Резюмета на публикациите на гл.ас. Анна Богомилова Гаврилова, д.б.

В.4. Хабилитационен труд – научни публикации в издания, които са реферирани и индексирани в световноизвестни бази данни с научна информация (Scopus и Web of Science) – *5 публикации*

В.4.1

PHARMACIA

Pharmacia 72: 1–3
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Short Communication

Essential oil composition of *Satureja kitaibelii* Wierzb. ex Heuff. from the central Danubian plain, Bulgaria

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Short summary

This study investigates the essential oil composition of *Satureja kitaibelii* Wierzb. ex Heuff., a Balkan endemic species with notable medicinal properties, from the central Danubian Plain, an unexplored region in Bulgaria. Essential oil were extracted using a Clevenger apparatus and analyzed via GC/MS, revealing *p*-cymene, limonene, carvacrol, and borneol as dominant compounds. Differences between localities (Kaylaka and Kartozhabene) were identified, alongside similarities with populations from other parts of Bulgaria and Serbia. These findings contribute to understanding phytochemical variability and hold implications for standardizing *S. kitaibelii* essential oil for pharmaceutical and industrial applications.

Keywords

essential oil, GC/MS, *Satureja kitaibelii*, Danubian plain

Introduction

The species ***Satureja kitaibelii*** Wierzb. ex Heuff. is a Balkan endemic species, which is one of the five most common wild species of the genus in the Balkans and the second most common in Bulgaria (Đorđević et al. 2014; Euro+Med plantbase 2024).

The above-ground parts of the plants are used in traditional cuisine and medicine in the whole range recent years many valuable properties of the species such as antioxidant, anti-inflammatory, hypoglycemic, antitumor and antimicrobial activity were reported (Gopcevic et al. 2019; Acimovic et al. 2021; Dimitrijevic et al. 2023). Considering the increasing resistance of microorganisms to antibiotics, the discovery of new bioactive molecules with high antimicrobial potential is very important (Uddin et al. 2021).

The literature references show that the essential oil

B.4.2.

plants

MDPI

Article

Metabolic Profile of Leaves and Pulp of *Passiflora caerulea* L. (Bulgaria) and Their Biological Activities

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Abstract: At present, there are no data in the scientific literature on studies aimed at characterizing *Passiflora caerulea* L. growing in Bulgaria. The present study aimed to investigate the metabolic profile and elemental composition of the leaves and pulp of this *Passiflora*, as well as to evaluate the antioxidant, antimicrobial and anti-inflammatory activities of its leaf and pulp extracts. The results showed that the pulp predominantly contained the essential amino acid histidine (7.81 mg g^{-1}), while it was absent in the leaves, with the highest concentration being tryptophan (8.30 mg g^{-1}). Of the fatty acids, palmitoleic acid predominated both in the pulp and in the leaves. A major sterol component was β-sitosterol. Fructose (7.50%) was the predominant sugar in the pulp, while for the leaves, it was glucose—1.51%. Seven elements were identified: sodium, potassium, iron, magnesium, manganese, copper and zinc. The highest concentrations of K and Mg were in the pulp (23,946 mg kg^{-1} and 1890 mg kg^{-1}) and leaves (36,179 mg kg^{-1} and 5064 mg kg^{-1}). According to the DPPH, FRAP and CUPRAC methods, the highest values for antioxidant activity were found in 70% ethanolic extracts of the leaves, while for the ABTS method, the highest value was found in 50% ethanolic extracts. In the pulp, for all four methods, the highest values were determined at 50% ethanolic extracts. Regarding the antibacterial activity, the 50% ethanolic leaf extracts were more effective against the Gram-positive bacteria. At the same time, the 70% ethanolic leaf extract was more effective against Gram-negative bacteria such as *Salmonella enteritidis* ATCC 13076. The leaf extracts exhibited higher anti-inflammatory activity than the extracts prepared from the pulp. The obtained results revealed that *P. caerulea* is a plant that can be successfully applied as an active ingredient in various nutritional supplements or cosmetic products.

Keywords: *Passiflora caerulea* L.; antimicrobial activity; antioxidant activity; chemical composition; anti-inflammatory activity; total phenolic content

B.4.3.

agronomy

MDPI

Article

Satureja kitaibelii Essential Oil and Extracts: Bioactive Compounds and Pesticide Properties

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Abstract: In recent years, the essential oil of *Satureja* species has been studied as a source of biocidal activity with potential applications in organic farming such as bio-pesticides. The present study aims to determine the potential of essential oil (EO), exudate fraction (EF) and methanolic extract (ME) of *Satureja kitaibelii* Wierzb. ex Heuff. to inhibit the mycelial growth of phytopathogenic fungi and acetylcholinesterase (AChE). Additionally, ME was tested for inhibitory activity on seed germination and root elongation. Phytochemical analysis was conducted using gas chromatography–mass spectrometry (GC–MS) and thin-layer chromatography (TLC). Biological activities were studied using in vitro methods. *p*-Cymene, limonene, geraniol, carvacrol and borneol were identified as the main components of EO. Oleanolic and ursolic acid, carvacrol and flavonoid aglycones were determined as the most abundant bioactive compounds of EF, whereas rosmarinic acid and flavonoid glycosides were found in ME. EO reduced the growth of all tested plant pathogens, indicated by 40% to 84% inhibition of mycelial growth (IMG). The growth rates of oomycetes *Phytophthora cryptogea* Pethybr. & Laff. and *Phytophthora nicotianae* Breda de Haan were affected to the greatest extent with 84% and 68% IMG. EF showed the most potent AChE inhibitory activity with IC_{50} value of 0.18 mg/mL. Aqueous solutions of the ME with a concentration above 5 mg/mL were found to inhibit seed germination by more than 90%, whereas a reduction in root elongation was observed at 3 mg/mL. The present study provides for the first time data for the pesticidal properties of EO, EF and ME of *S. kitaibelii*.

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B.4.4.

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ORIGINAL ARTICLE

PHYTOCHEMICAL SCREENING OF *SATUREJA KITAIBELII* WIERZB. EX HEUFF. EXTRACTS BY GC/MS AND TLC

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Abstract

The Balkan endemic species *Satureja kitaibelii* Wierzb. ex Heuff. is known in the folk medicine as herbal remedy, spice and natural food preservative. It has many biological properties such as antimicrobial, antioxidant, anti-inflammatory, etc. The purpose of this study was the GC/MS and TLC analyses of *Satureja kitaibelii* extracts of Bulgarian origin. Th plant surface exudate, the methanolic extract and a fraction prepared by alkaline hydrolysis were obtained the aerial parts. Phenolic acids, flavonoid aglycones (methyl derivatives of flavones), triterpene acids, terpenoids and fatty acids were identified in the plant surface exudate. Carvacrol, oleanolic acid, ursolic acid and 4-hydroxybenzoic acid were determined as main compounds in the plant surface exudate. Phenolic acids as quinic and rosmarinic acids, and carvacrol and palmitic acid prevailed in the methanolic extract. The most prevalent methanol insoluble phenolic acids further extracted with ethyl acetate after alkaline hydrolysis were caffeic and 4-hydroxycinnamic acids, followed by ferulic, syringic, 4-hydroxybenzoic and 3,5-dihydroxybenzoic acids. The investigated *S. kitaibelii* extracts showed a high content of important biologically active substances.

B.4.5.

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Flavonoid glycosides from Bulgarian endemic *Alchemilla achtarowii* Pawl

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Rosaceae
Flavonoid glycosides

1. Subject and source

The genus *Alchemilla* (Rosaceae) is represented in Bulgarian Flora by 35 species, 12 of which are endemics (Assenov, 1973). The endemic *Alchemilla achtarowii* Pawl. inhabits moist areas near mountain streams over shallow brown forest and rocky mountain-meadow soils of the Stara Planina Mountain between 1700 and 2100 m above the sea level. The species is rare and endangered according to the IUSN criteria and is included in the Red Data Book of R. Bulgaria (Vitkova, in press).

A. achtarowii Pawl. was collected from the Middle Stara Planina Mountain (Bulgaria) in July 2010 and identified by Assoc. Prof. Dr. Antonina Vitkova. Voucher specimen (SOM 165668) was deposited in the Herbarium at the Institute of Biodiversity and Ecosystem Research, Bulgarian Academy of Sciences, Sofia.

2. Previous work

Alchemilla species (Lady's mantle, Herba Alchemillae) are used in traditional medicine topically for wounds as well as orally for acute diarrhoea, dysmenorrhoea, menorrhagia, etc. (Bisset, 1994; Ivanov et al., 1977). Different studies showed that the phenolic compounds (tannins, flavonoids, etc.) present in the plant are responsible for the pharmacological activity of Lady's mantle (Jonadet et al., 1986; Lamaison et al., 1991; Filipek, 1992; Schimmer and Lindenbaum, 1995). So far, there are no literature data concerning the chemical composition of the endemic *A. achtarowii*.

3. Present study

Air-dried and powdered aerial parts (70 g) of *A. achtarowii* were extracted with MeOH (3 × 700 ml) at room temperature in an ultrasonic bath for 30 min each. After filtration, the solvent from the combined extracts was evaporated under vacuum to give a total methanolic extract (12.7 g). The latter was further dissolved in distilled water (200 ml) and partitioned

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Г.7. Публикации в чужди и в български издания, които са реферирани и индексирани в Scopus и Web of Science – *12 публикации*

Г.7.1. Morphometric variation of two endangered Bulgarian medicinal plant species *Alchemilla mollis* (Buser) Rothm. and *A. achtarowii* Pawł. (Rosaceae). /Приета за печат/

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Abstract: Morphometric variation of the protected in Bulgaria species *Alchemilla mollis* (Buser) Rothm. and *A. achtarowii* Pawł. (Rosaceae) was investigated based on ten morphometric characters under in-situ and ex-situ environmental conditions. Plant materials originating from Bulgarian localities of *A. mollis* and *A. achtarowii* in Central Balkan Mountains (1100-2000 m a.s.l.) were compared to others, harvested from experimental live collection, grown in Sofia (570 m a.s.l.). Abiotic factors like water regime, and temperature had a strong influence on the performance of both species in situ and ex situ. A distinctive difference in some morphometric characters of *A. mollis* in nature over the past 40 years was found. When exposed to prolonged temperature and drought stress *A. achtarowii* showed considerable variability regarding flower diameter and epicalyx indentation. The presented study should be used as a practical example of how some high mountain apomictic species react to changes in the environment and what are the resulting implications related to their traditional taxonomic treatment and conservation.

Г.7.2

PHARMACIA

Pharmacia 72: 1–4
DOI 10.3897/pharmacia.72.e146722

Short Communication

Accessibility of herbal substances containing toxic medicinal plants on the Bulgarian market

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Abstract

The aim of the presented study is to investigate whether raw herbal products containing herbal substances of poisonous medicinal plants are freely accessible on the Bulgarian digital market and, if so, to perform a brief analysis of the main flaws in the legislative framework that fails to prevent that. Twenty herbal substances enlisted as poisonous in Ordinance №5 (2004) on the requirements for the herbal procurement facilities and warehouses for herbal drugs were randomly selected, and the related herbal products that appear in a browser's top eight suggestions were analyzed. The study found that herbal products containing raw herbal drugs of poisonous plants, according to the mentioned Ordinance №5 (2004), are offered with varying frequency on Internet sites. These products have an unclear status because they violate specific legislative rules to be registered as food supplements or herbal medicinal products. Serious flaws regarding the consistency of the label information were also found. The results of our study indicate that a revision of the legislative framework related to the status, use, and control of these products is necessary.

Keywords

herbal substances, toxic plants, herbal products regulation

Г.7.3.

plants

MDPI

Review

Ziziphus jujuba: Applications in the Pharmacy and Food Industry

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Abstract: *Ziziphus jujuba* has been used since ancient times in traditional Eastern medicine. It is widely cultivated in numerous countries between the tropical and temperate climatic zones due to its high ecological plasticity and resilience to adverse weather. The different classes of chemical compounds contained in the plant are the reason for its medicinal properties. Research shows that every part of *Ziziphus jujuba*, the leaves, fruits and seeds, demonstrate therapeutic properties. This review focuses on the chemical composition in order to establish the relationship between the plant and its clinical use. Various biological effects are summarized and discussed: anticancer, anti-inflammatory, immunostimulating, antioxidant, hepatoprotective, gastrointestinal, etc. Apart from medicinal uses, the fruits of *Ziziphus jujuba* are edible and used in fresh and dried form. This literature review reveals possible medical applications of *Ziziphus jujuba* and its great potential for improving the diet of people in areas where the plant is abundant.

Г.7.4.

plants

MDPI

Review

Chemical Compositions, Pharmacological Properties and Medicinal Effects of Genus *Passiflora* L.: A Review

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Abstract: Practically all aboveground plants parts of *Passiflora* vines can be included in the compositions of dietary supplements, medicines, and cosmetics. It has a diverse chemical composition and a wide range of biologically active components that determine its diverse pharmacological properties. Studies related to the chemical composition of the plant are summarized here, and attention has been paid to various medical applications—(1) anti-inflammatory, nephroprotective; (2) anti-depressant; (3) antidiabetic; (4) hepatoprotective; (5) antibacterial and antifungal; and (6) antipyretic and other. This review includes studies on the safety, synergistic effects, and toxicity that may occur with the use of various dietary supplements based on it. Attention has been drawn to its application in cosmetics and to patented products containing passionflower.

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Г.7.5.

PHARMACIA

Pharmacia 70(3): 771–777
DOI 10.3897/pharmacia.70.e109767

Research Article

Capsaicinoids content in some Bulgarian varieties of *Capsicum annuum* L. obtained by RP-HPLC

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Abstract

Capsaicinoids are amides, a type of secondary metabolites in hot peppers, responsible for their hot taste also known as pungency. They possess many pharmacological properties with great potential for pharmacy like analgesic, blood glucose level reduction, insulin level improvement, reduction of triglycerides and cholesterol levels, etc. For the needs of this study a reliable and easy applicable RP-HPLC method with UV detection for determination of capsaicinoids was developed. Two traditional and two newly selected Bulgarian hot pepper varieties were studied. The concentrations of capsaicin and dihydrocapsaicin in the pericarp and the seeds were determined respectively. According to the Scoville heat unit (SHU) equivalence of the pericarps, the varieties Dzhulyunska shipka 1021, Zlatna shipka and Kehlibar show moderate pungency and present a potential value for the pharmaceutical and food industries. The current study contributes to the scientific database with regard to the pungency of *Capsicum annuum* L. varieties.

Г.7.6.

PHARMACIA

Pharmacia 69(3): 865–872
DOI 10.3897/pharmacia.69.e87549

Research Article

Assessment of morphological pharmacognostic characteristics of the content and label information of dried herbs marketed as food supplements in Bulgaria

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Abstract

According to the current food legislation in Bulgaria the dried herbs are classified under the large group of food supplements and their trade is allowed in pharmacies, drugstores and grocery stores. The aim of this study is to assess the morphological pharmacognostic characteristics of the content and the additional information on the labels of food supplements containing dried herbs in Bulgaria, in the light of key standard and regulatory documents related to the quality of herbal substances and food supplements. 91 herbal substances of 10 main groups were studied, which included 103 commercial products from 8 companies. The authenticity of the herbal substances was confirmed with macro-and microscopic tests. The macroscopic morphological indicators which were used as elements of trade-commodity analysis were changes in color, presence of other parts of the same or different plants, organic and mineral impurities, evidences of diseases and pest infestations. The phenological phase in which the herbal substances had been collected was determined also. We found that very small part of the studied products meet the standards for all of the selected criteria according to the considered documents which implies the need of strengthening control.

Г.7.7.

PHARMACIA

Pharmacia 69(1): 93–97
DOI 10.3897/pharmacia.69.e78304

Research Article

Contribution to the microscopic identification of Zingiberis rhizoma

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Abstract

Zingiber officinale Roscoe has a very long history of use throughout the world, both as a spice and as a medicinal plant. During the last two years in the midst of a global pandemic of SARS-CoV-2 the use of various herbal products with ginger rhizome as active ingredient increased because of its numerous health beneficial properties. A detailed characteristic of the crude powdered drug is presented by microscopic photographs for the first time. Although the structure of ginger rhizome is relatively simple and well-studied, the presented results in combination with the detailed analysis of the literature provide additional insight to the pharmacopoeial guidelines for the identification of ginger powder.

Г.7.8.

PHARMACIA

Pharmacia 68(4): 755–762
DOI 10.3897/pharmacia.68.e72769

Research Article

Preliminary *in vitro* study of anti-oxidant activity and anti-diabetic potential of plant extracts from 4 herbal substances not traditionally used for treatment of diabetes mellitus

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Abstract

The focus of the presented study is the *in vitro* anti-oxidant activity and anti-diabetic potential of water extracts from the following four herbal substances, not traditionally used for treatment of diabetes mellitus – leaves of *Sambucus ebulus* L. and *Prunus mahaleb* L., and flowering stems of *Cichorium intybus* L. and *Satureja kitaibelii* Wierzb. ex Heuff. The water extracts are obtained through ultrasonication. The extract of *S. kitaibelii* stands out due to its highest values in all studied indicators – total phenolic content, scavenging potential (DPPH, ABTS) and α-glucosidase inhibitory activity which was six times higher than acarbose. The extract of *C. intybus* also showed significant α-glucosidase inhibitory activity compared to acarbose. The flowering stems of both species are promising sources of biologically active substances for blood sugar control in diabetes mellitus.

Г.7.9.

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Flora and Vegetation of "Elenova gora" Natural Forest Reserve, Central Balkan Range (Bulgaria)

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Abstract. The study aims to investigate the flora, medicinal plants and vegetation diversity of "Elenova Gora" natural forest reserve, situated on the southern slopes of Central Balkan Range. The reserve occupies an area of 53.88 ha. The flora without mosses comprises of 132 vascular plant species, classified into 50 families and 108 genera. The most species-rich families are *Asteraceae, Lamiaceae, Poaceae, Ranunculaceae, Apiaceae, Aspidiaceae, Rubiaceae, Rosaceae*. Sixty five medical plants and 8 species of conservation concern were found (2 Balkan endemics, 3 species included in the Red List of Bulgarian vascular plants and in the Biodiversity Act and 3 species included in Appendix II of CITES). Eight relevés were collected during 2014 following the Braun-Blanquet approach. The vegetation diversity is represented by 3 classes (*Carpino-Fagetea sylvaticae, Mulgedio-Aconitetea* and *Thlaspietea rotundifolii*), 3 alliances (*Fagion sylvaticae, Petasition officinalis* and *Stipion calamagrostis*), 4 associations (*Asperulo odoratae-Fagetum sylvaticae, Festuco drymejae-Fagetum sylvaticae, Petasitetum hybrido-kablikiani, Parietarietum officinalis*) and 1 plant community (*Abies alba-Fagus sylvatica*). On the territory of the reserve was established 1 habitat type (9130 *Asperulo-Fagetum* beech forests) protected by Directive 92/43/EEC and the Bulgarian Biodiversity Act. Although its small size "Elenova Gora" natural forest reserve harbors relict beech forests and related herbaceous riverside communities with significant plant diversity and conservation value for maintenance of the beech forests of Central Balkan mountain and of the country.

Г.7.10.

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Section Ecoinformatics
Long Database Report

Balkan Vegetation Database: historical background, current status and future perspectives

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Abstract: The Balkan Vegetation Database (BVD; GIVD ID: EU-00-019; http://www.givd.info/ID/EU-00-019) is a regional database that consists of phytosociological relevés from different vegetation types from six countries on the Balkan Peninsula (Albania, Bosnia and Herzegovina, Bulgaria, Kosovo, Montenegro and Serbia). Currently, it contains 9,580 relevés, and most of them (78%) are geo-referenced. The database includes digitized relevés from the literature (79%) and unpublished data (21%). Herein we present descriptive statistics about attributive relevé information. We developed rules that regulate governance of the database, data provision, types of data availability regimes, data requests and terms of use, authorships and relationships with other databases. The database offers an extensive overview about studies on the local, regional and SE European levels including information about flora, vegetation and habitats.

Г.7.11.

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Agricultural Academy

INFLUENCE OF SPECIES COMPOSITION ON TOTAL PHENOLIC CONTENT AND ANTIOXIDANT PROPERTIES OF *HERBA ALCHEMILLAE*

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Abstract

VITKOVA, A., M. NIKOLOVA, M. DELCHEVA, Al. TASHEV, A. GAVRILOVA, I. ANEVA and D. DIMITROV, 2015. Influence of species composition on total phenolic content and antioxidant properties of *Herba Alchemillae*. *Bulg. J. Agric. Sci.*, 21: 990–997

Commercial product *Herba Alchemillae* is widely used in herbal medicine but it includes aerial parts of various species due to difficulties in their identification by herbalists. The present study determined the effect of *Alchemilla* species composition and the geographical distribution of species on total phenolic content and antioxidant activity of *Herba Alchemillae*. For that purpose a comparative analyzes of 22 samples of plant material collected from natural populations in 5 floristic regions of Bulgaria and 21 samples of the 8 common *Alchemilla* species was performed. The results showed that the content of total phenols and antioxidant activity depends mainly on the species composition and the quantitative participation of the species in plant materials. The study demonstrated greater percentage participation in *Herba Alchemillae* of species belonging to series *Vulgares*. All examined samples exhibited strong antioxidant activity, which is important from a practical point of view.

Key words: *Alchemilla* spp., medicinal plants, DPPH, radical scavenging activity, Bulgaria

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Г.7.12.

Cultivation of high antioxidant activity *Alchemilla* spp. (Rosaceae) for sustainable use

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Abstract

In this paper for the first time are presented guidelines for introduction and *ex situ* cultivation of species from genus *Alchemilla*, known by its curative properties for a variety of health disorders. Subject of the study are the rare and protected Bulgarian species *Alchemilla achtarowii* Pawl., *A. jumrukczalica* Pawl. and *A. mollis* (Buser.) Rothm., which showed high antioxidant activity in our recent research. Transplant material from natural populations grown in two live collections in the regions of Vitosha Mt. (1404 m a. s. l.) and West Rhodopes Mt. (1500 m a. s. l.) (Bulgaria) was used. The growth and development rate of the new plants was assessed according to the method of phenological observations. Nine morphometrical indices were studied and the biological productivity of the species was determined in *ex situ* conditions. The quantities of flavonoids (calculated as % quercetin) and tannins (calculated as % pyrogallol) during the different phenological stages of *ex situ* plant development were assessed via spectrophotometric methods. Several differences between the species in the two experimental stations were summarized as dependent on the ecological conditions. All results of the study were used to elaborate methodological instruction for successful cultivation of the species in field conditions.

Key words: *Alchemilla achtarowii* Pawl., *A. jumrukczalica* Pawl., *A. mollis* (Buser.) Rothm., medicinal plants, endemics, ex situ, biological productivity, flavonoids, tannins

Други публикации, които не са индексирани в БД Scopus и/или Web of Science, или са реферирани, но нямат метрика – *4 публикации*

PHYTOLOGIA BALCANICA 22(3): 335–343, Sofia, 2016

Current state of populations and resource assessment of *Alchemilla* species in Western Stara Planina and Western Sredna Gora Mountains in Bulgaria

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Abstract. The genus *Alchemilla* L. (Lady's Mantle) comprises 35 species in Bulgaria, 11 of them are Bulgarian and Balkan endemics. Herba *Alchemillae* is widely used in traditional and official medicine. In Bulgaria, the *Alchemilla* spp. are placed under a special regime of use by setting annual regional quotas according to the Bulgarian legalization. The main goal of the present study (2010–2012) was to record the distribution of *Alchemilla* species and determine their resources outside the protected areas in two floristic regions. Using the tracking method, 22 populations were found and studied in Western Stara Planina Mts and 14 in Mt Western Sredna Gora. The transect method was applied for resource assessment of nine economically used populations: five in the Western Stara Planina Mts and four in Mt Western Sredna Gora. Ecological characterization of the habitats, type of the plant community, and resource and operational stock of the species were established. A significant diversity of *Alchemilla* species was found in the Western Stara Planina Mts (13) and less in MtWestern Sredna Gora (9). Two endangered species were detected for the first time: *Alchemilla achtarowii* (Bulgarian endemic) in Mt Sredna Gora and *Alchemilla cathachnoa* (Balkan endemic) in the Western Stara Planina Mts. It was discovered that the operating reserves of Lady's Mantle in the Western Stara Planina Mts were insignificant. A comparative analysis has shown that resources in the MtWestern Sredna Gora (around Koprivshtitsa village) are considerably larger and can be used for commercial purposes.

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FLORA, HABITATS AND VEGETATION OF CHAMDZHA MANAGED RESERVE, CENTRAL BALKAN RANGE

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ABSTRACT: Chamdzha reserve is a managed reserve, situated on the southern slopes of Central Balkan Range, which occupies an area of 66.4 ha. The aim of this study was to explore floristic, habitat and vegetation diversity of the reserve. Totally the flora is represented by 51 families, 184 genera and 299 vascular plants (without mosses). The richest families are *Asteraceae*, *Poaceae*, *Fabaceae*, *Rosaceae*, *Caryophyllaceae*, *Brassicaceae*, *Boraginaceae* and *Apiaceae*. One hundred and eleven medical plants and 7 species of conservation concern were found (5 Balkan endemics, 3 included in the Red List of Bulgarian vascular plants and in the National Biological Biodiversity Act). Fourteen relevés were collected during 2014 following to the Braun-Blanquet approach. The vegetation diversity is represented by 5 classes (*Erico-Pinetea*, *Querco-Fagetea*, *Quercetea pubescentis*, *Koelerio-Corynephoretea* and *Festuco-Brometea*), 4 alliances (*Erico-Fraxinion orni*, *Carpinion orientalis*, *Carpinion betuli*, and *Festucion valesiacae*), 1 association and 5 communities. Woodland vegetation covers 61.2 ha whereas grassland vegetation includes only 0.15 ha. Natural communities represent 5 habitats protected by Directive 92/43/EEC and the Bulgarian Biodiversity Act.

Keywords: managed reserve, Bulgaria, Stara planina, *Erico-Pinetea*, *Koelerio-Corynephoretea*

New floristic records in the Balkans: 23*

Compiled by **Vladimir Vladimirov[1], Feruzan Dane[2] & Kit Tan[3]**

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Abstract: New chorological data are presented for 122 species and subspecies from Bulgaria (31-35, 43-64, 81-86, 105-112), Greece (16-24, 30, 65-80, 113-122) and Turkey-in-Europe (1-15, 25-29, 36-42, 87-104). The taxa belong to the following families: *Adiantaceae* (31), *Aizoaceae* (116), *Amaryllidaceae* (23), *Apiaceae* (65, 92-94), *Asteraceae* (16, 17, 36-39, 43-46, 55, 66-68, 98-100, 105, 106, 117), *Berberidaceae* (81), *Boraginaceae* (87), *Brassicaceae* (7-9, 40, 113), *Campanulaceae* (18, 118), *Caryophyllaceae* (2, 3, 56, 69, 70, 96, 97, 107), *Chenopodiaceae* (19, 71, 108, 119), *Cistaceae* (57), *Cucurbitaceae* (101), *Ephedraceae* (1), *Equisetaceae* (32, 33), *Euphorbiaceae* (20, 72, 120), *Fabaceae* (73, 84, 95), *Fagaceae* (85, 109), *Geraniaceae* (89-91), *Huperziaceae* (34), *Iridaceae* (77), *Lamiaceae* (21, 102, 121), *Liliaceae* s.l. (42, 61, 78, 79, 111), *Linaceae* (88), *Ophioglossaceae* (35), *Orchidaceae* (80, 115), *Papaveraceae* (4), *Phytolaccaceae* (47), *Pinaceae* (83), *Poaceae* (24, 52, 53, 62-64, 112), *Polygalaceae* (10-12, 48), *Polygonaceae* (13-15, 25-29, 86), *Portulacaceae* (122), *Primulaceae* (22), *Ranunculaceae* (5, 6, 74, 103, 104), *Rosaceae* (58, 75, 82), *Rubiaceae* (49, 59, 60), *Salviniaceae* (54), *Sambucaceae* (76), *Santalaceae* (30), *Scrophulariaceae* (41, 50, 110, 114), and *Vitaceae* (51).

New for science: *Aethionema saxatile* subsp. *corinthiacum* Kit Tan & al. (113) and *Galanthus samothracicus* Kit Tan & Biel (23), both from Greece.

New status proposed: *Euphorbia deflexa* subsp. *purpureo-suffusa* (Rech. f.) Biel & Kit Tan (20).

The publication includes contributions by: M. Aybeke (1-3), M. Aybeke & F. Dane (4-6), M. Aybeke, C. Kurt & A. Semerci (7-12), M. Aybeke & C. Yarcı (13-15), B. Biel & Kit Tan (16-24), F. Dane & S. Tütüncü Konyar (25-29), K. Giannopoulos, Kit Tan & G. Vold (30), D. Ivanova (31-35), B. Köse, S. Leventer & F. Dane (36-39), S. Tütüncü Konyar (40-42), A. Petrova (43-53), A. Petrova, R. Vassilev, D. Venkova & I. Gerasimova (54-64), K. Polymenakos & Kit Tan (65-80), A. Tashev & A. Gavrilova (81-82), A. Tashev, K. Koev & N. Tashev (83-86), S. Tütüncü Konyar & F. Dane (87-88), S. Tütüncü Konyar, F. Dane & S. Tütüncü (89-91), S. Tütüncü Konyar & S. Tütüncü (92-94), S. Tütüncü Konyar, S. Tütüncü & M. Aybeke (95), S. Tütüncü Konyar, S. Tütüncü & F. Dane (96-97), S. Tütüncü Konyar, S. Tütüncü & N. Güler (98-100), S. Tütüncü Konyar, S. Tütüncü & E. Konyar (101-102), S. Tütüncü Konyar, S. Tütüncü & B. Köse (103-104), V. Vladimirov (105-112), G. Zarkos, V. Christodoulou, Kit Tan & G. Vold (113-115), A. Zografidis & Kit Tan (116-122).

PHYTOLOGIA BALCANICA 17(1): 123–128, Sofia, 2011 123

Alchemilla mollis (*Rosaceae*) – a critically endangered species in Bulgaria

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Abstract. The present study discusses the current state of the only known so far population of *Alchemilla mollis* in Bulgaria. The species is a critically endangered on the territory of Bulgaria. The population is situated at the foot of peak Botev, the Central Balkan National Park. For the preservation of the species, some studies of the species population were initiated in the period 1990–2010. In this period the territory of the population has increased from 150 m^2 to 200 m^2. It is surrounded by a beech forest and harbours 65 vascular plants, mostly perennials (86.2 %), belonging to 57 genera and 24 families. In terms of age structure, young plants prevail. However, the ongoing process of erosion of the terrain and the anthropogenic impact are significant threats. Also the dryer and hot weather during the last few summers was affecting the phenological spectrum of *A. mollis* and could hamper the seed formation. On the basis of this, steps for *in situ* and *ex situ* conservation of the species are suggested.