., *C. ficifolium* Sm., *C. glaucum* L.; **Cistaceae**: *Fumana procumbens* (Dunal) Gren. & Godr., *Helianthemum nummularium* (L.) Mill., *H. salicifolium* (L.) Mill., *Rhodax canus* (L.) Fuss; **Convolvulaceae**: *Calystegia sylvatica* (Kit.) Griseb., *Convolvulus arvensis* L., *C. cantabrica* L.; **Cornaceae**: *Cornus mas* L., *C. sanguinea* L.; **Crassulaceae**: *Sedum acre* L., *S. album* L., *S. maximum* (L.) Suter, *S. ochroleucum* Chaix; **Cucurbitaceae**: *Ecbalium elaterium* (L.) A. Rich.; **Cuscutaceae**: *Cuscuta epithimum* (L.) L., *C. europaea* L.; **Dioscoreaceae**: *Tamus communis* L.; **Dipsacaceae**: *Cephalaria transsylvanica* (L.) Roem. & Schult., *Dipsacus fullonum* L., *D. laciniatus* L., *Knautia macedonica* Griseb., *Scabiosa hispidula* Boiss., *S. rotata* M. Bieb., *S. triniifolia* Friv.; **Ebenaceae**: *Diospyrus lotus* L.; **Elaeagnaceae**: *Elaeagnus angustifolia* L.; **Euphorbiaceae**: *Euphorbia agraria* M. Bieb., *E. amygdaloides* L., *E. cyparissias* L., *E. esula* L., *E. helioscopia* L., *E. myrsinites* L., *E. nicaeensis* All., *E. plathyphyllos* L., *E. polychroma* A. Kern., *E. serrulata* Thuill., *Mercurialis ovata* Sternb. & Hoppe, *M. perennis* L.; **Fabaceae**: *Amorpha fruticosa* L., *Anthyllis vulneraria* L., *Astragalus cicer* L., *A. glaucus* M. Bieb., *A. glycyphylloides* DC., *A. glycyphyllos* L., *A. monspessulanus* L., *A. onobrychis* L., *A. vesicarius* L., *Bituminaria bituminosa* (L.) Stirt., *Cercis siliquastrum* L., *Chamaecytisus hirsutus* (L.) Link, *C. supinus* (L.) Link, *Colutea arborescens* L., *Coronilla scorpioides* (L.) C. Koch., *C. varia* L., *Dorycnium germanicum* (Gremli) Rikli, *D. herbaceum* Vill., *Galega officinalis* L., *Genista sessilifolia* DC., *G. tinctoria* L., *Gleditsia triacanthos* L., *Laburnum anagyroides* Medicus, *Lathyrus aureus* (Steven) Brândză, *L. laxiflorus* (Desf.) Kuntze, *L. niger* (L.) Bernh., *L. nisso-*

lia L., *L. pallescens* (M. Bieb.) C. Koch, *L. pannonicus* (Jacq.) Garcke, *L. sphaericus* Retz., *L. tuberosus* L., *L. vernus* (L.) Bernh., *Lembotropis nigricans* (L.) Griseb., *Lotus angustissimus* L., *L. corniculatus* L., *Medicago arabica* (L.) Huds., *Medicago falcata* L., *M. lupulina* L., *M. minima* (L.) Bartal., *M. sativa* L., *Melilotus alba* Medicus, *M. officinalis* (L.) Pall., *Onobrychis arenaria* (Kit.) DC., *Ononis arvensis* L., *O. pusilla* L., *O. spinosa* L., *Robinia pseudoacacia* L., *Robinia ×ambigua* L., *Spartium junceum* L., *Trifolium alpestre* L., *T. arvense* L., *T. campestre* Schreb., *T. hybridum* L., *T. incarnatum* L., *T. patens* Schreb., *T. pratense* L., *T. repens* L., *T. scabrum* L., *Trigonella coerulea* (L.) Ser., *Vicia angustifolia* Grufberg, *V. cracca* L., *V. grandiflora* Scop., *V. lathyroides* L., *V. melanops* Sm., *V. narbonensis* L., *V. pannonica* Crantz, *V. pisiformis* L., *V. sativa* L., *V. villosa* Roth; **Fagaceae:** *Fagus orientalis* Lipsky, *F. sylvatica* L., *Quercus cerris* L., *Q. dalechampii* Ten., *Q. frainetto* Ten., *Q. pubescens* Willd., *Q. robur* L., *Q. rubra* L.; **Fumariaceae:** *Corydalis bulbosa* (L.) DC., *C. marschalliana* (Pall.) Pers., *C. slivenensis* Velen., *C. solida* (L.) Schwarz, *Fumaria parviflora* Lam., *F. officinalis* L.; **Gentianaceae:** *Centaurium pulchellum* (Sw.) Druce; **Geraniaceae:** *Erodium cicutarium* (L.) L'Her., *E. hoefftianum* C.A. Mey., *Geranium columbinum* L., *G. lucidum* L., *G. macrorrhizum* L., *G. molle* L., *G. pyrenaicum* Burm. f., *G. robertianum* L., *G. sanguineum* L.; **Globulariaceae:** *Globularia aphyllanthes* Crantz; **Hippocastanaceae:** *Aesculus hippocastanum* L.; **Hycinthaceae:** *Muscari botryoides* (L.) Mill., *M. comosum* (L.) Mill., *M. neglectum* Ten., *M. tenuiflorum* Tausch, *Ornithogalum comosum* L., *O. fimbriatum* Willd., *O. kochii* Parl., *Scilla bifolia* L.; **Hydrangeaceae:** *Deutzia crenata* Siebold & Zucc., *Philadelphus coronarius* L.; **Hypericaceae:** *Hypericum elegans* Willd., *H. hirsutum* L., *H. perforatum* L.; **Juglandaceae:** *Juglans regia* L.; **Lamiaceae:** *Acinos arvensis* (Lam.) Dandy, *Ajuga chamaepitys* (L.) Schreb., *A. genevensis* L., *A. laxmanii* (L.) Benth., *A. reptans* L., *Ballota nigra* L., *Betonica officinalis* L., *Calamintha nepeta* (L.) Savi, *C. sylvatica* Bromf., *Clinopodium vulgare* L., *Galeopsis speciosa* Mill., *Glechoma hederacea* L., *G. hirsuta* Waldst. & Kit., *Lamium amplexicaule* L., *L. galeobdolon* (L.) L., *L. maculatum* L., *L. purpureum* L., *Lavandula angustifolia* Mill., *Leonurus cardiaca* L., *Lycopus europaeus* L., *L. exaltatus* L. f., *Marrubium peregrinum* L., *M. vulgare* L., *Melissa officinalis* L., *Mentha aquatica* L., *M. pulegium* L., *M. spicata* L., *Nepeta cataria* L., *Origanum vulgare* L., *Phlomis tuberosa* L., *Prunella grandiflora* (L.)

Scholler, *P. laciniata* (L.) L., *P. vulgaris* L., *Salvia aethiops* L., *S. amplexicaulis* Lam., *S. glutinosa* L., *S. nemorosa* L., *S. nutans* L., *S. pratensis* L., *S. ringens* Sm., *S. sclarea* L., *S. verticillata* L., *S. virgata* Jacq., *Satureja coerulea* Janka, *Scutellaria altissima* L., *S. orientalis* L., *Sideritis montana* L., *Stachys annua* L., *S. atherocalix* C. Koch., *S. germanica* L., *S. obliqua* Waldst. & Kit., *S. recta* L., *S. sylvatica* L., *Teucrium chamaedrys* L., *T. polium* L., *Thymus callieri* Velen., *T. glabrescens* Willd., *T. jankae* Čelak., *T. pannonicus* All., *T. zygoides* Griseb.; **Lemnaceae:** *Lemna minor* L.; **Linaceae:** *Linum hirsutum* L., *L. tauricum* Willd., *L. tenuifolium* L.; **Loranthaceae:** *Viscum album* L.; **Lythraceae:** *Lythrum virgatum* L.; **Malvaceae:** *Abutilon theophrastii* Medicus, *Alcea pallida* (Willd.) Waldst. & Kit., *Althaea cannabina* L., *A. officinalis* L., *Lavatera thuringiaca* L., *Malva sylvestris* L.; **Moraceae:** *Morus alba* L., *M. nigra* L.; **Oleaceae:** *Forsythia suspensa* (Thunb.) Vahl, *Fraxinus excelsior* L., *F. ornus* L., *F. oxycarpa* Willd., *Jasminum fruticans* L., *J. nudiflorum* Lindl., *Ligustrum vulgare* L., *Syringa vulgaris* L.; **Onagraceae:** *Circaea lutetiana* L., *Epilobium hirsutum* L.; **Oxalidaceae:** *Oxalis corniculata* L.; **Papaveraceae:** *Chelidonium majus* L., *Papaver rhoeas* L.; **Plantaginaceae:** *Plantago lanceolata* L., *P. major* L., *P. media* L., *P. scabra* Moench; **Platanaceae:** *Platanus hybrida* Brot.; **Polygalaceae:** *Polygala anatolica* Boiss. & Heldr., *P. major* Jacq.; **Polygonaceae:** *Bilderdykia convolvulus* (L.) Dumort., *Fallopia aubertii* (L. Henry) Holub, *Persicaria hydropiper* (L.) Opiz, *P. mitis* (Schrank) Opiz, *Polygonum aviculare* L., *P. patulum* M. Bieb., *P. pulchellum* Loisel., *Rumex acetosa* L., *R. crispus* L., *R. obtusifolius* L., *R. patientia* L., *R. pulcher* L., *R. sanguineus* L.; **Portulacaceae:** *Portulaca oleracea* L.; **Primulaceae:** *Anagallis arvensis* L., *Cyclamen coum* Mill., *Lysimachia nummularia* L., *L. punctata* L., *Primula veris* L.; **Ranunculaceae:** *Adonis flammea* Jacq., *A. vernalis* L., *Anemone ranunculoides* L., *A. sylvestris* L., *Clematis recta* L., *C. vitalba* L., *C. viticella* L., *Consolida hispanica* (Costa) Greuter & Burdet, *C. regalis* Gray, *Delphinium fissum* Waldst. & Kit., *Isopyrum thalictrifolium* L., *Nigella arvensis* L., *Pulsatilla pratensis* (L.) Mill., *Ranunculus acris* L., *R. auricomus* L., *R. bulbosus* L., *R. cassubicus* L., *R. ficaria* L., *R. millefoliatus* Vahl, *R. polyanthemus* L., *R. repens* L., *R. sceleratus* L., *R. velutinus* Ten., *R. villosus* DC., *Thalictrum aquilegifolium* L., *T. minus* L.; **Resedaceae:** *Reseda lutea* L.; **Rhamnaceae:** *Paliurus spina-christi* Mill., *Rhamnus saxatilis* Jacq.; **Rosaceae:** *Agrimonia eupatoria* L., *A. procera*

Wallr., *Amelanchier ovalis* Medicus, *Aremonia agrimonoides* (L.) DC., *Armeniaca vulgaris* Lam., *Chaenomeles japonica* (Thunb.) Spach, *Cotoneaster horizontalis* Decne., *Crataegus laevigata* (Poir.) DC., *C. monogyna* Jacq., *C. pentagyna* Waldst. & Kit., *Cydonia oblonga* Mill., *Filipendula vulgaris* Moench, *Fragaria moschata* Duchesne, *F. vesca* L., *F. viridis* Duchesne, *Geum urbanum* L., *Malus praecox* (Pall.) Borkh., *M. sylvestris* Mill., *Potentilla argentea* L., *P. laciniata* Nestl., *P. micrantha* DC., *P. pedata* Willd., *P. pilosa* Willd., *P. reptans* L., *P. sulphurea* Lam., *Prunus avium* L., *P. cerasifera* Ehrh., *P. insititia* L., *P. mahaleb* L., *P. spinosa* L., *Pyrus amygdaliformis* Vill., *P. pyrastrer* Burgsd., *P. sativa* Lam. & DC., *Rosa agrestis* L., *R. canina* L., *R. corymbifera* Borkh., *R. dumalis* Bechst., *R. micrantha* Sm., *R. tomentosa* Sm., *Rubus caesius* L., *R. discolor* Weiche & Nees, *R. thyrsanthus* Focke, *Sanguisorba minor* Scop., *Sorbus aucuparia* L., *S. torminalis* (L.) Crantz, *Spiraea douglasii* Hooker, *Spiraea xvanhouttei* (Briot) Carr.; **Rubiaceae:** *Asperula cynanchica* L., *Cruciata laevipes* Opiz, *C. pedemontana* (Bellardi) Ehrend., *Galium album* Mill., *G. aparine* L., *G. heldreichii* Halácsy, *Galium odoratum* (L.) Scop., *G. paschale* Forsskal, *G. pseudoaristatum* Schur, *G. rubioides* L., *G. spurium* L., *G. verum* L., *G. volhynicum* Pobed., *Sherardia arvensis* L.; **Rutaceae:** *Dictamnus albus* L., *Haplophyllum thesioides* (DC.) G. Don., *Ptelea trifoliata* L., *Ruta graveolens* L.; **Salicaceae:** *Populus alba* L., *P. nigra* L., *P. tremula* L., *Salix alba* L., *S. caprea* L.; **Santalaceae:** *Thesium dollineri* Murb., *T. simplex* Velen.; **Scrophulariaceae:** *Cymbalaria muralis* Gaertn., B. Mey & Schreb., *Digitalis ferruginea* L., *D. lanata* Ehrh., *Lathraea squamaria* L., *Linaria dalmatica* (L.) Mill., *L. genistifolia* (L.) Mill., *L. vulgaris* Mill., *Melampyrum arvense* L., *Odontites serotina* (Lam.) Dumort., *Orobanche arenaria* Borkh., *Orobanche pubescens* D'Urv., *Pseudolysimachion barrelieri* (Roem. et Schult.) Holub, *P. orchideum* (Crantz) Wraber, *P. spurium* (L.) Raushert, *Rhinanthus rumelicus* Velen., *Scrophularia canina* L., *S. nodosa* L., *Verbascum blattaria* L., *V. crenatifolium* Boiss., *V. densiflorum* Bertol., *V. lychnitis* L., *V. phlomoides* L., *V. phoeniceum* L., *V. speciosum* Schrad., *Veronica anagalis-aquatica* L., *V. arvensis* L., *V. austriaca* L., *V. chamaedrys* L., *V. hederifolia* L., *V. officinalis* L., *V. polita* Fries, *V. praecox* All., *V. triloba* (Opiz) Kern.; **Simaroubaceae:** *Ailanthus altissima* (Mill.) Swingle; **Solanaceae:** *Datura stramonium* L., *Lycium barbarum* L., *Physalis alkekengi* L., *Sola-*

*num dulcamara* L., *S. nigrum* L.; **Staphyleaceae:** *Staphylea pinnata* L.; **Tamaricaceae:** *Tamarix tetrandra* M. Bieb.; **Tiliaceae:** *Tilia cordata* Mill., *T. platyphyllos* Scop., *T. rubra* DC., *T. tomentosa* Moench; **Ulmaceae:** *Celtis glabrata* Steven, *Ulmus glabra* Huds., *U. laevis* Pall., *U. minor* Mill.; **Urticaceae:** *Parietaria lusitanica* L., *P. officinalis* L., *Urtica dioica* L., *U. urens* L.; **Valerianaceae:** *Valeriana officinalis* L., *Valerianella pumila* (L.) DC.; **Verbenaceae:** *Verbena officinalis* L.; **Violaceae:** *Viola arvensis* Murr., *V. kitaibeliana* Schult., *V. mirabilis* L., *V. odorata* L., *V. reichenbachiana* Boreau., *V. riviniana* Rchb., *V. tricolor* L.; **Vitaceae:** *Parthenocissus quinquefolia* (L.) Planch.; **Zygophyllaceae:** *Tribulus terrestris* L.

### Liliopsida

**Alliaceae:** *Allium atrovioleaceum* Boiss., *A. flavum* L., *A. fuscum* Waldst. & Kit., *A. rotundum* L., *A. scorodoprasum* L., *A. ursinum* L.; **Alismataceae:** *Alisma plantago-aquatica* L.; **Amaryllidaceae:** *Galanthus elwesii* Hook. f., *G. nivalis* L., *Sternbergia colchiciflora* Waldst. & Kit.; **Araceae:** *Arum elongatum* Steven, *A. maculatum* L.; **Asparagaceae:** *Asparagus tenuifolius* Lam., *A. verticillatus* L.; **Asphodelaceae:** *Anthericum ramosum* L., *Asphodeline liburnica* (Scop.) Rchb., *A. lutea* (L.) Rchb.; **Cyperaceae:** *Carex caryophyllea* Latourr., *C. depauperata* With., *C. divulsa* Stokes, *C. flacca* Schreb., *C. hirta* L., *C. humilis* Leyss., *C. liparocarpos* Gaudin, *C. otrubae* Podp., *C. ovalis* Good., *C. pendula* Huds., *C. praecox* Schreb., *C. sylvatica* Huds., *Scirpus sylvaticus* L.; **Iridaceae:** *Crocus flavus* Weston, *C. pallasii* Goldb., *C. reticulatus* Adams, *Iris graminea* L., *I. pumila* L.; **Juncaceae:** *Juncus effusus* L., *J. inflexus* L.; **Liliaceae:** *Convallaria majalis* L., *Fritillaria pontica* Wahlenb., *Gagea arvensis* (Pers.) Dumort., *G. lutea* (L.) Ker-Gawl., *Lilium martagon* L., *Polygonatum latifolium* (Jacq.) Desf., *P. multiflorum* (L.) All., *P. odoratum* (Mill.) Druce; **Orchidaceae:** *Anacamptis pyramidalis* (L.) Rich., *Cephalanthera damasonium* (Mill.) Druce, *C. longifolia* (L.) Fritsch, *C. rubra* (L.) Rich., *Dactylorhiza saccifera* (Brongn.) Soó, *Epipactis helleborine* (L.) Crantz, *E. microphylla* (Ehrh.) Sw., *E. purpurata* Sm., *Himantoglossum caprinum* (M. Bieb.) Spreng., *Limodorum abortivum* (L.) Schwarz, *Listera ovata* (L.) R. Br., *Neottia nidus-avis* (L.) Rich., *Ophrys apifera* Huds., *O. cornuta* Steven, *O. mammosa* Desf., *Orchis morio* L., *O. purpurea* Huds., *O. simia* Lam., *O. tridentata* Scop., *Platanthera chlorantha* (Custer) Rchb.;



**Poaceae:** *Aegilops cylindrica* Host, *A. geniculata* Roth, *Agropyron brandzae* Pantu & Solacolu, *Agrostis capillaris* L., *Alopecurus myosuroides* Huds., *A. pratensis* L., *Anthoxanthum odoratum* L., *Apera spica-venti* (L.) P. Beauv., *Arrhenatherum elatius* (L.) J. & C. Presl, *Avena fatua* L., *Botriochloa ischaemum* (L.) Keng, *Brachypodium pinnatum* (L.) P. Beauv., *B. sylvaticum* (Huds.) P. Beauv., *Briza media* L., *Bromus arvensis* L., *B. commutatus* Schrad., *B. japonicus* Thunb., *B. mollis* L., *B. racemosus* L., *B. ramosus* Huds., *B. scoparius* L., *B. sterilis* L., *B. tectorum* L., *Calamagrostis epigejos* (L.) Roth, *Chrysopogon gryllus* (L.) Trin., *Cleistogenes serotina* (L.) Keng, *Cynodon dactylon* (L.) Pers., *Cynosurus cristatus* L., *C. echinatus* L., *Dactylis glomerata* L., *Dasypyrum villosum* (L.) Cand., *Digitaria sanguinalis* (L.) Scop., *Echinochloa crus-galli* (L.) P. Beauv., *Elymus repens* (L.) Gould., *Festuca heterophylla* Lam., *F. pseudovina* Wiesb., *F. valesiaca* Gaudin, *Hordelymus europaeus* (L.) Harz, *Hordeum bulbosum* L., *H. leporinum* Link, *H. murinum* L., *H. secalinum* Schreb., *Koeleria macrantha* (Ledeb.) Schult., *K. nitidula* Velen., *K. simonkaii* Adamovič, *Lolium perenne* L., *L. temulentum* L., *Melica ciliata* L., *M. uniflora* Retz., *Milium effusum* L., *Phleum phleoides* (L.) Karst., *P. pratense* L., *Phragmites australis* (Cav.) Steud., *Piptatherum holciforme* (M. Bieb.) Roem. & Schult., *Poa annua* L., *P. bulbosa* L., *P. compressa* L., *P. nemoralis* L., *P. pratensis* L., *P. trivialis* L., *Sclerochloa dura* (L.) P. Beauv., *Sesleria latifolia* (Adamovič) Degen, *Setaria italica* (L.) P. Beauv., *S. viridis* (L.) P. Beauv., *Sorghum halepense* (L.) Pers., *Stipa capillata* L., *S. pulcherrima* Koch, *S. tirsia* Steven, *Taeniatherum caput-medusae* (L.) Nevski, *Tragus racemosus* (L.) All., *Vulpia myuros* (L.) C.C. Gmel.; **Ruscaceae:** *Ruscus aculeatus* L., *R. hypoglossum* L.; **Sparagiaceae:** *Sparganium erectum* L.; **Typhaceae:** *Typha latifolia* L.

## References

- Andreev, N.** 1992. Botanical characteristics of the Shumen Plateau National Park. – In: Shumen Plateau National Park. Technical Project for Green Construction, pp. 17-62. Agrolsproject (in Bulgarian).
- Assyov, B. & Petrova, A.** (eds). 2012. Conspectus of the Bulgarian Vascular Flora. Distribution Maps and Floristic Elements. 4<sup>th</sup> ed. Bulgarian Biodiversity Foundation, Sofia.
- Beshkov, V., Donchev, S., Karapetkova, M., Nikolov, N., Meshinev, T. & Popov, V.** 1994. The Red Data Book of the Shumen District. Slavcho Nikolov & Co., Shumen (in Bulgarian).
- Biological Diversity Act.** 2002. State Gazette, No. 77 of 9 August 2002, pp. 9-42. Amended in State Gazette, No. 94 of 16 November 2007 (in Bulgarian).
- Boža, P., Anačkov, G., Igić, R., Vukov, D. & Polić, D.** 2005. Flora “Rimskog šanca” (Vojvodina, Srbija). – The 8th Symposium on the Flora of Southeastern Serbia and Neighbouring Regions, Niš, 20-24.06.2005, Abstracts, p. 55.
- Davidov, B.** 1904. Contribution to study of the flora of the Shumen district. – Sbornik Nar. Umotvor., 20(2): 1-54 (in Bulgarian).
- Directive 92/43/EEC.** 1992. Council Directive 92/43/EEC of 21 May 1992 on the Conservation of Natural Habitats and of Wild Fauna and Flora. – OJ L 206, 22.07.1992. Pp. 7-50.
- Gruev, B. & Kuzmanov, B.** 1994. General Biogeography. St. Kliment Ohridski Univ. Press, Sofia (in Bulgarian).
- Jordanov, D.** (ed.). 1963–1979. Fl. Reipubl. Popularis Bulgaricae. Vols. 1–7. In Aedibus Acad. Sci. Bulgaricae, Serdicae (in Bulgarian).
- Kozuharov, S.** (ed.). 1992. Field Guide to the Vascular Plants in Bulgaria. Nauka & Izkustvo, Sofia (in Bulgarian).
- Kozuharov, S.** (ed.). 1995. Fl. Reipubl. Bulgaricae. Vol. 10. In Aedibus Acad. Sci. Bulgaricae, Serdicae (in Bulgarian).
- Order RD-65.** 2013. Order RD-65 of 28 January 2013 for the special regime for conservation and use of medicinal plants. State Gazette, No. 14 of 12 February 2013 (in Bulgarian).
- Pavlov, D.** 2006. Phytocoenology. Publishing House Univ. Forestry, Sofia (in Bulgarian).
- Peev, D., Kozuharov, S., Anchev, M., Petrova, A., Ivanova, D. & Tzoneva, S.** 1998. Biodiversity of Vascular Plants in Bulgaria. – In: **Meine, C.** (ed.), Bulgaria's Biological Diversity: Conservation Status and Needs Assessment. Biodiversity Support Program, Washington, D.C., Vol. 1, pp. 55-88.
- Peev, D., Petrova, A., Anchev, M., Temniskova, D., Dnechev, C.M., Ganeva, A., Gussev, Ch. & Vladimirov, V.** (eds). 2012. Red Data Book of the Republic of Bulgaria. Vol. 1. Plants and Fungi. Institute of Biodiversity and Ecosystem Research – BAS & Ministry of Environment and Water, Sofia (in Bulgarian).
- Petrova, A. & Vladimirov V.** (eds). 2009. Red list of Bulgarian vascular plants. – Phytol. Balcan., 15(1): 63-94.
- Petrova, A. & Vladimirov, V.** 2010. Balkan endemics in the Bulgarian flora. – Phytol. Balcan., 16(2): 293-311.
- Protected Areas Act.** State Gazette, No. 133 of 11 November 1998, Amended in State Gazette, No. 98 of 12 November 1999, Amended in State Gazette No 19 of 13 March 2009 (in Bulgarian).
- Radoslavova, E.** 2002. The Orchids of the Shumen Plateau. Snežanka Petkova – AR, Shumen (in Bulgarian).
- Stanev, S.** 2001. Little Known Names in Bulgarian Botany. Pensoft, Sofia–Moscow (in Bulgarian).
- Stefanov, B. & Kitanov B.** 1962. Die Kultigenen Pflanzen und Kultigene Vegetation in Bulgarien. Verlag der Bulgarischen Akademie der Wissenschaften, Sofia (in Bulgarian).
- Stojanov, N. & Stefanov, B.** 1924. Flora of Bulgaria. Vol. 1. State Printing House, Sofia (in Bulgarian).

- Stojanov, N. & Stefanov, B.** 1925. Flora of Bulgaria. Vol. 2. State Printing House, Sofia (in Bulgarian).
- Stojanov, N. & Stefanov, B.** 1933. Flora of Bulgaria. Ed. 2. Guttenberg Press, Sofia (in Bulgarian).
- Stojanov, N. & Stefanov, B.** 1948. Flora of Bulgaria. Ed. 3. Univ. Press, Sofia (in Bulgarian).
- Stojanov, N., Stefanov, B. & Kitanov, B.** 1966. Flora of Bulgaria. Ed. 4, vol. 1. Nauka & Izkustvo, Sofia (in Bulgarian).
- Stojanov, N., Stefanov, B. & Kitanov, B.** 1967. Flora of Bulgaria. Ed. 4, vol. 2. Nauka & Izkustvo, Sofia (in Bulgarian).
- The Angiosperm Phylogeny Group.** 2003. An update of the Angiosperm Phylogeny Group classification for the orders and families of flowering plants: APG II. – Bot. J. Linn. Soc., **141**: 399-436.
- Velčev, V. (ed.).** 1982, 1989. Fl. Reipubl. Popularis Bulgaricae. Vols. **8, 9**. In Aedibus Acad. Sci. Bulgaricae, Serdicae (in Bulgarian).
- Velenovský, J.** 1891. Flora Bulgarica. Descriptio et enumeration systematica plantarum vascularium in principatu Bulgariae sponte nascentium. Prague.
- Velenovský, J.** 1898. Flora Bulgarica. Supplementum I. Praegae.
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