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ABSTRACTS

MUŞATA VILLAGE, THE BIRTHPLACE OF ANASTASIE FĂTU HISTORICAL HIGHLIGHTS

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The village Muşata, where Anastasie Fătu was born, located in Berezeni, Vaslui county, is located between two hills, namely Boţasca in the SouthWest, also called „the vineyards" because it was planted entirely with vines, hill Guzar in East, a plateau bordered by Elan hill in the west and an opening toward the Prut river in the South, being crossed by Muşata brook, which springs from the hill Elan, which dries up in summer, to spill into the lake Berezeni (Pruteţ).

The opinions about the name of the village are different: historian A.D. Xenopol sees the origin of toponimy in Mușatins lords, and popular tradition in a shepherd named Mușat *that came with the sheeps around here and never left, giving birth to his sons, five in number, first human settlement on these places, on which grows only pasture grass. Mușat Shepherd settled at the top of the village, and later, one of his grandchildren's opened a small inn where encamped and rested camps that, were taking goods from this place to Basarabia, and from there came back still loaded*.

The village, one of working peasants, which were granted with land by rural law of 1864, consisted of two suburbs: Văleni or "Lower" and Muşata or "Upper".

Archaeological evidence, indicating traces of habitance from the end of IV-th century d. Hs. and the beginning of V d. Hs., locates the town Mușata to the left side of the creek Mușata. Documentary, is attested at August 10, 1482 Musat's well, most likely identified in Mușata. Filip and Nechifor, Horţănii sons, sell at October 8, 1488 the inherited land and Mușata estate, sale strengthened by Stephen the Great.

The community school is founded on 1899 and the first church dedicated to the "Holy Kings" is attested from 1740. The village was in history and is today an isolated one.

ANASTASIE FĂTU – FOUNDER OF THE BOTANICAL GARDEN OF IAŞI

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The remarkable personality of Anastasie Fătu, through the socio-medical organization in Moldova, science development within the first modern University of Romania, the establishment in Iasi of the first botanical garden, recommend him as the founder of the medical and natural sciences school from the United Principalities.

Anastasie Fătu was born January 2nd 1816 in Muşata village, former county of Fălciu (today Vaslui county). His father Vasile, priest and his mother Ana, always wanted their son, who since childhood presented remarkable qualities, to be accepted as state scholar in the public school. He graduates the *Episcopal School of Huşi* and after, the *Vasilian Gymnasium* from Iaşi.

In 1834, as awarded pupil of the mentioned gymnasium, he is sent to Wien as state scholar, where in 1841 gets his PhD in philosophy and law. During his studies he realized (as V. A. Urechia will state in his speech towards Anastasie Fătu at his acceptance within the Romanian Academy) that in a country "widow of freedom, in the country of whip and unfair privileges" he couldn't confirm his law and freedom ideas derived from the books he read and from the courses he attended at the Faculty of Law of the University of Wien.

Between 1841 and 1846 he continued his studies at *Sorbona University from Paris* where he got his PhD in medicine with the thesis: "Des signes des maladies du *cœur* en général fournis par l'auscultation, la percusion, l'inspection et la mensuration".

In 1856, 160 years ago, the physician Anastasie Fătu founded in Iaşi, with his own resources, the first Romanian botanical garden, which was considered to be a remarkable cultural event.

Same as the Natural History Museum founded in Iaşi in 1834, Anastasie Fătu's Botanical Garden essentially contributed at the development of natural sciences, the cultivated plants being used also at illustrating the botanical courses held within different schools and at the Michaelian Academy, founded in 1835.

These achievements represented favorable premises for the establishment in Iaşi, in 1860 of the first modern Romanian University. The sciences field was based on the two previously mentioned institutions: Natural History Museum and Botanical Garden, where the scientific and educational activities regarding youth formation were coordinated by Professor Anastasie Fătu.

During the time Anastasie Fătu was preoccupied with the development of the botanical garden, he collaborated with well-known botanists: Dimitrie Brândză, Dimitrie Grecescu and Florian Porcius.

Moreover, Dimitrie Brândză presented the plants from "Fătu's garden" during the botany courses held for the University's students.

The garden was situated on his property, on a sloppy terrain near the *Criminalu Palace* and the historic monument *Râpa Galbenă*, bound by Butucului Alley (now Anastasie Fătu Street), Begiului Alley (now Flowers Street) and the road that connected with Bohotinenului Alley (now Arcu Street).

From the published catalogue with more than 2500 species of plants cultivated in his garden, it can easily be noticed that beside the autochthonous species that grow spontaneously there were also some species of exotic gymnosperms and species belonging to *Ficus*, *Acacia* and *Mesembryanthemum* genera.

In the manuscript *Catalogus herbarii vivi et seminum ex horto 1870*, the plants cultivated within the garden are enumerated as following: in the first part the species are alphabetically arranged, in two columns on each page, one with indigenous plants that were acclimatized and another with exotic plants. In the second part are registered several groups of ornamental plants, vegetables, greens and fruit trees. This way, professor Fătu brings the first contributions to the knowledge of Romanian and especially Moldavian flora.

The indigenous plant species were procured with the help of botanist Iosif Szabó, and the foreign species came from Wien or from exchanges with botanical gardens from Germany and Chişinău. In his garden two greenhouses were build, one hot for the tropical plants and another temperate. These aspects underline the fact that Fătu realized at that time, through his garden, a true experimental field for the acclimatization of several exotic species.

The personality of this great scholar was mentioned in volumes [AIFTINCĂ, 2014; BOTNARIUC, 1961; BUDA, 2013; MITITIUC and TONIUC, 2006; POP, 1967; MAFTEI, 1972; POP and CODREANU, 1975; TOMA, 1986; TOMA, 2015], dictionaries [anonymous, 1982; NECULA, 2001], journals [ANGELESCU and DIMA, 2006; BURDUJA et al., 1960; BURDUJA and TOMA, 1979; CONSTANTINESCU, 2009; LEOCOV, 1979, 1982; PAPP, BURDUJA and DOBRESCU, 1955; RESMERIȚĂ, 1982; TOMA, 1974, 1975, 1987, 1996] or during several scientific events (1981, at the 125th anniversary of the establishment in Iaşi of the first Romanian Botanical Garden, when the bust of Anastasie Fătu, realized and donated by the sculptor Iftimie Bârleanu was unveiled; in 1986 at the IIIrd Symposium of the Botanical Garden, Mandache Leucov, GheorgheZamfir, Petru Jitariu and Constantin Toma evoked the personality of Anastasie Fătu).

In Berzeni village (Vaslui county), The Gymnasium and the mixed arboretum keep as gratitude sign, the name of the great scholar.

In October 1996, the Botanical Garden of Iaşi was named after its founder Anastasie Fătu, aspect mentioned on the commemorative plaque from the administrative building.

Anastasie Fătu died at Iaşi, 130 years ago, on March 3rd 1886 and he is buried at Eternitatea Cemetery.

HYPHENATION OF HPTLC WITH BIOAUTOGRAPHY AND MALDI-TOF-MS AS AN EFFECTIVE TOOL FOR BIOPROCESS AND QUALITY CONTROL OF PLANT EXTRACTS

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Bioassays are usually performed in water based buffers or additionally substrate containing broths. Solvents are usually disturbing in these assays. By direct performance of visual detectable enzyme reactions on the HPTLC plate, the separated natural compound library can also be used for activity screening if a visualization of the assay is feasible.

Enzymatic bioautographic assays using Xanthine Oxidase (XOD)[1], Lipase, Acetylcholinesterase (AchE)[2] and β-Glucosidase[3] were optimized and applied for screening of less studied medicinal plants extracts and fractions from conventional and in vitro cultivation. HPTLC standardized fingerprint analysis was performed with automated equipment from (CAMAG, Muttenz) and HPTLC plates (Merck, Darmstadt).

It was observed that this on first sight very simple technique could deliver false positive results. Since a visualisation reaction is required, several conditions can lead to

seeming inhibition spots. In truth, lipophilic compounds could prevent wettability of the silica, which hindered the enzyme reaction at this spot. Moreover, reaction of assay compounds with visualization reagents could also cause visible artefacts. Results of screening of in vitro medicinal plant cultures and detection of artefacts are presented in detail. Extracts of in vitro cultured *Sideritis scardica* and *Pulsatilla slaviankae* showed to contain active compounds that are able to inhibit AchE and β-glucosidase. AchE inhibitors were moreover identified in *Clinopodium vulgare* whereas *Pulsatilla montana* showed potential XOD inhibiting compounds.

Direct coupling of HPTLC with MS detectors, e.g. MALDI-TOF-MS might be a suitable tool for detection of the active spots. For the analysis of flavonol aglycones and glycosides it has recently been reported to be applicable by Kroslakova and Wolfram[4]. The HPTLC chromatograms can be scanned with this technique for MS data from the start to the front zone.

In conclusion, bioautographic enzyme assays and HPTLC-MS hyphenation offer a rapid and simple tool for screening of secondary metabolite profiles for potential health beneficial activities, indeed active spots need to be examined critically.

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INVESTIGATION THE VIABILITY OF *SAUSSUREA* DC. GENUS POPULATIONS IN UKRAINIAN CARPATHIANS

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Changing in flora resulting in the impetuous decrease of populations, habitat loss and species extinction are one of the most important effect of human impact on vegetation. In context of global anthropogenic changes the attention of specialists is being concentrated on populations of rare species: the loss of biodiversity occurs first of all because of extinction the rare species (D. U. Hooper *et al*., 2012; S. H. M. Butchart *et al*., 2010).

The purpose of our researches was to identify the environmental factors affecting to the viability of populations of the species *Saussurea* DC. genus in the Ukrainian Carpathians.

There are three species was investigated, the common trait of them is that these species are rare and have been included in Red Book of Ukraine (2009), the *S. porcii* Degen even in Red European List (2011).

Population viability analyses (PVA) is commonly used in conservation biology to predict population viability in terms of population growth rate and risk of extinction (C. A. Brigham *et al*., 2003; E. S. Menges 2000, H.S. Akcakaya et al., 2000). It was found, that among 5 investigated populations of *S. porcii* only two exist in prosperity state and the other one are under the extinction risk. The populations of *S. alpina* and *S. discolor* are also under the decline risk. The principal component analysis has been performed for revealing the

limited ecological factors of habitat the populations from genus *Saussurea* DC. It was found that among edaphic factors the humidity (Hd), acidity (Rc) of the soil are crucial for viability, among climatic factors – humidity (Om), temperature (Tm) and freezing (Cr) conditions. One-dimensional ecological niches of genus *Saussurea* species in the Ukrainian Carpathians according to edaphic-climatic factors defined by the methods of phitoindication scale has been constructed. It was shown that taking in account the span of niches the species create decline range: S. discolor>S. alpina> S. porcii.

It was concluded, the whole species of genus *Saussurea* DC. demand special conservation methods and further monitoring.

NATURA 2000 HABITATS IN THE FUTURE GEOPARK BUZĂU LAND

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On the surface of the future Geopark Buzau Land there are three protected natural areas of Community interest, of SCI type: ROSCI0009 Bisoca, ROSCI0199 Plateau Meledic and ROSCI0272 Muddy Volcanoes from Pâclele Mari and Pâclele Mici. For them, the standard forms indicate the following types of *Natura 2000* habitats of Community interest: 6520 Mountain hay-meadows (in ROSCI0009 Bisoca); 9130 *Asperulo-Fagetum* beech forests (in ROSCI0009 Bisoca); 40C0 * Ponto-Sarmatic deciduous thickets (in ROSCI0199 Meledic Plateau); 1530 * Pannonic salt steppes and salt marshes (in ROSCI0272 Muddy Volcanoes from Pâclele Mari and Pâclele Mici). In the period 2015-2016 field research was carried out to identify these habitats and assess their conservation status. Studies confirm the presence of three of the four habitats of community interest, all in favorable conservation status. A fourth habitat - 40C0 * Ponto-Sarmatic deciduous thickets – is not confirmed in the Meledic area; the thickets present here are dominated by buckthorn (*Hippophaë rhamnoides*), which is sporadically associated with wild rose (*Rosa canina*), blackthorn (*Prunus spinosa*) and hawthorn (*Crataegus monogyna*). Further investigation is needed to determine whether xerophilous meadows and thermophilic forests from the future Geopark can be associated with some *Natura 2000* habitats.

THE DIVERSITY OF MEDICINAL AND AROMATIC PLANTS ENCOUNTRED IN VARIOUS NATURA 2000 HABITATS FROM GURGHIU MOUNTAINS

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Researches on medicinal plants used in various human disorders are particularly important and timely, as an alternative to medication. The studied semi-natural mountainous grasslands occur in the Gurghiu mountains. Special interest today worldwide for herbal

medicine has led us to study the Gurghiu mountains medicinal plants used in various diseases. In order to identify the taxa we used classical methods, described in the literature. Phytosociological indices were used to make a quantitative estimation of medicinal species and statistical analyse was also carried out.

Four plant associations were identified. These plant associations belong to 3 types of *Natura 2000* habitats. The phytosociological surveys were taken on altitudes between 504-1634 m. For this study 78 surveys were analyzed. The highest number of medicinal species was recorded in 6520 Mountain hay meadows Natura 2000 habitat namely in *Festuco rubrae-Agrostietum capillaris* association (98 medicinal species). A great number of medicinal species was recorded in *Telekio-Petasitetum hybridi* association that belong to 6430 Hydrophilous tall-herb fringe communities of plains and of the mountain to alpine levels Natura 2000 habitat (96 medicinal species). The inventory of medicinal species has led to the identification of 148 taxa containing certain therapeutic chemical compounds. The most frequent species with constancy of 81-100% (V) are: *Achillea millefolium, Petasites hybridus, Plantago lanceolata, Prunella vulgaris, Telekia speciosa etc.*

These species were gathered according to the dominant active principles for which they are used in traditional medicine or phytotherapy. Thus, we see that the numerous plants contain: tannins (16,21%), essential oils (12,83%), flavonoids (12,16%), coumarins (8,78%), saponins (7,43%), alkaloids (7,43%), iridoids (6,08%), phenolic glicosides (5,40%), mucilages (4,72%), organic acids, vitamins and provitamins (3,37%) etc. The studied grasslands are rich in medicinal species. We could say that an important source for enriching the therapeutic arsenal with new medicinal products can be found in this area.

NATIONAL STRATEGY AND ACTION PLAN FOR BIODIVERSITY CONSERVATION IN THE REPUBLIC OF MOLDOVA: ACHIEVEMENTS AND PROSPECTS

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National Strategy and Action Plan for Biological Diversity Conservation of Moldova was developed and approved by Parliament in 2001 and is focused on perfecting policies, research and environmental education of the population. In the period 2001-2014 were developed 50 legislative and normative acts on plant and animal kingdoms, cadastre of natural protected areas, green spaces of urban and rural areas, national ecological network, Red Book etc.

They were conducted research programs related to the taxonomy of plants and animals and edited book series "Vegetal world of Moldova" and "Animal World of Moldova" of 4 volumes each; developed and published II-nd (2001) and III-rd (2015) editions of the Red Book of the Republic of Moldova; initiated the publishing of "Flora of Bessarabia" in 6 volumes etc. The surface of the natural areas protected by state expanded and constitute 5.61% of the country (founded National Park "Orhei" - 33,8 th. ha; initiated the work of founding the first Biosphere Reserves "Lower Prut" - 14.7 th. ha, etc.).

Although there has been some progress, degradation of ecosystems, natural habitats and plants and animals species was not stopped.

The new strategy in the field (2015-2020) stipulates in particular mobilizing economic sectors in solving the problems of biodiversity conservation, development and promotion tools and mechanisms for the sustainable management of natural protected areas, further research on the taxonomy components of biodiversity, reduction negative impact of the invasive species etc.

Ecosystem services, quantified by up to 41% of GDP, are considered an important tool for mobilizing economic sectors in solving problems related to biodiversity conservation.

BOTANICAL AND PHYTOCHEMICAL APPROACH ON *PASSIFLORA* SPP. – NEW NUTRACEUTICAL CROP IN ROMANIA

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It has been performed a complex investigation – morpho-anatomical, physiological, taxonomical and phytochemical one – of *Passiflora* nutraceutical plants from Hofigal S.A., in the frame of project PN-II-PCCA-2013-4-0995, contract 160 (MAIA)/2014.

Anatomic analysis of leaf lamina, petiole and stem, provided data with taxonomical importance, leading to the conclusion that plant material belongs to *Passiflora caerulea* L., in concordance with world monographers of *Passiflora* genus: VANDERPLANK (2000) and ULMAN & MacDOUGAL (2004).

Physiological investigation referred to the following parameters: coefficient k, leaf area index (LAI), chlorophyll fluorescence, stomatal conductance and yield of green plant biomass.

Phytochemical investigation consisted in analyzing active principles (polyphenols, flavonoids) content, in correlation with their antioxidant activity and determination of citotoxicity of *Passiflora* extracts in NCTC cell line clone 929, provided from European Collection of Cell Cultures (ECACC). At 10-150 µg/ml concentrations, it was recorded a normal cell morphology. At concentrations over 250 µg/ml, the plant extract become cytotoxic, altering the cell membrane structure, cells viability and proliferation.

INSIGHTS INTO PLANT MECHANISMS OF ADAPTATION TO DIFFERENT ENVIRONMENTAL FACTORS AS WAY TO PREDICT RESPONSES TO FUTURE CHANGES

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Almost 20% of Earth surface is covered by mountains and approximately 10% of global population leaves here. Due to varied topography and distinct ecological zones altitudinal, mountains present a great diversity of species and ecosystems and also an increased number of endemisms. According to the inventory of flora from 66 mountains from North of Europe to Mediterranean zone it shows that the accelerating process of the climate changes from the last decade determines the alpine plants stress and migration of species at higher altitudes and renders mountain species as most vulnerable to climatic changes. The degradation of the ozone layer, mostly due to the human activity, determine a specific increase of the UVB radiation reaching the Earth. All these damaging effects are reflected on the efficiency of photosynthesis.

The purpose of our study is, first, to evaluate in-filed photosynthetic efficiency on *Vaccinium myrtillus* plants from different altitudes of Romanian Carpathian mountains: Obârşia Lotrului (1305 m), Vlădeasa Peak (1800 m) and Muntinu Lake (2040m). Secondly studied, the natural physiological differences on plants resident at low and high altitudes that is reflected in drastic morphological differences. This will give us a better image of how plants succeeds to adapt and survive in environmentally different conditions as a way to predict their possible response to future environmental changes.

THE RESULTS OF IMPROVEMENT OF PEONY IN THE REPUBLIC OF MOLDOVA

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In the Botanical Garden (I) of ASM, the research on the improvement of peony species started in the 70s of the 20th Century. Gradually, over 300 varieties and hybrids of this crop were obtained. Currently, in the "Register of Plant Varieties of the Republic of Moldova" there are 63 ornamental varieties, including 25 varieties of *Paeonia lactiflora*, documented in certificates of variety. The decorative qualities, the productivity and hardiness indices of these varieties place them at the same level as modern varieties, meeting the current standards. We mention some cultivars, which impress with elegance and beauty, being appreciated in numerous competitions, national and international exhibitions: *'Amurgul Dunării', 'Angeline', 'Eminesciana', 'Baladă', 'Cântec Etern', 'Sollo', 'Cetatea Albă', 'Viteazul', 'Horia', 'Smaranda', 'Dochia', 'Dulcele Foc', 'Ilinca', 'Imensitate', 'Muşatina', 'Moldova', 'Leonida', 'Mioriţa', 'Domniţa', 'Doina', 'Haiducul Bujor'* etc. In 2014, we applied for patenting two new varieties of peony 'Traian' and 'Ruxandra'. The methods used in

improving this crop are classic ones: induction of mutations, natural and artificial hybridization.

The collection of peonies of the BG (I) of ASM served as experimental ground in the works on improvement. It includes today 13 species and over 200 varieties and cultivars of *Paeonia lactiflora*. Pall. These species represent the flora of Europe, Caucasus, Siberia and Japan: *P. anomala* L., *P. arietina* Anders., *P. decora* Anders., *P. humilis* Retz., *P. lactiflora* Pall., *P. macrophilla* Lomak., *P. mlokosewischi* Lomak., *P. peregrina* Mill., *P. tenuifolia* L., *P. vetchii* Lynch., *P. wittmanniana* Hartw. ex Lindley etc. According to the horticultural classification, the varieties of peonies from the collection have different flower types: single, semi-double, double, anemone and Japanese. Here, the results of French, American, Russian and Japanese selection are gathered.

FITOCENOLOGICAL STUDY OF POPULATION *PAEONIA PEREGRINA* MILL. (*PAEONIACEAE*)

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The species *Paeonia peregrina* Mill. (Peony-of-woods) is balkan geophyte spread through xerophyte forests in Italy (Basilicata, Calabria), Albania, Greece, Macedonia, Serbia, Bulgaria, Romania and Turkey. On Moldova's territory is known in vicinity of village Bolţun, Nisporeni district where vegetates in small groups through the forests of downy oak (*Quercus pubescens* Willd.). The species is protected by state and is included in the Red Book of Moldova (1978, 2001, 2015, [category CR B1ab (i, iv, v)], and is conserved *ex situ* in the Botanical Garden of ASM. On 24 May 2016 was described a surveying of the forest near village Bolţun (47º0'25" lt. n. and 28º15'39" lg. east), where are about 60 exp. of *P. peregrina* were registered of which only 18 in the generative phase. The degree of completion of the canopy trees was about 65% in which predominate *Quercus pubescens* with tree height of about 7-8 m and diameter of 20-24 cm, and accompaninyg species of *Tilia tomentosa* and *Acer campestre, Cerasus avium, Fraxinus excelsior*. The bushes layer with coverage of 50% is consisting of *Acer tataricum, Cotinus coggygria, Crataegus monogyna, Amygdalus nana, Rhamnus cathartica, Cornus sanguinea, Rosa canina, R. pimpinellifolia, Euonymus verrucosus, E. europaeus*. The herbaceous layer coverage is of 50-80%, clearings up to 100%, and is consisting of *Adonis vernalis, Agrimonia eupatoria, Alliaria petiolata, Anemone sylvestris, Asparagus officinalis, A. tenuifolius, Brachypodium sylvaticum, Bromopsis benekenii, Buglossoides arvensis, Campanula bononiensis, C. persicifolia, Centaurea orientalis, Chaerophyllum bulbosum, Clematis integrifolia, Clinopodium vulgare, Dactylis glomerata, Euphorbia stepposa, Festuca valesiaca et al.* The survey is part of the association Paeonio peregrinae-Quercetum pubescentis (Sârbu, 1982) Popescu et Sanda 1999.

PHYTOCHEMICAL PROFILE OF *ARNICA MONTANA* L. PLANTS DIFFERENTIATED BY ORGAN TYPE HARVESTED FROM NATURAL AREAS IN BISTRITEI AND CALIMANI MOUNTAINS

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This study aimed to assess the variation of the main bioactive compounds, namely, phenolic compounds (PCs), sesquiterpene lactones (SLs) and essential oils in *A. montana* samples collected from natural areas in Bistritei (1700 m) and Calimani Mountains (1000 m, 1200 m, 1600 m). The samples were differentiated by organ type: flowerheads, leaves, roots and rhizomes. Both the main (F1) and secondary (F2) flowerheads were studied. Extraction of PCs was performed by ultrasonic assisted extraction using a methanol/acetone/water mixture. The method from the European Pharmacopoeia was used for the extraction of SLs, also by using ultrasonic treatment. The essential oils were extracted only from root and rhizome samples by hydrodistillation. Identification and quantification of PCs and SLs were achieved by HPLC analysis while the essential oils analysis was performed by GC-MS.

In all flowersheads, chlorogenic acid, caffeic acid, cynarin and the flavonoids isoquercitrin, apigenin and apigenin-7-*O*-glucoside were identified. In leaves, only chlorogenic acid and cynarin were detected, whereas from the group of flavonoids only apigenin was identified. In all samples, cynarin was the major phenolic acid (5.78–9.51 mg/g d.w. in flowersheads; 7.03–7.63 mg/g d.w. in leaves; 8.87–10.80 mg/g d.w. in roots and rhizomes), while isoquercitrin was the major flavonoid in flowersheads (2.25–3.90 mg/g d.w.). SLs content in flowersheads ranged from 0.99 to 1.46 % and from 0.32 to 0.43% in leaves. In all essential oils 35 compounds were quantified (95% of the total oil). The major constituents were 3-t-butyl-1,2-dimethoxybenzene (59.8–70.5%), 5,14-Dioxapentacyclo[7.5.0.0(2,6). 0(3,13).0(4,10)]tetradecane (7.1–9.8%), thymol (7.5–9.9%). The yield for the essential oils ranged between 2.18 – 3.24%.

All flowerheads had higher content of SLs and flavonoids, while the roots and rhizomes had higher content in phenolic acids. Furthermore, the roots and rhizomes had high yields of essential oil. In the prospective cultivation of *A. montana* species, the leaves, roots and rhizomes can be valuable byproducts rich in bioactive compounds.

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THE EFFECT OF *ALLIUM SATIVUM* L. EXTRACT ON THE FUNGUS *RHODOTORULA MUCILAGINOSA*

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The fungus *Rhodotorula mucilaginosa* was isolated from a human nail affected by onychomycosis and inoculated on Sabouraud-agar plates. The identification of the fungus was based on microscopically and cultural characteristics of the colonies developed on the nourishing medium and was confirmed by molecular analysis of DNA. The *Allium sativum* L. extract obtained through percolation was used in comparison to the commercial antifungal Exoderil (naftifine hydrochloride) to test its effect on the germination and the *in vitro* growth of the fungus *Rhodotorula mucilaginosa*. The minimal inhibitory concentration (14%) of the extract determined irreversible ultra-structural modifications in the cells of *Rhodotorula mucilaginosa* examined by means of electronic microscopy.

BIOTECHNOLOGICAL POTENTIAL OF THE VOLATILE ORGANIC COMPOUDS SYNTHESIZED BY THREE SPECIES OF WOOD-ROTTING BASIDIOMYCETES

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Wood-rotting basidiomycetes belong to a particular group of fungi that due to their complex enzymatic system and bioactive secondary metabolites represent a valuable resource regarding their biotechnological applications. From the secondary metabolites synthesized by wood-rotting basidiomycetes, volatile organic compounds, with their specific chemical structure and particular action mechanism have a great potential that can be successfully used in various biotechnological processed from the food industry, agriculture, cosmetics and perfumery. This study aims to describe for the first time the volatile profile of three species of wood-rotting basidiomycetes: *Lentinus tigrinus*, *Megacollybia platyphylla* and *Neofavolus alveolaris* and evaluate their biotechnological potential. The species were cultivated on liquid media and the surface cultures were homogenized and 4-hydroxy-4-methyl-2-pentanone was added as internal standard. Solid-phase extraction (SPE) was used for extracting the samples and the elution was done with 4 solvents of different polarities: *n*-hexane, dichloromethane, acetone and acetonitrile. The GC-MS analysis showed the presence of compounds such as alcohols, ketones, aldehydes and terpenes. From these, 2-methyl-1-propanol, 3-methyl-1-butanol and 2-methyl-1-butanol identified in *L. tigrinus* and *N. alveolaris* samples are recorded by literature as compounds with antifungal activity. The antifungal screening revealed that the volatile compounds synthesized by *N. alveolaris* had the highest antifungal activity against *Fusarium solani* and *Sclerotinia sclerotiorum*. Volatile

compounds such as: limonene, linalool, benzaldehyde and 3-octanone synthesized by the tested species, due to their specific aromas can be successfully used in the food industry, cosmetics and perfumery.

QUERCUS ROBUR, Q. CERRIS AND *Q. PETRAEA* AS HOT SPOTS OF BIODIVERSITY

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Three different bipartite networks (pathogenic, ectomycorrhizal and galling insects) established by *Quercus robur*, *Q. cerris* and *Q. petraea* were merged in order to investigate the topological properties of the composite network, shading light on how biodiversity was organized through complex interactions. The composite network contains 315 species - 163 are pathogens (parasitic interac

tion), 71 are mycorrhizal fungi (mutualists) and 81 species of galling insects (phytophagous consumers). As most relevant network descriptors, nestedness and modularity were analyzed in composite network as well as in subnetworks established by the selected interacting organisms. The main network and subnetworks displayed different behaviors in terms of topological properties, all networks were modular but highest modularity characterized galling insects network (Q = 0.333); medium significant nestedness characterized the composite network (N = 61.795) while mycorrhizal network was depicted by high and significant nestedness (N = 89.444). Galling insects and pathogens did not establish significantly nested subnetworks. The assembly of tree dependent communities based on interspecific interactions is characterized by different network topologies reflecting different life styles and evolutionary histories.

CHALLENGES IN DEVELOPMENT OF VALIDATABLE LC METHOD FOR FREE ANTHRAQUINONE AGLYCONES IN HERBAL DRUGS FOR THE EUROPEAN PHARMACOPEIA (PHEUR)

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Development of one robust and validated U/HPLC method for quantification of the aglycones aloeemodin, chrysophanol, emodin, rhein and physcion in *Aloe capensis*, *Frangulae cortex*, *Rhei radix*, *Rhamni purshiani cortex*, *Sennae folium* and *fructus*.

Due to the postulated mutagenic and genotoxic effects of aglycones, especially aloe-emodin, a limitation of the aloeemodin and rhein content in the monograph drafts of the Ph. Eur. for *Sennae folium* and *fructus* [1] has been proposed.

An UHPLC-DAD method was developed using a chromatographic modelling and DOE software (DryLab® 4) with 12 input runs. Additional MS data was used (ACQUITY

QDa, Waters) for peak identification. The model output yields a narrow robust range for the separation of the aglycones in all five drugs. Gradient for optimal separation of aloeemodin and best possible separation of the other aglycones in all herbal drugs has been chosen.

Results of different herbal drug batches using the method were reproducible in terms of the relative standard deviations (RSD) of triplicate measurements < 5%. During the process of method validation according to ICH, several herbal drug specific challenges occurred (except for *Rhei radix*):

- Different concentration range of aglycones: very low to higher content in drugs results in errors due to the intercept from the linear calibration curve. The intercept has a high influence in Sennae due to low aglycones content.
- Probable instabilities:

a) algyca in Frangulae based on accuracy and working range: observation of an increasing amount with increasing matrix concentration as well as unreproducible, results in spiking with reference solution emodin.

b) Inter-day precision RSD from 7 to 25%: were observed in the herbal drugs.

One UHPLC method for separation of anthraquinone aclyca in the respective Ph. Eur. herbal drugs was successfully developed. However, the validation of the method is challenging, except for Rhei radix, and the results suggest instability to light or an enzymatically or chemical conversion of the aglycones during sample preparation.

References: [1] EDQM: Pharmeuropa 27.3. 2015, PA/PH/Exp. 13A/T (15) 19-21 ANP.

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MICROBIOLOGICAL AND CHEMICAL EVALUATION OF SEVERAL COMMERCIAL SAMPLES OF *TILIAE FLOS*

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Tiliae flos cum bracteis represents the flowers from linden tree that are used in therapy to prepare aqueous vegetal with good effects for respiratory disease, and also present sedative and diaphoretic properties. The aim of our study was to evaluate the chemical and microbiological composition of several commercial sorts of *Tiliae flos cum bracteis*. We analyzed seven commercial samples of linden flowers. Macroscopic evaluation of samples indicates the variability of quality, so the sample S2 presents a lot of brow fragments that indicates the degradation of vegetal material during drying or conservation. Sample S2 presents the maximum level of microbiological contamination with 12000 colony forming units (CFU) aerobic germs/g, 9600 CFU fungi/g, respectively 360 CFU *Salmonella* sp./g. For all samples the number of colony forming units for each type of microorganism was under

the limits of European Pharmacopoeia, Eighth Edition (maximum 10^7 CFU aerobic germs/g sample, maximum 10^5 CFU fungi/g sample). By spectrophotometric metods from each sample we determined the quantity of flavonoids and polyphenols. For flavonoids results are expressed in mg rutoside/g sample and for polyphenols in mg caffeic acid/g sample. The amount of flavonoids ranges between 489 ± 1.25 mg/g (S2) and 647 ± 1.32 mg/g (S4). For polyphenols the quantities ranges between 663 ± 2.12 mg/g (S2) and 1169 ± 2.76 mg/g (S3). Each dried sample has been mineralized with nitric acid and the metal content has been determined by atomic absorption spectrophotometry. The results are expressed in μg metal/g vegetal sample. The maximum level of metals was: 103.54 μg Mn/g (S5), 226.69 μg Zn/g (S3), 13.62 μg Cu/g (S4), 99.22 μg Fe/g (S2), and 91.55 μg Pb/g (S3).

PHYTOACCUMULATION OF METALS IN SERPENTINOPHYTES FROM SERBIA

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The aim of this study was to determine the concentrations of 7 metals in the soil and plant material from the serpentine site on the mountain Goč in central Serbia. Since plant material belong to the endemic serpentinophytes, the intention was to estimate the ability of these species to accumulate researched metals from this specific location. The researches have included the following endemic serpentine plants: *Alyssum markgrafii* O. E. Schulz, *Artemisia alba* Turra (*Artemisia lobelii* All.), *Euphorbia glabriflora* Vis. and *Helleborus multifidus* subsp. *serbicus* (Adamović) Merxm. & Podl. (*Helleborus serbicus* Adam.).

The method used for determination of metal concentrations in plant and soil samples was inductively coupled plasma-mass atomic emission spectrometry (ICP-OES iCAP 6500). The following concentration of researched elements in the soil were observed: Mg>Fe>Ni>Ca>Cr>Mn>Co>Pb>Zn>Cu>Cd, while in the plants it was: Mg>Ca>Fe>Ni>Mn>Cr>Zn>Pb>Co>Cu>Cd. The concentrations of metals in plant material had variable value, depending on the plant species and metal. The metal uptake by the plant did not necessarily correlate with metal content in the soil. The highest concentrations of Mg, Fe, Pb, Cd, Co, and Cr were found in species *H. serbicus*, while the highest concentration of Mn and Zn were found in *E. glabriflora*. Species *A. markgrafii* accumulated the highest concentration of Ca and Ni. All researched plants contained higher contents of Ca than the soil. The biological absorption coefficient greater than 1, for Cu and Zn were determined in species *A. alba* and *E. glabriflora*, respectively. We observed that *A. markgrafii* hyperaccumulate Ni. The obtained results provided new information for this site and opened questions on soil/plant relations, that could be more thoroughly research.

IN VITRO PROPAGATION OF GOJI (*LYCIUM BARBARUM* L.) IN THE REPUBLIC OF MOLDOVA

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In recent years, in Moldova, the market demand for a wider range of cultivated plants has increased significantly, leading to the introduction and cultivation of new species and varieties of plants, thus it has directly contributed to solving some problems related to food supply and health of the population. In the Botanical Garden (Institute) of the ASM, the collection of plants with multiple uses, including fruit shrubs, has been founded and enriched for several decades. The upward trend in consumer demand and the international scientific interest in the fruits of this species – *Lycium barbarum* L., known as goji or wolfberry, are the main motivations for choosing this research material due to its curative capabilities and taste. Besides, this crop is resistant to unfavorable conditions (drought, frost, diseases and pests). The pedoclimatic conditions in the Republic of Moldova are relatively favorable to the introduction and cultivation of non-traditional fruit shrubs, which easily adapt to the environment and can be introduced without great expense in various sectors of national economy.

Goji berries (*Lycium barbarum* L.) are appreciated by consumers all over the world. For the Republic of Moldova, the cultivation of goji is a promising business, an alternative of vineyards and orchards, which requires about the same investments but the result is much more profitable. The purpose of this research is to obtain homogeneous and healthy planting material by *in vitro* culture. The initiation of *in vitro* cultures was performed with apical meristem, taken from donor plants with high productivity.

In vitro cultivation of goji plants (*Lycium barbarum* L.) is currently being tested in several growing media, media for callus induction and initiation of organogenesis, manifested by rhizogenesis and callogenesis. The basic medium used for the development of goji by *in vitro* culture is Murashige Skoog (MS). The further development of the plant depends on the amount of auxins and cytokinins.

TECHNIQUES FOR THE CONSERVATION OF THE SPECIES OF AMARYLLIDACEAE FAMILY

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The number of rare plants from the native flora of the Republic of Moldova is continuously decreasing because of the human activity that leads to habitat loss and expansion of invasive plant species. Amaryllidaceae family is represented by species of decorative perennial plants, with rhizomes or bulbs. The following plant species are studied by us: *Galanthus nivalis* L., *Galanthus plicatus* Bieb., *Leucojum aestivum* L., *Sternbergia colchiciflora* Waldst. & Kit, *Galanthus elwesii* Hook.f. Since these species are endangered and included in the Red Book of Moldova (3rd Edition), they need multiplication and further reintroduction in their natural niches.

A major problem related to the conservation of a species is the choice of a strategy that would stop the decrease in the populations of the endangered taxa. More and more researchers consider that biotechnological methods, as compared with traditional regeneration, are more effective in redressing the situation, for example micropropagation with subsequent reintroduction of the species in question in its natural niche.

The purpose of this paper is to develop a technology of microclonal propagation of ephemeral species: *Galanthus nivalis* L., *Galanthus plicatus* Bieb., *Leucojum aestivum* L., *Sternbergia colchiciflora* Waldst. & Kit, *Galanthus elwesii* Hook.f. of Amaryllidaceae family, for their conservation and sustainable recovery. At the initial stage of our research, the following objectives have been achieved: the determination of the degree of endangerment of the studied species, their habitats and their mobilization on the experimental plot of the Botanical Garden (I) of the ASM as donor plants. We have also studied the regime of sterilization and the sterilizing reagents, the choice of the explant size and the optimal plant tissue for an efficient regeneration.

The results of this study will be analyzed and interpreted later.

PROTECTED SPECIES AT INTERNATIONAL LEVEL IN THE COLLECTIONS OF THE "D. BRANDZA" BOTANIC GARDEN

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The **c**onservation of biodiversity is recognised as being the fundamental mission of botanical gardens worldwide. In order to achieve this mission, these institutions perform a multitude of diverse, but interconnected activities, such as research, collection, maintenance and conservation of plant species. In the "D. Brandza" Botanic Garden of the University of Bucharest, the conservation efforts are related to the living plants collections, who maintain a living store of genetic diversity. These collections housed in outdoor spaces and greenhouses, currently comprise over 2850 taxa. Some of them are listed under international policy instruments such as: the Habitats Directive, the Bern Convention, the CITES Convention and the IUCN Red List. The collections of the botanic garden host some of the protected species from the wild flora of Romania (*Galanthus nivalis*, *G. elwesii*, *Sternbergia lutea*, *S. colchiciflora*, *Adonis vernalis*, *Osmunda regalis*) and exotic species (*Aloe* spp., *Ceratozamia mexicana*, C. *robusta*, *Cycas circinalis*, *C. revoluta*, *Euphorbia* spp.) as well. The observations made over the years show that a large number of these taxa have adapted very well to the conditions of the botanic garden, some of them having become naturalized (*Salvia transsylvanica*, *Doronicum orientale* etc.).

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THE *SANTOLINA* L. SPECIES IN *EX SITU* CONDITIONS

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The genus *Santolina* L. comprises species of dwarf shrubs, shrubs or evergreen, perennial, aromatic plants that belong to *Asteraceae* family. They are native to Southern Europe and Northern Africa. According to current sources, the genus *Santolina* includes about 20 accepted species. Only 4-6 species are used for decorative purposes. Some species are included in the European Red Lists - *S. elegans* Boiss. ex DC., *S. oblongifolia* Boiss. etc.

The studies regarding their taxonomy, biomorphological and phenological peculiarities, multiplication and use. In the experimental field of the Floriculture Laboratory of BG (I) of the ASM, there are three species of this genus: *S. chamaecyparissus* L., *S. virens* Mill. *S. insularis*. (Gennari ex Fiori) Arrigoni. The budding phase of *S. chamaecyparissus* and *S. virens* takes place with a difference of 3-5 days from late May until early June. *S. insularis* blooms about 10-15 days later. The fruiting phase lasts about 45-60 days. The seeds obtained in the local soil and climate conditions have very low germination percentage, vegetative propagation is the most effective method of producing seedlings. Cutting, layering and division are the best methods of propagation of *Santolina* plants in the conditions of our country. This process allows obtaining uniform planting material. The optimum temperature for rooting is 20-22 ^{o}C. The cuttings of *S. virens* and *S. insularis* need more time for rooting: it occurs in the 17th-20th days. The rooting percentage is 65% in summer and 85% – in autumn.

We recommend them for green hedges, rock gardens, flowerbeds, for decorative walls and roofs, perennial meadow gardens. They are also suitable for cultivation in pots as indoor ornamental plants, due to the aromatic and insecticidal properties of the plants.

BLACKBERRY COLLECTION ESTABILISHMENT IN BOTANICAL GARDEN (INSTITUTE)

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Blackberry plants, are planted in the field after the effective period of acclimatization seedlings. Transplantation is carried out in the open, experimental territory of the Botanical Garden of Academy of science of Moldova (ASM), in territory of collection of fruit shrubs in order to collect valuable and diversify the productive cultivation of fruit shrubs. Transplanting is done following several purposes: *experimental* - for scientific research to enhance the value of the collection of species and varieties of shrubs, valuable material, and for *teaching purposes* for the study and practice of horticulture for pupils and students in high schools and universities, and also for individual entrepreneurs, farmers. A number of criteria are developed and perfected here depending on variety (cultivar): species,

variety, force entry bearing surface nutrition, mechanization of the work, the type of crown and the phasing harvesting the biological cycle.

Twelve studied varieties were transplanted in the field: *Chester, Loch Ness, Thornless Cvergreen, Smoothstem, Polar, Arapaho, Thornfree, Reuben, Betford Gigant, Polar, Triple Crown, Blak Satin*. They were planted about 10 plants from each cultivar.
Also they were mapped main roads and it was done parceling. Lots to take into account the orientation of lines, which is made to the north – south. Planting was done in the fall on the 2nd-3rd of November, and the percentage of plant survival was 100%.

Planting distances are 2 m between rows and 1.5 m between plants. Crown (which starts from the starting stems and roots) should be placed at 3 cm below ground level. Covering the base of the plant with straw, wood chips, scrap wood or corn cobs helps control weeds and preserve moisture and nutrients. Blackberry semi-climbing shrubs should be trained on espaliers and tied (*Smoothstem, Chester, Thornferee, Thornless Evergreen)*. Bushes with branches straight (*Arapaho, Polar*) do not need to be related if they are cut in summer, so that does not exceed 91-120 cm tall; long branches can be trained on espaliers with wire. Espalier is constructed from two poles anchored in the ground by 6 meters distance between them, including stretching wire.

GENUS *KNIPHOFIA* Moench. – HISTORY AND PRESENT

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The genus *Kniphofia* Moench. (torch lily, tritoma) includes about 70 species originating from Central and Southern Africa. It includes perennials, rhizome plants, now referring to *Xanthorrhoeaceae* Dumort family.

Our goal was to conduct a chronological history of the genus *Kniphofia* and to clarify its taxonomic structure. The studied genus is named by the professor in medicine Johannes Hieronymus Kniphof (1704-1763) who worked at the University of Erfurt in Germany. The first reference to the plant known as *Kniphofia uvaria* Hook. appears in the work of Teophrasti Eresii "Historia plantarum" (1644) as the *Iris uvaria promont. bonae spei*.

Until the introduction of binary nomenculature by Carl von Linné plants were named by a descriptive phrase. For the species *Kniphofia uvaria* there have been used the following names: *Aloe africana folio triangulo longissimo*; *Iris uvaria flore luteo*; *Aloe foliis linearibus triangularis*; *Aloe uvaria*.

Later torch lily were assigned to the genus: *Aloe* L.; *Aletris* L.; *Veltheima* Willd., *Tritoma* Ker Gawl. ; *Tritomanthe* Link.; *Tritomium* Link; *Notosceptrum* Benth.

The genus *Kniphofia* was created by Conrado Moench in 1794. He renamed *Aloe uvaria* in *Kniphofia aloöides* Moench., but this procedure has not been accepted. The name of the genus *Kniphofia* Moench. was taken over by Kunth in 1843, in his "Enumeratio Plantarum", vol. IV. Extensive studies of the genus were made by botanists: JG Baker, A. Berger, Eileen A. Bruce, L. E. Codd, Syd Ramdhani, C. M. Whitehouse.

In the collection of nontraditional perennials of the Botanical Garden (I) of ASM for more than 25 years there have been cultivated the following species: *K. uvaria* (L.) Hook., *K. ensifolia* Bak., *K. tukii* Bak., *K. nelsonii* Mast, *K. sarmentosa* (Andr.) Kunth, *K. citrina* Bak., *K. galpinii* Bak., obtained from seeds through international exchange.

L. E. Codd groups the genus in 10 sections according to probable similarities representing the taxonomic framework for specific delineation by many authors. The species existing in the collections of Floriculture laboratory are grouped in section 5-3 species, section 7-1 species, section 8-1 and section 10-2 species.

THE SCIENTIFIC VALUE OF „E. I. NYARADY" COLECTION FROM HERBARIUM OF PHARMACEUTICAL BOTANY DEPARTMENT, FACULTY OF PHARMACY IN TÎRGU MUREȘ

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The herbarium of Pharmaceutical Botany Department in Faculty of Pharmacy it is stored in the room called "Museum", in special cupboards, divided in several boxes. The herbarium sheets are systematically ordered by families and genera. The herbarium gathers specimens from Romanian flora and also from some Europeans countries flora in a lesser extent. In the herbarium distinguish a small collection of acad. ***E. I. Nyarady***. The lack of inventory and knowledge of scientific value of the Herbarium determined us to study it and process the data.

As the inventory of herbarium sheets was made, the plants nomeclature was revised according to *International Code of Botanical Nomenclature* (Vienna Code, 2006) and *Flora Europaea*. Processing the 388 herbarium sheets belonging to acad. ***E. I. Nyarady*** has led to the identification of 366 cormophytes and 22 lower-plants and fungi. The inventory of acad. ***E. I. Nyarady*** herbarium is providing some important scientific data. Thus, the herbarium includes plants with historical importance for Romanian flora. These plants were collected by ***E. I. Nyarady*** together with 22 personalities of Roamanian botanic such as: E. Grinţescu, Gh. Bujorean, E. Ghișa, I. Todor, Al. Buia, Al. Borza, C. Papp, I. Morariu, N. Boșcaiu, St. Peterffi etc. The herbarium sheets come from the exchange with similar institutions in the country, sheets edited by ***Flora Romaniae Exsiccata***. The scientific value of the Herbarium is conferred also by the presence of a large number of plants that are endangered today both at European and national level. Thus, of the 388 species inventoried, 31 species are belonging to different sozologic categories, many of them being endemic: *Aconitum lycoctonum* L. ssp. *moldavicum* (Hacq.) Jalas, *Campanula abietina* Griseb., *Festuca bucegiensis* Markgr.-Dannenb., *Heracleum palmatum* Baumg. etc.

RARE PLANTS SPECIES FROM ROMANIA IN THE HERBARIUM COLLECTION OF "ALEXANDRU IOAN CUZA" UNIVERSITY OF IAȘI

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The paper presents a list of vascular plants that are included in "Red book of vascular plants of Romania" (authors: Gh. Dihoru & G. Negrean), on the basis of the material that is in the herbarium of Faculty of Biology – "Alexandru Ioan Cuza" University of Iași [I].

All herbarium specimens were reviewed and redeterminate, aiming to complete the chorological data of these species. The processed material was inserted into the database herbarium.

ASPECTS CONCERNING ACHENS, GERMINATION AND INITIAL STAGES OF SOME SPECIES OF ASTERACEAE FAMILY CULTIVATED IN BOTANICAL GARDEN IASSY

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The Asteraceae family is well represented in the colections of the Botanical Garden in Iassy and from the many items with a specific ornamental value, some are used in traditional medicine. Seven species of american origin have been taken for studies and can be cultivated successfully with the purpose of emphasizing their technological value, because they have ornamental, medicinal or nutritional value.

Following the observations, a complete description of the achens was made and is useful in early identification regarding the planting. The study of the germination process was centred around determining the percentages and the speed of germination in controlled conditions, cotyledon developement, the modalities of originating of vegetative organs (radicle and first leaves) and their morphological aspects. The characteristics of the germination process signify differences that are important to know when initiating mass cultures.

THE INFLUENCE OF ZINC ON SOME PHYSIOLOGICAL AND MORPHOLOGICAL INDICATORS OF *OCIMUM BASILICUM* L.

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The paper presents the results of a study regarding the influence of zinc in different concentrations (50mg/l, 100mg/l, 200mg/l, 400mg/l, and 600mg/l) on some physiological and morphological indicators of *Ocimum basilicum* L.

Zinc was used as sulphate solutions. We analyzed the following indicators: the percentage of germinated seeds; the mean germination time; the length of root, the length of the hypocotyl and the tolerance index.

The results underline the specific variations of analysed indicators, depending on the metal concentrations.

The following effects were found: the insignificantly modifications of the germination percentage and of the mean germination time*;* the significantly delay of the growth in length of the root and of the hypocotyl; the decrease of the tolerance index. The length of the root and the hypocotyl and the tolerance index decreased progressively with the increase of the metal concentration. The root was more affected than the hypocotyl.

COMPARATIVE ASPECTS OF FOLIAR MICROMORPHOLOGY FROM DIFFERENT TAXA OF PELARGONIUM GENUS COLLECTION OF BOTANICAL GARDEN "ANASTASIE FĂTU" FROM IAŞI

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The investigations using electron microscopy (SEM Tescan Vega II SBH) were been realized on foliar surfaces from *Pelargonium graveolens* L. Her., varieties *'Bontrosai'*, *'Citrosum'* and *'Mint Rose'*, and from *Pelargonium odoratissimum* specie. They were been focused on secretory trichomes micromorphology, particularities of cuticular complexes and some specific elements used for differential diagnosis between species and varieties.

MORPHOLOGICAL AND MICROMORPHOLOGICAL INVESTIGATIONS REGARDING TO LEAVES FROM SOME ROSA L. SPECIES WITH EMPHASIS ON SECRETORY GLANDS

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Multicellular secretory glands are present on Rosa L. species, at least on the stipules edge; some of them have an larger number and different particularities.

The researches were been made on leaves of the following species: *Rosa agrestis*, *R. damascena*, *R. multibracteata*, *R. pimpinellifolia* and *R. rubiginosa*.

Micromorphological studies show emphasized a large number of cells which forming both terminal secretory part and foot, eventhough their dimensions are small.

These researches highlight the micromorphological aspect of these glands, tector hairs and epicuticular wax.

All of them were been examinating through scanning electron microscopy method.

MORPHO-ANATOMICAL ASPECTS IN SOME SPECIES OF THE *VIOLA* GENUS

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In Romania the *Viola* genus comprises around 30 species, some of them overlapping in morphological traits. Moreover, some species exhibit significant phenological plasticity, further complicating correct identification. Molecular and micromorphological analyses are used to complement traditional, morphological, means of identification, but the latter still offer valuable taxonomical information. The current paper assesses in a comparative manner some of the more frequently used morphological and anatomical characteristics of *Viola dacica*, *V. declinata* and *V. canina*, from mountain habitats in N-E Romania.

For *Viola dacica* and *V. declinata* which are morphologically similar, the leaf apex angle, for basal and upper leaves, the stipules length and width, the leaf area and the length of the flower peduncle were found to allow differentiation. *V. canina* presented significantly different values from the other two species for leaves and stipules parameters and petals sizes.

The main anatomical dissimilarities observed were in stem and petiole. The characters that could be taken into account are the contour of these organs, the number of vascular bundles, the shape and frequency of the calcium oxalate crystals and the collenchyma width. At the lamina level, the main differences were the size and shape of the epidermis cells and the width of the palisade tissue.

The morpho-anatomical data available for the analysed species are scant, and the results presented complement current information and may offer a basis for further comparison and identification of such taxa.

AGAVE GENUS COLLECTION IN BOTANICAL GARDEN IASI

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The *Agave* genus is endemic for the american continent and contains approximately 200 species, of which many are cultivated for ornamental purposes. The biology characteristic of this genus makes the analysis of floral elements – that are useful in classifying the taxonomical aspects – very difficult or even impossible.

The collection of the Botanical Garden in Iassy includes several hundreds of items apart to 15 species, their age ranging between 2 and 30 years old. All the items have been morphologically analysed for emphasizing the features concerning the aspect and the dimensions of the rosette, the teeth on the edge of the foliar lamina and the terminal spine. The observations complete the information regarding the vegetative organs, useful for the identification of the agave species. Based on the morphological features that were analysed, an identification key of the species in the collection is put forward.

FODDER VALUE OF SOME LEGUMINOUS PLANTS SPECIES OF THE COLLECTIONS FROM BOTANICAL GARDEN (INSTITUTE) OF THE ACADEMY OF SCIENCES OF MOLDOVA

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The grasslands from the Republic of Moldova covers about 14%, are in a deplorable condition and very diminished productivity with a share of leguminous plants decreasing from year to year.

The fodder leguminous plants play an important role in forming and maintaining phytocoenoses, contribute to biological nitrogen accumulation in the soil, to the improvement of soil's physical and chemical characteristics, to the formation of soil's structure and its recovery, play an important role in increasing the quality of feed because they contain significant amounts of protein, vitamins and minerals. In order to restore grasslands is necessary to extend the spectrum of research and selection of valuable forage leguminous species to increase productivity and quality of grasslands. The native leguminous plants species maintained in pure culture in collection of new and non-traditional fodder plants: *Astragalus ponticus* Pall., *Coronilla varia* L., *Lotus corniculatus* L., *Medicago falcata* L ., *Onobrychis arenaria* (Kit.) DC., *Trifolium repens* L., served as object of study. Collecting samples for biochemical analysis was performed from first cut in budding-flowering period.

It has been established the nutritional value of 1 kg of natural forage, harvested in budding-flowering period accounts: *Astragalus ponticus* - 0.21 nutritive units, 2.43 MJ metabolizable energy and 225g digestible protein/ nutritive unit; *Coronilla varia* - 0.20 nutritive units, 2.22 MJ metabolizable energy and 131 g digestible protein; *Lotus corniculatus* - 0.25 nutritive units, 3.07 MJ metabolizable energy and 106 g digestible protein; *Medicago falcata* - 0.17 nutritive units, 2.33 MJ metabolizable energy and 242 g digestible protein; *Onobrychis arenaria* - 0.23 nutritive units, 2.76 MJ metabolizable energy and 154 g digestible protein; *Trifolium repens* - 0.20 nutritive units, 3.03 MJ metabolizable energy and 145 g digestible protein/ nutritive unit.

In conclusion we mention that the studied species possess high feed value and could be used to restore pasture forage values in Moldova.

STUDIES ON ANTIOXIDANT, ANTIHYPERGLYCEMIC AND ANTIMICROBIAL EFFECTS OF EDIBLE MUSHROOMS *BOLETUS EDULIS* AND *CANTHARELLUS CIBARIUS*

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The study evaluated the antioxidant, antihyperglycemic and antimicrobial effects of ethanolic and hydromethanolic extracts from the fruiting bodies of wild edible mushrooms

Boletus edulis (penny bun) and *Cantharellus cibarius* (golden cantharelle) (sampling place: Poiana Stampei, Suceava county). The antioxidant activity was assessed by free radical scavenging, reducing power, ferrous ion chelation and 15-lipoxygenase inhibition assays. The antihyperglycemic activity was studied by alpha-glucosidase inhibition assay. The antimicrobial effects against Gram-positive, Gram-negative and yeasts were assessed by agar diffusion assay. The total phenolic contents of extracts were determined (Folin-Ciocalteu assay), the hydromethanolic extract from *Boletus edulis* showing the highest value (72.78±0.29 mg/g). This extract was also the most active as scavenger of DPPH and ABTS radicals (EC_{50}=151.44±0.85 and 65.4±0.4 microg/mL, respectively) and reducing agent (EC_{50}=46.77±0.34 microg/mL). The ethanolic extract from *Cantharellus cibarius* showed high ferrous ion chelating (EC_{50}=82.9±0.6 microg/mL), 15-lipoxygenase (EC_{50}=236.7±1.5 microg/mL) and alpha-glucosidase (EC_{50}=9.77±0.06 microg/mL) inhibitory activities. For both mushrooms, the ethanolic extracts (D=14 mm) were more active against *Staphylococcus aureus* ATCC 25923 than the hydromethanolic ones (D=11 mm). The antioxidant and antihyperglycemic effects revealed in this study support further studies for a possible valorization of both mushrooms in the dietary supplement and pharmaceutical industries.

BIPARTITE MUTUALISTIC NETWORK BETWEEN FUNGI AND TREE SPECIES IN FOREST ECOSYSTEMS FROM GIUMALĂU MASSIF

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Mutualistic relationships between trees' roots and certain species of ectomycorrhizal fungi are particularly important for the stability and diversity of forest ecosystems. The study shows the connection between ectomycorrhizal fungi and species of trees (*Picea abies*, *Abies alba*, *Fagus sylvatica*, *Betula pendula*) in the forests from Giumalău Massif. The 92 mycorrhizal species, inventoried in 20 sample plots, in three consecutive years, were included in a bipartite network highlighting that the host tree species composition significantly influence the ectomycorrhizal species composition in the communities they edify. The results showed asymmetry of the mutualistic network and the high degree of connectivity between nodes (represented by trees). Numerous generalist species were found (*Amanita muscaria*, *Boletus edulis*, *Hydnum repandum*, *Russula nigricans*, *Tricholoma saponaceum* etc.). Among trees with the most species of generalist fungi were *Picea abies* and *Abies alba*. Mycorrhizal species with only one tree were identified also, as *Lactarius deterrimus* (with spruce), *Lactarius salmonicolor* (with silver fir), *Russula betularum* (with birch trees) etc. The existence of more species forming mycorrhiza with coniferous trees can be explained by the fact that forests edified by them occupy significant areas compared to those edified by deciduous species, represents the climax stage for the forest vegetation in the area, and generalist plant species tend to interact with generalist fungi species. Also, with increased connectivity between nodes it is expected that the phenomenon of fungi specialization to be diminished, which explains the reduced presence of mycorrhizal species with only one species of host tree.

SPATIAL DISTRIBUTION OF SOME ECTOMYCORRHIZAL FUNGI (RUSSULACEAE, FUNGI, BASIDIOMYCOTA) IN FOREST HABITATS FROM THE NORTH-EASTERN REGION (ROMANIA)

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ECM macromycetes are, generally, an important ecological component for forest habitats, and a sustainable resource in the context of sustainable development of Nord-Est Region's rural communities. The woody species distribution is an extremely important factor for the ECM macromycetes presence. The research's purpose is to elaborate potential distribution maps of some ECM edible macromycetes from *Russula* and *Lactarius* genera. Data analysis was realized based on GIS methods and R coding, throughout multiple filtering and data transformations. The study was fundamented on chorologic information, Romanian Vegetation Map, vegetation tables and bibliographical sources.These informationallowed the elaboration of 49 distribution potential maps of edible species from the *Russula* and *Lactarius* genera. The obtained results highlighted that the Nord-Est Region of Romania has annoteworthy potential for the *Russulaceae* species. As expected, there is a large amplitude of species presence in the field.

INFLUENCE OF THE NITROGEN SOURCE ON THE TOLERANCE AND BIOREMEDIATION POTENTIAL OF SOME LIGNICOLOUS BASIDIOMYCETES TO ELICITATION BY COPPER BASED FUNGICIDES

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The study aims to investigate the *in vitro* tolerance of nine lignicolous basidiomycetes species (Order Aphyllophorales, Class Agaricomycetes, Phyllum Basidiomycota, Kingdom Fungi) to the action of three copper based fungicides: Champion 50 WP (copper hydroxide), Alcupral 50 WP (copper oxychloride) and Bordeaux mixture (copper sulphate). These copper based fungicides, with 1500 ppm concentration of active ingredient, were amended separately into solid (agarised) media containing three different nitrogen sources: peptone, malt extract and soybean meal. Furthermore, the three most tolerant fungal species were subsequently tested for the tolerance in submerged cultures by growing on a nitrogen-rich liquid medium amended with the Champion 50 WP fungicide at different initial concentrations of active ingredient (125 ppm, 250 ppm and 500 ppm).The maximum vegetative growth potential of fungal colonies was recorded on solid culture medium containing soybean meal followed by those of malt extract and peptone. The copper hydroxide and copper sulphate based fungicides were less toxic than that of copper oxychloride due to the higher tolerance of fungal colonies during vegetative growth. The solubilization of copper based fungicides in solid culture media was revealed by diffusse /

clear zones (halos) around and underneath of fungal colonies. Subsequently, the mycogenic crystals precipitates were formed in agar media amended with the copper hydroxide / copper oxychloride based fungicides and were disposed in concentric rings. The most tolerant three fungal species: *Bjerkandera fumosa*, *Fomitopsis pinicola* and *Daedalea quercina* formed pelletised biomass and produced the complete solubilization of the copper hydroxide based fungicide in liquid culture medium.We consider that the results obtained emphasize possible biotechnological applications of some lignicolous basidiomycetes on remediation of copper based fungicides (contaminated soils, wastes and wastewaters) and recovery of copper (bioleaching of ores).

STUDY OF A MODEL FOR THE INTEGRATION OF SCHEFFER INDEX EVALUATING THE PREDICTION DEGREE OF RISK FOR RELATIVE DEGRADATION IN CONSTRUCTION WOOD

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The Scheffer Index was introduced in 1971 to predict the risk of relative degradation for treated or untreated wood, exposed under natural conditions, mainly regarding the wood construction elements in direct contact with the ground. Such indices were calculated for several countries, including risk maps, but for Romania, was mentioned only one value for the entire country into a European study area. This specification does not provide accurate information for the adequate protection of wood in the areas of interest, given the diversity and variation in climatic parameters for Romania. Climatic parameters used to calculate the index are linked to the monthly amount of precipitation and temperature average value, calculated both for local or wider area. The values may vary between 1 and 100, a higher value of the Scheffer index exceeding 65 indicating a higher risk of degradation of the wood under the incidence of macromycetes. In order to assess the species diversity of macromycetes directly involved in the degradation of construction wood, we proceeded to investigate a number of monuments exposed outdoors, especially constructions grouped into open-air museums in three points in Romania (north, northeast and center). For all these points were taken into account historical values for climatic parameters used in Index Scheffer formula, for a period of three years - the number of days per month with precipitation amounts greater than 0.25 mm (D) and temperatures monthly average (T, in °C). By comparing the values obtained for the three study points (Suceava, Sibiu, Sighetul Marmatiei) was achieved a ranking as relative risk areas for construction wood in direct contact with the ground. Thus, the values are between 30 and 56, which indicates for all the study points the assignment to an area with medium risk of wood degradation. Incidence and macromycetes diversity on the construction wood calculated for each study point confirm into the higher risk areas (calculated SI = 56-57) an accelerated degradation and a greater diversity of macromycetes involved in this process.

THE ANTIMICROBIAL EFFECT OF UNCONVENTIONAL TREATMENTS FOR PREZERVATION OF PAPER

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Biological contamination of heritage objects with bio-deterioration agents presents important negative implications due to esthetic devaluation and through decreasing resistance of materials and loss of characteristic physical properties. Papers based objects are susceptible, if not stored properly, to fungal and bacterial attack, affecting the structure and properties of paper till total compromising the support. For these reasons, arise the necessity for the developing of new technics for decontamination and for long term preservation of heritage goods.

In this study, the efficacy of new unconventional treatments for preserving of paper based material has been tested. Samples of old paper, biologically loaded, have been treated in plasma for decontamination and covered with chitosan derivatives for increasing the strength of paper, along with antimicrobial effect on long term. For assessing the decontamination efficiency, paper samples treated in plasma were placed onto solidified nutritive media that are optimal for development of bacteria and fungi, being recorded the germination of micro-organisms from the initial load. The samples covered with chitosan derivatives have been subjected to testing the antifungal / antibacterial effect through *de novo* inoculation with pure isolates.

The treatment for decontamination in plasma and afterglow treatment at a distance of 8 cm lead to a total decontamination. Treatments that have been applied to the paper samples had given antifungal and antibacterial proprieties to paper samples, especially the application of carboxy-methyl chitosan and alchyl di-merceten in combination with humid treatment for sterilization has an increased efficiency.

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MULTIDISCIPLINARY STUDY REGARDING THE STRUCTURED WATER AND BIOCOMPOST USE ON MEDICINAL PLANTS, AROMATIC AND SPICY, IN THE ECOLOGICAL CULTURE.

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The daily writhed life of the modern people and its fussing is compensated with a healthy food. Having regard the strict requirements with regard to the addition of fertilizers

and minerals in organic farming are studying various methods by which the plants can grow in an optimal environment. All exchanges that occur in and between the plant cells are produced in water. To stimulate the plants growth were used different methods to structuring the water which was used for wetting. Scientific research of the current state claim assumption that water can be structured using rocks rich in minerals, in the presence of colloids of rare metals or with the aid of magnetic fields.

Today farmers tend to practical agriculture, be it conventional or environmentally-friendly, without having to leave soil to "rest". Therefore, regardless of how well it is maintain the undercoat where are growing plants, it suffering a poverty in nutrients process. Hofigal Bucharest, Romania proposed by this study to find new bio-fertilisation methods of medicinal herbs and aromatic plants grown in it's greenhouses and on the own lands. This experiment was carried out in the Laboratory of Environmental University from Bucharest on different species of medicinal, aromatic and condimentar plants: alfalfa (*Medicago sativa*); basil (*Ocimum basilicum*); flax (genus *Linum* L.); thistle (*Silybum marianum)* negrilica (*Nigella sativa*); coriander (*Coriandrum sativum*) and hemp (*Cannabis sativa*). Has been used different types of composting for improvement of quality of the soil; they have been used in various combinations depending on the nutritive balance of each plants and on ecological requirements of the soil.

ASSESSMENT OF PHYTOCHEMICAL CONSTITUENTS OF *ARTEMISIA ANNUA* L. SPECIES FROM WILD POPULATIONS IN REPUBLIC OF MOLDOVA

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The aim of our study is to assess the phytochemical profile of *A. annua* samples harvested from 24 sites from the north, centre and south regions of Republic of Moldova (2014). In this respect we envisaged the following bioactive compounds: phenolic compounds, artemisinin and essential oil.

The samples consisted in leaves harvested before flowering (phenolic compounds and artemisinin) and *herba* at full flowering (essential oil). The plant material was extracted with chloroform, in order to isolate the sesquiterpen-lactone fraction and the residual plant material was extracted with methanol to isolate the phenolic compounds. Their identification and quantification was achieved by HPLC-DAD analysis. Isolation of essential oil was made by hydrodistilation for 2 hours in a Neo-Clevenger apparatus and the qualitative analysis was performed by GC-MS.

In *A. annua* samples 25 phenolic acids and derivatives were separated, 4 of which being identified and quantified (mg/ 100 g d.w.): caffeic ac. in amounts of 1.70 - 4.31, p-coumaric ac. 0.50 - 4.35, chlorogenic ac. 112.64 - 210.48, cynarin 307.13 - 617.72. Furthermore, 5 flavonoids were separated, among which 2 were indentified and quantified: isoquercitrin in amounts of 5.24 - 30.33 and luteolin-7-glicoside in amounts of 9.80 - 40.47. In the analyzed samples artemisinin content varied from 23.57 - 39.64 mg/ 100 g d.w. Total essential oil content ranged from 0.84 to 1.40 % and the qualitative analysis showed the following major constituents: α-pinene, 1,8-cineole, artemisia ketone, campfor, β-silenene and germacrene D. In all samples, artemisia ketone was found in the highest ratios, varying from 17.90 to 34.80%.

The content and composition of the envisaged bioactive compounds classes varied both depending on the collection site and region, a relatively high diversity also being observed for samples collected from the same site.

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EVALUATION OF THE DNA BARCODING METHOD IN STUDYING XEROTHERMIC FLORA FROM SOUTH-EASTERN PART OF THE SĂLAJ COUNTY, ROMANIA

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The gypsum from Sfăraş-Jebucu area, situated in the south-eastern part of Sălaj County is considered one of the most important biological hotspots from Transylvania. The landscape is mostly natural, archaic and represents a refugium for some rare, endemic and endangered plant species (*Thymus comosus*, *Sesleria heufleriana*, *Gypsophila collina*, *Daphne cneorum*).

This work aims to evaluate the ability of three DNA barcode markers to identify xerothermic plants found in this area. Three regions from the plastid genome (rpoB, rpoC1 and matK) were amplified and sequenced. Using a single pair of primers for each marker, the amplification and sequencing success was approximately 100% for rpoB and rpoC1, and much lower for matK (48%). DNA barcode sequences were obtained for 30 species belonging to 14 different angiosperm families.

To evaluate species discrimination success tree-based and similarity-based method (NCBI BLAST program) were used. A Maximum Likelihood Tree was generated, using rpoB and rpoC1 markers single and in combination (rpoB+rpoC1), to analyze phylogenetic relationships between species. Combination of rpoB+rpoC1 barcodes showed the highest discrimination ability, thus the topology of the tree corresponds to APG III phylogeny. After using BLAST to identify sequences in database, the identification success at species level was very low. DNA barcode sequences will be submitted to GenBank, and will complete the picture regarding the taxonomic status of some rare and endemic species from Sfăraş-Jebucu area.

LOW-ALTITUDE GLACIAL RELICTS - A NEW SOZOLOGIC CATEGORY IN PRESERVING AND PROTECTING THE BIODIVERSITY IN ROMANIA

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In the plains and hills of the Carpathian Basin were reported, along decades of botanical research, a series of species rather characteristic to the vegetation floors of the high mountain areas of the Carpathians (*Angelica palustris, Calamagrostis stricta, C. canescens, Trollius europaeus, Pedicularis palustris, Sphagnum* spp. etc.). The occurrence and their perpetuation in the lowlands, did not arouse curiosity for too many botanists. But in the light of the new findings on the spread of vegetation during the ice ages, it is outlined more and more that these species are among the last witnesses of the glaciations. Several authors from different fields of biology (zoologists, botanists, biogeographers), following the existing evidence, are supporting the fact that the Carpathian Basin, during the last ice age, was dominated by swamps and forests galleries that have survived in local microclimates. These proofs are opposed to the so widely accepted theory in the ancient literature, that the whole area was dominated by tundra and cold steppes, and the present plants have survived only in the three southern peninsulas of Europe. So it is highlighted the existence of some northern latitudes shelters, where temperate climate species continued to survive.

Therefore, the mountain species currently identified in the lower regions, are most likely the last remnants from the flora of the ice ages in the Carpathian Basin. The plant species have descended from the high mountains of the Carpathians, with the cooling climate, and due to exceptional elements, some have continued to survive until today. These conditions are fulfilled by the swamps and damp woods, that maintain a local microclimate, cool and with high moisture.

But so far, at least in Romania, there have not been studies on these relict plants. Therefore, their protection is needed since most of the marshes were drained in the region, and the mountain species are among the first affected.

ASPECTS OF FLORA AND VEGETATION FROM "VÂNĂTORI NEAMȚ" NATURAL PARK

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"Vânători Neamț" protected area was established in 1999 as a natural park (IUCN category V), for the conservation of natural, spiritual and cultural heritage, forest long-term management, preservation of local sceneries and traditions, and for the reintroduction of the European buffalo in its natural habitat. This area has raised the attention of numerous researchers since the second half of the 18th century and thus, the numerous studies have contributed ever since to the vascular flora inventory, that represents 28.1% of the Romanian flora. The geomorphological and pedoclimatic variety and the significant millenary human presence contributed to the high diversity of flora and vegetation of the area. Floristic studies revealed 1121 species (including 71 subspecies, 4 varieties, 1 forma) and 25 hybrids, of 64

orders, 106 families and 451 genera. Phytosociological studies led to the identification and description of 46 associations and 6 sub-associations.

CONTRIBUTION TO THE STUDY OF THE FLORA OF THE MACEA VILLAGE (ARAD COUNTY)

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Macea village has a total area of 72.64 km². Arable land predominates, followed by meadows, a little forest (approx. 10 hectares) and small surfaces with water.

Studies on flora of the Macea village have done COVACI Pavel (1969), TĂRĂBOANȚĂ Dumitru (1980) and DĂRĂBAN Iulia-Natalia (2013). SIMONKAI Lajos (1893) and ARDELEAN Aurel (2006) cites some species from Macea.

Our research in this direction were held during the years 2011-2016. Our plants list comprises 527 species. Among the plant species not mentioned from this area are the following: *Asclepias syriaca*, *Asperugo procumbens*, *Astragalus glycyphyllos*, *Bryonia alba*, *Camelina microcarpa*, *Centaurea apiculata* subsp. *spinulosa*, *Centaurea calcitrapa*, *Chamaesyce maculata*, *Dichanthium ischaemum*, *Eriochloa villosa*, *Euphorbia peplus*, *Filago vulgaris*, *Lathyrus nissolia* subsp. *nissolia*, *Linaria genistifolia* subsp. *genistifolia*, *Marrubium peregrinum*, *Melica ciliata* subsp. *ciliata*, *Phleum bertelonii*, *Thalictrum minus* subsp. *minus*, *Trifolium patens*.

ABOUT MEADOWS EDIFIED BY *CHRYSOPOGON GRYLLUS* FROM OLTENIA REGION

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Starting from the scientific and practical importance of the meadows that were edified by *Chrysopogon gryllus*, in this paper we try a comprehensive overview of the flora and vegetation of these areas of Oltenia and a corresponding framing to Natura 2000 habitats.

There has been identified three associations edified by *Chrysopogon gryllus*: *Chrysopogonetum grylli* Buia, Păun, Safta et Pop 1959; *Thymio pannonici* - *Chrysopogonetum grylli* Doniță et al. 1992 și *Danthonio* - *Chrysopogonetum grylli* Boșcaiu (1970) 1972.

The classification into three different associations is determined by climatic conditions in which vegetate phytocoenosis.

If we report the edified meadows of *Chrysopogon gryllus* the Habitats from Romania (Doniță & al. 2005) we can say that they fall in the following habitats: R3411 Meadows Daco-Balkan *Chrysopogon gryllus* and *Festuca rupicola* and R3501 Meadows Balkan *Chrysopogon gryllus* and *Danthonia alpina*.

All this information gives us an overview of grasslands *Chrysopogon gryllus*, highlighting the importance of scientific and economic fields with herbaceous vegetation.

In the plains of Oltenia are numerous rarities, some of which are gryllus *Chrysopogon* communities we studied: *Ziziphora capitata*, *Dianthus leptopetalus*, *Trigonella monspeliaca* - Reserve-Radovan Rea Valley.

ASTRAGALUS PSEUDOPURPUREUS IN ROMANIAN VEGETATION

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Astragalus pseudopurpureus was described as a new species for science by the botanist Mihail Guşuleac from Bicazului Gorges (Eastern carpathoans, Romania), at Piatra Panţârului, at 840 m alt., and Şugăului Gorges (Piatra Glodului, at 800-1300 m alt.) Later on, this species has also been identified in Hăşmaş Mountains: Suhardul Mare, Suhardul Mic at 900-1300 m alt., Suhardul Mic above the "Suhard" chalet, Surduc, Bardosul, and Munticelu. This species has also been cited from Nemira Mountains at Dărmăneşti (?), and from Tg. Mureş.

Astragalus pseudopurpureus is a perennial, hemicriptophyte, heliophylous, saxicolous and calciphyluous species, 10-40 cm tall. It grows on limestone screes, moderately moisted, on medium inclined slopes, in lower mountain belt of vegetation, being in blossom in May-June. It is a very rare and vulnerable plant species in Romania, being endemics for Eastern Carpathians (it is a Dacian floristic element).

It was collected for FRE no. 1277/1935 (BUCA 181 549), by Emilian Ţopa, in 1934, from Bicazului Gorges, on the "Dealul Glodului" and "Dealul Panţa", in "pineta", at about 900 m altitude a.s.l.

From phytosociological point of view, this species has been attributed by various authors, to *Elyno-Seslerietea* class or to *Seslerion bielzii* alliance.

It is made a proposal of a new sintaxon in this paper, namely: subassociation *astragaletosum pseudopurpurei* subass. nova, subordinate to the association *Galio albi-Teucrietum montani* Ştefan et al. 2007, described from Şugăului Gorges and Bicazului Gorges.

From coenotaxonomical point of view, this new syntaxa is framed, as follow:

Cl. Thlaspietea rotundifolii Br.-Bl. 1926

Ord. Thlaspietalia rotundifolii Br.-Bl. 1926

Al. Papavero-Thymion pulcherrimi I. Pop 1968

As. *Galio albi-Teucrietum montani* Ştefan et al. 2007

– subas. *astragaletosum pseudopurpurei* subass. nova

The differential species for this newly proposed subassociation, *Astragalus pseudopurpureus*, together with all the other species, edify phytocoenose with soil coverages between 10% and 30%, having a stabilizing role of limestone screes in both place: Şugăului Gorges and Bicazului Gorges.

BIODIVERSITY CONSERVATION THROUGH THE SAFETY OF NATURE AND ENVIRONMENTAL EDUCATION

Gabriela VLĂSCEANU[*]
[*] SC Hofigal Export Import SA, Bucharest

We all witness the technological advances of modern civilization; the more it progresses, the natural environment seems to be cut due to the influences and aggressive actions of people. Therefore we must train our children for an era in which we can live only if consciously protect the environment, managing responsibly the natural resources. It's necessary a lifestyle to realize the importance of everything that surrounds us, because ecological crisis worsens.

Hence was born an idea, a "shoot" project, which gave good results in 2015. The "NATURE LIKE" proposed by Atlas High School from Bucharest and supported by HOFIGAL magazine "Nature and Health" was an innovative and necessary idea. The project was so well received by the post-secondary "Atlas" school students (P.M.A) and also by students from the student's Club ECOING of the Ecological University of Bucharest, who are pleased with the results and especially about the host location, the *„Dimitrie Brândză"* Botanic Garden of Bucharest University – Faculty of Biology.

Following the observed results the organizers have decided to continue the program, ensuring "NATURE LIKE" project ongoing in 2016 with the organization of new visits in various locations, for pupils and students to see nature as it is, *real, palpable, living* ...

Project activities meet the basic education needs of young people and the formation of a healthy lifestyle is a prerequisite for the harmonious development of their personality.

Environmental Education aims to develop awareness, a sense of human responsibility in relation to everything around us. It blends harmoniously with components of a scientific, artistic, touristic, social, sporting, targeting a useful and formative leisure.

ENVIRONMENTAL DRIVERS OF THE STRUCTURE AND DENSITY OF *ARNICA MONTANA* POPULATIONS IN THE NORTHERN REGION OF ROMANIAN EASTERN CARPATHIANS

Constantin MARDARI[*], Camelia ȘTEFANACHE[**], Ciprian BÎRSAN[*], Tiberius BALAEȘ[*], Rareș ȘCHIOPU[**], Doina DĂNILĂ[**], Cătălin TĂNASE[*]
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Arnica montana is a medicinal species, relatively frequently met in mountain to subalpine secondary grasslands or shrubs communities in Romanian Eastern Carpathians. It is considered a vulnerable species due to excessive collection. Although species distribution is well documented, its populations' structure and density are still scarcely known. The present study was focused on the relationships between populations' structure (as vegetative rosettes and flowering rosettes) and density of *Arnica montana* (total rosettes number/m^2) and some biotic, as vegetation (community type, vegetation cover, species richness of plots) and abiotic, as climatic (mean annual precipitations, mean annual temperatures etc.), edaphic

(soil pH and nutrients derived from EIVs - mean values/plot etc.) and topographic (aspect and slope, altitude) factors. These relationships were assessed using generalized linear models. Selection of the best models was made based on corrected Akaike information criterion. Field sampling was carried out in the summer periods of 2015-2016. Results highlighted that climate characteristics had less significant effects compared to other site conditions, as soil nutrients, with more significant (negative) effects on density as well as on flowering rosettes number. Altitude was the most important factor influencing populations' structure (increased proportions of vegetative rosettes at higher altitudes, suggesting a shift in plant survival strategy from sexual to vegetative, clonal reproduction). Also, altitude had a significant negative effect on total rosettes number.

This study was realized within PNII-PT-PCCA-2013-4 no. 74/2014 (ARMOREC) project.

THE MACROMYCETES OF THE DOWNY OAK FORESTS FROM MOLDOVA

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The downy oak associations are spread, mainly, throughout the south part of Moldova, where they can be found in separate small areas. Insignificant sectors/areas can also be found alongside Nistru and Prut rivers, on the southern sloaps.

The first floor of stands consists, mainly, of downy oaks. The consistency of wood species is uneven, trees are arranged in groups, forming curtain. Rarely, in the first floor/layer the pedunculated oak, sessile, tatar maple, ordinary pear and cherry trees can be found.

The downy oak associations count about 240 species of macromycetes. Systematically, the Macromycobiota registers 91 genders, 43 families, 14 orders, 3 classes, falling into 2 phylum (*Ascomycota* and *Bazidiomycota*) of Fungi regnum.

An important part in spreading the mushrooms throughout the phytocoenosis of downy oaks plays the curtain type placement of trees. Based on that, the saprotrophic foliicolous mushrooms and the mycorrhiza ones are met in curtains, while in the clear meadows, among curtains, there appear good development conditions for sporophytes for those species that love open space, such as *Hygrocybe*, *Lepiota* and *Macrolepiota*.

RESISTANCE OF *TRAMETES GIBBOSA* SPECIES (BASIDIOMYCOTA, FUNGI) TO THE TOXIC EFFECT OF SOME PESTICIDES

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Pesticides play an important role in modern intensive agriculture, but their usage is controversial due their toxic effects over various organisms. The general public opinion concerning pesticides impact is negative, although any new product requires approval from authorities before entering the market.

In this study, we have tested the effect of two insecticides and one fungicide over the *in vitro* development of mycelium from *Trametes gibbosa*. The insecticides used are

based on synthetic pyrethroid compounds, substances that are known for causing toxicity to aquatic organisms. The toxic effect of pesticides addition has been assessed on solid and liquid media (malt extract-glucose) supplemented with the commercial formulation per se, in various concentrations. The minimum inhibitory concentration and lethal dose have been calculated for the three pesticides, and the development rate of mycelium was recorded. For investigating the mechanisms involved in resistance of mycelium to pesticide addition, production of ligninolytic enzyme laccase as a defense reaction has been assessed.

The liquid formulation of Fastac proved a stronger toxicity, although it is an insecticide, than the powdery fungicide Bavistin, explained by the composition of Fastac, containing petroleum compounds as solvents. When evaluating the production of laccase, higher enzyme activities have been recorded on media supplemented with Mospilan and Fastac compared with the control.

These results highlight the involvement of laccases in stress response over the addition of pesticides with important ecological implications. The high toxicity of pesticides containing petroleum compounds as solvents highlight the necessity of finding less toxic solvents.

Acknoledgements: This study was funded by Alexandru Ioan Cuza University of Iasi, Romania, through the project 13/3.12.2015, code GI-2015-10, Grant Competition for young researchers of UAIC.

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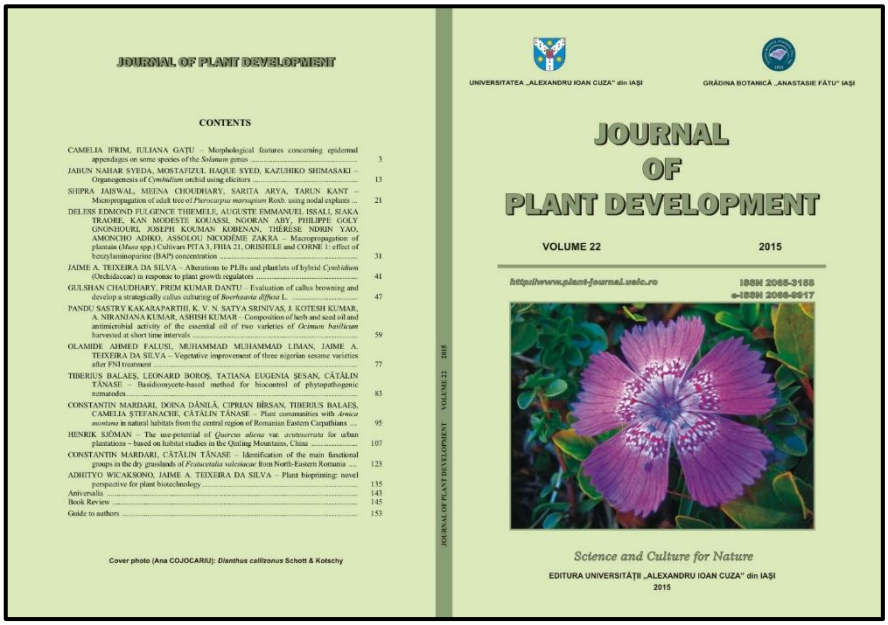

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AIMS AND SCOPE OF THE JOURNAL

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