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Cuprins

1. Plant conservation; forest ecosystems

2. Plant introduction and sustainable use of plant resources

1. PLANT CONSERVATION; FOREST ECOSYSTEMS

ENDANGERED PLANT SPECIES OF DOWNY OAK FORESTS (*Quercus pubescens* Willd.) FROM REPUBLIC OF MOLDOVA

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Keywords*: downy oak, conservation, endangered, species.*

Influence of human activity over the environment that have had lead to upset of population and diversity of plant species from downy oak forests (*Quercus pubescens* Willd.), by over exploitation of natural resources or a general shift away from the land two processes that have had different but equally harmful consequences for the conservation of species and habitats. If some time ago endangered plant species from Flora of Republic of Moldova represented 14 percent of the total number of species today percentage increased to 25 percent. The *Stipa* genera and relict vegetation communities of *Chrysopogon gryllus* (L.) Trip is threatened, that is caused by extreme condition at the limit of the spreading area, result of deforestation, human activity, overgrazing. Aim of this study is to make evident the problem of endangered plant species, critically endangered and vulnerable plant species and to establish ecological and chorological peculiarities of it, this is an actually issue about conservation of species and they habitats, and rationally exploitation of natural resources.

In downy oak forests it was studied over 90 plant species with a conservation value. We have inventoried their habitats and distributed they grow in specifically habitats in steppe clearing that is characteristic for this kind of ecosystem. Was delineated 28 families and 56 genera, some of them including from 6 to 10 plant species (*Fabaceae* family 10 species, *Rosaceae* family 9 species, *Poaceae* family 7 species), but the most of them included just 1 to 2 species. A lot of endangered plant species are multiannual take part from hemichryptophites (54%) and geophytes (30%). The number of phanerophytes is minor (7 species or 8%). Mezophytes plant species included 47 percent and xerophytes included 37 percent; the major percent of geographical elements is from Pontian taxa. From total number of endangered species 22 are included in the Moldavian Red Book and other national and international lists of protected species and are protected by law. The endangered plant species of downy oak forests have a lot of limitation factors. Some of them located at the limit of the spreading area, isolated population, reduced specifically habitats, plantation of forest crops in clearings, overgrazing, collecting of blooming plants, bulb extraction. The geographical elements are varied, this are caused by the geographical position of Republic of Moldova that is situated in contact of three botanical and geographical districts. The endangered species from downy oak forests make three main groups: Species that are located at the North-Eastern limit of its spreading area. This group included 18 plant species or 21 percent from total number of endangered species from downy oak woods. A dominant number of endangered plant species from southern area of spreading are Mediterranean species as *Chrysopogon gryllus* (L.) Trin., *Crataegus pentagina* Walds. Et Kit., *Carpinus orientalis* Mill., *Ornitogalum fibriantum* Willd., *Ventenata dubia* (Leers.) Cross; Balkan species as *Centaurea thirkei* Sch. Bip., *Paeonia peregrina* Mill., *Serratula bulgarica* Acht. Et Stojan., *Digitalis lanata* Ehrh.; Pontic species with specific feature of Mediterranean species are *Nectaroscordum bulgaricum Janca*., *Delphinium fissum* Waldst. Kit., *Trifolium vesiculosum* Savi., Pontic elements are represented by *Colchicum triphyllum* G. Kunze., *Ornitogalum oreoides* Zahar; European species are represented by *Pulsatila grandis* Wend., *Centaurea angelescui* Grint., *Sorbus domestica* L. [NEGRU, A., ŞABANOV, G., CANTEMIR, V., 2002]. The most species from this group are included in the Moldavian Red Book (the third edition).The endangered plant species with large area of spreading not just from territory of the Republic of Moldova. This group are included Pontic, Mediterranean and Panonian plant species as *Astragalus ponticus* Pall., *Bellevalia sarmatica* (Georgi) Woronow, *Crupina vulgaris* Cass., *Pleconax conica* (L.) Sourcova, European plant species with a large areal as *Pulsatilla grandis* Wend., Euroasiatic plant species as *Agrimonia pilosa* Ledeb., *Astragalus varius* S.G. Gmel., *Serratula coronata* L. p. p., *Spirea crenata* L. One of the most rare plant species from this group is *Bulbocodium versicolor* (Ker Gawl) Spreng., grows area included Hungary, Romania, the steppe region of Ucraine; and can be find it just in four places of habitats in our Republic, the stability of the population is in danger for this species. One of distinct protection required *Pulsatilla grandis* Wend. and *Fritillaria meleagroides* Patrin ex Schult. fil., this plant species is included in European Red Lists of Vascular Plants [WALTER, K. S. & GILLETT, H. J., EDS. 1998.] and List from Bern Convention. This species needs to be protected in all countries where have had sign the international convention of the biodiversity. Also is necessary to protect the population of *Crupina vulgaris* Cass., *Pleconax conica* (L.) *Sourkova* which are growing near Rascaeti village. This species meets not so frequently in South Bugeac steppe. The species with a large spreading area from the all territory of the Republic of Moldova. This species are protected by law (*Adonis vulgaris* L. *A. wolgensis* Stev.) population of *Amigdalus nana* (L.) that is not so numerous.

CONSERVATION OF MAIZE LANDRACES

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Keywords*: landraces, germplasm, collection active, base collection*

Problem of conservation of so called "local varieties" (landraces) that are unique by many traits still remains unsolved, even though for the first time it was put on the agenda as far back as in 1890 at the conference on hybridization [1]. One of items of the Second Global Plan of Action for Plant Genetic Resources adopted by the FAO Council is: "Promoting development and commercialization of all varieties, primarily farmers' varieties, landraces and underutilized species".

Historically, maize in Moldova is the main fodder-grain crop. For this reason, collection of maize landraces collected on private farms on the right-bank Moldova by professor A. E. Kovarskiy and his staff before collectivization in 1945-1946 was of great importance for selection and genetic works. In total 624 accessions were collected. This collection was used as a donor for many traits required for selection of maize. Later accessions with cytoplasmic male sterility, high protein content, early ripening, resistance to diseases and pests, with high-quality grains, and etc. were distinguished from this collection of landraces [2].

Center for Plant Genetic Resources of Moldova performs work on conservation of maize landraces. The base of collection includes local moldavian varieties obtained by us from the Vavilov Institute of Plant Industry. Besides, annual expeditions are organized to different regions of the republic. As a rule, material is collected from household plots, because in commercial production more often are used comercial hybrids of foreing breeding. Accessions collected by us (more than 120 forms) belong mainly to three types of varieties of flint maize Z. *mays L. var. indurata* (Moldavian Yellow, Orange, White-kerneled varieties) moreover there is a numerous group of forms of popcorn maize Z. *mays L. var. everta,* and semi-dent maize. In addition to task-oriented selection (individual and mass selection), accessions are studied by the whole complex of traits in order to introduce the obtained material in active collection.

Landraces are a true treasury of genes of resistance to pests and diseases spread in this area. Selection material obtained with the use of germplasm of local varieties is one more source of enrichment of the collection. Collection of Yurku A. I. received by us was created as a collection specialized in resistance to main diseases of maize [3, 4, 5]. It includes more than 280 lines and their analogues that can be used as donors of resistance to pathogens causing kernel smut and long smut (*Ustilago zeae Ung, Sorosporium reilianum McAlp),* stem blights.

However, all our efforts made for creation of active collection in the absence of base collection (of long-term storage) and irrigation of experimental plots can become unsuccessful. Thus, beginning with 2007 year conditions of frequent droughts placed reproduction of some forms in jeopardy. From year to year we obtained seed material of some genotypes in small quantity and not complying with quality standards. This situation finally leads to losses.

For the purpose of conservation of landraces for further generations it is necessary to take into account the experience of European Centres for Genetic Resources that find ways to re-entry landraces in production and distribute them among farmers and amateur plant breeders. However, cultivation of low-yielding landraces is normally unprofitable. Therefore a need arises to promote and incentivize population, which is done by collection holders with the active state support in a number of countries. Thus, our tasks on conservation of local gene pool of plants, including maize, are multifaceted challenges - from collection and conservation of germplasm to consecutive re-entry of local, often forgotten varieties and forms into production.

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RARE SPECIES OF *BORAGINACEAE* IN THE FLORA OF THE REPUBLIC OF MOLDOVA

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Keywords: *flora, rare species, Boraginaceae, R. Moldova, RBRM (Red Book of the Republic of Moldova), RBB (Red Book of Bulgaria), RBR (Red Book of Romania), RLR (Red List of Romania), HD (Habitats Directive), BC (Berne Convention)*

Twelve threatened species of *Boraginaceae* (categories CR, EN, VU), assessed according to IUCN criteria (2001, 2003), are presented in the paper. The list of species is proposed to be included in the Law on Rare Species Protected by the State and the Red Book of R. Moldova, fourth edition.

1. *Anchusa gmelinii* Ledeb. – Conservation status [Vulnerable (VU B2ab (ii, iv))]. Present in RLR; RBR. Pontic hemicryptophyte. Rarely found in five localities: near t. Otaci, v. Cobusca-Nouă (Bulboaca), v. Selişte (Nisporeni), v. Doi-Bani (Dubăsari), "Iagorlâc" Reserve. Limiting factors: poor propagation, habitat degradation and small number of locations.
2. *A. stylosa* M. Bieb. – Conservation status [Endangered (EN B2ab (i, ii, iii))]. Protected according to the Biological Diversity Act, Annex 3. Present in RBB, RBR. Its range includes Southeast Europe. Annual therophyte, thermophile, Ponto-Balkan. Rarely encountered near mun. Chişinău and Tiraspol, on slopes with steppe vegetation. Limiting factors: human settlements in close proximity, habitat degradation, small populations.
3. *Echium russicum* J. F. Gmel. – Conservation status [Vulnerable (VU B2ab (ii, iii))]. Present in RBB, HD. Biennial therophyte, Ponto-Pannonian. Sporadically distributed in Moldova. Limiting factors: mowing, excessive cultivation and degradation of slopes with steppe vegetation, anthropogenic impact.
4. *Heliotropium suaveolens* M. Bieb. – Conservation status [Endangered (EN B2ab (i, ii, iv, v))]. Present in RBR. Its range includes Southeast Europe. Eastern sub-Mediterranean element. Found in only three localities in the south of R. Moldova. Limiting factors: anthropogenic impact, poor propagation, small number of locations.
5. *H. ellipticum* Ledeb. – Conservation status [Endangered (EN B2ab (i, ii, iv, v); C2a(i))]. Identified in two localities: v. Zolonceni (Dubăsari), at the edge of forest, along Răut River, and in v. Nezavertailovca, on rocky, steep riverbank, near Cuciurgan Reservoir. Hemicryptophyte, thermophile, Eurasian. Limiting factors: restricted specific habitat, few locations, small populations.
6. *Myosotis discolor* Pers. – Conservation status [Endangered (EN B2ab (i, iii, iv); D)]. Encountered on petrophyte slopes, near t. Cahul and Zloți station. Limiting factors: few locations, the eastern limit of the range of the species, anthropogenic impact.
7. *M. popovii* Dobrocz. – Conservation status [Endangered (EN B2ab (i, iii, iv); D)]. Rare species in Străşeni, Căpriana, found on slopes with steppe or calciphile vegetation. Endemic species. Limiting factors: poor propagation, small populations, only two locations.
8. *M. ramosissima* Rochel – Conservation status [Vulnerable (VU B2ab (iii, iv); D1)]. European therophyte. Rare species, found in Viişoara (Glodeni), Bahmut (Călăraşi), Chetriş (Făleşti), in glades. Limiting factors: mowing and grazing in forests, small populations, few locations.
9. *Onosma lipskyi* Klokov – Conservation status [Vulnerable (VU B2ab (i, iii))]. Biennial therophyte, Ponto-Pannono-Balkan, identified on calcareous, stony slopes with steppe vegetation, in four locations. Limiting factors: exploitation of steppe sectors, small range and specific habitat.
10. *Rindera umbellata* (Waldst. et Kit.) Bunge – Conservation status [Critically Endangered (CR B1ab (i, iii, iv, v); C2a(i))]. Present in RBRM, RBR. Ponto-Balkan tertiary relict. Found in four localities in the south of the territory, in steppe and glades of oak forests. For the last time, it was collected in 1948. Limiting factors: anthropogenic impact, exploitation of steppe sectors and afforestation of glades.
11. *Rochelia retorta* Pall. – Conservation status [Vulnerable (VU B2ab (iii, iv, v) c(iv))]. Present in RBR. Ponto-Balkan therophyte. Found in Făureşti, Ciorescu, Hânceşti, Zloți, on sandy slopes with steppe vegetation. Limiting factors: specific habitat, poor propagation, few locations, anthropogenic impact.
12. *Symphytum popovii* Dobrocz. – Conservation status [Critically Endangered (CR B1ab (iii, iv))]. European hemicryptophyte. Endemic species. Found in a single location – v. Cuhneşti (d. Glodeni), in forest of oak with lime. Limiting factors: poor propagation, small populations.

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CONTENT OF CYCLIC NON-REPLACEABLE AMINOACIDS IN VARIOUS PROTEIN FRACTIONS OF GRAIN'S STORAGE PROTEINS IN SELECTIONS OF CHICKPEA OF THE F_4-GENERATION

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Keywords: *aminoacids, protein fractions, seeds, hybrids*

Chickpea (Cicer arietinum L.) are a leguminous crop with seed's protein content of 20-32%, which on itself does not mean that it is highly nutrient. The nutrition value of protein product is characterized by the content of non-replaceable aminoacids, especially such of tryptophan, lysine, methionine, etc [Singh, Rao, Singh, Jambunathan, 1988; Антипова, Аникеева, 2006; Suresh Kumar, Vaishali Kapoor et al., 2014; Вишнякова, Бурляева и др, 2014].

The non-replaceable cyclic aminoacids (tryptophan + tyrosine) content was investigated in 16 hybrid forms of chickpeas. Hybrids were produced by intraspecies hybrid combination ♀MDI 02432 (black seed, dezi; Bulgaria) x ♂MDI 02419 (beige, kabuli; Moldova).

Three fractions of proteins – albumins, globulins and strongly bonded with cell structures – were extracted from the flour of finely ground seeds of all genotypes.

Fractional composition of seeds proteins and content of aminoacids were investigated by photometric spectral analysis in UV-light with wavelengths of 274, 278 and 280.

The diagram on Figure 1 shows that a substantial changes of cyclic aminoacids content in all protein fractions was present in all selections as compared to their parental forms. Aminoacids content in the hardly extractable fraction of all hybrid forms was decreased by 90-98% in relative to best parental form (Fig 1, Series 3).

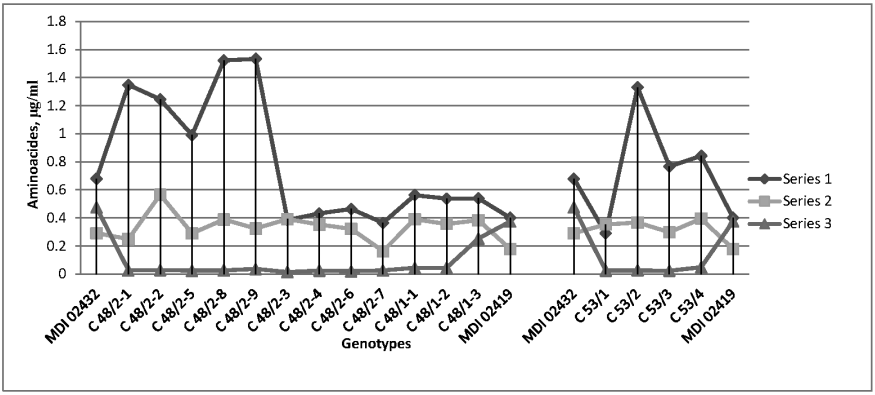

Figure 1. Cyclic aminoacids (tryptophan + tyrosine) content in protein fractions of chickpea seed's genotypes: albumin fraction (Series 1), globulin fraction (Series 2), tightly-bound proteins fraction (Series 3).

Relatively stable aminoacids content has been found in globulin fraction of seeds proteins for selections:
C 48/2-1, C 48/2-5, C 48/2-7, C 48/2-9 and C 53/3; it was roughly equal to the parental forms (figure 1, Series 2). Nine selections: – C 48/2-8, C 48/2-3, C 48/2-4, C 48/1-1, C 48/1-2, C 48/1-3, C 53/1, C 53/2, C 53/3, C 53/4 – showed the increase in aminoacids content up to 10-30% in relation to the parental forms. The genotype C 48/2-2 increased the content of these amino acids by 100%, in comparison with the maternal form. Aminoacids of albumin fractions of proteins for selections: C 48/2-3, C 48/2-7, C 53/1 were at the level of the father's form (figure 1, Series 1). The content of these aminoacids was higher by 8-15% for C 53/3, C 53/4 and for selections: C 48/2-5, C 48/2-2, C 48/2-1, C 53/2, C 48/2-8 и C 48/2-9 the relative increase was from 30 to 120% compared to maternal form (figure 1, Series 1).

COMPARATIVE STUDY GEUM URBANUM L. AND GEUM MONTANUM L. (SIEVERSIA MONTANA L.)

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Keywords: *Geum urbanum, Geum montanum*

An important task of modern herbal medicine is the search for promising medicinal plants to create new medicines. According to the literature of plants of genus Geum most widely used in folk medicine Geum urbanum. Geum montanum least studied species.

Previously, we have founded a high content of tannin, also we have studied the localization of tannins in the bodies of the Geum urbanum (2,3). Discovered antimicrobial activity phytopreparation - tinctures its rhizomes and roots, both gram-positive and gram-negative museum strains of Staphylococcus aureus, Bacillus cereus, Bacillus subtilis, Escherichia coli, Pseudomonas aeruginosa, Salmonella enterica serovar abony (1), and studied anatomical structure of rhizome and roots of Geum urbanum (4).

Providing comparative morphological and anatomical, phytochemical and microbiological studies Geum urbanum L. and Geum montanum L would be relevant.

Objective was to identify microscopic diagnostic features, conduct phytochemical research, and study the impact decoctions rhizomes with roots of Geum urbanum and Geum montanum on antimicrobial activity.

Materials and methods. The object of the study was rhizome with the roots of Geum urbanum collected in August and September in Lviv region and Geum montanum collected in the same period, at an altitude of 1900 m above sea level on Pip Ivan Montenegrin (Black Mountain). Anatomical studies of medicinal plants were carried out in the fresh material and fixed conventional method. Identify the main groups of biologically active substances of medicinal plants conducted using qualitative reactions of water, water-alcohol and acidified by hydrochloric acid extracts. Quantitative determination of tannin defined titrimetric method. Spectrophotometric method defined content of flavonoids, carotenoids and chlorophylls. Antimicrobial activity concoctions made by agar diffusion.

Results. Macro- and microscopic examination were found characteristic species-specific and general diagnostic features of the genus. Phytochemical study of water, water-alcohol and water extracts acidified hydrochloric acid overground and underground Geum urbanum and Geum montanum for the main groups of biologically active substances found content of tannins, anthocyanins, flavonoids and coumarins in all studied organs. The maximum amount of tannins found in groundwater bodies Geum montanum, which is 1.3 times greater than their number in Geum urbanum. Significantly fewer tannins found in the aerial part of Geum montanum, which is 1.2 times greater than their number in comparison with Geum urbanum. Chromatography in a thin layer of sorbent alcoholic extracts of the aerial studied species Geum identified flavonoids, including rutin and quercetin. Spectrophotometric method quantitatively determined in above-ground organs as Geum urbanum and Geum montanum flavonoids, β-carotene and chlorophyll. Established antimicrobial activity concoctions of ground studied species Geum as gram (Staphylococcus aureus) and the gram-negative (Pseudomonas aeruginosa) bacteria. As a reference medicinal product used antibacterial for systemic use - ceftriaxone.

Conclusions. The results can be used to develop methods for quality control of medicinal plants - above ground and underground of urban Geum, Geum montanum and creating promising phytomedications with antimicrobial activity.

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DNA ISOLATION FROM XEROTHERMIC PLANT SPECIES USING AN IMPROVED PROTOCOL

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Keywords: *DNA isolation, xerothermic plants, PCR amplification*

The Gypsum from Sfaras Jebucu draws our attention due to its plant species richness, being one of the most important biological hotspot in Transylvania. The xerothermic grasslands with his unique flora, belongs to the most valuable and also to the most threatened habitats in Europe. Despite the lack of legal protection, this area harbor many rare, endemic and protected species, such as: *Gypsophila collina* Steven ex Ser., *Campanula sibirica* L., *Thymus comosus* Heuff. Ex Griseb. & Schenk, *Daphne cneorum* L., *Serratula radiata* (Waldst. & Kit.) M Bieb., *Jurinea transylvanica* Spreng, *Cephalaria radiata* Griseb. & Schenk.

To evaluate the plant biodiversity in this area, a modern molecular method- DNA barcoding- is combined with the traditional, morphological-based taxonomic approaches. For comprehensive DNA barcoding studies, involving a large number of species, a reliable DNA isolation protocol is required.

Plant species normally store different polyphenols, polysaccharides, proteins and other secondary metabolites that normally affect the quality of the extracted DNA, having a negative influence on downstream applications, such as PCR amplification. The biochemical composition and the plant DNA vary even between closely related species. The amount of DNA varies among different plant species, so that a unique isolation method does not always work for all plants.

The aim of this study was to establish a single reliable DNA isolation protocol for xerothermic plant species belonging to different genera and families. The column-based method using the Isolate II Genomic DNA Kit (Bioline, UK) doesn't require liquid nitrogen and hazardous reagents such as phenol and it is suitable for a large-scale DNA isolation with various plant species in laboratories with restricted resources.

The concentration of the extracted genomic DNA from 35 plant species varied between 20 and 400 ng/µl. The A260/280 ratio was 1.6-2.0, indicating a low level of contamination. The extracted genomic DNA using the present protocol was high quality and amenable for PCR amplification with several plant barcodes primers.

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INFLUENCE OF MILLIMETER RADIATION ON PRIMARY METABOLIC PROCESSES IN LENTIL SEEDS (*LENS CULINARIS*) UNDER THE CONDITIONS OF *EX SITU* CONSERVATION

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Keywords*: ex situ conservation, lentil, millimeter radiation, IAA-oxidase, chromosome aberrations*

Long-term storage of collection accessions in plant gene banks inevitably results in aging processes occuring in seeds, that lead to reduction and even loss of germinability. One of the main challenges of gene banks is to maintain valuable seed material in *ex situ* collections in active state. Therefore, to increase seed viability it seems very pertinent to use methods of exogenous treatment of seeds after their long-term storage. For this purpose we used one of the promising physical factors – millimeter radiation.

Tested objects were seeds of pulse crop representative – lentil (*Cenușereasa* cultivar) after their 5-year storage under the conditions of *ex situ* conservation. Seeds were treated with millimeter radiation with the wavelength 5.6 mm, power density 6.6 mW/cm^2 and exposures 2, 8 and 30 min, after that they were let to germinate in Petri dishes in thermostat at 20°C. Seeds not treated with millimeter radiation were used as control. After seed radiation the following parameters were examined: germinating power and seed germinability, length of seed rootlets [1], content of IAA-o enzyme in seedlings of seeds [2], total content of freely soluble proteins in seeds and rootlets of seedlings [3], number and spectrum of chromosome aberrations [4].

Significant stimulation of germinating power of lentil seeds (by 22.2%) was observed at 30-min exposure of millimeter radiation, and significant inhibition of this parameter (by 10.6%) was noted at 2-min exposure of radiation. Earlier, stimulation of germinating power in seeds of other plant species was observed only at 2- and 8-min exposures of radiation. Determination of seed germinability revealed stimulation of germinability at 30-min exposure and inhibition – at 2-min exposure. When stimulating (for germinating power and germinability of seeds) 30-min exposure was used, it was noted that content of IAA-oxidase enzyme in seedlings of lentil seeds was the lowest among all experimental variants (30 min – 0.411 c. u.). With inhibiting 2-min exposure the opposite dependence was found (2 min – 0.955 c. u.). This is consistent with the known regularity, i.e. inverse correlation of said parameters [5]. Length of rootlets of lentil seedlings was maximal in stimulating variant with 30-min exposure (up to 1.5 times higher than control). Increase of growth activity of seedlings at stimulating exposure of treatment of seeds with millimeter radiation (30 min) was accompanied with the enhancement of protein synthesis in rootlets and seeds, but when inhibiting exposure of radiation (2 min) was used the protein synthesis was minimal. Conclusions regarding protein synthesis were made based on determination of total content of freely soluble proteins in rootlets and seeds of lentil expressed as mcg/g of crude substance.

Chromosome analysis of cells of rootlets of lentil seedlings showed the decreased number of chromosome aberrations after 8- and 30-min exposures of radiation as compared to the control. It is known from literature that number of chromosome aberrations in cells of seedling rootlets often increases during the long-term storage of seeds, and in our experiments with the help of millimeter radiation we successfully restored normal genetic state of seeds. Differences were obtained also by types of chromosome aberrations: in stimulating variants with 8- and 30-min exposures the number of single and double chromosome bridges decreased drastically with no triple bridges at all. Therefore, millimeter radiation promotes intensification of reparative processes in plant cells with faster elimination of cells with chromosome abnormalities and increase in number of normally divided cells.

Thus, millimeter radiation with the wavelength 5.6mm, power density 6.6 mW/cm^2 and 30- and 8-min exposures boosts viability of lentil seeds by stimulating germination processes in lentil seeds under *ex situ* conservation.

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STUDY OF STORAGE POTENTIAL OF TRITICALE COLLECTION ACCESSIONS FOR *EX SITU* CONSERVATION

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Keywords*: ex situ conservation, accelerated aging of seeds, germinability, length, biomass of rootlets*

The main condition of secured *ex situ* conservation of germplasm in plant gene banks implies the necessity to maintain seed viability, their physiological quality and reduce aging rate to the minimum. Before taking collection accessions for long-term storage it is very important to assess storage potential (SP) of the most valuable forms. For assessment of SP of seeds in plant gene banks in different countries the accelerated aging test (AA-test) of seeds is applied that involves incubation of seeds at increased temperature and humidity; period of exposure of seeds to these factors depends on each specific culture and sometimes even on specific genotype [1]. The AA-test allows monitoring of collection accessions of gene pool, continuous recording of their viability, and classification of genotypes by the parameters of aging of seeds from working and active collections. Applied method provides the basis for making recommendations concerning time for reproduction of seed material, and also indicates the necessity to restore viability of collection accessions with the help of various physical and chemical factors.

Purpose of these experiments was to study morpho-physiological and biochemical parameters of triticale seeds and seedlings, which allow characterization of their SP, and to perform ranking of genotypes by seed aging trait. Test objects were triticale accessions from collection of plant gene bank provided by the laboratory of applied genetics.

Accelerated aging test of seeds was performed at air temperature of 41-43°C, air humidity of 90-100%, aging period was 72 hours, after that seeds were germinated in Petri dishes in thermostat at 25°C. In each variant 300 seeds were used. The following morpho-physiological and biochemical parameters of seeds were assessed: germinating power (GP) and germinability (G) of seeds, main radicle length (RL), number of rootlets (NR), fresh and dry biomass of seedling rootlets (DBR) according to International Rules of ISTA [2], and peroxidase enzyme content (PO) in seedling rootlets [3]. Obtained results were processed using application software package Statistica 7.

Conducted accelerated aging test of triticale seeds revealed decreased values of all morpho-physiological parameters in aged seeds as compared to normal seeds. GP of normal seeds varied from 70.0 to 94.0% depending on genotype, and after seed aging it varied within 21.0 to 67.0. Tested triticale genotypes were divided into 3 groups by the level of reduction of germinability: genotypes of the first group (Ingen 40, Canar x Bogo) had seed germinability reduced by 25.0%; second group (Ingen 35, Ingen 93) – by 35.0 – 40.0%; third group (Ingen 33, (Coerulesc. x Ciulpan) x Lasco) – by 51.0%. Triticale genotypes in all groups had the decrease in values of their morpho-physiological parameters (RL, NR, DBR) after accelerated aging test as compared to the control: 11.0-60.0; 3.0-10.0 and 10.0-50.0%, respectively. With respect to peroxidase content in seedling rootlets of triticale seeds after AA-test, we observed significant increase of this parameter as compared to the control that is a characteristic effect caused by thermal stress. Test variants exceeded the control with respect to PO content in seedling rootlets of different genotypes (sometimes even twofold).

Using accelerated aging test of seeds, genotypic features of collection accessions of triticale were identified, and they were categorized into groups by potential capability to maintain seed viability after the influence of stress factors.

Thus, with the help of morpho-physiological and biochemical parameters of seeds and seedlings we assessed storage potential of various triticale genotypes, which is an important characteristic of accessions to consider while taking them for long-term storage in plant gene bank.

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SOME MORPHOBIOLOGICAL, BIOCHEMICAL TRAITS AND YIELD BY DIFFERENT SELECTIVE GENOTYPES OF CHICKPEA.

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Keywords: selective genotypes, seed type, 100 seeds weight, yield, proteins, fats.

The development of improved cultivars of chickpea is the need of the day. Availability of genetic variability is crucial for any breeding program, which provides an opportunity for selection of desirable genotypes. Material for the present study are consisted of 8 selective genotypes the offspring of the intraspecific hybrid combination ♀MDI02432 (desi, black seeds) × ♂MDI02419 (kabuli, beige seeds), in their F_6-, F_7 - generation. Cultivars Botna and Ichel have been applied as standard checks. The selective genotypes were differed according to certain traits among themselves and standards, that is important for breeding and selecting desirable types. Was used direct selection *per se*, according source [1].

Field experiences were examined over two growing seasons: 2014 - was very suitable for chickpea growth and 2015- was less suitable. Genotypes was described by seeds types and seeds colour coat (are presented for F_7 - generation) [2]. Weights of 100 seeds, duration of the vegetation period and grain yield are presented for both years (mean). Common data: seed protein content (total), fats (are presented for F_7 - generation) and plant height (for suitable 2014 season).

Cultivar Botna: desi, brown seeds coat, 100 seeds weight- 27,4 g, duration of the vegetation period- 92 day, grain yield in 2014 - 198,3 g/m^2, in 2015- 105,6 g/m^2, mean for both years – 152,0 g/m^2.

Cultivar Ichel: kabuli, beige seeds coat, 100 seeds weight- 31,0 g, duration of the vegetation period- 94 day, grain yield in 2014 – 164,2 g/m^2, in 2015- 98,4 g/m^2, mean for both years – 131,3 g/m^2.

Genotype C48/13: desi, light brown seeds coat, 100 seeds weight- 23,9 g, duration of the vegetation period- 91 day, grain yield (mean) 143,5 g/m^2.

Genotype C152/2: gulabi-desi[1]/ gulabi (pea-shape), brown/orange seeds coat (segregation for both traits), 100 seeds weight - 31,1 g, duration of the vegetation period- 96 day, grain yield (mean) 179,2 g/m^2.

Genotype C152/8: gulabi-desi, brown seeds coat, 100 seeds weight- 34,4 g, duration of the vegetation period - 102 day, grain yield (mean) 171,4 g/m^2.

Genotype C152/9: gulabi/kabuli, brown/beige seeds coat, 100 seeds weight - 32,6 g, duration of the vegetation period - 100 day, grain yield (mean) 181,4 g/m^2.

Genotype C76/7: gulabi, yellow/light yellow seeds coat, 100 seeds weight - 27,2 g, duration of the vegetation period - 92 day, grain yield (mean) 146,2 g/m^2.

Genotype C90/6: kabuli, beige seeds coat, 100 seeds weight - 28,3 g, duration of the vegetation period - 91 day, grain yield (mean) 158,0 g/m^2.

Genotype C105/5: gulabi, beige/ light yellow seeds coat, 100 seeds weight - 25,7 g, duration of the vegetation period- 92 day, grain yield (mean) 152,8 g/m^2.

Genotype C187/1: desi, dark brown seeds coat, 100 seeds weight - 24,2 g, duration of the vegetation period - 90 day, grain yield (mean) 149,8 g/m^2.

For selective genotypes variation of plant height were in limits 48,7 cm (C48/13) – 70,6 cm (C152/8), by cultivars Botna and Ichel - 57,8 cm and 68,1 cm, respectively.

Seeds protein content (total) by cultivars Botna and Ichel were 26, 85% and 23, 7%, respectively. Variation of this parameter by selective genotypes were from 24,9 % (C152/2) to 28,34 % (C90/6).

Fats content by cultivars Botna and Ichel: 6,55% and 6,26%, respectively. Variation of this parameter by selective genotypes from 2,7% (C152/2) to 6,4% (C90/6).

The protein and fat content are usually having inverse relations.

Variation of seeds weight were in limits 23,9 g (C48/13) - 34,4 g (C152/9). So, the present polymorphism, availability high yield and high protein content among selective genotypes, we believe to obtain a variety/s for cultivation.

[1]- Intermediate form: with roughness seed coat and pea shape.

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RARE PLANT SPECIES IN (SEMI) NATURAL HABITATS OF THE SOUTHERN OPILLYA (WESTERN UKRAINE)

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Keywords: rare species richness, occurrence, population size, habitats, Southern Opillya

Populations of rare plant species often go extinct due to habitat degradation. Natural and semi-natural landscapes of the Southern Opillya are highly fragmented and isolated due to transformation of 60-70% of the territory into agricultural lands. Forests (mainly oak and beech ones) cover from 16% to 30% of the territory, whereas other habitats have very small areas (meadows – 4.5%; wetlands – 0.4%; ponds – 0.4%; meadow steppes – 0.2%). Many habitats have experienced degradation due to continuous anthropogenic pressure.

The Southern Opillya occupies the area of 3500 km^2 on North of Ivano-Frankivsk Region, Southwest of L'viv Region and West of Ternopil Region (Western Ukraine).

We studied rare species number, number and size of populations in each of the following habitat types: forest, forest margin, wet meadow, dry meadow, meadow steppe, gypsum outcrops, wetland and reservoir.

Flora of the Southern Opillya comprises 259 rare species. Out of them 91 species are listed in the Red Data Book of Ukraine [1], 13 in the Annex I of Bern Convention and Revised Annex I of Resolution 6, 12 in EU Habitats Directive (Annex II; Annex IV), 94 in Red Lists of Ivano-Frankivsk, L'viv and Ternopil Regions.

Meadow steppes appeared to be the richest in rare species (85) and their populations (816) among habitats of the Southern Opillya. Forests cover area 80-150 times bigger, however comprise 1.7 times less rare species (50) and 1.8 times less populations (444) than meadow steppes. Wetlands being on the third place on species richness (39) comprise low number of populations (95). On the contrary, dry meadows are relatively poor in rare species (21) but the habitats comprise two times more populations than wetlands (188). Forest margins are habitats for 24 rare species and 162 their populations. Other habitats comprise relatively low number of rare species and their populations (wet meadows: 18 and 92; gypsum outcrops: 11 and 55; reservoirs: 11 and 50, respectively).

The species of rare occurrence predominate in each habitat type. Aquatic and wetland species showed extremely limited occurrence. Eutrophication of lakes and melioration of wetlands caused loss of most suitable habitats. As a result, 97.4% of wetland species and 72.8% of aquatic species are known from 1-5 localities.

Many species (29.7% of the total number) were found in 1-2 localities: *Diphasiastrum complanatum* (L.) Holub, *Gagea fistulosa* Ker Gawl., *Orchis purpurea* Huds., *Ophrys apifera* Huds., *Muscari neglectum* Guss. ex Ten, *Carex bohemica* Schreb. *C. hostiana* DC., *Eleocharis carniolica* W. D. J. Koch, *Festuca tenuifolia* Sibth., *Sesleria caerulea* (L.) Ard., *Thalictrum uncinatum* Rehm., *Trifolium lupinaster* L., *Rhamnus tinctoria* Waldst. et Kit., *Thesium ebracteatum* Hayne, *Limosella aqutica* L., *Pinguicula bicolor* Woł.

Nine species are likely to become extinct (*Botrychium multifidum* (S. G. Gmel.) Rupr., *Gymnadenia odoratissima* (L.) Rich., *Ophrys insectifera* L., *Tofieldia calyculata* (L.) Wahlenb., *Leersia aryzoides* (L.) Sw., *Aconitum besserianum* Andrz. ex Trautv., *Salix starkeana* Willd., *Viola palustris* L., *V. uliginosa* Bess.).

Very few species occur in 30-70 localities. Most of them are species of forests (*Allium ursinum* L., *Galanthus nivalis* L., *Leucojum vernum* L., *Lilium martagon* L., *Neottia nidus-avis* (L.) Rich., *Phyllitis scolopendrium* (L.) Newman), meadow steppes (*Stipa capillata* L., *S. pennata* L., *Adonis vernalis* L., *Chamaecytisus blockianus* (Pawł.) Klásk., *Echium russicum* J. F. Gmel., *Iris aphylla* L. subsp. *hungarica* (Waldst. & Kit.) Hegi, *Pulsatilla grandis* Wender., *P. patens* (L.) Mill. s.l.) and dry meadows (*Platanthera bifolia* (L.) Rich., *Potentilla alba* L., *Gladiolus imbricatus* L.). Significant area of forests and number of meadow steppe patches explain relatively high occurrence of these species. However, degradation of most habitats caused extinction of populations of other species. Thus, despite big number of patches and high richness of these habitat types, most species occur in 1-10 localities.

Population size of rare species generally is small. The share of populations comprising from several to 500 individuals vary from 72.4% to 92% among different habitat types. Only aquatic species have larger populations; 60.9% of them comprise from 500 to ten thousand individuals.

Populations of *Tephroseris papposa* (Rchb.) Schur, *Telekia speciosa* (Schreb.) Baumg., *Campanula latifolia* L., *Galium volhynicum* Pobed., *Ophrys apifera* comprise only several individuals.

Large populations comprise 0-12% of all populations in studied habitat types. More often they occur in forests and wet meadows, whereas only one large population (of *Minuartia thyraica* Klokov) inhabits gypsum outcrops and no one was found in forest margins and dry meadows.

Consequently, natural and semi-natural habitats of the Southern Opillya are rich in rare plant species. However, anthropogenic pressure significantly decrease their occurrence and population size. Conservation activities should be conducted for the prevention of rare species extinction.

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ENOLOGICAL-EDAPHIC ASPECT OF PUBESCENT OAK STANDS

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Keywords: *pubescens oak, ecological-edaphic aspect*

Pubescent oak is known as the Mediterranean and sub-Mediterranean species, thermophile, xerophyte and helophyte. According to investigations, the object of study is formations pubescent oak, located within the natural range, was founded that this species is very resistant to the influence of hot temperatures and prolonged summer droughts. According to the views of other researchers [5] pubescent oak is considered as edifying (probative) of dry regions, because they possess a high resistance to drought.

According to researchers of P. Cuza [2], pubescent oak comparing to other species of the genus Quercus, with naturally growing in our country it is considered the termotolerance species, followed by pedunculate oak and then sessile oak.

Instead, according to others studies [3] it is proved that pubescent oak would be very sensitive to frosts, which can be explained by the presence of radial cracks [1]. Thus, for this reason explains that pubescent oak occupy upper and medium sunny slopes, where temperatures are higher from the lower slopes.

Ecological-edaphic aspect from researchers of authors [6,7], the pubescent oak, within its natural range, behaves differently (heterogeneous). It is noteworthy that the author, conducting an analysis of the ecological- edaphical characteristics for stand of pubescent oak und have separated these stands in two eco-taxonomic groups: arid - very dry ecotypes, dry or wet ecotypes. For the first time, wet - ecotypes were identified only in the Caucasus, although in the absence of human pressure, them existence is possible in mountainous areas of the Crimea. Geomorphology, geology and type of soil combined with complex environmental factors - temperature, light, humidity, etc., play a decisive role in the process input during the growing oak pubescent. Pubescent oak grows on the levigated, neutral, heavier and drier chernozems. Pubescent oak appears insular and sometimes in the hillside in pure stand of sessile oak, strong sunny slopes with dry soils formed on calcareous marl substrates, which provide the heat necessary.

It is however noteworthy that pubescent oak appears in azonal forest area, rising to 700 m altitude on the sunny slopes, in which the islands true steppes. They are less productive forests with low prevalence and a low potential for regeneration germination.

From an ecological necessary we can notice that the most diverse spectrum of natural conditions vegetation of downy oak is found in Crimea and Caucasus mountains. Typological structure of oak forests here is the most extensive and complex.

In natural areas, within the limits of ecological niches, more pronounced differences can be seen in terms of climate. Pubescent oak inhabits humid environments favorable to the driest and dry, which has practically no competition with tall oaks and evergreen oak. Only during the transitional period in a humid environment, can coexist pubescent oak mixed with tall oaks and evergreen oak.

Natural downy oak stands in Moldova are spread steppe hilly, very dry soils, dry and wet in the influence area of Bugeac and Balti. As is known, steppes are characterized by dry air masses and insufficient amounts of precipitation. Location on planting basins and in the upper parts of the slopes, create more difficult conditions for growth and natural regeneration from seed.

In subaride regions pubescent oak form sustainable stands [7], where rainfall is low and the drought period is long.

Local extreme drought and vast are recorded more frequently in southern Moldova. Global atmospheric processes induce devastating droughts and usually they occupy practically the entire territory, maintaining a long time. [4]

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THE BEAUTIFULLY-FRUCTTING WOODY PLANTSON THE LANDSCAPES OF THE "ALEXANDRIA" ARBORETUM OF THE NAS OF THE UKRAINE

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Keywords*: deciduous, ornamental, plants fruit, color*

The "Alexandria" State Arboretum of the NAS of the Ukraine is one of the oldest parks of the Ukraine. The earls Branitskies, who are the founders of the park, had been planting plants with a variety of decorative features, since the beginning of the park creation. At present a collection of woody plants of the "Alexandria" Park consists of more than 2,632 taxa [1]. At the creating of highly decorative landscape compositions, along with such important decorative features as the size, shape and architectonics of the crown, the size, shape and color of the leaves, the most important features are the size, and especially the color. There are more than 250 woody deciduous species with brightly colored fruits in the collection of the "Alexandria" park, which is almost 10% of the total number of taxa.

Table 1. The colorvariety of fruits of woody plants in the collection of the "Alexandria" Park

Fruit color	Name of the plant
White	*Cotinus coggygria* Scop., *Symphoricarpos albus* (L.) Blake
Bluish, blue	*Amelanchier spicata* (Lam.) C. Koch, *Lonicera caerulea* L., *Vitis amurensis* Rupr., *Mahonia aquifolium* (Pursch.) Nutt., *Ribes dikusha* Fisch.ex Turcz., *Ribes nevadense* Kellogg, *Ribes sanguineum* Pursh, *Ribes saxatile* Pall.
Brown	*Gleditsia caspica* Desf., *Corylus colurna* L., *Aesculus hippocastanum* L., *Sorbus torminalis* (L.) Crantz, *Celtis occidentalis* L., *Acer pseudoplatanus* L., *Colutea arborescens* L., *Fagus sylvatica* L., *Quercus imbricaria* Michx.
Black	*Rhamnus davurica* Pall., *Aronia melanocarpa* (Michx.) Elliott, *Cotoneaster lucidus* Schlecht., *Crataegus pentagyna* Waldst. et Kit., *Padus maackii* (Rupr.) Kom., *Juglans nigra* L., *Ribes nigrum* L., *Ribes americanum* Mill., *Ribes fragrans* Pall.
Green	*Actinidia arguta* (Sieb. et Zucc.) Planch., *Liriodendron tulipifera* L., *Maclura pomifera* (Rafin.) Schneid., *Fraxinus ornus* L., *Staphylea pinnata* L.
Red	*Rhus typhina* L., *Berberis amurensis* Maxim., *Lonicera periclymenum* L., *Cornus mas* L., *Cerasus fruticosa* (Pall.) G. Woron., *Cotoneaster dammeri* Schneid., *Rosa multiflora* Thunb., *Sambucus racemosa* L., *Ribes alpinum* L., *Ribes rubrum* L., *Ribes glandulosum* Grauer, *Ribes komarovii* Pojark., *Ribes mandchuricum* (Maxim.) Kom., *Ribes spicatum* Robson, *Ribes tenue* Jancz.
Yellow	*Chaenomeles maulei* (Mast.) C. K. Schneid., *Crataegus pojarkoviae* Kos., *Prunus divaricata* Ledeb., *Platanus* x *acerifolia* (Ait.) Willd.
Orange	*Lonicera caprifolium* L., *Hippophae rhamnoides* L., *Pyracantha coccinea* (L.) V. Roem., *Magnolia* x *soulangiana* Soul.-Bod.
Two-color	*Celastrus paniculata* Willd., *Gleditsia sinensis* Lam., *Euonymus verrucosa* Scop.

As shown in a Table 1, in the "Alexandria" Park are dominated woody species with bright color of fruits (red, orange, yellow) that contrast noticeably among the green foliage and branches which facilitates the spreading and reproduction of plants, thereby ensuring a continuity and a stability of all biogeocoenoses of the arboretum.

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FLORISTIC FINDINGS IN STEPPE GRASSLAND IN THE VICINITY OF CÎZLAR VILLAGE (DISTRICT LEOVA, REPUBLIC OF MOLDOVA)

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Keywords: flora, steppe habitat, threatened plant species, protected areas

The dry grassland habitats in Republic of Moldova is located within the boundaries of the Ponto-Sarmatic steppes – *62C0 [3], belonging to the Steppic Biogeographical Region of the European continent [2] which has only a small foothold in the European Union, but it develops into a vast band of vegetation that stretches out from the eastern parts of Romania and incorporates the entire region known as Dobrogea over southern parts of Republic of Moldova, Ukraine, Russia and western Kazakhstan.

The study is conducted during 2015-2016. The collected material of plant species is deposited in the Herbarium of the Botanical Garden (Institute) of Academy of Sciences of Moldova. The designation of Habitat types was made according to NATURA 2000 on the basis of scientific criteria defined in Annex III of the Directive [3].

The estimation of the threat status of the species for the territory of R. Moldova is made according to the IUCN Red List Categories and Criteria (2001, 2003) [4, 5].

This study comes to bring awareness and scientific arguments in favor of valuable grassland site "Cîzlar" in order to confer the status of State natural protected area. The site is situated in the southern part of village Cîzlar, Leova district, mean coordinates: N 46°39'7.62"; E 28°32'28.91". The estimated surface of the site is circa 198.3 hectares.

As a result of field investigations the high vascular flora comprises 209 wild spontaneous growing species, belonging to 131 genera and 44 families. The rare floristic component of the vegetal communities of the site is represented by a list of rare and threatened with extinction species, included in the several red lists (including the lists of adjacent territories) – 20 rare taxa are protected by the state in the Republic of Moldova [6]; 14 species included in the Red Book of Romania [1]; 16 species are included in the Red Book of Ukraine [7].

Seven rarest and the most threatened species are included in the Red Book of the Republic of Moldova [8]: 3 species categories Endangered (EN) – *Stipa dasyphylla* (Lindem.) Trautv., *Crambe tataria* Sebeok, *Colchicum arenarium* Waldst. et Kit. and 4 species of category Vulnerable (VU) – *Bellevalia sarmatica* (Georgi) Woronow, *Astragalus dasyanthus* Pall., *Adonis wolgensis* Stev. and *Nepeta parviflora* Bieb.

In addition, there were registered three species of Community interest – *Echium russicum* J. F. Gmel., *Crambe tataria* Sebeok şi *Colchicum arenarium* Waldst. et Kit. These species are listed in the Annex II of the Council Directive 92/43/CEE on the conservation of natural habitats and of wild fauna and flora whose conservation requires the designation of Special Areas of Conservation [3].

An analysis of the geographical distribution of species found on the site showed that 21 species are growing in the region at the limits of their natural distribution areas.

On the basis of estimated conservation status according to IUCN Red List Categories and Criteria [4, 5] we propose *Rosa inodora* Fries [CR B2ab (ii, ii); D] to be included in the next edition of the Red Book of the Republic of Moldova and in the List of Vascular Plants protected by national law.

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RARE VASCULAR FLORA OF DNIESTER RIVER BASIN IN REPUBLIC OF MOLDOVA

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Keywords: flora, threatened plant species, Republic of Moldova

Currently in Moldova there were identified over 1800 species of vascular plants, 224 of which are protected by law and 165 are included in the Red Book of Republic of Moldova (3rd edition) [3, 4, 5]. As a result of severe water level fluctuations in the Dniester River (currently present and expected after the construction of hydroelectric power dambs upstream in Ukraine), all natural habitats in the basin Dniester will have to suffer. In this context considerable decline is expected, but in some cases total disappearance of certain endangered species, represented by the only or very few populations.

The analysis of localization and the population state of rare vascular species with a high threat categories in the Dniester River basin revealed a number of more than 100 vascular plant species, included in the Red Book of Moldova, namely 37 species of Critically endangered (CR) – *Scorzonera austriaca* Willd., *Gymnospermium odessanum* (DC.) Takht., *Dianthus polymorphus* Bieb., *Eremogone biebersteinii* (Schlecht.) Holub, *Paronychia cephalotes* (Bieb.) Bess., *Silene italica* (L.) Pers., *Astragalus pubiflorus* DC., *Medicago rigidula* (L.) All., *Erodium ciconium* (L.) L`Her. *Hypericum montanum* L., *Melittis sarmatica* Klok., *Scutellaria supina* L., *Thymus calcareus* Klok. et Des. -Schost., *Monotropa hypopitys* L., *Pulsatilla patens* (L.) Mill., *Thalictrum foetidum* L., *Pyrus elaeagnifolia* Pall., *Saxifraga tridactylites* L., *Pedicularis kaufmannii* Pinzg., *Trapa natans* L., *Valeriana tuberosa* L., *Allium montanum* F. W. Schmidt, *Sternbergia colchiciflora* Waldst. et Kit., *Maianthemum bifolium* (L.) F. W. Schmidt, *Carex rhizina* Blytt ex Lindb., *Scirpus supinus* L., *Stratiotes aloides* L., *Bulbocodium versicolor* (Ker-Gawl.) Spreng., *Colchicum triphyllum* G.Kunze, *Epipactis purpurata* Smith, *Gymnocarpium dryopteris* (L.) Newm., *Gymnocarpium robertianum* (Hoff.) Newm. and *Ophioglossum vulgatum* L., 34 Endangered species (EN) – *Pimpinella titanophila* Woronow, *Alnus glutinosa* (L.) Gaertn., *Crambe tataria* Sebeok, *Silene supina* Bieb., *Convolvulus lineatus* L., *Sempervivum ruthenicum* (Koch) Schnittsp. et Lehm., *Astragalus pastellianus* Pollini, *Lembotropis nigricans* (L.) Griseb., *Linum linearifolium* (Lindem.) Jav., *Nymphaea alba* L., *Chamaenerion dodonaei* (Vill.) Kost., *Aconitum lasiostomum* Reichenb., *Caltha palustris* L., *Pulsatilla grandis* Wend., *Cotoneaster melanocarpus* Fisch. ex Blytt, *Potentilla astracanica* Jacq., *Rosa frutetorum* Bess., *Rosa pygmea* Bieb., *Sorbus domestica* L., *Vitis sylvestris* C.C.Gmel., *Cyperus glaber* L., *Ornithogalum boucheanum* (Kunth) Aschers., *Ornithogalum flavescens* Lam., *Ornithogalum oreoides* Zahar., *Iris pontica* Zapal., *Gagea ucrainica* Klok., *Colchicum arenarium* Waldst. et Kit., *Stipa dasyphylla* (Lindem.) Trautv., *Stipa tirsa* Stev., *Phyllitis scolopendrium* (L.) Newm., *Dryopteris caucasica* (A. Br.) Fraser-Jenkins et Corley, *Polystichum aculeatum* (L.) Roth, *Thelypteris palustris* Schott, *Salvinia natans* (L.) All., and 30 Vulnerable species (VU), which will experience a worsening condition as a result of construction of hydroelectric power dambs. Two species of Community interest – *Crambe tataria* Sebeok and *Colchicum arenarium* Waldst. et Kit. were registered in the Dniester river basin. [1, 2]

Within the Dniester river basin, some threatened with extinction mesophilous species will disappear but the range of plants is very likely to expand northward and invasive species will find a better habitat in which to grow. The northern regions for example, could in principle gain many species from the south, leading to a high species turnover. [6]

The xerophilous biodiversity (ecosystems) are also vulnerable and predicted to suffer from water scarcity and heat stress because of temperatures above the heat comfort zone. This is expected to result in an increased frequency of forest mortality events, which will affect forest diversity.

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THE ANTHROPOGENIC PRESSURE ON THE DIVERSITY OF SPECIES OF THE FAMILY AMARYLLIDACEAE

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Keywords: *anthropogenic pressure, Fam. Amaryllidaceae, pollution.*

The current state of the flora depends on human activity, which affects the environment: deforestation, global warming caused by greenhouse gasses such as carbon dioxide, pollution etc.

The presence of local anthropogenic landscape changes and sources of pollution are stressful for natural habitats. The number of species characteristic of natural habitats (*Galanthus nivalis, Galanthus plicatus, Leucojum aestivum, Sternbergia colchiciflora*) decreases from year to year under the influence of environmental factors and anthropogenic pressure.

The Republic of Moldova faces numerous problems in biodiversity conservation, a process that leads to the extinction of some species and makes others critically endangered and vulnerable. The exploitation of natural resources is often irrational and the measures that have been adopted are not sufficient to conserve biodiversity. The current conditions (climate change, habitat fragmentation, pollution, extinction of species etc.) and the limited institutional capacities require a more realistic approach to the role of biodiversity in the national economy and a boost to the biodiversity protection processes.

The violation of environmental legislation and/or its disregard is a widespread phenomenon in society. The species of the family *Amaryllidaceae* are threatened because of they are collected for decorative, medicinal purposes and for sale. In some natural areas protected by the state, the situation is worsening because of the infringement of the protection regime, the gaps in the legal and institutional framework, the insufficient implementation of the legislation on management plans, the cadastre of natural areas protected by the state, vegetal and animal kingdom, as well as the national ecological network. Besides, the laws on land delimitation, construction in green areas, protection of forests and collection of wild plants are often violated [2].

There is no doubt that a good state of biodiversity would help solving numerous socio-economical problems (such as poverty alleviation, well-being and health improvement, supply with necessary products) and maintaining the ecological balance. Economic and industrial activities and national investment programs largely ignore the potential impact on biodiversity and the need for its sustainable conservation. Financial losses can be high if biodiversity conservation is not taken into account.

An important aspect of the process of increasing the productive capacity of forests is ensuring their protection and integrity. The measures taken by the competent authorities to stop the considerable losses caused by illegal logging are still insufficient. The implementation of certain activities (forest certification, strengthening the institutional capacity for management and control, the creation of alternative forest plantations on degraded lands, promoting native species, sustainable forest management) could reduce the pressure on biodiversity.

The consolidation and expansion of land for agricultural purposes and for construction exerts considerable pressure on natural habitats. Thus, the natural biological diversity is undermined by habitat loss. The development of an action plan for the conservation of rare, vulnerable and endangered species may help improve the situation [1].

The biological resources of the Republic of Moldova are limited and the official statistics show a higher consumption of products of biological origin in comparison with other countries. The genetic potential of national biodiversity differs greatly from its availability for use, which determines a state of an even greater vulnerability of the components of biodiversity.

The anthropogenic impact has negative consequences and threatens the rare plant species of the family *Amaryllidaceae* and the functionality of natural ecosystems.

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STUDY OF ENDANGERED SPECIES RHODODENDRON IN GEORGIA

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***Keywords**: Rhododendron ungernii, Rh. Smirnowii, Biodiversity indicator, Conservation*

The forests of Georgia are rich by genetically important species. The Adjarian Colchic forests are especially interesting in this aspect, because many endemic and relict species are spread there.

Rhododendron grows in the Colhic subforest of Georgia, which is presented by 5 species: *Rhododendron ungernii* Trautv, *Rh. ponticum* L., *Rh. smirnowii* Trautv., *Rh. caucasicum* Pall., *Rh. luteum* Sweet. Our object research were two endangered species of Rhododendron: *Rh. ungernii* Trautv. and *Rh. Smirnowii* Trautv.

The purpose of research was study of current condition, detail inventory of the above mentioned two species and development of conservative measures.

Rh. ungernii Trautv. is endemic species of south Colchic which is wildly spread only in Adjara floristic region, in Guria and Artvini regions (Turkey) 600-1900 m. *Rh. Smirnowii* Trautv. is endemic species of Adjara-Chaneti districtwildly spread only in Adjarian floristic district of Georgia and on small areas of Artvini region (800-1700 m). The both species are of Tertiary period which are enlisted in the Red List of Georgia.

On the research areas are defined diversity indices Shannon's and biodiversity indicator according to Simpson's Diversity index, density of research species, their resilience and a map of spreading. Studies have shown that the area of *Rh. ungernii* Trautv. is narrow and fragmented, propagation by seeds is restricted and classified as a vulnerable species. The spreading area of *Rh. smirnowii* Trautv. is comparatively narrow and can be found on Koslitavi mountain of Keda municipality. The condition of these species according to IUCN categories is relevant - endangered (EN). For the purpose of species conservation seeds were processed and saved in the seed bank.

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THE PECULIARITIES OF ECOLOGICAL RECONSTRUCTION IN PARTIAL DERIVATIVE STANDS

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"Codrii" Reserve

Keywords*: forest stand, partial derivative, ecological reconstruction, progressive cutting treatment.*

The territory covered by forests from „Codrii" Reserve constitutes 5040.7 ha, of which 1718.5 ha are inadequate stands requiring the ecological reconstruction work. From this surface the partially derivative stands records 450.7 ha.

The structurally degraded stands do not meet satisfactorily the assigned protection functions and provides a low quality of wood, thus requiring ecological reconstruction methods. The correct establishing of methods and procedures of ecological reconstruction of stands is the basis of successful and effectiveness of each intervention and the whole work.

In the specialized literature the derivative stands (total and partial) of forest fund from Republic of Moldova they are substituted by clearcutting, with alternate and adjacent strips.

According to the law no. 1538-XIII of 25.02.1998 concerning the Natural Areas Fund protected by state, the derived stands from the reserves are covered with ecological restoration works aimed their regenerating in direction of fundamental ecosystems, but the clearcutting are forbidden. In the specialized literature is lacking the technique and methods to achieve the ecological reconstruction in the reserve.

From the partially derivative stands in 2012 were selected 4 plots (3B, 12G, 14K, 54M) where they delimited the parquets to beginning the ecological reconstruction works.

In these parquets was performed the inventory of forest vegetation, determined the actual composition of stand, the type of station and forest, specified the soil type and target composition to determine compliance with data from Forest Management and was applied the progressive cutting treatment for each parquets.

As a result of the partial application of ecological reconstruction work through the progressive cutting treatment in the partially derivative stands have highlighted the following peculiarities:

- The partially derivative stands with 2-4 units of main species are conducted with ecological reconstruction work through applying the progressive cutting treatment.
- The initiation of ecological reconstruction work through the progressive cutting treatment is conditional on fructification of main species.
- The first intervention of the cutting of implementing in light applies to 1-3 years after the opening of gaps.
- The open gaps around oak trees are naturally regenerated but the remaining surface of the unregenerate parquet - by sowing non-uniform of the acorns.
- On applying the progressive cutting treatment in the open gaps the trees are selectively extracted around the trees of the main species, the size of gaps varies according to the crown diameter, but does not exceed one height of tree.

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CONDITIONS OF FORESTS VEGETATION IN THE FOREST DISTRICT STRĂȘENI

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Keywords: forest resort, forest types, soil types, hidrological conditions, climatic conditions

The study of vegetation conditions leads us to a better understanding of the potential offered by the forest resort and consequently to the natural selection of the species during the regeneration process.

Strășeni district through its location offers a wide range of environmental and vegetative conditions.

Geomorphological, the territory, where is placed the forest of the District Strășeni, is located on the Central Moldavian Plateau, and Codri forest region**.** This area is characterized by its high hills and slopes.

We see that predominantly lies the slope followed by the plateau.

The land has an extremely flat configuration but there is no missing the uniformly land.

78% of the total area or 3402,2 ha, are in slope (16g) and 22% in (16 g – 30 g).

According to the land exhibition the sunny slope represents 46%, the partly sunny represents 33%, and 21% has a shaded exhibition.

The lithological substrate is formed from mud clays and clay, and the geological structure is variable and non-uniform.

The volume of water reaches maximum level in the spring and after the rains during vegetations period but in summer when the rainfall is less than normal the rivers declines. The main rivers crossing the territory inside or near forests are r. Işnovăț and r. Cojușna in which other rivers are overflowing.

The forest vegetation is influenced by the hydrological regime where water represents, in all cases, an important factor, either by the lack of it in higher areas, either by the excess on the valleys where the water reaches its maximum level after rain or snow melt. From the climactic point of view, the territory of the Strășeni forest distict is assign to the continental moderate climate.

The temperature and precipitation indices are characterized by the following values: the temperature annual average + 9,1°C; - the average annual amounts of precipitation 530 mm. Prevailing winds are winds that blow predominantly from North-West and West; -maximum temperatures exceed + 40°C, and descending below minimum -25 -30°C.

The elevation, the landforms and the exhibition of the territory are important factors that determine the developpement of vegetation.

The average temperature in january is 4,2°C, and the hottest month of all.-July 19,7°C.

Durind 9 months (250-270 days) we have positive temperatures and negative-3 months(90-100 days). Maximum temperatures exceed +40C there have been in July and the absolute minimum-30°C has occurred in January.

The climate is favorable for the development of main species as oak and mixed oak with hornbeam, lime, ash, and other species. On degraded lands grow up acacia, gleditsia, and other species.

We realise that the temperatures continue a long-term warming trend.

Identified and described soils are: gray forest soils (97%), unpolluted soils (3%).

Identified resorts are: superior reliability – 42%; middle reliability – 52% and lower reliability – 6%. The same situation exists in the forest types productivity.

Analysing the productive potential of the forest stations and the real, achieved productivity we conclude that forest stands use maximum vegetation conditions. Some of the resorts are not used to their real capacity.

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THE BLACKBERRY: PHYTOCHEMICAL COMPOSITION OF PLANT PARTS AND ANTIOXIDANT ACTIVITY

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Keywords: *Rubus fruticosus* L., leaves, fruits, antioxidants

Introduction. The about 5 meters' height perennial shrub, with thorny stems, clusters of hairy leaves and well-known fleshy black fruits, called blackberries, *Rubus fruticosus* L. is naturalized throughout most of the world, including Oceania, and northern Africa and has been extensively used in herbal medicine from time immemorial. The root that contains saponins and tannins has been used to treat diarrhea, the bush abundant in chlorogenic acid and flavonoidic heterosydes to treat whooping cough, the juice full of anthocyanins has been recommended for colitis and the blackberry leaves rich in fruits acid, flavonoids, and phenols have been chewed for toothache. Taking into consideration that 100 gram of blackberries supplies only 43 calories and till 5 grams of dietary fiber (25% of the recommended Daily Value), as well as their high nutritional contents of vitamin C, vitamin K, and manganese, gastronomy wisely profits from their attractiveness, incorporating blackberries in jams, seedless jellies, syrups, wines, and liqueurs. The purpose of this research paper was to investigate the comparative phytochemical characteristics and antioxidant activity of different plant parts during their development (immature, intermediate, and ripened stages) in selected cultivars and wild blackberries.

Materials and methods. Blackberry leaves, stems, buds, flowers and aggregate fruits, were harvested in the village Teleșeu, district Orhei in 2016. The total anthocyanin and flavonoid contents were set out spectrophometrically [1]; the content of tannins was established by colorful reaction with phosphomolybdic reagent [2]; separate groups of flavonoids and hydroxycinnamic acids were assayed by means of HPLC method. Antioxidant activity of extracts was ascertained by redox derivative potentiometric titration with electrogenerated chlorine.

Results. The content of chlorogenic acid in unripe fruits varied between 1.27 for Thorn free cultivar, and 2.36 mg/100 g fresh weight (FW) for wild blackberries fruits. The leaders concerning this index are all leaves, so the gold goes to Arapaho of first year stems during fructification with 9.20, silver is for Thorn free, in similar evolution stage, with 6.82 and the top three is closed by 6.40 mg/g of wild blackberry leaves. The sum of flavonoidic heterosydes, expressed in robinin, marks out the highest values also for leaves: wild blackberry 24.9, Thorn free 19.2, and Arapaho leaves 18.7 mg/g both of first year stems during fructification, and 0.904 for Thorn free unripe fruits versus 4.12 mg/100 g for wild species, the same parameter, expressed in luteolin-7-O-glucoside equivalent, for unripe fruits constitutes 0.009 for Thorn free variety and 0.041 mg/100 g FW for wild blackberry, the indisputable record belongs to wild blackberry leaves – 3.34 mg/g. The total phenolic content, in terms of (-)-epicatequine equivalent, ranges from 61.7 to 76.1 mg/g for unripe fruits of Thorn free and 34.5 mg/g for the ripe one and is limited between 43.6 for unripe fruits to 25.8 mg/g for the ripe cultivar Arapaho. Regarding the leaves, were obtained 112.4 mg/g for first year Arapaho stems, 91.4 for Thorn free stems in the same condition, and last but not least 67.4 for wild thorny Codru blackberry. Unripe fruits of Arapaho contain 37.5 mg/g of tannins, followed by Thorn free with 64.0 mg/g and the head is unripe wild blackberry fruits – 89.5 mg/g, also a high performance was given by second year Thorn free buds and flowers - 85.4. Total anthocyanin content, expressed in cyanidin-3-glucoside equivalents, rises and falls in limits of 0.594 for Thorn free and 0.921 mg/100 g dried weight for Arapaho fruits. The estimated percentage of polyphenols in dry weight is 15 and 24 % in leaves and in the midst of 2.5-2.9 % in fruits; respectively the antioxidant capacity represents 30 mkMol GAE/g for fruits and 910 mkM GAE/g for leaves.

Conclusions. The antioxidant activity of leaf extracts was found 30 times higher than those of fruit extracts. Obtained results showed correlation between the content of total phenols and exhibited antioxidant activity. The leaves and fruits of both wild and *R. fruticosus* L. cultivars (Thorn free, Arapaho) can be taken in further consideration as a plant source for extraction of phenolic compounds with promising antioxidant activity.

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CRUPINA VULGARIS CASS. (*ASTERACEAE*) IN THE FLORA OF THE REPUBLIC OF MOLDOVA

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Keywords: *flora of the Republic of Moldova, Crupina vulgaris, Asteraceae*

The genus *Crupina* (Pers.) Cass. includes 2 species, widespread in South and South-East Europe, the southern part of Central Asia and North Africa, Southwest Asia [8]. In the wild flora of the Republic of Moldova, the genus *Crupina* (Pers.) Cass. is represented by a single species – *Crupina vulgaris* Cass., a rare species in the studied territory.

In the Republic of Moldova, it has been found in the extreme south, on the steep slopes of Prut River bank and hills with steppe vegetation, near the communes Giurgiulești, Câșlița-Prut, Slobozia Mare, Vadul-lui-Isac and Manta, district Cahul, in the steppe sectors near the villages Ciumai and Dermenji, district Taraclia, as well as in the glades with steppe vegetation from the *Quercus pubescens* Willd. stands near the commune Copanca, district Căușeni. Abroad, it is widespread in South-East Europe, the Mediterranean region, Asia Minor and the Caucasus.

Crupina vulgaris is an annual plant, grows as a component of herbaceous phytocoenoses, dominated by gramineae, and is found solitarily or in small groups of 2-4 plants. It flowers in May-June; the fruits ripen in June-July. It reproduces by seed. It is a xeromesophilous, oligotrophic species. It is a Pontic-Mediterranean element [1].

In Europe and in the neighbouring countries of the Republic of Moldova: Ukraine and Romania, *Crupina vulgaris* is more common. In the local flora, however, analyzing the bibliographic data and the herbaria, we have found that this taxon was noted and classified as a rare species [6, 7]. In the last two decades, it has been included in the List of Rare Species of the Wild Flora of the Republic of Moldova [5] and in the Preliminary Red List of Vascular Plants of the Flora of the Republic of Moldova [2].

During the field research, carried out in 2011-2016, it was found that this species formed very poor populations with a small number of plants, and in some areas, it survived only due to the limited access of people. This species is endangered because of the degradation of steppe sectors, the reduction of habitat area, the limited distribution of the species and the mowing before fruit ripening.

The risk of extinction of this species has been assessed in accordance with the criteria developed by the International Union for Conservation of Nature [3, 4]. Thus, *Crupina vulgaris* has been included in the category endangered species [EN]. The conservation of this species makes it necessary to take some measures, such as: its inclusion in the List of Species Protected by the State, monitoring of the populations, as well as the protection of the areas where the species grows, the determination and protection of new areas where it may spread, the *ex-situ* conservation and propagation of plants and their return to natural habitats.

The first attempts to cultivate and propagate this species in the *ex-situ* conditions, in the Botanical Garden of ASM, have demonstrated that *Crupina vulgaris* grows and develops well in artificial conditions, goes through all the ontogenetic stages, has a more vigorous habit than *in-situ*. The seeds are viable for many years, the germination rate of 4-year-old seeds is 86% and of 7-year-old seeds – 20%.

The need for a detailed research on the bio-ecological features and the propagation of the species *Crupina vulgaris* and the changes in the population dynamics is still relevant, in order to elucidate the real factors that limit the propagation of the species and the expansion of the populations in natural habitats.

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SPECIES OF *GENTIANA* L. (*GENTIANACEAE* JUSS.) FOR THE FLORA OF BESSARABIA

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Keywords: *Gentiana, Bessarabia, synonymy, bioecology, chorology*

The genus *Gentiana* L. includes about 250 species, occurring mainly in the temperate regions of the Earth, except Africa [5]. In the Republic of Moldova, there is only one species of this genus – *Gentiana cruciata* L., a rare taxon, included in the List of Rare Plants of the Wild Flora of this region [2, 3]. Species is included in the European IUCN Red List of Threatened Species with the category Least Concern [1]. The plants of the genus *Gentiana* are very demanding to the soil trophicity, and the biology of reproduction is very complicated. Most species need mycorrhizas and this fact makes propagation even more complicated outside their wild habitat [6]. The plants of the genus *Gentiana* are highly appreciated, because they include medicinal and ornamental species, which can be successfully used in landscaping.

As a result of the research on the genus *Gentiana* L. (critical analysis of the exsiccatae from the Herbarium of the Botanical Garden (I) of the ASM and of the Museum of Natural Sciences of Moldova State University, study of published scientific papers, floristic field research), in the flora of Bessarabia, two species have been highlighted: *Gentiana cruciata* L and *G. pneumonánthe* L.

The key for the determination of species

1a. Plants with rosette of basal leaves. Calyx with triangular laciniae, 3-4 times shorter than the tube ..... **1. *G. cruciata*.**

1b. Plants without rosette of basal leaves. Calyx with linear-lanceolate laciniae, ± equal to the length of the tube ..... **2. *G. pneumonánthe*.**

1. ***G. cruciata*** L. 1753, Sp. Pl.: 231; Гроссгейм, 1952, Фл. СССР, 18: 568; Ţopa, 1961, Fl. R. P. Române, 8: 439; Tutin, 1972, Fl. Europ. 3: 61; Цвелев, 1978, Фл. евр. части СССР, 3: 69; Гейдеман, 1986, Опред. высш. раст. МССР, изд. 3: 421; Чопик, 1999, Опред. высш. раст. Укр., изд. 2: 258; Negru, 2007, Determ. pl. fl. R. Moldova: 187; Ciocârlan, 2009, Fl. ilustr. a României: 602. – **Star Gentian** or **Cross Gentian**.

Perennial plant. Eurasian element. Flowers and produces fruits in July-August (sometimes in September). Grows in woodland edges and glades, thickets, meadows. Grows in groups by 2-4 plants. Rare species, found mainly in the north of Bessarabia. The specific spreading area of the species includes the Caucasus, Western Siberia, the northwestern part of Central Asia, Asia Minor, the Atlantic, Central and Eastern Europe and the Mediterranean region. It is a medicinal, essential oil bearing and ornamental plant.

2. ***G. pneumonánthe*** L. 1753, Sp. Pl.: 228; Гроссгейм, 1952, Фл. СССР, 18: 547; Ţopa, 1961, Fl. R. P. Române, 8: 464; Tutin, 1972, Fl. Europ. 3: 61; Цвелев, 1978, Фл. евр. части СССР, 3: 70; Чопик, 1999, Опред. высш. раст. Укр., изд. 2: 258; Ciocârlan, 2009, Fl. ilustr. a României: 603. – **Marsh Gentian**.

Perennial plant. Eurasian element. Flowers and produces fruits in July-October. Grows in wetlands, lakeshores, river meadows, woodland edges and thickets. Rare species, indicated for the north of Bessarabia, near the village Suliţa Nouă [4]. The spreading area of the species includes Europe, the Scandinavian Peninsula, the Mediterranean region, Western and Eastern Siberia and the Caucasus.

Gentiana cruciata L. and *G. pneumonánthe* L. are rare species in the flora of Bessarabia, and the monitoring of their populations in the natural habitats should continue, to identify limiting factors, to assess the risk of becoming extinct and to develop recommendations for the conservation of these species.

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FLORA WILLOW (*SALIX* L.) IN UKRAINIAN CARPATHIANS

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Keywords: *Salix, willow, flora, Ukrainian Carpathians, alpine, subalpine and boreal species*

Genus willow (*Salix L.*) is one of the largest in the boreal flora of Ukraine and according to various sources, it comprises 24-25 species (Nazarov et al., 1952; Krichfalushiy, 1982; Skvortsov, 1999; Ishchuk, 2015). Genus Salix species, due to its plasticity, can change a tree form into bush one and vice versa depending on soil and climatic conditions. However, the number of willows is steadily declining as due to both high demand for raw materials and due to excessive anthropogenic impact on the riverine and highland ecosystems (Ishchuk, 2014a; 2014b).

We conducted the research on the genus Salix species chorology by routing methods in the Ukrainian Carpathians and by analyzing the literature and herbarium samples of the genus Salix species in the herbarium of the Institute of Botany of NAS of Ukraine (KW), Uzhgorod National University (UU), I. Franko L'viv National University (LW) and the State Natural History Museum of Ukraine (L'viv) (LWS). The nomenclature of the plant species is given in accordance with the A by S.M. Mosyakin and M.M. Fedoronchuk (Mosyakin, Fedoronchuk, 1999). When analyzing the genus Salix species chorology, we used floristic zoning by B. Chopyk and S. Mosyakin (2015), under which the following areas are isolated on territory of the Ukrainian Carpathians: the Carpathians, the Eastern Beskids and low meadows, Gorgans, Svydovets, Chornohora, Chyvchyno-Hrynyavski mountains Maramorosh Alps, Volcanic Carpathians, Transcarpathian foothills and Transcarpathian plains.

The last edition of the Red Book of Ukraine (2009) lists six species of the genus *Salix*, of which *S. alpina* Scop. is classified as endangered, *S. lapponum* L., *S. myrtilloides* L. and *S. starkeana* Willd. – vulnerable, and *S. herbacea* L., *S. retusa* L. are categorized as rare.

The analysis reveal that the natural flora of the Ukrainian Carpathians is represented by 22 species of the genus *Salix*: *S. alpina* Scop., *S. alba* L., *S. daphnoides* Vill., *S. aurita* L., *S. Kitaibeliana* Willd., *S. caprea* L., *S.* x *fragilis* L., *S. lapponum, S. eleagnos* Scop., *S. myrsinifolia* Salisb., *S. cinerea* L., *S. viminalis* L., *S. purpurea* L., *S. pentandra* L., *S. rhaetica* Anders., *S. rosmarinifolia* L., *S. silesiaca* Willd., *S. starkeana*, *S. herbacea, S. triandra* L., *S. retusa*, *S. myrtilloides*.

According to the literature in the Alps Marmarosh very rare *S. reticulata* L., and the array of Montenegro *S. hastata* L. (Krichfalushiy, 1982; Chopyk, Fedoronchuk, 2015). However, the evidence in the herbarium herbarium Herbarium of the Institute of Botany of NAS of Ukraine (KW), Uzhgorod National University (UU), L'viv National University. AND I. Frank (LW) and the State Natural History Museum of Ukraine (m. L'viv) (LWS) is not revealed, so we believe that these species are absent in the Ukrainian Carpathians.

Thus, based on the analysis of publications, herbarium specimens and their study route can be argued that the natural flora of the genus Salix in the Ukrainian Carpathians has 22 species. By alpine and subalpine florotsenotychnyh complexes timed six species *S. alpina, S. herbacea, S. retusa, S. Kitaibeliana, S. rhaetica, S. silesiaca*. Two types of *S. hastata* and *S. reticulata* raise doubts about their presence on the territory of Ukrainian Carpathians and their chorology need clarification. The most numerous boreal flora Salix element in the Carpathians, covering 16 species: *S. alba, S. x fragilis, S. pentandra, S. triandra, S. myrtilloides, S. myrsinifolia, S. caprea, S. cinerea, S. aurita, S. starkeana, S. viminalis, S. lapponum, S. daphnoides, S. rosmarinifolia, S. eleagnos, S. purpurea.* All boreal species belong to mezohihrofiti or hygrophytes. Also found that all types of subalpine and alpine zone and boreal *S. starkeana, S. lapponum* need protection.

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EUPHORBIA PROSTRATA AITON (*EUPHORBIACEAE*) – A NEW ALIEN IN THE FLORA OF REPUBLIC OF MOLDOVA

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Keywords: *Euphorbia prostrata* Aiton, new alien species, flora, Republic of Moldova

The genus *Euphorbia* L. subgenus *Chamaesyce* Pers. contains about 10 native or naturalized species in Europe. [2] Most of them are of American origin, while *E. humifusa* is native in Asia, *E. chamaesyce* and *E. peplis* are native in Africa and Eurasia. [4, 9] There are 3 representatives of this subgenus (*Euphorbia chamaesyce* L., *E. humifusa* Willd., *E. maculata* L.) have been registered in the Republic of Moldova up to now. *Euphorbia prostrata* Aiton occurs in different countries of South-Western Europe (along the Adriatic coasts [5, 8, 9, 11], some parts of Austria [3], Hungary [2] and Romania [1], it has only been recorded outside the territory of Eastern Europe. In the Republica of Moldova *Euphorbia prostrata* for the first time was registered in the fall of 2014 in the flower beds around shopping centers in Chișinau. Repeted collections were made in 2015-2016.

Euphorbia prostrata Aiton, Hort. Kew. 2: 139. 1789. – *Anisophyllum prostratum* (Aiton) Haw. Syn. Pl. Succ.: 163. 1812. – *Chamaesyce prostrata* (Aiton) Small, Fl. S.E. U.S. 713: 1333. 1903. – *Tithymalus prostratus* (Aiton) Samp., Anais Fac. Sci. Porto, 17: 45. 1931. – **Prostrate spurge.**

Herbs, annual, 15-19 cm tall. Root fibrous. Stems many from base, prostrate, usually light red or red, occasionally green or yellow-green, glabrous or sparsely pubescent. Leaves opposite; stipules long triangular, easily fallen; petiole very short or sessile; leaf blade elliptic to obovate, 3-8×2-5 mm, adaxially green, sometimes with light red or red abaxially, margin entire or irregularly finely serrulate, apex rounded. Cyathia single, axillary or few clustered, peduncle 2-3 mm; involucre turbinate, 1×1 mm, usually glabrous, sometimes with some pubescence, marginal lobes 5, triangular or rounded; glands 4, appendages white, extremely narrow. Male flowers many, usually shorter than cup. Female flower pedicellate, exserted from involucre; ovary sparsely pubescent on angles; styles nearly connate at base; stigma 2-lobed. Capsule 3-angular, 1.5×1.4 mm, smooth, glabrous except for white hairs along angles. Seeds ovoid-tetragonal, 0.9×0.5 mm, yellow, each side with 6 or 7 transverse furrows; caruncle absent. Flowers from July to September.

Euphorbia prostrata is similar to both *E. maculata* and *E. chamaesyce*, but it has hairy capsule, while the latter 2 species are capsule hairy all over.

It is native to the Caribbean and certain parts of South America. It is widely naturalized in many other parts of the world, where it can be found in varied habitat types and in many areas grows as a roadside, garden and village weed. In the tropical and subtropical regions, it often appears in agricultural fields, in parks and on man-made objects, such as roads, pavement fissures, walls. [2]

The appearance of prostrate spurge in the Republic of Moldova in the flower beds, squares and in the vicinity of garden centers, possibly as a result of human activity, confirms former observations that the species is in expansion in many parts of the world. [2, 6, 7, 10]

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CONSERVATION OF *POTENTILLA PORPHYRANTHA* JUZ. (*ROSACEAE*) IN ARMENIA

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Keywords: Armenia, rare species, Potentilla porphyrantha

Potentilla porphyrantha Juz. is a globally rare species, listed in the Red Book of plants of Armenia as Critically Endangered (Tamanyan et al., 2010). It is a small, very ornamental plant with pink petals with red-purple base and veins, growing on bare rock outcrops on mountain peaks and ridges around 3000 m above sea level. The core problem, which is form the subject of investigation for this project, is to quantify the amount of genetic diversity existing within and between populations of *Potentilla porphyrantha* Juz. (Rosaceae). There were 2 sub-populations of this species known in Armenia, and 1 population in Nakhitchevan and one – in Iran. In 2012 it was discovered that Amulsar Mountain supported the species, becoming new known sub-populations in Armenia and five globally. Amulsar Mountain will be a gold mining, and the work here should destroy a part of its population. To ensure that the Amulsar Mine's biodiversity mitigation strategy conforms with international standards and complies with national requirements, Lydian International Ltd ("Lydian") is supporting a research project to confirm the best approach for achieving a net gain in population size of *Potentilla porphyrantha* within a "reasonable timeframe". The "Potentilla Project" intends to generate the evidence and understanding needed to create suitable conditions for reinstatement of plants to the rehabilitated mine pits post-mining. The Project is being implemented through a partnership with the Institute of Botany of the National Academy of Sciences of the Republic of Armenia (IOB), the University of Cambridge Botanic Garden (UCBG) and Treweek Environmental Consultants (TEC). This project will run until 2020.

This program, based at the IOB has monitored plants translocated from Amulsar to Sevan and Yerevan Botanic Gardens since their arrival in October 2015. Survival rates have been good for translocated plants with very few dying (<20). 252 out of 768 plants flowered and set seed in the experimental glasshouse (32.8%). On experimental rockeries constructed outside at Sevan Botanic Garden, 134 out of 357 plants flowered and set seed (37.5%). At the same time monitoring plots were established on Amulsar Mountain to obtain information on ecology of plants "in situ", including parameters such as survival and growth rate. Four plots were set-up in 2013, two of which were lost in 2016 because of clearance so that mining could proceed. Two additional plots were set-up in 2014. The aim is to return the population to pre-mining levels and to have a sustainable population. Enough plants should be introduced to the mountain to allow this population to develop as naturally as possible after mine closure. Based on information available now, if 500 plants were introduced to start the process and the population grew with the annual rate of population increase, it would take 16 years for the population to return to its pre-mining size. Based on combined survey results, the known population on Amulsar is therefore at least 5,500 individuals and is estimated to be over 7,500. 1264 individuals were translocated to different climatic conditions to situated Yerevan and Sevan botanical gardens. In the Autumn 2015 1125 specimens were planted in Sevan botanical garden: 768 in greenhouse and 357 on two rockeries. In 2016 139 specimens were replaced from winter storage in Sevan Botanical garden to Yerevan Botanical garden.

Now we continue our investigations – caryological, palynological, morphological, physiological – on this species in different conditions.

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THE PERCENT OF THE FEMALE FLOWERS OF PEDUNCULATE OAK DEVELOP INTO MATURE ACORNS

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Keywords: *pedunculate oak, non-fecundated flower, aborted acorn, mature acorn*

An important role in natural regeneration of oaks forests plays the periodicity of fructification of these species. The frequency and fructifications abundance, vary with the species, the station conditions and forest stand as well as the vitality of the trees. The pedunculate oaks begin to fructify at the age of 40–50 in the open and at the age of 70–80 years in dense canopies [3]. In the open, they fructify nearly every year while in stands, seed years repeat every 3–8 years [1]. Although potential acorn production is genetically controlled, actual production depends on weather, site productivity, wildlife and insect activity, and individual tree characteristics.

The research of formation and development of pedunculate oak acorns during vegetation season was conducted in the pedunculate oak stands from "Codrii" Reserve. The study was conducted in two variants: variant control and variant flowers/acorns isolated [2]. The control variant is to install the baskets on the branches of pedunculate oak for the collection of flowers and acorns fallen during the vegetation season, but to the variant - flowers/acorns isolated were installed bags to collect the flowers and acorns fallen and protect them from carpophagous insects. When installing the baskets and bags were counted the flowers on each branch, then they were collected weekly the flowers/acorns fallen in the bags and baskets installed and the remained on branch. The collected material was analyzed in the laboratory.

The researches results showed that only 6.8% of the initial number of flowers became mature healthy acorns. The non-fecundated flowers represented 21%, but 65.2% felt down in the different stages of the acorns development. From the carpophagous insects, *Curculio glandum* was that attacked 7% of the initial number of flowers.

To the variant flowers/acorns isolated, the healthy mature acorns constitute 13.8% of the initial number of flowers. As for the non-fecundated flowers and aborted acorns by the plant, they accounted 26.5% and 59.7%.

Most of acorns were aborted by plant during the period from May to July, when the climate conditions, in particular the soil moisture was favorable (May – 24.14%, June – 23.1%, July – 18.38%).

Among the causes that conduct to decrease the acorn production, premature abscission is one of the most important, 59.7% - 65.2% of the initial percentage of flowers, although acorns were formed, they were aborted by the plant in different stages of development.

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REGIONAL LANDSCAPE PARK «HADIATSKYI» AS THE PRESERVATION AND PROTECTION CENTER OF PHYTODIVERSITY IN THE LEFT-BANK FOREST-STEPPE OF UKRAINE

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Keywords*: phytodiversity, rare species, protection, regional landscape park «Hadiatskyi», Poltava region.*

Currently, the natural-protected network of Poltava region has enriched natural protected sites, including the objects of multifunctional purpose, among which is the regional landscape park «Hadiatskyi» (RLP), established in 2011 in the area of 12 803 ha.

In natural attitude the park area is located within the left-bank forest-steppe. According to the physiographic zoning of Ukraine [4] the studied region is located in the physiographic region of Poltava elevated plain, which occupies most of the left bank Dnieper forest-steppe zone province of the forest-steppe of East European plain of physiographic country. According to geobotanical zoning of Ukraine [2] the Western part of the territory is located within Hadiach-Myrgorod geobotanical district of meadow steppes, oak forests, floodplain meadows and lowland eutrophic marshes and East part within Zinkiv-Reshetylivka geobotanical district of meadow steppes and floodplain meadows.

The geographical position of RLP «Hadiatskyi» results in significant diversity of plant communities and formation of varied vegetation with phytocomplexes that are adapted to such elements of the valley landscapes of the Psel river as: the right bank slopes, floodplains, pine-forest terraces, gullies and gully systems.

The general floristic list of vascular plants of the park amounts to 923 species belonging to 436 genera, 111 families and 5 departments, which are dominated by representatives of *Magnoliophyta* division (97,2%). Vascular spore-bearing and gymnosperm plants are represented by only 26 species (2,8%).

The important indicator of the natural ecosystems conservation state is the presence of rare species in flora composition. On the territory of RLP «Hadiatskyi» it was identified 114 species, representing 12,4% of the park flora and 53,0% of the total number of rare and endangered vascular plants of Poltava region [1]. The studied species belong to 85 genera and 45 families. According to the sozology value they represent the following categories: the species included in the European Red List of animals and plants threatened with extinction on a global scale (2; 1,8% of the total number of rare park flora); the species included in the Red List of the International Union for conservation of nature and natural resources (2; 1,8%); the species listed in the Red Data Book of Ukraine (31; 27,2%); the species represented in the Convention on the conservation of wild fauna and flora and natural environments in Europe, Annex 1 (5; 4,4%) and Convention on International Trade in Endangered Species of Wild Fauna and Flora threatened of extinction, Annex I and Annex II (3; 2,6% and 6; 5,3%); and regionaly rare that are protected in Poltava region (81; 71,1%) [5].

In the whole, the park area represents the following types of vegetation: forest (vegetation of deciduous forest – broadleaf and mixed forests; coniferous-forest – pine and mixed forests; swamp-forest – alder; marginal – light forests and forest edges; shrub –riparian shrub coenoses and weeds), steppe (meadow steppe), meadow (wet meadow – marshy meadows; true meadows – mesophilic meadows; dry meadow – steppe grasslands), wetland (eutrophic swamp;eumezotrophic swamp), psamophite (sand-steppe group of open sands or open dry sandy habitats of pine-forest terraces and wet-sandy alluvial sands of riverine flood plain), hydrophilic (coastal water; water), synanthropic (ruderal; segetal). They represent the left-bank forest-steppe natural region (the Northern part). The composition of the park vegetation represented 14 sintaxons that were rare both at the regional (7) and the national levels (listed in Green Book of Ukraine [3] – 7).

«Hadiatskyi» RLP is particular important as a key area of Psil ecocorridor of the regional ecological network, as a reference natural area of the middle Psel river reaches, namely natural bank of wildlife genepool and cenofond, the center of biodiversity.

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FLORISTIC AND PHYTOCENOTIC ASSESSMENT OF THE VEGETATION OF "VILA TELENEȘTI" FOREST PLOT IN THE PERSPECTIVE OF THE EXPANSION OF "VILA TELENEȘTI" NATURE RESERVE

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Keywords*: expansion of protected areas*

Currently, the "Vila Telenești" nature reserve includes a natural stand of sessile oak, lime and ash (5Go3Te1Fr1Dt) from parcel 50 (subparcel C), with the area of 56.2 ha, located on a southern slope with the altitude of 150-250 m, which descends to the large meadow of the left affluent of Cula River. The average age of sessile oak is 70 years. The floristic composition and the phytocenotic structure of this forest sector demonstrate the presence of a natural stand, characterized by stability in the development of all its components, as well as balance with the environmental factors. These characteristics are important because "Vila Telenești" lies at the north-eastern limit of the natural range of mesophyte Central-European forests and is marked by the mutual influence at the boundary with the Eurasian steppes [3, 4, 5, 6].

During several growing seasons, but mostly in the spring-summer of 2016, floristic and phytocenotic studies on the forests of "Vila Telenești" nature reserve and on "Vila Telenești" forest plot were carried out. In the protected natural area, the presence of 11 species of trees, 7 species of shrubs and 23 species of herbs was determined. The following rare plant species were found: *Sorbus torminalis* L., *Staphylea pinnata* L., *Asparagus thenuifolius* Lam. and *Nectaroscordum dioscorides* (Sibth. Smith) Stank. The associative character of this forest was highlighted by the association *Tilieto (tomentosae) - Fraxineto-Quercetum (petraea)* Gheideman et aut., 1964, with the sub-associations – *cornietosum* and *staphylietosum*. By studying the entire area with natural forests of "Vila Telenești" forest plot (parcels 32-59, area – 2571.9 ha), the presence of natural stands – 93.9%, artificial stands – 5.4% and sectors without forest vegetation – 0.7% was determined. Forest associations were located in the forest plot according to the slope attitude and exhibition. At the altitude of 100-250 m, there were phytocoenoses of the as. *Querco(roboris)-Carpinetum* Borza 1937 with sub-associations of mesoxerophytes – *carietosum, cornietosum, staphyleietosum, hederietosum*, and at the altitude over 250 m, there were phytocoenoses of the association *Tilieto(tomentosae)-Fraxineto-Quercetum petraea* Gheideman et aut., 1964 with the above-mentioned associations – *cornietosum* and *staphylietosum*, as well as those from higher altitudes – *carietosum, ursinietosum, brachypodietosum*. The presence of rare plant species was also determined – *Tulipa biebersteiniana* Schmit. et Schult fil., *Vinca minor* L., *Lunaria rediviva* L., *Staphylea pinnata* L., *Sorbus torminalis* L., *Dryopteris filix-mas* L., *Fritillaria montana* Hoppe, *Lilium martagon* L., *Leopoldia comosa* (L.) Parl., *Asparagus tenuifolius* Lam., *Epipactis helleborine* (L.) Crantz., *Neottia nidus-avis* (L.) Rich., *Aconitum anthora* L., *Anemone nemorosa* L., *Stachys sylvatica* L.[1, 2].

The floristic composition and the phytocoentic structure of "Vila Telenești" forest plot represent an integral forest ecosystem with ancient trees, rare plant species, natural forests that are in dynamic balance with environmental factors and it is possible to take it under state protection and to implement a monitoring regime. We have to mention that, by our own observations, as well as by the observations of the foresters, in the "Vila Telenești" forest plot, we found that oak (*Quercus robur* L.), small-leaved lime (*Tilia cordata* Mill.), hornbeam (*Carpinus betulus* L.), sweet cherry (*Cerasus avium* (L.) Moench.) and elm trees (*Ulmus laevis* Pall. and *U. carpinifolia* Rapp. ex Suchow) were drying as a consequence of the climatic impact of global warming and the invasion of the steppe ecosystem on the forest ecosystem.

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TYPOLOGY OF GRASSLANDS - THE BASIS OF SUSTAINABLE PASTURAGE MANAGEMENT IN THE REPUBLIC OF MOLDOVA

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Keywords*: pasturage management, typology of grasslands*

Lately, in the Republic of Moldova, there has been an increasing tendency to use pasture lands to improve the productivity of forage by clearing the germination bed of the natural grassland and replacing the wild plants with forage crops – alfalfa (*Medicago sativa* L.), cat grass (*Dactylis glomerata* L.) and tall fescue (*Festuca arundinacea* Schreb.), but the most commonly – monocultures of alfalfa [5]. In the first years, these crops give a good yield, but then degrade, so, ploughing and sowing need to be carried out again, but in terms of diversity and quality of the forage, they are clearly inferior in comparison with those of natural pastures. This phenomenon has acquired huge proportions, especially because of the serious land crisis for foresters, whose goal is to increase the area of the forest fund to 25-30% (currently 11%) and the financial crisis for local public authorities. Foresters tempt landowners (local authorities, private farmers) to donate degraded pasture lands in favour of a sustainable pasturage management and financial subsidies for its implementation. The areas assimilated by such sustainable pasturage management, over the years 2002-2016, constitute currently 2972.9 ha, 500 ha of which, in 2014-2016, were assimilated as a part of the protected area Orhei National Park, with the financial sources of the "Clima-East Moldova" project and the creation of new communal forests – 21838.1 ha. What the sustainable pasturage management is? The sustainable pasturage management is a set of measures taken to ensure care, maintenance and rational use of grasslands (pastures of hayfields), based on the need for differential application and use of the utilization procedures, to maintain or improve the state of its valuable components in close correlation with the local conditions and the way of use in the national economy. At the base of the sustainable pasturage management, as a rule, the typology of grassland vegetation, applied on the basis of the knowledge gained after the praticolous study, is used [1, 2]. In the conditions of the Republic of Moldova, the pasturage management would be implemented on the basis of summing up and applying the knowledge in the field of pratological, geobotanical, pedological and ecological research. By pratological research [3, 4], it was determined the presence of zonal (xeric) grasslands, of 12 types, and azonal (from river valleys) with calcicolous habitat – 37 types and sodic habitat – 19 types of grasslands. The geobotanical studies on grasslands have highlighted the floristic and phytocoenotic composition, and the conditions of an area have been determined by pedological and ecological studies. The care and improvement of grasslands are achieved through two categories of works: superficial works and radical works. Superficial works are carried out more frequently, and the radical ones (ploughing and sowing) are done in areas with sparse vegetation, under 60%, and invaded by weeds. The planners and executors of pasturage management must work together in the process of implementing the measures required to obtain more efficiently a high quality and quantity of fodder production [6]. The pasturage management appropriate to a certain grassland should be the key element in maintaining the forage productivity, as well as phytocoenoses, biodiversity and sustainable use.

The cultivation of such lands with forage crops is also practiced in economically advanced countries of Western Europe, America, Australia, New Zealand, but they do not exceed 10% (temporary grasslands), while the rest are permanent grasslands (natural pastures) found in many fenced fields, protected and stimulated by certain maintenance procedures, where rotational grazing is used. Such pasturage management is also provided by the Decision of the Government of R. Moldova No. 667 on grazing and mowing [7], which came into force on 01.01.2011, but has not been implemented until now. This decision categorically prohibits the clearing of grasslands. Non-specialists take advantage of this situation, particularly agronomists whose works are not monitored, supervised by the services of the State Environmental Inspectorate and researchers from the Academy of Sciences of Moldova.

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THREATENED PLANT SPECIES INCLUDED IN THE EMERALD NETWORK IN MOLDOVA

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Keywords: *Emerald Network, threatened species, Republic of Moldova*

With the ratification in 1993 of the Bern Convention on the Conservation of European Wildlife and Natural Habitats (1979), the Republic of Moldova undertook the obligation, in line with the other EU Member States, to participate actively in ensuring the conservation of natural habitats, spontaneous flora and fauna, including the migratory species on the way of extinction. The Emerald network is an ecological network to conserve wild flora and fauna and their natural habitats in Europe, which was launched in 1998 by the Council of Europe as part of its work under the Convention.

The Republic of Moldova is involved, along with the East European and NIS countries, in the implementation of the Joint Programme of the Council of Europe and European Union to establish the Emerald Network as a part of the EU's Natura 2000 Network. The Emerald Network in Moldova is comprehended as a component of the National Ecological Network and is an integral part of the Pan-European Ecological Network. The scope of the Emerald network is to prevent the biodiversity decline through the long-term conservation of the most valuable and endangered species and habitats of European importance.

The Republic of Moldova was applied a self-evaluation methodological exercise, using the national database of proposed Emerald sites and the results of the biogeographical process. Emerald identified and GIS mapped species from the lists, including highly threatened species at both local and regional levels. These species are protected by the Law of State-Protected Areas (1998), Law of the Red Book of the Republic of Moldova (2006), having the categories Critically endangered [CR], Endangered [EN] and Vulnerable [VU].

Cypripedium calceolus L. [CR]. Grows in the sessile oak forests with beech, sessile oak forests with hornbeam. Territorially protected in the Scientific Reserve "Plaiul Fagului".

Marsilea quadrifolia L. [CR]. Grows in lakes, in stagnant and slowly flowing waters, only in the southern part of the country.

Pulsatilla grandis Wend. [EN]. Grows in the glades and steppe-like edges of forests of pubescent oak, the sector of primary steppe from the central and east parts of the country. Territorially protected in the state Scientific Reserve "Iagorlîc" and in the Landscape Reserve "Pădurea Hîncești".

Colchicum fominii Bordz. [EN]. Grows in the open slopes covered with grass, steppe hills. Territorially protected in the areas of multifunctional management, the sites with steppe vegetation "Bugeac" and "Dezghingea".

Serratula lycopifolia (Vill.) A. Kerner [EN]. Grows on the steppe rocky slopes, steppe meadows, clearing of forests, scrubs. Territorially protected in the Landscape Reserve "La Castel".

Crambe tataria Sebeók [EN]. Grows in the steppe slopes with different exposition and inclination, glades and steppe-like edges of forests with pubescent oak. Territorially protected in the areas of multifunctional management, the sites with steppe vegetation "Bugeac".

Schivereckia podolica Andrz. ex DC [VU]. Grows on the calcareous rocks, fissures of cliffs. Territorially protected in the Landscape Reserve "Trebujeni", "Valea Adîncă", "Țîpova", "La Castel".

Genista tetragona Bess. [VU]. Grows on the petrofilous phytocenoses on the sarmatian limestone of the basin of Nistru River and its confluents. Territorially protected in the Scientific Reserve "Iagorlîc" and in the Landscape Reserve "Trebujeni".

Aldrovanda vesiculosa L. It can be found in the inferior sector of the Nistru River. Grows in the portion of the rivers with the water flowing smoothly.

Iris aphylla L. Grows in the steppe slopes, clearings of cvercinee forests with pubescent oak and steppe stony hills. It is necessary the inclusion in the List of species protected by the state.

Moldova adhering to the Emerald Network has committed itself to protecting and monitoring the valuable and endangered species and habitats of European importance.

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THE COMPARATIVE ANATOMICAL STUDY OF LEAVES OF NEW BLACKBERRY CULTIVARS

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Keywords*: blackberry, specii, cultivars, anatomical*

Blackberry is a fructiferous bush of the Rubus fruticosus L. species. Blackberry fruits are highly appreciated for the medicinal, nutritional and beauty value that they possess. In the Laboratory of Embryology and Biotechnology of the Botanical Garden (I), biotechnological works were undertaken for determining the optimal conditions for *in vitro* propagation of planting material without viruses, of some new cultivars of blackberry. Blackberry leaves, collected during flowering from the collection of the Botanical Garden (I) of ASM of, have served as botanical material (fresh and dried) for study: spontaneous species *Rubus fruticosus* var. *ulmifolius* Schott [3], sp. *R. laciniatus*, *Thornless Evergreen* cultivar (cultivated in Romania, Transylvania) and 3 cultivars of blacberry with American origins, *Thornfree* (patented in Moldova) and cultivars *Arapaho*, *Chester*, obtained from sp. *R. fruticosus.* The anatomical study was conducted according to the classical methods [2].

The analysis of superficial preparations and cross sections of the leaf shows that the upper and lower epidermis are single-layered, composed of cells that are well wrapped, polygonal, with external walls slightly thickened. The epidermis is covered by a layer of cuticle, which easily penetrates between the epidermal cells. Both epidermises develop unicellular trichomes in cluster and covered with thick membrane. Pubescence is more pronounced on the lower epidermis, trichomes being distributed both along the veins and leaf surface. We note the presence of anomocytic stomata on both epidermises, but, numerically, more on the lower one. Leaf mesophyll is differentiated, dorsal-ventral, the palisade tissue consists of two rows of cells, slightly elongated, well arranged under the upper epidermis. The spongy tissue consists of parenchymal, and lobed cells. Collateral closed bundles, accompanied by sclerenchymatic sheath, cross the mesophyll. The presence of cells with druses of calcium oxalate, both along the veins and dispersed in the mesophyll, is obvious. In addition, mechanical, collenchyma tissue was observed under both epidermises, on cross sections, in the region of the ribs.

Comparatively, the leaves of *Arapaho* cultivar develop the greatest thickness (240.0 µm), followed by *Thornfree* (191.5 µm), then *Thornfree Evergreen* (170.0 µm) and the smallest – *Chester* cultivar (148.0 µm). A common anatomical feature of taxa is the presence of tector unicellular trichomes. The sp.*R. fruticosus* has trichomes that frequently form clusters, *Arapaho* cultivar – solitary trichomes, short with thick membrane, *Chester* cultivar – long, solitary and rare trichomes, *Thornfree* cultivar – trichomes that are solitary or in clusters, by 2 or 3, with dilated base in the socket of cells with brownish content, *Thornless Evergreen* cultivar – solitary trichomes anastomosed by 2 or 5, often on the veins. These morphological differences of trichomes represent a distinctive anatomical feature that helps to indentify the taxa [1].Another common anatomical criterion of the studied taxa is the development of anomocytic stomata on both epidermises, mainly on the lower epidermis. The only exception is *Thornless Evergreen* cultivar, with stomata only on the lower epidermis, which represent a distinctive anatomical feature [1].The blackberry species and the cultivars derived from them are characterized by the development of salts and the formation of calcium oxalate druses, and their differences relate to the manner of distribution: in the sheath of vascular bundles and in mesophyll (sp. *R. fruticosus, Thornfree* cultivar), only in mesophyll (*Arapaho* cultivar) and only in vascular bundle (*Chester* cultivar).

The anatomical comparative study of the new cultivars and some species of blackberry, grown in open ground and in greenhouse, revealed anatomical indicators, with adaptive character to unfavorable conditions, such as: the degree of pubescence, the degree of development of the epidermis and its derivatives, the correlation index of epidermal/leaf thickness, upper/lower epidermis, mesophyll/leaf, level of development and distribution of the calcium oxalate druses.

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THE ROLE OF MACROMYCETES IN NATURAL ECOSYSTEMS

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Keywords*: macromycetes, ecology, symbiotroph, mycorrhizal, saprotroph.*

The relationships between organisms in ecosystems have a characteristic called "social complex". This phenomenon consists in the following: in nature, there are nonmycorrhizal plants, but in practice, there are no nonmycorrhizal plant associations. In the tissues of the root system of a plant, as well as in the soil, there are possible anastomoses between the hyphae of different fungi. In conclusion, in an ecosystem with several plant species, of different ages and vegetation synusiae (trees, shrubs, herbaceous plants etc.), the mycelia of mycorrhizal fungi are interlinked and, through them, minerals and carbohydrates are able to "migrate" from one plant to another [5].

In meadow and forest habitats, fungi play key roles – without them, many plants cannot grow normally, and the seeds of orchids can germinate only when they are "infected" with certain species of fungi.

Fungi play not only the role of suppliers but also – of distributors of biogenic substances for plants of the entire ecosystem as a whole. The mycelium connects the vascular system of plants in a unique communication system. In addition, the mycelium of mycorrhizal fungi can promote plant diversity in ecosystems, as a result of the transmission of products of photosynthesis, by the general mycelium, from the dominant species of plants of the phytocoenosis to the "secondary" species, this means that not only woody plants can communicate, but also plants of different levels [6].

Thus, in any plant association, the root systems of plants of different species become interconnected in a complicated network of hyphae of more or less numerous species. Mycorrhiza acts as an integration mechanism, which determines the physiological integrity of a plant association [3, 4, 5, 6].

Mycorrhizal fungi form a physical barrier that prevents the access of phytopathogens from the soil. The fungal mantle covers the more fragile parts of the lateral roots leaving no gaps, thus preventing the direct contact of the young roots with the soil. Many mycorrhizal fungi produce volatile acids with fungistatic and antimycotic effect, limiting the development of microorganisms and maintaining a balance between symbiotic and pathogenic fungi in the soil [5].

The role of macromycetes in forest ecosystems on the territory of the Republic of Moldova is demonstrated by the presence of 287 species of macromycetes that enter into symbiotic associations with the main forest-forming species. Due to these symbiotic relationships, the absorption potential of trees increases and they become more resistant to drought, which is a common phenomenon in Moldova.

The lignicolous and foliicolous saprotrophic macromycetes, which have the ability to degrade complex macromolecules such as lignin, hemicellulose and cellulose, thanks to which primary biomass recycling, for soil fertilization, takes place, are also of particular importance in maintaining the ecological balance in forest ecosystems [1, 2].

Not all fungus-plant interactions are mutually beneficial. Aside from benefits, much of the lignicolous macromycetes (optional parasites) considerably weaken the physiological and physical condition of woody plants, with negative effects on forests.

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IN MEMORIAM: ACADEMICIAN ANDREI NEGRU (28.07.1937-21.12.2011)

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The biologist, specialist in botany (in the field of fossil and current flora), doctor habilitat in biological sciences, professor, academician, Andrei NEGRU was born on July, 28, 1937 in Stoicani commune, Soroca district. In 1954, he graduated from the school no. 1, in Soroca, and continued his studies at the Faculty of Biology and Chemistry of the Tiraspol Pedagogical Institute (1955-1960). Andrei Negru began his pedagogical activity as assistant lecturer at the Botanical Department of the Tiraspol Pedagogical Institute (1963-1966). He continued his studies as a PhD student at "V. Komarov" Botanical Institute of the Russian Academy of Sciences (Sankt-Petersburg, 1966-1969), being a student of the illustrious paleobotanist P. Dorofeev. He defended successfully the doctoral thesis in biological sciences (1969), and in 1986 – the habilitation thesis. At the end of 1986, he was elected corresponding member and in 1992 – permanent member of Academy of Sciences of Moldova.

From 1969, he combined the scientific activity with the pedagogical and organizational one, passing the stages of junior researcher, senior researcher, head of the Flora and Geobotany Laboratory, Deputy Director for Science of the Botanical Garden of ASM (1969-1987), and during 1988-1996, he was director of the Institute of Botany of Academy of Sciences of Moldova. Between 1996 and 2003, he was professor at the Department of Ecology and Soil Sciences of Moldova State University. He taught the following university courses: General Ecology, Systematics of Higher Plants, Environmental Protection and the special courses: Plant Ecology, Biodiversity, Natural Ecosystems, etc. During 2003-2006, he held the position of head of the Department of Forestry and Public Gardens of Moldova State University, thereby contributing to the training of personnel in the field of biology, ecology and forestry.

From the early stages of his career, Andrei Negru was one of the most prominent paleobotanists in Europe, one of the best specialists in the field of fossil flora in Eastern Europe. From the beginning of his scientific activity, Andrei Negru devoted himself, for more than 35 years, to the study of the Miocene flora in the northwest of the Black Sea basin. He is the founder of the Paleobotany School in R. Moldova. He founded and substantiated scientifically the concept of Cronoflora-Cleome as New Floristic Geotype in the evolution of the Eurasian flora, elucidated and scientifically documented the process of genesis of current European flora and vegetation. He highlighted the laws, stages and phases of evolution of the flora of Eastern Europe over the past 13 million years. The conducted paleofloristic research was successful and resulted in the discovery and description of 127 new paleofloristic taxa.

The activity of the academician in the research on the current flora, conservation, enrichment and sustainable use of the plant resources in the R. Moldova is also of great importance. At the initiative of A. Negru and with his direct participation, the monograph "Flora of Bessarabia", in 6 volumes, was drafted and prepared for publication (prepared 5 volumes). The 1st and 2nd volumes of the monograph have already been published. He was the author and co-author of more than 400 scientific papers, including 18 monographs on evolutionary floristics, ecology, plant diversity and conservation. He is a scientific editor and co-author of the book series "Plant World of Moldova", in 4 volumes (2004-2007), editor-in-chief of the monograph "Flora of Bessarabia", in 6 volumes. In 2007, he published "Guide for determining plants of the flora of the Republic of Moldova" and in 2011 – "Flora of Bessarabia. Vol. I".

A special chapter in the life of A. Negru was his organizational and managerial activity at the Institute of Botany of ASM, which he headed during 1988-1996. Taking into account the needs of the development of botanical science during the transition to the market economy, Biotechnology, Landscape Architecture and Plant Protection Laboratories were created. According to the General Plan of the BG, a number of exhibition sectors were designed, created and significantly decorated: Alpine Garden, Iris Garden, Peony Garden, Lilac Garden, Decorative Bridge, Central Entrance and others.

He also contributed a lot to the training of the scientific personnel; under his supervision, 14 PhDs were trained. He was member of the expert commission of NCAA in the field of plant biology and geography (2006) and the head of the Expert Council of NCAA (2006-2011). As co-author of the "First National Report on Biological Diversity" (2000), the "National Biodiversity Strategy and Action Plan of the R. Moldova" (2001) and as head of the National Committee of MAB in R. Moldova "Man and Biosphere" UNESCO (2002-2006), he strongly promoted the Strategy for Plant Diversity Conservation.

For his achievements and substantial contribution to the development of botanical sciences, Andrei Negru was awarded the governmental distinction "Meritul civic" (Civic Merit), the Medal "Dimitrie Cantemir" of ASM, the prize "Grigore Antipa" and the First Degree Diploma of the Government of R. Moldova. Academician Andrei Negru will remain in the memory of all those who have known him as an outstanding personality and a remarkable researcher devoted to science.

RESPONSE CURVES OF *ARNICA MONTANA* ALONG SOME ECOLOGICAL GRADIENTS IN THE NORTHERN REGION OF ROMANIAN EASTERN CARPATHIANS

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Keywords: ecological optimum, tolerance, *Arnica montana*.

Arnica montana L. is a perennial species, wide-spread in Europe, with individuals presenting one or several rosettes connected by a rhizome. It is a characteristic species for in nutrient-poor grasslands - class Calluno-Ulicetea Br.-Bl. et R. Tx. ex Klika et Hadać 1944 (MUCINA 1997; COLDEA 2012). It is used for extraction of some specific compounds used in pharmacy, homeopathy, and cosmetics (SUGIER et al. 2013). Currently, the population are declining because of habitat loss and excessive collection.

HOF models (Huisman et al., 1993; Jansen & Oksanen, 2013) were used in order to detect *Arnica montana* response along some ecological gradients: altitude, temperature, soil moisture, pH and nutrients. This models allow to identify the optimum of species in respect to ecological factors and also the niche width. As results, for both presence-absence and abundance data, probability of occurrence of *Arnica montana* presented a skewed trend, of increase up to 900-1000 m a. s. l. (ecological optimum) followed by a decrease at higher altitudes. This suggests that this particular species is not an alpine plant specialist, and has a distribution and abundance constrained by abiotic and biotic features of habitat. Depending on temperature, the probability of occurrence was characterized by a unimodal symmetric model with an increase up to 4 (meaning that ecological optimum is in cool, mountain areas). For soil moisture the trend of the probability of occurrence was monotonously decreasing, with the optimum around 4.4, suggesting the preference for moderate humid soils. For soil pH and nutrients, the trend was also unimodal (symmetric) characterized by an increase up to 4.5 (for soil pH – ecological optimum in acid soils) and 2.8-3 (for soil nutrients – ecological optimum in nutrient poor soils). Decrease of species probability of occurrence depending on soil pH could be attributed to some underlying effects of other factors as organic matter accumulation, nutrient availability for plants and $Al3^{+}$ toxicity. Moreover lower pH values, specific to higher altitudes, increase the organic matter content but decrease the nutrients availability for plants. Higher values of soil pH can enhance the decomposition rates and can increase the nutrients content of soil. In addition, fertilization of grasslands can change the competitive relationships between grasses and *A. montana* (with low growth rate) for light and nutrients.

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MORPHOLOGY AND STRUCTURE OF FRUITS OF TWO PEAR CULTIVARS (PYRUS COMMUNIS L.)

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***Keywords**: pear fruits, anatomy, morphology, structures, light microscopy*

The great demand for the fruit of pear is associated with their taste and nutritional values. Pears are characterized by attractive flavor, aroma, and juiciness as well as high contents of potassium, fibre, vitamin C, and iodine. Compared with apples, pears cause allergic reactions less frequently. Fruit quality is influenced by external conditions, for example, temperature, humidity, physiological disorders, fungal diseases, and by internal factors related to the fruit structure. Especially the important role is played by the structure of the fruit surface layer and the structure of parenchymal cells [1, 2].

The micromorphological structures and anatomy of "Noiabriskaya" and "Vystavocinaya" fruits in the harvest maturity stage were investigated under light microscope. Substantial differences in fruit structure were observed in the harvest maturity stage. Cross-sections from fragments of three fruits were made; next, the samples were embedded in glycerol gelatin and viewed under the BIOLAR "B" light microscopy. In each slide, the thickness of the cuticle, the height of the epidermal cells, the number of layers of hypodermis and its overall thickness, and the thickness of 3 layers of the parenchyma located under the hypodermis were determined in three places. Additionally, the diameter and thickness of the walls of 10 largest stone cells located in the parenchyma adjacent to the hypodermis were measured.

The fruits of "Noiabriskaya" and "Vystavocinaya" exhibited inconsiderable morphological differences in the fruit set stage, whereas in the harvest maturity stage they differed distinctly in the color, shape, and surface. In the harvest maturity stage, broad oval, asymmetric "Vystavocinaya" fruits had a thick, slightly glossy peel with a brown fuzzy, point blush, and tiny green lenticels. In turn, the "Noiabriskaya" fruits were strongly elongated, the peel was matt, rough, and greenish without a blush but with brown russet over a half of the fruit, and the lenticels had a larger diameter than in the "Vystavocinaya".

In the harvest maturity stage, a great number of microcracks, which formed a specific reticulate network often aligned along the epidermal cell walls, characterized the fruit surface in both cultivars. In both cultivars, a markedly lower number of lenticels per fruit surface unit characterized mature fruits.

The epidermis in both cultivars was formed by rectangular cells, whose height (length of anticlinal walls) was not much greater than the width (length of periclinal walls) 18.44 ± 1.13 (Noiabriskaya) and 21.9 ± 1.28 (Vystavocinaya). The hypodermis was formed by tiny, longitudinally, and laterally dividing cells with relatively thin walls. Number of hypodermis layers 7-9 (Noiabriskaya) and 6-7 (Vystavocinaya).

Sclereid aggregates composed of several cells were found in harvest-mature fruits of both cultivars, with a greater number thereof in the "Noiabriskaya". The largest number of sclereids in both cultivars was located in the inner, ca. 5 mm thick pericarp layer; additionally, in the "Vystavocinaya" they were present in a close vicinity of the receptacle, and in the "Noiabriskaya" in the inner layers of the pericarp and around the area of the fruit calyx. The diameter of stone cells (37.15 ± 1.81 – „Noiabriskaya" and 44.25 ± 2.11 – „Vystavocinaya") and the thickness of their walls in both cultivars were similar.

The analyses indicate that firmness and durability of pear fruits are largely influenced by the presence of russet, the proportion of closed lenticels and number of stone cells, and the content of starch grains and tannin compounds. The thickness of the cuticle and presence of epicuticular waxes as well as the number of lenticels and the number and depth of microcracks play a minor role.

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CONTRIBUTIONS TO THE PRUT FLOODPLAIN VEGETATION STUDY

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Keywords*: meadow vegetation, Prut floodplain vegetation*

The growing anthropoid influence on the vegetation determines the necessity of the protection strengthening and the enlargement of the protected areas network. The river valleys vegetation is the most susceptible, the significant part of it being destroyed and replaced by farmlands. In order to reveal the best saved areas, the research of the vegetation of Prut meadow was carried on Leova city nearbyes.

The reverine part of the floodplain is the most elevated part, well drained with sandy, easy mobile substrate. The influence of the river is being emphasized here by the alluvial deposit, that's why only the plants able to withstand to such conditions will grow here. On the riverside, the banks are populated by *Tussilago farfara* L. thickets, and partly by *Petasites spurius* (Retz) Reich. On the sloping costal areas solitary specimens of willows (*Salix viminalis L., S. triandra* L.) can be founded. On the more raised sites the floodplain forests are located in a narrow band, represented by poplars (Populetum). The main specie is *Populus alba* L., mixed with *Populus nigra* L., *Salix alba* L., *S. fragilis* L. - constituing the first tier. The II tier isn't well marked and it is represented by sole specimens of *Ulmus laevis* Pall. with a dash of *Pyrus communis* L. The undergrowth sparse consists from separate specimens of *Swida sanguinea* (L.) and *Rhamnus cathartica* L. The herbage is uneven with a changeable structure. More often than others *Galium aparine* L., *Urtica dioica* L., *Symphytum officinale* L., *Centaurium pulchellum* (Sw.) Druce, *Lysimachia nummularia* L., *Aristolochia clematitis* L., *Plantago major* L. and *Rorippa sylvestris* (L.) Bless. can be meted.

On the areas located below, with the insufficiency of humidity, the fragments of high level grassland are developed. They are distributed on small areas and being well protected are characterized by a predominance of a rhizome grasses, with a significant participation of the motley grasses and pulses. Among the grasses more common are *Elytrigia repens* (L.) Nevschi, *Bromopsis inermis* (Leyss.) Holub, *Calamagrostis epigeios* (L.) Roth, among the motleys - *Galium verum* L., *Potentilla supine* L., *P. argintea* L., *Rumex thyrsiflorus* Fingerh, *Achillea mellifolium* L., among the pulses - *Lotus corniculatus* L., *Medicago lupulina* L., *M. falcata* L., *Trifolium pratense* L. and *T. montanum* L. Motley grasses lose their importance on the areas disturbed by grazing, some species of forage plants, in specially pulses are falling out of the grass stand. The weed plants become more common. Such species as *Centaurea diffusa* Lam., *Chamomilla recutita* (L.) Rauschert, *Spergularia maritima* (All) Chiov., *Xeranthemum annuum* L., *Plantago lanceolata* L., *P. major*, *Bromus arvensis* L., *Anizantha tectorum* (L.) Nevski, *Goniolimon besserianum* (Schult.) Kusn become more frequent.

Flat, raised areas of the central floodplain, with highly moisturized cites are occupied by a meadow vegetation. The dominant species are represented by turf grasses and motleys, such as *Poa pratensis* L., *P. trivialis* L., *Elytrigia repens* (L.) Nevski, *Festuca pratensis* Huds, *Lolium perenne* L. In less abundance *Dactylis glomerata* L., *Phleum pretense* L., *Alopecurus arundinaceus* Poir., *A. pratensis* L., *Agrostis stolonifera* L. are present. The grass cover includes a lot of leguminous: *Lotus corniculatus* L., *Medicago falcata* L., *M. lupulina* L., *Galega officinalis* L., *Melilotus officinalis* (L.) Pall, *Trifolium repens* L., *T. pratense* L., *T. hybridum* L., *T. fragiferum* L., *Vicia angustifolia* Reichard. Also can be meted: *Filipendula ulmaria* (L.) Maxim, *Ranunculus repens* L., *Inula helenium* L., *Lisimachia nummularia* L., *Carex hirta* L., *Juncus gerardii* Loisel., *Taraxacum officinale* Wigg., *Mentha aquatica* L. On the relatively flat central part of the floodplain, there are lot of small sloping lowerings, excessively moisturized, were marshy meadows could appeared. The grass stand is mainly formed by *Agrostis stolonifera* L., accompanied by *Scirpus tebernaemontani* C. C. Gmel., *Bolboschoenus maritimus* (L.) Pall., *Carex otrubae* Podp., *C. hirta* L., *C. melanostachia* Bieb. Ex Wild., *Eleocharis palustris* (L.) Roem. et Schult., *Glyceria arundinaceae* Kunt., *G. maxima* (C. Holub.), *Juncus compressus* Jacq., *Butomus umbellatus* L., *Rorippa sylvestris* (L.) Bes.

The waterlogged areas are distributed on the lower parts of the central, terraced floodplain, being dominated by reed formations - up to 80-90%. The main cenosis reprezentant is *Phragmites australis* (Cav.) Trin ex Steud. As a result of the intensive sprouting, due to the rapid growth of rhizomes, cane form dense, almost pure thickets, grabbing large areas. They are accompanied by *Cerattophyllum demersum* L., *Potamogeton perfoliatus* L., *P. crispus* L., *Lemna trisulca* L., *Spirodela polyrhiza* (L.) Schleich., *Myriophyllum spicatum* L., *Butomus umbellatus* L., *Salvinia natans* (L.) All., *Scirpus tabernaemotanii* C. C. Gmel.

In some places among the reeds could be meted *Butomus umbellatus* L., *Typha angustifolia* L. and *T. latifolia* L. Areas of cattail formation (dominated by *Typha andustifolia* L.) are smaller and quiet common here. On the coasts they are surrounded by a continuous carpet of *Agrostis stolonifera* and small thickets of *Glyceria arundinacea* Kunth and other water-marsh plants: *Bolboschenus maritimus* (L.) Palla, *Eleocharis palustris* (L.) Roem. et Schult., *Alisma plantago-aquatica* L., *Sagittaria sagittifolia* L., *Biedens tripartita* L., *Polygonum hydropiper* L., *Altaea officinalis* L.

In general, it may be noted that this area is represented by the vegetation typical for floodplains of the steppe zone communities, well preserved and typical for river Prut marshes. Not many similar sites occupied by floodplain vegetation remained. That's why they may become protected areas, were floodplain vegetation will be conserved.

QUALITATIVE STRUCTURE OF THE ALGAL COMMUNITIES OF THE RIVER BIC

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Keywords*: periphyton, algal communities, eutrophication.*

The study of the qualitative-quantitative dynamics of algal communities has a particular significance in terms of continuous eutrophication and pollution of the water reservoirs. The wastewater discharged in the river Bic contribute to the degradation of the specific algoflora composition. As a result, there develop intensely cyanophyta and euglenophyta, belonging to genera *Anabaena, Aphanizomenon, Microcystis, Oscillatoria, Phormidium* and *Euglena*, which may cause the phenomenon of "water blooming" [3]. In such conditions there also begin to develop intensely species of diatom and chlorophyta resistant to increased concentrations of organic substances dissolved in water. In the coastal zone of the river and on various substrates filamentous algae grow abundantly (species of the genera *Cladophora, Oedogonium, Enteromorpha, Ulothrix, Zygnema, Mougeotia*), forming a biomass of up to 2-5 kg/m^2 [1; 2].

As a result of investigations on algal communities of the river Bic, there have been highlighted representatives belonging to the following phyla: *Cyanophyta* – 51 taxa, *Bacillariophyta* – 104, *Xanthophyta* – 3, *Dinophyta* – 3, *Chlorophyta* – 72 and *Euglenophyta* – 19.

Thus, according to the number of species and varieties of algae observed in the river periphyton, dominate the diatoms, which list 104 species from 30 genera, belonging to 8 families, 4 orders and 2 classes. The representatives of the class *Pennatophyceae* with 97 taxa (93,3% of the total number of highlighted diatoms) have an important role in shaping the algocenosis. From this class the most numerous in species are the: *Naviculaceae* family with 45 species and varieties of algae; *Nitzschiaceae* – with 20 species; *Fragilariaceae* with 12 species and *Surirellaceae* – with 11 species. Frequently found in the periphyton have been the species of the genera *Cymbella, Gomphonema, Navicula, Pleurosigma, Pinnularia, Gyrosigma, Amphora, Bacillaria, Hantzschia, Nitzschia, Diatoma, Fragilaria, Synedra, Cymatopleura* and *Surirella*, which develop intensely, especially in the cold season.

Centrophyceae class is represented by 7 species (6,7%), belonging to 2 families - *Coscinodiscaceae* with 6 species and *Biddulphiaceae* with one species *Biddulphia laevis*.

On the second place according to the number of species are green algae with 73 taxa, belonging to 37 genera, 19 families, 6 order and 4 classes. Taxonomically reacher is *Chlorococcophyceae* class, with 38 species, or 52,1% of all species of this phylum. More numerous in species proved to be the families *Scenedesmaceae* (11 species) and *Chlorococcaceae* (6 species). The families *Coelastraceae, Micractiniaceae, Radiococcaceae* and *Treubariaceae* include only one species. The most representatives from *Chlorococcophyceae* class are met frequently in the river plankton.

There were found 51 species and varieties of algae of the *Cyanophyta* phylum, which belong to 2 classes, 3 order and 14 families. Most numerous in species is *Hormogoniophyceae* class, which includes 38 taxa or 74,5% of total number of cyanophyta highlighted in the river Bic periphyton. From this class the most numerous in taxa is the family *Oscillatoriaceae* with 27 species, quantitatively predominating those of *Oscillatoria* and *Phormidium* genera, producing a biomass of about 40-70 g/m^2. The species of the family *Anabaenaceae* were also developing abundantly, causing the phenomenon of "water blooming". The *Nodulareaceae, Rivulariaceae, Pseudonostocaceae* and *Schizothrichaceae* families, each include a single species and develop with abundance indexes of "rare" and "very rare". The *Chroococcophyceae* class is represented by 13 species, which are frequently found in the river plankton.

The *Euglenophyta*, from the waters of the river Bic, including 19 species, belong to the *Euglenophyceae* class, *Euglenales* order and *Euglenaceae* family. Most of the species belong to the genera *Euglena* (7 taxa), *Phacus* (4) and *Trachelomonas* (4).

Xantophyta and *Dinophyta* are present in the river Bic periphyton with three species each. These were highlighted in periphyton during summer, with abundance indexes of "rare" and "very rare", therefore have a minor role in determining the quantitative parameters of the river algoflora. Frequently are met only the species belonging to the *Tribonema* genera.

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FONDUL FORESTIER NAȚIONAL-STAREA ACTUALĂ ȘI PROBLEMELE DEZVOLTĂRII

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Fondul forestier al Republicii Moldova constituie 446.6 mii ha, inclusiv suprafața acoperită cu păduri - 379,5 mii ha și este alcătuit din trei componente, deținători ai fondului forestier Tab.1:

Structura fondului forestier național conform Cadastrului funciar general (la 01.01.2015)

Categoriile de destinații	***Suprafața totală mii ha / %***			***Suprafața acoperită cu păduri mii ha / %***		
Fond forestier proprietate publică a statului	362.3	/	81.1	328.6	/	86.6
Fond forestier proprietate publică a unităților administrativ-teritoriale	81.7	/	18.3	48.3	/	12.7
Fond forestier proprietate privată	2.6	/	0.6	2.6	/	0.6

Ultima componentă, fondul forestier proprietate privată, deși are o pondere nesemnificativă, este în continuă creștere; în ultimii ani s-a triplat ca suprafață și pondere. Pădurile private sunt culturi silvice artificiale din salcâm. Aici problemele abia încep să se contureze. Prima, și cea mai importantă, este finanțarea lucrărilor de împădurire a terenurilor private. În caz că statul își asumă o parte sau total finanțarea activităților de împădurire, ponderea acestui component va crește semnificativ. O altă problemă este necisitatea modificării articolului respectiv a Codului Funciar pentru a asigura împădurirea terenurilor cu o bonitate mai mare. Nu este mai puțin important și modificările în Codul Silvic care ar prevedea împădurirea terenurilor private nu după dorința proprietarului dar respectând tipul și bonitatea stațiunii a crea fitocenoza care ar exercita toate funcțiile atribuite pădurii.

Componenta doi-fondul forestier proprietate publică a unităților administrativ-teritoriale se confruntă cu degradarea continuă, fragmentarea, distrugerea, gestionarea spontană, fără planificarea impusă de regimul silvic. Administrarea, gospodărirea și responsabilitatea de pădurile primăriilor este necesar să fie stipulată în legislația respectivă, Codul Silvic și materialele de amenajare.

În fondul forestier proprietatea publică a statului putem menționa o degradare continuă a ecosistemelor forestiere ce duce la diminuarea funcțiilor principale a pădurii: ecologică, economică, social-recreativă, protecția biodiversității și captarea carbonului. Pentru a opri acest proces se propune ca gestionarea lui să fie efectuată pe tipuri de vegetație: naturale și artificiale.

ABOUT THE VEGETAL ASSOCIATIONS OF „HÂNCEȘTI" RESERVATION

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Keywords: Association, phytocenosis, protected area, arboretum, shrubs

The "Hânceşti Forest" Landscape Reservation is located between the city Hânceşti and the villages: Logăneşti and Mereşeni of Hancesti district. The surface of the Hânceşti Forest Landscape Racking is 4499 ha (according to the *Law on the Fund for Natural Protected Areas, 1998*). This surface is the largest landscape reservation in Moldova. It is a Protected Natural Area consisting of plant communities of three vegetation formations: *Quercus petraea* forests, *Quercus robur* forests and *Quercus pubescens* fiorests. There have also been recorded forest plantations and areas occupied with grass vegetation.

So far, few scientific research has been carried out, the grassrock was collected, but publications about plant associations in this Protected Natural Area were not routed because they have not carried out special scientific research to characterize this protected area.

The vegetation research in the Hânceşti Reservation was carried out according to the principles of the J. Braun-Blanquet phytosociological school (1964). Fields with physionomy and homogeneous conditions corresponding to the plant communities were selected at the field stage. The abundance, the dominance (AD) and the frequency, were noted in the list of species of the simple surface. The five-step scale was used to determine each species. The *Quercus petraea* plant communities have been assigned to the following associations.

As. Querco petraeae -Carpinertum betuli Gheidemna 1964 was formed at altitudes of 200-250 m, on the slopes with north exhibition is in the plots of Mereşeni Forest District, Hânceşti Forest Enterprise. The floral composition is rich in mezoxero-mesophilic species. In the arboretum dominates *Carpinus betulus* with an unusual participation of *Quercus petraea*. In the arboretum participate such companion species as *Tilia cordata, Cerasus avium, Acer campestre, Acer platanoides* and a. The herbaceous layer has a variable coverage of 10-20% and includes over 50 species of vascular plants. There are many species of epimeroides: *Scila bifolia, Corydalis solida, Dentaria bulbifera* and other characteristic species such as *Carex brevicollis, Carex pilosa, Asarum europaeum, Glechoma hirsuta* and a.

As. Cotino-Querccetum petraeae Gheideman 1964. *(Quercus petraea*) with *(Cotinus coggygria*) communities were formed on plateaus and on slopes with south and south-west exposition.

In the arboretum dominates the oak (*Quercus petraea*), which is accompanied by such species of *Acer campestre, Acer platanoides, Acer tataricum, Carpenus betulus, Cerasus avium, Fraxinus excelsior, Sorbus aucuparia, Sorbus torminalis, Tilia cordata, Tilia tomentosa and Ulmus carpinifolia*. In the layer of shrubs dominates the price (*Cotinus coggygria*), less abundant is horn (*Cornus mas)*, sporadically occurring *Crataegus monogyna, Euonymus europaeus, Euonymus verrucosa, Rosa canina, Sambucus nigra, Swida sanguinea, Viburnum lantana*.

As. **Poo nemoralis - Tilietum cordatae** Firbas et Sigmond 1928.

The plant communities assigned to this association are spread in depressions and wetter places. Phytocenoses are dominated by *Tilia cordata* and *Tilia Tomentosa*. In the layer of trees were also recorded solitary specimens of *Acer campestre*, *Acer platanoides* and *Fraxinus excelsior*. Arrow layer is poorly expressed. In the herb layer more often is *Poa angustifilia* dominates. *Aegopodium podagraria, Stelaria holostea, Scutellaria altissima* etc. are also present.

For the pubescens oak forests in the protected area Hancesti Forest the most widespread association is:

As. Cotino -Quercetum pubescentis Soo 1932. Occupy large areas on the slopes with south and southwest exposure. In the layer of trees dominate the pubescens oak (*Quercus pubescens*), and in the layer of the bushes dominates the price (*Cotinus coggygria*). The fluffy oak tree is accompanied by such companion species *Tilia cordata, Acer campestre, Cerasus avium, Ulmus carpinifolia*. Due to the unusual consistency of the tree, the layer of bushes is very well developed. It is very abundant *(Cotinus coggygria*), which is accompanied by *Crataegus monogzna*, *Euonzmus verrucosa, Ligustrum vulgare, Cornus mas, Prunus spinosa, Viburnum lantana and a*. The layer of herbs is rich in meadow: *Poa angustifolia, Festuca valesiaca, Fragaria vesca* and so on.

CASE OF STUDY REGARDING WALNUT (*Juglans regia* L.) BIODIVERSITY CONSERVATION

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Keywords: walnut, biodiversity, nut descriptive analysis, conservation, Republic of Moldova.

There is studied different byotypes of *Juglans regia* L. natural populations of Republic of Moldova which is a country with ancient walnut culture tradition [2-4]. Main selected and used for establish commercial orchard biotypes was local bearing trees (usually originated from seeds) has good qualities and high and sustainable productive potential. Actually it is necessary to establish plantations using adequate varieties in whole concordance with the specific local arpo-ecological conditions (resources). In the same time, it is indispensable to coordinate assortment with requirements of nuts qualities of modern market demands. Our studies were focused on explorative evaluation of perspective local walnut biotypes, selected from different natural populations of local pomological zones (north, north-vest, central and partially south) comparatively to autochthonous creations and some introduced and registered for multiplication in the Republic of Moldova varieties. Main biologic material of this research consists of more than 100 walnut trees chosen during surveys around walnut growing areas in Republic of Moldova: 16 genotypes from north- west, 48 trees from central and 36 trees from north. From each trees, nuts were harvested at full ripe in September. From the nut samples traits which describe the morphological size and characteristic were measured according international UPOV and UNECE guidelines [5]. Fruit descriptive sensory analysis were done by trained panelists, six kernels from each tree nut sample were presented to each panelist. Oil and fatty acids content were defined by direct extraction with hexane, total protein determined by Lowry method. Fatty acids composition as well as vitamin E (tocopherols) were determined by high performance liquid chromatography (HPLC) using suitable methods and quantified by ELSD and UV detectors respectively [1]. The assessment also enclosed walnut main descriptors, and sensory attributes including nut form, weight, structure (including index of shape form, total kernel weight, index of kernel/endocarp relation), kernel structure, color, flavor, texture, specific eating qualities, etc. The nut shape of the biotypes, selected as important ones was mainly rated oblate to ovate. Biotypes of north zone were recorded to have the whitest shell color and high index of kernel/endocarp relation: 45-59% of kernel were noticed at 13 biotypes. Most of the biotypes had a moderate kernel fill and shriveling score. The highest score of aroma, flavor and sweetness intensity was noted in central pomological zone (1Cmd, 2Cmd, 3Cmd, 17Cmd). In general bitterness, puckeriness and sweetness assessments greatly changing among local varieties and biotypes. Crispness rating of the biotypes was almost the same in all zones. Thus, on the basis of obtained data we suppose the existence of many others genetically important native trees (genotypes) all around the Moldovan studied areas.

Preliminary data indicate that walnut in Rep. of Moldova could be considered as a "pan-population" in which the plants are able to exchange genes by pollen cloud. The trees with lateral fruit bearing, founded also in natural population, makes the country interesting for walnut improvement since this trait is very important to enhance the productivity aimed by breeders. The obtained results could be considered and examined with other European populations in the framework of a research devoted to evaluate the biodiversity and to investigate on the origin of walnut in Europe. We are considering that there is strongly necessary to conduct *in-situ* and *on-farm* inventories also for walnut biodiversity conservation.

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PROTECTED PLANT SPECIES IN FLORESTI DISTRICT

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Keywords*: rare plants, Florești district, Moldova.*

During the floristic research, carried out in 1987-2016, on the vegetation from Florești district, 52 species of plants, protected by the State [2], were recorded. 20 of them have been included in the Red Book of the R. Moldova [1]. 3 rare species are proposed to be included in the List of species protected by the State.

Species included in the Red Book of the Republic of Moldova [1]: ***Aconitum eulpophum*** Rchb. (Ranunculaceae) – vulnerable: Târgul-Vertiujeni, Vertiujeni); ***Allium inaequale*** Janka (Amaryllidaceae) – vulnerable: Cenușa, Prodănești; ***Cephalanthera damosonium*** (Mill.) Druce (Orchidaceae) – vulnerable: Cuhureștii de Sus; ***Cotoneaster melanocarpus*** Fisch. ex Blytt (Rosaceae) – vulnerable: Napadova; ***Dryopteris carthusiana*** (Dryopteridaceae) – endangered: Târgul-Vertiujeni, Cuhureștii de Sus, Văscăuți; ***D. filix-mas*** (L.) Schott (Dryopteridaceae) – vulnerable: Cernița, Târgul-Vertiujeni; ***Ephedra distachya*** L. (Ephedraceae) – vulnerable: Napadova; ***Fritillaria montana*** Hoppe (Liliaceae) – vulnerable: Vertiujeni, Ciripcău, Japca; ***Galanthus nivalis*** L. (Amaryllidaceae) – vulnerable: Zaluceni, Vertiujeni, Temeleuți, Văscăuți, Coșernița, Cuhureștii de Sus; ***Helianthemum canum*** (L.) Hornem. (Cistaceae) – vulnerable: Bobulești, Cenușa, Roșieticii Vechi, Căprești, Prodănești, Prodăneștii Vechi, Ștefănești; ***Koeleria splendens*** C. Presl [= *K. moldavica* M.I.Alex.] (Poaceae) – vulnerable: Cenușa, Căprești, Prodănești; ***Lembotropis nigricans*** (L.) Griseb. (Fabaceae) – endangered: Vertiujeni; ***Linum tauricum*** Willd. [= *L. linearifolium* Javorka] (Linaceae) – endangered: Cenușa; ***Orchis purpurea*** Huds. (Orchidaceae) – critically endangered: Văscăuți; ***Ornithogalum amphibolum*** Zahar. (Asparagaceae) – critically endangered (Florești); ***Pulsatilla grandis*** Wend. (Ranunculaceae) – endangered: Târgul-Vertiujeni; ***Saxifraga tridactylites*** L. (Saxifragaceae) – critically endangered: Stârceni, Ștefănești; ***Scopolia carniolica*** Jacq. (Solonaceae) – vulnerable: Văscăuți; ***Seseli peucedanifolium*** Besser (Apiaceae) – vulnerable: Bobulești, Cenușa, Prodănești, Prodăneștii Vechi, Țâra; ***Sesleria heufleriana*** Schur (Poaceae) – vulnerable: Ștefănești.

Rare species, protected by the State: ***Adonis vernalis*** L. (Ranunculaceae): Cernița, Târgul-Vertiujeni, Cenușa, Roșieticii Vechi; ***Alyssum saxatile*** L. (Brassicaceae): Florești, Cenușa, Ștefănești; ***Amygdalus nana*** L.(Rosaceae): Târgul Vetiujeni; ***Asparagus officinalis*** L. (Asparagaceae): Cenușa, Târgul-Vertiujeni, Napadova; ***A. tenuifolius*** Lam. (Asparagaceae): Cernița, Ciripcău, Vertiujeni, Târgul-Vertiujeni, Temeleuți; ***A. verticillatus*** L. (Asparagaceae): Târgul-Vertiujeni, Napadova; ***Asplenium ruta-muraria*** L. (Aspleniaceae): Florești, Stârceni, Cenușa, Căprești, Târgul-Vertiujeni, Sănătăuca, Japca; ***A. trichomanes*** L. (Aspleniaceae): Zaluceni, Târgul-Vertiujeni, Vertiujeni; ***Astragalus dasyanthus*** Pall. (Fabaceae): station Unchitești; ***A. vesicarius*** L. (Fabaceae): Mărculești, Florești, Stârceni, Cenușa, Roșieticii Vechi, Țâra, Prodănești, Prodăneștii Vechi, Ștefănești; ***Chamaecytisus ratisbonensis*** (Schaeff.) Rothm. (Fabaceae): Cenușa; ***Crocus reticulatus*** Steven ex Adam (Iridaceae): Cuhureștii de Sus, Târgul-Vertiujeni, Temeleuți, Cerniță; ***Cystopteris fragilis*** (L.) Bernh. (Woodsiaceae): Vertiujeni; ***Epipactis helleborine*** (L.) Crantz (Orchidaceae): Cuhureștii de Sus; ***Genista elata*** (Moench) Wender. [= *G. tinctoria* auct. mold. non L.] (Fabaceae): Temeleuți, Văscăuți; ***Goniolimon besserianum*** (Schult.) Kusn. (Plumbaginaceae): Târgul-Vertiujeni; ***Helichrysum arenarium*** (L.) Moench (Asteraceae): Târgul-Vertiujeni, Napadova, Prodăneștii Vechi; ***Hyacinthella leucophaea*** (K.Koch) Schur (Asparagaceae): Târgul-Vertiujeni, Florești, Cenușa, Țâra, Prodănești; ***Iris pumila*** L. (Iridaceae): Florești, Cenușa, Târgul-Vetiujeni; ***Lilium martagon*** L. (Liliaceae): Vertiujeni, Temeleuți, Cerniță, Ciripcău; ***Neottia nidus-avis*** (L.) Rich. (Orchidaceae): Ciripcău, Cuhureștii de Sus; ***Polygala sibirica*** L. (Polygalaceae): Cenușa; ***Paris quadrifolia*** L. (Melanthiaceae): Cuhureștii de Sus; ***Pulsatilla montana*** (Hoppe) Rchb. (Ranunculaceae): Târgul-Vertiujeni, Cerniță; ***Scrophularia umbrosa*** Dumort. (Scrophulariaceae): Cerniță; ***S. vernalis*** L. (Scrophulariaceae): Vertiujeni; ***Staphylea pinnata*** L. (Staphyllaceae): Vertiujeni, Târgul-Vertiujeni, Temeleuți, Cuhureștii de Sus; ***Stipa lessingiana*** Trin. et Rupr. (Poaceae): Târgul-Vertiujeni; ***S. pulcherrima*** K. Koch (Poaceae) Napadova; ***Tulipa sylvestris*** L. (Liliaceae): Vertiujeni, Târgul-Vetiujeni, Văscăuți, Japca; ***Veratrum nigrum*** L. (Melanthiaceae): Văscăuți, Temeleuți, Cerniță, Ciripcău; ***Vinca minor*** L. (Apocynaceae): Temeleuți, Văscăuți, Vertiujeni, Târgul-Vertiujeni.

The following taxa are proposed to be included in the List of species protected by the State: ***Alyssum tortuosum*** Willd. (Brassicaceae): Bobulești, Cenușa, Țâra; ***Jurinea multiflora*** (L.) B. Fedtsch. (Asteraceae): Mărculești, Florești; ***Helianthemum nummularium*** (L.) Mill. (Cistaceae): Florești, Cenușa.

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GYMNOSPERM PLANTS OF THREATENED CATEGORIES' SPECIES IN THE CONIFERETUM OF GRISHKO NATIONAL BOTANICAL GARDEN

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Keywords*: Gymnosperms, threatened species, Kyiv.*

The Coniferetum of National botanical garden has been founded in 1945. As of 2017, there are plants of 66 species. These plants belong to five plant families (*Cupressaceae, Ephedraceae, Ginkgoaceae, Pinaceae, Taxaceae*) and 22 plant genera. Geographically the National botanical garden is located in Kyiv, a city with a humid continental climate. The coldest temperature ever recorded in the city was −32,9°C, the highest - +39,4°C. The average precipitation is 621 mm, the average annual temperature is +8,4°C (Клімат Києва, 2010).

This article contains the data about the Coniferetum's threatened species' plants in the open air condition. In accordance with The IUCN Red List of Threatened Species, these species are facing a higher risk of global extinction Critically Endangered (CR), Endangered (EN) and Vulnerable (VU)), and would be threatened without an ongoing taxon-specific conservation programme (Near Threatened (NT) (IUCN, 2016)). The threats are a combination of the extensive exploitation, the spread of the introduced pathogen, and a result of climate change. Resistance to the lower temerature limits is showed according to The Gymnosperm Database, 2015. In order to indicate the plants' growth characteristics, we use the diameter of trunks parameter (DBH - Diameter at breast height).

There are eight trees from CR category, *Abies numidica* de Lannoy ex Carrière (-28.8°C), which were planted in 1953 from seeds obtained from Adler (Russian Federation). Now these plants' DBH are 44-71 cm. The grafts of *Picea koyamae* Shiras. (-28.8°C) from the same category were selected in the arboretum "Goverla" (Ivano Frankivsk region) in 2006; now we have four understocks.

The EN category is represented by the following plants. Thirteen *Ginkgo biloba* L. (-34.3°C) trees from Bucharest, planted in 1949 with DBH 30-50 cm; ten trees from Odessa planted in 1956 with DBH 25-50 cm. One *Abies koreana* E. H. Wilson (-28.8°C) yang tree purchased in 2009 from Belgium. 21 trees *Metasequoia glyptostroboides* Hu & W. C. Cheng (-28.8°C) from L'viv botanical garden were planted in 1964, and one tree from Leningrad (Saint-Petersburg) was planted in 1955. These plants' DBH are 25-50 cm. *Picea omorika* (Pancic) Purk. (-28.8°C), obtained from Germania in 1947, have DBH 28 cm.

From the VU category there are three plants *Picea asperata* Mast. (-23.2°C) taken from Fomin Botanical garden (Kyiv) and planted in 1970; their DBH are 15-23 cm. Two trees *Picea likiangensis* (Franch.) E. Pritz. taken from Yalta in 1971, their DBH are 22,5 cm. *Picea breweriana* S. Watson (-23.2°C) young tree bought in 2009 from Belgium. Tree *Pseudolarix amabilis* (J. Nelson) Rehder (-23.2°C) from Beregomet dendropark (Chernivci region) planted from seeds in 2010.

From the NT category there are seventeen plants *Chamaecyparis lawsoniana* (A. Murray bis) Parl. (-23.2°C) obtained from Uzhgorod in 1962; DBH 11-28 cm. There are six trees *Platycladus orientalis* (L.) Franco (-23.2°C) grown from China seeds since 1964 year with DBH 23-41 cm. Two plants *Chamaecyparis obtusa* (Siebold & Zucc.) Endl. (-23.2°C) grown from Hiroshima seeds since 2010. *Cryptomeria japonica* (Thunb. ex L.f.) D. Don (-23.2°C) taken in 1971 from Uzhgorod. Plants taken from Trostyanets dendropark comprise four trees *Pinus peuce* Griseb. (-28.8°C) obtained in 1966; DBH 22-46 cm, five trees *Tsuga canadensis* (L.) Carrière (-34.3°C) obtained in 1954; DBH 15-21 cm, and *Thuja standishii* (Gordon) Carrière (-23.2 C) taken in 1952; DBH 35 cm.

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CLIMATE CHANGE IMPACTS ON THE BIRCH (*Betula pendula* L.) FORESTS FROM THE REPUBLIC OF MOLDOVA

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***Keywords**: climate change impacts, birch tree populations*

Numerous publications suggest for a global climate warming tendency, which is about 3°C, when compared to the pre-industrial period (before 1750). The average air temperature in the last 100 years (records during the period 1906-2005) increased by 0.74°C and in the last years the air temperature was the highest during the whole observation period (Boian I., Scorpan V., 2007, Boian, 2012). Most of models show that climate aridity will increase during the 21st century. Climate change in recent decades has an obvious impact on birch populations and other plant species in the Republic of Moldova.

Our research was performed using the comparative method. We compared the state and the participation of birch trees in the Rosoşeni forest from the Briceni Forest District. The geobotanical descriptions carried out since 1972 were used in our research as starting point of our observations. The information from the forestry management plans carried out by the Institute of Forestry Research and Development in 1994 were analysed as also from 2004 and 2015. The composition of the birch forest stands was compared from 1994 when the impact of climate change on the birch trees was limited, compared with data from 2005 when the impacts of climate change were evident and compared with data from 2015 when the impact of climate change was very obvious. The main indicator is the composition of forest stands.

Our research results displayed the reduction of birch individuals through time and the total disappearance of birch from the Rosoşeni forest (Briceni Forest District).

Based on geobotanic descriptions performed in 1972 in the Rosoşeni forest body, the birch trees were growing in pedunculate oak forests according to Gheideman T. and Osadcii V. (1972) that indicated the presence of three birch species (*Betula pendula*, *Betula oicoviensis* and *Betula platyphilloides*). According to Postolache Gheorghe (1978) the birch forest communities were assigned to three plant communities: *Betuleto Quercetum (roboris) caricosum (brizoides), Betuleto (pdendulae) Quercetum (roboris) poosum (angustifoliae), Betuleto (pendulae) Quercetum (roboris) herbosum*.

The participation of birch trees was different. As for example there have been recorded only 2-3 birches trees in some forest stands, compared to other forest stands where birch accounted 2%, and in very few stands the number of birch trees represented 30% of total number of trees. According to forestry management plans from 1994, the forest tree composition was (9ST1MECI) (9 Pedunculate Oak, 1 Birch) in less wet areas (14A; 35A, 19M) compared with wetlands areas with more growing abundance of birch trees 7ST3MEPl (7 Pedunculate Oak, 3 Birch) in (26D, 26J, 36A).

The total forests area of pedunculate oak with birch in the Rosoşeni forest was 137.9 ha in 1994, and birch was about 65-70 years old, with 20-21 meters of height and 30 cm in the diameter. The birch trees used to produce many seeds but the seeds did not sprout, and as a result they were not birch seedlings in these forests. Thus the natural regeneration of birch was not achieved. This could be appreciated as an indicator of the impact of climate change on birch in the Republic of Moldova. We may consider based on our observations that the impact of climate change was evident in the period of between 1994 and 2004. As a result of the impact of climate change by 2004, the area of birch forests has been reduced to 65.6 ha, which is 47.5% of the area from 1994. Less affected were birch forests growing in more humid habitats (14A) compared with forest stands in more dry conditions.

Since 2007, many dry periods have been recorded which have been also in 2012 and 2014.

Climate change in the last years has had an evident impact on vegetation from the Republic of Moldova, including birch forest populations. Spontaneous Birch has disappeared from the Rosoşeni forest. Only solitary trees have been observed in some wetland areas in 2015 but most of them were affected by drying and also fallen trees have been noted. The rate of birch tree loss has increased and intensified even further in the last period. We may consider that spontaneous birch trees have disappeared in the Rosoşeni forest.

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PROPOSALS ON THE INCREMENT IN THE EXTENT OF NATURAL PROTECTED AREAS

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Plant diversity protection is realized by in situ conservation within 118 natural protected areas. Four protected natural areas have been created to preserve plants diversity of Fagus sylvatica forests, 32 natural protected areas have been created on an area of 15310,5 ha to preserve sessile oak forests (Quercus petraea), pedunculate oak forests (Quercus robur) with hornbeam (Carpinus betulus), 8 protected areas have been designed to protect plants diversity of pedunculate oak (Quercus robur) with cherry (Cerasus avium) forests on an area of 1076 ha, 24 natural areas on a total surface of 2042.7 ha preserve plants diversity of pubescent oak forests (Quercus pubescens), 11 protected areas include protected areas for in situ conservation of willow forests (Salix alba, S. fragilis) and poplar (Populus alba, P. nigra) from river meadows.

We propose to extend the Codrii Reserve with 2057.9 ha for in situ preservation of sessile oak forests diversity by joining the Capriana-Buda forest body from the Capriana Forest District (Straseni Forest Entreprise). The Capriana-Buda forest body includes plots 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22.

It is proposed to extend the "Cobac" protected natural area by joining the forests of the entire Cobac forest body from the Cioreşti Forest District (Nisporeni Forest Enterprise) to the Cobac protected area. The "Cobac" forest body includes parcels 3, 4, 5, 6, 7, 8, 9, 10, 11, 13, 14, 15 from the Ciorăşti Forest District. The total area of the "Cobac" forest body is 1059.5 ha. Thus, the protected natural area of Cobac will have an area of 1059.5 ha and will include natural forests as well as many beech forests.

It is recommended to extend the natural protected area "Teleneşti", with subplots 50B and 50G from the Teleneşti Forest Enterprise with a total area of 111 ha. Based on our research we propose to extend the Teleneşti protected area by including parcels 32, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 51, 52, 53, 54, 55, 56, 57, 58, 59. After this enlargement, the total area of the protected area of Teleneşti will be 2571,9 ha, of which 2412,4 ha (93,9%) natural forest, 135,3 ha (5,4%) planted forest stands and 24.2 ha (0.7%) of grasslands.

We also propose to extend the Ghiliceni Protected Area, which is located within the plot 24 with subplots A, O, L and K in the Madreşti Forestry District, the Teleneşti Forest Enterprise, with a total area of 38 ha. It is proposed to extend the protected area of Ghiliceni by including the forest parcels 19, 20, 21, 22, 23, 25, 26, 27, 31, 32, 43, 44. After this extension the Ghiliceni protected area will encompass a total area of 1141.4 ha, of which 860.8 ha (68.7%) natural forest stands, 231.0 ha (26.7%) artificial forest stands and 49.6 ha of meadows and other surface areas.

We recommend to enlarge the protected area "Scăfăreni", which is located in the parcels 3 and 4 of the Scăfăreni forest with an area of 97 ha, by joining with forest parcels: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 from Harjauca Forest District, Calarasi Forest Enterprise. The total area is about 330.4 ha. The surveyed area includes Quercus petraea, Quercus robur and few white poplar (Populus alba). The Scăfăreni forest body is located in the adjacent area of the Plaiul Fagului Scientific Reserve. In order to better realize biodiversity monitoring it is proposed to join the "Scăfăreni" forest body to the "Plaiul Fagului" Scientific Reserve. The protected areas of Hârjauca-Sipoteni and Leordoaia are located in the "Hârjauca - Leordoaia" forest body which includes the parcels: 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 52, 53, 54, 55, 56, 57, 58, 59, 60 from the Harjauca Forest District, the Calarasi Forest Enterprise. The total area is about 781.1 ha. In this area are growing forests of Quercus petraea, Quercus robur and few beech forests (Fagus sylvatica). We also recommend to enlarge the area of the protected area of Hârjauca-Sipoteni from 5.4 ha to 75.8 ha that will include subplots 41A, 41B, 41D, 41J, 41E, 41F, 41K, 41G, 42A, 42B, 42C, 42G, 42H, 43E, 43G, 43J, 43I.

We propose to extend the Protected Area Leordoaia from 67.7 ha to 225.7 ha by including subplots: 54A, 54E, 54F, 54I, 54G, 54K, 54O, 54R, 54S, 54T, 54U, 54V, 55A, 55C, 55D, 55F, 55G, 55H, 55I, 55L, 55N, 56B, 56C, 56F from Harjuuca Silvic District, Calarasi Forest Enterprise. All proposed protected areas are characterized by the presence of many rare plant populations, many areas with fundamental natural stands and many valuable plant species. After conservative value, the proposed surfaces are assigned to the category with high conservative value.

GERMPLASM CHARACTERIZATION AND EVALUATION DATA IN THE SYSTEM OF AGRO BIODIVERSITY CONSERVATION

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Keywords: *plant genetic resources, documentation system, characterization/evaluation data*

Gathering and sharing information about our agricultural biodiversity is vital to its conservation and use, for farmers, scientists, conservationists and breeders.

An indispensable part of the work of genebanks is the phenotypic characterization of accessions. Phenotypic data is also called characterization and evaluation data. Characterization refers to recording highly heritable traits, usually controlled by a single or very few genes, while evaluation refers to traits depending on several to many genes, whose expression is usually environment-dependent.

The characterization/evaluation of germplasm starts with the adoption of an appropriate descriptors list. Most of the descriptors for characterization/evaluation are species-specific. They are regarded as a standardized characterization system, which provide an international format and a universally understood "language" for describing the diversity of crops. Their use allows a rapid, reliable and efficient means for information exchange, storage, retrieval and communication, thereby facilitating the utilization of Plant genetic resources.

In order to facilitate standardization of information obtained during characterization/ evaluation, Bioversity International has been coordinating the development, publication and updates of various plant descriptor lists in close cooperation with crop experts and genebank curators. There are descriptor lists developed for more than 90 crops.

The descriptors could be qualitative and quantitative traits. The qualitative descriptors are morphological, physiological and molecular traits, whereas quantitative descriptors are subject to environmental factors such as edible yield and components, host plant resistance, stress tolerance etc. Descriptors states are a numeric value, a code within a scale, or a qualifier for any traits. The morpho-agronomic characterization consists in the analysis of germplasm, using specific descriptors developed by IPGRI (Bioversity International), the UPOV or other international consortia, and subsequent morphometric analysis.

Documentation of plant genetic resources, as well as services to collection curators, gene bank managers, and users of the genetic resources are provided by the National Information System - ReGen. ReGen consists of two conjoined databases - passport, characterization/evaluation data, which use a common unique identifier – the national accession number.

Characterization and evaluation of PGR is made using IPGRI (Biodiversity International) crop descriptors. A lot of information is documented manually and only a small part of these data has been computerized. In this case it is mentioned the collections of pepper (*Capsicum annuum* L.) and eggplant (*Solanum melongena* L.). The database contains passport data and characterization /evaluation data of, 152 pepper samples and 48 samples of eggplants.

The good characterization and evaluation of the genetic resources can provide breeders with valuable information on the genetic resources for their possible use in breeding programmes. In this way, an evaluation substantially increases the value of PGR collections for breeders and other users.

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CONTRIBUTIONS TO THE STUDY OF DRY GRASSLANDS HABITATS IN MUREŞ COUNTY (ROMANIA)

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Keywords: dry grasslands, Natura 2000 habitats, phytosociology

Romania retains some of the most significant resources of wildflower-rich lowland grassland in Europe [1]. Mures County is located in north-central Romania and it is characterized by a great diversity of plant taxa and habitats, because of the localization of the region, diversity of landforms (mountains, hills, hillocks and lowlands), and the various exposures and inclinations of the slopes. In the hilly area of Mures County and in the Transylvanian lowland, xerophilous and xero-mesophilous grasslands with great floristic diversity were identified. The floristic diversity was able to thrive and expand as a result of the human interactions which cause deep transformations to the area. This transformation was primarily due to changing the natural limits of the forest area which favored the considerable expansion of the grassy groups.

In the study area, we identified dry grasslands belonging to the Festuco-Brometea class. These grasslands were assigned to three types of Natura 2000 habitats: 6210* - Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometea*) (*important orchid sites), 6240* - Sub-pannonic steppic grasslands and 62C0* - Ponto-Sarmatic steppes. The type of habitat has been coded in accordance with Manual interpretation of habitats in Romania [3] and Habitats from Romania [4].

Qualitative structure monitoring of the habitats followed the method of highlighting the complex of species and different functional groups that characterize each habitat. Qualitative analysis of the structure was done considering floristic composition, coenotic groups, and plant associations using phytosociological surveys.

A number of 150 phytosociological surveys from 32 observation points located in all types of landform (Transylvanian lowland, Târnavelor Plateau, hilly area) were analyzed.

The identified phytocoenosis were classified in 12 plant associations from the Festuco-Brometea class: *Thymo pannonici-Stipetum stenophyllae* Sanda et al 1998, *Danthonio-Brachypodietum pinnati* Soó 1946, *Polygalo majoris-Brachypodietum pinnati* Wagner 1941, *Brachypodio pinnati-Festucetum rupicolae* Ghişa 1962, *Rhinantho rumelici-Brometum erecti* Sanda et Popescu 1999 (from 6210* habitat); *Medicagini minimae-Festucetum valesiacae* Wagner 1941, *Agrostio-Festucetum valesiacae* Borisavljevic et al. 1955, *Botriochloetum ischaemi* I. Pop 1977, *Thymio pannonici-Chrysopogonetum grylli* Doniţă et al. 1992, *Stipetum capillatae* (Hueck 1931) Krausch 1961 (from 6240* habitat); *Stipetum pulcherrimae* Soó 1942 and *Elytrigetum hispidi* (Dihoru 1970) Popescu et Sanda 1988 (from 62C0* habitat).

The most widespread grasslands investigated in this study are those edified by *Brachypodium pinnatum*. The coenoses with *Stipa pulcherrima* and *Stipa capillata* dominate on steep slopes mostly with south and south-west exposure; they occur in Transilvanian lowland and also on Târnavelor Plateau.

Many rare species present in national and international red lists [2, 5] as well as a number of phyto-geographically important plant species were identified in the floristic composition of these grasslands.

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PRESENT LOCATION OF *LIPARIS LOESELII* (L.) RICH. *(ORCHID ACEAE)* IN THE LEFT-BANK DNIEPER (UKRAINE) AND THEIR PROTECTION

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Keywords: *Liparis loeselii, rare species, location, protection, left-bank Dnieper*

Liparis loeselii (L.) Rich.is the representative of Orchidaceae family with Holarctic amphiatlantic area in most parts of Europe and North America with minor distribution in Asia. Everywhere it is characterized by the rarity and also small populations. The number of species in the last decade in many European countries is declining, though it has rather high International protection status: it is included to Annex I of the Bern Convention, Annex II b and IV b of the European Union Directive on Habitats, Appendix II to the CITES Convention, Annex A of the EU Regulation on Trade of Wild Flora and Fauna objects. Moreover, it has the national conservation status in Russia (listed in the Red Data Books of 41 subjects of the Russian Federation), Belarus and some other countries. In Ukraine, it is included into the Red Data Book of Ukraine with the conservation status «Inerable» and protected on the areas of some nature reserves (Kanivskyi, Cheremskyi), national parks (Shatskyi, Bilozerskyi), some natural reserve objects of local significance.

In Ukraine, this boreal species was identified in the Carpathians, Polissia, rarely in the forest-steppe and even steppe zone and is located on the southern border of the area. Therefore, determining of new localities of the species in Ukraine, phytosozological monitoring and protection of already known are the important environmental objectives nowadays.

The species distribution on the territory of the left bank Dnieper within the left-bank forest-steppe of Ukraine is studied in research. The long-standing data about *Liparis loeselii* locations that were registered in the mentioned region are known, they are accepted missing nowadays.

According to the results of the literature data and herbarium collections, as well as original field materials, it was determined the present location of the species on the left bank Dnieper: Kyiv region: on the pine-forest terrace of the Dnieper, near paths among the bulrush (Pereiaslav-Khmelnytskyi district, village Stovpniahy (Chorna H. A., 23.06.2014 KW); meadow near the pond of the farm «Nivka», village Novobilychi, to the right of the Brest-Litovsk highway, near the Nivka river (Timchenko I. A., Shevchenko M., Parnikoza I., 14.06.2006 KW); in the swamp (Pereiaslav-Khmelnytskyi region, ouside the city on the way to Cherkasy for about 5 km, Belozerske forestry (Kretsul O. A., Timchenko I. A., 25.06.2010 KW); on the Bile lake in SPE Biloozerskyi (Kyiv, Cherkasy region (Yarova O. A., 2012); Poltava region: in the peripheral strips of sphagnum bogs-saucers among the pine-forest massives in the lower reaches of the Vorskla river (Kobeliaky district, the islands on the Dniprodzerzhynsk reservoir «Novoorlytski kuchugury», «Vyshniaky», «Kramareve», peninsula «Pelykhy» (at present are protected within the regional landscape Park «Nyzhniovorsklianskyi», Smoliar N. O., monitoring since 1994); on the terrace near swamp in the environs of the village Borivske on the territory of Borivske forestry (landscape reserve of local significance «Velykyi ta Malyi Lymany», Smoliar N. O. monitoring since 2015).

In conditions of the left-bank Dnieper *Liparis loeselii* can be found in small sparse groups up to 10 (20) objects in open sedge-sphagnum bogs with enhanced mineral nutrition, peat flood plain with the inflow of groundwaters in the group composition of the classes Oxycocco-Sphagnetea, alliance Calthion classes Molinio-Arrhenatheretea, Phragmiti-Magnocaricetea.

The leading biological factors that limit the distribution of *Liparis loeselii* (possible mycorrhiza formation and competition from other species), and negative environmental factors (violation of the hydrological and light regimes in habitats, climate change, the destruction of the typical and potential biotopes) were determined as the main threats for the studied species.

The nature-protected sites, as well as projected objects of Emerald network (Nyzhniovorsklianskyi RLP (UA 0000059), Borivskyi reserve (UA 00000184), etc.) provide the preservation of biotopes with *Liparis loeselii* in the left-bank Dnieper.

SESQUITERPEN-LACTONE PROFILE FOR *ARNICA MONTANA* L. SPECIES IN NATURAL GROWING SITES FROM THE ROMANIAN EASTERN CARPATHIANS

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***Keywords**: sesquiterpen-lactone, HPLC-MS, flowerheads, leaves, Romanian Eastern Carpathians*

Arnica montana L. is a medicinal plant with traditional use in Europe for treating blunt injuries and rheumatic disorders (Aiello *et al*., 2012). Due to the changes in land management and its intensive collection from nature, it is rare in Europe and a vulnerable species in Romania.

Our study aimed the assessment of the sesquiterpen-lactones (SLs) content in the flowerheads (main and secondary flowerheads, harvested in early flowering stage and full flowering stage) and leaves collected from wild populations at different altitudes: 5 sites at 800 - 1000 m and 5 sites at 1000 - 1700 m.

For the isolation of the sesquiterpen-lactone fraction, the method from the European Pharmacopoeia was used. The phytochemical analysis was performed using a HPLC-DAD system.

The separation and identification of SLs was achieved by using and Agilent 6500 Series Accurate-Mass Quadrupole Time-of-Flight (Q-TOF) LC/MS system, while for quantification of total SLs (expressed as dihydrohelenalin tiglate, %) an HPLC Agilent 1200 Series (UV-VIS DAD) system was used.

In all flowerhead samples, 14 SLs were separated, out of which helenalin (H), 7 helenalin esters and 7 dihydro-helenalin (DH) esters: H-acetate, H-methacrylate, H-isobutyrate, H-tiglate, H-2-methylbutirate, H-isovalerate, 11,13-DH, DH-acetate, H-methacrylate, DH-isobutyrate, DH-tiglate, DH-2-methylbutirate, DH-isovalerate. The phytochemical profile is similar with that obtained by Perry et al. (2009).

The SLs profile of the leaves samples was slightly different, by the absence of helenalin.

In the flowerhead samples the content of helenalin esters is higher than dihydrohelenalin esters content, which indicates that the plant material harvested from the natural growing sites in the Romanian Eastern Carpathians is included in the helenalin/dihydrohelenalin esters specific to Central Europe, which has a higher ration of helenalin esters (Perry et al., 2009).

Quantitavely, the total SLs amounts varied from 0.268 – 1.270% for the main flowerheads in early flowering stage, 0.903 – 1.426% for the main flowerheads in full flowering stage, 0.773 – 1.275% for the secondary flowerheads in early flowering stage and 0.759 – 1.366% for the secondary flowerheads in full flowering stage. The SLs content in leaves samples was of 0.209 – 0.431%.

H-2-methyl butyrate (0.115 – 0.319%) and H-isobutyrate (0.133 – 0.320%) were the main compounds in the flowerheads samples, while H-methyl acrylate (0.101 – 0.179%) was the main SLs in leaves samples.

The flowerheads at full flowering stage have a higher SLs content when compared with the ones harvested in early flowering stage, both for the main and secondary flowerheads. There are no major differences between the main and secondary flowerhead samples harvested from the same growing site.

Regarding the altitudinal gradient, no clear tendency of SLs accumulation was observed.

Like main flowerheads, the secondary flowerheads can be harvested without affecting the SLs yield. In addition to the flowerhead, the leaves can be important sources of SLs. By using this additional SLs sources, the pressure on this species in natural growing sites is reduced.

This is an important aspect in developing sustainable harvesting strategies and in the introduction of the species in cultures.

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MARSH FORESTS IN NORTH-WESTERN TRANSYLVANIA CONSERVING GLACIAL RELICTS AT LOW ELEVATION

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***Keywords**: marsh forests, lowland glacial refugia, relict plant species.*

Abstract: A series of scientific documents and new data from the field suggests that the Carpathian Basin was a refugium in the last glacial period for many species of plants and animals. This region belongs in the category of extra-Mediterranean refugia, the so-called cryptic northern-refugia, on whose territories were woods and extensive marshlands which maintained a specific microclimate that helped the survival of continental species, mostly from mountain origin. These habitats formed the lowland glacial refugia, being distributed in plains and hills outside the area of the Carpathians. Even if the climate has changed, a number of exceptional elements allowed the survival of these mountain species until the present days in the lowland regions, being the last remnants of those periods.

The marsh forests maintain these perfect conditions for the survival of the mountain species: high humidity, coolness, peaty soils etc., the microclimate being maintained and stabilized even by the trees. The main types of forests that preserved these species are the alder forests dominated by *Alnus glutinosa* and the damp oak (*Quercus robur*), elm (*Ulmus laevis*) and ash (*Fraxinus angustifolia*) forests. The alder forests conserve even larger areas of peat moss (*Sphagnum*), which sometimes form floating islets, together with species like: *Menyanthes trifoliata, Angelica palustris, Carex appropinquata, Betula pubescens* subsp. *carpatica, Calamagrostis stricta, Calamagrostis canescens, Carex rostrata, Carex lasiocarpa, Epilobium palustre* etc. Other marsh forests types with some glacial relicts are formed by *Populus alba* and *Salix alba*, only in the lowlands.

The humid oak forests preserves not only high altitude relict species (*Trollius europaeus, Centaurea triumfettii* subsp. *stricta*), but also the vegetation cover of the beech forests from the mountain areas that came down on the plains during the Subboreal period (*Galium odoratum, Sanicula europaea, Lilium martagon, Listera ovata, Galanthus nivalis, Athyrium filix-femina* etc.). Several mountain species (*Pedicularis palustris, Carex davalliana, Carex flava, Cirsium palustre, Salix aurita*) were reported in the former Ecedea Swamp (northern part of the Western Plain), now drained, which was covered by alluvial forests, being famous for its wilderness and the richness of marsh and aquatic species.

The present study aims at identifying and mapping these forests with relict species, by contributing to a better understanding of the vegetation dynamics of glacial and postglacial periods in Central Europe, the protection and preservation being particularly necessary in the future.

CONSERVATION OF PLANTS DIVERSITY IN „ANASTASIE FĂTU" BOTANIC GARDEN OF „ALEXANDRU IOAN CUZA" UNIVERSITY FROM IAȘI

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Keywords: conservation, diversity, plants, botanic garden.

„Anastasie Fătu" Botanic Garden within „Alexandru Ioan Cuza" University from Iași has a key role in didactic, scientific and education activity, focused on pant diversity conservation and their use as a long term resource (TĂNASE (ed.), 2016). The plant genetic fond of the 10 sections is currently represented by 8.459 taxa.

By its area, by the complexity of scientific themes and its specific functions, „Anastasie Fătu" Botanic Garden allow the approaching of some complex problems of landscape planning and *ex situ* conservation of plants (STĂNESCU et al., 2009; TĂNASE et al., 2012; TĂNASE (ed.), 2016).

The strategic directions of „Anastasie Fătu" Botanic Garden are focused on various aspects regarding native species conservation, development of endemic, rare and threatened plant species collections (MARDARI et al., 2007), development of over-exploited species collections, of germplasm resources, studied of reproduction biology and micro-propagation, genetic variability and eco-morphology. Since 2002 the garden is a founder member of the Association of Botanic Gardens from Romania and is affiliated, starting with 2003 to Botanic Gardens International Association.

Since 2009 „Anastasie Fătu" Botanic Garden is an IPEN member (*International Plant Exchange Network*), and since 2011 is member within *Botanical Gardens of Coimbra Group Universities*.

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CONTRIBUTION TO THE STUDY OF PLANT COMMUNITIES DOMINATED BY *TEUCRIO POLII – MELICETUM CILIATAE* (PUȘCARU V. ET AL., 1978) FROM THE REPUBLIC OF MOLDOVA

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Keywords*: Plant community, association, relevés, Festuco-Brometea.*

INTRODUCTION

Plant communities of *Teucrio polii – Melicetum ciliatae* (Pușcaru V. et al., 1978), are widespread in the territory of districts Cahul and UTA Găgăuzia, in the semi-desert steppes from the southern part of Moldova. The semidesert steppe association is intersected in this zone by a number of rivers: Cahul, Prut and Ialpug (Săvulescu, 1927; Postolache 1993, 1995).

MATERIAL AND METHOD

I have realized a phytosociological study in 2007-2011, that had as result the identification of species and plant communities in the districts Cahul and UTA Găgăuzia. The present study is based on 15 vegetation relevés. Phytosociological surveys were conducted according to the classical methodology of the Zürich-Montpellier school (Braun-Blanquet, 1964).

RESULTS AND DISCUSSIONS

The ecology and phytocoenological characterisation. The association *Teucrio polii – Melicetum ciliatae* is widespread in the steppe zones as secondary vegetation type in semi-desert steppes, developing mostly on base rich terrains and erosional landforms in river valley. The floristic composition of the association is rich 52 species. The dominant species *Melica ciliata* and *Teucrium polium* realizes a covering of vegetation with values between 70 and 80%, while the characteristic species has a high constancy in the frame of the association. The analysis of the ecologic spectra: xerophytes - 75%, xeromesophytes species - 25%. The spectrum of the bioformes - the hemicryptophytes are clearly dominant 48%, followed by the therophytes with 34,6%, chamaephytes 7,6%, geophytes 5,7% and fanerophytes 3,8%. The analysis of the phytogeographic elements euroasiatic element 46,1% and pontic species 36,5%, followed by the european and mediterranean 5,7% each, central-european 3,8%, atlantic by one species. The economical plant importance. Analyses of plant from wild flora is represented by eight categories of economical plant importance. The most numerous are the industrial 27 species, decorative 23 sp., melliferous 21 sp., medicinal 18 sp., feed 13 sp., alimentary and toxic 6 sp., and aromatic plant have four species.

CONCLUSIONS

Plant communities of *Teucrio polii – Melicetum ciliatae* (Pușcaru V. et al., 1978), in the territory of districts Cahul and UTA Găgăuzia, have describe and according with 15 vegetation relevee. This associations steppe has been occupied by a variety number of balkas, deeply notched valleys, erosion ravines and river valleys: Prut, Cahul și Ialpug. This type of vegetation is similar to the strongly degraded grasslands that can be found on the territories of former carbonates soils grasslands. The floristic compositions of plant communities described is unstable and reflect local conditions in this arid steppes and wich confirm dominance species by the Festuco-Brometea elements. Species dominant *Teucrium polium* and *Melica ciliata* is more common and have a coverage level of 60%. In the analysis of the ecologic spectra dominant is xerophytes with 75% and in the phytogeographic elements most euroasiatic with 46,1%. The characteristic species are assigned the following: *Artemisia absinthium, Ajuga chia, Salvia austriaca, Ceratocephala testiculata, Taraxacum serotinum, Astragalus corniculatus, Chamaecytisus austriacus, Poa bulbosa, Bromus japonicus și Nigella arvensis.*

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HIGHLY THREATENED SPECIES OF ROSOIDEAE IN THE FLORA OF THE REPUBLIC OF MOLDOVA

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Keywords: *Rosoideae, rare species, conservation status, Red Book, R. Moldova*

The conservation of the diversity of living organisms has two distinct aspects: the identification of endangered species and the immediate measures necessary for their salvation, on the one hand, and the correct application of these measures in endangered biocenotic systems, on the other hand.

In recent decades, the ecosystems and the biodiversity of the Republic of Moldova have undergone intense anthropogenic impact, because of which, the natural habitats of many endangered species have been destroyed, the specific spreading areas of these species have reduced and the structure of plant populations has suffered quantitative and qualitative changes. Besides, much of the plant populations are at the boundaries of their specific spreading areas, which increases their vulnerability to climatic disturbances and anthropogenic impact.

Considering these facts, the list of rare species of *Rosoideae* (*Rosaceae* Adans.) is of first priority and was elaborated in 2007-2017, based on the available data and new field observations, as a result of a complex research.

The assessment of the conservation status of all the species and their classification have been done in accordance with internationally accepted standards, applying categories and criteria developed by the International Union for Conservation of Nature (IUCN, 2001, version 3.1)[1, 2].

The rare taxa have been categorized as follows:

Extinct in the wild (EW) – *Sanguisorba officinalis*;

Critically Endangered (CR) – *Alchemilla micans* CR B1a+2ab (i, ii, iii) and *Rosa turcica* CR B2ab (ii, v);

Endangered (EN) – *Rosa frutetorum* EN B2ab (i, ii, iii); C2a (i); *Rosa micrantha* EN B2ab (i, ii, iii, iv); C2a (i); *Rosa inodora* EN B2ab (i, ii); D; *Rosa balsamica* EN B2ab (i, ii, iii); D; *Rosa pygmaea* EN B2ab (ii, iii, v); D; *Potentilla micrantha* EN B2ab (i, ii, iii, iv) C2a (i); *Potentilla astracanica* EN A4c; B2ab (i, ii, iii, iv); C2a and *Potentilla humifusa* EN B2ab (i, ii, iii, iv); C2a;

Vulnerable (VU) – *Rosa villosa* VU B2b (i, ii, iii, iv); C2a (i); D2; *Rubus idaeus* VU D2 and *Potentilla alba* VU B2b (i, ii, iii, iv); C2a (i).

Three of the 14 threatened species of *Rosoideae*, *Potentilla astracanica* Jacq., *Rosa frutetorum* Bess. and *Rosa pygmaea* Bieb., have been included in the Red Book of the Republic of Moldova, 3rd edition [3], 11 species (*Alchemilla micans* Buser, *Rubus idaeus* L., *Potentilla alba* L., *P. astracanica* Jacq., *P. humifusa* Willd. ex Schlecht., *P. micrantha* Ramond ex DC., *Rosa frutetorum* Bess., *R. balsamica* Bess., *R. villosa* L., *R. micrantha* Borrer ex Smith, *R. turcica* Rouy) have been recorded in the natural areas protected by state, and *Potentilla alba* L., *P. micrantha* Ramond ex DC., *P. humifusa* Willd. ex Schlecht., *P. astracanica* Jacq. and *Rosa frutetorum* Bess. are protected *ex situ*, in the collections of the Botanical Garden.

To protect these taxa in their natural habitat, it is necessary to comply with the rules that ensure in situ conservation in the areas where these species grow, and to monitor the status of the existing populations. In this context, we recommend including the following species of *Rosoideae*: *Alchemilla micans, Potentilla micrantha, P. alba, P. humifusa, Rosa villosa, R. turcica, R. inodora* and *R. micrantha*, in the 4th edition of the Red Book of the Republic of Moldova.

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THE POTENTIAL OF REGIONAL RED LISTS AS TOOLS IN CONSERVATION OF PLANT DIVERSITY. Case Study: Arad County (Romania)

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***Keywords**: red list, conservation, plant diversity*

Legal designation of protected natural areas and setting of red lists (of species, recently, also of habitats and ecosystems) are basic instruments in the nature conservation. Red lists are established, as a rule, at national scale and then at community (European Union) and international levels, although the conservation measures are applied at the scale of a protected area or Natura 2000 site, and the control and coordination of these actions are made at the scale of a county and/or region. Starting from these considerations, we propose, for the Arad County, a red list of cormophytes species, starting from the national red lists (Dihoru & Negrean, 2009, mainly) and from 43/92/CEE Directive annexes, by addition of some species that are not included in these lists, but which are represented by small populations and/or present in few places. These species which are not included for the moment in the *sozological categories* defined by The International Union for Conservation of Nature (IUCN), have a regional importance, in the functioning of ecosystems (components of structural biodiversity and support of functional biodiversity), ethnobotanical importance and direct economic importance or through tourism. As an example of a species which deserve the inclusion in a local/regional red list, we present the white lily (*Nymphaea alba* L.) a species with the Least Concern status, according to IUCN, but whose spontaneous populations have largely disappeared in the majority of the county territory as a result of the habitats disappearance (drainage works, damming); the lilies pond from Mureș Floodplain Natural Park is an objective for conservation as well as for tourism. Red Lists defined at the scale of a county has the potential of permitting the application of focused conservation measures through which one can prevent the disappearance of cormophyte populations. Other examples of species included in the proposal for the Arad county red list are *Ilex aquifolium* L., *Paliurus spina-christi* Mill., *Iris halophile* Pall., *Sedum cespitosum*(Cav.) DC., *Spergularia media* (L.) C. Presl (=*S. maritima* (All.) Chiov.), *Narcissus poeticus* L. subsp. *Radiiflorus* (Salisb.) Baker.

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DISTRIBUTION OF AROMATIC CARBOXYLIC ACIDS IN *LUPINUS ANGUSTIFOLIUS* L. SEEDLINGS

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Keywords: *blue lupine, chlorogenic acid, gallic acid, ferulic acid, cotyledons*

Introduction. Lupine seed germination is epigeal. The cotyledons emerge above the soil surface and become the first photosynthetic organs. The growing tissues of the seedlings are supplied with carbon from both sources, such as products of decomposition of the seed reserve substances and products of photosynthesis. The processes of the polysaccharide, protein, lipid and amino acid mobilization [1-3] during germination are accompanied by the less studied metabolism of the phenolic compounds.

Aim of the study. A comparative assessment of the aromatic carboxylic acids content in the cotyledons and first palmate leaves of blue lupine seedlings.

The objects of investigation were genetically related samples of narrow-leaved lupine differing in alkaloid content and branching peculiarities: cv. Nemchinovsky 846 (indeterminate habit, medium-alkalod level), both the highly restricted branching mutants: cv. Ladny (low-alkaloid level) and the sample Nemchinovsky 846 x Mut1 (high-alkaloid level).

Methods. The plants were grown in the field trial in Moscow region conditions. The four-day seedlings at the stage of the cotyledon opening - the first palmate leaves appearance were taken for analysis. The seed leaves and the first palmate leaves were taken at the same time at 10 am and were dried to an air-dry state in a thermostat at temperature 55°C. The samples of 0.2 g dry matter were extracted with a 10 ml methanol. The chromatographic quantification of the phenolic compounds was performed by HPLC-method. Detection was made at a wavelength of 254 nm. The solvent system consisted of a mixture of acetonitrile: 0.03% trifluoroacetic acid (15:85, *v*/*v*). All contents were expressed as milligram per 100 g DW.

Results and discussion. HPLC chromatograms contained 13 characteristic peaks corresponding to the retention time of various substances, of which four peaks were higher in chromatograms of cotyledons extracts and four peaks were higher in chromatograms of leaves extracts in all three blue lupine stocks.

Based on the availability of the chemical reference standards, the quantitative content of chlorogenic, gallic and ferulic acids was determined by the results of HPLC analysis. The general pattern of aromatic acids distribution in the studied samples was as follows.

The content of gallic acid was in the range of 0.9-2.0 mg, ferulic acid was from 76.5 to 197.7 mg both in cotyledons and leaves. The gallic acid content in the cotyledons was 1.3 times higher than in the leaves. On the contrary, the ferulic acid content in the cotyledons was 1.2-1.7 times less than in the leaves.

The chlorogenic acid was found mainly in the cotyledons (60.3-242.8 mg). The presence of chlorogenic acid in young leaves was found only in the one sample (4.1 mg).

The established regularities were probably associated with the participation of the aromatic acids in the hormonal regulation of both the growth processes and the polysaccharide breakdown as well as the formation of phenolic polymers during germination and seedling development [4-7].

The discovered features of the distribution of aromatic acids in seedlings depend on both the time of day and the age of cotyledons and leaves, but are not related to the alkaloid content and branching type.

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2. PLANT INTRODUCTION AND SUSTAINABLE USE OF PLANT RESOURCES

ANTIOXIDANT ACTIVITY OF SAFFLOWER (*CARTHAMUS TINCTORIUS* L.) IN THE PROCESS OF VEGETATION

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Keywords*: safflower, antioxidant activity, extract, leaves, petals.*

INTRODUCTION

Evaluation and selection of crops with high antioxidant activity, the composition of the study, content and physico-chemical properties of water-soluble antioxidants, and the study of the mechanisms of their action are relevant and necessary for further use the knowledge gained to create functional food products that strengthen human health and reduce the degree of risk of various diseases. The aim of our study was to investigate the antioxidant activity in the process of growing the introduced in the Moscow region culture safflower variety Krasa Stupinskaya (FGBNU VSTISP) under different farming practices.

MATERIALS AND METHODS

The studies were performed in 2013-2015 years in the Center Gene pool and Bioresearches of plants FGBNU VSTISP (Moscow region). Object of the research – the leaves and petals of safflower variety Krasa Stupinskaya, collected in phase branching, bud formation, flowering and maturation. The experience founded on the study of the antioxidant activity according to the methods of farming: seed rate – 10, 12 and 14 kg/ha, depth of seed placement – 3, 5, 7 cm. The total antioxidant activity of aqueous and alcoholic extracts was measured by a spectrophotometer Heliosa DPPH [2, 3].

RESULTS AND DISCUSSION

In 2015 we studied the dependence of the total antioxidant activity (AOA) of the methods of farming: seed rate and depth of seed placement. Demonstrated its high antioxidant activity of alcohol extracts in the phase branching at a depth of seed placement of 5 cm – 90.67%. The water extracts antioxidant activity increases from the phase branching to the phase of budding – 52.06 and 64.40%, respectively, at a depth seed placement of 5 cm. To the aqueous extracts of antioxidant activity increasing from phase of branching to phase of budding – 52.06 and 64.40% respectively, at depth of embedment 5 cm. At a depth of seed placement 3 and 7cm there is a decrease antioxidant activity in both extracts. At seeding rates of seeds of 14 kg/ha antioxidant activity higher that in the alcoholic extracts. The aqueous extracts obtained high result at the seeding rate of 10 kg/ha in all the phases growing: branching, budding, flowering and ripening – from 56.42 to 60.72%.

In the analysis of safflower petals proved their high antioxidant activity. Has been revealed the dependence of the total antioxidant activity of the color (yellow, white, red) petals. In alcoholic extract of petals of red color antioxidant activity is 2 times less than that of the petals of white color, and amounts to 30.90%. The antioxidant activity of aqueous extract petals of red color higher by 12.86% (84.23%), than in petals white color (71.37%). Antioxidant activity of methanolic extract of yellow petals is 1.4 times less than in the petals of white color and is 1.6 times higher than in the petals of red color (51.75%). The antioxidant activity of an aqueous extract of petals of yellow color is within the 88.43% (on the average 1.2 times higher than that of the petals white color and by 4.2% higher than that of the petals of red color). The total antioxidant activity of the alcoholic extract of petals safflower white color has higher values compared to the samples petals of red and yellow in color and an average constitute of 73.56%. In aqueous extracts have greater antioxidant activity a petals yellow color – 88.43%.

CONCLUSIONS

Leaves and petals of safflower variety Krasa Stupinskaya possess high total antioxidant activity. Optimal physical and biochemical parameters of the content of the antioxidant activity in aqueous and alcoholic extracts of variety Krasa Stupinskaya increased from phase branching until the end of the growing season when depth of seeding of 5 cm. The antioxidant activity of alcohol extracts of the above at norm or rate seeding of seeds 14 kg/ha, in aqueous extracts of high result obtained when seeding rate of 10 kg/ha. The maximum antioxidant activity in alcohol extracts was obtained at was obtained at seeding norm 14 kg/ha, in aquatic extracts a high result was obtained at was at seeding norm of 10 kg/ha.

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VEGETATIVE REPRODUCTION OF FORMS AND HYBRIDS OF WALNUT FOR QUALITY AND PRODUCTION IMPROVEMENT

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Keywords: *Vegetative reproduction, Juglans regia, rootstock selection, tissue culture, productivity.*

Vegetative reproduction is very important in selection work, being the main method of preparing of planting stock in many regions. Nevertheless, experience in vegetative planting in different years in the Crimea, Georgia, Czechoslovakia and other countries did not bring expected results to many selectionists. Differences have been revealed in the filed of preservation, establishment and condition of the plants, grown by different methods in this region and in natural area.

It is reasonable to make plantings by seed method, certainly using winterhardy seeds of local species. Seeds are preferable in case of natural species; and cuttings are preferable in case of hybrids. Hybrid walnuts have the potential to be a fast-growing home-grown hardwood alternative to timber imported from far away. They do not have the dark heartwood so prized by furniture makers but hybrid walnut timber is easy to work. can be sliced for veneer and is easily stained. Lastly yet importantly, they are likely to benefit from projected climate change.

There are different walnut species utilized for valuable timber production. The most popular is Common walnut (Juglans regia), original from Central Asia and utilized in Europe for nut production for millennia. Other species with remarkable commercial interest are the black American walnuts (Juglans nigra, J. major, J. hindsii).

Tissuecultured walnuts on their own roots have proven to be more vigorous and productive than conventionally propagated walnuts. Also, tissue culture is an efficient tool to help breeders select and test possible superior genotypes. Walnut tissue culture requires research to be performed on almost every new clone, variety to be propagated.

Differences with tissue culture behavior between species are greater than with other vegetative propagation methods. J. nigra has shown to have very different requirements than J. regia, and its performance in vitro is more difficult. This is just one illustration, but shows the trend of the entire genus.

When a specific rootstock is needed because the presence of particular soil condition, it is desirable to use clonal material coming from superior selections. Under those circumstances, performance of the trees will be better than those grafted onto seedling rootstocks.

Tissue culture is also a determinant tool to make a good rootstock selection, because there is a reliable method for the necessary propagation of the original selected trees in order to get enough repetitions to perform field tests in different conditions.

The use of tissue-cultured walnuts for timber production seems to be as favorable as for nut production, or probably more, because vigor is usually a more desirable feature for timber production. Selected clones can improve both productivity and timber quality, and can allow the utilization of plant material adapted to specific soil or climatic conditions, or resistant, tolerance to either soil or air borne pathogens. Uniformity of plantations will be greater, and phytosanitary treatments can be applied more effectively. In the case of self-rooted trees, the lack of graft union may avoid the presence of defects to the wood that could reduce the price of the timber, although selected clonal rootstocks can be used if necessary. Particularly, J. nigra, where soil diseases are not a problem, and most of the clonal selections are based on the features of the scion, propagation of the same by tissue culture to produce self-rooted clonal trees is a feasible possibility when looking for increased productivity, shortened rotations and higher quality timber. In the same way as for nut producing trees, when clonal rootstocks provide desirable features, tissue culture is the only propagation method available for them.

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WALNUT BREEDING FOR SELECT AND DEVELOPMENT OF NEW HYBRIDS AND ROOTSTOCKS

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Keywords*: Hybrid walnuts, rootstock, selection, development, orchards.*

Cultivated walnut varieties, generally well adapted to climatic conditions of the different production zones, often lack some important agronomic characteristics. It would therefore be useful to select in natural populations or create through hybridization new cultivars combining characters of improved climate adaptation, early fruiting, high productivity, disease tolerance and quality fruit production. This is possible given the very large and so far unexploited variability within the Juglans regia L. species.

Long juvenility period and high variation between trees in terms of different characteristics, usually make it impossible to establish uniform orchards. Yield and quality of fruit and kernel is low and could not compete with the production of the countries that have used the cultivars. So, breeding and introducing of new suitable walnut cultivars is necessary for walnut development.

Poor walnut tree health usually associated with wrong rootstock selection, or growth in areas with inadequate topsoil depth, have inculcated a strong traditional resistance amongst growers and horticultural developers to walnuts as a viable alternative crop for the region. Recent trials comparing Juglans hindsii, a traditional rootstock for the area, with a new selection of Paradox rootstock, have shown the Paradox entity significantly outperforms J. hindsii in terms of scion growth in the first year.

However, both the common walnut Juglans regia and black walnut J. nigra are quite particular in terms of optimal growing conditions. Hybrid walnuts provide an exciting alternative. It is possible to encourage and control hybridisation through tree breeding programmes. Hybrid species tend to have greater than either of their parents, and may be more tolerant to a wider range of conditions.

Across Europe several varieties of walnut hybrids have been bred and made commercially available. They include both Juglans nigra x J. regia and J. major x J. regia crosses, all of which are vigorous and have good form. Hybrids planted into existing woodlands in continental Europe have grown very well, generally have good apical dominance and fewer branches than either species. Most producers plant more than one variety, primarily for adequate pollination, because varieties behave differently to natural environmental occurrences and to cultural treatments. Butternut (Juglans cinerea), also known as white walnut, is a native hardwood related to black walnut (Juglans nigra) and other members of the walnut family. Butternut is a medium-sized tree with alternate, pinnately compound leaves that bears large, sharply ridged and corrugated, elongated, cylindrical nuts born inside sticky green hulls that earned it the nickname lemon-nut.

The prevalence of blackline disease in an area will also affect the choice of scion and rootstock to plant in an orchard. Blackline disease causes the death of the graft union after infection by a pollen-transmitted virus when trees are grafted on either black or Paradox rootstock.

Root systems have a strong influence on the vigor of the tree. Vigorous rootstocks are commonly used to increase productivity or to decrease it. This feature is especially important when dealing with trees, as most of the research in breeding with walnuts has been looking for very vigorous scions that must be grafted on seedling rootstocks of unknown and heterogeneous growth capabilities. Once selected scions are shown to be very vigorous and productive on their own roots, it can be assumed that micropropagated selections of walnuts must result in more homogeneous and vigorous trees than the same selections grafted onto seedling rootstocks.

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THE INTRODUCTION OF GYMNOSPERMS FROM NORTH AMERICA IN THE REPUBLIC OF MOLDOVA

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Keywords: *gymnosperms, plant introduction, North America.*

The natural conditions of the Republic of Moldova are quite favourable for the growth of various woody plants. This fact explains the relative richness of the dendrological flora (more than 140 species of trees and shrubs, including 1 species of gymnosperms – *Ephedra distachya* L.). By 2017, i. e. during more than 150 years, the introduced dendrological flora of the Republic of Moldova has been enriched with 181 species, subspecies, varieties, hybrids and over 900 cultivars of gymnosperms, belonging to 6 families and 28 genera. The largest number of species represents the following genera: *Picea* Dietr. (28 species; 194 cultivars); *Thuja* L. (3; 113); *Juniperus* L. (22; 145); *Pinus* L. (51; 149); *Chamaecyparis* Spach (4; 121); *Abies* Mill. (25; 57); *Larix* Mill. (11; 21) [1].

More than 50 species of gymnosperms from the North America have been tested in the Republic of Moldova. Among them, the following should be noted: ***Pinus*** *aristata* Engelm., *P. banksiana* Lamb., *P. contorta* Douglas ex Loudon, *P. contorta* Douglas ex Loudon var. *murrayana* (Balf.) Engelm., *P. flexilis* E. James, *P. jeffreyi* Balf., *P. longaeva* D. K. Bailey, *P. monticola* Douglas ex D. Don, *P. ponderosa* Douglas ex C. Lawson, *P. ponderosa* Douglas ex. Lawson var. *scopulorum* Engelm., *P. resinosa* Aiton, *P. rigida* Mill. *P. strobus* L., *P. taeda* L., ***Picea*** *breweriana* S. Watson, *P. engelmannii* Parry ex Engelm., *P. glauca* (Moench) Voss, *P. glauca var*. albertiana (S. Br.) Sarg. (syn. *P. albertiana* S. Br.), *P. x lutzi Little (P. glauca x P. sitchensis), P. mariana* (Mill.) Britton, Sterns & Poggenb., *P. pungens* Engelm., *P. rubens* Sarg., *P. sitchensis* (Bong.) Carrière, ***Pseudotsuga*** *menziesii* (Mirb.) Franco, *P. menziesii* var. *glauca* (Beissn.) Franco, ***Larix*** *laricina* (Du Roi) K. Koch, *L. occidentalis* Nutt., ***Tsuga*** *canadensis* (L.) Carrière, *T. mertensiana* (Bong.) Carrière, ***Abies*** *amabilis* (Dougl. ex Loud.) Forb., *A. balsamea* Mill., *A. concolor* (Gord.) Ldl. ex Hildebr., *A. concolor* var. *lowiana* (Gord.) Lemm., *A. frasieri* (Pursh) Poir., *A. lasiocarpa* (Hook.) Nutt., *A. lasiocarpa* var. *arizonica* (Merriam) Lemmon, *A. procera* Rehder (syn. *A. nobilis* Lindl.), ***Sequoiadendron*** *giganteum* (Lindl.) J. Buchholz, ***Taxodium*** *distichum* (L.) Rich., ***Thuja*** *occidentalis* L., *T. plicata* Donn ex D. Don, ***Chamaecyparis*** *lawsoniana* (A. Murray bis) Parl., *Ch. thyoides* (L). Britton, Sterns & Poggenb., ***Cupressus*** *arizonica* Greene, *C. lusitanica* Mill., *C. macnabiana* A. Murray bis, *C. nootkatensis* D. Don (syn. *Xanthociparis nootkatensis* (D. Don) Farjon & D. K. Harder; *Chamaecyparis nootkatensis* (Lamb.) Spach.), ***Juniperus*** *communis* L., *Ju. communis* var. *depressa* Pursh, *Ju. horizontalis* Moench, *Ju. scopulorum* Sarg., *Ju. virginiana* L., ***Calocedrus*** *decurrens* (Torr.) Florin, ***Taxus*** *canadensis* Marshall, ***Torreya*** *taxifolia* Arn.

After summing up the results of testing gymnosperms and analyzing the flora of the globe, new species were identified for further replenishment of the collection. In the future, the mobilization of more than 60 species of gymnosperms from North America is planned (***Ephedra*** *antisyphilitica* Berland. ex C. A. Mey, *E. aspera* Engelm. ex S. Wats., *E. californica* S. Wats., *E. cutleri* Peebles, *E. fasciculata* A.Nelson, *E. funerea* Coville & Morton, *E. nevadensis* S. Wats., *E. pedunculata* Engelm. ex S. Wats., *E. torreyana* S. Wats., *E. trifurca* Torrey ex S. Wats., *E. viridis* Coville, ***Pinus*** *albicaulis* Engelm., *P. arizonica* Engelm., *P. attenuata* Lemmon, *P. ayacahuite* Ehrenb. Ex Schltdl, *P. balfouriana* Balf., *P. cembroides* Zucc., *P. clausa* (Chapm. ex. Engelm.) Sarg., *P. coulteri* D. Don, *P. culminicola* Andresen and Beaman, *P. douglasiana* Martinez, *P. echinata* Mill., *P. edulis* Engelm., *P. engelmannii* Carrière, *P. hartwegii* Lindl., *P. lambertiana* Douglas, *P. monophylla* Torr. & Frem., *P. muricata* D. Don, *P. palustris* Mill., *P. pinceana* Gordon, *P. pungens* Lamb., *P. quadrifolia* Parl.ex Sudw., *P. radiata* D. Don, *P. sabineana* Douglas ex D. Don, *P. serotina* Michx., *P. virginiana* Mill., ***Picea*** *chihuahuana* Martinez, *P. martinezii* T. F. Patt., ***Pseudotsuga*** *macrocarpa* (Vasey) Mayr, ***Larix*** *cajanderi* Mayr, *L. lyallii* Parl., ***Tsuga*** *caroliniana* Engelm., *T. heterophylla* (Raf.) Sarg., ***Abies*** *bracteata* (D. Don) A. Poit, *A. durangensis* Martinez, *A. grandis* (Douglas ex D. Don) Lindl., *A. magnifica* A. Murray, *A. vejarii* Martinez, ***Sequoia*** *sempervirens* (D. Don) Endl., ***Cupressus*** *bakeri* Jeps., *C. macrocarpa* Hartw. Ex Gordon, ***Juniperus*** *coahuilensis* (Martinez) Gaussen ex R. P. Adams, *Ju. communis* L. var. *saxatilis* Pall. (syn *Ju. oblonga* M. B.), *Ju. monosperma* (Engelm.) Sarg., *Ju. monticola* Martinez, *Ju. occidentalis* Hook., *Ju. osteosperma* (Torr.) Little, *Ju. pachyphlaea* Torr. (syn. *Ju. deppeana* var. *pachyphlaea* (Torr.) Martínez), ***Taxus*** *brevifolia* Nutt., ***Torreya*** *californica* Torr.). The enrichment of the collection of gymnosperms can also be based on the huge d iversity of ornamental cultivars.

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TOTAL CONTENT OF CAROTENOIDS IN DIFFERENT VEGETABLE PRODUCTS OF SPONTANIOUS AND CULTIVATED SP. *LYCIUM BARBARUM* FROM THE REPUBLIC OF MOLDOVA

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Keywords: *Lycium barbarum, spontanious, cultivar, carotenoids*

Goji berries, especially grown in Chinese are called „superfruits" because of high content of different biological active substances such: polysaccharides with 6 types of monosaccharides, carotenoids, flavonoids, phenylpropanoids, tannins, amino acids, vitamins (thiamin, riboflavin and ascorbic acid), many minerals (potassium, sodium, phosphorous, magnesium and calcium), and organic acids (citric, malic, fumaric and shikimic) [2]. The species *L. barbarum* is characteristic for spontaneous flora of Moldova and during last 5 years the cultivar *Ning Xia N1* is mutiplicated *in vitro* in the laboratory of Embryology and vegetal biotechnologies of Botany Garden of AS of Moldova. The obtained plants *in vitro* are cultivated in the plant field collection of Botany Garden of Academy of Science [1].

The aim of this study is determination of total content of carotenoids in different vegetable products of spontaneous and cultivated *L. barbarum,* grown in the conditions of the Republic of Moldova.

For chemical analyses the following dried biological materials were used: fruits of *L. barbarum* collected in forest and near the village (Falesti district); Goji fruits and leaves (in the flowering period) of *cv. Ning Xia N1*, growing in the open field (collection of Botany Garden of Academy of Science of Moldova). The extracts from vegetable products list were obtained with 85% acetone in the refrigerator by centrifugation during 5 min. The absorbances were determinated at: 644 nm for chlorophyll *a*, 633 nm – chlorophyll *b* (data required for carotenoid content calculation) and 452, 5 nm – carotenoids. The total content of carotenoids, presented in table 1 is calculated by formula: CD (content of carotenoids) x 1,5 ml/0,2g = μg/mg

Table 1

The total content of chlorophylls and carotenoids in different vegetable products (VP) of *L. barbarum*

Vegetable product	Total content (μg/mg dried VP)		
	Chlorophyll *b* (644 nm)	Chlorophyll a (663 nm)	Carotenoids (452,5 nm)
Lycii fructus (spontaneous, forest)	2,309	0,542	81,345
Lycii fructus (spontaneous, village)	1,570	0,194	22,255
Lycii fructus, **cv. *Ning Xia N1***	0,641	0,403	53,563
Lycii folia **cv. *Ning Xia N1***	14,336	27,031	47,594

The results denote that the richest contents of carotenoids is characteristic for spontaneous fruits collected in forest (81,35 μg/g of dried vegetable product). For Goji cv. *Ning Xia N1* content of carotenoids is 53,56 μg/g, which is double that in spontaneous fruits from village (22,25 μg/g) and a little more than half that in the spontaneous fruits from forest (81,35 μg/g). In cv. *Ning Xia N1* carotenoid content is slightly higher in the fruits (53,56 μg/g) than in the leaves (47,59 μg/g).

Goji antioxidative activity is mainly attributed to carotenoid content [2]. The content of carotenoid determinated in the vegetable products collected from spontaneous population and cultivar from Moldova plantation demonstrated that they can have a high antioxidant activity and represent the data regarding the health-promoting properties of Goji vegetable products in our country.

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ANTIOXIDATIVE POTENTIAL OF IN VITRO CULTIVATED CALLUS OF *RHODIOLA ROSEA* L., AN ENDANGERED MEDICINAL PLANT, IN RELATION TO *REGLALG* APPLICATION

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Keywords: *Rhodiola rosea L – callus - natural growth regulator Reglalg - biomass - phenols – flavonoids - total antioxidant capacity – peroxidase.*

Higher plants represent the sources of vast and valuable compounds, which are largely used in medicine, food industry and agriculture (Kabera J. N. 2014, Jimenez-Garcia S. N. 2013). At intensive exploitation of plants from nature habitat occur more pronounced depletion of natural resources and often even the extinction of some species. Since *Rhodiola rosea* L. is also an endangered medicinal plant some measures are undertaken for alternative methods utilization in obtaining compounds, which are widely used in the therapy of cancer, cardiovascular and nervous system (Grech-Baran 2015 Dascaliuc A., Calugaru 2008). A solution of the problems could be application of biotechnological methods, including *in vitro* cultivation of *R. rosea*. These methods provide controlled growing conditions, which allow acceleration of biomass production, due to optimizing nutrient media and ensuring of continuous production cycle of the cell culture. Therefore, the problem of optimizing growing conditions that would ensure both proliferation and accumulation of valuable compounds in *R. rosea* callus cells continues to be relevant.

The aim of the present study was to investigate the effects of plant growth regulator (PGR) *Reglalg* application on the cell proliferation, isoenzymes spectrum of peroxidase (PO) and the antioxidant potential activity of the extracts of *R. rosea* callus cells.

Callus of *R. rosea* used in our investigations was cultivated on solid media under *in vitro* conditions with MS medium (control) and supplemented with PGR *Reglalg*, diluted with culture media in the ratio of 1/1000, 1/1200, 1/1400 and 1/1800 (test variants). Evaluation of antioxidant parameters were studied in callus biomass, accumulated during of 32 days of cultivation.

The results showed that all of the investigated *Reglalg* dilutions influenced beneficially callus growth, but utilization of PGR in the dilution of 1/1000 increased biomass accumulation by 38% compared to the control. Including of PGR *Reglalg* to the culture media ensured not only the increase of callus biomass, but and the accumulation of total phenolic compounds (TPC), including flavonoids. Evaluation of total antioxidant capacity (TAC) of the ethanol extracts from *R. rosea* callus biomass demonstrated that changes of TAC correlate positively with the content of phenolic compounds in the extracts of *R. rosea* callus cells. The highest level of TPC, flavonoids ant TAC was established for the callus of *R. rosea* cultivated on the media supplemented with *Reglalg* in the ratio of 1/1000. Significance differences were observed in the enzymatic spectrum of peroxidase (PO). Notable intensification of some PO isoforms in the callus cultivated on the media supplemented with PGR *Reglalg* has been observed.

Changes of the callus state that occur under the influence of *Reglalg* are beneficial, as an increase of the *R. rosea* callus reliability occurs, determined by the accumulation of TPC, including flavonoids and activation of some PO isoenzymes involved in the adjustment of oxidation-reductive potential of cellular components.

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COMPARATIVE ANALISYS OF THE TOTAL DEGREE OF FLAVONOIDS AND POLYPHENOLS IN DIFFERENT PRODUCTS OF HYPERICUM PERFORATUM

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Keywords: *H. perforatum, flavonoids, polyphenols, spectrophotometric, Hyperici flores*

The most studied species of the *Hypericum genus* is St. John's Wort, which is known by its chemical composition and pharmacological action. St. John's wort is widely used in the traditional and scientific medicine as an antidepressant, anxiolytic, antiinflamatory, antioxidant, astringent remedy due to its chemical composition. Naftodiantrones (hypericin, pseudohypericin) have been isolated 70 years ago and due to them, *H. perforatum* L. has antidepressant, antiviral, antitumor properties. Other substances of *Hyperici herba* (hyperforin, adhyperforin) have antidepressant properties, too [1,2]. The antiinflamatory, anxiolytic, antibacterial and astringent action of vegetal and extractive products of the *H. perforatum* L. is due to its flavonoids, tanning substances, oils content [3,4]. Chemical studies reavealed that the naftodiantrone (hypericin, pseudohypericin) content is higher in flowers (4,63 mg/g) than in leaves (1,82 mg/g) and a low content in strains (0,08 mg/g). The amount of phloroglucinol (hiperforin, adhiperforin) is higher in flowers (48,0 mg/g) than in leaves (4,33 mg/g). [5]

In this study we have decided to perform chemical analysis of vegetal products *Hyperici flores* and *Hyperici herba* obtained form *H. perforatum* L. species. The qualitative study was realized through Paper Chromatography [6]. We have identified the polyphenols in flowers and aerial parts of *H. perforatum* L.: rutoside (Rf= 0,202), hyperoside (Rf= 0,404), izoquercitroside (Rf= 0,45), quercitroside (Rf= 0,61), quercetin (Rf= 0,96) through Paper Chromatography. The quantitative determination of flavonoids and polyphenols was made by the spectrophotometric method with UV/VIS SP-8001 spectrophotometer. The absorbance of flavonoids was determined on 412 nm wavelength, and the polyphenols were determined on 765 nm [3,4]. As a solvent we used ethyl alcohol 80%. We used the rotative evaporator Laborota 4011-digital in order to obtain the dry extract. The evaporation of alcohol was made at 40°C.

The research demonstrated that 4,91% of flavonoids were found in *Hyperici herba*, but in *Hyperici flores* 5,91%. The content of polyphenols in aerial parts is 6,24%, but in flowers–8,8%. The dry extract of vegetal products *Hyperici flores* contained a double amount of flavonoids (67,28 mg/ml) in comparison to *Hyperici herba* (35,74 mg/ml). The report is also observed in the content of polyphenols of aerial parts (28,51 mg/ml) and flowers (55,11 mg/ml).

Due to the high content of flavonoids and polyphenols in flowers we can harness another type of vegetal products *Hyperici flores*. For these reasons, we intend to continue the chemical and pharmacological research on extractive products of *H. perforatum* L, which could be a source of new pharmaceutical forms in future.

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BIOLOGICAL AND PHYTOCHEMICAL STUDIES OF SOME *LAMIACEAE* SPECIES: PROMISING SOURCES OF BIOACTIVE SUBSTANCES

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Keywords: *Lamiaceae,* biological peculiarities, chemical composition, economic importance

The *Lamiaceae* is one of the most important plant families with extensive economic importance.

The biological peculiarities and phytochemical composition of some *Lamiaceae* species from the collection of the Botanical Garden (Institute) of ASM, in order to increase therapeutic possibilities and their practical use in national economy was the main goal of this study.

The study was carried out during 2010-2016. The studied species were introduced in the Botanical Garden (Institute) of ASM by international seed exchange and from spontaneous flora. The biomorphological peculiarities and the phenologic observations were registered using standard methods [5]. The aerial parts of studied species were chemically analyzed, qualitatively and quantitatively using chromatographic and spectrophotometric methods. Essential oil was obtained by hydrodistillation of the aerial parts of the plants for 2hrs in a Clevenger apparatus.

In the context of the optimal growth characteristics and phytochemical profile promising results were obtained for *Mentha gattefossei* Maire, *Satureja subspicata* Bartl. ex Vis., *Teucrium polium* L., *Ajuga reptans* L., *A. genevensis* L., *Thymus marshallianus* Willd. and *Th. citriodorus* (Pers.) Schreb.

The phytochemical analysis highlighted a high content of flavonoids, hydroxycinamic acids and total polyphenols in the methanol extract of *A. reptans* and *A. genevensis.* The etanolic extracts showed an evident antioxidant activity due to higher concentrations of flavonoids and hydroxycinnamic acids [2].

The main components of the *T. polium* essential oil are Germacrene D, b-pinene, a-pinene and bicyclogermacren. The *T. polium* essential oil belonging to Germacrene D chemotype represents an important source with potential application as an antimicrobial agent in the treatment of various diseases.

The essential oil of *Th. citriodorus* growing in our climatic conditions is rich in oxygenated monoterpenes of alcohol type (lavandulol, nerol, borneol), aldehydes (geranial) and esters (geranyl acetate, bornyl acetate, geranyl formate). The aromatic derivatives presence provides a fine floral fragrance to *Th. citriodorus* essential oil with the perspective of use in perfumes and cosmetics industry.

The high antioxidant activity was shown by two chemotypes of *T. marschallianus* species from spontaneous flora and *ex situ* experiments which have high polyphenolic content and volatile fraction rich in o-cymene, γ-terpinen and trans-citral [4].

The volatile oil of *M. gattefossei* cultivated in the Republic of Moldova is characterized by the predominance of oxygenated monoterpenes and belongs to chemotype pulegone/menthone, thus demonstrating antioxidant activity [1].

The *S. subspicata* essential oil consists mostly of phenolic monoterpenes, monoterpene hydrocarbons, bicyclic sesquiterpenes and their oxygenated derivatives. The most abundant components are phenolic terpene carvacrol, monoterpene hydrocarbons *p*-cimen and γ-terpinene. Unreported before components like γ-terpinene, (*E*)- and (*Z*)-citral, b-bisabolene, nerol, b-caryophillene in the essential oil may increase the biological activity and perfumery value of *S. subspicata* oil of Moldovan origin [3].

The scientific data obtained add the information about biological peculiarities and chemical composition of several *Lamiaceae* species growing in the Botanical Garden (Institute) of ASM, broadening the raw material base of medicinal plants by their introduction into cultivation.

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CONTRIBUTIONS TO ETHNOBOTANICAL STUDY OF MEDICINAL PLANTS IN CAHUL DISTRICT, REPUBLIC OF MOLDOVA

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Keywords: ethnobotany, wild medicinal plants, Cahul district, Republic of Moldova

Little information and documented references [1-3] on the ethnobotany of medicinal and aromatic plants spontaneously growing in the local flora are available. This study was aimed to identify and document the medicinal plants and their traditional uses by local communities in six rural settlements (Zârnești, Colibași, Văleni, Clobozia Mare, Câșlița Prut and Giurgiulești) of district Cahul, Republic of Moldova.

The studied areas are situated in the northern part of Bugeac steppe region, characterized generally as steppes of the plains, plateau and hills of the western Black Sea, west of the Dniester with the main habitat type being Ponto-Sarmatic steppes. Ethnobotanical information was accumulated via informed questionnaires and oral interviews with local people. A total number of 33 people (9 men and 24 women), between the ages of 43 and 85 years, were interviewed. Collected plant samples were taxonomically identified using the up to date scientific works and labelled voucher specimens are deposited in the Herbarium of the Botanical Garden (Institute) of ASM.

A total of 72 species of vascular plants from 60 genera and 29 families that are traditionally used both for consumption and for treating various illnesses were documented. The most utilized species belonged to *Asteraceae* (9 sp.), *Lamiaceae* (7), *Rosaceae* (6), *Fabaceae* (6) and *Solanaceae* (5).

At the present time, less than 30% of recorded species are used by local people, while another more than 70% have been frequently consumed in the past, but not anymore. A good numbers of species were mentioned by respondents as plants consumed during famine (in XX century, after the 2nd World War) and no longer used today.

Among the species that are widely used nowadays the high utility value was reported for *Arctium lappa*, *Hypericum perforatum*, *Urtica dioica*, *Leonurus cardiaca*, *Origanum vulgare*, *Crataegus monogyna* and *Thymus marschallianus*. The uses of recorded species relate to minor ailments, mainly in the treatment of skin diseases, respiratory infections and gastrointestinal disorders. One of the most representative medicinal plant in this region is the nettle (*Urtica dioica*), which is used widely even nowadays. The most frequent dish is "*tocana de urzici*" and nettle soup. Some species (*Artemisia annua*, *Galium verum* and *Thymus marschallianus*) represent even nowadays, the indispensable part of ritual food or drink for religious holidays. An example of this is the traditional drink "*vin cu pelin*" obtained by maceration of wormwood young leaves in home-made red wine. It is consumed at religious holiday "*Rusalii*" as a symbol of health and blood purification [3].

The species used for fruits continue to be collected and traditionally used. The fruits of *Prunus spinosa*, called "*porumbrele*" are consumed directly in the field after the first frosts. A home-made alcoholic drink with *P. spinosa* fruits is an up-to-date tradition in the area. It is also used as medicinal remedy in the treatment of diarrhoea. The fruits of *Rosa canina*, called "*macieșe*" are collected in large quantities and dried for later use or for commercialization. In particular, the infusion is used as a source of vitamins in the cold season. The fruits of *Crataegus monogina* called "*păducele*" are collected, dried and used mainly for heart diseases and hypertension.

The study reveals that local people continue to use the knowledge of wild medicinal plants in their day-to-day life, but the tradition of their using is obviously declining, fact that encourages further ethnobotanical studies in rural areas throughout the country.

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MEDICINAL *TANACETUM* L. SPECIES INTRODUCED AND STUDIED IN THE BOTANICAL GARDEN (INSTITUTE) OF ASM

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Keywords: *Asteraceae, Tanacetum* L., introduction, biological peculiarities, medicinal importance

The genus *Tanacetum* L. (syn. *Chrysanthemum* L., *Pyrethrum* Zinn) is one of the largest and most widely distributed genera of the *Asteraceae* family. *Tanacetum* L. species have been used as remedies in folk medicine since ancient times throughout the world. Modern pharmacological reports reveal that interest in *Tanacetum* L. species is increasing in last decades due to the presence of large number of chemical constituents which are implicated in diverse biological activities such as antimicrobial, anti-inflammatory, antibacterial, cytotoxic, anthelmintic, insecticidal, antiulcer, phytotoxic, antioxidant, and anticancer [3].

In the Botanical Garden (Institute) of ASM, *Tanacetum* L. genus is represented by eight taxa (*Tanacetum parthenium* L., *T. boreale* Fisch. ex Link, *T. balsamita* var. *tanacetoides* Boiss., *T. balsamita* var. *balsamitoides* (Sch. Bip.) Grierson, *T. cinerariifolium* (Trev.) Sch. Bip., *T. vulgare* L., *T. odessanum* (Klok.) Tzvel. and *T. corymbosum* (L.) Scop.) obtained by seed exchange with other institutions in the world and the last three species are introduced in the medicinal plant collection from spontaneous flora.

Six new for our collection *Tanacetum* L. taxa (*T. parthenium, T. boreale, T. balsamita* var. *tanacetoides, T. balsamita* var. *balsamitoides, T. odessanum* and *T. corymbosum*) were studied. The propagation by seedlings, cuttings and division of the plants has been investigated. The phenological stages and bio-morphological peculiarities of the plants under cultivation conditions were highlighted according to methodological works [5].

Tanacetum parthenium is a perennial species native to the Balkan Peninsula and cultivated nowadays around the world. It is used in folk medicine to reduce fever, headaches, arthritis, digestive disorders and many other ailments. The plants contain a large number of active constituents with multiple therapeutic effects, such as anticancer, anti-inflammatory, cardiotonic, antispasmodic [4].

Tanacetum balsamita is a perennial species of Asian origin, naturalized and cultivated in different parts of the world. The plant has been used for several centuries in folk medicine. Currently is used in medicine (cardiotonic, hepatoprotective and tonic) as well as in food and perfumery industries [1].

Tanacetum boreale is an herbaceous perennial plant distributed in East Asia that has been traditionally used in oriental medicine to treat hypertension. It has been reported as having potential medicinal properties, including antibacterial, cytotoxic, anti-inflammatory and antiviral activities [2].

Spontaneous *T. odessanum* and *T. corymbosum* are less studied from biochemical and pharmacological viewpoints. There are very limited literature and research works on their applicability in phytotherapy, encouraging in this way further studies on these species.

The research regarding plant biology features, ontogenetic cycle, growth and development during the vegetative period showed that investigated allochthonous *T. parthenium, T. boreale, T. balsamita* species grow and develop normally, completing the entire ontogenetic cycle. The species commonly pass all the stages of seasonal development (immature and virginal stages, budding, flowering and fructification) fact that indicate the prospects of their introduction and cultivation in climatic conditions of Republic of Moldova. An advantageous way of multiplication of these plants in our conditions is vegetative propagation. The indicators of growth and development of native *T. odessanum* and *T. corymbosum* under *ex situ* conditions are very encouraging, demonstrating their suitability for cultivation on a large scale.

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MICROPROPAGATION OF THE SPECIES *ACTINIDIA KOLOMIKTA* (RUPR. ET MAXIM.) MAXIM. AND *ACTINIDIA ARGUTA* (SIEBOLD ET ZUCC.) PLANCH. EX. MIQ.

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Keywords: actinidia, micropropagation, in vitro culture, growing media.

The species of the genus *Actinidia* L., *A. kolomikta* and *A. arguta*, are well-known and popular ornamental, medicinal and fruit-bearing plants. They are appreciated due to the stimulating biologically active substances contained in fruits and leaves, having a broad range of applications, described and analyzed in many papers.

The above-mentioned species are native to Japan, East China, Sakhalin and Kuril Islands. The plants are dioecious. Traditionally, they propagate by green cuttings and, more rarely – by lignified cuttings and by seeds. Tissue culture is successfully used to obtain initially perfectly healthy plants. Over the years, this method has become a modern technique of rapid propagation of species of economic interest and demanded by consumers. The ultimate goals of this research are the rapid propagation of plants, the production of virus-free and healthy planting material, the creation of genotypes with desired characteristics, resistant to diseases, pests and physical and chemical stressors.

For the *in vitro* inoculation of plants, the use of apical and lateral meristem, fragments of shoot, such as nodes, and seeds as explants, was tested and researched. The asepsis of explants was carried out according to the method developed in the Embryology and Biotechnology Laboratory. From 11 variants of growing media, the following were selected: 1) MS -100% supplemented with α NAA – 0.25 mg/l and zeatin – 0.5 mg/l, sucrose – 30 g/l; 2) MS – 100% supplemented with BAP – 0.5 mg/l, α NAA – 0.25 mg/l, sucrose – 30 g/l. pH -6.2-6.8. The apical meristem explants with foliar primordia were the most viable – 84.6%. The inoculation of node fragments of shoot resulted in 66.5% viable explants. The inoculation of seeds generated 16.92% viable explants. The visual analysis of the two lines of female and male plants highlighted two types of development: for the female line – a slower growth, the shape of the plant – *rosette*, and for the line with male explants – a *shoot* shape with more rapid growth. The combination zeatin + NAA favoured the initiation of morphogenic callus of *rosette* as well as *shoot* type of both lines. The rooting of propagules *in vitro*, in rhizogenic medium MS with naphthaleneacetic acid (NAA), yielded good results – 80% of rooted plantlets during 2-3 weeks. Experiments were also carried out on other variants of media with rhizogenic properties: MS – 100%, MS – 50%, MS – 25%. In these variants, the rhizogenesis occurred later, varying by the length, quantity and dynamics of the root system initiation. The process of rhizogenesis of microcuttings occurs in four different ways: a) above the basal part of the cuttings, b) from the basal part of the microcuttings, c) from the callus that forms on the basal part of the microcuttings, d) mixed – the roots form on the basal part of the shoot and above it. Usually, the plantlets with the root system formed above the basal part of the shoot (above the agarized or liquid medium) and from the callus formed on the basal part, practically, do not adapt and necrotize during the acclimatization *in vitro*.

The acclimatization of plantlets in greenhouse conditions takes place at the optimal temperature and humidity for growth and development, in containers with a mixture of sterile substrate of peat and perlite at the ratio of 1:3, being covered in the first phase of acclimatization with a transparent film and vented 2-3 times a day. About 84% of the plantlets of the species *A. kolomikta* adapted to the *ex vitro* conditions, but the percentage of rooting of the species *A. arguta* was smaller – 72%. The adaptation occurs better in spring and in early summer, but in winter, the acclimatization is more difficult.

As a result of the researches, we can conclude that the studied species – *A. kolomikta* and *A. arguta* are suitable for vegetative propagation through *in vitro* tissue culture. With the obvious advantages of this method, knowing initially the female and male plants, we can control the number of plants of the necessary genus. The tests on the growing media for various explants of the species *A. kolomikta* and *A. arguta* showed that the optimal regenerative potential is achieved by the inoculation of the apical meristem with the first foliar primordia.

QUANTITATIVE PHYSIOLOGICAL PARAMETERS OF ASSIMILATION PIGMENTS IN *POLYGONUM SACHALINENSE* F. SCHMIDT IN THE REPUBLIC OF MOLDOVA

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***Keywords**: P. sachalinense, assimilatory pigments, chlorophyll "a", chlorophyll "b", carotenoids.*

Foliage is the primordial photosynthetic organ of green higher plants due to the anabolic reaction that occurs in the mesophyll, based on assimilation pigments, which are responsible, largely, for the photochemical reactions, the conversion of solar energy into potential chemical energy, then used to integrate CO_2 in the chain of organic substances [2, 5]. These pigments of green plants are involved, depending on their structural features, classification and photochemical properties, in the processes of photosynthesis, simultaneously with their synthesis in assimilation tissues from the green organs of the plant. Being located in the green plastids, as specialized organelles, in the thylakoid membranes, they form complex specific, functional-active proteins, found in antenna-pigment photosystems [3, 6]. The estimated timeliness motivated us to study, simultaneously with the research on the physiological parameters of the species *P. sachalinense*, in the conditions of the Republic of Moldova, some functional, qualitative and quantitative aspects of the assimilation pigments in the leaves of the above-mentioned plants, in the active growing season. The objective of the research was to study the amount of assimilation pigments depending on the age of the plants and the position of the leaves on the stems.

The leaves of *P. sachalinense* F. Schmidt, the variety Gigant (created and patented in the Botanical Garden (I) of ASM) collected in the budding stage, served as experimental material, which was then subjected to laboratory analyses. The research on assimilation pigments and their quantitative determination were carried out in the Laboratory of Plant Physiology, the Department of Plant Biology of TSU. The methods used included extraction, separation, followed by the determination of quantitative parameters – the spectrophotometric method [1, 4], obtaining the respective values, which were subsequently analysed and included in tables according to the groups of highlighted assimilation pigments.

The results obtained after the spectrophotometric analyses of the leaves of plants, differentiated in two variants (2- and 4-year-old plants, the position of leaves – from tip to base), highlighted a quantitatively higher content of assimilation pigments in the 4-year-old plants, especially in the leaves from the middle of the main axis, fact that increased the photosynthetic efficiency of mature leaves. The quantitative ratio of the groups of chlorophylls and carotenoids, in the leaves located on the tip was 2.8:1, in those located in the middle – 3.5:1. In 2-year-old plants, this ratio was more significant, in favour of the groups of chlorophylls (in the leaves from the middle of the plant – 3.5:1, but in those situated on the tip – 3.6:1, with essential deviations from the standard bibliographic values – 3:1). Special attention was paid to the specific physiological aspects of the studied leaves of *P. sachalinense*, with heliophile and thermophile capacities, in more advanced synthesis of groups of chlorophylls.

The concentration of assimilation pigments (chlorophyll "a + b" + carotenoids), in 2-year-old plants of *P. sachalinense*, was 3.33 mg/g in the leaves from the tip of the shoot and 5.0 mg/g – in those from the middle. In 4-year-old plants, the values of these indices were 20-40% higher (5.54 mg/g in leaves from the tip and 5.68 mg/g in leaves from the middle); this fact denotes a higher photosynthetic potential. In the 4-year-old plants, the maximal amounts of chlorophyll "a" and "b" were found – 2.56 mg/g and 2.78 mg/g, in the leaves from the middle of the main axis. The content of carotenoids increased with the age of plants and depending on the light intensity, which significantly contributes to the biosynthesis of assimilation pigments and the intensity of photosynthesis (Tab. 1).

Table 1.

The content of assimilation pigments in *P. sachalinense*

The age of plants and the position of leaves		Chlorophyll "a" mg/g	Chlorophyll "b" mg/g	Chlorophyll "a+b" mg/g	Carotenoids mg/g
2 years	Leaves from the tip of the shoot	1.603	1.612	3.215	0.118
	Leaves from the middle of the shoot	2.388	2.442	4.829	0.169
4 years	Leaves from the tip of the shoot	2.462	2.700	5.162	0.374
	Leaves from the middle of the shoot	2.561	2.779	5.339	0.345

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THE LEAF AREA OF THE SPECIES *POLYGONUM SACHALINENSE* F. SCHMIDT IN THE ENVIRONMENTAL CONDITIONS OF THE REPUBLIC OF MOLDOVA

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Keywords: *Polygonum sachalinense, leaf area*

Introduction

The species *P. sachalinense* F., native to Far East, was introduced in the collection of the Botanical Garden (I) of ASM, by A. Teleuță, in 1982, from North Ossetia (Agricultural Institute, Vladikavkaz). The productive potential of the species is 124.2 t/ha green mass, used as fresh feed or silage [2]. The estimation of the leaf area is an essential part of the analysis of plant growth and development. The accumulation of green biomass in plants is determined by the total area of the leaves, which is the surface that assimilates sunlight, an important index for the photosynthetic efficiency. Thus, the leaf area underlies the photosynthetic capacity, which determines the plant productivity. The leaf area is calculated by a complex method, because the shape and the size of leaves are changing during the growing season.

Materials and methods

The leaves of the species *P. sachalinense*, the variety "Gigant", served as botanical material for analysis. From different foliage layers of five plants, aged 2 and 4 years, by 5 leaves were collected and analyzed, by calculating the average value of the leaf blades taken from each plant. The measurements were performed on fresh leaves collected during the growing season of 2016. The method used to determine the leaf area of *P. sachalinense* was based on the identification of the contour of leaves on graph paper. It is a high-precision method, requiring accuracy and precision [3]. The stages of this method are the following: 1. positioning the leaves on graph paper and tracing the contour; 2. calculation of the leaf area, expressed in cm^2, which is determined by counting the complete squares, but the incomplete squares are counted using the method "cut and fill" [1].

Results and discussions

The leaves, chosen for measurements, were of different size on the same plant and in correlation with the age. Two-year-old plants had smaller leaves, from 20.5 cm to 31.0 cm long and from 15.1 cm to 19.0 cm wide. The length of the leaves of 4-year-old plants varied from 22.5 cm to 43.1 cm and their width – from 15.1 cm to 32.1 cm. The total number of leaves on a plant was also larger in 4-year-old plants, from 49 to 64 leaves/plant and 43-60 leaves on 2-year-old plants, respectively.

Table 1.

The average leaf area of 2- and 4-year-old plants of sp. *P. sachalinense*

No.	Statistical indices							
	2-year-old plants				4-year-old plants			
	Number of leaves on a plant	Area of the leaf blade (cm^2) M±(Sx)	Leaf area of a plant (m^2)	CV	Number of leaves on a plant	Area of the leaf blade (cm^2) M±(Sx)	Leaf area of a plant (m^2)	CV
1	54	323.02±23.53	1.73	16.31%	64	435.42±64.46	2.82	34.70%
2	48	318.66±28.88	1.54	20.30%	53	665.31±122.10	3.55	41.10%
3	60	347.50±41.53	2.10	26.77%	62	601.24±101.04	3.72	37.65%
4	51	326.72±39.79	1.38	27.28%	49	452.60±72.60	2.21	35.93%
5	43	351.40±39.03	1.51	24.88%	53	551.26±123.86	2.92	50.33%
M	51,2	333.46	1.65±0.13	16.97%	56.2	541.17	3.04±0.28	20.39%

Note: **Sx – standard error; CV – coefficient of variation; M – average**

The results of the biometrical analysis (Table 1) show that 2-year-old plants develop leaves with an average area of a leaf blade of 333.46 cm^2 and the leaf area of a plant is 16500 cm^2 (1.65 m^2). The 4-year-old plants are characterised by higher values of these biometrical indices, respectively: the average area of a leaf blade – 541.17 cm^2 and the leaf area of a plant – 30400 cm^2 (3.04 m^2).

Thus, the values of the biometrical indices, the number of leaves/plant, the area of a leaf blade and the leaf area of a plant, depend on the age of the plant. The 4-year-old plants are characterised by higher values of these biometrical indices as compared with the 2-year-old ones, which denote a higher photosynthetic capacity, and can serve as a more effective source of raw material to obtain forage biomass.

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MEDICINAL PLANTS AND PHYTODRUGS USED IN RESPIRATORY DISEASES

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Keywords*: respiratory diseases, medicinal plants, vegetal products, phytodrugs.*

Breathing is the function that ensures continuous supply of oxygen from atmospheric air to the cells, and respiratory diseases are a major problem because the lungs and airways are strongly exposed to external agents. After circulatory diseases and cancers, respiratory diseases are the third among the leading causes of death. High morbidity because of respiratory diseases is a result of epidemics of seasonal flu, and high density of urban population keeps spreading the infection and, therefore, maintain the incidence of respiratory diseases in urban areas higher than in the rural areas. According to the National Center for Health Management, Respiratory pathologies represent 4.8% of the population of Moldova.

In the realization of this study it was established a methodological research plan, which included evaluation of medicinal herbs and the active principles which can be used in respiratory system diseases and their phytodrugs. Out of the medicinal herbs used in respiratory system diseases, we can mention those which are rich in polyholosides, volatile oils, saponosides and alkaloids. The expectorant action of polyholosides manifests itself by stimulating the locomotor activity of epithelial cilia, for vegetal products: *Althaeae radices et herba, Malvae folia et flores, Farfarae folia, Plantaginis majoris folia, Tiliae flores cum bracteis.* The diversity of volatile oil components determines their very diverse action, being used as antiseptic and antiinflammatory in respiratory pathologies, such as: *Eucalypti folia, Menthae herba, Salviae folia, Hyssopi herba, Chamomillae flores, Inulae rhizomata et radices, Basilici herba, Origani vulgaris herba, Serpylli herba, Thymi vulgaris herba.* Saponosides are used to treat whooping and spastic coughs through their property to increase bronchial secretion, such as: *Eryngii plani herba, Glycyrrhizae glabrae radices, Primulae veris rhizomata cum radicibus, Saponariae officinalis radices.* We can mention other products, such as: *Marrubii herba* which contain bitter substances, or products with cough-suppressant action through isoquinoline alkaloids: *Glaucii flavi herba* (glaucine), *Papaveris capita* (codeine) or acycles alkaloids: *Ephedrae herba* (ephedrine).

Out of the 5446 drugs included in State Nomenclature of Medicines of Moldova, the share of phytodrugs, including vegetal products, homeopathic preparations, and medicinal species, is 13.9%. Phytodrugs used in respiratory diseasses make up 114 products or 2.1% reported to total products. Of these, products containing volatile oils are placed in the top (47) and constitute 41.2%, followed by polyholosides (34), or 29.8%, alkaloids (19) or 16.7% and saponins (14 products), which make up 12.3%.

To conclude, we affirm that the pathologies of respiratory system constitute 4.8% of the top causes of death in Moldova and phytodrugs used in respiratory disorders hold only 2.1% of total pharmaceutical products in the State Nomenclature of Medicines of Moldova.

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AROMATIC PLANTS IN COSMETIC INDUSTRY

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Keywords: *aromatic and medicinal plants, cosmetic industry, products, properties, extracts, essential oil, implementation, complexion.*

The modern study on aromatic and medicinal plants, which has become more relevant recently, is a treasure that can be used to promote health, which leads to the conclusion that the main source of health is nature, which unconditionally provides resources to improve human health. In modern, industrially produced cosmetics, the natural plant extracts are widely used and their presence on the ingredient list constitutes a huge advantage to the products, a well-grounded evidence in favour of their beneficial effects. Among the research areas of the Botanical Garden (I), a special place is occupied by the research on the use of plant species in cosmetic industry.

Rosemary (*Rosmarinus officinalis*) is an herbaceous plant, native to the Mediterranean Basin, famous for its pleasant smell. In our country, it is cultivated as a medicinal, spice and ornamental plant. In cold winters is often killed by freezing temperatures. The stem with arched or ascending branches can grow up to 60-150 cm tall. At the bottom, the bark is exfoliated and in the upper part is covered with grey hairs. Leaves are evergreen, linear, 2-3 cm long and resemble conifer needles. The flowers are light blue or purple and form a raceme. The leaves and the branches contain essential oil, composed of terpenic hydrocarbons, camphene, limonene, myrcene, caryophyllene, humulene, santene. It also contains oleanolic, ursolic, glycolic, glyceric, nicotinic, saponic, tannic, caffeic and hydroxy caffeic acids, and vitamin C. These active principles confer it antifungal, anti-inflammatory, antioxidant and antimicrobial properties [1]. Successfully treats alopecia, stimulating hair growth, and acts as a balm, invigorating the hair and making it look healthy. The tonic and moisturizing properties of rosemary oil make it suitable for use in skin care products. If drank regularly, rosemary tea slows down the aging process, because it provides the body with a lot of vitamins, minerals and antioxidants, which protect it from free radicals, stimulates cell regeneration, improves skin firmness and tonicity. It is a natural anti-inflammatory remedy, which contributes to the circulation of blood in the skin. Rosemary softens the skin, can be used to treat dandruff and benefits hair growth. In facial masks, rosemary tea is used together with other ingredients for normal and oily skin. Rosemary oil is a basic ingredient in fragrances and skin care products. If added to bathing water, it has aphrodisiac and neuro-stimulating effects [2].

Tarragon (*Artemisia dracunculus* L.) is a species native to Siberia and Mongolia. It is cultivated for medicinal and culinary purposes. It grows on large areas in the Caucasus. In Romania, tarragon is cultivated on small areas. It is cultivated and researched in the Botanical Garden (I) of ASM. It is a half-woody, perennial plant, which develops, in the soil, strong roots, from which sprout numerous stolons and several aerial stems. The stems are branched, ascending and grow to 150 m tall. The leaves are lanceolate-linear, acute, with entire or slightly serrated margin; the inferior leaves are often trilobed. The flowers are greenish-white, produced in almost globular capitulae, 2 mm in diameter, bent downward, form paniculate racemes. In a capitulum, the marginal flowers are female, and those from the centre are hermaphrodite. The involucre is formed of external bracts, elongated-elliptical, greenish, and inner bracts, ovate, with membranous margin. The fruits are small achenes, elongated-obovate, 1-2 mm long, dark brown, without pappus. Only several varieties produce fruits. The plant is propagated by cuttings. Tarragon flowers from July until late autumn. The entire aerial part with leaves is harvested; it is cut at maximum 10 cm under the last ramification. The obtained product has pleasant, characteristic aroma and strong, spicy, bitter taste. After drying, tarragon loses some of its smell. The leaves and the young branches contain essential oil (0.2-0.8%), rich in phenylpropan, methyl chavicol, anethole, menthol, herniarin, carbohydrate substances and others, depending on the origin [3]. It is used as a stimulant of gastric secretions in the treatment of kidney and liver conditions or water retention, anorexia, arteritis, atherosclerosis, ascites, cancer, particularly – gastric cancer, cholecystitis, colitis, toothache, headache, intestinal worms. The plant is recommended also to stimulate appetite and digestion. The tea prepared from the aerial part of the plant is used as diuretic and the decoction – against throat infections. It is also a good remedy for rheumatism. The young leaves are used in the preparation of salads with very pleasant aroma and special medicinal properties. Tarragon is indispensable for people who are on a diet or for vegetarians. Since ancient times, myths and legends have been woven around tarragon, being considered a magic ingredient to seduce the loved one. As a digestive tonic, tarragon essential oil is the ideal weapon to fight digestive disorders, besides it is very helpful in the treatment of eczema. Plant extracts are specific cosmetics [4]. In cosmetic industry, essential oils are used in skin care and hair care products, to cleanse, moisturize and rejuvenate the skin.

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METHODS OF STERILIZATION FOR PLANT INOCULATION: *LILIUM MARTAGON, FRITILLARIA MONTANA, BELLEVALIA SARMATICA*

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Keywords: *in vitro, rare plants, sterilization, inoculation*

The group of rare plants in the spontaneous flora of the Republic of Moldova includes over 500 species and, unfortunately, the number of taxa in various categories is constantly increasing.

The most successful strategy of long-term preservation of plant diversity is the protection and conservation of phytocoenoses and populations of the wild flora – *in situ* conservation. Nevertheless, many rare species have already reached a limit when *in situ* conservation is not sufficient to solve protection problems caused more and more frequently by anthropogenic factors.

As research subjects, the plant species of the families *Liliaceae* and *Hyacintaceae* were tested: *Lilium martagon, Fritillaria montana, Bellevalia sarmatica*. The species were mobilized from „Codrii" Reserve (*Lilium martagon*), v. Telița d. Anenii Noi (*Fritillaria montana*) and com. Bugeac reg. Comrat (*Bellevalia sarmatica*).

The asepsis of bulbous plants is a very important and complicated process, which has to be carried out carefully and accurately because bulbs grow in soil and the removal of all the particles of soil and sand is a very responsible procedure.

When choosing the method of sterilization of the organs used as explant donors, an important role is played by the origin of the vegetative material and the period during which the explant is taken for inoculation.

To achieve high inoculation efficiency and to obtain high quality planting material (bulbs), a preliminary sterilization of the planting material is required, consisting in the removal of contaminating microorganisms from the surface of the bulbs without affecting the internal tissues.

According to the specialized literature and the carried out research, the species under study are more susceptible to infection than other bulbous plants. For this reason, it is necessary to sterilize the material very carefully. Various preparations and chemical reagents, necessary for the sterilization of bulbs, were tested. As a result of the research, the necessary concentration for sterilization, the optimal time and the exposure to certain sterilizing reagents were determined.

The following stages of sterilization were described:

Rinse of the soil particles with running water

Disinfection – Tween -20, for 10 minutes

Sterilization with $KMnO_4$ (0.05%), for 10 minutes

Sterilization with 70% ethyl alcohol, for 30 seconds

Treatment with diacid 0.03% solution, for 5-7 minutes

After each procedure, the material was rinsed three times with distilled water.

The treatment of the scales of the bulbs with diacid was tested in several variants. In the case when the scales were from the interior and young, they were exposed to 0.03% diacid for 5-7 minutes. The scales of the bulbs that were from the exterior and the damaged ones were exposed to diacid for 15 minutes. The treatment with diacid and the duration of sterilization were the same for *Lilium martagon* and *Fritilaria montana*. For *Bellevalia sarmatica*, the concentration of diacid was 0.01%. In the end, the bulbs and the scales were rinsed four times with autoclaved distilled water and, for an efficient sterilization, with 3% H_2O_2, after which they were rinsed one more time with autoclaved distilled water.

The explants were inoculated immediately after asepsis, because they gradually degrade. At the beginning, a small number of explants is prepared. The rate of degradation and the loss of viability depend on the nature of explants, their size and storage conditions.

All the listed processes are carried out in sterile conditions.

To obtain healthy plants by in vitro propagation, the initial vegetative material must be taken from young bulbs. The sterilization of the laboratory equipment and the vegetative material should be done with great rigor to avoid the contamination of inoculums.

EFFICIENCY OF PRELIMINARY REPRODUCTION OF THE STARTING MATERIAL FOR STUDIES ON IMPROVEMENT OF *TRIGONELLA* L. SPECIES

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Keywords*: spice plants, reproduction*

The Moldovan market of spices is flooded with imported expensive products while local consumption is very limited despite the fact that many of the introduced spice species are easily cultivated in the environmental conditions of our country. Proceeding from the foregoing, it is obviously necessary to improve the starting material for the production of new improved varieties with an increased production, high quality, resistant to diseases and pests characteristic of spice species.

To diversify the range of spice plants, to enhance their quality and quantity and to cover the needs of the internal market with the necessary spices, we considered it appropriate to take for study the species of Trigonella caerulea (L.) Ser. and Trigonella foenum - graecum L. The given species are widely used in the world both as fodder and green manure, as well as in human alimentation because they are rich in minerals, vitamins and other substances as spices either dried, added to traditional mixture, or sprouted as spicy greens, in salads. They are also very precious for medicine, because their processed seeds have curative properties and are used to treat diseases which attack human health.

In the case of our study, these species have served as a basis for obtaining the starting material in improvement research with a view to selecting the prospective forms of the species of Trigonella caerulea (L.) Ser. and Trigonella foenum - graecum L., to be later introduced in culture.

For foundation of experimental plots, the seed material was processed with extracts of aromatic plants (in particular with essential oil Koellia virginiana). Then experimental sectors were organized for selection. In the course of the vegetation period phenological observations and various biometric measurements were conducted, according to standard methodology.

Trigonella caerulea species, which we have studied, has a special morphological character like – colour of seeds. Taking into account that fact, during the experiment seeds were selected in two lots – yellow seeds and kaki seeds, which were sown separately, for different plots.

In the same sector was also sown the species of Trigonella foenum - graecum.

The species studied were sown in two terms – on the threshold of winter and in spring of the next year, in the first emergence.

As the fruits (proper seeds) of the named species are the raw material, they have also been selected according to the average grain weight (AGW), being sown those that obtained higher indices.

According to the conducted study, I also found that the sowing period in the conditions of the studied year did not influence considerably the vegetation period. But we have noticed that sowing on the threshold of winter, allows for better germination and density of plants in spring, probably due to their provision with an optimal quantity of water, for development.

Favourable spring temperatures also guarantee a good plant emergence and density, which contributes to a significant qualitative and quantitative production.

The selections made on seeds allowed to choose the forms with the increased mass of 1000 grains, compared to that of the initial forms taken for the study. The material obtained will still be selected in order to increase the AGW and the production of grains in its entirety.

In conclusion, we can state that the optimal age of sowing for species of Trigonella caerulea and Trigonella foenum - graecum is on the threshold of winter with the favourable temperatures corresponding to the season, which contributes to the obtaining of a valuable production. And the two forms of Trigonella caerulea and one of Trigonella foenum - graecum highlighted for further improvements, with increased AGW, compared with that of the initial forms taken for the study will serve as the basic raw material for further selection to obtain new varieties adapted to climate and economic conditions of the Republic of Moldova.

APPLICATION BIOELICITORS AS INDUCTORS OF RESISTANCE PLUM TREES VARIETY STANLEY TO PATHOGENS

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Keywords: *bioelicitors, inductors of immunity, plum tree, plant protection.*

In the Republic of Moldova, the common or European plum *Prunus domestica* L. (Rosaceae Juss.) is the main fruit plant that is bred for industrial purposes. The average yield of plum trees is 15-25 t/ha, in favorable years can reach 35-50 t/ha or more. One of the best varieties from which are produced 80 till 90% of prune plums (dried plums) in Europe and the USA, is the "Stanley" variety and his "heir" - the "Amers" (Standard x Stanley) variety. The primary benefits of the "Stanley" variety are its high winter hardiness, sufficient resistance to drought, as well as resistance to such dangerous diseases as red spot (polystigmosis Polystigma rubrum DC) and Sharka virus (plum pox, Plum pox virus). At the same time, plants oh this variety are affected by pests and fungal diseases, including blossom blight - moniliosis (*Monilinia sp.*, primarily *M. laxa*, *M. fructigena*). Thus, to obtain a high-quality crop, it is necessary during the growing season to carry out a complex of treatments against pathogenic agents. Modern trends in the agro-industrial sector are aimed at the development of organic farming. One of the relatively new elements of ecological technologies of plum protection is the use of organic compounds - so-called bioelicitors, capable of inducing nonspecific systemic resistance to pathogens in plants. Currently are known the bioelicitors of various types: based on bacterial cultures (*Agat-25, Alirin, Gamair, Phytosporin, Extrasol, Oso/Tavano, Ph-D, Botector, Double Nichelul*), based on chitosan (*Agrochit, Narciss, Chitosar, Phytochit, Ecogel*), based on organic acids (*Immunocytophyte, Obereg, Novosil, Zircon, Succinic acid*), based on plant extracts (*Regalia*) and others.

Biogenic elicitors apply in very small doses, so they are practically harmless. However, one of the disadvantages of this method is the inability to guarantee full protection of plants under high infectious levels (infectious loads) or mass colonization by pests. Therefore, during the growing season, it is necessary to regularly assessment the phytosanitary situation and takes into account all the unfavorable factors for the competent use of bioelicitors in the plum orchards.

For the evaluation the effectiveness of the applying of bioelisitors in increasing the resistance of plum plants to pathogenic agents, we tested three biopreparations of microbial and plant origin: *Reglalg-1* 0.5 l/ha, *Recol* 6.0 l/ha and *Paurin* 2.0 l/ha. Reglalg-1 is a preparation obtained from green algae *Spirogira* spp. (200 g/l), Recol is a plant extract from *Reynoutria sachalinensis*, (15 g/l) and Paurin is a microbiological preparation based on the bacterium *Pseudomonas fluorescens* CR-330D (titre not less than 10 billion cells/ml). The experiments were carried out in 2016, on the territory Republic of Moldova in the plum orchard, Ltd. "Ialoveneni", district Ialoveni, on the "Stanley" variety (4 ha). In total, three treatments were carried out with bioelicitors - before bud blossoming and after flowering, with an interval of 10 days.

As a result, it was established that the degree of prevalence and development of *Clasterosporium carpophilum* Aderh. on leaves and fruits in variants with treatment by bioelicitors (experience) was significantly lower than in the control and chemical standard. The biological effectiveness of bioelicitors on fruits in the third decade of July was following: *Reglalg-1* ¬ 62.2, *Recol* ¬ 55.5, and *Paurin* 80.0% (chemical standard 44.4%). Against *Polystigma rubrum* DC on leaves, the efficiency of bioelicitors reached 80.0 (*Reglalg-1* and *Recol*) and 85.0% (*Paurin*), while the effectiveness in the chemical standard did not exceed 55.0%. On the fruits development of polystigmosis was not observed. It was revealed that under the conditions of 2016 on the experimental aria of the plum orchard on the "Stanley" variety there was no manifestation of monilial blight of shoots and flowers (*Monilia laxa*). The first symptoms of infestation of fruits by moniliosis (*Monilia fructigena*) were observed in the first third of July (2016.06.07). The biological effectiveness of bioelicitors against moniliosis on fruits was high – 71.3-75.0%. Statistical analysis showed that variants with bioelicitors maintaining the highest level of biological effectiveness in comparison with chemical standard (37.5%). Simultaneously, was improved of the chlorophyll index in the experimental variants in comparison with the control and the chemical standard, as well as were increased amount of sugars and weight of the fruits.

ADVANTAGES OF ECONOMIC CULTIVATION OF THE GENUS *RHEUM* PLANTS IN THE REPUBLIC OF MOLDOVA.

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Keywords: *Rheum, non-waste processing technology, medicinal and food plant, plant protection*

Every third medical product in the world market is an herbal preparation. Preparations from the roots of medicinal genus *Rheum* species, *Polygonaceae* family, for the treatment of cardiovascular, gastrointestinal diseases, and as antitumor agents are used. The food-consumed petioles of the vegetable rhubarb are used in the food industry. Vegetable rhubarb petioles contain 1,0% organic acids, from 1,0 to 2,5% pectin substances and up to 3,2% of dietary fiber, as well as minerals and vitamins. The vegetable rhubarb petioles consumed fresh, canned, dried, frozen form and are used for the preparation of a products variety with a high vitamin value. Scientists have found that the coloring extract from the rhubarb roots has a bacteriostatic, antioxidant and antiseptic properties that allow increasing the shelf life of food products and improving their quality. More than 200 varieties of vegetable rhubarb known in the world. The yield of petioles of rhubarb for the first 3-5 years is 4-6 t/ha, for the 6-7th year it reaches to 25-30 t/ha and more.

Having examined the properties of rhubarb secondary metabolites, we saw the possibility of using it as a source of biologically active phenolic compounds, including anthraquinones, flavonoids and tannins for biological plant protection. On these phenols basis is possible to create a plant protection products, combining several types of biological activity (fungi static, activating and insecticide). The applying of these products will reduce the number of chemical treatments, thereby reducing the pollution of ecosystems, and induced resistance will allow the plants to reduce energy costs in the defense against pathogens and conserve energy for growth, development and formation of seeds.

Phenolic compounds are valuable chemotaxonomic markers of the entire P*olygonaceae* family, and the synthesis of these various low molecular weight substances is a characteristic feature of their metabolism. In our research, we used biologically active phenolic compounds (emodin, resveratrol, quercetin) of extracts from the roots and leaves of *R. raponticum* plants harvested in the period 2012-2016 from the plot of the Institute of Genetics, Physiology and Plant Protection of the ASM of Moldova. *R. rhaponticum* seed was taken from the plant-breeding specialist of the Ukrainian National Botanical Garden, doctor of agricultural sciences Rahmetov D. B. In order to obtain practical data on the spectrum of action of *Rheum* extracts, the species belonging to different systematic groups were used as test objects: *Bacteria* class -*Pseudomonas syringae* Hall; *Mycota* - *Fusarium moniliforme* Sheldon; *Fusarium graminearum* Shwabe, *Fusarium sporotrichiella* Bilai, *Sphaerotheca fuliginea* Poll; *Insécta* class - *Aphis fabae* Scop, *Aphis pomi* Degeer, *Sitotroga cerealella* Oliv. Extracts exhibit fungicidal, bactericidal, deterrent and immune-stimulatory properties.

R. raponticum are large, multi-year, unpretentious plants, which can grow up to 15 years at one place. Propagated plants can be traditionally in two ways - growing seedlings from seeds or by vegetative propagation. The newest method of rhubarb reproduction is connected with the cell culture. Researchers from different countries develop and improve the cell culture media, elicitors and technologies for obtaining *Rheum* plants in vitro with given properties, as well as for biodiversity conservation of medicinal plant species belonging to this genus.

In order to increase the germination of *Rheum* seeds, we used pre-sowing treatment of fungus antagonist *Trichoderma lignorum*. We proved that the treatment increases *Rheum* seed germination several times. Phenological observations of the life cycle of *Rheum* plants made it possible to identify the main pest - the beetle larva (genus *Melolontha*, family *Scarabaeidae*), that gnaws small seedling roots. Successfully deal with this pest; we were able planting on the plot 1-2-year-old seedlings, instead of seeds. The collection of *R. rhaponticum* L seeds on our experimental plantation with drip irrigation takes place annually.

Conclusions. In view of the variety of possibilities for the economic use of *Rheum* plants, the simplicity of the agricultural techniques of cultivation and reproduction in the Republic of Moldova and the absence of significant losses from diseases and pests, we can recommend the creation of rhubarb plantations and its complex processing. It is necessary to expand the species diversity of rhubarb in the Republic of Moldova by means of medicinal species that grow in neighboring regions, such as *Rheum palmatum var. tanguticum* Maxim.

EXPERIENCE THE CONSERVATION OF RARE AND ENDANGERED PLANT SPECIES EX SITU

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Keywords: introduction population, conservation of rare plant species, ex situ

The studies on modelling of natural phytocoenoses are carried out in a many botanical gardens. Such works are known in the Main Botanical Garden RAS in Moscow, in the Central Siberian Botanical Garden in Novosibirsk, in the Stavropol Botanical Garden as well as in botanical gardens and arboretums of Ukraine, particularly in Donetsk Botanical garden was created an artificial steppe [11].

The examples of repatriation a rare species are known. On the territories, which not included to the natural reserve fund, was formed an artificial (introduction) populations by propagated plants. In this way V. G. Sobko created the populations of *Silene hypanica* Klok. and *Dianthus hypanicus* Andrz. on granite outcrops Southern Bug [8]. N. Ye. Antonyuk, who propagated a number of rare species (*Scopolia carniolica* Jacq., *Lilium martagon* L., *Galanthus nivalis* L.) in the botanical garden, formed their populations in Klavdievo, Golosievo and Boryspil forestry [1].

Since 1949 in the M. M. Gryshko National Botanic Garden was started a works for creating the botanical-geographic areas. In this way areas like "Steppe", "Karpaty", "Forest plains of Ukraine", "Crimea", "Caucasus", "Central Asia", "Altai and West Siberia" and "Far East" were formed. According to the concept of modeling the artificial phytocoenoses a rare plants species was planted on these areas too. In 1970 was founded a separate plot "Rare plants of Ukrainian flora". Nowadays the collection on this plot is more than 150 species of plants with sozological status. The plot was created as a collectible exposition. Plants were planted on it for regional and ecological principles.

Many rare plant species are characterized by zoochory (especially myrmecochory) and anemochory. These species are able to spread in ex situ conditions on a long distance. Plants, which successfully produce fruits and seeds in new conditions, are forms stable populations in Botanical Garden. Among these plants are ones from the Red Book of Ukraine: *Delphinium pallasii* Nevski*, D. sergii* Stev., *Silene hypanica*, *Leucojum vernum* L., *Colchicum autumnale* L., *Crocus angustifolius* Weston., *Epipactis helleborine* (L.) Crantz, *Dactylorchiza majalis* (Rchb.) P.F.Hunt et Summerhayes*, Crocus speciosus* M.Bieb, *Crocus heuffelianus* Herb., *Tulipa quercetorum* Klok. et Zoz., *Gymnospermium odessanum* (DC.) Takht., *Taxus baccata* L., *Pulsatilla pratensis* (L.) Mill. and other ones are rare in a different regions: *Scilla bifolia L.*, *Ornitogalum fimbriatum* Willd., *Ornithogalum gussonei Ten., Primula veris L., Daphne mezereum L., Muscari neglectum* Guss. ex Ten., *Hedera helix L., Helleborus purpurascens* Waldst. & Kit., *Allium decipiens Fisch. ex Schult. et Schult. fil., Primula vulgaris L.* Some plants with good vegetative reproduction formed stable perennial clones: *Allium ursinum* L., *Daphne taurica* Kotov, *Euonimus nana* Bieb., *Cerasus klokovii* Sobko., *Epipactis palustris* (L.) Crantz, *Marsilea quadrifolia* L., *Iris sibirica* L., *Cerastium biebersteinii* D. C.; *Convallaria majalis* L.

The results of many years work on the introduction of rare plants in the M. M. Gryshko National Botanical Garden NAS of Ukraine showed the success of this practice. Many species were able to successfully adapt under new conditions and formed homeostatic artificial populations during decades. Plants differ in the requirements for growing conditions, which is reflected in varying degrees of success of their self-reproduction in different areas. In general, the introduction of rare species into phytocoenoses is an effective way to demonstrate and *ex situ* protect plants in the botanical gardens and arboretums.

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METHODS OF THE INVESTIGATION OF BEE BREAD DURING PHARMACEUTICAL DEVELOPMENT OF ITS EXTRACTS

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Keywords: bee bread, antioxidant capacity, polyphenols, flavonoids, botanical origin.

Bee bread has been used for many years in traditional medicine, supplementary nutrition and in alternative diets, primary due to their nutritional properties and health benefits. However, the dependence of content phenolic substances, flavonoids, antioxidant activity, antimicrobial action on botanical and geographical origin still are not defined considering very complicated content of biologically active substances in bee bread and usage of different methods and analytical procedures for estimation of this bee keeping product (Nagai et al., 2005; Ivanišova, et al., 2015; Sobral F. at al, 2017).

The key aim of this publication was an overview of publications dedicated to the study of bee bread phytochemical and biological properties with the purpose of generalization of the existing information on the chemical characterization and methods of the investigation of this bee keeping product.

Bee bread contains lipids, proteins, aliphatic acids, mainly unsaturated ones, amino acids, carbohydrates, polyphenols, alkanes (C_{21}-C_{35}), carotenoids, micro- and microelements, vitamins E, C, K, and etc. Basic method of the studies of bee bread is microscopic analysis which determines botanical origin of bee pollen grain and periods of pollen productions in the field. *The second* method of the study of bee bread is the measure of antioxidant activity expressed by antioxidant capacity. Measuring antioxidant activity of herbal products is regarded as a first step in their characterization. *The third* type of studies of bee bread is the measure of total phenolic content by means of the Folin-Ciocalteu colorimetric method. Some conditions such as proper volume ratio, optimal reaction time, and temperature for colour development, standard optical density, and use of a particular reference-standard polyphenol are required during elaboration of this analytical procedure for the purpose of achieving meaningful, reliable and predictable results. *The forth type* of phytochemical study of bee bread is the measurement of sum of flavonoids using mainly aluminum colorimetric method and identification and assay of individual flavonoids. According to our studies, differential spectra of bee bread extracts with aluminum chloride can serve an important marker of determination of a dominating flavonoids group in bee bread. Results of investigations conducted by different authors show different values of measuring total antioxidant activity, total phenolic content, sum of flavonoids and other components. This fact and usage of different analytical methods and procedures interfere standardization of bee bread (Nagai et al., 2005; Ivanišova, et al., 2015; Sobral F. at al, 2017).

One of the biological studies of bread extracts is the study of antimicrobial activity of its extracts. Extracts of bee bread show antimicrobial properties against pathogenic bacteria and fungi. Disc diffusion and microbroth dilution methods are used to study antimicrobial action of bee bread extracts. However, it is difficult to compare studies of different authors because they employed extracts of different content of bee bread of sundry botanical and geographical origin, different solvents for extraction, various antimicrobial active pharmaceutical ingredients for positive control and different species of microorganisms. The second type of the biological studies of bee bread extracts is cytotoxic assay (antitumor activity) (Nagai et al., 2005; Ivanišova, et al., 2015; Sobral F. at al, 2017).

Summing up the results of studies of different researchers, it is concluded that phytochemical and biological studies show the prospects of usage of bee bread in food and pharmaceutical industry as a functional food ingredient and/or a component of natural medicinal products with antioxidant properties. Further studies of bee bread should be directed on the interrelation of botanical origin, total phenolic content, sum of flavonoids, vitamins, lipids and content of other biologically active compounds with their pharmacological properties.

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VITAMIN C EQUIVALENT OF ANTIOXIDANT CAPACITY (VCEAC) OF SAFFLOWER EXTRACTS

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Keywords*: VCEAC, safflower, seed, leaves, flowers, callus*

Several different methods have been developed for measuring antioxidant capacity, but none of them are exempt from problems and limitations. Until now it was not proposed one standardized procedures for antioxidant activity determination. The DPPH (2,2-diphenyl-1-picrylhydrazyl) assay, one of the most commonly employed methods [1,2], and potentiometric procedure, which was used by us, are simple, efficient and inexpensive [3,4]. The main aim of this work was comparative study of antioxidant capacity of extracts from different samples of safflower. Two radical species $DPPH^{\bullet}$ and peroxyl radical generated by 2, 2'-azobis-(2-amidinopropane)-dihydrochloride (AAPH) were employed independently to evaluate the efficiencies of its scavenging by safflower extracts. The ascorbic acid (AA) was used as antioxidant standard and the antioxidant activity of tested extracts was expressed as equivalent of AA or vitamin C equivalent of antioxidant capacity (VCEAC). The antioxidant capacity of ascorbic acid, determined by both AAPH and DPPH scavenging assays, showed a dose-dependence of the first-order with good approximation equal to 0.95 and 0.96, respectively. The kinetic linearity of reactions for 20-70% scavenging of free radicals in these assays was determined in different diapasons of AA concentration. Not surprisingly that standard antioxidants or different fraction of plant extracts reacted with different efficiencies against radicals used in reaction. Thereby the concentration of AA which inhibited free radicals by 50% significantly differed against AAPH and DPPH, IC_{50} were equal to 16.15±0.84 mg/l and 159.26±4.94 mg/l, respectively. The results of antioxidant capacity of tested extracts obtained by both procedures were highly correlated, Pearson coefficient of correlation was equal r^2=0.918. The VCEAC calculation showed that the best scavenger of free radicals was the extract obtained from intact seeds of safflower. The VCEAC of tested extracts determined by AAPH procedures were ranged following (mg AA per g of dry residue of extract): seeds (43.37±6.38) > defatted seeds (32.61±1.61) > flowers (22.96±1.17) > leaves (18.38±1.07) > callus (17.69±0.18).

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MORPHOLOGICAL AND ANATOMICAL FEATURES OF LEAVES OF *ARTEMISIA ABROTANUM* L. (ASTERACEAE) UNDER CONDITIONS OF INTRODUCTION IN UKRAINIAN POLISSYA

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Keywords: *Artemisia abrotanum* L., introduction, parenchyma, trichomes.

Artemisia abrotanum L. (southernwood officinalis) from the family *Asteraceae* is a hardy herbaceous plant spread over the whole of Ukraine, being rather promising for pharmacy and medicine, this phytoncidal, medicinal, essential-oil crop contains various biologically active compounds, essential oil, phenol-carbolic compounds and their derivatives, flavonoids, coumarins (Suresh et al., 2012; Ivashchenko et al. 2015). *A. abrotanum* is not cultivated in Ukrainian Polissya, thus, intoductional study of this crop is relevant, namely, its morphological and anatomical features, in view of being further used in pharmacy, medicine, perfumery.

The aim of the paper was to study the morphological and anatomical structure of *Artemisia abrotanum* leaves under conditions of introduction in Ukrainian Polissya.

The study was conducted on material represented by leaves of *A. abrotanum,* introduced in Botanical Gardens of Zhytomyr National Agroecological University. The anatomical structure of the introducent's leaves was studied in M. G. Kholodny Institute of Botany of NAS Ukraine by generally accepted methods (Carde, 1987; Gayer, 1974).

The obtained results demonstrate the lamina structure of *A. abrotanum*, introduced in Zhytomyr Polissya: leaf blade being amphistomatic, epidermal cells being characterized by undulated outlines and elongated or flattened projections. External cell-walls of the upper epidermis are thickened and covered with well-developed cuticle, while the lower epidermis possesses less obvious cuticle. The stomata are oval, of anomocytic type and located on both the adaxial and the abaxial epidermal surfaces, being more frequent on the lower side of the leaf. Between the epidermal cells were recorded stomatal oval guard cells with chloroplasts, surrounded by subsidiary cells that do not differ from the common epidermal cells. On both sides of the leaf blade were detected indumentary trichomes of various types: twisted, T-shaped, cylindrical, capitate and simple conical hairs. *A. abrotanum* lamina is characterized by isobilateral structure. A one- to three-seriate palisade parenchyma consists of cylindrical, cone-shaped, pear-shaped cells that differ in size; besides, there are intercellular spaces. The cells are elongated perpendicular to the leaf surface, they contain a significant amount of chloroplasts and are located freely. Spongy parenchyma is made of round, oval and angular cells that are distributed loosely, there occurring intercellular spaces. The palisade tissue is more developed as compared with that of the spongy type (xeromorphology). The midrib vascular bundle is collateral.

In external secretion excretory tissues, on the epidermis, were located oval multi-cellular glandular trichomes, typical of the family *Asteraceae*. Internal secretion excretory tissues are represented by essential oil containers.

The abaxial surface is, in general, very much similar to that of the adaxial one in the nature and composition of pubescence along with the character of epidermal cells outlines, differences to be found mainly in the quantitative indices. Thus, on the lower epidermal surface non-glandular trichomes and stomata are more numerous.

Hence, the following xeromorphic features of *A. abrotanum* have been detected: small and compact leaves, the presence of trichomes, a more developed palisade tissue in comparison with the spongy one, thick-walled epidermal cells. Secretory structures and non-glandular trichomes may be viewed as a taxonomical characteristic and can be used to identify *A. abrotanum* raw material.

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ACELERATE APPRECIATION OF THE INFLUENCE OF NATURAL GROWTH REGULATOR *REGLALG* ON WHEAT (Triticum aestivum L.) FROST RESISTANCE

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Keywords*: frost, winter wheat, natural growth regulator Reglalg.*

The correct evaluation of the influence of natural growth regulators on plants resistance to adverse temperatures is especially important for their efficient practical use, and as well for the optimization of the elaboration new plant regulators able to modify the plants frost resistance. In the literature information about the possibility of modifying the plants response to stress factors the action of biologically active substances of natural [1] and synthetic [2] origin exists. In connection with rising requirements for environmental protection, a more pronounced interest is manifested towards biologically active substances of natural origin, consistent with the requirements of organic farming. Seeds germination is a specific phase in the life cycle of wheat plants. It starts from the initial stages of germination up to the exit of coleoptile the first leaf. The development of these processes takes place in the presence of water and between 1-35°C positive temperatures. The temperatures below this range induce stress in wheat plants [3]. The aim of our research was to determine the specific influence of *shock* with *negative temperatures* (*SNT*) on the process of seed germination, coleoptile and embryonic roots growth and as well on the possibility to modify these processes using natural growth regulator *Reglalg*. In researches the wheat seeds Moldova 5 reproduced the experimental fields of IGFPP were used. Initially, the influence of different concentrations of the preparation *Reglalg* the germination and growth rate of the coleoptile and roots were determined. Before germination seeds were immersed during 2 minutes in water (*control*) and solution of the preparation *Reglalg* diluted with water in the ratio 1/1000, 1/800, 1/600, 1/400, 1/200 and 1/100 (*experiment*). The obtained data have shown that the preparation *Reglalg* in all concentrations demonstrated beneficial influence on germination and seedlings growth. The maximum of the stimulating effect was demonstrated by Reglalg dilution with water at the ratio 1/200. Namely this dilution was used for determining the influence of Reglalg on wheat seedlings response to the action of *SNT* with different temperatures (0 - - 10°C)) during 8 hours. The *daily growth rate* (*DGR*) of the root and coleoptile of control and experimental plants was determined after exposure to the *SNT*. The results showed that under the influence of the *STN*, the percentage of germination, roots and coleoptile *DGR* of control and experimental plants were reduced in proportion to the temperature. At the same time, this effect was less pronounced after *SNT* of seedlings obtained from the seeds previously treated with the preparation were *Reglalg*. Reinitiating of roots and coleoptile growth occurs more pronounced in the experimental plants. Their final length exceeded those of control plants. Higher values of *DGR* of experimental plants at first day after the application of SNT suggest about the beneficial influence of *Reglalg* on the primary plants frost resistance and the seedlings increased length at fifth day after application of *SNT* demonstrates that under the influence of *Reglalg* also rise the processes of restoring the wheat seedlings growth. The *DGR* of coleoptile of seedlings obtained from the seeds treated with *Reglalg* reach maximum at day 2-3 and decreases to zero in the fourth day after application of *SNT*. The DGR of plants from the control variant reaches zero on the fifth day after application of *SNT*. The application of *SNT* resulted in a reduction of coleoptile length in all variants. However, the coleoptiles of seedlings obtained from the seeds treated with the preparation Reglalg overcome in length those of control plants after exposure to all doses of *SNT*. Thus, obtained data have shown that the preparation *Reglalg* has a beneficial effect on the initial frost resistance of wheat seedlings, as well as on their ability to restore growth processes. In this way, the specificity of germination, growth of embryonic roots and coleoptile can serve as important parameters in the elucidation of the influence of natural growth regulators on wheat frost resistance.

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COMPONENT COMPOSITION OF ESSENTIAL OIL FROM *DRACOCEPHALUM MOLDAVICA* L. GROWN IN THE UKRAINIAN POLISSYA

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Keywords: aromatic plants, *Dracocephalum moldavica* L., essential oil composition.

Moldavian dragan is a new for Ukraine, ether-oil, aromatic and medicinal plant which is a source of nutrients and biologically active substances (Abd El-Bacy 2008, Kotyuk 2013). Above-the-ground parts of this plant are used in phytotherapy, and essential oils - in the perfume, cosmetic, and food industries (Kotyuk et al. 2012, Nikitina et al. 2011, Reichling et al. 2009).

The aim of our study was to investigate the component composition of essential oils obtained from the vegetative and generative organs of *D. moldavica*, grown in the botanical garden of the Zhytomyr National Agroecological University.

Chromatography analysis of the components of the essential oil was made with a gas-liquid chromatographer by Agilent Technologies 6890, with mass spectrometric detector 5973.

Our investigation had shown that the herbal part of *D. moldavica* collected during flowering contained 0,74% of essential oils. The components of the plant essential oils were identified: 19 substances in the stem, 16 in leaves, and 20 in flowers. Essential oils contained 26 compounds; of those 11 compounds are common for all parts of the plant: neral, geranial, nerol, geraniol, 1-octene-3-ol, 1,8-cineol, fenilatsetaldehid, α-thujon, camphor, terpinen-4-ol, and hermakren D. Cis-otsymen and hryzantemal were found only in leaves.

The presence of citral (a mixture of geranial and neral), geraniol, and nerol determine the biological activity of *D. moldavica*. The highest content of neral and geranial was found in the leaves, the lowest - in the stems. The leaves contained 43,49% and 42,45% neral and geranial, flowers – 31%, 51% and 34,31%; stems – 10,25% and 11,52%. The highest content of geraniol and nerol was in stems *D. moldavica* (28,14% and 15,76%). There were 9,48% and 3,26% compounds in flowers, and 3,35% and 2,76% compounds in leaves.

A common feature of leaves and flowers was presence of nerylatsetat (1,25% and 1,17%) and geranilatsetat (0,365% and 14,65%). The stems of Moldavian dragan contained 11,92% of camphor and 9,52% of α-thujone; their content in other plant organs ranged from 0.53 to 0,78%. Small amounts of metylevhenol, humulen, mirtenol, borneol, β-thujone, and trans-sabinenhidrat were identified in the stems. They were not detected in the leaves and flowers of the plant.

The results of our investigation conducted in the conditions of the Ukrainian Polissya were obtained and analyzed for the first time. Overall, 26 compounds were identified: 19 in the stems, 16 in the leaves, and 20 in the flowers. The highest contents of neral (43,49%) and geranial (42,45%) were observed in leaves, of nerol and geraniol (28,14 and 15,76%) – in the stems.

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CURRENT STATE OF CONSERVATION AND INTRODUCTION OF *ASTRAGALUS SPP* IN UKRAINE AS SOURCES OF PROMISING HERBAL SUBSTANCES

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***Keywords**: Astragalus, robinin, protected species, herbal substances, introduction.*

The flora of Ukraine comprises 47 species of the genus *Astragalus* [4], amongst which are 18 protected ones in accordance with the actual edition of the Red Data Book of Ukraine [5].

There are two *Astragalus* species, which were considered as official in the Newly Independent States: *Astragalus dasyanthus* and *A. falcatus*. The State Pharmacopoeia of Ukraine, which is harmonised with the European Pharmacopoeia, comprises the monograph for Astragalus mongholicus root.

An infusion of the medicinal plant material *Herba Astragali dasyanthi* is applied as a sedative, hypotensive and diuretic substance. The plant taxon is included in 1997 IUCN Red List of Threatened Plants with a category "rare".

Leaves and flowers of *Astragalus falcatus* are recommended for producing the individual flavones glycoside flaronin (robinin) of hypoazotemic activity, which is successfully applied to treat chronic renal insufficiency. The plant species is an introduced one in Ukraine.

Therefore, there is a limited natural resource base for these herbal substances. Introduction of the plant species seems as a possible trend to satisfy industrial needs. The second direction comprises investigation of *Astragalus spp* with a sufficient resource base in Ukraine as possible substitutes of the aforementioned plant sources with the purpose for the further pharmaceutical development of new herbal drugs.

Attention to folk medicine data often has an essential impact on the effectiveness in the search of promising phytopharmaceuticals. Studying the experience of folk medicine may be one of leading methods for the search of new official herbal drugs. Currently, the folk medicine plant *A. glycyphyllos* is regarded acting pharmacologically as *A. dasyanthus* and a promising source of vitamin-mineral complex and antioxidant biologically active compounds [1,3].

The biological and phytochemical characteristics under cultivation conditions for plants of the genus Astragalus the most actively in the state currently are investigated by scientists at M. M. Gryshko National Botanical Garden of the NAS of Ukraine [3].

Astragalus spp., as the largest genus of vascular plants, might be considered the most promising plant taxon for search and further pharmaceutical development of robinin-yielding nephroprotective herbal drugs [2]. With that purpose in the Botanical Garden of Danylo Halytsky Lviv National Medical University introduction of *Astragalus falcatus, A. galegofirmis, A. glycyphyllos* and complex estimation of its successfulness for further cultivation and application with medicinal purposes are carried out.

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SUSTAINABLE USE AND QUALITY HANDLING IN HIGH DENSITY APPLE ORCHARD

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Keywords*: industrial apple growing; standard quality apple; consistent high annual cropping tree; CLM; PGRs; homogenous orchard*

Economic efficiency of the apple-growing industry supposes increased planting density at least between 2500...3000 trees/ha [4] (typical of modern high density orchard, called as well intensive orchards) and up to 13000 trees/ha in European countries, for example Poland [3] (extremely high density orchard, namely superintensive orchards). At this, generally, the law „the higher density- the higher yields" is respected. Whichever system the grower opts[1], the main task is to promote consistent high annual yields of marketable apples from the first planting year from each pome tree in the orchard,- since these are the premises for an easier trade and an early and subsequent consistent high profit, i.e. return on investment ROI [2, 6]. Mandatory for superintensive orchards, these profit-generating activities are impending crop load management CLM[2] available for organic orchards too. To a great regret, the cost of existent techniques is rather high [1]; besides, adverse effects and improper quality of machine work and chemicals apply were reported (one of the obstacles is considered heterogeneity of orchards) [6], anywise additional manual works are required. This entails the fact: one and the same orchard area is worked over many a time throughout the growing year increasing the volume of work and diminishing ROI [5]. So, consistent high annual yields and, especially fruit quality assurance, might rest on manual labor and its' differenced approach towards each fruiting branch and each pome tree on the whole, unless a huge amount of work. Thus, there appears a need for a rapid, cheap technique effective with just one hit.

Established in spring 2007, homestead" MIPaciu", vill. Brăviceni, reg. Orhei, Moldova experimental apple orchard cv. Golden Delicious grafted on M9 with Superspindle training system was studied within 2012-2014 period under: **a)** planting densities: 4,0x1,5 m (control, intensive scheme, 1675 trees/ha) and superintensive ones 3,0x1,0 m (3300 trees/ha); 3,0x0,66 m (5016 trees/ha); 3,0x0,33 m (9999 trees/ha); **b)** canopy maintenance modes via pruning in various periods of year; secondary techniques (disruption along the axis; axis bending to 0^0 „Solaxe®); use of plant growth regulators PGRs (paint-gel FAGÉL 1% NAA; Regalis®10WG). Efficiency was estimated by maintenance of equilibrium between vegetative growth and fruiting (indicated by harvest without biennial bearing, high yield of standard apples); sanitary state (by percent of perished trees); heterogeneity (by percent of annual normal cropping trees). Out of 34 trial combinations inclusively control- Dormant pruning M we recommend only selected combinations variant/ density V2/0,33 m (Dormant pruning+ ⅓ axis superior disrupt. + FAGÉL around 1st scaffold) and V3/1,0 m (Pruning after harvesting) because studied factors didn't show the same impact by planting density.

Valuable combinations variant/ density requiring absolutely no thinning vs. control ones

Planting scheme	Canopy maintenance	Fruit number, fruit/tree	Real yield per tree, kg/tree	Global calcul. yield, t/ha	Cumulative calc. yield, t/ha	Category, %/ha				Firmness, kg/cm²	Dry substance, Bx	Annual bearing of trees, %/ha						BBI- biennial bearing index	Perished trees, %/ha
						<60mm	60-65mm	65-70mm	70+mm			zero	low	below medium	medium	normal	heavy		
4,0x1,5 m	M	105	11,75	19,68	59,03	23,7	51,0	5,0	20,3	8,99	17,8	11,1	11,1	22,2	22,2	11,1	22,2	16,8	0,0
3,0x1,0 m	M	88	8,51	28,08	84,25	35,3	4,3	13,3	47,0	6,21	18,3	5,6	11,1	36,1	8,3	5,6	33,3	43,0	1,80
3,0x0,66 m	M	81	8,27	41,48	124,45	27,0	35,7	11,0	26,3	6,38	18,3	5,6	16,7	22,2	16,7	0,0	38,9	21,1	2,22
3,0x0,33 m	M	59	5,22	52,19	156,58	53,7	6,0	5,7	34,7	9,49	17,0	0,0	11,1	15,1	30,1	21,4	22,2	15,1	2,22
3,0x1,0 m	V3	78	10,65	35,16	105,47	11,7	42,3	28,0	18,0	8,59	17,5	0,0	5,6	11,1	5,6	27,8	50,0	0,3	3,81
3,0x0,33 m	V2	57	7,32	72,16	219,48	16,7	44,7	26,3	12,3	10,2	14,4	0,0	0,0	16,6	5,6	16,7	61,1	-6,6	11,1

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1 establishment and running costs for an intensive orchard are 2-3times cheaper than for a superintensive one [1, 2]

2 CLM refers to optimization of crop load which helps pome tree to maintain proper balance of vegetative and reproductive growth. It implies various buds/ flowers/ fruits thinning or inducing/ saving methods

UDK 582.572.8:581.162.3:581.48

PROSPECTS OF INTRODUCTION OF DASYLIRION WHEELERI (*DASYLIRION WHEELERY* S. WATSON EX ROTHROCK) INTO LANDSCAPING OF THE SOUTHERN COAST OF THE CRIMEA

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***Keywords**: (Dasylirion wheeleri* S. Watson ex Rothrock*), assistance in natural pollination, seeds quality, germination capacity, resistance to fungal diseases and harmful insects, Southern coast of the Crimea*

Dasylirion wheeleri (*Dasylirion wheeleri* S. Watson ex Rothrock*)* is an exotic slow-growing evergreen shrub with a single unbranched trunk of up to 1.5 m height and trunk diameter up to 40 cm. In the native country it often grows as a surface life-form with stems recumbent on the ground. This unusually flowering plant is native to arid environments of northern Mexico: states Chihuahua and Sonora as well as in the southwestern United States: states Arizona, New Mexico and Texas. The leaves with a toothed margin radiate from the center of the plant's apex in all directions and are about 35.0 to 100.0 cm long and 1.5-2.0 cm broad, of green, gray-green or silvery-blue color. The flowering-bearing stem (double dibotry) also grows from the apex center and to a height of 5 m with a diameter of 3-5 cm. On the second order inflorescences branches many small flowers are formed – white on the male and purple-pink of the female specimens, about 2.5 cm long with six tepals. The fruit is an oval dry capsule 5.0 – 8.0 mm long with a single round yellow seed [1, 2, 3].

In the collections of the Nikitsky Botanical Garden (NBG) until spring 2015 were only 2 dasylirion wheeleri plants grown from the seeds obtained from Arizona in 1935 and planted in 1946 at flower bed No. 51 of the Upper Park. The plants' height in 1955 was 70.0 cm. In 2016, one specimen has a trunk diameter, after abscission of the leaf cuttings, of 18.5 cm and a height of 120.0 cm. The total plant's height with a crown is 180.0 cm. The second specimen with a trunk diameter of 16.5 cm and a height of 100.0 cm has the total height of 160.0 cm. Since 1986, assistance in the natural pollination has been carried out by means of implantation of several fragments of blossoming second order inflorescences taken from a male specimen. As a result, seeds were received whose X-ray diffraction study has shown that their plumpness amounts to 94%. The germinating power is from 82% to 100%, the mean class seed development fluctuates from 4.5 to 5.0 i.e. more than 90% of seeds are full-bodied and have high sowing quality. The laboratory germination capacity during test germination is from 95% to 100%, the field germination fluctuates between 85% and 94%.

Many years of observations over experimental plants in the NBG have shown their relatively high drought resistance, winter resistance and tolerance to fungal diseases and harmful insects. However, due to insufficient control over introduced plants brought from abroad there is a real danger that new invasive types of phytophages will come up such as the palm moth (***Paysandisia archon*** Burmeister Lepidoptera: Castniidae) and red palm weevil (***Rhynchophorus ferrugineus*** **Oliv. Coleoptera**:**Curculionidae) [4].** Currently works are underway to study the morphological properties of vegetative and reproductive organs, of endogenous, ecological and chronographic variability of fruits and seeds of this species. As a result, technologies for the industrial seed propagation of Dasylirion wheeleri will be developed and recommendations as to its culture at the Black Sea coast of the Crimea and Caucasus provided.

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THE ADAPTATION OF VARIETIES OF PEACHES OF DIFFERENT ORIGIN TO LOCAL CLIMATIC CONDITIONS

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Keywords*: varieties of peaches, photosynthetic activity, respiration*

Peaches are transitional to subtropical plants therefore for their cultivation it is necessary to have enough heat and good illumination of the crown. The early maturity of this culture makes it economically viable. Variety diversity of peach and ecological plasticity are genetically determined and related to geographic origin. In the Republic of Moldova, peach orchards occupy 8-9% of the total area of fruit plantations. Climatic conditions allow the cultivation of a rather broad range of varieties the limiting factors are sharp temperature changes in the winter-spring period, frequent thaws and early frosts. Therefore, the research task was to identify the adaptive capabilities of peach varieties in the conditions of Moldova.

All genotypes are grown in identical controlled conditions of lysimeters (1x1x2.5 m) of the IGPPP of Academy of Sciences of the Republic of Moldova, in compliance with all requirements of agricultural technology and cultivation and previous experience. Varietal composition is presented by early varieties (Collins, Kievsky rannii), medium ones (Redhaven, Cardinal) and late-ripening varieties of peach (Flamingo, Moldavsky jeltii). They differ in productivity, genetic origin, strength of growth and degree of resistance to adverse environmental factors. On the leaves of the middle level during the vegetative period, photosynthetic and respiratory gas exchange, transpiration was determined with the instrument RTM-48 [1]. The intensity of respiration of leaves and shoots was measured by a manometric method [2], the fluorescence of chlorophyll was recorded with the instrument PAM-2000 [3].

During the period of research, the plants have been exposed to stressful weather conditions several times, which made it possible to identify the most adapted genotypes that are resistant to sharp changes in the continental climate. An abnormal sharp increase in temperature in early March 2014 and 2015 caused an early awakening of the buds and a weakening of their protection. Therefore, later on, the impact of a strong north wind led to damage to flower buds. During this period in the buds of the early-ripening varieties Cardinal and Kievsky rannii, dry matter content was 20-30% more than in the late-ripening Flamingo variety. In stressful conditions, these varieties suffered the greatest damage. Up to 60% of plants lost almost completely fruits at an early stage of ripening. The buds of late-ripening varieties were at rest and retained their fertility. Assessment of the general resistance of the variety for later selection is very important in our climate zone. Drought resistance is associated with a high relative water content in the leaves and the ability to retain it at high temperatures. According to these indicators, the best were the varieties Cardinal and Moldavski jeltii. As a new diagnostic criterion for drought resistance, the RAM-2000 fluorometer was used. On the basis of measuring the parameters of chlorophyll fluorescence induction, the influence of high temperatures on the efficiency of the photosynthetic apparatus of peach leaves was studied. The varieties with the greatest stability of the factors of real quantum yield of photosystem II were identified, which indicates the stability of FA to high temperatures of 32-37^{0}C.

Varietal differences in productivity are closely related to the intensity of photosynthesis in the phase of fruit ripening. High-yielding genotypes are distinguished by higher indices compared to low-yielding ones. A similar picture is observed in the dynamics of respiratory gas exchange. The most productive variety Flamingo surpassed others in its ability to assimilate carbon. The ratio of photosynthesis and respiration, of growth processes and of fruit formation is reflected in the real productivity of the fruit tree. By the strength of growth in the conditions of lysimeters peach varieties were different as follows. The dry above ground weight of the plants of Collins and Cardinal varieties was 2-3 kg per plant, in the middle-sized plants 3-4 kg (Redhaven). In very tall plants – Moldavsky jeltii, Flamingo the plant biomass reached 6-7 kg. The annual increase in shoots was 20-35-45 meters, respectively.

Thus, studies of morphological features of organs, the productivity of peach plants, biochemical and biophysical parameters of the photosynthetic apparat made it possible to identify the most promising varieties of peach for the climatic zone of Moldova.

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MORPHOLOGY AND ULTRASTRUCTURAL DIVERSITY ASPECTS WITH IMPORTANCE IN PLANT CONSERVATION USING ELECTRON MICROSCOPY

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Keywords: *Scanning electron microscopy/SEM, Elemental microanalysiss/EDX, Transmission electron microscopy/TEM, plant citology*

The purpose of the present work was to characterize the morphology and ultrastructural diversity aspects in cell and plant tissues of some species from Romania flora using electron microscopy techniques (TEM, SEM/Environmental-SEM, EDX). Variation in leaves surface, types of stomata and hairs are only a few morphological characteristics which can provide us data about morphological variation, homology and convergence as a result of common adaptive responses to environmental pressure. Seed germination and seedling morphology, seeds surface, stem system diversity, these structures as different phase of plant development could give us information regarding the structural and functional diversity and taxonomy with importance in plant conservation. Knowing the aspects of morphology, plant physiology, measures can be taken regarding their protection and preservation.

THE INFLUENCE OF VERBASCOSIDE ON RHIZOGENESIS AND GROWTH OF LIGNIFIED CUTTINGS OF BLACK CHOKEBERRY, VARIETY "*ALECSANDRINA*"

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***Keywords**: Aronia, cuttings, treatment, verbascoside.*

The variety "Alecsandrina" of *Aronia melanocarpa* (Michx.) Elliot (black chokeberry) differs from other varieties in productivity, size (1.5-2 m), morphological features and content of biologically active substances [2]. Its cultivation on large areas is highly profitable. The fruits of this variety can be used as raw material for food and pharmaceutical industries. The establishment of a plantation of black chokeberry requires high quality planting material, with high productivity, and compliance with the planting technology. The purpose of this study has been to determine the spectrum of activity and the optimal concentration of the substance used for the treatment of lignified cuttings of black chokeberry in order to obtain planting material of higher quality in comparison with the already available one. In horticulture, the process of rhizogenesis of the cuttings is intensified by treating them with various growth stimulators. Natural growth stimulators are cost-effective because, even in small doses, have a positive impact on the process of rhizogenesis of lignified cuttings of some ornamental plants. To stimulate this process, it is necessary to treat the cuttings with solutions of various concentrations, in different periods, to produce cost-effective and high quality planting material. This phenomenon is explained by the fact that natural growth stimulators enter the tissues of cuttings, intensify the metabolism and optimize the process of callusogenesis [1]. The solutions of natural compounds – verbascosides – obtained from *Verbascum phlomoides* L., in various concentrations (from 0.1 to 0.001%), were used to treat lignified cuttings for an increased and efficient production of planting material of black chokeberry from a mother plant. The 18-20-cm-long stem cuttings, obtained from annual shoots of the aforementioned variety of black chokeberry, were treated for 5-7 days with verbascoside solution (0.1-0.001%). After treatment, they were planted in trays and hotbeds. In the first 2 weeks after planting, the respective solutions were administered 2 more times and then a specific water and temperature regimen was observed throughout the growing season. Seedlings treated with distilled water served as control.

As a result of the research conducted in laboratory and in open ground, it was found that 0.01% verbascoside solution, extracted from *Verbascum phlomoides* L., was optimal for the lignified cuttings of black chokeberry. Its effect consists in the intensification of rhizogenesis and growth capacity of rooted cuttings in the first growing season. The number of rooted cuttings was by 35% higher as compared with the control. The plantlets obtained from the cuttings treated with the aforementioned solution were distinguished from those obtained from untreated cuttings (control) by the bright green colour of leaves, the high growth rate and the well-developed root system. In comparison with the control, in the first growing season, the plants obtained from cuttings treated with verbascoside grew higher (by 40%), had more leaves and lateral roots and the first-order root was more developed (by 50%).

In laboratory conditions, it has been found that the studied solutions of natural compounds have a positive influence on the process of callusogenesis and bud swelling. It has been determined that the treatment of cuttings with 0.01% verbascoside solution is the optimal variant. It has also been found that the solutions of biologically active substances enhance the process of rhizogenesis, increase the number and length of roots, increase the leaf area of plants and stimulate their growth in the early ontogenetic stages, besides, they increase the resistance to biotic and abiotic factors. The spectrum of activity and the optimal concentrations of aqueous solutions of biologically active substances have been assessed in order to improve the propagation techniques of chokeberry varieties.

The treatment of lignified cuttings with 0.01% verbascoside solution, for a period of seven days, has allowed us to intensify the process of propagation of several specimens of the variety "Alecsandrina", which grow and develop in the Botanical Garden (I) of ASM, and to produce cost-effective, efficient and high quality planting material which will serve as mother plantation.

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QUANTITATIVE ANATOMY OF LEAF EPIDERMIS AT INTERGENERIC HYBRIDS QUINCE X APPLE (CYDONIA X MALUS)

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Keywords*: quantitative anatomy, leaf, epidermis, hybrids*

The structural particularieties of leaves Cydonia x Malus distant hybrids differ through genotype and resistance to biotic and abiotic factors. In this article are described the particularities of structure leaf epidermis at 13 hybrids of quince x apple which are growing in the Botanical Garden (Institute) of ASM, Chisinău. The preparing of micro-sample achieved from the foliar surface, also the ulterior study, according to the methodics were performed. The study results concerning quantitative anatomy of abaxial and adaxial epidermis of leaves at hybrid plants with diverse level of polyploidy were statistically processed according to methods. (1,2)

Hypostomatic leaf of intergeneric hybrids which were included in the research has a dorsiventral structure like at those initial forms. Abaxial epidermal cells are distinguished from those of adaxial epidermal cell by form, dimension, and thickness of cell membrane and of cuticle. Abaxial epidermis of leaf of hybrid plants studied, as well as initial forms, is compound of many components, so epidermal cells have polygonal form which possess a sinusoidal profile, stomata which are formed from two reniform stomatal cells are positioned têtê-á- têtê, annex cells don't have a certain orientation.

The stomata, together with secondary cells forms a stomatal complex of anomocit.

Tetraploid hybrids differ from triploid and diploid plants by epidermal cell dimensions both in radial direction (45-50 μm) and in tangential (25-29 μm). The medium length of the leaf epidermal cells at the diploids was 23-37 μm, while the width-14 and 22 μm, the length of cells at parental forms reached 34-38 μm and 19-24 μm in width. The triploids occupy, after studied parameters an intermediate position between tetraploid and diploid. The same regularity at the studied hybrids concerning such anatomical characters as the stomata and aperture dimensions was identified.

The results of investigations attest concerning the existence of direct correlative dependence (r=0.6-0.8) between the polyploid level at the intergeneric hybrids, quince x apple and the dimensions cells epidermis adaxial and abaxial of stomata and ostiole. However, a correlative indirectly proportional dependence into the multiplicity level and stomatal frequency of epidermal abaxial and adaxial cell per unit of foliar area (r=0.5-0.6) is registered. Stomatal density 1 mm^2 of foliar area at tetraploid was 357-420, diploid-471-663, triploid-419-551, meantime at apple was equal to 716 and quince -855 stomata.

The studied hybrids are distinguished between them quaznttitatively after following characters: epidermal cell dimensions, stomatal dimensions, aperture dimensions, adaxial and abaxial epidermis cell density per 1 mm^2 of foliar surface (area).

The quantitative anatomical characters in supplementary testing of hybrid biological resistance in early stage can serve, in the process of plant breeding which belong to Pomoideae subfamily, Rosaceae family.

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THERAPEUTIC AND PHARMACOLOGICAL POTENTIAL OF POTENTILLA ALBA L. SPECIES

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Keywords: *Potentilla alba* L.; *phytochemical composition; pharmacological effects.*

Introduction

Nowadays, medicine and pharmacy fields are being in progress. In order to produce new medications, pharmaceutical industry needs raw material, which has to be rich in biologically active compounds. A perfect solution would be the medicinal herbs. A special scientific interest presents *Potentilla alba* L. species. It would be a potential remedy for the treatment of thyroid gland diseases, as it is a considerable source of iodine. It may also replace the hormonal therapy, which frequently causes complications [5]. The toxicity level of *P. alba* L. is very low. The aim of this review is to prove the importance of pharmaceutical validation of *P. alba* L. species.

Methods

In order to gather the information, the keywords *Potentilla alba, Rosaceae* medicinal plants have been searched in scientific publications, articles, medical literature and database ResearchGate. All the found sources were analyzed and the information was used for the current review.

Results and discussions

P. alba L. is one of the most common plants used in public health, particularly in the treatment of thyroid disorders. Since 18th century, in Polesia (Belarus), the thyroid diseases were successfully cured using the decoctions of leaves and roots of *P. alba* L. Due to this fact, there was a very low incidence of endemic goiter in these areas. This species used to have an important radio-protective role after the Chernobyl disaster. For the first time clinical researches were initiated at the beginning of 1970s by the Ukrainians Smykov G. K. and Krivenko V. V. The remarkable results determined the start of the studies on the methods of introduction of *P. alba* L. species in culture.

P. alba L. has a various chemical composition: tannins (up to 50%), phenolic compounds, saponins, flavonoids, iridoids. The highest concentration of phytochemical compounds is registered during the flowering period. It is a source of elemental iodine and anion of hydrogen iodide [2]. Rhizomes are rich in macro- (Na<S<P<Mg<K<Ca) and microelements (boron (16-17 mkg/g), silicon (11-34 mkg/g), aluminum (48-110 mkg/g)). Rhizomes and roots contain 11 amino acids, 4 of them are essential. Moreover, there were also identified: arabinose, sucrose, essential fatty acids (linoleic and linolenic). *P. alba* L. contains a significant amount of proanthocyanidins (≈80 g/kg) – this is much higher than in chokeberry fruits (52 g/kg), which are known as a very rich source of proanthocyanidins [3].

The rhizomes' extract of *P. alba* L. shows many important activities: adaptogenic (the increase in resistance, level of lactose and glucose in blood, as well as glycogen in the hepatic cells), locomotor and anxiolytic (decrease in anxiety and stimulation of the exploratory activity), antioxidant (due to phenolic compounds, it is a strong reducing agent (even stronger than ascorbic acid, gallic acid and Pycnogenol®) and chelating agent), anti-inflammatory and anti-hypoxic [1,4].

In therapeutic purpose, *P. alba* L. is used as vegetal product: *Potentillae albae rhizomata cum radicibus,* or it can be a compound of preparations and dietary supplements: «Tireoton», «Tireonorm», «Endocrinol», «Альба», «Тирео-Вит», «Нуксен VII» [1,6].

Conclusions

P. alba L. species is a high-potential plant for the medicine and pharmacy, due to its phytochemical composition and pharmacological activity. It manifests thyrotropic effect and a reduced level of toxicity, which is very important in the treatment of endocrine diseases. *P. alba* L. is also a potential source of essential compounds, which are necessary for the human organism.

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EARLY FRUITING VARIETIES OF PEAR AS A FACTOR IN ACCELERATING THE BREEDING OF NEW VARIETIES

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Keywords: *pear, variety, hybrid, fruitinge, crossing*

Pear in the Republic of Moldova is relatively well adapted species to the conditions pedoclimaterice. An important role in the implementation of the objectives of the breeding program and to improve plant assortment have the gen pool collected in the Scientific-Practical Institute of Horticulture and Food Technology, which includes more then 300 local and introdused varieties and the best elite forms, created in the Institute. Pear genetics has been insufficiently studied. The difficulty of research of the heritage of the valuable character of the pear varieties is comprehensive, which is caused by heterozigotei cast and poligeniei of the property, and on the other hand, their late beginning fruiring of hybrids on the own roots and grafted to pear tootstocks. Most of the hybrids in combination with resistance to the main pests and diseases, to cold inherit low quality of fruit, which requires numerous repeated crossings. Thus, the process of pear breeding, respectively, take from 15 to 35 years [1, 2, 3, 4]. Juvenile period of pear trees has been studed and analyzed by many breeders, aiming to identify possibilities for shortening it and reducing the cost of the selection process. Early entry on the rod is very important for hybrids on own roots, as well as for the grafted trees. The sooner the hybrids begin to fruit the faster will be studied other parameters and selected the most promising ones. Heredity juvenilității plants is a quantitative character. Due to the determinism of polygenic, through hybridization, artificial can get F1 hybrids with an early entry on the rod.

The varieties used in the hybridization were selected after a set of valuable characters, first of all, fruit quality, productivity, resistance to pests and diseases. The study of the biological features of cultivars and elites of pear showed significant difference after this character, as well pear varieties included in the hybridization differ significantly. Trees of the Socrovișce variety are distinguishable by the earliest entry on the fruitting on pear franc rootstock - 4th year, then the variety Noiabrisckaya in the 5 th year after planting, and the variety Ciudo and elite 8-18-100 to 7th – 8th year after planting. The trees of the hybrids on own roots enter on the rod later then grafted on the rootstocks ones. The beginning of the fructification of the studied hybrids varied between years 7 and 20. In combinations of crossbreeding of varieties Socrovișce and Noiabriscaia were obtained some hybrids with the beginning of fruitting at the 7-th year after planting. In the combination of the crossing of the variety Ciudo trees began fruiting at the 10th year after planting, and the elite 8-18-100 at the 12th year after planting.

Beginning of the fruiting of the major part of the studied hybrid trees (87%) varied between 7 and 20 years. The fraction of the hybrids with the early fruitting (befor the 11 years) constituted only 8,4%. The major fraction of hybrids enter on the rod starting from the 11th year, and 8% of studied hybrids enter on the rod very late - after 20 years. The analyses of dates of pear varieties studding show the best results were obtained in the combinations of crossing of Socrovișce and Noiabriskaia varieties. Studies were allocated 22% of dwarf hybrids, especially 2 promising low growing hybrids with high quality of fruits which will be subjected to more detailed study: 97-2-3, 94-4-4. Both hybrids was created with ussing variety Socrovișce in the crossing.

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DIVERSIFICATION OF APRICOT (*Prunus armeniaca* L.) ASSORTMENT FOR SUSTAINABLE PRODUCTION IN THE CONDITIONS OF REPUBLIC OF MOLDOVA

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Keywords: *apricot, assortment, new varieties, production, Republic of Moldova.*

In spite of relatively small territory, Republic of Moldova is characterized by variable microclimatic and edaphic conditions. Apricot as one of traditional stone crops, preferable for fresh consumption of local population, exports, as well as for different kinds of processing. Creation and selection of the new apricot varieties and hybrids characterized by manifestation of valuable biological and agronomical traits in the conditions of Republic of Moldova there are the aim of breeding researches [2-5]. Identification of new, high-quality genes resistant to the biotic and abiotic stress factors as well as their new cross-breeding combination to produce genotypes with both attributes, identification of hybrids, selections and prospective elites with agronomic standards higher than the existing cultivars, identification and selection of genotypes showing a high content in anti-oxidant, therapeutic and nutritive compounds; increasing fruit quality for processing fruits, meaning a high bio-chemical content and better fruit physical properties like color, good seeds, etc.; extending the maturation season and the fresh fruit consume also for apricot, -there are considered main problems of assortment diversification for sustainable production. From the fruit preservation view point it is about: a) the concentration of period of fruit ripening, b) the methods to stop the ethylene effect on fruit ripening, c) the extension of fruit preservation period by improving fruit firmness, d) keeping the organoleptic qualities and fruit chemical composition, e) working up a new fruit preservation technology capable to improve fruit, extending the harvest season, mproving aroma, environmental adaptation (in the period of climate change: regarding temperature requirements, water deficit, etc.). remain very important areas of researches.

For apricot it is a very difficult breeding task to combine the valuable pomological traits together with environmental adaptability and yield reliability. Us researches shows that there are no significant differences between introduced (American and European) and Moldavian ones according to the time of initiation and characteristics of the differentiation of flower buds. Same American varieties like Rival, Robada, Lorna, Katy, does not have an acceptable resistance of flower buds to the winter low (-15 - -20°C during 7-10 days) temperatures. Only some studied American genotypes and Italian ones have the earliest beginning of blooming (1-2 days) in comparison to the Moldavian ones. There have been found some Romanian varieties with late blooming period. Period of flowering of CR-263, NJA-42, Paterson, Tilton coincide with the principal Moldavian varieties (Bucuria, Krasnoshciokii, Nadejda, Detskii), serving as good pollinators for its. The most of American varieties are more susceptible to the attack of *Monillinia laxa* than Moldavian ones. Introduced varieties Cream ridge, Stark Early Orange, Goldrich, NJA-42, Patterson, Selena, Olimp, Krimskii amur there are interesting for utilization in intraspecific hybridizations because of the complex of valuable features which are favorable manifested in the conditions of the republic of Moldova. Based on evaluated high level of adaptabilitity and large ecological plasticity to different variable pedo-climatic conditions local varieties and of some elites (N1, 1B26, 1B47) are proposed for future apricot breeding programs regarding specific qualities of fruits. Actually in our country. Actually in the catalog of plant variteties for 2017y. there are registered 20 varieties, including 11 created in Rep. Moldova [1]. Europeen varieties: Bebeco, Big red, Litoral, Olimp, Tirynthos, Faralia and Farbaly there are admitted only for temporary testation.

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MODIFICATION OF THE PHENOLS SUBSTANCES CONTENT IN PEAR FRUITS IN DEPENDING ON STORAGE CONDITIONS

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Keywords*: fenols substance, fruits of pear, storage conditions*

Phenols are substances spread in the plant world, have an important role in all vital processes resulting in plants: growth, development, respiration, photosynthesis and protect them from the action of unfavorable factors. They regulate the distribution of light absorbed by leaves. Phenols substances remain in the leaves, flowers, fruits and shoots. Different organs are distinguished not only by its content but also by their composition and quality.

At present, phenols' basic functions have known been of the plant. They participate actively in redox processes as anti-oxidative enzymes what resulting in plants. An important role of phenols substances in plants is their interaction with proteins and their ant-oxidative action, in particular with the enzyme systems of the cell. Thus forming of hydrogen bonds with proteins and enzymes leads to changing of their activity as allosteric effectors. Phenols substances have a significant influence on the process of growth and above the activity of AAI-oxidation, that participating in its biosynthesis or acting as non-specific inhibitors. The main role in the immune system of the fruit rest with phenols substances. Thus, not hormones phenols may influence growth and development processes of plants, and at the same time they may activate processes for the synthesis of hormones.

Provide current research looking for new sources of biologically active substances including phenols substances to improve taste qualities of fruit to the cultural perspective. In aging processes in pear fruits it takes place the modification intensity physiological and biochemical processes that determine the change of ownership of various chemical compounds and as a consequence the physical and organoleptic characteristics of the fruit. It is known that to slow the hydrolytic decomposition of organic substances in the post-harvest period it is necessary to create the optimum storage conditions, which may reduce the intensity of the maturation process - senescence and aging of the fruit dryer. The storage method investigated by us, using of the atmosphere depleted in O_2 and enriched in CO_2 (controlled atmosphere), the treatment of the fruit to initiate storage of the long-term synthesis inhibitors ethylene (Fitomag) and keeping their following the standard atmosphere meet these requirements. In the fruits produce significant braking metabolic processes that induce the shelf life.

The content of phenols substances was determined on two varieties of pear Noiabrskaia Vâstavocinaia which have been treated with the substance to initiate storage of Fitomag, and the application of certain controlled atmosphere of CO_2 and O_2 concentrations. During preservation fruit pear was found a gradual decrease in content of phenols. Vâstavocinaia variety has been a reduction of less highlighted, while in s. Noiabrskaia - a slower decrease in the amount of phenols. The fruit was. Noiabrskaia amount of phenols was higher than those from s. Vâstavocinaia. In controlled atmosphere (CA) where the fruits were kept in the content of 3% CO_2 and 5% O_2 amount of phenols was higher than variant 5% CO_2 and 3% O_2, but lower than the variant Fitomag where fruits were kept under standard atmosphere. Both version where fruits were treated with Fitomag and to the AC used to store fruits influenced the phenol content of fruit, being higher than the control variant and differing depending on genotype, conditions and terms storage of fruit. The fruit was. v. Vâstavocinaia treated with 27-34% Fitomag- variety Noiabrskaia - by 21-34% and in controlled atmosphere with 7-18% Vîstovacinaia variety and s. Noiabrskaia with 4-17% higher than the control variant. In conclusion we find that the biologically active substances, mentioned in the paper, influenced positive above phenols content of fruit pear and slows maturation of the fruits during storage.

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PECULARITIES OF GROWTH AND DEVELOPMENT OF *STRANVAESIA DAVIDIANA DECNE* SPECIES IN THE REPUBLIC OF MOLDOVA

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Keywords*: Stranvaesia, vegetative propagation, 0,01% IBA solution*

The main strategy of botanists is will be the intensification and mobilization of new plants from spontaneous and exotic flora. World dendroflora provides us with many woody plants of interest for the various branches of national economy. In this context we consider *Stranvaesia davidiana* a precious shrub and perspective for our country. This species, originating in Central and Western China, is cultivated in the Botanical Garden (Institute) of ASM from the spring of 1985. In the first 4-5 years of development, in the cold winters has frozen the plant till snow cover, beginning the vegetation period with the growth of new stems. If in the origin country the plant reaches the height of 8 m, then in the Republic Moldova only 2-3 m. Phenological observations on plant growth mother-plants and plantlets according to the methodology were carried out [2, 4, 5]. In the Botanical Garden *Stranvaesia davidiana* Decne is cultivated from the spring of 1985. *Stranvaesia davidiana* is a large evergreen shrub which achieves 2 (3) m height. The young stems are sericeous and hairy, later become glabrous. The leaves are oblong or oblong-lanceolate, acuminate, cuneiform, with the entire edges, reaches 6-11 cm length, glabrous, green with red petiole, up to 2 cm in length. The flowers are white, reaches 8 mm in diameter, red, the stamens are equal in length to the petals, the inflorescence represents an umbellate cluster by 7-10 cm of width. The fruit is a berry red dark glossy, as small as a pea, under the round, down to 8 mm in diameter. The shrub has the temperament of a semidarkness. Prefer a mild climate, with rich soils, returned. The species has the decorativeness "A", due to the persistent foliage and red fruit, which adorn the plant all winter. The species is recommended for parks, gardens, in habitats sheltered semi-shady, in central and southern districts of Republic Moldova [1, 4]. From the point of view that the plant is requested, we have proposed to study the particularities of multiplying of the species. The annual stems in two periods were taken: March-April and June-July. Fashioned cuttings with solutions of the 0.01% $KMnO_4$ and 0.01% IBA have been treated, with the exhibition during 16 and 24 hours according to the methodology [3, 6] where distilled water as a control served. It was applied the multiplying by marcottage and dividing the bushes. The cuttings treated and untreated were planted in seedbeds cold into two substrates: sand or sand + peat with minimal foggy of the 24%. The cuttings have been rooted after 30-45 days and grow in such conditions till next year after layering. After one year the cuttings were planted in containers or in the open ground. The optimal variant and effective multiplication of this shrub has been by marcottage and from stem lignified cuttings, treated with 0.01% solution of IBA with the exposition for 16 hours. It was established that the seedlings multiplied vegetatively are sensitive to low temperatures in early spring in the first years of development necessitating covering with foliage. As a result of multiplication process of multiplication of the cuttings was obtained uniform genetic material, vigorous, which possesses the properties of and qualities of the mother plant.

The process depends on many factors: the quality of cuttings and substrate, the conditions of growth and development of maternal plants, especially from the stems until the cuttings, the respecting the optimal period of cuttings and of advanced technology during the cuttings and of the seedlings density in the nursery.

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CHARACTERISTICS OF GROWTH AND DEVELOPMENT OF THE SPECIES *SPARTIUM JUNCEUM* L. IN THE REPUBLIC OF MOLDOVA

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Keywords: generative propagation, *Spartium junceum* L.

Phenological observations were carried out according to methodical indications [1, 2, 5], in 2013-2016. The seeds, collected in August and September, were stored differently, cleaned by various methods and treated according to the methodology [3]. Prior to the incorporation in fine loose soil, the seeds were treated with hot water of 70°C for 30, 60 minutes and 16 hours, until the water chilled, and with 0.01% and 0.03% gibberellin solution – for 24 hours. The seeds were sown in two periods, in February-March, in boxes, in greenhouses, in a mixture of soil, sand and peat in a ratio of 2:1:1, and in April-May, depending on climatic conditions. Depending on the climatic conditions in the years of research, the percentage of fruiting ranged between 48 and 65%. Temperature fluctuations had a negative impact on the process of ontomorphogenesis of seeds and only half of them were viable, the rest – sterile. The viable seeds differed from the sterile ones in colour, size and weight.

Hydrothermally treated seeds, sown in February-March in the greenhouse, germinated evenly in 15 days, while those sown in April-May germinated unevenly in 20-25 days. The germination of the seeds, treated with 0.01% gibberellin solution for 24 hours and sown in trenches, was more even and by 10-15% higher as compared to the untreated seeds. The 0.01% gibberellin solution influenced positively the germination capacity of seeds and the germination percentage, in the years of research, constituted 85-90%.

Before sowing, the seeds had been soaked in hot water for 16 hours, until the water cooled. Transplanting the 5-7 cm tall seedlings, obtained from the seeds sown in February-March, did not give the expected results. The seedlings obtained from seeds treated with hot water for 16 hours had a less developed root system as compared with those obtained from seeds treated with gibberellin. The seedlings obtained from seeds treated with 0.01% gibberellin solution for 24 hours, sown in trenches, in April-May, reached a height of 30-35 cm, by the end of the growing season, and had a well-developed root system. These seedlings were planted in loose soil. The survival rate of seedlings was about 80-90%, depending on climatic conditions and compliance with the technology in the years of research. The weight of 1000 fruits was 350-420 g and the weight of 1000 seeds ranged between 14 and 30 g. Analysing the data from Table 2, we can conclude that the fluctuations in temperature and the amount of rainfall in the years of research, 2013-2014, had a negative impact on the morphological parameters of fruits: the percentage of fruiting, the share of seeds in the mass of fruits, the number of viable seeds in a fruit. The lowest percentage of fruiting was recorded in 2015.

The seeds were sown about 2 cm deep. The norm of pure and fertile seeds was 3-4 g per linear meter. Transplanting can be carried out in the first 2-3 growing seasons because the survival rate decreases by 40-50% as the plants get older. The well developed and deep root system hinders transplanting of mature plants in the field.

1. The duration of the flowering stage of this shrub, the abundance of flowering and fruiting is in close correlation with the climatic conditions at the time.
2. The optimal method of propagation of Spartium junceum L. was sowing in spring, in April or May, the seeds that had been previously treated hydrothermally with hot water of 70°C for 16 hours and with 0.01% gibberellin solution for 24 hours.

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MORPHOLOGY AND ANATOMY OF THE LEAF IN SOME SPECIES OF THE GENUS *KNIPHOFIA* MOENCH.

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Keywords*: Kniphofia; anatomy, leaf.*

The first studies on the genus *Kniphofia* Moench. (red-hot pokers, tritomes) have described the macro-morphological characteristics of the species [2, 3]. Srivastava described the leaf epidermis as the second most important characteristic after cytology in solving taxonomical problems [4]. Leaf anatomy is used by many researchers in the classification of difficult taxonomic groups and, in the case of the genus *Kniphofia*, in solving some uncertainties regarding the specific and generic belonging. A. Berger has done the first descriptions, at anatomical level, of the species of red-hot pokers (tritomes) in his monumental work "Pflanzenreich" vol. IV, which includes descriptions on the genus *Kniphofia* [2]. In W. Russell's opinion, this study has many gaps and considers it necessary to carry out a more detailed study on the leaf structure in *Kniphofia aloides* Moench. (sin. *Kniphofia uvaria* (L.) Hook.) [5]. Baijnath studied the leaf anatomy of 18 species of red-hot pokers to assess the taxonomic value of the anatomical features of leaves. He discovered that the leaf area and the internal anatomy proved to be useful features, especially for the exclusion of the genus *Notosceptrum* [1].

This paper presents an analysis of the histo-anatomical features of the leaf of some species of the genus *Kniphofia* in *ex situ* conditions. The biological material was collected in 2015, from the species: *Kniphofia ensifolia* Baker, *K. uvaria* (L.) Hook., *K. tukii* Baker, *K. nelsonii* Mast. and *K. sarmentosa* (Andr.) Kunth. Fresh material was used, from which cross sections were prepared by hand. To detach the epidermis, we used the peeling method. Stomatal density (SD) is the number of stomata per mm^2. To determine the SD, we used the micrometric coefficient for each eye piece-objective pair at the microscope Biolam-D-12. Pictures were taken with Kodak AF camera, 8.2 megapixel.

Red-hot pokers, are generally cultivated as ornamental plants. They have linear, long acuminate, radicular leaves. The midrib, on the upper side of the leaf, is canalicular and, on the lower side, smooth and hull-like. The margin of the leaf blade is entire (*K. ensifolia*, *K. tukii*) or toothed (*K. nelsonii, K. sarmentosa, K. uvaria*). The teeth are 1-2 mm long. The leaf surface is glabrous in all the studied species. The leaf is no thicker than 2 mm. In cross section, the leaf blade is V-shaped at the base and Y-shaped at its tip.

In terms of structure of the cross section, the leaf of *Kniphofia* consists of epidermis, mesophyll and vascular tissue. Both epidermises are similar, consisting of a cell layer, with well-defined cuticle, made of prosenchymal cells. The studied species have bi-stomatal leaves, with tetracytic stomata. Their density on the upper epidermis, as well as on the lower one is on average 20-30 per mm^2. The mesophyll is isolateral. Under each epidermis, there are 1-2 layers of palisade cells, followed by lacunar tissue, rich in chlorophyll. The central part of the mesophyll consists of a colourless parenchyma composed of cells that are much larger than the cells of the palisadic and lacunar tissue, of a rounded shape, which has storage function. Vascular bundles, together with the xylem and the phloem are quite numerous and located in lacunar tissue. They are arranged in two parallel rows, delimited by the colourless parenchyma.

The morpho-anatomical features of the leaf of the studied species of *Kniphofia* allow determining such characteristics as succulence and water storage capacity, which helps the plant tolerate drought and cope with this stress factor, characteristic of xerophytes. Besides, the density of stomata is an important physiological feature. The small density of stomata in red-hot pokers, in comparison with other species (100 – *Fraxinus excelsior* L.; 115 – *Populus nigra* L.) denoted the fact that the plant limits the intensity of the process of transpiration and is an adaptive feature that enables it to cope with drought.

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THE DEVELOPMENT RATE OF SEVERAL SPECIES OF *HOSTA* TRATT. IN THE BOTANICAL GARDEN (INSTITUTE) OF ASM

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***Keywords**: Hosta Tratt., description, phenology, multiplication, cultivation*

The genus *Hosta* Tratt. (hostas, plantain lilies or giboshi) belongs to the subfamily *Agavoidae*, family *Asparagaceae* Juss., order *Aspargales* Link., class *Monocotyledoneae*. It is native to the Eastern Asiatic floristic region: Japan, China, Sakhalin and Kuril Islands [1, 2]. Currently, 38-40 species are known. Some authors attribute this genus to the *Hostaceae* family [5, 7]. The genus was named in honour of the Austrian botanist and doctor N. Host (1761-1834) [2]. For a long time, hostas were considered representatives of the genus *Hemerocallis* L. [2], and later – of the genus *Funkia* Spreng [1, 4]. The later has remained as a synonym.

In the wild, plantain lilies grow on riverbanks, cliffs, mountain slopes and swampy areas and even on sand dunes. They prefer shady and humid habitats [3, 6]. Currently there are many varieties of *Hosta*. According to some sources, about 3,000 varieties and a much larger number of cultivars have been recorded [6]. These wonderful ornamental plants, which have been known and cultivated in Japan since ancient times, were brought to Europe by the end of the 18th century, becoming more popular in the 1990s.

Hostas are perennial herbaceous plants, geophytes, with short, slightly lignified rhizomes. The root system – very bushy and branched [1, 3]. The leaves are radicular, usually ovate-lanceolate, cordiform leaves, with prominent veins, of green, emerald-green or variegated colour, their margin is sometimes undulate [6]. It forms beautiful, very decorative bushes. Some species and varieties have glaucous leaves. The flowers are funnel-shaped, pendulous, lilac, bluish, violet or white; consist of six arched stamens, a filamentous pistil and perigonium with six laciniae. The inflorescences are arched racemes, which can be taller or about as tall as the bush. The fruits are tricarpelar, polispermous capsules.

The research was conducted on the experimental plot of the Floriculture Laboratory of the Botanical Garden (I) of ASM. Four species of the genus *Hosta* served as research subjects. The development rate was studied according to the method of phenological observations in botanical gardens [8].

In the collection of non-traditional perennial plants of the Botanical Gardens (I) of ASM, the following varieties are cultivated: *Hosta fortunei 'Gigantea', H. 'Minima', H. 'Elegans'* and *H. 'Ice & fire'*. The rhizomes were acquired by international exchange or during the work trips of our collaborators to botanical gardens from abroad.

The growing season for the plants of the genus *Hosta*, starts at the end of March or at the beginning of April. The first leaves appear wrapped in sharp, green or green-violet buds, depending on the species. Until the end of April, the buds grow in height and the first leaves unfold. The growing season lasts until the end of June for *H. fortunei 'Gigantea'* and until the end of July or the beginning of August for *H. 'Minima', H. 'Elegans'* and *H. 'Ice & fire'*. The generative stage divides the species in two groups: early flowering (*H. fortunei 'Gigantea'*) and late flowering (*H. 'Minima', H. 'Elegans'* and *H. 'Ice & fire'*). The flowering stage lasts 30-45 days.

The cultivation of hostas for over two centuries in Europe and for about six decades in our country reflects a high adaptive potential to the new conditions. Due to their long growing season and flowering stage, these plants are promising for the landscaping of the green urban and rural areas, and as indoor ornamental plants. The plants propagated by seed reach maturity only after 4-6 years, and that is why the vegetative propagation of plantain lilies is preferable.

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SCILLA SIBERICA HAW. – VALUABLE ORNAMENTAL SPECIES CULTIVATED IN *EX-SITU* CONDITIONS

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Keywords: *Scilla siberica, extinct, ex-situ cultivation, development rate, propagation, use.*

Scilla siberica Haw. in: Andrews, 1804, *Bot. Repos. 6: t. 365*. (*Asparagaceae*) – Siberian squill or wood squill. The species was described by Haworth A. H., based on the plants cultivated by the author from the seeds received from P. Pallas from Volgograd Oblast (Tsaritsyn), Russia, but was published by Andrews H. C. [4,5]. In Bessarabia, it was indicated only by T. Săvulescu, T. Rayss (1924), for the forest near Leova, included later in the extinct category, for the Republic of Moldova [1]. In the Herbarium of the BG (I) of ASM and of other institutions, there are no specimens collected in the republic. In Romania, it is a rare species and is found in the districts Satu Mare and Constanța [2]. As a rule, it grows in the forests and shrublands from the mountain areas of Eastern Europe, Crimea, Caucasus and Western Asia. This species is a xeromesophile, mesotherm and acid neutrophil [1, 4, 6].

It is a geophyte, which grows 10-20 cm tall. Subspherical bulb. Flower stalks – by (1) 2-4, erect, not branched, compressed. The leaves are linear, abruptly apiculate. The flowers are bisexual, actinomorphic, campanulate, nutant, by 1-4 in raceme. The perigonium is blue-azure, the tepals 1-1.2 cm long. The fruit – globular capsule. Blooms in March-April. 2n = 12. [1, 2, 4, 5].

The epithet of the species is misleading, because it is not native to Siberia. Nevertheless, it is considered as a priority, recognized and used today as *S. siberica*. In Crimea and Russia, *Scilla siberica* is a rare, endangered plant, which has been included in the regional red lists and red books [5].

In the collection of spring ephemerals of the Botanical Garden (I) of ASM, *S. siberica* has been cultivated for over 35 years. The present population comprises over 200 plants of different ages. About 70 plants bloom each year. The flowering stage lasts from 12.03 to 06.04, but varies depending on the climate conditions, especially temperature. *S. siberica* fructifies about 45 days. All the phenological phases occur in 60-70 days. The plants are characterized by a brief development rate: the beginning of growth (01.03); budding, emergence of the stalk with flower buds (08.03); beginning of flowering (15.03); full flowering (20.03-29.03); end of flowering (06.04); fruit development (20.03-15.05), which lasts the longest. Four phases of flower development have been highlighted: a) white-cream bud of 0.3-0.6 cm; b) bud with cream base and blue tip, 0.7-0.9 cm; c) blue-azure bud, 1.0-1.3 cm; d) mature flower – 1.3-1.7 cm. At the time when the first flowers open, the plants are 6-10 cm tall. By the end of flowering – 20-25 cm. A plant develops 2-4 stalks with 1-4 flowers grouped in racemes. A plant can produce from 7 to 12 flowers. *S. siberica* produces few fruits (4-7 capsules per plant), but each capsule, about 1cm long, contains up to 30 seeds. Thus, if cultivated, Siberian squill propagates easily vegetatively, as well as by seeds. The small, black seeds are sown in soil immediately after ripening, because they quickly lose their germination capacity. The bulbs are almost spherical, dark brown, about 2-2.5 cm in diameter. The roots are whitish, 2-3 cm long. They can be transplanted both in spring and in autumn. This species prefers neutral soils and is incompatible with the highly acidic soils. It is recommended to plant it in sunny areas, but also under trees and shrubs. On rich soil, Siberian squills propagate even without human intervention for years, by bulbs, but also by seeds.

S. siberica has been cultivated since the 18th century. Currently, many cultivars are created, the most popular: *Spring Beauty, Alba* etc. with pink, lilac, violet, white and cream flowers [3]. *S. siberica* is used as ornamental plant on lawns, in gardens, in solitary groups or together with other bulbous plants, for example, species of *Muscari, Ornithogalum, Crocus, Gagea* etc. It is also recommended for rockeries, floral decorations, bouquets or cultivation in pots. We consider it appropriate to carry out a new floristic research in the forest near Leova, to determine the state of the plant population in this locality. At the same time, we propose the repatriation of *S. siberica* to the natural habitat.

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THE SPECTROPHOTOMETRIC DETERMINATION OF THE TOTAL DEGREEE OF FLAVONOIDS AND POLYPHENOLS IN THE AERIAL PARTS OF *HYPERICUM PERFORATUM* L. AND *HYPERICUM ELEGANS* STEPH.

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Keywords*: flavonoids, polyphenols, hypericum perfratum, plant products*

The genus Hypericum consists of 460 species, 5 of them are found in the flora of the Republic of Moldova: *H. perforatum* L., *H. elegans* Steph, *H. hirsutum* L., *H. Tetrapterum* Fries., *H. montanum* L. In the European Pharmacopoeia (2008) likewise in the Romanian Pharmacopoeia edition (1993), only *H.perforatum* L is admitted for the scientifical use. [1]. Only 2 species *H. perforatum* L and *H. Maculatum* Crantz. (synonym *H. quadrdrangulum.*) are used in the Russian Federation. Both species are used for the preparation of infusions, tinctures, obtaining of the dry extracts which are included in the composition of medications such as "Prostanorm" and "Sibictan" [5]. From the bibliography sources it is acknowledged that the anti-inflammatory, antioxidant action is caused by the flavonoid, tannin compounds, essential oil content. Nowadays, in the Republic of Moldova, the aerial parts of the *H. perforatum* L. are being widely used in the popular medicine for their astringent, sedative and anti-inflammatory action. From the local vegetal products, no medicine has been obtained.

In this study we have determined the total flavonoids' degree (in rutin equivalent) and polyphenols degree (in galic acid equivalent) from the aerial parts of *H. perforatum L* and *H. elegans* Steph.The aerial parts have been collected in the spontaneous flora of the Republic of Moldova. Also, has been done the quantitative determination of the dry obtained extracts and aerial part of the analyzed species. The quantitative analysis has been realized through the spectrophotometric method. The absorbance was measured with Meterthech UV/VIS SP 8001 [6,7]. As solvent was used 80% ethanol. The hydro alcoholic extractions were concentrated at 40°C at a rotary evaporator Laborota 4011.

The studies have revealed that the total amount of flavonoids from the aerial parts of *H. perforatum* L (3,57%) is equal to that from *H. elgans* Steph. (3,51%). In contrast to flavonoids, the total amount of polyphenols between these two species differs: *H. Perforatum* L. (6,65%), *H. Elegans* Steph. (5,71%). In the dry extract from the aerial parts of *H. perforatum* L. the flavonoids establish the amount of 37,74 mg/ml while in *H. elegans* Steph. a lower level is attested – 30,42 mg/ml. This predictability is observed on the total polyphenols degree in the aerial parts of the dry extract. They are being close to each other: *Hypericum perforatum* L. -23,89 mg/ml and *H. elegans* Steph. – 23,14 mg/ml.

As a result of being intense used in traditional medicine as anti-inflammatory, hypnotic, astringent, antibacetrian remedy, H. perforatum is gathered in excessive quantities. The problem may be diminished by the *H. elegans* Steph's introduction into the culture, because of its analogue content to *H. perforatum* Steph. Therefore, it is necessary to be studied the farmacognostic, chemical and biological aspect of this plant.

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IN SITU AND *EX SITU* PHYTOCHEMICAL PROFILE OF*ARTEMISIA ANNUA* L. SPECIES IN REPUBLIC OF MOLDOVA

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Keywords*: artemisinin, phenolic compounds, essential oil, HPLC, GC-MS*

The aim of our study was to assess the phytochemical profile of *A. annua* samples harvested from several natural growing sites from the north, centre and south regions of Republic of Moldova (2014 and 2015) and from the *ex situ* collection (2016) developed at the Botanical Garden (Institute) of ASM.

In this respect we envisaged to characterizethe following bioactive compounds: phenolic compounds, artemisinin (for *in situ* and *ex situ* samples) and essential oils (*in situ* samples).

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 (Stefanache *et al*., 2016). Isolation of essential oil was made by hydrodistilation for 2 hours in a Clevenger apparatus and the qualitative analysis was performed by means of GC-MS.

In all *in situ* samples the following compounds were identified: caffeic ac. in amounts of 1.70 – 4.31 mg/ 100 g d.w. (2014) and 1.18 – 3.37 (2015), *p*-coumaric ac. 0.50 – 4.35 mg/ 100 g d. w. (2014) and 1.46 – 5.59 mg/ 100 g d.w. (2015), chlorogenic ac. 112.64 – 210.48 mg/ 100 g d. w. (2014) and 170.29 – 512.28 mg/ 100 g d. w. (2015). Cynarin was found in amounts varying from 307.13 to 617.72 (2014) and 553.59 - 1390.87 mg/ 100 g d. w. (2015). There are few reports of cynarin being found in *A. annua* species (Zao *et* al., 2015). Isoquercitrin was found in amounts of 5.24 – 30.33 mg/ 100 g d. w. (2014) and 8.83 – 33.70 mg/ 100 g d. w. (2015), while luteolin-7-glicoside was 9.80 – 40.47 mg/ 100 g d. w. (2014) and 28.05 – 132.93 mg/ 100 g d. w. (2015).

For the samples harvested from the *ex situ* collection chlorogenic acid was found in amounts of 194.19 – 833.67 mg/100 g d. w. and cynarin in amount of 700.38 – 2115.09 mg/100 g d. w. The flavonoids isoquercitrin and luteolin-7-glicoside were found in amount of 21.27 – 77.11 mg/100 g d. w. and 50.56 – 318.27 mg/100 g d. w., respectively.

For the samples harvested from the natural growing sites the artemisinin content varied from 0.236 – 0.396 mg/g d. w. (average 0.310 mg/g d. w.) for 2014 samples and 0.619 – 1.799 mg/g d. w. (average 1.075 mg/g d. w.) for 2015 samples. The artemisinin content for the samples harvested from the *ex situ* collection was relatively lower, varying from 0.082 to 0.686 mg/g d. w. (average 0.303 mg/g d. w.).

Total essential oil content ranged from 0.84 to 1.40%. By means of GC-MS analysis, the following major constituents of the essential oil were identified: α-pinene (2.54 – 9.78%), 1,8-cineole (4.07 – 9.67%), artemisia ketone (17.9 – 34.8%), campfor (6.93 – 20.47%), β-silenene (4.41 – 8.69%) and germacrene D (1.06 – 3.15%). The ratio between the major compounds varied among different samples.

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.

The samples harvested from the natural growing sites had high amounts of bioactive compounds compared to *ex situ* samples, the artemisinin content being comparable with the literature data. Artemisinin content in the *ex situ* samples was lower when compared with the *in situ* samples but still in the range of the content cited in literature. In contrast, the phenolic compounds content was higher for the samples harvested from the *ex situ* collections. Artemisia ketone, compound which is known for a good antimicrobial activity (Bilia *at al*., 2014), was the major constituent in all analyzed samples.

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THE APPLICATION OF BACULOVIRUSES DIVERSITY AND USE AS BIOINSECTICIDES

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Keywords: *baculovirus, biological control, crop protection, bioinsecticides*

Biopesticides are attracting global attention as new tools to kill or suppress pest populations such as weeds, plant pathogens and insects while posing less risk to people and the environment than synthetic pesticides. Globally, the use of biopesticides has steadily increased by about 10% per year. Biopesticides are typically derived from living organisms, of plant or microbial origin; this paper focusses only on the latter. More than 225 microbial biopesticides are manufactured in 30 countries in the Organization of Economic Development and Cooperation. The NAFTA countries (USA, Canada, and Mexico) use about 45% of all biopesticides sold, the European Union uses 20%, Oceanic countries use 20%, the South and Latin Americas use 10%, and India and Asia use 5%. (Szewczyk et al. 2009; Moscardi et al. 2011).

Baculoviruses have long been recognized as potential candidates for biopesticides because of their readily observable symptomology, their ability to produce impressive epizootics in insect populations and because they are detectable by light microscopy as a consequence of being occluded in relatively large protein crystals, referred to as occlusion bodies (OBs), within infected host cells. Currently, a number of baculoviruses are registered as insect control products worldwide. Most of the registered baculovirus products are for control of lepidopteran and sawfly forest pests but a few have been developed as highly successful biopesticides to control lepidopteran pests in agriculture (Rohrmann G. F., 2013).

Commercial production of baculoviruses for use as biological control agents of insect pests is carried out worldwide at different scales depending on the market. In 2014, there are more than 430 registered biopesticide active ingredients and 1320 active product registrations. Over 50 baculovirus products have been used worldwide as microbial insecticides. At Institute of Genetics, Physiology and Plant Protection of Academy of Science of Moldova are prepared the bioinsecticides for use in Republic of Moldova, mostly for the control of insect pests. In order to reduce the population of insect it is recommended utilization of the ecologically inoffensive preparations Virin-ABB-3, Virin-OS, Virin-HS-P, which is an efficient preparation for combating this pest in agricultural, ornamental and forest biocenosis.

In us researches show the difference between the parameters of biological activity of biological mass obtained on the different days from the infection with baculoviruses. There are not noticed any substantial differences of biological activity in the case of viral suspension with the same concentration (10^7 pol./ml). Good results were registered at the analysis of lethal time necessary for obtaining a death rate of 50% of larvae (TL_{50}). That parameter has minimal value of the first 5 days from infection. In the terms of that aspect, biological mass obtained from dead larvae after these days is characterized by parameters specific to wild strains obtained from natural conditions, that aspect induces the difference of biological activity of biological mass obtained from dead larvae on different days of infection and denotes the possibility of application of that measure in the process of improving baculoviral strains applied for elaboration of viral insecticides (Ciuhrii & Volosciuc, 1988; Volosciuc, 2009). Other authors also have confirmed the results of the investigations in that field, (Ilienih, 2007).

This study provides a potential solution for controlling Lepidoptera vector in Republic of Moldova. It finds that the Moldavian baculovirus preparats can reduce the Lepidoptera larvae.

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THE CREATION OF A GOJI COLLECTION IN THE BOTANICAL GARDEN (I) OF ASM

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Keywords: *Lycium barbarum, cultivar, collection, agrotechnics*

Goji, or wolfberry, is the fruit of *Lycium Barbarum* L., a species in the family Solanaceae, native to Tibet, and is an important source of vitamins. It contains large amounts of vitamin C, vitamin A, selenium, calcium, iron, potassium, unsaturated fatty acids, beta-carotene, lycopene, lutein, polysaccharides etc., and this fact explains the benefits of these fruits for the human body. The therapeutic qualities of goji berries are completed by the presence of 18 amino acids (11 of which are essential), which decisively contribute to the health of the human body.

At present, the creation of a goji plantation may be one of the best investments in agriculture. Although goji berries are not in high demand in our country, they are very popular in Europe. Besides, this medicinal plant has huge potential and, in terms of profit, can surpass raspberries, blackberries and currants in the next few years. Goji is an early ripening species with a high potential for production. In the fruiting stage, about 4-5 t/ha can be harvested usually. In order to support and simplify the high productivity of goji, it is necessary to implement all the agrotechnical measures fully and correctly, beginning with the creation of the plantation [1].

For this study, the goji shrubs were planted in the collection of fruit-bearing shrubs, in the experimental field of the Botanical Garden (I) of ASM.

The main purpose of the creation of the goji plantation was to analyse the growth and development of the given species, the quality of the fruits produced by these plants, in order to determine the nutritional value of the fresh fruits and to establish the suitability of this species for obtaining nutraceutical products (with high content of dry matter, antioxidant capacity, high amount of vitamin C, polyphenols etc.). The planting material represented by the cultivar *Ning Xia N1*, was obtained by *in vitro* culture and was acclimatized in greenhouse conditions. The shrub prefers sunny locations, south-facing slopes and soils with a pH = 6-7. It is resistant to temperature fluctuations between - 25 and + 40°C. It starts blooming in May and starts producing fruits in July.

The planting material was planted according to a scheme, in holes of 15 cm x 15 cm and a depth of 25 cm, at a distance of 2 m between rows and 1.5 m between plants in a row. The preparation of the soil for the creation of the collection and the care work were carried out according to the specialized literature. The beginning of the growing season and the beginning of the dormant season, respectively, the dynamics of growth of shoots, the number of flowering shoots per plant, the time of blooming, the morphological and decorative characteristics of flowers and inflorescences and the amount of flowers and fruits produced by plants were determined during the experiment. The collection was established in spring, more exactly in March, when the plants were dormant, on moderately eroded soil.

The cultivated plants were shaped three level model, with a maximum height of 2 m, to facilitate the access to the upper branches, spraying foliar fertilizers, pruning and fruit picking, any branch exceeding this height was removed by cutting. The multi-layered form for goji shrubs was chosen to ensure better ventilation and exposure to sunlight, all for a higher yield. The distance between the layers of the main branches thus formed was 40-60 cm, in order to facilitate maintenance, to allow sunlight and air to access all parts of the plants.

Goji is characterized by a very high adaptability, both in terms of soil and climatic factors. Regarding climate, goji can withstand extreme temperatures and a low precipitation level, one of the few limiting factors is light. As for the soil, goji turns out to be a pioneer plant for very poor and degraded soils, since it manages to improve, in a short time, the structure of the soil and its chemical composition, by fixing atmospheric nitrogen [2].

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THE COLLECTION OF FERNS IN THE GREENHOUSES OF THE BOTANICAL GARDEN (INSTITUTE) OF ASM

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Keywords*: collection, ferns, genus, species, sori, spores*

Ferns (the phylum *Pteridophyta*) are the first vascular land plants, which have vegetative body, represented by the sporophyte generation and which becomes dominant. Currently, more than 12,000 taxa, classified in about 300 genera, are known.

Ferns are moisture-loving plants. In the wild, they live in a wide variety of habitats: mountain elevations, dry desert rock faces, bodies of water and open fields.

In the greenhouse collections of the Botanical Garden, there are ferns of 11 families, 26 genera and 63 taxa. According to the number of taxa, the following families are best represented: *Polypodiaceae* Bercht. et J. Presl with 16 species and cultivars, *Oleandraceae* Ching. ex Pichi-Serm with 14 (gen. *Nephrolepis* Schott), *Adiantaceae* Ching with 7, *Pteridaceae* Reich with 6 etc.

The planned introduction of ferns in the greenhouses of the Botanical Garden (I) of ASM started in 1975; that year the collection consisted of nine species. Over the years, the number of taxa varied. At the end of the 90s of the 20th century, this number was 82.

Of the 63 taxa from the collection, 38 (60.32%) develop sori with spores. Practically, all the taxa of *Adiantum* L. (7), *Nephrolepis* Schott (4), *Pteris* L. (6), *Phlebodium* J. Smith (3) and *Platycerium* Desv. (2) produce spores.

In greenhouse conditions, the ferns propagate vegetatively, by division or by offsets – young plantlets formed on the mother plant (*Asplenium bulbiferum* Forst. and *Tectaria gemmifera* Alst.). Some species reproduce by free dissemination of spores, for example: *Adiantum capillus-veneris* L., *Athyrium filix-femina* (L.) Roth and *Cyrtomium falcatum* L. f. C. Presl. To reproduce by spores, the ferns need special conditions: +26 -+28°C temperature of the substrate, 80-85% humidity of the air and of the substrate of red peat and river sand. The spores are incorporated into the surface of the substrate. To maintain the air humidity, the pots are covered with glass and periodically vented.

In the Botanical Garden, the collection of ferns is located in the greenhouse with tropical plants grown in pots and in vegetative containers on racks, where the temperature varies between +14°C and + 30°C, the relative air humidity is 70-85% and, in spring-summer, the plants are protected from direct sunlight.

The optimal period for transplantation and vegetative propagation is the end of January-February. The substrate must be lightweight, permeable to water and air.

The most fern taxa from the collections of the Botanical Garden can be successfully used to decorate rooms with northwestern exposure, with no direct sunlight and with air temperature from +16°C to +26°C. Ferns are popular ornamental plants, primarily, due to their aesthetically pleasant appearance and, secondly, due to the ability of many species to absorb harmful substances from the air.

The most decorative and hardy ferns, suitable for use as houseplants, are the representatives of the genera: *Adiantum, Asplenium, Nephrolepis, Platicerium, Pteris, Phlebodium.*

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INTRODUCTION OF PLANTS OF *STRELITZIA REGINAE* AIT. OF THE REPUBLIC MOLDOVA

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Keywords*: specie of Strelitzia reginae Ait., methods of cultivation, seed productivity*

Strelitzia reginae (Pasărea paradisului) originară din Africa de Sud, provinciile Kalahar (raionul Kalahar) şi a Capului (raionul Natal) se întîlneşte de preferinţă pe locuri deschise. Această specie a fost introdusă în cultură în anul 1773 şi prezintă un interes deosebit pentru industria floricolă şi amenajări peisagere de interioruri.

Drept material pentru studii au servit plantele de *Strelitzia reginae* multiplicate de la 2 exemplare (achiziţionate în anul 1974) pînă la 1500 actualmente.

Pe parcursul anilor 1985-1986 145 de plante au fost sădite la sol la distanţa de 70x70 cm. Pe parcursul a 30 de ani aceste exemplare s-au transformat în tufe din 5-11 unităţi cu numărul total de 870 plante.

În baza cercetărilor particularităţilor biologice şi fenologice efectuate în serile R. Moldova GB (I), s-a stabilit că perioada de înflorire la Strelitzia reginae revine pentru lunile Septembrie-Mai.

Perioada de înflorire depinde de temperatura mediului pe parcursul anului. La plantele de *Strelitzia* în condiţii de teren protejat seminţele se formează numai în rezultatul polenizării artificiale. Pentru obţinerea seminţelor se selectează inflorescenţe bine dezvoltate, în care se află de la 5 pînă la 7 flori. Polenizarea se înfăptuieşte în primele zile ale deschiderii florii cu polen propriu sau cu polen de la alte flori. Deschiderea florilor are loc succesiv, cu un interval de 3-5 zile, în dependenţă de temperatura mediului. Dezvoltarea primei flori, de la apariţia inflorescenţei din teaca frunzei pînă la deschiderea ei, durează de la 58 pînă la 102 zile. Din momentul polenizării pînă la coacerea deplină seminţele se dezvoltă pe parcursul a 165-170 de zile.

Fruct capsulă dehiscentă cu pereţi lemnificaţi. Într-un fruct se dezvoltă de la 3 pînă la 55 de seminţe negre, ovale cu arilus portocaliu. Deseori nu toate seminţele formate sunt viabile. Numărul de seminţe nedezvoltate într-un fruct variază de la 1 pînă la 4. Temperatura optimală pentru germinarea seminţelor este de 24-26°C. În condiţii de oscilaţii a temperaturii seminţele proaspăt colectate au capacitatea germinativă de 43-62%.

Perioada de germinare a seminţelor proaspăt colectate în lunile Iulie-August şi încorporate în sol în aceaşi perioadă durează 55-65 de zile. Conform datelor de literatură seminţele înainte de a fi încorporate în amestec de substrat sunt ţinute în apă timp de 24-48 de ore. Pentru a obţine un termen mai scurt de germinare ele se tratează cu soluţie de fitohormoni şi apoi se încorporează în sol nisipos, la o adîncime de 1.5 ori mai mare decît dimensiunile seminţei. În aşa condiţii (temperatura 24-26°C şi fitohormoni) seminţele încep să germineze după 4-8 săptămîni (temperaturile mai joase reţin acest proces).

La plantulele apărute procesele de creştere şi dezvoltare decurg lent. Prima frunză aprare la o lună după apariţia cotilidonului, a doua la 1.5 luni după prima. La vîrsta de 18 luni planta atinge înălţimea de 35-37 cm, are 9-10 frunze, lungi de 11.5-19 cm şi late de 8.8-13 cm. Fiecare frunză nouă apare şi se dezvoltă în teaca în celei precedente. Plantele obţinute din seminţe ating faza generativă la vîrsta de 5-6 ani.

Pe lîngă înmulţirea generativă Strelitzia se multiplică şi vegetativ prin divizarea tufei la începutul primăverii. În acest caz plantele obţinute înfloresc după 1-2 ani din momentul divizării.

Pe parcursul perioadei de înflorire fiecare plantă are cîte o inflorescenţă. Pentru a stimula dezvoltarea mugurilor florali toamna, plantele au nevoie de o perioadă de repaus pe parcursul lunilor Iulie-August.

Perioada optimală pentru transplantarea plantelor tinere- lunile Martie-Mai. Strelitzia are nevoie de lumină solară, în lispa ei plantele nu ating faza generativă.

Primăvara şi vara substratul se lasă să se usuce la suprafaţă între udări. Iarna se udă în regim normal, la temperatura de 20-24°C. În perioada de creştere se adaugă îngrăşăminte minerale (bogate în K), şi organice odată la 2-3 săptămîni.

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MISCANTHUS GIGANTEUS CELL WALL COMPOSITION AND THEORETICAL BIOETHANOL POTENTIAL IN THE CONDITIONS OF MOLDOVA

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***Keywords**: biomass, cell wall composition, ethanol, Miscanthus x giganeteus, near infrared reflectance spectroscopy*

The last decades of XX and XXI centuries can be called the decades of searching for renewable energy sources. The increasing consumption of fuels, in many branches of industry, makes science face the challenge, which undoubtedly is the necessity of searching for new, innovative methods of processing alternative, ecological and inexhaustible sources, before natural sources would not be able to satisfy human and economic needs. The most abundant renewable resource, produced all around the world, is represented by lignocellulosic biomass. Bioenergy is the chemical energy stored in organic material, which can be directly converted into useful energy sources by biological, mechanical or thermochemical processes. The sustainable development of a bioenergy industry will require low-cost, high-yielding and high quality biomass feedstock.

Applying the methods and techniques of forage quality analysis to determine the compositional and quality traits of biomass, for conversion properties, represents a valuable tool for current research in biofuel production. When using near infrared reflectance spectroscopy (NIRS) methods, quality spectroscopy should first be performed. The plant cell wall is made up of three main components: cellulose, hemicellulose and lignin. Cellulose and hemicellulose represent structural carbohydrates, which if accessible, could be converted to other products including transportation fuels.

The development of specific crops dedicated to energy has been proposed as a strategy to produce energy without affecting food security and the environment. As perennial grasses, the plant species that use the C_4 photosynthetic pathway have potential to meet agronomic, non-competitiveness with food, environmental and sustainable development requirements for biofuel production. *Miscanthus* is a peculiar genus native to East Asia; about 25 species were listed by various researchers. *Miscanthus sinensis* Andersson, *Miscanthus sacchariflorus* (Maxim.) Franch., *Miscanthus floridulus* (Labill.) Warb. ex K. Schum. and Lauterb., *Miscanthus lutarioriparius* L. Liu ex S. L. Chen and Renvoize and the hybrid *Miscanthus giganteus* (*Miscanthus sinensis* x *Miscanthus sacchariflorus*) Greef et Deu. are mainly used for biomass production because of their high biomass potential (20-45 t/ha). At present, China has the largest area under *Miscanthus* cultivation in the world, approximately 100.000 ha, in Europe, there are estimated 30.000 ha. One of the most commonly used energy crops in Europe, *Miscanthus giganteus* Greef et Deu., a sterile tetraploid hybrid characterized by a rapid growth and development, reaching a maximum height 4.5 metres, is tolerant to adverse soil and environmental conditions and the estimated life time of a plantation is 20–25 years.

The *Miscanthus giganteus* biomass was collected in the spring of 2016, from the experimental land of the Botanical Garden (Institute) of Academy of Sciences of Moldova. It served as subject of study, wheat straw and corn stalks – as control variants. The collected biomass was milled. The content of neutral detergent fibre (NDF), acid detergent fibre (ADF) and acid detergent lignin (ADL) were evaluated using the near infrared spectroscopy (NIRS) technique of the Research-Development Institute for Grassland Brasov, Romania. The concentration of hemicelluloses was approximated by subtracting the ADF from the NDF, while the concentration of cellulose of each sample was estimated by subtracting the ADL from the ADF. Hemicellulose and cellulose values were substituted in place of component pentose and hexose sugar values in the theoretical ethanol potential (TEP) equation.

The *Miscanthus giganteus* biomass was characterized by high content of cellulose (557 g/kg), hemicellulose (283 g/kg), pentose (100 g/kg) and hexose (47 g/kg), in comparison with wheat straw (430 g/kg; 277 g/kg; 78 g/kg and 46 g/kg) and corn stalks (417 g/kg; 250 g/kg; 75 g/kg and 41 g/kg). The theoretical ethanol potential was 19-26% higher and constituted 610 l/t dry matter.

The obtained results indicate the possibility of using the hybrid *Miscanthus giganteus* for the creation of industrial plantations and the production transportation fuels, bioethanol, in the Republic of Moldova.

PHYSIOLOGICAL CHARACTERISTICS OF DIFFERENT VARIETIES OF APRICOT

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Keywords*: apricot varieties, the growth, photosynthesis, transpiration, pigment fund*

For the Republic of Moldova is particularly important selection of apricot varieties with high adaptability to varying local conditions, genetic resistance to frost and high physiological potential for balancing growth and fruiting. Comprehensive experimental studies are needed to evaluate promising varieties introduced from the international assortment [1.2]. For several years in the Photosynthesis laboratory of the Institute of Genetics, Physiology and Plant Protection (IGPPP) of Academy of Sciences of Moldova together with the Nursery Department of NGO "Codru" we have studied the physiological and biochemical features of a number of apricot varieties that grown in an industrial nursery, a garden, and in the conditions of vegetative experience in the lysimeters. Particular attention was paid to the formation and functioning of the photosynthetic apparatus of plants, which characterize the physiological state and productivity of apricot trees [3-4].

This report presents the results of studying the features of growth and photosynthetic ability of perspective for Moldova apricot varieties of different age and maturity of fruits. Four-year-old fruiting apricot plants of the late Sirena variety, two-year-old plants of the Shalakh varieties with early-middle ripening period, as well as Vasile Cociu early variety were studied, under controlled conditions of the lysimeters of the vegetation complex of the IGPPP of Academy of Sciences of Moldova. The dynamics of growth processes, the rate of photosynthesis and transpiration using LCI device, pigment fund by spectrophotometric method were studied.

The obtained data show the strategy of the deployment strategy of the leaf surface in the varieties under studied: the fruiting plants of the Sirena variety are distinguished by the enhanced accumulation of the biomass of the leaves during the periods after flowering, growth and especially ripening of the fruit. The weight of such leaves exceeds the average values for young plants of Shalakh and Vasile Cociu varieties by 17.65 and 22.10%, respectively. This corresponds to the same differences between varieties in the specific surface density of the leaves. This advantage varieties Sirena by the weight of the leaves allows a higher accumulation of assimilates to be directed to growth and yield.

The intensity and ratio of photosynthesis: the transpiration in the studied varieties is at a close level, increasing only when ripe fruit varieties have Sirena and kidney tab at grade Vasile Cociu. This creates additional reserve power in the event of a request for assimilates. Seasonal dynamics of chlorophylls and carotenoids in the studied plants are the same, which confirms the existence of a single type of pigment accumulation strategy for different apricot varieties. The pigmentary fund of the strongly grown Shalakh variety, as a rule, surpasses other varieties. However, in June, during fruit ripening, in the fruit-bearing plant of the Sirena variety, the amount of chlorophyll and especially the ratio *of* chlorophyll *a* and *b* was the highest. The potential productivity of the studied varieties is characterized by the net productivity of photosynthesis, which is, for example, for the period from 7 to 16 June: 0.62; 0.37 and 0.32 mg $\cdot$ $dm^{-2}\cdot$ h^{-1} and from 16 to 30th of June is of 0,81; 0.47 and 0.36 mg$\cdot dm^{-2}\cdot h^{-1}$ for the Sirena, Shalakh and Vasile Cociu varieties respectively.

Thus, features of growth processes, dynamics of pigment content in leaves, intensity of photosynthesis, transpiration and net productivity of photosynthesis, characterizing different varieties of apricot, are revealed. This testifies to the existence of a number of closely interconnected processes that serve as a mechanism for realizing the regulatory action of the genetic plan for the manifestation of different maturation periods for fruits and plant productivity.

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WEDELIA TRILOBATA (L) HITCH.: OPPORTUNITIES FOR USE IN LANDSCAPING ON THE TERRITORY OF THE REPUBLIC OF MOLDOVA

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Keywords: *Wedelia, introduction, vegetative reproduction*

At present, the issue of expanding the range of plants used for external landscaping in the summer is becoming important. It is especially necessary to replenish the assortment of plants for container culture. This problem can be solved by introducing into the culture of new interesting tropical and subtropical plants. One such plant is *Wedelia trilobata (L) Hitch*.

Wedelia trilobata (L) Hitch. (sin. Complaya trilobata, Sphagneticola trilobata, Acanthospermium trilobata) belongs to the family *Asteraceae* subfamily *Helianthaceae*. The people call it a yellow creeping daisy or a Singapore daisy. It comes from Central America and South America. Being an invasive weed in places of natural growth, Wedelia has great adaptive abilities and can grow both in the shade and in the sun and is very drought-resistant. Currently, it is often found in tropical regions and the Old World. Introduced as an ornamental plant, it was naturalized under new conditions and is already found in Thailand, Mniyama, Vietnam and in the wild.

This herbaceous creeping perennial shrub up to 30 cm in height forms a dense carpet on the surface of the soil. The leaves are glossy-green from the upper side and pale green from the bottom, with simple coarse white hairs. The shape of the egg-shaped leaf on the tip of the leaf is notched or irregularly serrated, usually with pairs of side lobes. Stems thin creeping rounded, rooted in the nodes can reach 2 m or more in length. Single flowers are located on peduncles 3-10 cm long, bright yellow 6-15 mm in diameter. In tropical areas it is used as a ground cover perennial.

Wedelia trilobata (L) Hitch. Appeared in the collections of the Stock Greenhouse of the Botanical Garden of Academy of Sciences of the Republic of Moldova in 2015. The stalk was brought from Chile, where it was taken from the wild. This plant easily adapted to the conditions of keeping in the greenhouses of the Botanical Garden of Academy of Sciences of the Republic of Moldova. Therefore, we investigated the features of the development of this plant in our conditions. For this, the features of vegetative propagation were studied by way of cuttings of the buckwheat and the growth features of these plants.

The features of root formation in cuttings of Wedelia were studied in two terms in April and in August. In this case, the number of basic roots formed, their length and total length of the developed root system were taken into account after 15.30 and 60 days after the beginning of rooting. The results showed that the root system in the cuttings of the wader begins to form already in the first week of rooting. On day 15, there were already 3 to 5 formed rootlets with a length of 2 to 5 mm. At day 30, the root system had an average of 5-7 root roots 5-8 cm long per plant, and on day 60, 8-10 basic roots 8-11 m long. It was also found that the rooting time has an effect on the rooting of the cuttings of the *wadelium*. So in April the percentage of rooted cuttings was 85%, and in August it reached 100%. The intensity of root formation was not significantly different in terms of cuttings propagation. The processes of root formation were better in April and the number of formed was slightly higher than in August. But the growth of the root system was better in August. In general, the experiment showed a good ability of buckwheat to vegetative reproduction.

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PESTS AND DISEASES OF IN VITRO CULTURES OF BLACKBERRY

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Keywords: *mites, aphids, nematodes, powdery mildew, necrosis.*

The blackberry plantlets, obtained by *in vitro* culture, grown in containers, pots and under stress conditions, are not always well adapted and are less resistant in comparison with those grown directly in the soil, in the garden, in open ground. The high temperatures and the constant moisture of the substrate become favourable conditions for various pests, which affect the plants at different stages of acclimatization: mites, whiteflies, aphids, nematodes. The affected plantlets react by the appearance of spots, necrosis, discolorations etc.

Blackberry is a hardy fruit-bearing shrub that is not susceptible to a wide range of diseases and pests. Only bacteriosis caused by mites, whiteflies and other pests may create real problems.

Tetranychus urticae (red spider mite) – a species of mite, very small insects, difficult to distinguish with the naked eye, can be noticed due to the web woven on different organs of the plant, most often on the dorsal side of the leaves, where they are found. The optimal conditions for the development of such pests are a rapid decrease in air humidity on hot summer days, when the plantlets are in the 2nd and 3rd phase of acclimatization. When the plantlets, obtained by *in vitro* culture, are exposed to the natural conditions for acclimatization, these pests appear and feed on leaf epidermis, lay their eggs on the lower surface of leaves, or at the ends of young shoots, which they attack. They pierce the superficial tissues and suck the sap. Besides, red spider mites may be dangerous because they can transmit diseases caused by viruses [1].

Trialeurodes vaporariorum (greenhouse whitefly) is a species of Aleyrodidae, small insects, difficult to control, which feed on plant sap. They are frequently found in greenhouses. These insects lay their eggs on the underside of leaves. Because of them the plant dries, the leaves turn yellow and then fall. More often, the plants are infested with greenhouse whitefly in the cold season, when the *in vitro* cultures are in the 2nd and 3rd phase of acclimatization, because of the lack of ventilation in the room. In the cases when the plantlets were acclimatized under natural conditions, the infestation of *in vitro* cultures with this pest was not observed [3].

Nematodes are dangerous pests for blackberry plantlets, obtained by *in vitro* culture. Nematodes are very small worms, which cannot be distinguished with the naked eye. These pests reproduce in the peat substrate, which is rich in organic substances. When the reserves of organic substances from the substrate are depleted, the nematodes start attacking the young, developing rootlets of plantlets, by damaging the tissues and feeding on the sap. As a result, the plantlets begin to wither. After removing them from the substrate, we can observe that the rootlets are necrotized, without content and thin like a hair. This pest spreads mostly in the first stage of acclimatization, when there is excess moisture in the substrate and the room is poorly ventilated.

Even in a protected environment, plants are at risk of becoming a target for various pathogens, undergoing stress and, as a result, developing diseases. The diseases of plantlets, obtained by *in vitro* culture, develop during the stages of acclimatization, because of one or several factors: too little or too much moisture, too little or too much light, unsuitable temperature, the presence or absence of air currents, poor drainage, transplanting. The diseases may be bacterial, fungal and viral.

Some cultivars were affected by powdery mildew, a disease caused by certain species of fungi of the order *Erysiphales*. The main symptom of powdery mildew is the appearance of white or grey spots on the stems and leaves of plantlets, the infection affects mainly the upper surface of leaves. The fungi produce large numbers of spores in environments with high humidity, small spaces and poor air circulation. To prevent powdery mildew, it is necessary to transfer the plantlets to a well-ventilated room, because in rooms with poor air circulation, they are more susceptible to this infection. Over this period, it is necessary to avoid wetting the leaves, when watering, and fertilizing the substrate, because powdery mildew grows well in humid and fresh environments [2].

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DIAGNOSTIC VALUE OF CARPOLOGICAL CHARACTERISTICS OF LAMIACEAE LINDL. FAMILY SOME SPECIES

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Keywords*: Lamiaceae, carpological characteristic, fruit*

Structural characteristics of the fruits and seeds are quite constant. These characteristics can be used to solve a number of issues in modern Botany [1-3].

We study carpological characteristics of 17 species of the *Lamiaceae* family. These species are rare in the natural flora of Ukraine. *Dracocephalum moldavica* L., *D. ruyschiana* L., *D. botryoides* Steven, *Lamium galeobdolon* (L.) L., *Melittis carpatica* Klokov, *Origanum vulgare* L., *Phlomis tuberosa* L., *Prunella grandiflora* (L.) Scholl., *Salvia austriaca* Jacq., *S. glutinosa* L., *S. nutans* L., *S. scabiosifolia* Lam., *S. sclarea* L., *S. tomentosa* Mill., *Scutellaria creticola* Juz., *Sideritis montana* L., *Stachys recta* L. are epy plant species with the conservation status "rare", "endangered" or "vulnerable".

A coenobium is a fruit of *Lamiaceae* family representatives. The coenobium is formed from four erems placed at the bottom of the calix and it is completely hidden.The coenobium quickly collapses and breaks after ripening. So diagnostic value has only morphological characteristics of erems.

The erems of the studied species are characterized by enhanced apex and slightly narrowed base. The erems of the *Salvia* species are obovate, bluntly triangular and broadly globose at the top. Dorsal side is slightly convex, globose. Ventral side is biangular with more or less blunt rib in the middle.

The rib of *Salvia nutans* and *S. sclarea* is concave. *S. austriaca, S. scabiosifolia* and *S. tomentosa* ribs are slightly convex. The hilum of *Salvia* species is obliquely truncated, depressed, surrounded by whitish rim. The hilum is placed on the ventral side at the base of narrowed ribs. *S. austriaca, S. tomentosa* and *S. nutans* hilum is triangular in outline, pointed in the basal part. Other *Salvia* species hilum is more globose.

The hilum contour of *Dracocephalum botryoides* and *D. moldavica* is narrowly sagittal and white. The hilum contour of *D. ruyschiana* is wider and grayish.

The erems of *Lamium galeobdolon* and *Phlomis tuberosa* are characterized by triangular-prismatic shape with truncated triangular apex. The erems of *P. tuberosa* are densely covered with transparent star-like branched hairs. *Scutellaria creticola* erems surface are covered with star-like branched trichomes also. The other studied species are with glabrous dull surface (*Dracocephalum moldavica, D. ruyschiana, D. botryoides, Lamium galeobdolon, Melittis carpatica, Origanum vulgare, Phlomis tuberosa*), slightly lustrous (*Salvia* species), slightly glossy (*Prunella grandiflora*).

The erems of *Prunella grandiflora* and *Melittis carpatica* are more globose with a narrow longitudinal rim. The erem rim in *P. grandiflora* is less distinct.

The erems of studied taxa have different colors: almost black (*Salvia scabiosifolia*), brickly-brown or greyish-brown (*Dracocephalum* species and *Stachys recta*), can be variegated (*Sideritis montana*) or with longitudinal striped pattern (*Salvia sclarea, Prunella grandiflora*).

These morphological characteristics of erems are representative and have diagnostic value for taxonomic and can be used as additional criteria for identification.

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APPLICATION OF BIOLOGICALLY ACTIVE SUBSTANCES IN REPRODUCTION OF *HYACINTHUS ORIENTALIS L.* AND *LILIUM HYBRIDS*

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***Keywords**: hyacinth, lily, bulb squames, vegetative propagation, biologically active compounds, treatment*

The advantage of the biological active substances possesses a significant impact on growth, physiological and morphogenetic processes that occur in plants.

Hyacinth east (*Hyacinthus orientalis L.*), as well as hybrid lilies (*Lilium hybrids*), belong to the lily family (*Liliaceae*). These are perennial bulbous plants. The bulbs of hyacinth are spherical or widecone with many succulent stocking up covering squames. The bulbs of lily represents modified, greatly shortened underground stem with leaves, where the stem appears as basal plate, and leaves - squames. The representatives of *Hyacinthus orientalis L.* and *Lilium hybrids* are part of the collection of ornamental bulbous plants in the Botanical Garden of Chisinau. Their assortment is not numerous, and reproduction, until recently, held a natural division of the bulbs.

Such a method does not provide a large number of planting material, as the bulbs in the formation of hyacinths usually appears at 5-6-th year, and for lilies on the third - fourth.

The bulbs preserve properties and characteristics of the mother plant, only at vegetative propagation. One way of vegetative propagation of these crops is reproduction of bulbs' squames. This method is based on the ability to regenerate plants.

One of the new and promising directions in flower growing is the search for biologically active compounds with the mechanism of action, which is aimed on stimulating the immune system of plants.

Therefore, some studies have been conducted on the effects of biologically active substances on reproduction process of *Hyacinthus orientalis L.* and *Lilium hybrids*. The aim was to obtain healthy planting material and the accelerated increase in the number of taxa.

Studies were carried out in the greenhouse and in the floriculture laboratory of Botanical Garden (Institute) of ASM. Based on the methodology of Bykhovets, Goncharuk (2004), we propagated 2 varieties of hyacinth and 3 varieties of lilies with various growth factors.

The pre-treatment was done and soaking s squames, that were separated from the bulbs, in solutions of various growth stimulants (8 variants to hyacinth and 9 variants to lilies).

More than 400 new bulbs were received from 6 hyacinth bulbs in 14 weeks. This method allows getting from one bulb of lilies 15-100 new plants. New bulbs obtained from the squames of bulbs, have been separated from the parent squames in a stage of root formation and a couple of leaves, and planted in a seedling boxes for the further rearing. Thus, on the basis of the results of research we can conclude about the success of breeding of *Hyacinthus orientalis L.* and *Lilium hybrids* squames of bulbs under conditions of Botanical Garden (Institute) of ASM. The use of plant extracts in the process of reproduction, contributed to strengthening the immune system of plants in all variants. The best results were obtained using: Gumat + 7, Reglalg, Appin, when breeding hyacinth; Zircon - when breeding lilies.

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CONCERNING THE INTRODUCTION OF *ARGRYRANTHEMUM FRUTESCENS* L. IN BOTANICAL GARDEN (INSTITUTE) OF ASM AND PERESPECTIVES OF ITS UTILIZATION

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Keywords*: bush chrysanthemum, ontogenesis, introduction, cultivate and utilization.*

Argyranthemum frutescens (*Magnoliophyta department*, *class Magnoliopsida*, the order *Asterales*, family *Asteraceae*, genus *Argryranthemum* L. Sch. Bip) – *bushy chrysanthemums*. Previously, the species belonged to the *Chrysanthemum genus*; actually it is separated into independent *Argryranthemum* genus which includes 23 species. The *bushy chrysanthemums* are native from Canary and Madeira Islands. Some species of the genus have been introduced in culture for more than 200 years ago, they are perennial plants, and are valued for abundant, long flowering, but are cultivated as annuals, because they do not tolerate low temperatures [Kiselev, 1952]. From 2014 in the collection of perennials in our Botanical Garden (Institute) of ASM from Holland representatives of the genus *Argryranthemum* were introduced. When the plants are transferring in other geographic and environmental conditions, their peculiarities are not stable and may change significantly. In connection with comprehensive study of the adaptive abilities and biological characteristics of new culture in given soil and climatic conditions was started.

The purpose of our research was the study of the *bushy chrysanthemums* (*A. frutescens*) vital cycle (ontogenesis) in the conditions of Moldova's central part. The scientific investigations in the stock greenhouse and in the experimental section of Floriculture laboratory of Botanical Garden (Institute) of ASM were carried out. The research objects three varieties *(Pompon white, AngelicTMLemon, AngelicTMMagenta) Argranthemum frutescens* were served. The studies according Krasnova, Vysyascheva, Yuskevich methodic (1990) were carried out. Phenological observations, biometrical indices in the open ground, as well as the description of ontogenetic peculiarities according to the generally accepted methodic of phenological observations in the Botanical Gardens of the USSR were made (1979). Uterine specimens were planted in the greenhouses ground, and then the plants by green cuttings were propagated. Cuttings were carried out in two terms October 2014 and March 2015. In late April, rooted cuttings were planted in the ground. Throughout the growing season under the plants agrotechnical care were carried out, observations were made, also the fixing the phases of development, as well as biometric measurements. According to our observations, the phase flowering in some varieties of *argyranthemums* begins immediately after the rooting of the cuttings, still in the shelves, before planting in the ground. During the planting its inflorescences were removed. The most intensive grow and development of all three experimental varieties was observed in September, the beginnings of October, where during that time are forming the main number of inflorescences. The blooming at all three varieties is long, throughout of all summer and early autumn period, right up to the very frosts. The completion phase of flowering was noted on all varieties in one day, since the inflorescences perished, due to a sharp reduction in temperature. According our observation, the inflorescences of argyranthemum supports the decrease of temperature indices till + 2-4°C, lower air temperatures it leads to the death of inflorescences.

According our scientific results, we have established that for cultivation *Argranthemum frutescens* in the climatic conditions of the given zone, the multiplication is recommended in October or propagation in early spring. The optimal temperature for successful rooting of *Argranthemum frutescens* cuttings is recommended +12-16°C, at a soil relative humidity of 80-85%. *Chrysanthemum bush* represent a photophilous plant, on which growth and development, substantially influences air temperature and the planting period. During the dry season difficultly entered in the generative phase. Under favorable growing conditions *Argranthemum frutescens*, in our Botanical Garden, abundantly and blooms for a long time. In the open field is not saved. In connection with may be cultivated only as an annual plant.

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ANTIMICROBIAL ACTIVITY OF INTRODUCED *AMPELOPSIS BREVIPEDUNCULATA* AND *RUTA HORTENSIS*

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Keywords: *Ampelopsis brevipedunculata, Ruta hortensis, antimicrobial activity*

The introduction and study of plants that can be a source of biologically active compounds for use in pharmacy and medicine is an important. This applies to the treatment of diseases of the oral cavity, because the problem of periodontal tissue treatment is actual and unsolved yet. This is due to the depletion of resources of plants in nature, and in view of the fact that there are international requirements for the cultivation of medicinal plants "Good Agricultural and Collection Practice" (GACP, 2003). On the other hand, the introduction of plants that can be used in the future - one of the objectives of the botanical gardens. So, our aim was to investigate antimicrobial activity of introduced species *Ampelopsis brevipedunculata,* and *Ruta graveolens. Ampelopsis brevipedunculata* (leaves) and *Ruta hortensis* (the above-ground part) introduced and cultivated in the Botanical Garden of Ivan Franko L'viv National University, were collected just before flowering in June-July 2013-2015. Both species were dried in the shade at room temperature until achieved a constant weight and used for further investigation. Extracts of the plants were made like described previously (Vorobets et al., 2015). For extraction have been used 20% and 70% ethanol, and distilled water at a ratio of plant material 1:10 (m/v), and at 25˚C temperature. The standard agar dilution method was used to determine the sensitivity of microorganisms to the herbal extracts by using glass cylinders and disc diffusion methods (Collins et al., 1995; Vorobets, Yavorska, 2016)**.** The tested Gram-positive and Gram-negative bacteria were *Staphylococcus aureus* (*ATCC 25923*), *Escherichia coli* (*ATCC 25922*), and *Candida albicans* (*ATCC 885-653*), and clinical strains of *Enterobacter sp.*, *Streptococcus salivarius*, *Neisseria sp., Staphylococcus aureus,* isolated from the oral cavity of patients with periodontitis from the Microbial Culture Collection of the Department of Microbiology of Uzhgorod National University**.** It has been shown that aqueous extracts and 20% ethanolic extracts of both investigated species did not inhibit the growth of all microbial strains which have been used except *Enterobacter sp.* The tested 70% ethanolic extract of *Ampelopsis brevipedunculata* and *Ruta hortensis* demonstrated antibiotic activity with the inhibition zone diameter values range of 15.7±0.6 mm and 18.5±1.2 mm against *E. coli***,** respectively. DZI against both strains of *S. aureus* was 18.0±0.6 mm with 70% ethanolic extract of *Ampelopsis brevipedunculata,* and 17.5-22.5mm with 70% ethanolic extract of *Ruta hortensis.* It was found 21±1.2 mm and 14±1.0 mm DZI of 70% ethanolic extract of *Ampelopsis brevipedunculata* and *Ruta hortensis,* respectively against *Enterobacter sp.* So, there was confirmed that aqueous extracts of both investigated plant species have not less activity against *Enterobacter sp.* compare to 70% ethanolic extract. Given the fact that *Enterobacter sp.* complex are widely encountered in nature, but they are also causative agents of nosocomial infections in the last decade, and a lot has been published on the antibiotic-resistance features of these microorganisms (Mezzatesta et al., 2012; Davin-Regli, Pagès, 2015), and with strong weak immune system enterobacteria can proliferate in other parts of the body, for example in the throat, our results can be considered as a first step of research the possibilities of using medicinal plants as a preventive agent about this bacteria.

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RESISTANCE OF BOXWOOD *(BUXUS SEMPERVIRENS L.)* LEAVES TO NEGATIVE TEMPERATURES DEPENDING ON THEIR AGE AND THE SEASON OF THE YEAR

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Keywords: boxwood *(Buxus sempervirens* L), leaves, negative temperatures, photosynthetic system

Boxwood is a perennial evergreen plant. There is no doubt that boxwood for a long period has acquired specific qualities contributing to survival in various environments. This can explain its high resistance to extreme winter temperatures and unpretentiousness to soil conditions of growth. Thanks to this, its leaves can be used to study the specificity of physiological and biochemical processes which determine the functional state of the boxwood photosynthetic system, depending on the age and season of the year [1, 3]. That is why we chose boxwood for studying the features of the passing these processes in plants.

The boxwood leaves of at the age of 1, 2 and 3 years were selected for analysis in different seasons of the year (winter, summer, autumn, spring) and exposed to range of negative temperatures: -5, -10, -15, -20, -25, …-30°C during 8 hours. After that, for assuring the fulfillment of restoration process, the leaves were exposed in thermostat at temperature of 22-24ºC, relative humidity of 92-95%, illumination with fluorescent lamps at photosynthetic radiation of 50 mM m^{-2} sec^{-2} and a photoperiod of 16 hours - illumination, 8 - darkness. The reaction of the leaves photosynthetic apparatus to exposition to low temperatures was determined by the change in the activity of the photosynthetic system-II (PS-2) with the fluorometer PAM 2100 (FRG) at different periods of exposition to negative temperatures [1, 2, 3].

Obtained results proved that the least resistant to negative temperatures are the leaves age of three years, collected in the summer. They were died after exposition at temperature of -5ºC. The most resistant to negative temperatures are the leaves of the first year, collected for analysis in winter. They have survived after exposure to low temperatures down to -30°C.The leaves of the spring and autumn vegetation period have an intermediate resistance to the action of negative temperatures.

Thus, it is revealed that the leaves of boxwood, regardless of age, have the ability to adapt to low temperatures, so that they show the highest resistance to them in winter and the lowest resistance - in summer. With increasing of the age, the leaves resistance decreases mainly due to a lowering their ability to repair damage caused by negative temperatures.

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3. LANDSCAPE ARCHITECTURE, ENVIRONMENTAL PROTECTION, ECOLOGICAL EDUCATION

CHANGING INDIVIDUAL BEHAVIOR OF *LEPTINOTARSA DECEMLINEATA* ADULTS (*COLEOPTERA- CHRYSOMELIDAE*) ABOUT THE APPLICATION OF PLANT EXTRACTS AS TREATMENT TO COMBAT THEM

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Keywords*:pesticid; prolificacy; cannibalism; hyperexcitability.*

Abstract:

Using medicinal plants to combat various insect pests is not a new method.

The first plants used for this purpose over time were nettles tobacco juice, basil, garlic, etc.

In experiments conducted for this paper they were used two common plants namely savory *Satureja hortensis*, known as a natural antibiotic and common wormwood- *Artemisia vulgaris*.

On adults fed in cages growth were applied aqueous extracts and alcohol in these plants from time to time and in concentrations progressive then were monitored several aspects such as the social behavior of individuals, prolific generation of adults occurred after treatment potential applied insecticide preparations, etc.

Insecticide potential of these solutions is the subject of another work. In the present study addressed issues prolificacy post treatment and social behavior of individuals, because during treatment and after that time there were interesting in adults receiving behavioral changes, including hyperexcitability and cannibalism.

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THE USE OF MEDICINAL AND AROMATIC PLANT EXTRACTS AGAINST COLORADO BEETLE SPECIES - *LEPTINOTARSA DECEMLINEATA* (*COLEOPTERA - CHRYSOMELIDAE*)

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Keywords*: medicinal plants;Colorado beetle; alternative methods to combat.*

Abstract

Colorado-beetle *Leptinotarsa decemlineata* (*Coleoptera - Chrysomelidae*) is the main pest of potato crops everywhere, and if near these cultures there are other solanaceous species planted or spontaneous flora then becomes as harmful for them.

This paper is the result of research conducted on adults of the species of beetle *Leptinotarsa decemlineata* (*Coleoptera - Chrysomelidae*) carried out in laboratory conditions.

The I generation adults were collected from the field immediately after coming out of hibernation and brought to the lab where they were installed in cages growth. To have as much information and to confirm the results have been achieved five experimental variants:

First version - has not been treated; version 2 and 3 were those which were used in alcoholic extracts of medicinal and aromatic plants, and version 4 and 5 were those in which the aqueous extracts were applied.

As plants used were chosen: *Satureja hortensis* and *Artemisia vulgaris*.

As a source of food for the adults as young seedlings were used monitoring of tomatoes, peppers or eggplant.

It was monitored and recorded the possibility that the substances applied to be a natural method of combating clean and determine the most effective ways of conditioning products applied.

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SOIL COMPACTION IN URBAN AREA DEPENDING ON LAND USE – LIMITING FACTOR IN THE INTEGRATION OF GREEN INFRASTRUCTURE

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Keywords: *compaction, soil, runoff, pervious, urban*

Restoring the urban soil quality and reduce compaction, involves many obstacles and can be problematic. This is important in the low impact development strategies which provide a faster infiltration and drainage of the stormwater runoff than the traditional systems (Gregory et al., 2006). The compaction has various negative effects on soil and environment (Craul, 1994; Harris et al. 1999; Chen et al., 2013; Mohd Idris and Cameron, 2016). The compaction is a problem in the first 30.5 cm of surface soil layer. Compaction varies depending on soil type and the thereof water content at the time of testing (Schuler et al., 2000). To determine whether a soil is compacted or not and if are needed measures to improve the structure, must be quantified the degree of compaction. Within urban soils there is a high degree of variability (Craul, 1994; Jim, 1998) being present residues resulting from anthropic activities and large amounts of stone. Soil compaction in urban areas is one of the negative factors that can be improved by implementing sustainable drainage systems that have the capacity to improve the soil structure and manage surface rainwater runoff.

The aim of this study is to evaluate the degree of soils compaction in four sites different in terms of land use and to determine whether permeable surfaces are subject to accentuated compaction. The study is justified by the fact that the process of the soil compaction depreciates the infiltration capacity and leads to increased surface rainwater runoff and related consequences.

Studied area. Cluj-Napoca is located the central area of Transylvania, in the Someş Mic Corridor, with an area of 179.5 km² - located at the intersection of parallel 46°46'N with meridian 23°36 'E. The measurements were performed in four sites different in terms of land use: the commercial area, the industrial area, low density residential area, and high density residential area. In order to determine the compaction degree was used the digital electronic penetrometer with cone Field ScoutTM SC 900. We have established nine points of penetration for each site. In order to determine the degree of compaction we calculated the percentage of values that exceeded 2086.5 kPa (300 psi) in the first 45 cm.

The results define soils as: slightly compacted - uncompacted in the commercial area; easily compacted in the high density residential area; moderately compacted in the low density residential area; severe compacted in the industrial area. Compaction affects the soil regardless of the land use in urban area.

The studied urban areas encounters problems in terms of land degradation. Two of these sites are facing a severe compaction while only one show slight compaction. Analyzing in terms of spatial variability, there is a link between the land use, location of study sites in Cluj-Napoca and their degree of compaction. The degree of compaction of the soil is another prerequisite local showing that the implementation of bioretention cells is a viable solution for improving the existing conditions and that can participate to the goals of sustainable development in Romania (bioretention cells or SUDS being tested practices that can solve the problems derived from urban soils compaction).

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REEVALUATION OF ETHOLOGY PARTICULARITIES OF IMAGO HELIOTHIS ARMIGERA DEPENDING ON PHENOLOGICAL PHASES OF DEVELOPMENT SOYBEAN CULTURE

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Keywords*: Climate conditions, phenological phases, H.armigera, pheromone traps, ethological particularities*

The impact of climatic factors are the differences in temperature, humidity and precipitations, especially in spring and autumn season. They are creating deviations in the preferable host species of *H. armigera*. These variations can modify a ethology of this pest, whose development is associated with choosing larval habitats nutrition.

Climatic factors of the vegetation period in 2016 in Moldova were characterized by a variety of precipitation and average temperature of the season. The summer was very hot and significantly rainfall deficient in July and August. Exceeding the average air temperature by 1,5-2,4°C above the norm (20,8-23,0°C) is noted once in 10 years the whole period of observations. The temperature maximum in summer reached to 37,0ºC, which is noted once in 5 years on average, and the minimum temperature was fixed to 3,5ºC.

The total yield of plants depends on the accordance degree of growth and development factors of optimum value that varies depending on phenological phase. On the experimental field of the IGFPP (S = 1.2 hectares), soybean "Nadezhda" was sown on April 29. During the vegetation period were noted phenological phases of soybean plants growth: germination (1-12 May), forming the first true leaves (18th), ramification (June 5th), butonization (June 20th), flowering (13 July) the appearance of the pods (26 July), beans maturation (4-23 August).

Flight of the first *H. armigera* pest male was noted by pheromone traps on May 18. During this period the maximum temperature reached 22,1ºC, that is the threshold of pest population activity beginning. Due to heavy rainfall (80% higher than average) in the first ten days of June, the temperature values fell significantly (up to 9,1ºC). It lids to a temporary suppression of the first generation of the pest population (1-3 males/trap pheromone) activity. However, July and August were characterized by a significant lack of precipitation.

The average temperature for this period was 20, 8-23,0ºC, which is more to 1,5-2,4ºC from the norm. This factor led to the increase of *H. armigera* population activity, and amounted to 15 males/pheromone trap. It was determined that the pest highest activity, was manifested in the third generation, which flight lasted until the end of September. This is due to factors of high temperatures in this period.

Thus, the revaluation ethological peculiarities of pest *H. armigera* in the conditions of changing climate factors demonstrated that there is an extension of the period of activity. The beginning of the first generation activity started 15 days earlier and the third generation flight extended by 30 days.

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THE INFLUENCE OF SOIL POLLUTION WITH HEAVY METALS ON THE PRODUCTION QUALITY OF SOME PLANT TYPES GROWN IN THE IASI

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Keywords: *heavy metal, contamination, production quality, leaf vegetables*

Soil is a complex structure and contains mainly five major components i.e. mineral matter, water, air, organic matter and living organisms. The quantity of these components in the soil does not remain the same but varies with the locality. The presence of different kinds of heavy metals such as Cd, Cu, Mn, Hg and Zn etc. in trace or in minimum level is a natural phenomenon but their enhanced level is an indicator of the degree of pollution load in that specific area.

This paper presents the study the influence of soil pollution with heavy metals on the production quality of some plant types grown in the in soil pollution with heavy metals in Holboca area-city Iasi. Here lies an important pollution source, which exceeds the EU norms by over 3 times: CET (Electro-thermal power plant) Holboca which lies just 11.5 km away from the center of the city.

Sampling was made from the two surface horizon because it is considered that they are affected by pollution. Soil samples treatment collected for tests was made in accordance with the standard SR ISO 11464/1998 – Soil quality. Heavy metals determination (Cd, Cu, Zn and Pb) was made in accordance with the standard SR ISO 11047/1999- Soil quality, through atomic absorption spectrometry. Metals extraction was made with concentrated sulphuric acid and oxygenatedwater 50%, with a mineralisator type Digestal HACH. (Standard SR ISO 11047/1999 – Soil quality).

The plant species chosen for this study are green salad (Lactuca sativa L. var. capitata) and spinach (Spinacia L. oleracea var. matador), as they are the most consumed vegetables because their leaves are very rich in nutrients. Green salad was chosen because it has the biggest capacity of accumulation of heavy metals, mainly of Cd without manifesting visible symptoms of phytotoxicity, which amplifies the risk over the human health.

The highest concentrations of cadmium were measured in the soil from Holboca area, this being also the area with records of excesses of the average value of 1mg/Kg dry substance, provided by the relevant regulations in force. An excess of the average value was recorded south and south-east from the steam power plant and on the two sampling depths.

In the case of copper as well, the highest concentrations in the soil for this element were in Holboca area as well, recording excesses of the average value and of the alert threshold as well The highest concentration for copper was recorded West, on the depth of 0-10 cm, (152.8 mg/Kg dry substance), this being 7.64 times over the average value and 1.52 times over the alert threshold.

Analyzing the results for zinc in 2015 we notice excesses of the average value, the frequency of excesses being of 20%. We notice that higher values for lead were recorded in 2015 than in 2016. Therefore, in 2015 the highest concentration for lead was recorded west, on the depth of 0-10 cm (18.2 mg/Kg dry substance), it being little over the average value.

Spinach accumulates a bigger concentration of heavy metals compared to green salad and it had a production with 25% less.

The studied vegetables exceed the maximum admissible concentration of Cd and Pb.

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HOW CAN THE PROCESS OF EROSION CHANGE THE STATE OF THE QUALITY OF ORDINARY CHERNOZEMS

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Keywords: *erosion process, the ordinary chernozem, the chemical characteristics, the reception basin, Republic of Moldova.*

Summary. The soil cover is the national wealth, natural resource and the principal means of production in the Republic of Moldova agriculture. Purpose and research tasks consist in setting up the changes we made erosion on the chemical characteristics of the ordinary chernozems. Were conducted the necessary investigations on the territory of the reception basin "Negrea". In this paper are argument humus content, carbonates, pH, nitrogen, phosphorus, potassium and distributing them on the soil profile. From the data obtained on changing the chemical characteristics of soils investigated, it noted that appears significant quantitative and qualitative differentiation of these, depending on the degree of erosion.

Research has shown that the chemical characteristics of soils with different degree of erosion are more strongly influenced by erosion. They were highlighted forms of soil degradation and damage caused to the national economy as a result of their extent. Instability climate, especially precipitation regime, conditions the droughts and the floods and torrential character of rains in the warmer seasons presents a decisive factor of soil erosion. Deforestation, grubbing steppe land fund privatization led to the parceling of excessive and the division of quotas from uphill to downhill.

All this has led to the acceleration of erosion, including that linear [1]. For accomplish the purpose of the proposed research was conducted a study field by collecting soil samples and distribute, then, for detailed analysis in the laboratory. Harvesting of soil for analysis is a very important operation that depends largely on the accuracy of research results. The number of samples is fixed by the size of the study surface, field uniformity, condition and nature of tests executed. In laboratory tests working immediately, fresh or dried in air, put in cardboard boxes and stored in the laboratory evidence locker. Experiments were located within the perimeter of the village Negrea, Hincesti district in river hydrographic basin the Lapusna. We have studied four main profiles of ordinary chernozem with different degrees of erosion, characterized by different type of profile [5].

Soil samples collected in the laboratories of the Institute of Pedology, Agrochemistry and Soil Protection „Nicolae Dimo" were analyzed, and in results demonstrated the influence of the erosion process on investigated soil the chemical characteristics [10, 11, 12].

In this article we present data determining the humus content by the method Tiurin layers 0-30 cm for not eroded and weakly eroded soils are characterized as moderately humiferous with humus content of 3.1 - 3.7%. Soil reaction determined by potentiometric method of the not eroded soils, often and the weakly eroded soils is neutral for the Ah and Bh1 horizons with values ranging from 6.9 to 7.2 and weak alkaline for the Bh2, BC and C horizons. According to calculations by the soils investigated cultivated with hoes crops hoes cultivated with crops nitrogen losses is 18 kg/ha. For weakly eroded soils lost 23 kg/ha of nitrogen and the moderately eroded to 28 kg/ha. Highly eroded soils lose - about 40 kg/ha of nitrogen.

NUTRITIVE ELEMENTS (P, K) IN TYPICAL FOREST BIOCENOSES, RESERVE «CODRII»

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The paper presents an evaluation of the results of minerals elements research, the mobile forms of **P** and **K** in the soil and their content in the herbaceous species of European forestry biocenoses from the Codrii Reserve, representing the common oak with hornbeam forest on typical gray clay forest soils over clay-sandy loam (**BI**); durmast oak with linden and ash forest on brown clay soils over deeply gleyed clay (**BII**); beech with durmast oak forest on brown sandy loam soil over clay-sand (**BIII**). The samples were taken from each of eight allotted 1m^2 sample area in 1800 m^2 experimental land surfaces. Approximately 41 species belonging to 35 genres and 20 families were analyzed. The research of plants parameters, along with the full soil characteristics, was carried out during the period 1995-2002 (2000-2002 thanks to the Soros Financial Support Scheme). In order to have complete information on the accumulation and spatial distribution of **P** and **K**, and to assess the indicator features of the plants to **P** and **K** content, we consider the results from 2001, made in soil and plants during the spring, summer and autumn periods.

The analyzed soils are characterized by a medium and low content of mobile **phosphorus**, maximum values being in the fertile layer (0-20 cm) in **BI** soils (5.2-13.5 mg/100g) and **BII** (5.2-11.2 mg/100g), shrinking abruptly in the adjacent layers at the level of herbaceous root accumulation. For the on brown sandy loam soil over clay-sand **BIII**, the mobile **P** values are much lower, within the limits of 0.2-1.9 mg/100g, slowly changing in the depth. The summer period is characterized by a decrease of the **P** values for all soil types, the autumn being at a higher level in the **BI** and **BII** soils compared to the summer.

The spatial distribution of phosphorus **by depth and horizontally** in each type of forest is very varied, which largely determines the spatial distribution of plants. The coefficient of variation of **P** for soil **BI** in the 0-20 cm layer ranges from 35-55% in spring, 37-61% in summer and 28-71% in autumn. The deviations by depth are even higher in accordance with the physico-chemical characteristics of the soil. Spatial variations of **P** in soil **BII** in the 0-20 cm layer are lower than in other soils. The coefficient of variation of **P** mobile for soil **BIII** in **vertically and horizontally** is high at all vegetation periods.

The studied soils are rich in reserves of **K.** The results of the researches have shown: exchangeable potassium values varies depending on the type of soil, the type of vegetation and the depth, less pronounced depending on the vegetation period. The studied soils were distinguished with a high diversity of **K** values in layers with fertility maximum 0-10 cm, 10-20 cm; 19.3-97.5 mg/100g for **BI** soil, being higher compared to other soils in all research periods; 7.5-55.0 mg/100g soil **BII**; 3.8-20.5 mg/kg in soil **BIII**. In the adjacent layers (30-60 cm) the **K** values are smaller and their limits by the layers and horizontally are narrower in each type of vegetation. During the vegetation period the coefficient of variation is small in the 0-20 cm layer, medium and small in the adjacent layers (up to 40-60 cm). The coefficient of variation in the layer 0-60 cm indicates large and medium values (27.8% - 45.8%) for **BI** and **BII** soil (38.5%, 59.3%), small (14.9%, 23.2%) for the **BIII**. Spatial variations of **K** according to the type of forest are maximum for all layers, with diminution in the summer period.

The accumulation of **P** in the analyzed species varies with the vegetation period. Reserves of nutrients, including **P** in the soil, have contributed to the accumulation of organic matter. The highest amount of **P** – above 4% was established in the species *Polygonatum latifolium*. Groups of species with different accumulation limits of **P** have been distinguished. Most vernal species (*Corydalis marschalliana, Corydalis solida, Dentaria bulbifera* etc.), and some summer and autumn ones (*Aegopodium podagraria Mercurialis perennis Stellaria holostea* and others) were placed within 2-4%. The species *Convallaria majalis, Corydalis bulbosa, Euphorbia amigdaloides, Myosoton aquaticum, Pulmonaria officinalis, Symphitum tauricum, Viola hirta, V. odorata, V. reichenbachiana* have a low **P** content, within 1-2%. The smallest values (less than 1%) of **P** were found in *Dactylis glomerata, Galeobdelon luteum* - summer, autumn.

The **K** values in the analyzed species were in the 3-10% range, with the exception of *Myosoton aquaticum* species 11-19% which may be qualified as accumulator of **K**. The species were grouped by the range of **K**: 7-10% - 6 species, 6-8% - 8 species, and species having **K** in the broader ranges 3-7% - 17 species; 4-9% - 5 species; 6-10% - 5 species.

AGRO BIOLOGICAL SIGNIFICANCE OF ECONOMIC DAMAGE THRESHOLD OF PARASITIC NEMATODES PLANT COMPLEXES OF THE GENUS *MELOIDOGYNE* VEGETABLE CROPS FROM PROTECTED LAND

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Meloidoginoze caused by nematodes of parasitic plant from the genus *Melodogyn*e after the spread of phyto helminthiasis prevails in most plants vegetables from protected ground, but the implications of ecological plasticity and strength of plant nematodes to the action of climatic factors causing invasions that present a problem of vegetable production in agro-ecosystems priority.

The diversity of species, high prolificacy, which are changed annually, high capacity to adapt to different types, varieties and hybrids of vegetable plants, etc. induced to their specialization, the parasitic plant protection agents, the development of chronic, destructive damage to vital organs in plants and huge losses of the qualitative and quantitative crop (Ocopnâi, 1976, 1990, Nesterov, 1988, 2000 buffalo, etc.).

The situation was aggravated in particular, when they formed associations of collective production and private farmers neglecting certain protection measures in the cultivation system. Promoting measures to combat requires not only financial investments but also the development of certain methodologies for monitoring plant invasions on specific phyto nematodes surveys and biological records to establish regular damage thresholds for some specific species of the genus *Melodogyne* phyto nematode.

Economic damage thresholds (EDT) is not a constant value for different areas or districts in generalizing experimental data related to EDT, but it requires a finding periodic of those values in making decisions about the degree of affection and taking measures to combat the melodogyne vegetable plants growing in various media.

Analyzing historical data of many authors on the threshold of damage of some species of nematodes plant, Barker and co-authors (1979) showed that the level of damage of phyto nematodes for each culture depending on other abiotic factors will be different, but other authors, such as Antonova (1980), Pocrovskaia (1988), Sadâchin, Ocopnâi, Ox (1996, 1998, 2002) consider that a major factor in the resistance reaction of the plant host rests in phyto helminths parasiatic impact. As a result of our investigations possibility forecasting crop loss caused by parasitic nematodes of plant have certain priorities compared with forecast losses caused by other pests. This is explained primarily by the limited mobility of populations of plant nematodes of the genus *Melodogyna* and sedentary *Heterodera* at level of biotope, and the influence of environmental factors in determining quantitative indices over by them. This variation persists and extends varieties and hybrids of vegetable crops, the impact species of parasitic nematodes plant and of new races of vegetable crops evolved in different agro recovered and routed in protected or open land.

From applicative point of view, an important element recommended is the use of varieties and hybrids us with productive potential and high strength vegetable plants even associations of producing vegetable which will considerably improve the phytosanitary situation in agrocoenoses and will result in decreasing abundance and frequency of plant parasitic nematode populations. It is necessary to set the resistance of plants and vegetables in the pathogen population density will decrease below the threshold of damage for each vegetable species cultivated in that agrocenoses. In order to detect and prevent invasions of parasitic nematode plant from the genus *Meloidogyne* there are determined minimum and maximum quantity of species number of populations investigated that determine the threshold of loss of economic importance including associations of cysts, invasive larvae, eggs, which are individually to each investigated vegetable crop, both in protected and open field. It has been found that the number of individuals of 500-800 larvae in 100 cm^3 of soil is a minimum damage threshold for protected land and 1000-1200 larvae in 100 cm^3 of soil is a minimum damage threshold for various vegetable incubators in plots open site; with predominance of mold clay soils infested with parasitic nematodes of the genus *Melodogyne* in combination with those of the genera *Ditylenchus* and *Pratylenchus*.

Conclusions of the investigation as a result of plant monitoring helminthology with an analysis the values obtained during the years 2012-2016 on the extent of damage and economic threshold of damage to vegetable plants by nematodes of the genus *Meloidogyne* species with other species of plant parasitic determined level of invasive funds, which allow determining the resistance of the plant to the nematode invasive population density specialized in trophic parasitic plant and significant impact of host plant favored by the environmental factors of temperature, soil type and moisture of implementation of these results in the application and adaptation of safeguards green.

FAIRGROUND GRASS A BIOINDICATOR OF EXTREMELY SUPERFICIAL STRONG COMPACTED SOILS FROM URBAN AREA

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Keywords: *couch grass, fairground grass, ekranic Technosols, urban compcted soil.*

The soils cover from urban areas have strongly modified properties, due to various anthropogenic activities. The urban areas consist of several taxonomic units. In the urban areas, there are some habitats with strongly degraded soils by compaction processes. It is well known that some plant species are very good bioindicators of soil degradation and highlighted soil perturbations. Parks and gardens frequently have paved or asphalt alleys. The soils covered by asphalt or another compact materials (such as concrete materials) are known under the name of ekranic Technosols. These soils have strongly modified properties and perform only part of the specific functions that allow only low biological activity and root growth of some plants species. Soil under asphalted alleys have water retention capacity and allows expansion of the roots of woody plants and grasses. In the soil horizons under asphalt can be developed only a small number of plant species that are tolerant of deficient aeration. Our studies conducted in several locations of urban area showed that soils under asphalted paths or alleys keeps some undisturbed soil properties such as particle size, mineralogical composition. Some plants roots may continue to grow after pavement is placed over an existing roots system. Some plants species such as Tillia tomentosa, Populus nigra, Populus alba that grow in the vicinity of asphalted paths lead unevenness, cracking and perforation of asphalt path. Even if it seems impossible, the asphalt path can be traversed by plant roots or runners that develop from buds on roots or rhizomes of herbaceous plant species. Some herbaceous plant species able to penetrate asphalt are Cynodon dactylon, Convolvulus arvensis.

Fig.1 Degradation of asphalt alleys after growth of *Cynodon dactylon* (A) and *Convolvulus arvensis* (B). *Sclerochloa dura* (C) as bioindicator of extremely superficial strong compacted soils

The developed cracks on the asphalt allow growth of other plant species such as dandelion, birdweed, false barley, roadside pepperweed, According to the occurrence of the compact layer compaction processes could be extremely superficial (on the depth of 0-5 cm), surface compaction (0-25 cm), shallow depth (ploughpan) on the 20 (30) – 35 (45) cm and deep compaction. Very good bioindicators of extremely superficial strong compacted soils is Sclerochloa dura common names common hardgrass and fairground grass. It grows in lawns, campsites, roadsides, athletic fields, fairgrounds, and other disturbed sites. It is frequently found in severely compacted soils, because it can withstand heavy traffic by vehicles and pedestrians. Among the main conclusions drawn from the studies mentioned: (i) Some species of herbaceous perennials such as Cynodon dactylon are able to perforate asphalt. (ii) High power crossed the thick rhizomes of couch grass is frequently underestimated and not taken measures to prevent degradation of asphalted alleys. (iii) We believe that Sclerochloa dura is a good bioindicators of extremely superficial strong compacted soils.

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REDUCTION OF *GRAPHOLITHA FUNEBRANA* HB. PEST DENSITY AT PLUM CULTURE

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Keywords: biological efficacy, Trichogramma, field launch, integral protection, Grapholitha funebrana

In the plum cultures, the following pests have been encountered: plums wasp (*Hoplocampa minuta Christ*), plum fruit moth (*Grapholitha funebrana Tr.*), oriental fruit moth (*Grapholitha molesta Busck*) etc. The most dangerous and harmful pests at plum culture is G. *funebrana* which has two generations per year. Chemical treatments are not efficient because of the hidden lifestyle of the larvae of *G. funebrana*, which can be regulated by applying biologically active substances of plant and animal origins as well as different entomophagus. *G. funebrana* and *G. molesta* eggs can be parasitized by *Trichogramma*.

As scope proving, along the years 2011-2012, in the "Agrobrio" farm from Ialoveni, Moldova, there have been conducted researches at the plum culture. Natural presence of Trichogramma in field has been determined beforehand with a rate of 1-3.8% during the first generation and 6-7% during the second generation. The most common species of *Trichogramma* collected from the field were: *T. embryophagum Hb.* – 50%, *T. dendrolimi* – 30%, *T. evanescens* – 20%. Density of the *G. funebrana* along the 2011-2012 years at plum culture, varied from 12.8 to 18.6 eggs at 100 fruits. Evidences have been taken from 60 different points in field.

As result of the researches held during the 2011-2012 years with *T. embryophagum* with 6 launches and 8 samples (before and after launches with *Trichogramma*), against *G. funebrana*, biological efficacy at plum culture has varied from 22.20 up to 38.10%. Fruits attack varied from 0.6 to 1.1% compared to non treated: from 1.3 to 2.2%. During the second generation biological efficacy varied from 38.00 to 75% and fruits attack varied from 1.3 to 2.5% as compared to non treated where the attack was much higher: from 3.00 to 4.4%. Parasitized eggs in non treated sample varied from 3.6 to 6%.

Launch norm was 250 thousand eggs for the first generation and 450 thousand for the second generation, based on *G. funebrana's* density in the field. With the help of the Bioclass program, along the years, space/time density maps have been created of the *G. funebrana* eggs during the first and second generation development which helped us identify the irregular distribution and their hotbeds.

Samples were taken in each variant at 100 fruits in 60 different points in plum orchard. With the help of digital mapping hotbeds of the *G. funebrana* pest have been identified which in first generation are little highlighted, but with the development of the second generation the hotbeds become more and more pronounced what confirms the growth of the pest density at plum culture.

As of the result of the researches held, methodical principles of *T. embryophagum* field application were elaborated for the pest *G. funebrana* pest control at plum cultures.

Trichogramma application in integrated control benefits are: cost savings for cultures' protection keeping the beneficial organisms in the nature, growth of the biological efficacy in the field, growth of the yield, low pricing, assurance of the high quality of the production, reduction to minimum the chemicals treatments in integrated protection, assurance of the inoffensively, high quality products, simplicity in utilization, ecological results, no pollution.

ENVIRONMENTAL EDUCATION – THE HEALTHY LIFESTYLE'S DECISIVE FACTOR FOR POPULATION OF REPUBLIC OF MOLDOVA

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Keywords*: education, environment, society, demography, health.*

The environment is important to human health, living conditions and employment, for the country's economy, in the way to achieve a high standard of living for the entire population of Earth. The right to a favorable environment requires knowledge about the state of environment in which the society exists [1].

The first stage of environmental protection is public awareness and ecological education of next generations from the youngest age.

A child humanization and his/her personality are determined by environmental conditions socio-cultural and education within it has the decisive role. The child becomes a social person only through education, through which appropriates social language, literacy and moral - citizenship behavior, forms his worldview, develop their creative potential and prepares for socio – professional integration [2].

It is generally known that the healthy child can be educated more easily. The child forms quickly all necessary skills, a child is more easily adaptive to the change of social and ecological conditions and requirements of all trades submitted to it. Health is the most important prerequisite for correct formation of character, initiative, strong will, natural abilities and aptitudes. It is therefore important that all the educational factors (parents, teachers, youth organizations, cultural institutions) possess knowledge of the child's personality, its degree of educability and on this basis to structure the entire technology education project, including environmental education [2, 3].

In connection with the increase of population's general knowledge and increasing need for awareness of healthy lifestyle principles in recent years also increased the interest in hygiene education problems of children and youth. Solving this problem depends largely on secondary school, one of the important problems of which is to educate young generations in a healthy and harmoniously way. Biology teachers hold the leading role in the training of sanitary – hygienic studies. Almost every lessen can be used to explain students the importance of diseases prevention, the influence of environmental factors on maintaining and strengthening the nation's health and genetic background [3].

Also, non-governmental organizations through volunteer programs, actively participate in training actions in environmental protection through: publication of articles in the media, installation of billboards, such actions by planting trees, cleaning of public spaces, organization and active participation in literary circles and workshops or seminars promoting strategies, policies and lifestyles in harmony with the environment [4].

Access to information is the main prerequisite for solving the problems of environmental protection. Information concerning the characteristics and causes that produce environmental changes are the key in defining effective environmental protection. Knowing details about environmental issues is a prerequisite for achieving fast and effective solutions to resolve them. It follows that, information is power.

Informing citizens about environmental issues and solutions, to prevent and protect the environment is the first step in their awareness on the impediments that may occur through pollution. Environmental education starts with good information. To a certain outcome, the citizen will be direct and active involved in addressing environmental issues through their participation in drafting regulations, the formulation and implementation of decisions [1].

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MULTIFUNCTIONAL ROLE OF PROTECTIVE FOREST PLANTATIONS IN THE SUSTAINABLE DEVELOPMENT OF THE AGRICULTURAL LANDSCAPES

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Keywords*: agriculture, environment, forest "frame", landscape, protective forest plantation.*

Protective forest plantations in agro landscape perform multifunctional role. Along with the protection of agricultural land from soil water and wind erosion, water sources from pollution and siltation, and crops from drought of dry winds, they are the main organizing element of land management that enhances the efficiency of technical measures. Performing hygiene - sanitary and hydrology condition, water and soil protection functions, protective forest plantations contribute to the intensification of agricultural production, increase crop yields and improve the quality of cultivated agricultural products. At the same time, improving the environmental capacity of agricultural landscapes, protective forest plantations are the main means of biological and engineering improvement of rural areas.

For perfection of agroecological environment it is necessary to establish the optimal ratio between the field, meadow, forest and other components of landscape, which are consistent with natural laws - the more heterogeneous and difficult is landscape, the more resistant is it [1]. It was found that for Ukraine the share of agricultural areas shall not exceed 65%, forests - 17,4%, protective nature reserves - 10% [2]. For each zone, the ratio of these areas depends on its natural and environmental conditions. To optimize agricultural landscape, it is necessary to form a forest "frame", which will consist mainly of natural forests, connected into a whole system of forest plantation bands for various purposes, created on the farmland. Basic principles of the forming the forest "frame" are following: systematic approach, territorial integrity, environmental safety, aesthetics. Consistency and territorial integrity of forest "frame" is necessary for the enrichment of both established forest band and other forest plantations, as well as the landscape in general by their free colonization of the forest fauna, which must be linked into a whole woodlands forest belts to ensure the migration corridors of the fauna from forests to agrolandscape.

Research has established that the closest thing to natural forest ecosystems are forest belts, which is home to about 40% of bird species compared to forests, 41% of mammals, 70% of bee. The richer species of biocenosis, the more stable and the greater its impact on environment [3].

Environmental safety of the forest "frame" is the establishment of forest plantations system should not cause adverse changes in the environment. Forest "frame" is an important formation part in the artificial forest - agricultural landscape creation. It should promote how to reset the changed appearance of the landscape, meet the aesthetic needs of the population and create favorable conditions not only for economic activity and to increase the capacity of the recreation area.

In the selection of species for protective forest plantations it is need to respect the principles of botanical - geographical and phytocenosis conformity. Principle of botanical - geographical compliance assumes that the structure established plantations close to natural stands of typical types of specific botanical and geographical zone and having the high environmental qualities that will contribute to the restoration of faunal communities with high potential for self-regulation. Selection of species for creation the protective forest plantations must be carried out on the basis of phytocenosis compliance and reflect the functional tasks of these plantations.

Currently, in Moldova there are 1928 thousand hectares of erosion-hazardous land, which is about 80% of the total arable agricultural land. From the above mentioned volume the 877,3 thousand ha are eroded land [1]. This indicates that the predominant area of projected forest protection strips along with environmental features must fulfil the main soil - water protection role. Depending on the purpose and location of protective forest plantations on agricultural land its divided in the following protection categories: field protective (water regulating) forest belts; flow control forest belts; ravine forest strips; sanitary - protective forest belts; water reservoirs forest strips; ravine - beamed forest plantations [1].

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IMPACT OF SOIL POLLUTION WITH COPPER ON CONTENT OF Cu, Mn AND Fe, NITRATE REDUCTASE AND PEROXIDASE ACTIVITY IN SOYBEAN AND SUGAR BEET PLANTS

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Keywords: soybean, sugar beet, nitrate reductase, peroxidase, pollution

Cultivation of fruit and vine plants in Moldova as well as multiple applications of compounds containing Cu in vegetation of foliar treatments on these plantations leads to its excessive accumulation in soil and plants and therefore significant disturbances in plants metabolism. According to the literature review, the average copper content in plants tissue constitutes $10\mu g^{-1}$of 1g dry mass. Critical concentration of Cu in nutrient medium (if below - plants develop visual symptoms of micronutrient deficit) varies from 10^{-14} to 10^{-16} M. Plants are usually safe when copper concentration in soil solution is from 10^{-6} to 10^{-9} M. On the other hand, concentrations greater than those required inhibit plant growth and development, develop significant alterations in the processes of photosynthesis and respiration.

The purpose of this research - to determine the influence of Cu in soil on the primary process of denitrification, correlation between denitrification intensity in soil and nitrate reduction in plants (activity of nitrate reductase), peroxidase activity in leaves, distribution of Cu, Fe, Mn in organs, vegetative mass accumulation by soybean and sugar beet plants in dependence of soil pollution with copper. The activity of nitrate reductase in soil, the activity of nitrate reductase in vivo in leaves and peroxidase activity were determined using conventional research methods and the content of trace elements Cu, Mn and Fe – the AAS-1. Short-term experiences with soybean (v. Dorinţa) and sugar beet (v. Victoria) were carried out under greenhouse conditions at the Institute of Genetics, Physiology and Plant Protection ASM. Capacity of pots - 1,1 kg of soil. Soil - calcareous chernozem. Each pot contained an amount of fertilizers calculated through - NPK – 100 mg active substance/kg of soil. Maintaining soil moisture (70% CWS) was being monitored by weighing. The increasing doses of copper in soil were administered according to the following scheme: control (no Cu treatment): 5; 30; 60; 120; 250; 500; 1000; 1500 mg element/kg soil. The mass (weight) of the seedlings, the activity of nitrate reductase in ground, the activity of nitrate reductase and peroxidase in leaves, as well as the content of Cu, Fe and Mn in leaves, petioles and roots were determined at the stage of branch soybean phase and the 5-leaf true for sugar beet.

Primary process of denitrification decreases slightly under low Cu doses but optimal doses for cultivation of soybean and sugar beet plants (5 mg Cu/kg soil), and declines significantly under increasing doses of Cu in soil (60 - 1500 mg Cu/kg soil). Leaf nitrate reductase activity is maximal under optimal copper supply of plants and significantly reduces under excess of this microelement in the environment. It was found that nitrate reductase activity is maintained at a high and stable level in polluted soil by copper within the range of 200-300 mg Cu/kg soil, which is confirmed high tolerance of plants to major doses of copper in the environment. Along with the significant inhibition of denitrification process (dose range 500-1500 mg Cu/kg soil) there is a decrease of nitrate reduction in leaves and vegetative mass accumulation by plants, especially sugar beet. While nitrate reductase activity was high in leaves within the range of 5-300 mg Cu/kg soil, peroxidase activity decreased to 5 mg Cu/kg soil, was intensified under increased the dose of copper to the 300 mg/kg soil, but administration of 500 mg Cu/kg soil showed a slight decrease in enzyme activity. That high level of enzyme activity had been maintained at further increase the dose of pollutant (1000 and 1500 mg Cu/kg soil). High peroxidase activity in leaves under conditions of copper excess in soil probably indicate the role of this enzyme in annihilation of reactive oxygen species and increase in plant resistance to copper environmental pollution. The excess of copper in soil leads to its significant accumulation in leaves, stems, especially in roots, and causes deviations in Fe and Mn distribution. The optimal dose 5mg Cu/kg and its increase to 300 mg Cu/kg soil triggers antagonism distribution between Cu and Fe, Cu and Mn in stems and leaves. The excess of Cu promotes probably induces reduction of Fe and Mn accessibility for plants and prevents their transport to aerial organs. Such doses as 1000mg Cu/kg and 1500 mg Cu/kg soil lead to most significant accumulation of Cu, Fe and Mn in organs of soybeans and sugar beet, confirming significant disturbances in the metabolism, in the cellular membrane permeability for these nutrients.

THE COMPARATIVE ASSESSMENT OF INDICES OF SOIL IN DEPENDING OF AGROTECHNOLOGIES APPLIED TO GROWING MAIZE

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Keywords: maize, soil properties, agrocenoses, soil tillage, crop rotation.

Soil is the most important component of the biosphere role result of complex ecological functions it performs within it, and by interacting biotic components that motivate them fertility and bio-forming systems (Rusu T., 2008).

The soil is the main natural resource of Moldova and most important means of production in agriculture. Activity industrial complex, whose share in GDP is 30-35%, is based on the exploitation of land resources. The status of soil quality, the actual fertility level depends largely on crop productivity, development of livestock sector, the ecological and welfare of the Republic. In natural conditions of Moldova the main factors that contribute to high and stable harvests are moisture (rainfall) and actual fertility level of the soil (Andrieş A., 2007).

The aim of this study was to evaluate some physical properties by applying different tillage systems - conventional and conservative in growing maize monoculture (34 years) and maize in the rotation. Currently, the world uses two tillage systems - conventional (traditional) and conservative. Soil tillage should be adapted to specific local conditions, selecting the most appropriate solution in relation to indicators of suitability and crop needs. Following the extension of soil degradation processes, because conventional agriculture and technological mistakes, over the years, were studied and implemented in practice so-called conservative agricultural technologies (Cainarean Gh., 2015).

Food security is one of the key global challenges of this century. Agriculture plays a strategic role in all countries, as is the main sector responsible for food security of the population, while having a special contribution to the overall process of sustainable economic development and environmental protection (Cainarean Gh., 2015).

One of the basic crops of maize in the Republic of Moldova, with a wide use in human food, animal feed, in industry and as a product for export activities. Maize has multiple features and biological phyto outstanding. It has good resistance to drought and heat; It has less disease and fewer pests; may be grown on land that is different in different climatic conditions; supports monoculture; being a hoe plant, leaves the field free of weeds; is a good forerunner for many plants; well recovered organic and mineral fertilizers; reacts strongly to apply the irrigation; It can be sown for fodder and even for the second crop; propagation coefficient is very high; by appropriating its plant-monoecious unisexual allows for very productive and convenient hybrids adapted cultivation areas etc. (www.agrimedia.ro).

Of paper notes that conservation tillage system of soil moisture is kept within 40-50 cm, giving the possibility to plants to grow better especially root system. The apparent density of the No-till variant research in maize monoculture agrocenoses varies between 1.25 to 1.42 g/cm^3, is greater than plowing variant, ranging within 1.09 to 1.20 g/cm^3, this observing and maize crop rotation, No-Till bulk density ranging between 1.16 to 1.20 limits g/cm^3, plowing - having bulk density limits from 1.19 to 1.35 g/cm^3, while penetration resistance both versions of maize research different technologies of tillage increases with depth.

Systems conservative tillage choice of crop rotation is more needed than in conventional systems, having beneficial effects on both the soil by improving biological activity and the supply of nutrients and the mass development of root in better control of weeds, diseases, pests and plants grown in increasing the productivity.

It is worth mentioning that respecting crop rotation we not only beneficial effects on the soil, developing root system, but also achieve higher productivity, for example maize productivity increase by 40%, which is very necessary to solve problems related to providing food to people and animals. This would be one of the solutions on the substantial increase in the world population.

INFLUENCE OF THE SOIL OF PHYSICAL ACTIVITY INDEX CELLULOLYTIC WINTER WHEAT SUB AGROCOENOSES

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Keywords: cellulolytic activity, crop rotation, agrocenoses, winter wheat, soil tillage

Soil is a complex environment where the rock turns giving some elements necessary for life, the place where beings that have completed their life cycle are again decomposed raw material necessary for life in other beings. Among living organisms living in the soil and plant nutrition are closely connected. Effective soil fertility is determined by meeting the necessary conditions for conducting biological activity of soil microorganisms. In the absence of microbiological activity, the soil does not provide plant nutrients in sufficient quantity so that there is a low fertility.

In this paper researches were conducted under agrocenoses winter wheat in rotation (after beans) on sandy loam carbonate black earth of SDE Chetrosu. Purpose and research tasks are to establish changes in cellulolytic activity in rows and between rows of plants of winter wheat, applying different technologies depending tillage on soil moisture and penetration resistance. Cellulolytic activity was determined by the method Mişustin E., based on the principle of the method using the decomposition of cellulose under aerobic conditions blades in the 0-30 cm layer of the soil depending on the soil moisture, the method effected by oven drying of soil samples, in 0-120 cm layer and penetration resistance carried out in the field penetrometer 0-50 cm layer. The research was conducted parallel research on both types of technologies tillage - No-till and plowing. In agrocezona winter wheat from 50-120 cm layer of soil moisture percentage in depth kept the variant No-till compared with plowing variant, while penetration resistance is greater variant No-till ranging from 20 to 23 kgf/cm^2 compared with penetration resistance ranging between 9-20 kgf/cm^2 version of agrocenoses plowing winter wheat (earing phase) in rotation. Resistance to penetrate both variants research increases with depth. Referring to research data made mention that cellulolytic activity is higher in 0-10 cm layer where decomposition blade compared to the initial mass is 55.67%, the middle classes as values on chernozioms cellulolytic activity (method Mişustin E.), the research variant - plowing compared with the variant No-till research, which is 30,14% - lower cellulolytic activity. According to G. Muller, 1968 by plowing plow essential increase aerobic microflora (fungi, bacteria, actinomycetes) that have a role in decomposition of organic cellulose (resistant). Cellulolytic activity carried evaluating comparative data rows between the rows of plants and plant winter wheat is observed that the percentage of rows cellulolytic activity is higher because the bacteria live in the vicinity of the roots.

Microorganisms are invisible; it is an important component of terrestrial ecosystems via highly diverse physiological activity underpinning the creative fertility of soil functions. From the numerous microorganisms found in soil bacteria highest percentage returns. In a soil which is in a good state of health and fertility total exceed 109 bacteria/g soil, and the number of species isolated so far is over 20 thousand.

The importance of microorganisms is highlighted by the fact that they participate actively in all the chemical transformations that occur in soil, being one of the sources that are part of the organic component of soil and let the soil up to 1/3 of total annual organic wastes due to extremely high number of bacteria, fungi and actinomycetes in the soil. Microorganisms have a particularly important role in soil fertility as a result of their participation in the development cycle nutrients, such as those of carbon and nitrogen, necessary for plant growth; in turn microorganisms are responsible for the decomposition and mineralization of organic matter, having reached the ground in different ways to give the final nutrient available for plant nutrition.

THE CONCEPT OF „*POCKET PARKS*" IN LANDSCAPE DESIGN

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Keywords: Concept, design, green spaces, harmony, "Pocket Parks", urban, vegetation

As the Landscape Protection, Landscape Management and Landscape Management Act implies concrete responsibilities regarding the protection of the environment, natural habitats and biological diversity, this paper strengthens the importance and necessity of increasing green areas in Cluj-Napoca, bringing to attention a new Landscaping concept called *"Pocket Park"*.

"Pocket Park" is a category of green space, a kind of park designed on a much smaller area, embedded in highly urbanized spaces, which includes permeable surfaces and predominantly tree vegetation. These spaces can be provided with different constructions or equipment's to offer short-term recreation for those green space users, facilitating pedestrian traffic, in order to build a safe and welcoming environment for members of the surrounding community.

A characteristic feature of a *"Pocket Park"* is that it has to be situated between other elements in the city like office blocks, retaining walls or apartment buildings, in places with good visibility. These categories of green spaces with different functions can serve activities such as: organization of small events, relaxation areas, meeting and social events, lunch breaks etc.

The benefits of these unique urban spaces include the following: supporting the overall ecological environment and landscape, as well as heritage protection and conservation, pollution reduction, regeneration of damaged areas, ensuring safer and more sociable communities etc.

The proposed *"Pocket Park"* concept aims to ensure a harmonious connection between the natural and the anthropic environment, respecting nature and landscape, sustainable development, promoting and combining art with design and good taste, as well as creating an environmentally friendly neighborhood. Due to excessive urbanization and congestion in Cluj-Napoca, designing and then implementing such green areas would be beneficial for both the city aesthetics and the raising of the citizens' living standards.

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INFLUENCE OF GROWTH SUBSTRATUM ON BIOMETRIC AND PHYSIOLOGICAL PARAMETERS IN *COTONEASTER DAMMERI* "SKOGHOLM" SAPLINGS

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***Keywords**: Biometric parameters, Cotoneaster, growth substratum, physiological parameters, saplings*

The Genus *Cotoneaster* has about 90 species, different taxonomic studies being made on *Cotoneaster dammeri* (Zhou et al., 2000; Lu et al., 2005). *Cotoneaster dammeri* C. K. Schneid. is a creeping shrub native from China and it decorates due to both its branches laying on the ground and its dark-red, globe-like fruit that resists for a long time on the plant (Iliescu, 1998). It is also an important ornamental species due to its anatomy, high ecological plasticity, and ability of fitting niches in landscaping.

The goal of the study was to assess the influence of the growth substratum structure on growth and development in the saplings of Cotoneaster during the first stages of vegetation. The biological material was represented by the species *Cotoneaster dammeri* "Skogholm", a Swedish selection. Was used cuttings 10±0.5 cm long with a diameter of 0.35 cm, aged 100 days, rooted in river sand and treated with the rooting biostimulator Radistim 2. The growth substratum mixture was prepared in four variants from garden soil, peat and sand in variable proportions (volumes) as follows: V_1 – 60% garden soil; 30% peat; 10% sand; V_2 – 50% garden soil; 30% peat; 20% sand; V_3 – 40% garden soil; 20% peat; 40% sand; V_4 – 30% garden soil; 20% peat; 50% sand. The volume of growth jars was 1000 cm^3. Biometric and physiological parameters assessed to describe the evolution of the cuttings on the growth substratum prepared focused on the sapling collar diameter (D), sapling height (H), leaf size (length – L; width – W), leaf number (Lnr) and leaf area (LA).

Sapling height had values ranging between 11.58 cm in the variant V_1 (control variant) and 25.56 cm in the variant V_4, with statistically ensured differences. Sapling diameter varied between 0.800 cm in the control variant (V_1) and 1.388 cm in the variant V_4, with statistically ensured differences. Leaf number and leaf area in saplings also varied depending on the nutrient mixture. Values ranged between 6.15 and 19.15 (leaf number) and between 14.01 and 222.81 cm^2 (leaf area), all statistically ensured.

The interdependence relations between biometric and physiological parameters of the saplings and the components of the nutrient mixture show that *Cotonaester* saplings need, in the process of multiplication, a growth substratum with a light, sandy texture, with lower supply of organic matter and nutrients because of the low consumption of nutrients during vegetation stages, that facilitate the development of both the root system and of the other parameters.

Based on the photosynthesis area of each variant, saplings accumulated in a different way biomass at stem level, in correlation with leaf area determined through leaf number and leaf size. The relation between leaf area and the diameter of the sapling stem collar, and sapling height was described by 2nd grade polynomial, all statistically ensured (LA – D, $R^2 = 0.978$; $p << 0.001$; LA – H, $R^2 = 0.932$; $p << 0.001$).

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INFLUENCE OF SEED TREATMENT ON GERMINATION IN *LABURNUM ANAGYROIDES* MED.

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Keywords: common laburnum, propagation, seed treatment, sapling

Laburnum anagyroides Medik. is an indigenous species widespread in southern Europe; in Romania, it is rarely found in spontaneous flora, in Oltenia. The species has high ecological plasticity: it is resistant to frost, drought, salinity, and air pollution (Roloff et al., 2009). It can grow on poor, dry, limey soils with proper aeration. Because of the alkaloid cystine present in its bark, leaves, and seed, it has a certain toxicity (Gray et al., 1981). The propagation of the species *Laburnum anagyroides* has been made most commonly through seeding or grafting; treating with electromagnetic microwave is beneficial for the increase of the germination percentage (Aladjadjiyan, 2002), which is also common in other species (Talei et al., 2013). Recent studies have reported the first *in vitro* micropropagation of *Laburnum anagyroides* starting from buds explanted from mature trees (Timofeeva et al., 2014, 2016).

The aim of this study was at assessing the influence of seed treatment in the propagation of *Laburnum anagyroides* and the effect on saplings during the first vegetation stages. Because of the difficult germination under natural conditions (tegument features), the seeds were treated with cold water for 24 h (V_1), with hot water 90°C for 24 h (V_2), and they were stratified (V_3) and scarified (V_4). To assess the influence of the seed treatment on germination and on saplings, were determined, in each variant, the percentage of germinated seeds, the collar diameter in the saplings (D), sapling height (H), the number of roots (Rn), the length of the roots (RL), the number of leaves (Lnr), and the leaf area (LA). Sapling collar diameter was measured with electronic callipers (precision: ±0.001 mm). Sapling height was measured with a ruler (precision: ±0.5 mm). The number of leaves was determined by numbering per sapling and variant. Leaf area was measured based on leaf size and area constant, according to the model proposed by Sala et al. (2015).

As for germination, preparatory treatments of the seeds influenced germination differently. The percentage of germinated seeds 10 days after germination started was 70% in the variant V_1 (moistening with cold water), 76% in the variant V_2 (moistening with hot water 90°C), 87% in the variant V_3 (stratification) and 98% in the variant V_4 (scarification). Sapling collar diameter ranged between 0.191 cm in the control variant (V_1) and 0.378 cm in the variant V_4 (scarification). Differences between the control variant and the other variants were significant only in the variant V_4. Sapling height ranged between 3.76 cm in the variant V_1 and 6.31 cm in the variant V_4, with statistically ensured differences in the variants V_3 and V_4 (stratification and scarification, respectively). Multivariate analysis of the Cluster-analysis type facilitated the grouping of the variants based on Euclidian distances depending on biometric and physiological parameters with a high degree of statistic safety (Cophenetic coefficient: 0.887). There were two distinct clusters, one in which were grouped the variants V_1 and V_2 and one in which were grouped the variants V_3 and V_4, depending on the values of the analysed parameters.

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IPROVEMENT OF COMMON WINTER WHEAT RESISTANCE TO FOLIAR DISEASES

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Keywords*: Triticum aestivum,L., F_1 hybrids mutual, resistance, leaf rust, Puccinia triticina., Septoria tritici blotch, dominance*

The yield and stability of the Triticum aestivum L. harvest is determined by a number of quantitative characters and physiological properties, crucial being the life duration of foliar mechanism. Evolution and appearance of foliar diseases is the result of triple interaction between favorable environmental conditions x host susceptibility x virulence of the pathogen. The brown rust developed by *Puccinia triticina* Eriks. and also leaf necrosis developed by fungal *Mycosphaerella graminicola* (Fuckel) Schroeter (anamorph: *Septoria tritici* Rob. ex Desm.) have been identified for common autumn wheat in many countries. Up to now it has been discovered and mapped over 60 genes *(Lr*) resistant to brown rust and over 21 – to *S. tritici* (Stb). Most of these manifest in seedling stage through a specific reaction to the breed pathogen. The climate factor is determined by continuous development of new pathogens and their migration, which cancels the efficacy of the specific gene resistance present in the host plant. The focus of research in recent years is on using quantitative partial resistance, adult plant controlled by genes with small effects. The essential requirements for the effective use of durable resistance are: germplasms with diverse resistance processes of efficient reproduction of hybrids, which generate new combinations of genes and comparative assessment accompanied by consistent selections in field conditions with a high level of fungal infection [1, 2].

The purpose of this essay is to analyze the behavior of a set of autumn wheat hybrids under the pressure of natural infection of foliar fungal diseases of 2016 growing conditions.

The research was conducted under conditions of natural infection of foliar diseases. The material of the study included wheat genotypes, the parents of the fall BT 16-04, L 101, Odeschi 267 and F_1 hybrids derived from mutual combination of the parents. The degree of brown rust and *S. tritici* attack was assessed visually in the grain filling stage (depending on the degree of coverage of the leaf lesions) and carried out in the scale of 0...5 steps. The degree of dominance (h_p) was determined after Брюбейкер (1966). Heterosis (%) compared to the best parent (HP) was calculated using the formula: H = F_1 – HP/HP x 100. It has been determined that for parents genotypes the degree of attack of brown rust varied within the limits of 1.29...2.31, while the *S. tritici* – 2.14...2.74, reduced reaction being attested for genotype BT 16-04. The attack level of pathogenic agents to reciprocal F_1 hybrids showed wider variation range: 0.73...1.46 ...3.46 and 2.10, respectively in response to *P. triticina* and *S. tritici*. At the same time, in response to the reciprocal hybrids of the foliar diseases was shown parental involvement of genetic factors. The calculation of the Heterosis to the best parent to confirms the presence of negative heterosis in reciprocal hybrids F_1 (oriented in the direction of reducing the attack of the causal agents) in all the three combinations when the attack of *S. tritici* (-8% ...-68%) and only in combination L 101/Odeschi 267 (-5% ...-30%) – in the case of brown rust attacks. This phenomenon indicates the involvement of the maternal effect of genotype BT 16-04 in resistance improvement to both pathogens in the combination of the BT 16-04/L 101. While, in the combination of hybrids L 101/Odeschi 267 have been registered paternal effects L 101 and Odeschi 267, respectively, in the formation of the resistance to fungal agents *P. triticina* and *S. tritici*. The values of dominance level (h_p) are different from a hybrid combination to another, regardless of the set of reciprocal hybrids, with values meaning partial dominance, complete dominance, and over dominance of reaction. Significant resistance reaction (negative dominance orientation) was documented in most reciprocal hybrids when attacked by *S. tritici*, while attacked by *P. triticina* – only to hybrid F_1 Odeschi 267 x L 101. The reaction of winter wheat reciprocal hybrids depending on the combination is inherited both dominant and recessive to *P. triticina* and only dominant to *S. tritici*.

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GARDEN OF FAIRY TALES

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Keywords*: project "Garden of Fairy Tales", national carpet, ornamental species, architectural forms, folk tales.*

The garden art has evolved over time according to the socio-historical development of the peoples, the national peculiarities, the tradition and the culture of the peoples as well as the conditions of the natural geographic environment [1]. Every people sacredly keep what their ancestors left as heritage. These values also include floral arrangements, elements of landscape design, which over time have become not only a necessity, but also a tradition, a spiritual attribute. Thus, many plant species from both native and introduced flora are labeled as *national flowers*, which have their special significance in a certain context. Along with lady's bedstraw, sage, summer savory, oregano etc., some species brought from other floristic regions and renamed by the native people are also extremely popular: marigold (*Tagetes patula* L.), youth-and-age (*Zinnia elegans* Jack.), Indian chrysanthemum (*Chrysanthemum indicum* L.), flossflower (*Ageratum houstonianum* Mill.), sweet alyssum or sweet alison (*Lobularia maritime* (L.) Desv.) etc.

At the Botanical Garden (Institute) of ASM, a workgroup has been created to deal with the execution of the dendro-floricultural project and the implementation of the concept developed in the framework of the international exhibition EXPO ANTALYA 2016, entitled "Flowers and Children", held on 23 April-30 October 2016, in Antalya, with the following members: Teleuță Alexandru, PhD; Roșca Ion, PhD; Sîrbu Tatiana, PhD; Sfeclă Irina, researcher. Our idea emerged in the context of the international exhibition EXPO ANTALYA 2016 and it was intended to promote our national entity through material and spiritual values, using skillfully the world of plants in floral arrangements and not only. The team activated at the request of the Embassy of the Republic of Moldova in Turkey. After many variants and proposals, we selected the design of a carpet in which we kept the ornament, but we changed the color to create a more expressive picture. The prototype of the "Garden of Fairy Tales" is a national carpet from the 19th century, which is part of the country's cultural heritage [3, 5]. The geometric lines have been transformed into access ways and paved paths leading to numerous floral decorations.

Our team decided to create a floral carpet, which will be represented by ornamental species from the flora of the Republic of Moldova (*Viola odorata* L., *Anemone sylvestris* L., *Primula veris* L., *Clematis integrifolia* L., *Vinca minor* L., *Asarum europium* L., *Adonis vernalis* L. etc.), endangered species or rare species of the native flora (*Paeonia perigrina* Mill., *Scilla siberica* Haw., *Iris pontica* Zapal, *Galanthus nivalis* L., *G. plicathus* M. B. *etc.*) protected by law [2], but also exotic species with long-lasting flowers, which will provide colour to the garden for a long time. Also, there will be varieties (*Paeonia, Iris, Hemerocallis*) obtained in the Botanical Garden of Academy of Sciences, integrated in compositions with small architectural forms and characters from folk tales to impress the visitors, especially children. Thus, among the decorative banks, pots, wells, carts, swings, we will place fairy-tale characters: The Goat and her Three Kids, the wolf, Păcală and Tândală, the fox, the bear, Făt-Frumos and Ileana Cosânzeana, the dragon, the old witch, etc. A "Wish Tree", where any visitor can leave a note with his/her wish, will grow in the centre of this carpet. Near the tree, the mascots of the exhibition will be placed: Ece and Efe, dressed in Moldovan folk costumes. The entrance gates will be decorated in the traditional style and the garden – surrounded by a decorative fence made of sticks.

This project aims at promoting the floral and faunal diversity of our country, traditions and national costumes and also to delight the visitors with the beautifully landscaped space. It will remind us that, to enjoy our national heritage, it is not necessary to go each time to a museum to see national relics and collections left by ancestors, but it is possible to organize folk-styled areas in the house, garden or courtyard.

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DECREASE IN THE CONCENTRATIONS OF INORGANIC ELEMENTS BY BIOGEOCHEMICAL BARRIER IN AGRICULTURAL LANDSCAPE

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***Keywords**: biogeochemical barrier, shelterbelt, calcium, magnesium and mineral carbon in ground water*

High concentrations of organic and inorganic compounds migrating ground water of agricultural landscape among ecosystems lead to the degradation quality of water. The study reported herein was conducted to achieve the optimum width of shelterbelt for the function as biogeochemical barrier. At present, insufficient data are available on the interaction of shelterbelts as biogeochemical barrier for the spread of these compounds in agricultural landscape. Additionally, the results obtained from all the experiments should give a better insight into the changes, which take place in the landscape affluent with functional elements as biogeochemical barriers.

Calcium, magnesium and mineral carbon quantities were investigated in the ground water of biogeochemical barriers in the form of shelterbelts in agricultural landscape. The differences among the concentrations of calcium, magnesium and mineral carbon were attributed solely of width of the shelterbelt and kind of trees. The biogeochemical barrier in the form of shelterbelt efficiently decrease the concentration of chemical substances included in the dry mass ranged from 30 to 75%, calcium from 20 to 54%, magnesium from 46 to 72% and also mineral carbon from 58 to 71%.

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STRUCTURE AND ACTIVITY OF BIOLOGICALLY ACTIVE SUBSTANCES IN SOILS

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Keywords: *organic substances, structure – activity*.

Each chemical and biochemical substance possesses numerous biological activities (amino acids, amides, phenolic compounds, auxins, coumarines, terpenoids, flavonoids, peptides, nitrozoamines and nitrozoamides, mycotoxins, glycosides, phytoalexins. Alcaloids. However, its activity always depends on is the object, dose and participation in the chemical conversions or biochemical pathways. The biological potential of substance may be discovered under the specific experimental conditions. Biological activity (e.g., mutagenicity, cancerogenicity, teratogenicity, inhibition of enzyme activity, toxicity) of substances is governed by their properties, which in turn are determined by their chemical structure. Some biologically active substances act at low concentrations. Phytohormones can be also considered in the same category as antagonisms as they affect the plant growth. Vitamins from B group are normal constituents of fertile soils. Their presence is due to release from organic residues, liberation from plant roots and synthesis by soil microorganisms. Phenols and phenolic acids derived from the lignin decay by microorganisms influence the activity of peroxidase in soils and inhibit the process of root growth and seed germination.

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IMPORTANT AGRO – ECONOMIC RESEARCH ASPECTS OF HARMFUL ORGANISMS OF STRAWBERRY CROP *FRAGARIA MOSCHATA* IN FIELD CONDITIONS, THE CENTRE, MOLDOVA

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Keywords: *strawberry crop, phytosanitary monitoring, plant pests, diseases, nematodes fitoparazite complex.*

The main strategy in the development of Moldova fruit growing consists in an efficient exploitation of existing plantations with a potential unspent production and their gradual replacement with new structures of surfaces including strawberry plantations in super intensive systems that offer 2-3 annual harvests by using maximum ecological, agro – technological and economic factors, achieving high yields of fruit berry competitive both in the internal market and for canned food production industry, processing and freezing them in certain periods, for trading systems of internal and external market.

Moldovan pedoclimatic conditions makes strawberry crop be more sensitive to attack of phytopathogens compared with gooseberries, currant, raspberry, blackberry, it causing serious early damage to strawberry plant. A key aspect in the broad and significant study of this remarkable culture is the investigations of phytosanitary monitoring of harmful organisms on strawberries crop and environmental factors as significant indicators, which determines the degree of affection, extensivity of key diseases and phytophagus pests on strawberry culture.

The actuality estimates the purpose and objectives of the investigations, with references to the achievement phytoparasitical monitoring, establishing the etiological composition, the degree of affection of abundance and frequency of harmful organism's complexes on strawberry crop, in the condition of the Centre of the Republic of Moldova, being subsequently applied in the development of processes for tracking and forecasting significant ecological protection for this crop.

Evidence surveys for diseases, pests and complexes phytonematode parasites have been achieved during periods of the growing season (April-September 2016) in the productive plantations of new type, in commercial plantations of reproduction seedlings and strawberry fruit with some varieties performed for imports from Center area (Nisporeni, Ialoveni, Orhei).

As a result of recording and analysis of the composition of etiological key diseases, strawberry pests that were appreciated in the active period of vegetation, there was found a significant diversity of nine specific diseases highlighted in various significant values (5-35%) of the degree of extensivity and attack on leaves, shoots, fruits such as: red stele (*Phytophthora fragariae var. fragariae*) and crown rot (*P. cactorum*), noble rot (*Botrytis cinerea*), powdery mildew (*Oidium fragariae*), white leaf spot (*Mycospahaerella fragariae*), red leaf spot (*Diplocarpon aerliana*), brown leaf spot (*Dendrophoma abscurans*), marginal yellowing (*Strawberry yellow virus*), the wrinkling of strawberry leaves (*Fragaria vitus 2 Smith*), the wilting of plants (*Vertcillium dahliae*). From this crop pests more frequently were detected both specific diseases, as well as the diversity of species of insects and mites that simultaneously with plant diseases have affected every organ worthing 3-25% of the attack level, namely: click beetles (*Agriotes sp.*), black weevil (*Anthonomus rubi*), Apple Blossom Beetle (*Epicometis hirta*), vine weevil (*Otiorhynchus sulcatus*), the strawberry aphid (*Myzus fragariae*), twospotted spider mite (Tetranycus urticae), cyclamen mite (Tarsonemus fragariae). In the same situation arise the complex of nematodes phytoparasiatic which attack generally all organs of the plant, causing necrosis, nodule galico at the level of roots, and some species migrate upward through the plant tissues until the stems, leaves, flowers, fruits, and also served as a role of vectors and pathogenic microflora of pedobionte insects. As a result of evidence and analyzes of parasitic nematofauna at the strawberry crop there were found phytohelmiotic affections worthing 3 – 18%, caused mostly by some species specific for this crop, namely: Meloidogyne, Ditylenchus, Aphelenchoides, Pratylenchus, Tylenchus și Rotylenchus. The results of carried out investigations at the culture of strawberry plant diversity reflects the invasion of harmful organisms, causin serious damages to plants and strawberry fruit in the process of dynamic growth and development. The degree of disease and extensivity for this culture rests mostly in diseases that goes along with flowering until finishing harvesting berries, but insects and the parasite phytonematode complexes cause serious damage both during the growing season, and preliminary phases of exit and route during the rest period as perennials undergo attack both ontogenetic and phylogenetic as well. Carried out researches are welcomed and applicative in the development of short and long term forecasts, for methods of prevention and protection integrated over all bodies reported.

EVOLUTION OF FORESTS' CONTRIBUTION IN GREENHOUSE GAS BALANCE IN MOLDOVA DURING 1990-2015

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Keywords: forest, carbon, conversion, sequestration, emissions.

Forests serve multiple protection functions, most of which can be attributed to climate issues. One of the main functions assigned to forests in Moldova is oxygenic. This function consists of the capacity of forests to produce oxygen and to consume carbon dioxide during the formation of the timber. National communications (reports) targeting inventories of emissions and reductions of greenhouse gases (GHG), including areas related to forests, are regularly developed under the UN Framework Convention on Climate Change (UNFCCC).

National GHG inventories are prepared according to the methodologies developed by the Intergovernmental Panel on Climate Change (IPCC). Under that methodology forests are attributed to the sector "Land use, Land Use Change and Forestry" (LULUCF). On the occasion of recent GHG inventory (2016-2017) the methodologies described in the Good Practice Guidance for Land Use, Land-Use Change and Forestry (IPCC, 2003) and Guidelines for National GHG Inventory (IPCC, 2006) were applied. According to calculations the volume of GHG removals (carbon dioxide/ CO_2) generated by LULUCF sources during 1990-2015 is estimated on average at 5.165 Mt annually. Forests account for 58.9% of this volume (3.041 Mt CO_2). To estimate reductions/GHG emissions related to forests were used Tier 2 methods, including country specific emission/reduction factors. An important element realized during in the current event of GHG inventory is the development of Matrix for the LULUCF category for the period 1970-2015. This tool helps in particular to elucidate the evolution of changes in carbon sinks (soil, litter) as the result of land use conversion.

Dynamics of GHG removals recorded by Moldovan forests during 1990-2015 has registered steady growth compared to the base year (1990), and the maximum was reached in 2008 - the 111.6% and 3.255 Mt of CO_2. The evolution of quantities of sequestered GHG was directly influenced by the forest condition and area in this period, which increased by 12.2% compared with 1990. The same period is characterized by a significant increase in the harvested timber, which according to official records, during the period 1990-2015 was about 12,618,000 m^3, including about 1.5 million m^3 from illicit logging (11.9%).

According to the biological peculiarities, current condition, productivity and the occupied area, the highest weight in the sequestration of CO_2 belongs to *Quercus spp*. (49.8%) and to *Robinia* (30.5%), cumulatively summing the rest of the species, only about 20% of the total sequestered volume. In terms of capacity sequestration of carbon dioxide the most productive in existing Moldovan forests are the following species: hornbeam (12.6 t/ha/year), oaks (9.6 t/ha/year), lime (9.4 t/ha/year) and ash (8.7 t/ha/year).

Increasing volumes of GHG sequestration can be achieved by increased productivity of existing forests through wider application of the reconstruction (substitution) of damaged trees and those with low productivity. The same framework encompasses the extension of woodland areas to reach indicators established by national policy documents - at least 15% from the country territory or 510 000 ha of land covered by forests.

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FAMILIES (COCCINELLIDAE AND CHRYSOPIDAE, INSECTA) IN PROTECTION STRIPE AND SOYA AGROECOSYSTEM

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Keywords*: plants, species, entomophages predator, fauna.*

The investigations were carried out in the central steppe forest zone of the Republic of Moldova in the experimental fields of the Institute of Genetics, Physiology and Plant Protection on soya field no. 1, which was bounded with the protection strip, the soya field no. 2 served as a control. The great number of entomophages and of pollination entomofauna were concentrated at the blossom phase of the plants from Asteraceae, Fabaeae, Lamiaceae, Apiaceae, Rosaceae, Gramineae, Brassicaceae.

Tab. Species composition of fam. *Coccinellidae* and fam. *Chrysopidae* in the soya field no. 1 adjacent the protection strip.

N/O	Taxa	Control soya field no. 2	Soya field N1	Forest protection strip adjacent to soya field.
I	Fam. Coccinellidae			
1	*Coccinella septempunctata*	+	+	+
2	*Harmonia axyridis*	+	+	+
3	*Adonia variegata*	+	+	+
4	*Propilaea guatuordecimpunctata*	+	+	+
5	*Thea vigintiduopunctata*	-	+	+
6	*Hyperaspis reppensis*	-	-	+
7	*Adalia bipunctata*	-	+	+
Species (%)	Fam. *Coccinellidae* / Total 61	13	22	26
II	Fam.Chrysopidae			
1	*Chrysopa carnea*	+	+	+
2	*Chrysopa perla*	+	+	+
3	*Chrysopa formosa*	-	+	+
4	*Chrysopa prasina*	-	-	+
5	*Chrysopa flaviifrons*	-	-	+
6	*Chrysopa septempunctata*	-	+	+
Species (%)	Fam.*Chrysopidae* / Total 39	7	12	20

Species composition of fam. *Coccinellidae* in the soya field no. 1 had 22%, in control -13%, and in the forest protection strip adjacent to soya field. – 26%. Fauna fam. *Chrysopidae* in the soya field no. 1 had 12%, in control – 7%, and in the forest protection strip adjacent to soya field – 20%. Species composition of fam. *Coccinellidae* in soya ecosystem constituted: *Coccinella septempunctata* – 27,3%, *Adonia varigata* – 24,2%, and *Harmonia axyridis* – 21,2%, and in reduced relative numeric density was registered *Propilaea guatuordecimpunctata* – 18,1%. The dominant species in the soya field of fam. *Chrysopidae* was *Chrysopa carnea* 34,7%, codominant *Chrysopa formosa* – 26,8%, followed by *Chrysopa septempunctata* – 21,7% and *Chrysopa perla* – 13,04%.

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TROPHIC LINK OF SOME ENTOMOPHAGES WITH SPONTANEONS PLANTS AND THE SOYA GROP (YOUNG PLANTS GROWTH)

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Keywords*: floristic, families, species, entomophages.*

Beneficial entomofauna complex formation to a large measure depends on plants. The role of entomophages (parasites, parasitoids and predators) and functional biocenotic importance in terrestrial ecosystems consists in phytophage population density regulation.

Floristic structure of the forest plantation includes several taxa of the wild plants: *Equisetum arvense L.* (Equisetaceae)., *Coronilla varia L., Galega officinalis L., Trifolium pratense, Robinia pseudo-acacia L.* (Fabaceae)., *Pulmonária officinalis L.,(Boraginaceae)., Daucus carota L. (Apiaceae), Vinca minor L.* (Apocynaceae)., *Onopondon acanthium L., Artemísia vulgaris L., Taraxacum officinale Wel., Matricaria recutitaL Centaurea cyanusL..*(Asteraceae)., *Agropyron repens L. Beary.* (Gramineae)., *Rosa canina, Potentila aserina. L .*(*Rosaceae*), *Achillea millefolium L., Lamium album L.,* (Lamiaceae), *Urtica dioica L* (Urticaceae)., *Sambucus nigra. L.* (Caprifoliaceae), Hypericum perforatum L, (Hypericaceae), {Gutiferae}.

In the following we present a list of some spontaneous plant families and each families being accompanied by the complex of entomophages registered during our investigations.

As a result of the investigations it was established that the greatest number of the entomophages were present on the spontaneous plant of families:

1) Asteraceae - with 5 plant species, which possesses a complex of 8 families of entomophages.
2) Families Fabaceae of 4 species of plants and 6species of entomophages
3) (Lamiaceae), of 3 species of plants and 7 species of entomophages
4) Fam. *(Apiaceae),* of 2 species of plants and 8 species of entomophages
5) Fam. *Boraginaceae* of 1 species of plants and 3 species of entomophages
6) Fam. *Rosaceae* of 2 species of plants and 4 species of entomophages
7) Fam. Urticaceae of 2 species of plants and 6 species of entomophages

Our observations showed, in dependence on plant families with diverse species of biennal, annual, and perennial plants, that the majority of entomophages and pollination entomofauna have been concentrated on the blossom phase on the plants from.: *Apiaceae, Lamiaceae, Fabaceae, Gramineae, Rosaceae, Asteraceae, Brassicaceae.*

During the blossom period of the wild plants from the spontaneous flora, the majority of entomophages and pollination entomofauna have maximal attractivity on the plants from. Papilionaceae, Violaceae, Polygonaceae, Ranunculaceae, Brassicaceae, Apiaceae, Asteraceae Lamiaceae, Rosaceae, Fabaceae, Gramineae. On the *Taraxacum officinalis., Matricaria recutita L. Centaurea cyanus L.* (Asteraceae)., *Agropyron repens L. Beary.* (Gramineae two species of Syrhidae fly species were observed: *Epistrophis balteata* and *Syrphus ribesii* in the second decade of April and the first decade of May. On the inflorescenses of *Sambucus nigra. L.* (Caprifoliaceae) and *Valeriana officinalis (Valerianaceae)* in the third decade of May and first decade of June the *Cantharis lateralis* (Cantharidae). Among all the plant families the least number of insects was observed on *E. arvense*. On the contrary the most number of insects was observed in the Asteraceae plants complex.

For the addition nutrition with nectar the majority of insect species use Apiaceae plant family.

Apiaceae plant Family is a source of attraction for predator entomophages in proportion of 66% with entomoprasitoides having 34%.

Maximal dynamics of entomophages was observed in period May – June.

Spontaneous flora attracts the significant number of entomophages and pollination entomofauna thus intensifing potential for biological protection of the pests.

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