



*The International Conference
dedicated to the 70th anniversary of foundation of first research
institutes of the ASM and the 55th anniversary of the inauguration of the
Academy of Sciences of Moldova*

**LIFE SCIENCES IN THE DIALOGUE
OF GENERATIONS:
„CONNECTIONS BETWEEN UNIVERSITIES,
ACADEMIA AND BUSINESS COMMUNITY”**

ABSTRACT BOOK

*March 25, 2016
Chisinau, Republic of Moldova*

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PROGRAMME

9⁰⁰ – 10⁰⁰	REGISTRATION and POSTER SETUP <i>Central Scientific Library „A. Lupan” of the ASM (3 Academiei Street, Chisinau)</i>
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CURRENT ASPECTS AND PROSPECTS IN BIOMEDICINE and BIOINFORMATICS

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Chairs: Acad., Prof., D. Sc. Teodor FURDUI; Dr. Victoria SACARA

- 14⁰⁰ – 14²⁰ **Acad., Prof., D. Sc. Teodor FURDUI**, *Institute of Physiology and Sanocreatology, ASM, Republic of Moldova*
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Chairs: Dr. Sc. Maria NEDEALCOV; Dr. Ilie BOIAN

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Chairs: Corr. Memb., Prof., D. Sc. Ion DEDIU; Dr. Alexandru TELEUTA

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Central Scientific Library „A. Lupan” of the ASM(3 Academiei Street, Chisinau)

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CURRENT ASPECTS AND PROSPECTS IN PLANT BREEDING

LIFE SCIENCES IN THE DIALOGUE OF
GENERATIONS:
*CONNECTIONS BETWEEN UNIVERSITIES,
ACADEMIA AND BUSINESS COMMUNITY*

DETECTAREA SPECIEI DE FITOPLASMĂ LA DIFERITE GENOTIPURI DE *SOLANUM LYCOPERSICUM* PE LOTURILE EXPERIMENTALE A IGFPP

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Candidatus Phytoplasma solani este o bacterie fără perete celular, care infectează un spectru larg de plante și culturi agricole aproximativ 300 de specii atât în Europa cât și pe alte continente. Ea cauzează mari pierderi economice datorită scăderii calității și a productivității culturilor. Un obstacol în studierea fitoplasmei îl constituie imposibilitatea cultivării în condiții *in vitro*, cât și metodele imuno-fermentative nu sunt mereu eficiente în determinarea fitoplasmei. Însă datorită dezvoltării metodelor moleculare aceasta a devenit posibilă. Scopul principal al cercetării la constituit determinarea speciei de fitoplasmă care infectează soiurile și liniile de tomate din cadrul câmpiilor RM. Pentru cercetare au fost utilizate soiuri și hibrizi de tomate: din colecția Institutului de Genetică, Fiziologie și Protecție a Plantelor. Izolarea ADN-ului s-a realizat cu ajutorul ADN-zol. Inițial însă s-a determinat prezența fitoplasmei în probele cercetate cu primeri nespecifici ribosomali. Astfel conform rezultatelor obținute cu primerii nespecifici soiurile *Milenium* și *Prestij* au fost infectate iar *Jubiliar 60/20* nu a fost infectat. Pe baza rezultatelor primite au fost selectate soiuri pentru determinarea speciei de fitoplasmă ce infectează tomatele. Rezultatele obținute au clarificat că patogenul care infectează plante de tomate în câmpurile ale IGFPP este *Candidatus Phytoplasma solani*. Aceasta a fost demonstrat utilizând primeri specifici din genă *Chaperonine* și ADN din trei soiuri de tomate. Soiul *Jubiliar 60/20* n-a dat amplificare, dar soiuri *Milenium* și *Prestij* au amplificat cu ambele perechi de primeri *cpn* din *Ca. P. solani* (cpn421 F/R și cpn200 F/R) și n-au dat amplificare cu cpnA261 F/R din *Ca. P. asteris*. Utilizarea ADN-ului extras dintr-o singură plantă a soiurilor infectate necesită efectuarea *PCR nested*. Runda I (primeri cpn421 F/R) nu a arătat infecția fitoplasmică, care a fost demonstrată în runda II (primeri cpn200 F/R). Cea ce demonstrează sensibilitatea sporită a *nested-PCR*

ANTIFUNGAL ACTIVITY OF SOME STRAINS OF MICROORGANISMS AFTER 3 AND 6 YEARS OF LYOPHILIZATION

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Antifungal activity is a relatively common characteristic among bacteria, conferring an ecological advantage in environments which support the growth of a mixed bacterial and fungal flora. This activity has been detected by using a variety of *in vitro* methods and although the chemical basis for this activity has been elucidated in many cases, in some it has not, even though antifungal activity has been demonstrated. This activity has significance in four areas: development of therapeutic antifungal drugs, development of plant protection agents, suppression of fungal colonization: proliferation within the human body resulting in modification of the pattern of certain human clinical infections and reduction in the efficiency of isolation of fungal pathogens from clinical specimens.

In this regard, the strains of microorganisms that are used in biotechnology are representing a commercial value and the problem of maintaining as longer as possible of their biosynthetic proprieties and of those that are economic valuable are permanently in the attention of scientists. The conservation of microorganisms and of their properties requires the use of efficient methods of preservation and a continuous monitoring of the effectiveness of these methods.

The results of investigations undertaken on determining the antifungal activity of the strains of *Ps. aurantiaca* CNMN-PsB-08, *Ps. aureofaciens* CNMN-PsB-07 and *B. cereus* var. *fluorescens* CNMN-BB-07 over the strains of fungal pathogens after their freeze-drying storage in the protective environment of Na succinate + 12% sucrose during the 3 and 6 years, proved that together with the extension of the storage period increases and the antifungal activity. Thus, the collected data are demonstrating that after 6 years of conservation of strains of *Ps. aurantiaca* CNMN-PsB-08 and *B. cereus* var. *fluorescens* CNMN-BB-07 the antifungal activity on micromycetes *F. oxysporum* and *F. solani* is increasing so, that the diameter of the inhibition zone is increasing by 5,0 – 4,7 mm and 6,3 – 7,7 mm, respectively, from the preservation period of 3 years.

The antifungal activity of all isolates has increased together with the increase of the storage period of 3 to 6 years towards the micromycetes *A. alternata* and *B. cinerea* which also are active pathogens of the crop plants. In this case, we can observe that the diameter of the inhibition zone of the strain *Ps. aurantiaca* CNMN-PsB-08 towards the *A. alternata* and *B. cinerea* is growing by 8,6 and 5,3 mm, respectively. Unlike this, the strains of *Ps. aureofaciens* CNMN-PsB-07 and *B. cereus* var. *fluorescens* CNMN-BB-07 are possessing antifungal activity and over the *A. niger* culture, thus the diameter of the inhibition zone is increasing from 12,3 to 19,0 mm and from 14,3 to 15,0 mm, respectively.

The most significant increase of the antifungal activity was determined at the strain *Ps. aureofaciens* CNMN-PsB-07 over the micromycetes *B. cinerea*, where the inhibition zone was increasing together with the storage period from 3 to 6 years with 2,03 times. The use of these bacterial species in biological control would allow to increase the plant resistance to pathogens. Thus, the achievement of some efficient conservation methods that would allow the maintenance or the increase of antifungal properties can be finalized with the development of some technological equipment for the attainment of the active biological remedies, efficient in the agricultural usage as an alternative to chemical fungicides.

IMPROVING QUALITY OF GRAIN PROTEIN IN MAIZE USING GENETIC TOOLS

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Maize grains contain relatively low protein (10%), with low quality due to limitations in lysine and tryptophan. Traditional methods such as selection, polyploidy, mutagenesis and distant hybridization, have succeeded in elevating grain protein content, yet, quality remains low. Today, the only way of overcoming this issue are genetic tools, particularly using specific genes with certain biochemical effect. There are several known genes, but only few received practical application i.e. recessive endosperm mutations *opaque2* and *floury2*. However, certain pleiotropic effects of these genes on certain agronomic traits of maize, particularly, floury endosperm, high moisture of grains at harvest which increase *fusarium spp.* infection, reduced yield etc., discouraged the interest in these forms. Thus, new methods to improving maize protein quality are necessary to develop.

At the Agricultural University of Moldova it was started the experimental elaboration of an innovative idea of creating an original genetic model of tetraploid maize genome with *opaque-2* (*o2*) gene to identify new areas of fundamental research for improving the grain quality of *Zea mays* L.

Since their first development, tetraploid forms of maize have shown valuable morphological, physiological and biochemical traits but reduced fertility, slower growth, longer growing season, low productivity, which make them uncompetitive with diploids. However, scientists use them in different research programs regarding genetic variability, inbreeding and heterosis, genomic imprinting, gene expression, dosage effects etc.

The germplasm used in our experiments consisted of two simple maize hybrids Chişiniovski 307 PL and Chişiniovski 401 L. that contain the *o2* gene. The Chisiniovski 401L also contains modifier genes that change the physical structure of the floury endosperm in mosaic, partly glassy. Tetraploidy was induced by colchicine treatment. Biochemical analysis was performed by infrared spectroscopy. Protein amino acid content was determined by ion exchange chromatography on an automatic aminoacid analyser T339M.

Biochemical analyzes revealed a higher protein content in tetraploid grains of *o2* maize as compared to diploid counterparts. On average the difference constituted 1-2% absolute. In the same time, the content of lipids in tetraploid mutant grains was lower than that of diploid mutant form, practically at the level of normal diploid grains, but no essential differences were noticed as regard to cellulose content. The analysis of amino acids profile of the protein from the two grain citotypes, showed that with increasing ploidy level there was a tendency to increase the content of aspartic acid, threonine, serine, glutamic acid, tyrosine, alanine, reducing content of proline, glycine, valine, cysteine, leucine, isoleucine, histidine, arginine. Experiments with different doses of *o2* gene in grain endosperm showed that in the case of six *o2* recessive alleles, the lysine content was higher than all other doses of diploid and tetraploid levels.

These results demonstrate the possibility of increasing the protein content in maize and improve its quality through the use of biochemical effect of *o2* genes and polyploidy. The specificity analyze of the obtained results is currently focused on their use in the breeding process in the form of recommendations for technology of creating tetraploid forms of maize with *o2* gene and the system of their evaluation.

GROWTH OF MICROMYCETES UNDER FACTORS OF STRESS

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In the process of nutrition and thus in the development of microorganisms, they are subject to influences of environmental factors which condition is causing microbial activity of stimulating of growth and reproduction or inhibiting of the activity.

Under the action of the environment as a result of the interdependence between environmental factors and the answer that give microorganisms were established while adapting. To survive in hostile conditions, fungi adopt different strategies that find their expression in the characters changes in culture, structure, activation of genes, gene mutation or emergence of new biosynthetic products involved in the survival and resistance. The colonies are small and compact form, slowing down reproduction.

Nutrition microorganisms is a complex physiological process by which microorganisms procure the necessary elements and energy for biosynthesis of cellular compounds, growth, reproduction and maintenance of vital functions. There is no carbon source that is not used on microbial way. Microorganisms usually different carbon sources use in different quantities. The purpose of research was determine the action of stress factors on growth and development of micromycetes.

Subjects of studies were 50 strains of macromycete of NCNM. As a stressful cultivation on the agar medium of micromycetes, as well as submerged were tested: the lack of carbon source (glucose) as well as the presence of glucose in different concentrations (30,0; 20,0; 10,0 mg/l) ; presence of trifluralin in concentrations (mg/l): 50; 100; 200; 300; 500.

It has been established that Czapek medium with glucose concentration 30 g/l and 20 g/l all 50 strains grow. Thus, the medium with glucose concentration of 30 mg/l - 30 strains of fungi grow well, 18 medium and 2 weak, and the glucose concentration of 20g/l, grow well only 10 strains, 30 of them recorded an average growth and 10 growth is weak. Out of 50 tested strains at a concentration of 10 mg glucose / or the strain has not been a good increase, the average increase is 18, 30 - poor, and two strains do not grow. On medium without glucose 24 strains do not grow, and the remaining 26 grow very poorly.

The results obtained from submerged cultivation of strains on the same media showed that denied creep biomass accumulated glucose-free medium 2-7, and in some strains even 12-16 times lower than that obtained with medium glucose concentration 30 g/l .

Growing strains on fungal medium Czapek 20 g/l glucose and supplemented with different doses of trifluralin, showed good growth of all strains in the control (Czapek 20% glucose) and some growth was more intense. To the exclusion of glucose Czapek medium and supplementing it with different doses of trifluralin, strains reacted differently. Such strains tested of 12, 6 of which do not grow on Czapek medium without glucose medium supplemented with trifluralin showed an increase of all strains. 4 strains in the presence of trifluralin in concentration of 500 mg/l was grown more intense, 4 did not notice any change and 4 increase is weaker compared to the control. This shows that in some cases trifluralin can serve as a source of carbon and thus stimulate growth and development of micromycetes.

The results obtained demonstrate that micromycetes can adapted to stress factors.

VARIABILITY OF THE CONTENT OF POLYPHENOLS TO THE GENOTYPES OF *ORIGANUM VULGARE* L. SSP. *VULGARE* AND *ORIGANUM VULGARE* SSP. *HIRTUM* (LINK) IETSWAART

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The species *Origanum vulgare* ssp. *vulgare* (Ovv) and *O. vulgare* ssp. *hirtum* (Ovh) are used for centuries as a medicinal plant with significant pharmacological value backed by chemical composition: essential oils, tannins, bitter principles, flavones, anthocyanins, polyphenolcarboxylic acids and their derivatives, terpene compounds, minerals, vitamins, and like herbs as preservatives, seasoning, perfumery, ornamental, melliferous, insecticides.

The purpose of the present work was identification and determination of the tannins, determination of the total contents of polyphenols expressed in caffeic acid, gallic acid and pirogalol in aqueous and methanolic extract to 6 genotypes of Ovv, including 2 genotypes from spontaneous flora, as well as 6 genotypes of Ovh.

Samples-the aerial part of the plant (*Origani herba*) were taken from the collection of medicinal and aromatic plants of the Institute of Genetic, Physiology and Plant Protection ASM in July 2014.

The tannin substances has been identified by using specific quality reactions: solution of iron alum, sol. $(\text{CH}_3\text{COO})_2\text{Pb}$ 10% , sol. sodium nitrite. The quantitative determination of tannins was executed by permanganatometric method. The total content of polyphenols expressed in gallic acid, caffeic acid and pirogalol was determined spectrophotometrically by Folin-Ciocalteu method in aqueous and methanolic extract.

Qualitative analysis has shown the presence of polyphenols and tannins substances in all samples analyzed from both Ovv and Ovh. More pronounced were reactions to the extractive solutions from Ovv. The content of tannin substances to genotypes Ovv varies within the limits of 33,04-40,44%. To the genotypes of Ovh, the concentration of tannins is lower, ranging from 12,62% until 30,34%. The content of polyphenols at Ovv genotypes was 112,54-165,66 mg/g expressed in gallic acid, 129,20-193,50 mg/g – caffeic acid and far below in pirogalol-82,22-125,83. Ovh genotypes are poorer in polyphenols: Gallic acid-102,60-118,31 mg/g; caffeic acid-117,18-136,99 mg/g; pirogalol-74,03-87,37mg/g.

From the above we can concludes that the genotypes of *Origanum vulgare* ssp. *vulgare* L. și *O. vulgare* ssp. *hirtum* (Link) Ietswaart sre distinguished by different concentrations of polyphenols, including tannins. It has been attested to both the difference between the two subspecies and between genotypes belonging to the same subspecies. Genotypes *Origanum vulgare* ssp. *vulgare* L. are richer in tannins and polyphenols as *O. vulgare* ssp. *hirtum* (Link) Ietswaart.

EFICACITATEA APLICĂRII GLICOZIDELOR ÎN SPORIREA VIABILITĂȚII SEMINTELOR DE LEGUME

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În abordarea problemei ce ține de aprovizionarea populației cu produse alimentare cu o valoare biologică sporită, un rol deosebit le aparține culturilor legumicole. Perfecționarea procedeelelor agrotehnice de cultivare a legumelor reprezintă una din condițiile esențiale de obținere a sporurilor de recolte, în diverse condiții de producere. Calitățile semințelor prezintă un ansamblu de proprietăți care influențează asupra creșterii și dezvoltării plantelor și asupra formării recoltei. Energia germinativă, ce caracterizează viabilitatea plantelor, este unul din indicii esențiali al calității semințelor. O energie germinativă mare asigură încolțirea simultană a semințelor, uniformitatea în creșterea și dezvoltarea plantelor, ce favorizează ulterior sporirea productivității și îmbunătățirea calităților comerciale ale producției.

În acest sens, în ultimul timp utilizarea substanțelor biologic active devine un procedeu tot mai atractiv în tehnologia de cultivare a legumelor. Tratarea semințelor înainte de semănat cu biostimulatori naturali îmbunătățește procesele metabolice, reglează echilibrul hormonal, accelerează germinația și înrădăcinarea, reduce termenul de coacere, sporește recolta, în consecință asigură realizarea deplină a potențialului biologic al culturilor legumicole. Această măsură agrotehnică, ecologic sigură este economic profitabilă și asigură obținerea producțiilor posibile a culturilor legumicole în diverse condiții pedoclimatice.

Tratamentul complex al semințelor de legume cu bioregulatori de origine vegetală favorizează sporirea energiei germinative, stimulează facultatea germinativă a acestora, constituie baza pentru obținerea germinației omogene și uniforme în condiții de câmp, asigură condiții pentru formarea unei recolte mai sporite. În scopul aplicării eficiente a glicozidelor în tehnologia de cultivare a legumelor, trebuie luată în considerație acțiunea diferențiată a acestora în dependență de concentrație, durata de tratare, particularitățile soiului cultivat, metodele și termenii de utilizare.

STUDY OF DIFFERENT SUNFLOWER HYBRIDS RESISTANCE POTENTIAL TO BROOMRAPE"

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The study purpose presents the resistance degree determining of some sunflower genotypes from *Orobanche cumana* Wallr. attack on artificial infestation conditions in the greenhouse. The research was performed in the context of sunflower forms highlighting, resistant to broomrape populations collected from different regions of the Republic of Moldova and Romania.

As biological material was initially used eight sunflower genotypes (MS – 1589A; MS – 2039A; MS – 2098A; MS - 2091A; MS – 2077A; MS – 2067A; MS – 2161A; MS – 2026A) as potential of germplasm sources to obtain resistant to broomrape hybrid forms and 4 differentiators of D-G broomrape races, offered by the National Agricultural Research Developing Institute of Romania. As a source of infection were used broomrape seeds collected from three locations: Soroca, Anenii-Noi, Moldova and Tulcea, Romania.

Among the studied genotypes, tested in 2013-2014 were noted MS – 2039A and MS – 2161A two forms that have shown a relevant resistance to broomrape attack, the average degree of attack constituted 1.39% from total plants, studied in of artificial infection conditions with broomrape collected in Soroca.

Genotype MS- 2161A resistant to broomrape populations collected in Anenii-Noi and MS – 2067A and MS – 2039A genotypes showed obvious rezistance to attack marking the limits 2,45% - 3,0%.

In 2014-2015 was undertaken a study of sunflower genotypes, greenhouse seeded and artificially infested with broomrape seeds collected in both moldovan regions and from Tulcea region, Romania.

The experiment results showed the following: genotypes MS – 2039A and MS – 2161A were marked by durability, the attack degree constituting 1,8% and 2,0%, respectively. The most sensitive genotype MS-2077A was 16,2% degree of *Orobanche cumana* Wallr breeds infection, collected from Soroca.

In case of infection with collected in Tulcea, Romania broomrape seeds, genotypes targeted resistance picture shows a differentiated aspect. The most resistant to broomrape hybrid, MS-2077A with infection degree 5,5% and hybrid MS-2098A with value 6,3%, having medium resistance values like MS – 2161A by 7,5% and MS – 2039A hybrid forms, by 9,8%, which had had a high resistance to broomrape invasion collected in Soroca and Anenii-Noi.

We conclude that was highlighted some hybrid forms that have shown a high resistance degree to broomrape attack and can subsequently be used in hybridization to obtain resistant sunflower forms.

THE CHARACTERISTICS OF NEW SOYBEAN VARIETIES

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In Moldova soybean is one of the priority crops. Research work on soybean in Institute of Genetics, Physiology and Plant Protection of the ASM is carried out in the direction of development of new hybrid soybean varieties which meet the modern production requirements. During recent five years there were brought into the State Testing six varieties. Four of them are included into the Register of Selection Achievements of Moldova. The best of them having complex of economic useful traits are included into the selection process for the development of high productive soybean hybrids.

Soybeans [*Glycine max* (L.) Merr.] varieties Stefanel and Laduta have been developed through a hybridization method. The authors are A. Budak, V. Celac, L. Coretci and A. Cheban. The parental types for variety Stefanel are as follows: the maternal one is the variety Irina and the paternal one is K-003. The bean productivity is 17,5 -35,3 q/ha. The protein content in beans is 38,9%, the oil content is 19,1%. The weight of 1000 beans is 113-152 g. The vegetation period is 112-118 days. The plant is 55-89 cm tall. It is characterized by a high setting level of the first seedpod (15-16 cm) and an enhanced drought resistance. As compared with the standard variety the variety Stefanel exceeds it in productivity by 3% in the testing by State Commission for Crops Variety Testing in the 2016 year.

The variety Stefanel is resistant to the following diseases: *Uromyces appendiculatus*, *Fomopsis sojae*, *Septoria glycines* Hemmi, *Fusarium sp.*, *Phomopsis sojae*.

The initial types for variety Laduta are as follows: the maternal one is the variety K-003 and the paternal one is Hodgson. The bean productivity is 18,1-33,9 q/ha. The protein content in beans is 38,9%, the oil content is 23,2%. The weight of 1000 beans makes 110-161 g. The vegetation period is 110-114 days. The plant is 65-75 cm tall. It is characterized by a high setting level of the first seedpod (15-16 cm) and an enhanced drought resistance. As compared with the standard variety the variety Laduta exceeds it in productivity by 9% in the testing by State Commission for Crops Variety Testing in the 2016 year. The variety Laduta is resistant to the following diseases: *Uromyces appendiculatus*, *Fomopsis sojae*, *Septoria glycines* Hemmi, *Fusarium sp.*, *Phomopsis sojae*.

SOY SEEDS INHIBITORS AND THEIR INTERACTION WITH EXOPROTEASES OF MICROORGANISMS FROM THE GENUS FUSARIUM

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Every protease inhibitor interacts with targeted protease within the catalytic domain, forming a stable protease-inhibitor complex and passivating the proteases.

Microorganisms of every kind have a peculiarity in their metabolism, that allows synthesis of the proteases of a concrete kind, thus adjusting their ability to react biochemically with host organism in case of pathogen infiltration of the host [Laskowski and Kato, 1980; Шульгин, Мосолов, 1985; Norton, 1991; Валуева, Мосолов, 2004; Мосолов, Валуева, 2005].

In our work, we used 2 genotypes of soy, K003 and Aura (both obtained by local breeders), as an object for investigation.

Quantity of inhibition activity of protein inhibitors was estimated by residual proteolytic activity of exoproteases. Using method suggested by [Чебан и соавт., 2013], we discovered the quantity of proteolytic activity of exoproteases excreted in liquid cultural environment by 5 kinds of microorganisms from *Fusarium* genus (*F.oxysporum* Schl., *F.moniliforme* Sheld., *F. gibbosum* App. et Woll., *F.culmorum* Sacc., *F. nivale* (Fr.) Ces.).

The measured concentration of proteins within the environment reached 1mg/ml. As a substrate, we used a commercial preparate of the caseine protein.

1 mg of protein secreted in cultural environment by microorganism of *F. Gibbosum* kinds was characterized by the highest exoproteolytical activity as compared to other four *Fusarium* genus kinds - 4,8023 units. In comparison to *F. gibbosum*, activity of proteases in case of *F.oxysporum* was 10,4% lower, in case of *F.culmorum* - 31% lower, in case of *F. nivale* - 33% lower and in case of *F.moniliforme* - 70 % lower.

Proteine inhibitors from K003 genotype seeds suppressed the exoproteases activity: in case of *F. nivale* - for 84,65%, in case of *F.oxysporum* - for 69,02%, in case of *F. Gibbosum* - for 67,83%, in case of *F.culmorum* - for 67,59% and in case of *F.moniliforme* - for 27,73%. Proteine inhibitors from Aura genotype seeds suppressed the exoproteases activity: in case of *F. nivale* - for 66,85%, in case of *F.oxysporum* - for 49,82%, in case of *F. Gibbosum* - for 52,71%, in case of *F.culmorum* - for 63,73% and in case of *F.moniliforme* - for 34,91%. Aura genotype possesses lower inhibition activity against the exoproteases of *Fusarium* genus microorganisms, than genotype K003.

The activity of exoproteases secreted in cultural liquid by *F.moniliforme* was 3 times lower than those of *F. gibbosum* и *F.oxysporum*; however, this activity was suppressed only for 1/3 by soy seeds of both genotypes.

It is known that in soybean seeds is usually contained two kinds: of proteins inhibitors suppressing the activity of trypsin (protein inhibitor of the Kunitz family) and "two-headed" protein inhibitors that inhibit the proteolytic activity of trypsin and chymotrypsin (from the Bowman-Birk family). At microorganism *F.moniliforme*, apparently secreted several exo-proteinases and most of them do not form an enzyme-inhibitor complex with inhibitor proteins from seeds of soybean genotypes.

SOME ASPECTS OF STUDY OF HALOPHYTES IN THE FAURESTI GOIAN AREA

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The area under study is of interest both from the point of view of conservation and protection of natural resources as practical. This regularly requires evaluation and monitoring activities of all components of biodiversity. For effective protection and security for sustainable management of biodiversity it is very important to know the floristic composition and valuable elements of the surface vegetation.

Halophyte plants is a complex environmental group that have different structural and functional adaptations. Also named a salty plants, they represent a population of plants that are adapted to the conditions of an elevated salt concentrations.

River Ichel, in the study area, crosses a massive limestone divide this area in two steep slopes with the bottom of a rocky valley. Mainstream forms meanders. Grouping reef is covered with loose limestone (6-8 m). Of minerals useful here, used in quarries, there is a limestone for construction. The soils in the landscape are several types: rendzinas typical (skeletal), which are more prevalent on the right side and is formed on limestone rocks; alluvial floodplain and layered, slightly salty - which grows in grassy meadow river Ichel under the rug hydrophilic different species. At the bottom of the right side of the source, we have part of the marshy soil. Gray forest soils are widespread on both slopes: on the right between limestone blocks tumbled and they grow some shrubs and herbaceous plants; on his left largely based on the slope.

Halophytes main strategy is desalting by special structures located in the aerial organs. The most obvious feature of them is that most are succulent plants with thick leaves, fleshy, more or less transparent, with a well developed palisade tissue.

The study included 22 species halophyte of which 18 species are facultative halophyte (82%) and 4 species are mandatory halophyte which constitutes 18%. Among families with a large number of halophyte are: Asteraceae (23%), Fabaceae (18%), Poaceae (18%), Chenopodiaceae (14%), Polygonaceae (14%), Cyperaceae (9%), Malvaceae (4%).

Unfortunately, in recent years, the associative nature of halophytes and habitat conditions leads to severe xerofitizare, throughout the vegetative season, in favor of the extension of halophytic grass species at the expense of ordinary meadows. Saline groundwater, such as sulphates, hydrogen carbonate, sodium and potassium chlorides, failing flooded regime, contributed significantly to enhancing the habitat of species of halophyte grasses.

In order to conserve vegetation in the study area, it is necessary to undertake a series of measures, which include: restoring characteristic species given place; purification of water resources; rational exploitation of limestone.

THE USE OF GAMMA RAY MUTAGENESIS ON CHICKPEA (*CICER ARIETINUM L.*)

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Chickpea (*Cicer arietinum L.*) is a traditional culture for Asia and Mediterranean Europe, especially in arid climate areas. Chickpea is an important source of proteins in many developing countries. For the Republic of Moldova, chickpea is a perspective crop and there is a need of new cultivars with improved resistance for local environmental threats.

Radiation induced mutagenesis was used for breeding in more than 1700 new cultivars in the last 30 years [1] Gamma ray mutagenesis is widely used in plant breeding for many crops. The doses between 275 to 350 Gy of gamma ray have been described as semi-lethal (DL50) and are recommended for use on chickpea [2], [3].

Gamma ray mutagenesis was used for inducing of more than 400 chickpea mutants. Currently there are studied 18 mutants in the M₆-M₁₁ generation. They have stable traits and were selected by having Many of these mutants were characterized by having valuable traits for this crop, as for example, there were obtained mutants with improved dimensions of the seeds (5-6 mm), medium height of plants (450-500 mm), resistance to drought and fungal diseases. One of obtained mutants exceeded the control (Ichel) by more than 300% in the drought conditions of the 2012 year. Precocious mutants suffer less from fungal diseases when humidity rises by the end of vegetation.

In the R. of Moldova, one of the most important traits for the chickpea is the resistance to fungal diseases, in particular for the fusarium wilt and the ascochyta blight. A screening of 14 mutants revealed 3 of them having an increased resistance of the seeds to the culture-filtrate of fusarium. These mutants will be used as breeding material to combine the plant resistance with higher productivity and resistance to the drought.

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BREEDING OF LEGUMINOUS CROP UZING MOLECULAR GENETICS TECHNOLOGIES

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The purpose of the research consisted in elucidating of the molecular-genetic basis of leguminous crop relations with pathogens and breeding of new soybean and chickpea resistant genotypes. Objectives: to determine the composition of the fungi species that attack soybean and chickpea crops and their pathogenicity; to identify the gene effects involved in controlling soybean genotypes resistance to pathogens (*Fusarium spp.*, *Ph. sojae*, *P. glycinea*) in vivo; to elucidate the peculiarities of heritability of soybean resistance to *F. oxysporum* in vitro; to characterize genetic-molecular features of soybean and chickpea genotypes based on enzymatic factors, SSR-markers and plant response to *F. oxysporum*; germplasm evaluation and breeding of valuable soybean and chickpea genotypes resistant to pathogens and unfavorable abiotic factors possessing high indices of productivity; to determine the role of hereditary and acquired resistance in the integrated soybean and chickpea breeding. The gene effects involved in controlling soybean genotypes interactions with fungal and bacterial pathogens, and polymorphism of SSR markers for soybeans and chickpea have been established. A high degree of similarity has been found for soybean, chickpea plant response to *F. oxysporum* and polymorphism of SSR markers from different linkage groups, which indicates a polygenic control of the reaction and the opportunity to use molecular markers to identify resistant genotypes. The strategies of genetic resistance control employment in crop breeding have been developed. A complex study of *G. max* x *Fusarium spp./Ph. sojae/P.glycinea* pathosystems has revealed that the formation and the heritage of soybean resistance to pathogens is subject to genetic control of the additive-dominant type. The gene actions and epistatic interactions specific to each pathosystem have been identified. An important role of genotype and temperature factor in manifestation of soybean resistance to *F. oxysporum* in vitro and in vivo has been defined. A positive correlation has been established between the level of embryogenic callus formation in the presence of *F. oxysporum* metabolites and the *Fusarium* resistance of intact plant in vivo conditions. Increase in the oxidation-reduction and hydrolytic reactions involved in detoxification of mycotoxins and fungal cell walls degradation has been shown to be one of the mechanisms ensuring soybean resistance to pathogens. *F. oxysporum* has no strict specialization for soybeans while a specialized *F. oxysporum* f. sp. *ciceris* form has been found for chickpea. *F. oxysporum* strains 690-10 and *F. oxysporum* strains 693-4 with enhanced virulence useful for plant x pathogen interaction research have been employed to develop an artificial background for the trials of soybean resistance to *Fusarium* and plant x pathogen interaction investigations.

Four lines, seven soybean and three chickpea varieties have been developed. Soybean lines have been included in the National breeding programmes to develop new varieties resistant to biotic and abiotic factors; four varieties of soybeans and two varieties of chickpea have been approved for the Moldova conditions and included in the database of the N.I. Vavilov Research Institute of Plant Industry, St. Petersburg, Russia.

INCREASE OF VIABILITY OF CASTOR-OIL PLANT SEEDS (*RICINUS COMMUNIS* L.) WITH THE HELP OF MILLIMETER RADIATION UNDER THE CONDITIONS OF *EX SITU* CONSERVATION

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One of the tasks of gene banks includes conservation of seeds of cultivated plants in *ex situ* collections. During long - term storage of seeds they suffer from complex physiological and biochemical processes of aging that result in decrease of viability of collection accessions. Therefore development and use of various chemical and physical methods for stimulation of seeds with decreased germinability are challenging problems for gene banks.

Millimeter radiation with the wavelength of 5.5mm, power density 10mWt/cm² and exposures of 2, 4, 6, 8, 10 and 30 minutes were used as a physical factor to influence on castor-oil plant seeds with low initial germinability after their 5-year period of storage (germinability of seeds 66,0%). After radiation seeds were sprouted in distilled water in Petri dishes in thermostat at 25°C and then a number of morphological and physiological, biochemical and genetic parameters of seeds and seedlings were estimated.

Peak stimulation of germination was achieved with 2 - and 8-min exposures of radiation of seeds (seed germinability in these variants surpassed the control by 20,0 and 22.2%, respectively). Maximum length of the main rootlet of castor-oil plant seeds was recorded with the same exposures of radiation. Experiments were conducted with dry and imbibed seeds of castor-oil plant and there were similar results obtained by growth parameters. Length of the main rootlet of seedlings in case of imbibed seeds after 8-min exposure was 1,5 times higher than the control (control – 7,2mm ± 0,38; experiment – 11,7±1,12mm).

2 - and 8-min exposures were also stimulating for the content of IAA -oxidase enzyme in rootlets of seedlings. After 2-min exposure of radiation of seeds the activity IAA-oxidase enzyme in rootlets of dry seeds was 0,1163c.u., after 8-min exposure – 0,0566c.u., i.e. it was 2 times lower, that is indicative of much higher growth activity of seedlings in this variant. The highest values were obtained in the experiments with dry seeds of castor-oil plant.

Total content of highly soluble proteins in rootlets of seedlings after their treatment with the millimeter waves was higher in imbibed seeds as compared to dry seeds due to their increased hydrophilic properties. In the experiment with imbibed seeds the content of protein in control was 925mcg/g on a wet weight basis, and in the experiment (8-min exposure) – 1252mcg/g on a wet weight basis. Ratio relationship between high growth activity and high total content of highly soluble proteins in rootlets of seedlings was found both in dry and imbibed seeds of castor-oil plant.

Genetic status of seedlings was estimated in the experiment with imbibed seeds. It is known that during long-term storage a natural mutation process develops in seeds leading to the increase of frequency of chromosome aberrations. Treatment of seeds with the millimeter radiation with 8- and 30-min exposures caused significant decrease of this parameter (control – 6,6%, 8- and 30-min exposures – 3,2 and 2,4%, respectively). The range is represented by single and double chromosome bridges and chromosome lagging. Decrease of chromosome aberrations in meristem of embryo roots after treatment of old seeds of castor-oil plant with the millimeter radiation facilitates faster elimination of cells with chromosome aberrations, at that, number of normally dividing cells increases. Therefore the ability of millimeter radiation to increase viability of seeds of castor-oil plant under the conditions of *ex situ* conservation was demonstrated even on the genetic level.

ESTIMATION OF GENETIC PURITY OF MATERNAL LINES USED IN PRODUCTION OF LOCAL SUNFLOWER HYBRIDS

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Discovery of cytoplasmic male sterility (CMS) has enabled a major leap in crop hybrids production. Actually, CMS is indispensable for sunflower hybrids obtaining. The seed quality control regarding male sterility is an important element in achievement of a high efficiency hybridization based on CMS-*Rf* system. Furthermore, hybrids obtained in such way show significant heterosis effect. Cytoplasmic male sterility is caused by the presence of *orfH522* gene in mitochondrial DNA. The research purpose was to estimate the degree of sterility in laboratory and field conditions.

In analysis were used samples from six maternal forms with CMS: MS-2077A, MS-2067A, MS-2091A, MS-2098A, MS-2039A, MS-1589A from collection of "AMG - Agroselect" SRL.

In laboratory conditions sunflower seeds were grown in pots to the cotyledon leaf stage, serving as starting material for DNA extraction with the CTAB reagent. PCR was performed using specific primers (sense 5'GGCGCACTCTCTTTTCTGT3' and antisense 5'CTTGAATGGCAGTGGTGATG3') previously developed for *orfH522* using program Primer3. The amplicons were visualized in 1 % agarose gel with ethidium bromide staining in the presence of molecular weight marker GeneRuler 100 bp DNA ladder (Thermo Scientific).

In the field conditions genotypes were grown on areas geographically isolated from other sunflower varieties, measuring between 3.3 and 16.0 hectares. During the period of flowering sunflower plants were checked for sterility and counted.

Thus, a comparative assessment of the degree of male sterility in sunflower genotypes was performed by techniques of molecular analysis, combined with the field experiments.

The obtained data revealed the expected amplicon in all samples. Five of the six maternal lines (MS-2077A, MS-2067A, MS-2098A, MS-2039A, MS-1589A) have a maximum level of sterility (100 %). These results perfectly correlate with the data obtained from the field.

For MS-2091A line, sterility degree estimated in laboratory conditions was 99,0 %, which is lower by 0,9 % comparatively with that determined in the field. The shortfall does not exceed significant errors thus being shown that these methods can be used separately or together to estimate the level of sterility in genotypes used in sectors of maternal multipliers for elite seed obtaining or in sectors of hybridization for F₁ hybrids creation.

Thus, gene-specific primers can also be used for *orfH522* determination and screening of the presence of cytoplasmic male sterility in sunflower lines. The implementation of such control methods in selection programs ensure successful use of CMS plants as a relatively inexpensive solution for obtaining of productive hybrids with high genetic purity level.

APPLICATION OF MOLECULAR METHODS FOR DISSECTION OF PLANT PARASITISM, EXPLORING SYSTEM HOST PLANT-ROOT PARASITIC PLANT-SOIL BIOME

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Among flowering plants, root holoparasites (broomrapes-*Orobanchaceae*) are the most fascinating phenomenon, because they totally abandoned autotrophic way of life to rely entirely on other “host” plants for water and nutrients.

To achieve this broomrapes form haustorial connections with their hosts vascular system. Several mechanisms secure tighter coordination between developmental stages of parasites and the host plants. For germination of broomrape seeds to proceed an exposure to chemical compound termed germination stimulants (GS), emitted from the roots of host plants is required. GS originally play role in attraction of arbuscular mycorrhizal fungi (AM) but during their evolution broomrapes started to use this system to recognize prospective hosts. Next critical step is the formation of haustorial connection between the parasite and the host vascular tissue, which allows broomrapes to withdraw water, minerals and photosynthesis products from the host.

Development of the primary haustorium occurs by transformation of the radicle meristem of the parasite following its exposure to a suitable haustorial inducing factors (HIF). Limited or no information is available about mechanisms that secure further coordination of parasite life cycle to the one of the host. Apart of being plant phenomenon, several broomrapes parasitize important crops causing severe losses in crop production.

Therefore recently several research initiatives started focusing on interaction of this three lateral system in order to develop new efficient and environmentally friendly methods for control of broomrapes.

Our research is focused 1) Identification of genes involved in host-parasite interactions; 2) on unraveling role of soil biome in host-parasite interactions; 3) Understanding genome to genome interactions between host and parasite on transcriptome level.

IN VITRO PROPAGATION OF LYCIUM BARBARUM L. (GOJI) A STUDIED CULTURE PLANT IN BOTANICAL GARDEN (I) AŞM

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Culturing fruit shrub species on a larger scale is motivated especially by their importance as food crops, due to their high content in vitamins, minerals, antioxidants but also their frost tolerance and their capacity to use low-fertility soils. In recent years, in the Republic of Moldova, the market demand for new assortments of crops has increased, contributing directly to the implementation of the Food and Health Programme of the country. The creation of industrial plantations with new species of fruit-bearing shrubs is a novelty for Moldova and plays an important role in the implementation of the programme. Goji is wolfberry (*Lycium barbarum* L.), a vine berry in the same plant family (*Solanaceae*) as tomato, potato and eggplant, cultivated in Northwest China and mediterranean region. *Lycium barbarum* L. has many benefits such as antioxidant and has high medicinal value, being known one of the important traditional Chinese medicinal plant species.

The pharmacological activities that gives goji fruit consists of its high content of vitamins and minerals. Among the vitamins that are found in goji berries include: vitamin C, in very large quantities; vitamin A, is an excellent source of vitamin A; vitamin E, which is found rarely in fruits, with a strong antioxidant effect; vitamins B1 (thiamine), B2 (riboflavin) and B6 are vital metabolic processes and help convert food into energy. Level of Goji berry antioxidants measured ORAC scale (ability to absorb oxygen free radicals) is 30,500 units, almost 20 times more than the oranges. Antioxidants reduce the aging process. It is to be emphasized that this shrub became popular lately due to the taste of its fruits, their therapeutic properties and rich content of biologically active substances; this fact explains the interest of people in high quality planting material of this crop. The polysaccharides in *Lycium barbarum* L. can exhibit anti-aging, anti-tumor, cytoprotective, neuromodulation, and immune modulation effects. Goji fruit is rich in zeaxanthin which can function as an anti-oxidant. Therefore, having *Lycium barbarum* L. in the diet can increase plasma zeaxanthin levels which can maintain macular pigment density in the retina. Also, it is possible to use *Lycium barbarum* L. for the treatment against aging-related diseases as *Lycium barbarum* L. has a wide array of effects reducing all the risk factors in aging-related diseases. Researches on the regeneration of some new cultivars of *Lycium barbarum* L. by *in vitro* cultures will be conducted, within the framework of the institutional project, by the team of Embryology and Biotechnology Laboratory. This project aims the development and optimization of *in vitro* propagation technologies that ensure the production of planting material of high biological value that meets important criteria: genetic uniformity, quality of planting material and price, and it is also a method of obtaining pathogen-free planting material.

THE FUNGI SPECIES THAT CAUSE TOMATO LEAF BLIGHT IN CONDITIONS OF REPUBLIC OF MOLDOVA

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According to the recent bibliographical sources, between *Alternaria* spp. last times the species *A. alternata* occurs with high frequency and aggression, occupying the ecological niches or decrease area of extending of species *A. solani* (Ell. et Mart.) Sorauer, which in over regions presents one of the basic species of tomato. The species *A. alternata* has a wide specialization, causing various diseases at a wide circle of plant species agricultural and technical: tomatoes, wheat, sorghum, barley, sunflower, rapeseed, cotton, etc., causing enormous economic losses [1, 3]. The composition of the species involved in the development of one and the same diseases is different [4], and high polymorphism of pathogens, as a result of lability of the genetic and epigenetic system, determines their high adaptability to environmental conditions [2]. From this, presents a big interest the researches on the composition of fungus species that causes diseases of tomato in condition of Republic of Moldova.

Whereas in the 2012 year the severe drought and high temperatures during the period of vegetation has inhibited the development of fungal diseases to all agricultural crops, including tomatoes, research on pathogens that cause brown staining of the leaves of tomato were possible in 2011, 2013, 2014 and 2015 years. By isolating the fungi from plants with the symptoms of the disease, was found that brown leaf spot to tomato was caused by the *Alternaria* spp.: *A. solani*, *A. alternata*, *A. consortiale*. With the highest frequency was noted the species *A. alternata*: 69,7; 74,6; 77,08 and 67,9%, in 2011, 2013, 2014 and 2015 years, respectively. It is important to specified that in the field conditions of 2014 and 2015 years, was not detected the species *A. solani*.

Thus, we can conclude that in the context of frequent and sever disturbances on climate in our conditions a wider spread have the microconidiens forms of fungi, as is the *A. alternata*.

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REZULTATELE PRELUMINARE DE INTRODUCERE A ȘOFRĂNELULUI (*CARTHAMUS TINCTORIUS* L.).

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Lucrarea este scrisă în memoria doctorului habilitat în biologie Florea Vasile care a fost inițiatorul cercetărilor de introducere și particularităților de cultivare a șofrănelului (*Carthamus tinctorius* L.) în condiții de colecție de plante medicinale al IGFPP. Această specie este cunoscută numai în cultură, și fiind o specie agronomică valoroasă cu utilizare multiplă se cultivă în multe țări de pe toate continentele. Pigmenții roșii și galbeni ale inflorescențelor sunt demult folosiți ca coloranți alimentari naturali. Semințele conțin până la 55% de uleiuri grași, care se caracterizează ca sursa bogată de alfa-tocopherol și pot fi utilizați în alimentație, precum și în scopuri tehnice. Specia dată se cultivă și ca plantă furajeră, dar până în prezent rămâne a fi neutilizată în Republica Moldova.

În ultima decadă a lunii martie semințele de șofrănel au fost semănate pe loturi experimentale ale colecției lipsite de irigare. Semințele nu au necesitatea de stratificare și pe parcursul a 10-15 zile s-au încolțit în condiții de câmp. În sezonul de vegetație al anului 2015 primăvara și vara au fost caracterizate prin temperaturi ridicate peste norm[cu 2,2...3,3°C, ceea ce s-a remarcat pentru prima dată pe teritoriul RM pentru întreaga perioadă de observații meteorologice. În plus au căzut precipitații atmosferice de mai puțin de 100...200 (în medie). În aceste condiții meteorologice specia a demonstrat un potențial avansat de rezistență la secetă. Plantele au avut un ritm de creștere și dezvoltare normal, până la apariția lăstarilor laterali plantele au avut câte 18-25 frunze tulpinale și la mijlocul lunii iunie a început faza de butonizare. Vremea deosebit de caldă și cu deficit de precipitații a fost observată și în luna august, când planta de șofrănel a fost în faza de înflorire în masă și la începutul fazei de formare a semințelor. Înălțimea tulpinilor principale în perioada aceasta a constituit 33-78 cm. Durata fazei de înflorire a fost 30-35 zile. Numărul de inflorescențe pe o plantă a variat de la 5 până la 39, media din 100 plante a constituit 13,16, aproximativ 3,73 inflorescențe de pe o plantă au fost caracterizate ca nedevelopate. În ciuda acestui fapt, de pe o plantă s-a colectat în medie 314,38 de semințe, 61,5% de plante supraviețuiește au format mai mult de 100 semințe. Masa 1000 de semințe a constituit 29,35±0,65 g. Datele obținute sunt în bună concordanță cu rezultatele prezentate de savanții din Turcia (Kizil S., Cakmak O., Kirici S., Inan M. A comprehensive study on safflower (*Carthamus tinctorius* L.) in semi-arid conditions. *Biotechnol. & Biotechnol. Eq.*, 2008, 22 (4), 947-953) și Iran (Khaki-Moghadam A., Rokhzadi A. Growth and yield parameters of safflower (*Carthamus tinctorius* L.) as influenced by foliar methanol application under well-watered and water deficit conditions. *Environment & Experiment. Biol.*, 2015, 13, 93-97), din țările mai tradiționale pentru această specie de plantă. Așadar plantele de șofrănel cultivate în RM fără irigare în condițiile secetei din anul 2015 au demonstrat posibilitățile sale adaptive înalte, caracteristicile biologice și calitatea semințelor obținute au fost la nivelul celor mai bune eșantioane de semințe din străinătate. Rezultatele preliminare obținute vor fi utilizate ca bază a argumentărilor pentru introducerea în agricultura Republicii Moldova a unei noi specii de plante valoroase.

EVALUATION OF CHICKPEA BREEDING MATERIAL BY AGRONOMIC PARAMETERS AND HOMO/HETEROGENEITY SOME CHARACTERS

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Intraspecies crossing between parental forms MDI 02432 (seed *desi*, black) and MDI 02419(*kabuli*, beige) resulted in breeding material (F₇ - generation), the offsprings of which have a rather level of genetic variation.

Breeding material was evaluated in field experiment in 2015 using “pedigree” method. Selections were divided into 2 groups: with beige seeds (standard - *Ichel* cultivar) and pigmented ones (standard - *Botna* cultivar). Standards were sown after 8 selections; comparative analysis of parameters was performed by their average values compared with 2 closest standards. Offsprings were evaluated by 5 agronomic traits: 1” and 2” – productivity expressed as g/plant and g/m², 3” – germinability (%), 4” and 5” number of productive plants and their ratio to the number of seedlings(%). From total offsprings 32 families from initial selections C48/13, C48/14, C48/28, C152/2, C152/4, C152/8, C152/9, C101/1, C101/5, C76/6, C76/7, C152c, C152/7, C152/9, C90/6, C88/3 were distinguished by 5 traits as compared to standards and their values were at the level of standards or higher.

Average values of productivity 1 in experiment and the range for rows of *Ichel* cultivar were: 8,8 and 8,1- 9,6 g/plant; for *Botna* cultivar – 8,6 and 8,2 - 9,1 g/plant. In selections with beige seeds the range for this parameter was: 7,9 (C101/5) – 12,8 (C76/7), for other selections: 8,4 (C48/13) – 13,3 (C152/9). Values of this parameter that exceeded standards by more than 10% were noted in 18 families (56,0%). Average values of productivity 2 in experiment and the range for rows of *Ichel* cultivar were: 95, 6 and 83,3 – 111, 7 g/ m²; for *Botna* cultivar 108,7 and 97,2 – 119,3 g/ m². In selections with beige seeds range for this parameter was: 104,1 (C48/14) – 150,2 (C152/2), for others: 94,2 (C152/4) - 149,8 (C76/7). By germinability of seeds the following families were not distinguished as exceeded the standards: C101/1 by 8,7%, C48/28 (6,5%). Average value of germinability for *Ichel* cultivar was $93,2 \pm 1,1\%$, for *Botna* cultivar – $97,3 \pm 0,8\%$. 25 offsprings (78% of their total number) had germinability at the level of standards or higher. Values of parameter *number of productive plants* in 24 families (75%) were at the level of standards or higher. Values of parameter *number of productive plants and their ratio of the number of seedlings* in *Botna* cultivar and in selections were 73, 1% to 86,3% and 72,4 % (C152/9) – 92,2% (C152/2). Values of this parameter in selections with beige seeds and *Ichel* cultivar were a shade less: 70, 1 (C152/7) to 89, 0 (C101/1) and 68,2 – 79,1%.

It should be emphasized that manifestations of agronomic traits of selections are significantly influenced by their resistance to the main pathogens – *Ascochyta rabiei* and *Fusarium spp.* (*F. solani* prevailed). It was noted that selections of *desi* and *gulabi* (pigmented seeds) had higher resistance to both pathogens as compared to *gulabi* (beige seeds) and *kabuli*.

Evaluation of homo/ heterogeneity of selected offsprings by tested traits revealed that higher homogeneity occurred in 2 parameters: (1) maturation period (2 families were heterogeneous (C48/13, C152/9), and (2) by seed type (2 were heterogeneous (C152/2 and C152/4). 6 families (C152/2, C152/4, C152/9, C152c, C152c/f, C101/5) from 32 (18,8%) had segregation by pigment, and the highest heterogeneity was found in seed size: evenness at the level or higher of standards was found in 14 selections (C152/8a, C152/8c, C152/9a, , C152/9b, C152/9e, C101/1c, C101/1d, C101/5b, C101/5c, C101/5d, C152c1/f, C88/3a, C152/4a, C152/9b).

THE ROLE OF PARENTAL FACTORS IN SYSTEMIC INDUCED RESISTANCE TO TOMATO

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In relatively recent studies, it is mentioned about the involvement of maternal factor in the heritance of quantitative and qualitative characters [1]. Even the response to selection can be affected by this effect [2]. Maternal and paternal effects can lead to different evolutions of the one for which selection is oriented. Parents influence the descendents indirectly (genetically) and directly (through the resources they supply the seed) [3]. However, selection based on direct genetic effect, without taking into consideration the cytoplasm maternal form may not be adequate, and lead to the exclusion of an important source of genetic variance.

Whereas maternal factor has obvious involvement in reaction of tomato plants to pathogens *Alternaria*, shows interest its role in systemic resistance induced by biologically active substances-heteroauxin and Enoxil (the autochthonous preparation of phenolic origin) which have the ability to stimulate the rootedness process. By researching the role of parental factors on germination and root growth of tomato, under optimal conditions (control), stress (culture filtrate – CF of *A. alternata*) and in the presence of resistance inducers (heteroauxin, Enoxil) was found that in all variants was manifested the role of maternal factor ("-" sign) on the investigated characters. The degree of manifestation of maternal factor depended on the character and variant. Thus, in version control both characters investigated: germination and length root, the value of effect of reciprocity was -3,03 and -5,25, respectively. In the version with CF *A. alternata*, the degree of involvement of the maternal factor decreased for both characters, although he remained at a level high enough: -2,17 and -3,12, respectively, for germination and length root. In both variants, with heteroauxin, and Enoxil maternal factors had a greater involvement in the process of germination than root growth.

Thus we can conclude that successful combination of resistance inducers with the right choice of components of hybridization as maternal or paternal parent, contributes largely to the development of efficiency strategy induced systemic resistance in fitopatosis tomato x *A. alternata*.

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CHARACTERIZATION OF NEW VARIETIES OF TRITICALE IN MOLDOVA

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The Ingen 40 variety has been developed through hybridization of the varieties Titan (Romania) x (Atol (Romania) x Ingen 93 (Institute of Genetics, Physiology and Plant Protection) followed by an individual selection in the F₂-F₄ generation. The variety belongs to the Erythrosperrum variation and has a following characterization: a white spike, without pubescence, with white awns and the kernel is red. The spike is of a medium size (10,5-13,0 cm), cylindrical of a medium density (28-34 spikelets per 10 cm of the spike rachis length).

The kernel is large (the weight of 1,000 kernels is 47-50g), oval, contains 13-14% of protein and 22-24% of gluten. The kernel number per spike varies from 65 to 80, 2-3 kernels per spike.

The vegetation period, if sown in the second-third decade of September consist 275-282 days. The variety belongs to a medium ripening group. The plants are 95-105 cm tall; a tillering plant contains 2,8-3,0 stems.

The variety Ingen 93 has been developed through hybridization of the varieties Ingen 8 (Institute of Genetics, Physiology and Plant Protection) and CAD 2/917 (Institute of Genetics, Physiology and Plant Protection) followed by an individual selection in the F₂-F₄ generation. The variety belongs to the Leucomelean variation (a white spike, without pubescence, with white and gray awns, the kernel is red). The spike is of a medium size (9,5-11,0 cm long), cylindrical of a medium density (28-31 spikelet per 10 cm of the spike rachis length).

The kernel is large (the weight of 1,000 kernels consist 46-47 g), oval, contains 12%-13,5% of protein and 20%-22% of gluten. The kernel number per spike varies from 54 to 62, 2-3 kernels per spike.

The vegetation period, if sown in the second-third decade of September is 276-282 days. The variety belongs to a medium ripening group. The plants are 94,0-96,0 cm tall; a tillering plant contains 2,8-3,0 stems

The varieties belong to a medium ripening group. In field conditions they are characterized by high resistance to diseases such as mildew, brown/yellow rust, root rot and septoriose. They are resistant to drought and wintering. The varieties are high-productive with a yield of 6,0-7,0 t/ha (Ingen 40) and 5,5-6,0 t/ha (Ingen 93). The varieties are resistant to lodging and the biochemical qualities are fairly good.

Triticale is used both as food and as a forage crop for animal feed. Ingen 93 is used more as a fodder crop and Ingen 40 for bread flour. Ingen 40 flour can be used to make yeast breads without the addition of wheat. It is higher in protein and fiber than both wheat and rye on their own, making it excellent for bread baking. This hearty, whole grain flour is great for all your baking recipes.

EVALUAREA HISTOLOGICĂ A ANTERELOR DE ORZ LA DIFERITE ETAPE DE CULTIVARE *IN VITRO*

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Androgeneza se bazează pe trei evenimente cruciale: 1) represia dezvoltării gametofitice și dediferențierea microsporilor; 2) restaurarea diviziunilor celulare și stabilirea potențialului embrionar; 3) formarea structurilor embriogene. După cercetările efectuate de Maraschin și autorii (2005), dezvoltarea embriogenică în timpul androgenezei *in vitro* este indusă prin aplicarea diferitor tipuri de stresuri abiotice, inclusiv șocul termic, temperatura rece, inaniția și altele. Stresul transformă o celulă destinată să producă un gametofit masculin, adică un grăuncior de polen, într-o celulă cu potențial embriogen, care se va dezvolta într-un sporofit, adică într-un embrioid (Soriano M. et. al., 2013; Wang M. et. al., 2000).

Din păcate, mecanismul de declanșare a dediferențierii rămâne neclar și inducerea embriogenezei microsporale este o sarcină importantă în rezolvarea androgenezei (D'yachuk et. al., 2010; Rodrigues L. R. et. al., 2005).

Scopul acestei lucrări este evaluarea histologică a anterelor diferitor genotipuri de orz pe parcursul cultivării *in vitro*. În cercetare au fost incluse soiurile de orz Ciuluc (de toamnă) și Galactic (de primăvară). În acest scop anterele cu răspuns pozitiv și cele care au generat structuri embriogene pe diferite scheme de pretratament și medii de cultură au fost prefixate în soluție de aldehydă glutarică 2% și postfixate în soluție de 1% de tetraoxid de osmiu. După deshidratare probele au fost incluzionate în amestec de rășini epoxidice. Secțiunile semifine au fost obținute la microtomul YMTII-3, după care au fost etalate pe sticle microscopice și colorate cu albastru de metilen după *Apparizio* și examinate la microscopul fonic.

În timpul cultivării *in vitro* a anterelor de orz de pe mediul de inițiere, majoritatea nu au prezentat nici o reacție, microsporiile arătând vacuolizarea celulei vegetative, în curs de dezvoltare chiar degenerarea (Andronic L. et. al., 2015). Numai un număr foarte mic de antere au trecut calea androgenetică, adică au format structuri embriogene, ulterior regeneranți.

În urma evaluării structurii anterelor fără răspuns se atestă microspori sterili, situați compact lângă peretele anterei. Endoteciul fiind reprezentat prin 2 rânduri de celule bine diferențiate. Majoritatea microsporilor erau degradați, fiind atestată chiar și distrucția sacilor polinici.

În baza aspectului histologic al structurilor embriogene se constată acumulări de amidon și compuși fenolici în interiorul celulelor. Structurile embriogene se caracterizează prin zona compactă și zona spongiosă în care celulele își pierd adezivitatea. În zona compactă celulele se caracterizează prin activitate metabolică intensă, ceea ce ulterior au condus la formarea de regeneranți.

Se cunoaște, că o condiție importantă pentru expresia potenței calusogene reprezintă rezerva de materii nutritive, sub formă de granule de amidon, care servesc ca sursă de energie pentru necesitățile metabolice la etapa incipientă, până la implicarea glucidelor elaborate în procesul fotosintezei.

Un rol important în stabilirea reacțiilor de răspuns la stres este atribuit compușilor fenolici, acumularea cărora este o expresie a adaptabilității la condițiile defensive. Compușilor de natură fenolică este atribuit rolul de protecție.

În concluzie, capacitatea androgenetică este legată de acumularea de stocuri a substanțelor și compușilor fenolici.

HIGH DENSITY PLANTATION-AN IDEAL GROPHYTOCENOSIS FOR DWARF APPLE TREES

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More and more countries have already changed or are found on the way to shift to set up superintensive types of industrial orchards made up of trees of modern varieties, 92% of which are grafted on rootstock of small vigor M9, system of cultivating is in solitar raws and planting schemes 3,5-3,0-2,5x1,0-0,8-0,7-0,3m, tree canopies are maintained as continuous and dense hedgerows with spatial arrangement of vegetative macrostructure predominantly vertical (constituted of spindly types of canopies with central leader, Superspindle), rarely in two-dimensional oblique plane (flattened Palmette training system).

In Republic of Moldova share of high density plantations doesn't come up to 20-25% as soon as they imply much more investments as compared to regularly ones. In spite of this fact, the advantages from dense planting schemes are evidence of that they create an ideal *agrophytocoenosis* to grow dwarf apple trees. That's why, established in 2007, early spring, at homestead "MIPaciu", village Brăviceni, region Orhei with modern pome fruit trees range represented by Golden Delicious 75% and Idared 25% grafted on M9 and trained by Superspindle system experimental plantation with advanced technologies (drip irrigation) was studied (2012-2014) under conditions of our country from point of view of influences: a) different planting schemes: 4,0x1,5m (sample trees, according to the Existent Recommendations, 1985) and 3,0x1,0-0,66-0,33m pursuant to successful global practices and b) efficiency of canopy maintenance modes via pruning in various periods of year plus secondary techniques (disruption, testing gel FAGÉL), treatment after blossom with bioregulator Regalis®10WG at a dose of 1,25+1,25 kg/ha; 2,5 kg/ha; 3,2 kg/ha.

Planting scheme	Height		Quantity flowers		Quantity shoots		Summed shoots		L med shoots		Leaf area m ² *10 ³ /ha		Harvest kg/ tree		Global harvest	
	m	%	buc	%	buc	%	m	%	cm	%	m ²	%	kg	%	t/ha	%
4,0x1,5m	2,83	100	808	100	133	100	34,2	100	25,9	100	12,3	100	14	100	23,7	100
3,0x1,0m	2,87	+1,4	914	+13	131	-1,5	26,7	-22	20,0	-23	11,7	-4,9	8,4	-40	27,7	+17
3,0x0,6m	2,92	+3,2	585	-28	92	-31	17,7	-48	18,8	-28	14,5	+18	7,8	-45	39,0	+65
3,0x0,3m	2,98	+5,3	423	-48	64	-52	11,2	-67	17,5	-33	18,3	+49	5,6	-60	54,6	+131

Effect of density: along with minimization of nutritive space, trees show restraint in annual growth, decrease in volume, leaf area, quantity of flowers and production per tree; yet, we register increase in height of trees, volume, leaf area and global harvest per hectare.

Effect from tree pruning and conducting operations was estimated by maintenance of equilibrium between growth and fruiting, harvest without biennial bearing and yield of standard production. From 34 experimental variants we can recommend for implementation: 1) winter pruning with 1/3 superior disruption + FAGÉL for schemes 3,0x0,33m- 74t/ha; 3,0x0,66m- 49t/ha; 3,0x1,0m- 32t/ha; 2) pruning after harvesting for schemes 3,0x0,33m- 59t/ha; 3,0x1,0m- 35t/ha. Some toilsome variants requiring thinning: 3) annual treatment with Regalis® 10WG at a dose of 2,5 kg/ha for scheme 3,0x0,33m, 50t/ha; 4) Solaxe training system gives circa 49t/ha for 3,0x0,33m, 2-5t/ha more than Superspindle.

INHERITANCE OF SELECTION VALUABLE CHARACTERISTICS BY HIBRIDS F₁ OF TOMATOES

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The presented information in this research is the result of study of hybrids F₁: L111xMaKrista, L8xL11069, L1185xMaKrista, L111xL1185, L111xFakel and L111xMilOranj, obtained through the method of hybridization between the lines with mutated genes (sp⁺, ssp, dd, nor, rin j-2, ls) and high-productive varieties MaKrista, MilOranj and Fakel. The nature of inheritance was studied for some selection features of high value in F₁, in dependence from applied parental forms (P₁ и P₂). It was discovered that the feature "the duration of vegetation period" of hybrids F₁, obtained by used genes «rin and nor» mainly inherited intermediately with deviation towards positive or negative dominance in dependence from combination of hybridization. Combinations - L111xMaKrista and L8xL11069, heterozygotus by the gene «nor» showed mostly negative dominance (hp -0,62....-0,87) and respectively heterosis (11,0%....31,6%). In combinations F₁ - L111xMilOranj, L111xFakel, the positive dominance was observed (hp 0,33....0,46), but the duration of vegetation period was at the level of mutant-less forms. The shortest period of vegetation (99 and 107 days) was observed in combinations L1185x MaKrista and L111xL1185, obtained by crossing contrasting forms "ultra early-maturing x middle-maturing with gene «nor», which retards the maturation" with positive dominance (hp 0,96 0,63) early-maturing parent. F₁ hybrid of combinations L8xL11069, which is the carrier of the two genes of keeping quality "nor" and "rin", showed the greatest duration of the vegetation period (124 days). Probably, the two different genes of keeping quality in the heterozygote slow down the maturation of fruits.

Positive super-dominance (hp 1,2...3,7) and high heterosis (51.6%...83.0%) was detected in all investigated F₁ hybrids by plant height.

The analysis of inheritance character of feature "productivity" has shown, that in combinations L111xFakel, L111xMaKrista, L1185xMaKrista, L111xMilOranj the positive super-dominance was obtained (hp 1,7....6,4). In first 2 hybrids (L111xFakel and L1185xMaKrista) the increased productivity was achieved due to increased number of fruits on the plant, and in combinations (L111xMilOranj and L111xMaKrista) due to increased average weight of the fruit. In these combinations there was observed the dominance in the marketability of fruits (hp 0,9...1,3). Intermediate inheritance (hp 0,4....0,28) was discovered in combinations L111xL1185 and L8xL11069, but there was a negative dominance in the marketability of fruits (hp -0,16....-0,28).

Pericarp thickness is a feature, which affects the marketability of the fruit. Its value in the hybrids F₁, ranged between 0.30...0.70sm. The highest rates were observed in combinations of hybrids - L111xMaKrista and L8xL11069. Probably forms with genes "nor" and "rin" used in these hybrid combinations determine such high rates. Inheritance of this feature in the three hybrids was happening through positive super-dominance (hp 1,1....1,7).

The results of the study of the nature of inheritance of some selection features of high value in hybrids F₁, obtained by applying lines with mutant genes, are very valuable for further genetic and selection research.

HETEROSIS MANIFESTATION IN SOME BREEDING AND VALUABLE TRAITS OF TOMATO F₁ HYBRIDS

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The phenomenon of heterosis is usually considered as the increase in an average characteristic index of hybrids over that of the parental forms (Brubaker, 1966). Twenty two tomato hybrid combinations have been studied in this work to assess the heterotic effect. Heterosis has been found to most frequently display in plant growth. The hybrid plants were more vigorous and healthy in 77,1% of combinations. During the two years of research (2014-2015), heterosis for plant growth was recorded in 72,6% of F₁ hybrid combinations on the 57th day of growth in the field conditions.

A high heterotic effect has been found for total and marketable crop yields. For total yields, 61,9% of hybrids displayed a high heterosis (52,6%-91,1%). The best results (83,6%-91,1%) were achieved by the hybrid combinations L111 x MaKrista, L1185 x MaKrista, L111x L1185, L111 x MilOranj, and MaKrista x Fakel. Heterosis was observed in 68,3% of F₁ hybrids for marketable yields. In the combinations studied, heterosis frequently displayed for the fruit number per plant (71,1%), and less frequently (28,9%) for fruit average weight. This corroborates with the findings of other researchers (G.A.Saakyan, S.I.Ignatova, and S.F.Gavrish), who consider that the increased fruit setting capacity is the most important index for F₁ hybrids that should be taken into account in yielding capacity breeding programs.

Hybridization of forms with different quality traits revealed different response to seed set. The findings of the two-year studies (2014-2015) showed that in 21,2% of F₁ hybrid combinations, the seed number was higher than that in the both parents. The seed weight in less than a half (39,4%) of the F₁ hybrids studied in the year of crossing was lower than that of the original parental forms. Simultaneously, 30,4% of the hybrid combinations exceeded the values for the fruit seed number and the weight of 1000 seeds of the original parents. The high heterotic effect (64,7%-81,5%) for seed productivity in some F₁ hybrids proves that a mutual stimulation of the fecundation and seed set processes occurred in these combinations. The enhanced seed number in fruits is a very valuable economic trait as the cost price of heterotic seeds decreases significantly with the increase in the seed number per pollination.

Along with the traits studied, we have evaluated F₁ hybrids (22) for the resistance to stressful abiotic factors, particularly to heat and drought at the stage of mature male gametophyte. A high resistance to heat (63,7%-85,1%) and drought (56,3% - 60,5%) has been revealed in the hybrid combinations, the parents of which have similar average values of the traits. They develop a more resistant pollen to the above stress factors than their original parental forms.

The studies on the tomato F₁ hybrids in the two different years have resulted in identification of combinations (L111 x MaKrista, L8 x L11069, L1185 x MaKrista, L28 x L111, L111 x L1185, L111 x MilOranj, and L111 x Fakel) that display a high heterotic effect for a complex of the selective and valuable traits studied.

INDUCED MUTAGENESIS IN SOYBEAN (*Glycine max* (L.) Merr.)

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Food resources of the modern world are strained due to the increasing population. On this, several methods have been tried by scientists to augment food production. Apart from the quantity of food, quality is also a critical issue to maintain nutritive values with increased potential for yield. Seeds are an important part of the plant due to their role in reproduction and storing food reserves in the embryonic cotyledons. Legume seeds are major resources of human food and animal feed with their unique nutrient compositions including oil, protein, carbohydrates, and other beneficial nutrients, and also provides biological nitrogen fixation by forming a symbiotic relationship with rhizobia (Gepts et al., 2005). Soybeans are unique in legumes with a seed content of about 40% protein and 21% oil on a dry matter basis. It is the most widely grown oil seed crop in the world and represented 56% of the world's vegetable oil seed production in 2013. The animal feed industry uses about 70% of soybean meal due to it being high in protein with a good amino acid balance. Soybean meal provides more energy than any other plant protein source (Cromwell, 2012). At present, improvement of major food crops in the world rests majorly on mutation. This comes either naturally or through irradiation. So crops with restriction in genetic variation require mutagenesis or induced mutation to create desirable and heritable variations in them. One of these methods is the gamma-ray-induced mutagenesis. This method was used in our researches performed at Institute of Genetics, Physiology and Plant Protection of the Academy of Science of Moldova, in order to obtain the valuable initial material for soybean. The used biological material was two cultivars (Zodiac and Alina) of soybean, approved in Moldova that was treated with gamma rays doses of 100, 150, 200 and 250 Gy. The result of gamma-ray-induced mutagenesis was the obtaining the M₅-M₉ generations soybean (2015). From these generations were selected mutants that were highlighted with a wide range of variability of agronomic characteristics: precocity (115-125 days), plant height (50,5 to 84,5 cm.), the number of nodes on the main stem (9-17), height of pod insertion, number of pods (72-124), the number of seeds in the pods (104-302), yield per plant, shape, color and weight of 1000- seed. The best effect of the mutagenesis was obtained in the range between 100 and 200 Gy. Mutants obtained have precious traits and will be used for breeding of soybean in R. Moldova. So from the above, it is obvious that the gamma radiation is useful in the induction of genetic variability, that present a large spectrum of mutations and a high frequency of their manifestation

THE HERITABILITY OF SOME QUANTITATIVE CHARACTERS IN TOMATO

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Most characters valuable for tomatoes were quantitative and that was why evaluation of their variability and heredity attracted great attention primarily for development of genetic and improving programmes and successful completion of the improvement process.

The aim of the research was complex evaluation of quantitative characters in new intra-specific hybrid combinations and study of variability and heredity of these characters for effective forecasting of the improvement process.

Six components (P1, P2, F1, F2, BC1, BC2) in 4 hybrid combinations obtained under intraspecific hybridization (Maestro x Irişca, Maestro x Dwarf Moneymaker, Mihaela x Irişca, Mihaela x Dwarf Moneymaker) were used as a starting material for the intended research.

Analysis of the data demonstrated essential differences of genotypes / populations by variability of evaluated characters. A rather sufficient diversity was revealed in plant height depending on both, genotype and climatic conditions, which gave us possibility to choose genotypes for creating new varieties more suitable to carry out mechanized tillage. The average variation coefficients for characters of the plant height and number of branches were 21,0 and 19,5%, which showed that the characters were environmental variables. *The number of fruits per plant and weight of fruits per plant* in analyzed tomato forms were 36,5 and 37,1 which demonstrated the pronounced variability of characters. Variability in the number of fruits per plant was more pronounced in varieties of Dwarf Moneymaker (34,4%), Mihaela (30,1%) while hybrid populations were within 23,6... 47,7%.

Variability of the *fruit weight* was more pronounced in cultivar Irişca (29,9%) and segregating populations F₂ Maestro x Irişca (22,4%), Mihaela x Irişca (22,6%), BC₁ [F₁ (Maestro x Irişca) x Maestro] (26,5%), F₂ (Mihaela x Dwarf Moneymaker). The average variation coefficient of evaluated character was 20,1 indicating that the character was environmentally variable.

Study of the dominance degree of the biological elements and tomato productivity showed that the most of F₁ hybrids manifested intermediary domination and positive supra-domination of the character. Our research showed that in 36 variants (4 hybrids F₁ x 9 characters) hp were positive for 67% of cases. This revealed predominant manifestation of the parents with high character values.

The heritability coefficient of quantitative characters in broad and narrow senses depended largely on parental forms. The highest heritability values were recorded for the number and fruit weight per plant in combinations of Maestro x Irişca and Mihaela x Dwarf Moneymaker. High values of heritability for the pericarp thickness being within the limits of 0,39 to 0,69 demonstrated possibility to obtain forms with high transportability.

As a result of the analysis of the complex of 16 hybrid combinations created on the base of intraspecific hybridization there were obtained genotypes which differed by productivity, shape and size of the fruit and the pericarp thickness that might be used for obtaining new cultivars with valuable traits and high transportability.

ANTIOXIDANT ACTIVITY OF EXTRACTS FROM THE FRUITS OF *TAYBERRY (RUBUS LOGANOBACCUS L.H. BAILEY)*

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Berries, especially members of several families, including *Rosaceae* (strawberry, raspberry, blackberry), belong to the best dietary sources of bioactive compounds (BAC). They have delicious taste and flavor, have economic importance, and because of the antioxidant properties of BAC, they are of great interest also for nutritionists and food technologists due to the opportunity to use BAC as functional foods ingredients. The bioactive compounds in berries contain mainly phenolic compounds (phenolic acids, flavonoids, such as anthocyanins and flavonols, and tannins) and ascorbic acid. These compounds, either individually or combined, are responsible for various health benefits of berries, such as prevention of inflammation disorders, cardiovascular diseases, or protective effects to lower the risk of various cancers.

In this thesis we will present some results of antioxidant activity of extracts from the fruits of *Tayberry (Rubus loganobaccus L.H. Bailey)* which is a cross between a blackberry and a red raspberry. Studies were carried out with the varieties *Tayberry Medana* (which is a variety with thorns) and *Tayberry Buckingham* (a thornless variety).

Analyses were performed in the Laboratory of Ficobiotechnology of the Institute of Microbiology and Biotechnology of the ASM.

Determination of antioxidant activity was carried out by ABTS - radical method (2,2 azinobis 3-ethylbenzotiazoline-6-sulfonic acid) (Re, 1999).

Tab.1. The antioxidant activity, ABTS % of inhibition of extracts from *Tayberry* berries.

Type of extract	Hydric extract			Ethanol extract 50%			Ethanol extract 70%		
Variety	Medana (frozen)	Medana (fresh fruit)	Buckingham (frozen)	Medana (frozen)	Medana (fresh fruit)	Buckingham (frozen)	Medana (frozen)	Medana (fresh fruit)	Buckingham (frozen)
ABTS, % of inhibition	37,33	64,8	26,9	51,5	90,3	40,7	47,4	86,4	33,3

Data analysis determined that extracts obtained from fresh fruits of variety *Tayberry Medana* is far superior to antioxidant activity of extracts obtained from frozen fruits.

The frozen fruits of the variety *Buckingham* contain a smaller amount of antioxidant compounds than the frozen fruits of the *Medana* variety. Thus, the antioxidant activity of the hydric extracts is 28% lower than the ABTS assay values determined for frozen fruit extracts.

By 45% is reduced activity of 50% ethanol extracts, and by 38,5% of the 70% ethanol extracts.

CURRENT ASPECTS AND PROSPECTS IN STONE FRUIT TREES BREEDING FOR REP. OF MOLDOVA

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There are presented main problems, objectives and results of breeding of stone fruit species in the conditions of the republic of Moldova. Main tasks: to perform breeding of fruit trees stone species (european plum *Prunus domestica* L., myrobalan (*Prunus cerasifera* Ehrh. and Japanese plum (*Prunus salicina* L.), peach (*Prunus persica* L.), apricot (*Prunus armeniaca* L.), sour (*Prunus cerasus* L) and sweet cherries (*Prunus avium* L.), ziziphus (*Ziziphus jujube* Mill., introduced from China), etc.) for the variable agroclimatic resources of rep. Moldova; to provide maintenance and sustainable use of fruit trees species for the studies or adaptability and ecologic plasticity of important genotypes within main and specific characters; to perform DUS testing and pomological characterization of new varieties (cultivars) bred in rep. of Moldova. Researches as well as and promotion there are effectuated on the basis of National experimental *in situ* collections of RIHAT, which actually holds more than 1300 varieties and elites, and 9000 hybrids, obtained from different type of hybridization, including diallelic ones. Methodological aspects include: biotechnologies methodologies (*in vitro* embryoculture); reproductive biology (male and female reproductive system, fertilization, compatibility; potential of productivity (flower initiation, development and realization of production - light microscopy investigations); bioregulators of fruit set and factors controlling cropping (in collaborative programs), ripening and quality (biochemical) and main sensorial traits of fruits quality, abilities to storage and transportation) According agronomical, biological and economical parameters were selected 177 promising varieties and selections. Principal long term objectives of stone breeding programs function there are to meet the needs of local land management agencies, state and nursery programs, private land owners and respective businesses for competitive fruit production at national and EU level. Effectuated evaluations show that many of the valorous foreign varieties of all of mentioned stone species are not suitable for the soil-climatic variable conditions of our country. That is why the RIHAT develop breeding programs with the following main objectives: for plums - tolerance and resistance to PPV, early as well as late ripening; for apricot – extra early and early ripening and longer rest period of flower buds, tolerance and resistance to PPV; for peach and nectarine - powdery mildew resistance, extra early and late ripening, for sour and sweet cherry - very early and late ripening, big fruits, self-fertility, moderate vigor and compact tree habits, resistance to *Coccomyces hiemalis* Higg.; for ziziphus-adaptability to variable soil-climatic conditions of our country.

During the last 5 years were created/selected 45 varieties, registered in the State Catalog of Plant Varieties of rep. Moldova for multiplication, including for temporary testing 5 local and introduced from international breeding programs new varieties. For state Tests there are transmitted more than 100 experimentally created in RIHAT new genotypes of stone fruit trees species.

EFICACITATEA INHIBITORULUI DE ETILENA(FITOMAG) ASUPRA CALITATII FRUCTELOR DE PRUN IN PERIOADA DE PASTRARE

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În Republica Moldova prunul reprezintă una din culturile pomicole de bază. Fiind favorizat de condiții de creștere și fructificare pe întreg teritoriul țării, este cultivat în toate zonele pomicole. Prunul a fost cultivat pentru calitatea fructelor utilizate în alimentație în stare proaspătă și ca materie primă pentru industria alimentară, însă durata de păstrare este limitată. Ca urmare, important este desfășurarea unor metode efective, care permit prelungirea termenului de păstrare a fructelor de prun ce corespund cerințelor de calitate.

Ca metodă de studiu „Fitomag” în concentrațiile 0,25g/m³. Etilena este un hormon vegetal, care generează o avalanșă de reacții biochimice ce au drept rezultat înmuirea și coacerea fructului și ca urmare, pierderea calității și a valorii comerciale. Sub protecția preparatului „Fitomag”, efectele negative ale etilenei sunt întârziate. Preparatul „Fitomag” utilizat în concentrațiile indicate, nu este dăunător sănătății și mediului înconjurător.

Experimentele montate în anii 2015-2016, privind determinarea gradului de influență a inhibitorului sintezei etilenei „Fitomag” asupra intensității proceselor de maturare – senescență la fructele de prun, au fost efectuate în condițiile celulelor frigorifice ale bazei experimentale “Carpotron” a Institutului de Genetica, Fiziologie și Protecția Plantelor AȘ. Fructele de prun au fost tratate-fumegate cu inhibitorul sintezei etilenei “Fitomag” în dozele 0,25g/m³ și păstrate la temperatura de +1°C și umiditatea relativă a aerului de 85-90%.

Ca obiect de studiu au servit prunele de soiurile: Stanley și Angelino. Cercetările au demonstrat că soiul tardiv de prune Angelino s-a pastrat calitățile gustative, aspectul comercial și gradul de perisabilitate mult mai ridicat față de soiul Stanley. Pentru ca acest lucru să fie fezabil, este important ca prunele să aibă un grad optim de maturare la momentul recoltării. Durata perioadei de păstrare a fructelor de prun este condiționată de compoziția substanțelor plastice, gradul de maturare și calitatea recoltării lor.

Mărimea indicilor de pierdere în greutatea fructelor de prun în perioada de păstrare a depins atât de calitățile soiului cât și de influența inhibitorului sintezei etilenei. Analizând rezultatele cercetărilor putem face concluzia că la variantele martor s-a evidențiat soiul de prune Angelino. Tratarea fructelor cu “Fitomag” a redus semnificativ scăderea în greutate față de variantele martor. În dinamica perioadei de păstrare au fost cercetați și indicii biochimici – acidul ascorbic și masa uscată. Rezultatele obținute au demonstrat, ca intensitatea biodegradării indicilor biochimici a fost mai lentă pe întreaga perioadă de păstrare la fructele tratate cu “Fitomag” în raport cu fructele martor. Conținutul acidului ascorbic din varianta martor a soiului Stanley și Angelino a fost mai redus, față de fructele din varianta aplicării cu preparatul “Fitomag”. Analizând indicii masei uscate la ambele soiuri de prune s-a demonstrat eficacitatea preparatului “Fitomag”.

În baza cercetărilor facem concluzia, că aplicarea preparatului “Fitomag”, încetinește procesele de maturare, pierderea greutateii și reduce biodegradarea indicilor biochimici

OBTAINING OF INITIAL MATERIAL OF THE WINTER DURUM WHEAT

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Winter durum wheat, grains with a high hardness, content of protein and gluten, has a huge importance in the national economy, as food, providing the much part of carbohydrates and proteins necessary for human beings.

Winter durum wheat improvement in Moldova is a matter of great importance. This enables us to obtain valuable forms as productivity, quality and resistance to biotic and abiotic factors of the environment. In improvement of durum wheat we used for obtaining the new initial material the interspecific and intraspecific hybridization. At the first stage we studied the collection of winter durum wheat and soft one. As a result of this work we have selected the valuable parental forms, which have been used in the past five years for the production of more than 200 hybrid combinations. The percentage of tying for intraspecific hybrids varied within 0 and 80% for interspecific hybrids from 0 to 70,5%. In these years has been studying heterosis of F_1 hybrids. In our investigation we have found that F_1 interspecific hibrids have manifested a marked somatic heterosis as for height of plant, length of ear and number of spiklets. The hybrid vigour of intraspecific hybridisation is more proeminent and it is manifested better reproductive heterosis by the number of grains in ear, their weight per 1000 grains. Individual selection of plants we started with the second generation and we extended it to all stages of improvement. The best forms assessed during the breeding process were studied in the field of selection, control, competition, demonstration and multiplication.

In the last 5 years in the selection field has been studied around 7500 winter durum wheat lines selected from hybrid material. After all tests, we selected 150 forms with short stature, winter drought, disease resistance and high productivity. The best lines were selected by productivity from hybrid combinations Amol x Crupinca, Hordeiforme 9 x Auriu 273, Cristall 2 x Auriu 273 ets. Most selected lines have medium sized (6,5 to 9,2 cm.), with a large number of spiklets (20-26) grains (60-75) large oblong, 1000 grain weight is 42-55g. The productivity of the best lines of selection field per 80-180g., and control of Hordeiforme 335-80g.

The studing of new forms in comparative trials of control and competition allowed us to select some of them, which give a crop much more than the best variety by productivity and resistance to abiotic and biotic factors of the environment. The best forms of control field has exceeded a check variety with 1,0 -1,6t/ha (2016). As a result of the comparative competition tests it was established that only two forms are more productive than the check variety Hordeiforme 335. These two forms have been sown in the field of multiplication. The latest achievement of our breeding program was the creating of new variety Hordeiforme 340. It is more productive with 0,8 t/ha than the variety Hordeiforme 335.

The three-year average yield of Hordeiforme 340 was 4,4 t/ha and potential production on rich soil may be 6 t/ha. The sort belongs to the group of varieties with high resistance to winter, drought and disease and a high percentage of protein and gluten. The obtained forms and varieties are a valuable initial material for improving the winter durum wheat.*Current*

THE ROLE OF PARENTAL FACTOR IN COMMON WHEAT AUTUMN REACTION TO *HELMINTHOSPORIUM AVENAE* CULTURE FILTRATE

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Keywords: *Triticum aestivum* L., F₃ hybrids mutual, *Helminthosporium avenae* culture filtrate, meristem apical, frequency of callose, callus area, and callus biomass.

The preventive evaluation of newly created lines for the use of metabolites or pathogenes spore suspensions is carried out by involving pathogenic strains widespread in related locality. The tissue condition in vitro culture of heterozygous hybrid populations are influenced by the combinative ability of genitors. The explanation of callus characters heredity phenomenon is possible in hybrid populations derived from mutual crosses.

The following characters were investigated: the callus *frequency* (%) of apical meristem of the mature embryo of common winter wheat callus *area* (mm²) and callus *biomass* at six F₃ hybrids derived from the reciprocal crossover of genotypes: BT 16-04, Odeschi 267 and line L 101 in 2014 weather conditions. As a selective factor *in vitro* was used the culture filtrate (CF) *Helminthosporium avenae* (*Drechslera avenae* Eidam.) and further, in Murashige and Scoog (MS) crop environment in concentration of 30% capacity.

In control version the callus *frequency* showed peaks at L 101 line and callus *area* and *biomass* - to the parents BT 16-04. Reciprocal hybrids had intermediate values of the mentioned characters, reduced and also at the level of the respective genitors. In callus *frequency* occurrence was involved maternal determinant L 101, and paternal BT 16-04. Meanwhile, for the callus *area* index succession determined was paternal and maternal role of the genitor Odeschi 267 and for the callus *biomass* - the maternal effect of BT16-04.

Under the action of FC *H. avenae* the callus *frequency* was reduced to genitors BT 16-04 and line L 101, while the callus *area* - to Odeschi 267. On background with callus *biomass* the culture filtrate was only increased. In response to FC *H. avenae* the hybrids of reciprocal combinations showed significantly reduced *frequency* and callus *area* indexes or at the same level as of the witness. The callus *biomass* was intermediary to the genitors, but at the same level or greater than of the witness. In the succession of the callus *area* and *frequency* characters it was determined the paternal impact of genitors Odeschi 267 and L 101, while in efficiently increasing of callus *biomass* index - it was determined the maternal and paternal impact of genotype BT 16-04.

Therefore, in the *in vitro* reaction to FC *H. avenae* was involved in heredity effect of paternal Odeschi 267 character resistance callus *frequency* and paternal effect of the resistant genitor L 101 in manifestation of callus *area* resistance, the phenomenon indicated the participation of genomic allelic relations in increasing of indexes. In callus *biomass* character inheritance at reciprocal hybrids was found the efficient role of genotype BT 16-04: paternal effect - in combination with genitor L 101, and maternal - in combination with Odeschi 267. For callus *biomass* genesis in given combinations on culture filtrate background were involved nuclear allelic relations for paternal efficiency and genomic and cytoplasmic - for maternal efficiency. In reaction to FC *H.*

In reaction to FC *H. avenae* *in vivo* the frequency of parental effects decreases in which paternal effects remaining dominant.

**THE CAROTENOID CONTENT FROM VEGETAL PRODUCTS
CULTIVATED IN SCIENTIFIC CENTER FOR CULTIVATION
MEDICINAL PLANTS USMF „NICOLAE TESTEMIȚANU”**

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IP University of Medicine and Pharmacy „Nicolae Testemițanu”

Carotenoids are yellow, red and orange pigments, synthesized by higher plants, fungi and some bacteria. They play an important role in human organism: regulates metabolic processes and act as antioxidants and photoprotectors at the molecular and cellular level, thus preventing mutagenesis and carcinogenesis. They have anti-inflammatory, immunomodulatory and gastroprotective effects.

In this study we purpose to perform the qualitative and quantitative determination of carotenoids in plant products collected in Scientific Center for Cultivation of Medicinal Plants USMF „Nicolae Testemițanu”.

Vegetal products – flowers, were taken from species *Tagetes patula*, *Tagetes erecta*, *Calendula officinalis* L. local population, *Calendula officinalis* L. variety Diana, *Calendula officinalis* L. variety Natali during July-August, the fruits were taken from *Hippophae rhamnoides* L., *Rosa canina* L. and *Viburnum opulus* L. in October - November .

Qualitative analysis was performed by thin-layer chromatography (TLC). It was identified β - carotene in hexane- ethyl acetate 50:50: *T. patula* (Rf = 0,903), *T. erecta* (Rf = 0,911), *C. officinalis* L. local population (Rf = 0,896), *C. officinalis* variety Diana L. variety (Rf = 0,888), *C. officinalis* L. variety Natali (Rf = 0,881), *H. rhamnoides* L. (Rf = 0,896) in extracts, from fruits of *R. canina* L. and *V. opulus* L. at the same level of Rf = 0,90, β -carotene was not observed.

The quantitative determination of carotenoids, equivalent to β -carotene, was performed by the spectrophotometric method. Carotenoid content, in descending order, are following in *T. patula* (75,34 mg %), *T. erecta* (21,97 mg %), *C. officinalis* L. variety Natali (13,09 mg %), *Calendula officinalis* L. variety Diana (12,39 mg%), *Calendula officinalis* L. local population (10,99 mg%), and *Hippophae rhamnoides* L. fruit (0,373 mg%). The fruits of *Rosa canina* and *Viburnum opulus* were not dosed because the presence of β -carotene has not been proven quality.

The amount of carotenoids varies in dry extract too. In dry extracts obtained from *T. patula* flowers is 137,87 mg%. But in samples obtained from marigold flowers carotenoid content of dry extract varies as follows: *Calendula officinalis* L. variety Natali (39,98 mg%), *Calendula officinalis* L. variety Diana (34,05 mg %), *Calendula officinalis* L. local population (27,38 mg %).

Qualitative and quantitative analysis of extractive products showed variety of carotenoid content in plant products. It was certified the difference between species and between varieties. This study reveals an opportunity phytochemical research *Tagetes* varieties that can serve as sources for the pharmaceutical industry with high content of carotenoid.

ANTIFUNGAL POTENTIAL OF MICROMYCETES OF NCNM

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Increasing plant productivity and harvest quality improvement in agriculture is one of the main tasks of biological and agricultural sciences. An important role in achieving this problem lies with microorganisms - producers of bioactive substances.

Combat crop pests is achieved by several methods: chemicals (with the use of pesticides), biological (using antagonistic microorganisms and natural), genetic (by improving the resistance of plants to pests), agro (by soil treatment) and physical-mechanical (seed disinfection, etc.). The use of bio product based on microorganisms (fungicides, herbicides, insecticides) is intended for different purposes in agriculture: growth stimulation and development of plants, and treatment of affected plants profiling of various pathogens, etc.

Biological method of pest control is very current for crop due ecologically pure products obtained, which are healthier as those raised on chemical base.

The purpose of the investigations was to select strains of fungi with antifungal properties against some phytopathogens of agricultural plants.

As a result of screening performed in 40 strains of *Penicillium* against 10 phytopathogens: *Aspergillus niger*; *Alternaria alternata*; *Botrytis cinerea*; *Sclerotinia sclerotiorum*; *Stemphylium botryosum*; *Rhizoctonia solani*; *Penicillium expansum*; *Fusarium solani*; *Fusarium oxysporum*; *Fusarium gibbosum*, was shown that in all strains tested, 18 of them did not show any antifungal activity against phytopathogens agents used in the study. 7 *Penicillium* showed antagonism against 1 phytopathogen, 5 against 2 phytopathogenic strains, and 4 against 3 phytopathogens. Active against a broad spectrum of phytopathogens occurred less *Penicillium* strains. So far only two strains showed antifungal activity against 4 and 9 phytopathogens, and 3 strains showed antagonism against 6 phytopathogens.

The level of activity was shown to be strains of *Penicillium* sp. 32 and *Penicillium* sp. 62, declaring their antifungal activity against 9 of the total 10 phytopathogens. Strain *Penicillium* sp. 32 not only exhibit antagonism against *Alternaria alternata* and *Penicillium* sp. 62 to *Stemphylium botryosum*. Both strains of *Penicillium* retain the increase of phytopathogens agents mentioned. Most antifungal bio products are phytostimulators, therefore were tested exometabolites of strain *Penicillium* sp. 62 on the seeds of wheat infected with *F. oxysporum* and cultivated in the laboratory. It has been found that the effectiveness of fungal exometabolites of *Penicillium* sp. 62 at low concentrations (1: 100) is quite obvious, decrease action of *F. oxysporum* 4 times and significantly enhancing root system and growth of seedlings. According to the results we conclude that *Penicillium* sp. 32 and *Penicillium* sp. 62, can be used as potential producers of antifungal and phyto stimulator bio products for agriculture.

PROMISING PROSPECTS IN THE STUDY OF SUNFLOWER - DOWNY MILDEW INTERACTION

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In 2014, according to the national Bureau of Statistics, in Republic of Moldova were present 319 thousands hectares of sunflower which led to a gross harvest of 407536 quintals. Almost the same area was dedicated to the cultivation of wheat. This evidence places the sunflower (*Helianthus annuus L.*) among the most important crops. Together with the climate and soil conditions, the presence of plant diseases can greatly influence the amount of produced harvest.

Sunflower downy mildew represents an economically important disease, reducing the crop yield in all sunflower growing areas not only in Moldova but worldwide. Downy mildew has been observed in European sunflower crops since 1960. The disease with typical symptoms, including damping off, dwarfing or retardation of flowering in systemically infected plants or local chlorotic spots on plants with secondary infection, is caused by the biotrophic oomycete *Plasmopara halstedii*. A better characterization of *P. halstedii* infection and dissemination mechanisms, and the identification of molecular basis of the interaction with sunflower, is a prerequisite to efficiently fight this pathogen. Furthermore, preventive control of the contamination can be achieved using seeds of sunflower hybrids resistant to the known races of pathogen.

Previous genetic studies indicated that the resistance of sunflower to *P. halstedii* is conferred by major resistance genes denoted *Pl*. The aim of this research is to analyse the genetic pool of sunflower species cultivated in Republic of Moldova and select the samples which contain relevant *Pl* genes. These are more resistant toward the infection thus, of greater interests for farmers. A deeper understanding of the sunflower system which controls the resistance to *P. halstedii* attack can be achieved through laboratory and bioinformatic tools. These will be used for the identification, characterisation and expression analysis of the genes involved in the plant pathogen interaction.

On the one hand, the employment of modern biology technique as Polymerase Chain Reaction will generate precise and accurate data that will help to underlay the molecular properties of selected genes. On the other hand, bioinformatics will be used to analyse the genetic pool and associate the sunflower genes with their representatives in other plants, including model plants such as *Arabidopsis thaliana*. The comparison between the nucleotide sequence, functional domains and the pathways of evolution of these genes among several organisms has the goal to create a computer modelling for sunflower downy mildew resistance system and predict its behaviour.

INVESTIGATION OF ATTACHMENT FORMATION IN SUNFLOWER-BROOMRAPE PATHOSYSTEM

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The ability to develop invasive haustorium is specific for parasitic angiosperms. The development of haustorium by many species from *Orobanchaceae* family is influenced by different physical and chemical factors. Only a combination of mechanical and enzymatic mechanism allows the penetration of the parasite in the host cell.

Embryological research conducted on the species of the genus *Orobanche* revealed that only seeds which are near to the host plant roots will germinate. Thereby, the seeds of *O. cumana* can induce the parasitism. As a result of this process the *haustorial primordium* is formed. It attaches to the root of sunflower using adhesive organic substances, secreted by cells of the germinal tube. Tissue penetration is achieved by enzymatic action, resulting in separation of the host cells and replacement of them with pathogen cells.

Research purpose was to study the mechanism of attachment formation and development of the connection between host and pathogen.

Artificial infection of the host was carried out in Petri dishes on the substrate of perlite which allow effective monitoring of the development process of the pathosystem. Cultivation strategy included the following steps: sunflower seeds germination, transfer of sunflower seedlings in root chambers and artificial infection with broomrape seeds.

Sunflower seeds were germinated and were grown on wet filter paper for 1-2 days until radicle emerges. Sunflower seedlings were transferred in root chambers with perlite for 3-4 days. *Orobanche cumana* seeds were added in root chambers and attachment have been observed after 7 days.

The attachment and penetration process was observed at microscope (XSZ-206T, Ningbo Wason Optical Instrument Co., Ltd.) equipped with CCD camera (MEM1300, Future Optics Sci. & Tech. Co., Ltd) connected to the computer.

Analysis of observed phenomenon along stages of infection revealed the processes of *Orobanche* seed germination. During germination broomrape seeds undergo a series of morphological changes: apical polarized grow of the germinating filament towards the host root, initiation of appressorium attachment, penetration of root cortex and ultimately proliferation of broomrape tissue and formation of the haustorium.

Broomrape seed germination is triggered by chemical signals released by host roots forcing appressorium development. Subsequently, appressorium is attached to the host plant root and penetrate the root cortex due to mechanical and enzyme action essential in the host cell wall degradation. Appressorium apex cells have a large number of vesicles that contain substances involved in penetration in host tissue. Enzyme activity consists in modifying the physical and chemical properties of the middle lamella and primary cell wall upstream the cells of parasite. Also, microscopic analysis highlighted that host tissues are not destroyed during pathogen penetration and grow.

EVALUAREA ACTIVITĂȚII BIOLOGICE A GLICOZIDELOR LA DIFERITE SOIURI DE TOMATE

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Sporirea productivității tomatelor, una din cele mai populare și prețioase legume după calitățile nutritive și dietetice, prezintă o importanță deosebită pentru țara noastră. Una din soluțiile acestei probleme constă în sporirea energiei și facultății germinative a semințelor de tomate în etapele inițiale ale ontogenezei, prin aplicarea substanțelor biologice active de natură glicozidică. O energie germinativă mare, în condiții de producere, asigură încolțirea simultană a semințelor, uniformitatea în creșterea și dezvoltarea plantelor, ce favorizează, în cele din urmă, sporirea productivității și îmbunătățirea calităților comerciale a producției de tomate.

În acest studiu a fost cercetată influența noilor glicozide (melampirozide) obținute din specia sor-cu-frate (*Melampyrum nemorosum* L.) asupra creșterii și dezvoltării plantelor de tomate, dar și specificitatea acestora în dependență de soiuri cu diferite grade de maturitate. În calitate de obiect de studiu au servit semințele diferitor soiuri de tomate *Garmonia*, *Balada* și *Laguna*. În scopul stabilirii concentrațiilor optime ale substanțelor utilizate, dar și durata de tratare a semințelor, testarea preliminară a fost efectuată în condiții de laborator. În experiență semințele de tomate au fost tratate timp de 24 ore cu soluțiile apoase ale sumei melampirozidice în concentrații de 0,0001%, 0,001%, 0,005% și 0,01%. În calitate de martor au servit semințele tratate cu apă distilată. Fiecare variantă a fost expusă în 4 repetiții (câte 100 de semințe fiecare).

În rezultatul cercetărilor sa stabilit că glicozidele studiate manifestă acțiune stimulatorie asupra energiei germinative, dar și asupra facultății germinative a semințelor de tomate. Un efect stimulator mai sporit a energiei și facultății germinative a fost obținut la tratarea semințelor de tomate soiul *Balada*, cu soluția melampirozidică de 0,001%. Valorile acestor indici în variantele date au constituit 91,5% și respectiv 95,8%, cu 7,6% mai mult față de martor. În celelalte variante a fost stabilită o acțiune inhibitoare semnificativă a acestor procese.

În urma analizei acțiunii melampirozidelor asupra energiei și facultății germinative, s-au mai evidențiat variantele la care pentru tratare au fost utilizate semințele de tomate soiului semitimpuriu *Laguna*. În acest caz, toate concentrațiile soluțiilor melampirozidice manifestă un efect pozitiv în comparație cu martorul, în afară de concentrația de 0,0001%, la care a fost observată o acțiune inhibitoare nesemnificativă a energiei germinative.

Datele obținute, demonstrează că melampirozidele în mod diferențiat posedă acțiune stimulatorie asupra energiei și facultății germinative a semințelor de tomate, manifestând specificitate față de soi, efectul maxim fiind observat la soiul semitimpuriu *Laguna*. Din aceste considerente, pentru utilizarea melampirozidelor în tehnologia de cultivare a tomatelor, este necesară testarea preliminară a acestora în condiții de laborator.

**ACȚIUNEA SUBSTANȚEI BIOLOGIC ACTIVE REGLALG ASUPRA
PROCESULUI DE RESTABILIRE A ACTIVITĂȚII FOTOSISTEMULUI
II LA FRUNZELE DE *Buxus sempervirens* L. DUPĂ DISECARE.**

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Cunoașterea proceselor de adaptare a plantelor în condițiile de secetă este una din problemele primordiale. În legătură cu aceasta, noi am cercetat procesele de normalizare a stării fiziologice a frunzelor de cimișir după desecarea lor artificială. Inițial umiditatea frunzelor a diminuat de la 16% până la 8%, ceea ce s-a soldat cu diminuarea cuantumului efectiv a activității FS II de la 0,500 – 0,600 până la 0,150 – 0,200 unități convenționale. Restabilirea umidității frunzelor a fost realizată în termostat pe hârtie de filtru umectată cu apă (martor) sau cu a preparatului Reglalg diluat cu apă în raportul 1/200, 1/1000, 1/2000 pe parcursul a 2, 4, 6, 8, 16, 24 și 240 ore de expoziție (variante experimentale). În toată perioada de restabilire a umidității temperatura în termostat era de 22-24°C, umiditatea relativă a aerului 95 – 97%, iluminarea cu tuburi luminescente (RFA 50 – 55 $\mu\text{M m}^{-2} \text{cek}^{-1}$) cu fotoperioada de 16 ore lumină și 8 ore întuneric. Restabilirea stării fiziologice a fost realizată în baza determinării activității FS II, efectuată nemijlocit după menținerea frunzelor în concentrațiile de Reglalg și apoi după 24, 75, 120 și 240 ore.

Cercetările au demonstrat că menținerea permanentă a frunzelor în prezența concentrațiilor mari ale preparatului Reglalg (1/200) duce la micșorarea activității FS II iar în prezența celor mici și medii - asigură stimularea activității FS II în comparație cu cea la frunzele martor. Incubarea de scurtă durată (până la 24 ore) a frunzelor în prezența preparatului Reglalg, stimulează viteza de restabilire a activității FS II cu atât mai rapid, cu cât concentrația Reglalgului era mai înaltă. Aceasta demonstrează că efectul de restabilire a frunzelor de cimișir după disecare este o urmare a concurenței dintre procesele de restabilire și cele de amplificare a deteriorărilor. Sporirea vitezei de restabilire a activității FS II sub acțiune incubării de scurtă durată a frunzelor în prezența Reglalgului demonstrează că preparatul favorizează procesele de restabilire a deteriorărilor. Inhibarea restabilirii activității FSII în varianta de incubare îndelungată în prezența Reglalgului în concentrației mari demonstrează că în această variantă se deplasează însăși echilibrul homeostatic din frunzele de cimișir în direcție nefavorabilă (cu vigoare scăzută).

ISTORIA CERCETĂRII AMELIORĂRII FLORII SOARELUI ÎN REPUBLICA MOLDOVA

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Procesul de ameliorare a florei-soarelui în RM are aceeași istorie și tradiție ca și la nivel internațional și include două etape importante: crearea soiurilor și crearea hibrizilor.

Istoria cercetării datează de la începutul secolului XVIII, floarea-soarelui în special, fiind utilizată pentru extragerea uleiului. Mai apoi, extinderea suprafețelor de floarea-soarelui și creșterea cererii de produse oleaginoase, au dictat necesitatea intensificării cercetărilor în acest domeniu. Primele cercetări privind ameliorarea (începând cu anii 1945), au fost făcute la Stațiunea Experimentală de ameliorare și genetică a culturilor de câmp, de la Costiujeni. Acest centru științific sub conducerea lui A. Kovarski, zeci de ani la rând, s-a axat pe cercetări de mare valoare în domeniul geneticii, ameliorării și producerii semințelor.

În prima etapă a programului de ameliorare a florei-soarelui (1959-1965), strategia cercetărilor a fost axată totdeauna pe obținerea unor soiuri cu un conținut înalt de ulei, mai rezistente la factorii biotici și abiotici. Deci, lucrările au fost orientate în direcția creării soiurilor cu o productivitate mare și sporirea uleiului în semințe până la 50%. Pentru extragerea de ulei, se utilizează 5 varietăți de floarea-soarelui, înscrise în *Catalogul soiurilor de plante al Republicii Moldova pentru cultivare în agricultură*: (Ariadna (EST 42X), LG5474HO (LH257/07), Moogli CL HO, Tutti (NX73008)HO și NK Ferti (NX 33896)).

Începând cu anul 1976, accentul în ceea ce privește ameliorarea florei-soarelui, a fost pus pe dezvoltarea hibrizilor cu creștere viguroasă prin manifestarea efectului de heterozis. Ameliorarea prin heterozis constituie o nouă etapă importantă în cercetarea florei-soarelui.

Ținând seama de importanța florei-soarelui pentru economia RM, pe parcursul mai multor ani au fost întreprinse cercetări profunde avînd drept scop selecția și ameliorarea acestei culturi. Începând cu anii 1980, procesul de ameliorare s-a concentrat la Institutul de cercetări în domeniul culturilor de câmp „Selecția” din orașul Bălți, strategia fiind bazată pe crearea hibrizilor înalt productivi, fiind mai tehnologici. Au fost elaborate metode de obținere a semințelor hibride sută la sută. Folosind metoda *pedigree*, în selecție a fost obținut un număr mare de linii consangvinizate, fiind ulterior utilizate în combinații hibride și de valorificare a fenomenului de heterozis [9]. Prin utilizarea metodei consangvinizării și heterozisului s-a urmărit sporirea producției de semințe la hibridii simpli și trilineali, astfel încât să se realizeze un salt considerabil al producției de ulei la unitatea de suprafață [3; 7]. În rezultat, au fost selectate 5 genotipuri de floarea-soarelui cu un grad înalt de autofertilitate, care servesc drept bază de material inițial [2; 6; 11] pentru crearea noilor hibrizi productivi de floarea-soarelui [4; 10]. Echipa de cercetători, antrenați în acest proces, a stabilit variabilitatea manifestării fenotipice a androsterilității în cadrul diferitor surse de ASC în condițiile Moldovei și valoarea ameliorativă a ASCp, ca cel mai stabil tip de androsterilitate. Totodată au fost selectate și 24 de linii restauratoare de fertilitate homozigote după gena Rf, cu o productivitate

înalță în condiții variabile de mediu. Pentru aceasta a fost utilizată metoda de sterilitate citoplasmatică masculină sau CMS (*cytoplasmic male sterility*). *Androsterilitatea citoplasmatică* constă în avortarea polenului, dar cu menținerea fertilității și dezvoltării vegetative normale a plantelor femele. În urma folosirii aproape exclusive a acestei surse CMS pentru obținerea de semințe, toți hibrizii din cultură sunt înrudiți după multiple trăsături. Eforturile în domeniul ameliorării vizează mai ales lărgirea variabilității genetice a hibrizilor de floarea-soarelui, prin dezvoltarea de noi surse ce au la bază CMS [8].

Aici ținem să menționăm, că efectul heterozisului la floarea-soarelui era bine cunoscut mai de mult. Însă descoperirea androsterilității citoplasmatică, inclusiv a genelor restauratoare, a impulsionat fondarea unei direcții noi de ameliorare a florii-soarelui. Anume aceste circumstanțe au contribuit la crearea hibrizilor comerciali și introducerea lor în producere [1; 5].

O direcție nouă în ameliorarea florii-soarelui a fost obținerea de hibrizi cu conținut ridicat de acid oleic, procentul de acizi grași saturați mai mare de 90% din totalul acizilor grași din sămânță. Existența unei variabilități genetice în germoplasma de floarea-soarelui cultivată a făcut posibilă dezvoltarea hibrizilor cu grad ridicat de autofertilitate cu un potențial de producție de semințe de peste 5,5 t/ha, precum și cu bună rezistență la boli și la parazitul *Orobanche cumana* [6].

Din 1990 au fost create și instituții private ca: Magroselect, Agroselect, Novasem care continuă să se ocupe și azi cu ameliorarea, seminologia și producerea semințelor de elită de floarea-soarelui.

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CURRENT ASPECTS AND PROSPECTS IN BIOMEDICINE

LIFE SCIENCES IN THE DIALOGUE OF
GENERATIONS:
*CONNECTIONS BETWEEN UNIVERSITIES,
ACADEMIA AND BUSINESS COMMUNITY*

THE CONSOLIDATION OF SENSORIMOTOR INTEGRATION BY APPLICATION OF TACTILE SOMATOSENSORY STIMULATION

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Somatosensory monitoring system ensures defense and protection of living organism. Ascending sensory input to higher brain centers is strongly specialized. Light tactile stimulation activates Meissner corpuscles and induces impulses neurotransmission via medial lemniscus pathway informing about comfort and safety. On the other hand, hard deep tactile stimulation activates Pacini, Ruffini corpuscles, Merkel cells and initiates a flow of impulses through spinothalamic tract conditioning alarm and defense threat. The consolidation of sensorimotor interactions is realized due to an induction of neuroplasticity in the somatosensory cerebral cortex. This neuroplastic remodeling includes the increase of dendrite arborization and number of spines on the dendrite surface, the induction of gene expression and biosynthesis of proteins which form ion channel subunits and receptors. These modifications provide essential sensitivity and reactivity enhancement of sensory processing centers on the base of long-term synaptic potentiation. It is very important that adaptive remodeling of primary somatosensory cortex (S1) is associated with modulation of firing activity of primary motor cortex (M1) neurons. The aim of this study is to approve tactile somatosensory stimulation effect on sensorimotor integration characteristics. The investigation was carried out in voluntary healthy male subjects (19-25 years old, n=15) by the combination of sensory and motor testing with electroencephalography (EEG) recordings. EEG recordings were effectuated before (baseline) and after (experimental) the course (15 days) in tactile somatosensory stimulation. This course involved non-invasive gentle manual pressure to reflexogenic zones on feet, hands and ears in accordance with reflexology and somatotopic charts. We realized qualitative and quantitative estimations of reflectory activity by the sensory and motor testing. The sensory testing applied to determination of sensitivity to light and sharp slightly painful touch, 2-point discrimination, vibration, and proprioceptive sensation. The motor reflex testing included the assuming of muscle tone, movement coordination and balance maintenance standing on different surfaces, expression of motor reflexes. Spectral and cross-correlation analysis of EEG recordings was performed by means of Spike-2 software (*Cambridge Electronic Design, UK*). Brain mapping was effectuated in correspondence of Brodmann cytoarchitecture with our electrodes placement (primary somatosensory cortex: areas 1, 2, 3 – CP1, CP2, CP3, CP4; primary motor cortex: area 4 – C3 and C4). Statistical analysis was realized by use of ANOVA method with Student's t-criterion utilization. Obtained data manifest that higher sensitivity in different part of body is statistically significant for vibration and sharp slightly painful stimuli (9,1-9,4 points, $P<0,05$). The course of tactile stimulation leads to the elevation of sensitivity to light touch and pressure up to 18,7% ($P<0,05$) in upper and lower members. An amelioration of plantar, ulnar, and patellar (knee-jerk) reflexes was observed after reflexogenic tactile stimulations. The EEG spectral analysis manifests a decrease in the alpha rhythm spectral power (up to 43,5%, $P<0,05$) in primary motor area in comparison with baseline recordings. This decrease of alpha spectral power is realized on the background of beta₂ band spectral power increase (up to 38,6%) and theta band by (21,6%, $P<0,05$). High level of correlation ($r=0,788$, $P<0,05$) for beta band was revealed between somatosensory and motor areas as well as between delta and theta bands ($r=0,834$, $P<0,05$). Thus, our findings suggest that the tactile somatosensory stimulation has a beneficial effect on sensory and motor reflexes in association with bioelectrical activity changes in somatosensory and motor neocortical areas.

MANAGEMENT OF CATHETER-ASSOCIATED URINARY TRACT INFECTIONS

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Catheter-associated urinary tract infections (CAUTI) are the most common healthcare-associated infections. No formal recommendations exist regarding treatment of CAUTI and clinical practices related to managing these infections are not well understood.¹

The purpose of this study was to reviews the prevention and management of catheter-associated urinary tract infections (UTI).

Indications for the use of urinary catheters. The most effective way to prevent UTIs in patients with urinary catheters is to carefully identify situation in which the use of the urinary catheter is indicated and thereby limit its use to selected patients.¹ In a patient with a indwelling urinary catheter, the risk of bacteriuria increases by 3% to 10% each day that the catheter is in places. Bacteriuria is therefore inevitable in patients with long-term urinary catheters. The best way to reduce the morbidity, mortality and associated costs of CAUTI is to prevent or minimize bacteriuria.^{1,2,4,5}

Alternative drainage techniques. Various drainage techniques have been developed to reduce the risk of bacteriuria and UTI in selected patients with indwelling catheters. Options including use of intermittent catheterization, use of condom catheters and suprapubic catheter drainage.^{2,4,5}

Nursing recommendations. Various recommendations regarding hygiene have been proposed to reduce the risk of CAUTI. Only some, however, have proven to be beneficial. Measures that have not been proven effective include routine and vigorous meatal cleaning, routine fixed catheter changes and isolation of patients with UTI in a separate room.^{1,3}

Catheter material. Catheters materials have been evaluated in regard to their antibacterial properties. Latex, silastic and silver catheters are most commonly used. Latex and silastic catheters have similar long-term outcomes in terms of incidence urinary tract infections. Silver-coated catheters are costly but have been shown to decrease CAUTI in some studies.³

Bladder irrigation. Bladder irrigation using antiseptic solutions or antibiotics have not shown any benefit in decreasing CAUTI. An obstructed catheter should always be replaced.^{1,2,3,5}

Chronic use of antibiotics. Several studies have been performed to assess the efficacy of prophylactic antiseptics or antibiotics in prevention of bacteriuria. Prophylactic use of antibiotics may be indicated in specific populations, including patients undergoing transurethral resection of the prostate. The use of antibiotics after this surgery decreases the incidence of postoperative bacteriuria, although no evidence of a decrease in clinical UTI has been demonstrated.³

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ANTIBIOTIC RESISTANCE OF *STREPTOCOCCUS PNEUMONIAE* AND *HAEMOPHILUS INFLUENZAE* STRAINS ISOLATED FROM PATIENTS WITH RESPIRATORY TRACT INFECTIONS

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Streptococcus pneumoniae remains an important cause of pneumonia, meningitis, bacteremias, and acute otitis media worldwide. The recent emergence of strains of drug-resistant *Streptococcus pneumoniae* is a serious clinical and public health problem. By the early 1990s, penicillin-resistant clones of *S. pneumoniae* spread rapidly across Europe and globally. Additionally, resistance to macrolides and other antibiotic classes escalated in tandem with penicillin resistance.

Between January 2015 and February 2016, the clinical specimens submitted at the microbiology laboratory were processed and all *S. pneumoniae* isolates were included in this study. *S. pneumoniae* identification was based on macroscopic and α -hemolytic colony characteristics, microscopic morphology by Gram's stain, optochin sensitivity, and bile solubility. Susceptibility was determined using the Kirby-Bauer disk diffusion method, employing a Mueller-Hinton agar containing 5% sheep's blood. *S. pneumoniae* ATCC 49619 was used as the control strain.

Antibiotic susceptibility testing of the isolated *S. pneumoniae* strains established the existence of a significant percentage of strains resistant to oxacillin, cotrimoxazole, penicillin, cefepime, ampicillin, kanamycin and ceftazidime. Among cephalosporins, the highest levels of resistance were recorded at fourth generation cephalosporins (cefepime – 59,3%) and third-generation cephalosporins (ceftazidime – 45,3%). A more pronounced sensitivity was registered to first generation cephalosporins (cephalothin – 72,6% and cefazolin – 67,7%). The vast majority of strains were found to be sensitive to imipenem (97,0%), rifampicin (85,0%), ofloxacin (84,7%), gentamicin (76,9%) in a smaller ratio to chloramphenicol (75,9%), and cephalothin (72,6%). Regarding bacterial multiresistance, 1,38% strains were resistant to amoxicillin and erythromycin, 5,5% to penicillin and erythromycin simultaneously.

The current study reveals that *S. pneumoniae* strains show variable resistance to beta lactamines. Thus, the proportion of resistant strains to penicillin is 37,2%. In contrast, the proportion of resistant germs to cefepime is much higher: 59,3% resistant. The lowest resistant levels to beta lactamines were registered for cephalothin and cefotaxime. Regarding macrolides, the resistance was much higher compared to European countries – 45,4% to erythromycin. High levels of *S. pneumoniae* resistance were recorded for co-trimoxazole (62,9%), kanamycin (46,9%) and tetracycline (43,7%), mainly explained by the excess prescription during the last decades. On the other hand the vast majority of strains of *S. pneumoniae* were sensitive to chloramphenicol (75,9%), consistent with its poor use in practice lately.

The antimicrobial resistance rate of *S. pneumoniae* in Republic of Moldova is substantial, and the emergence of pneumococcal strains with a dual macrolide resistance mechanism is alarming. At this point it is important to decrease the social impact of the multiple resistance phenomenon to anti-infectious (antibacterial) chemotherapy drugs, by optimizing the use of existing antibiotics, formulating strategies aiming to reduce to extinction the bacterial strains with multiple resistance to the action of antibiotics.

**POLYPEPTIDE SPECTRUM FROM THE SUMMARY PROTEINS
FRACTION EXTRACTED FROM SPIRULINA BIOMASS
CULTIVATED IN THE PRESENCE OF THE COORDINATION
COMPOUNDS OF Cu(II)**

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Cyanobacteria serve as non-traditional sources of raw material for the food and pharmaceutical industry, animal husbandry and cultivation, cosmetics and perfumery, due to the protein content, amino acids, lipids, polyunsaturated fatty acids, vitamins, enzymes, carotenoids, chlorophyll, phycobiliprotein, polysaccharides, hormones substances, antibiotics and other substances with a pronounced biological activity. The amount of bioactive substances synthesized by cyanobacteria is directly dependent on the growth conditions of cyanobacteria.

The comparative study of the polypeptide spectrum from the summary protein fraction subjected to the SDS- electrophoresis in polyacrylamide gel of 15%, revealed some new polypeptide bands in *Spirulina* biomass that was cultivated in the presence of the coordination compounds of Cu(II).

At cultivation in laboratory conditions *Spirulina* has a linear form, the protein expression of 21,9 kDa and 20,3 kDa (specific for spiral filaments) is focused on building kDa proteins of 52,0 kDa and respectively 31,8 kDa, what is observed in the case of *Spirulina* cultivation in the presence of copper compounds.

The polypeptide with apparent molecular weight of 60,4 kDa identified at cultivation in the presence of copper compounds, is possibly the phytochelatin homodimer of the synthase, which belongs to the class of enzymes that participate in the synthesis of phytochelatins, a class of peptides post-translationally synthesized which play an important role in the tolerance of plants, fungi, algae and cyanobacteria compared to the heavy metals by binding them and diminishing the concentration of free ions.

At cultivation in the presence of the coordination compounds of Cu (II), in the protein spectrum of *Spirulina* appear new polypeptides, with molecular mass of 33,12 kDa. This polypeptide is similar according to the molecular mass with the protein center of reaction of photosystem II that reacts as antibodies. It was determined the polypeptide with the mass of 28,51 kDa which according to the literature data may correspond to the peptides that possess antiviral and antioxidant action as superoxide dismutase. We notice as well polypeptides with molecular masses of 24,5 kDa, 22,2 kDa, 20,0 kDa and 19,1 kDa corresponding to the α - and β - phycocyanin and allophycocyanin subunits.

The prior researches data show that at the degradation of proteins "in vitro" from *Spirulina* biomass with the molecular mass of 46,0 kDa belonging to the ferredoxin-NADP+ oxidoreductase takes place the production of some intermediate molecular masses of 37,0 kDa, 36,0 kDa, 35,0 kDa and 34,0 kDa. Possibly, in the case of *Spirulina* cultivation in the presence of copper compounds occurs the protein degradation with the mass of the 46,0 kDa and the production of those with molecular weight of 37,0 kDa.

The electrophoretic spectrum of the summary proteins reflected the emergence of polypeptides with new molecular masses of 33,12 kDa – essential components of the photosystem II acting as antibodies, 28,51 kDa – peptides that possess antiviral and antioxidant action and 60,4 kDa – the phytochelatin homodimer of the synthase. Therefore, the copper coordination compounds affect the photosynthesis processes and the oxidative stress developed by Cu(II) is annihilated by the enzymatic antioxidant system.

**THE ACTION OF SOME INORGANIC NANOPARTICLES ON THE
ACCUMULATION OF CELL BIOMASS AND THE BIOSYNTHETIC
CAPACITY OF *SACCHAROMYCES CEREVISIAE*
CNMN-Y-18 YEAST STRAIN**

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Currently more and more attention is given to the researches on nano-scale obtaining and use of biomaterials. The biosafety of nanomaterials represents an important factor regarding their industrial production and integration of nano-products in the branches of economy.

The use of microorganisms as producers of nanoparticles involves safe processes from the environmental the point of view and is becoming more and more important in microbial biotechnology. For this purpose, more frequently bacteria, yeasts, fungi, actinomycetes, etc. are used. Therefore, the biologically-made nanostructures offer substantially different properties, such as good adhesion, good tribological properties, low toxicity, biocompatibility, making them more valuable for biological applications.

The titanium, zinc and magnesium oxide nanoparticles are widespread and have a practical application in various fields - medicine, food industry, cosmetics etc. However, the influence of these types of nanoparticles on the productivity and the biosynthesis of biologically active substances in yeasts is less studied.

The aim of the work was to assess the action of inorganic nanoparticles on the accumulation of biomass and biosynthetic capacity of the *Saccharomyces cerevisiae* CNMN-Y-18 yeast strain. For the evaluation of the TiO_2 and ZnO/MgO nanoparticles action, the given compounds were added to the culture medium of YPD, in a concentration of 0,5...15 mg/L. The study, regarding the amount of biomass obtained after 120 hours of cultivation in depth, revealed that nanoparticles of titanium dioxide are not tolerated by the *Saccharomyces cerevisiae* CNMN-Y-18 strain.

The content of biomass in the experimental samples varied between 5,25 to 5,61 g/L S.U., the values being at the level of the control. The experiments have shown that the ZnO/MgO nanocomposite, in a concentration of 10...15 mg/L increases the production of biomass with 20-25%.

The analysis of the results of mannoprotein content in *Saccharomyces cerevisiae* CNMN-Y-18 biomass culture, at the cultivation of YPD medium supplemented with nanoparticles, showed a relative stability. At low concentrations of ZnO/MgO nanoparticles, the yeast culture accumulates almost the same amount of mannoproteins, as well as in standard conditions. At the same time, TiO_2 nanoparticles in concentrations of 10,0 and 15,0 mg/L increase the content of mannoproteins with 23% more than in the control sample.

Thus, the study on influence of two types of nanoparticles of the *Saccharomyces cerevisiae* CNMN-Y-18 yeast has established that both the nanoparticles of titanium dioxide, as well as those of the oxides ZnO/MgO , represent elements having a major influence on increasing the content of mannoproteins and the accumulation of cell biomass. The stimulative character of nanoparticles for the *Saccharomyces cerevisiae* CNMN-Y-18 strain depends on the applied concentration.

MENTAL HEALTH DISORDERS IN PATIENTS WITH CHRONIC VIRAL HEPATITIS

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Mental health problem is acute and complex, its relevance has increased significantly in previous years. Nowadays a lot of attention is given to the study of the people's mental sphere. However, most studies have directed on studying of mental disorders and illnesses and the mental health very rarely is the subject of basic research.

The chronic viral hepatitis (CVH) also is important problem of contemporary medicine. According to WHO estimates (2012), viral hepatitis (VH) B and C affect much of the world's population because more than 500 million of people worldwide are infected with these viruses. Viruses of the hepatitis B, C, D are the most frequent cause of CVH and an important risk factor for liver cirrhosis (LC) and hepatocellular carcinoma (HCC). VH is a one of acute problems for Moldova owing to the increased morbidity and high rate of disability. CVH, evolving into the LC and HCC remains a significant cause of mortality in our country. Liver disease is often associated with mental health problems, a continuous increase in the prevalence of which was marked in the past few years in Moldova. Probably the economic and social crises have negatively influenced the mental health status of the Moldovan population.

In opinions of Rosenberg et al. (2001, 2003), Hazaveh et al. (2015), Rafique et al. (2015) and our observations (Berezovscaia, 2015), mental health problems frequently occur in patients with CVH. Fabregas et al. (2012) and Alian et al. (2013) have demonstrated high comorbidity of CVH with a lot of mental health problems from the fatigue and anxiety to serious long-term mental, emotional, and behavioral disorders. Over 50% of patients with CVH have one or more mental or behavioral disorders. Such high comorbidity significantly alters the quality of patient's life. It was felt that the increased prevalence of mental health problems in patient with CVH may be associated with viral *infection*, which may have an indirect impact on the central nervous system. However, we do not exclude the influence of psychosocial factors and secondary psychiatric disorders on the background of the problems understanding of the disease, stigmatization and other factors.

It should be noted that, the majority of studies don't contain pathogenic typology of psychiatric disorders in patients with CVH, which would contain a form of the disease, personality characteristics and age of the patient. That does not allow developing an individual approach to the prevention of mental disorders. The absence of which adversely affects the effectiveness of treatment and of the patient's quality of life.

Based on the principles of Psychosanocreatology proposed by academician Furdui (2014), we developed the concept of individual approach, which provides elucidation of the phenomenology of mental health, identification of the possible variants of deviant or dyssanogen behavior and creation of a typology of individual levels of mental health, containing behavioral abnormalities characteristic of patients with CVH. This concept will improve the algorithm of tactics in support of patients with chronic viral hepatitis and will enable to create personalized prevention of mental disorders.

GENDER AND AGE CHARACTERISTICS OF THE COGNITIVE STYLES

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Analysis of the current scientific literature on the problem of determining, organizing, developing and selection cognitive styles testing methodologies, showed that psychology researchers is currently no consensus on a number of matters relating to relations with the cognitive styles of cognitive orientation of the person (В.Колга, 1986, Н.М.Лебедева, 1986, Д.А.Леонтьев, 1990, М.А.Холодная, 2002).

So, there is disagreement on: the bipolar nature of cognitive styles (М.А.Холодная, 2002), the stability of cognitive styles (И.М.Палея, 1996), treatment of the cognitive styles as an individual preference (Г.А.Берулава, 1996) age peculiarities of manifestation of cognitive styles (В.Н.Дружинин, 2001).

From a substantive point of view, some of the styles of "overlap" each other, so the existence of a certain number of styles and their classification can also speak with a sufficient degree of conditionality (М.А.Холодная, 1990).

In the thinking style there are manifested individual differences of intellectual activity related to the peculiarities of reflection and resolution of conflicts, with the peculiar ways of solving problems inherent to a particular individual, as well as decision-making features and their implementation. Flexibility cognitive styles poses the question about the level of their stability or lability in different situations (И.П.Шкуратова, 1998).

Particular attention is now being given to the study of age-related features of the style of thinking: revealed stylistic features of children of preschool and primary school age, thinking styles are correlated with the stages of intellectual development in the student's age and originality of intellect described characteristics in the elderly (В.Ю.Саякин, 2011, А.В.Либин, 1991, М.А.Холодная с сотр., 1998).

The primary school age is characterized by a non-linear way of thinking. In adolescence, there are gender differences in thinking style profile: for boys it is characterized by the dominance of a practical way of thinking, for girls - management style (Г.А.Молохина, 2010).

Stability of cognitive thinking styles in subjects whose cognitive capabilities are constantly improving due to the necessity of intellectual adaptation to changing situations is a testament to the inadequacy of the mental (intellectual passivity): lack of initiative in the intellectual activity; cessation of mental work in the absence of significant reinforcements; avoidance of intellectual effort; lack of curiosity; low intellectual performance, and others. (А.Рван, 2003, А.М.Матюшкин, 2008).

Trends of modern education is intended to cover all stages of the life path of a person. This makes it necessary to expand research on the thinking styles dynamics at different age levels, to identify gender differences in the development of the style of thinking, to determine the relationship of thinking style with the features of a person's identity, what is most important in adolescence, which accounts for the maximum share in the organization of intelligent forms of activity, in the development of thinking and creativity.

IMPACT OF TiO₂ NANOPARTICLES ON THE PROTEIN CONTENTS IN THE YEASTS RHODOTORULA GRACILIS CNMN-Y-30

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Present-day biotechnological processes are based on the use of the microorganisms producing active biological substances but the yeasts have a high production potential. The advantage of the yeasts use is, first of all, their rapid adaptability, since they grow up easily and have high productivity but their culture medium and cultivation conditions may be adjusted for the purpose of biosynthesis optimisation. They are resistant to alien microflora and do not pollute the environment. We shall mention the chemical substances acting as precursors or synthesis stimulators, within the range of the main factors regulating the biosynthesis capacity of bioactive principles in the yeasts.

Presently, the use of titan dioxide nanoparticles presents a special interest for the scientific community, since such nanoparticles may change the biochemical composition of the microbial culture. An important factor characterising the course of metabolic processes in the cultures subjected to the action of different cultivation factors is protein content. Since proteins are built only of aminoacids, they may be enzymes that catalyse different biochemical reactions in the organism. Others may play an important role in maintenance of cell integrity (cellular wall proteins), in immune and autoimmune response of the organism, in the cellular structure and functioning. Proteins are used in large quantities in medicine, in prevention and treatment of an imposing range of diseases, in various cancer types, myocardial infarction, hepatites, obesity, nephropathies, undernutrition, renal failure, arteriosclerosis, regulation of general metabolism and organism immunity.

This study elucidates the effect of TiO₂ nanoparticles having the dimensions of 30 nm and the concentrations of 0,5, 1,0, 5,0, 10,0 and 15,0 mg/L of the culture medium, on protein accumulation on the base of the pigmented yeasts *Rhodotorula Gracilis* CNMN-Y-30. The results mark that the response reaction of the yeasts is manifested through favourable changes in the protein contents – by 15 to 17%, if compared to the witness samples. The TiO₂ nanoparticle concentrations of 0,5, 1,0 and 5,0 mg/L added to the nutritive medium initiate a clear accumulation of the protein contents in the yeast biomass, varying from 44,6 to 45,3%, if compared to the witness sample containing 38,7%. The TiO₂ nanoparticle concentrations of 10,0 and 15,0 mg/L produce an increase by 23,8 to 25,9% in the protein contents in the biomass, if compared to the witness sample. As a consequence, we may affirm that the protein biosynthesis process depends on the TiO₂ nanoparticle concentrations.

Hence, the realised researches have shown that titan dioxide nanoparticles are the promising sources for stimulation of protein biosynthesis processes, thus representing and important factor for the biotechnology of *Rhodotorula Gracilis* CNMN-Y-30 yeast cultivation and implementation of protein sources in various spheres: nutrition, pharmaceuticals, cosmetology, and particularly medicine.

THE IMPACT OF ALIMENTARY FACTOR IN PROCESS OF MULTIPLICATION AND DEVELOPMENT OF ENTERIC STREPTOCOCCI

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The purpose of the present paper provided elucidating of impact of alimentary factor in the process of multiplication and development of enteric streptococci.

During all investigations microorganisms species *E. faecium* of genus *Enterococcus* did not reflect the pathogenic properties. Previous research established as the species *E. faecium* can be considered nonpathogenic and is why was recommended for inclusion in composition of some microbial preparations with probiotic action. Simultaneously, it was established in human and animal digestive healthy tract this species of bacteria it was present in an amount of 68-76%, and *E. faecalis* - by 24-32%.

The investigations were made in two series of experiments seven lots each, under *in vitro*. They were tested six variants being tested rations (1 – 57, 35, 8; 2 – 58, 33, 9; 3 – 59, 31, 10; 4 – 60, 29, 11; 5 – 61, 27, 12; 6 – 61, 25, 14 % respectively), through their action on bacteria species *E. faecium* in monoculture (first) and in association poly component (second).

As a result, it has been found in that variants in which were tested food rations No. 1-4 and 6 the number of these bacteria was reduced, and in variant with food ration No.5 the number of these bacteria was increased insignificantly. So, we can say as food rations no. 1 to 4 and 6 have inhibitive effect, and ration No.5 - stimulatory.

So, only the fifth variant can be recommended to be used in order to maintain the optimal level of enterococci in monoculture.

Based on final data of the second series we can say that only variants No. 5 and 6 of experienced food rations association with poly microbial component have demonstrated the positive impact on the process of multiplication and development of microorganisms genus *Enterococcus* (species *E. faecium*).

Simultaneously it was discovered that newly developed food rations have contributed to changing the composition of qualitative enterococci. These data confirmed that the presence of variants with rations 1-4 multiplied more intensively streptococcus species *E. faecalis* and - 5 and 6 - *E. faecium*.

Thus, based on these data we can say that variants 5 and 6 of experienced food rations association with poly microbial component they have demonstrated the positive impact on process of multiplication and development microorganisms of the genus *Enterococcus* (species *E. faecium*) and can be recommended for maintenance the numerical value of enteric streptococci at an optimal level

MODULATORY EFFECT OF DIETARY LIPIDS ON T-CELL IMMUNITY

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Sanocreatology considers food as a most important factor of formation and maintenance of somatic and mental health (Furdui, 2015, 2011, 2010). Existing data on the effect on lipid exchange immune responsiveness of T-lymphocytes exposure to of the organism show that its effect can be manifested through the development of metabolic immunosuppression of T cells, or proliferation of T lymphocytes and increasing their number. However these data differ in discrepancy.

In this regard, the objective of this research is to determine influence of food lipids on T-cells' immunity.

Twenty-four-months-old white female laboratory rats (b. w. 230 – 300 g) in period of diminution where used as the object of this research. Animals were housed in the vivarium.

Laboratory animals were randomly divided into two groups: the first one – control group, fed with standard food, and the second one – with diet enriched in fats (65%), and containing 15% of proteins and 20% of carbohydrates. Drinking water was available ad libidum. General T-cells, active T-cells, thermostable T-cells, T-helpers and T-suppressors were investigated.

At the end of diet exposure T-cellular element of immunity showed that general T-lymphocytes were at 11% level, active T-lymphocytes – 2%, thermostable T-lymphocytes – 0,33%, T-helpers – 9%, T-suppressors – 2% in control group, and respectively 29%, 7%, 5%, 23% and 6% in group with diet enriched with fats. Therefore, unidirectional tendency of increase in number of general T-lymphocytes and their subpopulations is revealed in group of animals fed with food containing high quantity of lipids.

Higher number of T-lymphocytes and their subpopulations from experimental group in comparison with control is caused (as showed Vologjanin et al. (2005); Martinova et al. (2001); Trushina et al. (1992); Chandra (1991)) by stimulating role of lipids in activation of lymphocytes.

Thus, the feeding of old animals with diet rich in lipids has the proliferative activity on T-lymphocytes, but it should be signalized that too high lipid level can lead to steatosis hepatis.

Comparative analysis of laboratory data regarding the immune status of rats hold on diets with different fat level revealed that a diet with predominant lipid content has a positive dynamics on increasing of T-lymphocytes indicators in the blood serum.

MICROSCOPICAL AND PHYTOCHEMICAL STUDY OF VEGETABLE DRUGS FROM SP. *WITHANIA SOMNIFERA* DUNAL MICROPROPAGATED *IN VITRO*

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Species *Withania somnifera* Dunal (fam. Solanaceae) commonly known Ashwagandha is spontaneous, herbaceous plants, originary from India and Sri-Lanka. This species is with high medicinal value, that why in nowadays is intensive analysed in scientific laboratories from different European and Asian countries and it is cultivated in different regions. It was successfully multiplied by biotechnological methods *in vitro* in Botany Garden of Academy of Science of the Republic of Moldova and acclimatized in climate conditions of Moldova.

The plants of *W.somnifera* multiplied *in vitro* and grown in greenhouse and open field were studied by microscopical and phytochemical methods.

By microscopical study of root, stem, leaf, flower and fruit the principal microscopical characteristics were elucidated such as: leaf and stem epidermis with multicellular dendroid trichomes and secretory hairs (uni- or multicellular gland and unicellular stalk), calcium oxalate rosette in stem cortex and leaf mesophyll, air lacuna in stem cortex, fatty globules in fruit mesocarp, and collateral vascular bundles.

The comparative qualitative and quantitative study of alkaloids in three vegetable drugs were effectuated: *Withaniae folia*, *W. herba* and *W. radices*, from plants grown in greenhouse and open field. Qualitative identification of alkaloids were provided by series of special chemical reactions (Bouchardat reagent, Dragendorff reagent, tannic acid, phosphomolybdic acid, phosphotungstic acid, picric acid, picrolonic acid). The results demonstrated that alkaloids are present in all vegetable drugs, but more effective in *W.radices*.

Quantitative study of alkaloids was effectuated by isolation with chloroform in separated funnel. After drying of alkaloid chloroform extract in acids medium were determinated the total content of alkaloids by titrimetric method with solution of sodium hydroxide.

The results denote that the vegetable drugs (*W. folia* – 1,154%, *W. herba* – 1,016%) obtained from the greenhouse plants contain the higher value of total alkaloids than in vegetable drugs (*W. folia* – 0,851%, *W. herba* – 0,784%) from the open field plants.

In both case (plants from greenhouse and in the open field) the highest content of total alkaloids there is in vegetable drug *W. folia* (respectively – 1,154%; 0,851%). Comparison, the highest content of total alkaloids there is in *W. radices* (1,415%) than in decreasing *W. folia* (0,851%) and *W. herba* (0,784%).

This study elucidated the specific microscopical characteristics to identify the vegetable drugs (*W. folia*, *W. herba* and *W. radices*) obtained from sp. *W.sominera* Dunal, grown in the climate conditions of Moldova. The phytochemical study of three vegetable drugs demonstrated that the plants of *W.somnifera* may be the good source of tropanic alkaloids, especially *W. radices*.

THE MICROBIOLOGICAL DIAGNOSIS AND MANAGEMENT OF INFECTIVE ENDOCARDITIS

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Infective endocarditis (IE) carries a high risk of morbidity and mortality. Rapid diagnosis, effective treatment, and prompt recognition of complications are essential to good patient outcome. Therapy of IE caused by the more commonly encountered organisms, including streptococci, enterococci, staphylococci, and the HACEK organisms (*Hemophilus parainfluenzae*, *Hemophilus aphrophilus*, *Actinobacillus* (*Hemophilus*) *actinomycetemcomitans*, *Cardiobacterium hominis*, *Eikenella* spp. and *Kingella* spp.).

Infective endocarditis remains a diagnostic challenge in some patients. Identification of the etiologic agent is critical to selecting an appropriate treatment, as the fatality rate remains high. The proportion of IE that is without an etiologic diagnosis varies from country to country and among different centers in the same country. These variations reflect the local epidemiology of IE, diagnostic criteria used, initiation of antibiotics in patients prior to obtaining blood cultures, and the diagnostic protocol used to establish an etiology.

Positive blood cultures are a major diagnostic criterion for IE and are key in identifying the etiologic agent and its antimicrobial susceptibility. Continuous bacteremia and a high frequency of positive blood cultures are typical of this infection. However, the intensity of the bacteremia may not be great; fewer than 50 colony-forming units per milliliter of blood were detected in the majority of patients. Blood cultures are negative in ≤5% of patients with IE diagnosed by strict diagnostic criteria. Failure to culture the organism in IE may result from inadequate microbiological techniques, infection with highly fastidious bacteria or nonbacterial microorganisms, or most importantly, from the administration of antimicrobial agents before blood cultures are obtained. For the diagnosis of bacterial endocarditis, culture of two to three separately collected blood samples of at least 10 ml, and preferably 20 ml, each generally suffices; however, in cases who have recently received antibiotics it may be necessary to culture an additional two to three blood samples or to consider use of β -lactamase, antimicrobial adsorbent resins, or lysis-concentration, the last of which is also the most effective method for recovering mycobacteria and fungi from blood.^{1,2}

In addition to blood cultures and serological assays, culture of valve tissue or vegetations that have embolized to peripheral arteries and have been removed surgically may reveal the causative organism. Specific light-microscopy fluorescent-labeled antibody stains, electron microscopy, or molecular techniques to recover specific DNA or 16S rRNA from blood or tissue samples may also assist in diagnosis. As experience with this technique in patients with IE grows, polymerase chain reaction may prove useful for the diagnosis of infection caused by other microorganisms.³

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THE INFLUENCE OF ZnO NANOPARTICLES ON BIOSYNTHESIS OF β – GLUCANS OF *SACCHAROMYCES CEREVISIAE* CNMN-Y -20 YEAST.

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Currently a great scientific and practical interest presents the basic cell wall polysaccharides of yeasts, specifically β -glucans, that have an extensive usage in various fields. Due to their antiviral and antibacterial activity, immunomodulatory and antitumoral activity, β -glucans of yeasts have a special biomedical significance. Recently it were found hypocholesterolemic, anticoagulant, antimutagenic and antioxidant properties of β -glucans, making them a promising substances as health promoters. β -glucans present base active substances for the elaboration of new anticancer vaccines, which actually are being tested. The obtaining of β - glucans from yeasts is economically more advantageous than those of animal or vegetable origin.

Lately, the attempts of using of nanotechnologies in biotechnology for obtaining of bioactive principles from microorganisms have been started. Zinc oxide nanoparticles are often used as an antimicrobial bioproduct. Due to its antimicrobial properties, zinc oxide (ZnO) is widely used in pharmaceutical products with dermatological applications.

According to special literature, it is known that the application of inorganic nanoparticles on microorganisms leads to various modifications of biosynthetic processes. More and more researches are targeted on elucidating of the pathways of the regulating of cultivation processes and biosynthesis capacities of microorganisms of biotechnological interest.

In this context, the aim of the research was to elucidate the action of ZnO nanoparticles on the biosynthesis of β -glucans at *Saccharomyces cerevisiae* CNMN-Y-20 yeast strain, the β -glucans active producer. For the research YPD medium and ZnO nanoparticles with sizes of 10 and 30 nm in concentrations of 0,5; 1,0; 5,0; 10,0 and 15 mg/l in the emulsion form were used. As a control was examined variant without nanoparticles. The yeast biomass was collected after 120 hours of cultivation.

Thus, obtained results have demonstrated that the content of yeast biomass showed a relative stability for the yeast grown in the presence of ZnO nanoparticles with different sizes. The content of the biomass changes were observed after administration of 5, 10 and 15 mg/l of nanoparticles with the size of 30 nm, the amount of biomass in these samples decreased by 11-16% compared to the control.

The analysis of the results demonstrated a tendency of increasing of the content of β -glucans in the experimental samples with the application of the nanoparticles of 30 nm at concentrations of 5, 10 and 15 mg/l. The content of β -glucans in the cell biomass of the variants with the application of nanoparticles with size of 30 nm showed an increase compared with the variants with the application of 10 nm size nanoparticles. Maximum increase of the content of β -glucans was specific to concentrations of 5-15 mg/l nanoparticles, the values being 11,5 to 15,2%, or 1,1-1,2 g/l higher compared to the control.

Thus, we conclude that ZnO nanoparticles with dimensions of 30 nm at a concentration of 5, 10 and 15 mg/l can be used to stimulate the biosynthesis of β -glucans at *Saccharomyces cerevisiae* CNMN-Y-20 strain.

MOLECULAR MECHANISMS OF ACTION OF NEW PSYCHOACTIVE SUBSTANCES SPREAD ILLICITLY IN THE REPUBLIC OF MOLDOVA

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The use of new psychoactive substances can cause severe health issues and can be problematic for public policy. Few countries have monitoring systems susceptible to this new phenomenon in the drug field, and the methodological difficulties to detect them are considerable. New psychoactive substances are spread and sold via the Internet as “spice” and “ethnobotanical” products, being available at least since 2010. In Germany and Austria, as a result of forensic investigations on identification of the composition of the substances contained in “Spice” drugs, it was detected the so-called synthetic tetrahydrocannabinol, encoded as (JWH-n), the initials of the researcher who created it – John W. Hoffman. Synthetic cannabinoids are derivatives of the indole group, a compound with analgesic action, from the phenylacetylindole family, which acts as a cannabinoid agonist with approximately equal affinity for CB₁ and CB₂ receptors, with a K_i of 8.0 for CB₁ and 7.0 for CB₂. JWH-203, originally researched and developed as probe for CB₁ and CB₂ cannabinoid receptors, it came to be widely abused and sold under various names for its properties similar to those of marijuana (THC). Synthetic cannabis JWH-203, although initially was investigated for therapeutic purposes, alters mentality and can cause extreme anxiety, panic attacks, convulsions, this is due to the damage caused to GABA (*Gamma*-Aminobutyric acid) neurotransmitter, which is stronger than THC. The spread of these substances in the Republic of Moldova is most often done via the Internet, the so-called “spice” substances, which in Romania are called “ethnobotanical”. The synthetic cannabinoid JWH-203 has over 100 derivatives that are a great problem for the institutions responsible for public health and law enforcement, for forensic and toxicological identification of new substances, for immediate risk assessment and implementation of control measures.

The name and the chemical formulas of the most common synthetic cannabinoids in the Republic of Moldova:

Ab-chiminaca: C₂₀H₂₈N₄O₂, N-((S)-1-Amino-3-methyl-1-oxobutan-2-yl)-1-((3-hydroxycyclohexyl)methyl)-1H-indazole-3-carboxamide;

Ab – pinaca – CHM: C₂₀H₂₈N₄O₂, N-[(1S)-1-(aminocarbonyl)-2-methylpropyl]-1-pentyl-1H-indazole-3-carboxamide.

Ab – pinaca: C₁₈H₂₆N₄O₂, N-[(1S)-1-(aminocarbonyl)-2-methylpropyl]-1-pentyl-1H-indazole-3-carboxamide.

Ab – fubinaca: C₂₀H₂₁FN₄O₂, N-[(1S)-1-(Aminocarbonyl)-2-methylpropyl]-1-[(4-fluorophenyl)methyl]-1H-indazole-3-carboxamide.

5-MAPB (5- APB ME) Formula: C₁₂H₁₅NO, 1-(benzofuran-5-yl)-N-methylpropan-2-amine-2-(4-chloro-2,5-dimethoxyphenyl)-N-[(2-methoxyphenyl)methyl] ethanamine.

As a result of examinations of drug users diagnosed in 2015, carried out at PMSI Republican Narcological Dispensary, 116 persons who consumed synthetic cannabinoids were diagnosed.

Table 1. Number of people who have used synthetic cannabinoid, during 01.01.2014 - 01.31.2015

No. year	Cases	Male	Female	Urban	Rural	Average age (years)
2015	116	90	26	87	29	25,44

Structurally, the group included 116 persons, 90 men (77,58%) and 26 women (22,41%), most of them live in towns (75%). Statistical calculation reports an average age of consumers of 25,44 years in 2015.

THE MOLECULAR MECHANISMS INVOLVED IN DNA DAMAGE AND REPAIR

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Introduction. Interaction of ionizing radiation (IR) with living matter by transferring energy to irradiated substrate, causes ionized chemical structures, generating various harmful biological effects. The most vulnerable to IR cells are characterized by a high multiplication rate, and a low degree of differentiation: the lymphoid cells, myeloid, epithelial, reproduction, and highly differentiated cells such as those of nervous system.

The **purpose** of the research was to analyze data on the response of the human body to the action of RI.

Results. Tissue radiosensitivity has a polygenic character. As the IR causes various damage of the DNA molecules: mono- and two-chain tear, injury of nucleotides, the formation of dimmers etc., genotypes with enzyme deficiency involved in DNA repair are more radiosensitive. A key role in effective repairing of damaged by RI DNA hold XRCC1, XRCC3 and OGG1 genes involved in BER (base excision repair). It has been found that the XRCC1 gene mutations cause an increased level of radio sensitivity and a large number of chromosomal aberrations. *Missense* mutations 194Arg/Trp and 399Arg/Gln in XRCC1 have been described as being associated with a major risk of adverse effects of ionizing radiation therapy (IRT) in patients with cancer. Both polymorphisms 241Thr/Met of XRCC3 and 399Arg/Gln of XRCC1 are associated with chromosomal deletions result of irradiation *in vitro*.

IR are widely used in IRT, but directly affects cellular components, generating reactive oxygen species (ROS) and nitrogen (SRN), which can disrupt the macromolecules atomic structure.

Some genes resume their functionality after the occurrence of lesions in the DNA molecule. Those mechanisms contribute to halting the cell cycle/DNA repair/manufacture of apoptosis. A considerable leap in explaining the mechanisms of IR action and repair of DNA lesions was made possible by research of miRNA's molecules – a class of non-coding small molecules that regulate post-transcriptional gene expression.

Conclusions: The target of IR is DNA molecule that violates stalling the cell cycle or causing cell death, including at the stage of a dividing cell. Molecules of miRNA play a role in protecting the cell against IR. Polymorphic genes XRCC1, XRCC3 and OGG1 can provide protection against the development of acute side effects after applying TRI.

ELECTROPHYSIOLOGICAL CHARACTERISTICS IN INDIVIDUALS WITH DIFFERENT ANXIETY LEVELS WHILE COGNITIVE PROBLEM-SOLVING

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Research carried by academician T. Furduliu shows that the condition and maintenance of mental health, and therefore productive intellectual activity, to a large extent depend on the intensity of the stress caused by emotional, mental, social and informational burden. The state of anxiety is closely related to stress, therefore tests assessing the severity of anxiety are successfully used to diagnose stress levels. The aim of the study was to investigate the influence of the level of anxiety in clinically healthy individuals on some parameters of bioelectrical activity of the human brain during cognitive problem-solving.

The study involved the voluntary participation of 30 women engaged in intellectual activity. Anxiety has been defined by C. Spielberger test, which was later modified by Y. Hanin. The experimental subjects were solving cognitive tasks under time pressure. The registration and processing of the results have been realized by means of the licensed software package EEG-2000.

The bioelectrical activity of the cerebral cortex represents the objective information about human activities in terms of psychological and informational stress. Peculiarities of individual affective reactivity and anxiety generation mechanisms are closely related to the nature of space-time organization of the brain bioelectrical potentials. Consequently the evaluation of spectrally coherent relationships of electrical processes of the cerebral cortex and their correlation with the individual characteristics can significantly expand understanding of the electrophysiological patterns that characterize an individual psycho-emotional portrait of a human being.

For the electroencephalogram evaluation we have used index analysis that characterizes the percentage of the duration of bioelectrical activity recording, during which there was observed a certain frequency of waves. This method has contributed to the identification of stereotyped modifications in brain electrical activity in subjects. Furthermore, there was accomplished the topographic mapping which allows to present a two-dimensional distribution of density of power of electroencephalogram rhythms in a certain area of cerebral cortex.

It was found out that the model of created intellectual burden causes emotional stress in humans with medium and high levels of anxiety. Index Analysis of electroencephalogram has revealed the difference in the character of bioelectrical activity of the cerebral cortex depending on the level of anxiety. During the cognitive problem-solving there was observed a difference in the value of the index rhythms of electrical activity of the cerebral cortex in the subjects with high and low levels of anxiety. The alignment of power of rhythms happens in humans with low level of anxiety, whereas preservation of the nature activity was identified in subjects with high level of anxiety. Power density distribution of Δ – and θ – rhythms on the surface of the cerebral cortex depends on the degree of anxiety. Index and spectral analyses of the power of rhythm in combination with psychological testing can be used for a more adequate assessment of the state of anxiety in healthy people.

COORDINATIVE INFLUENCE OF PREPARATIONS ON SPERMATOGENESIS COCK

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It is known that the sex cells and their constituent structures, functional activity of sperm and reproductive system, under the influence of intrinsic and extrinsic major factors.

The maintenance of the spermatogenesis intensity as a physiological process, which includes all the transformations that spermatogonia goes through, represents one of the priority tasks of sanocreatology (Furdui T. et al., 2008), and is achieved through the directed training and the regulation of physiological status in the varying conditions of the environment.

Over several years Institute of Physiology and Sanocreatology conducts research in order to enhance semen sanogenity through application by breeders of the directed alimentation. In this plan they were undertaken investigations concerning the influence of different coordination compounds on spermatogenesis in rooster. These targets come in line with the principles of the scientific development of sanocreatology, which provide the development of the directed theory and practice in the formation and maintenance of not only the body's health but also of all the morphological and functional structures, including as well the reproductive system.

As research material we used roosters which were selected according to the principle of analogy and divided into four groups, one of which was the witness group and three others were experimental groups. In the witness group there was administered physiological saline solution, and in the experimental one - various coordination compounds. The last represents a balanced combination of zinc and selenium, as well as their specific derivatives and of trichloroacetic acid.

The coordination compounds were administered to the cocks in liquid form 1 ml per os every day during 35 days. This period includes spermatogenesis of cocks, the experimental period and the post-experimental one. The sperm quality was appreciated according to the following physiological indices: the sperm content, longevity, concentration and mobility.

As a result of the research upon the influence of the coordinative substances on the spermatogenesis strengthening at cocks, there was established that the coordinative preparations possess properties of spermatogenesis stimulation. The coordinative preparations have synergistic properties, which are manifested through their influence on spermatogenesis in roosters. The primary coordinative preparation, being administered into the body it stimulates the sperm concentration and mobility.

Given the results of the experiments, the efficiency obtained is predetermined by the fact that the primary coordinative preparation influences the sanogene peculiarities of the semen through the mechanisms of stimulating the germinal epithelium and DNA synthesis and by regulating the action of the zinc-dependent enzymes (Prasad A., 2008). It is also known that the zinc accumulates in the germ cells, especially in the spermatogonia' and the sperm's mitochondria (Yamaguchi S. and colab., 2009), participating in the regulation of the spermatogonial proliferation and in the germline meiosis (Miura T. and colab., 2006).

Thus, the spermatogenesis sanogenity can be achieved by improving the diet of the cocks by using the zinc and the organic selenium in configurations easily assimilated by the body.

A BRIEF INTRODUCTION IN PHARMACOGENETICS

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The science and human civilization progress have revolutionized medicine transforming it into a genetic medicine. All sciences about human integrates genetics achievements, confirmed by genetic fields that have turned into independent disciplines which also include pharmacogenetics. Pharmacogenetics aims is to elucidate the clinical response variability to a particular regimen by studying the patient genetic profile, thus improving treatment decisions and facilitating practicing personalized medicine. The important role of genetic factors in producing individual variations and drugs effectiveness has been confirmed by a number of clinical observations. Thus, identifying genetic biomarkers that predict individual response to treatment by genetic and genomic research, will allow the practice of personalized medicine.

Currently, the elements of personalized medicine are widely applied in oncology, cardiology, becoming an indispensable element of medical sector, which contributes to reducing costs while increasing the effectiveness and innocuousness of drug therapy. As an example, in cardiology Warfarin administered in base of pharmacogenetic tests, allows savings of about \$ 5,000 per 100 treated annually patients. Pharmacogenetical approach has become necessary because the effects of many medicines are determined polygenic, and also possible by using modern techniques of genotyping using microarray, allowing rapid scanning of thousands genomic markers that influence a person's response to medications.

However, the use of patient genotyping for therapeutic decision making is not widely practiced yet. This requires extensive research to develop a genetically informed and personalized medicine, as well as clinical studies are needed to prove efficacy, tolerability and safety of pharmacotherapy administered to patients. The UnASM teaching staff considered essential that the course of Pharmacogenetics and molecular biomarkers must to be a part of higher education curriculum. We have all confidence to believe that the study of this discipline will allow young researchers to develop fundamental skills in argumentation of the role of genetic polymorphisms of the individual variability to the same drug clinical response and will also ensure the acquisition of knowledge that will complete their professional training, becoming more competitive in the job market.

Identification of new targets for pharmacological agents, knowledge of a drug's mechanism of action and understanding of the genetic factors that determine drug response will allow new molecules targeted specifically to certain populations, thus avoiding the effect of pharmacogenetic variability in therapeutic response.

**JUGLANS REGIA - BIOLOGICAL PRODUCT FOR THE
PREVENTION OF HYPOTHYROIDISM IN THE REPUBLIC OF
MOLDOVA.**

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The obtained results demonstrate that walnut extract has a restorative effect on the body, have been subjected to experimental hypothyroidism, and allow us to recommend its use for treatment and prevention state of iodine deficiency of organism.

Keywords: thyroid gland, hypothyroidism, thyroxine, triiodothyronine, tiocyanat, *Juglans regia*.

Direction of investigation: investigation of the effects of an extract of green walnut hull in the prevention of iodine deficiency diseases on the background of tiocyanat action

The aim: is the investigation of green walnut hull in the prevention of iodine deficiency on the background of tiocyanat action.

Objects: elaboration of experimental model of hypothyroidism of white laboratory mice with the aim of testing of an extract of walnut, analysis of blood indices, glucose and cholesterol content in the blood against the backdrop of the influence of tiocyanat, investigation of the dynamics of T3, T4, TTG contents and histological analysis of the thyroid gland.

Methodology of scientific investigation: One of the base principles of study of the endocrine system is a comprehensive study that includes: identification of functional disorders by determining the concentration of hormones in the blood line, identification the impact of the hormonal constancy on the hormonal status of a body, establishing the etiology of endocrine diseases, getting images of the endocrine glands structure in the pathologies.

Scientific novelty and originality: new experimental data of influence of the tiocyanat on the morphological status of the thyroid gland, the synthesis and secretion of thyroid hormones were obtained. The dynamic of the renal excretion of tiocyanat was established. The effect of an extract of green walnut hull on the synthesis and secretion of T4, T3, TTG, blood indices, as a histological analysis of the thyroid gland have been investigated.

Application value: The obtained results demonstrate that walnut extract has a restorative effect on the body, have been subjected to experimental hypothyroidism, and allow us to recommend its use for treatment and prevention state of iodine deficiency of organism.

Implementation of scientific results: in the process of didactic activity and development of drugs for the prevention of hypothyroidism.

THE IMPACT OF THE PHYSICAL EFFORT UPON THE FUNCTIONAL STATE OF THE SPORTSMAN SWIMMERS BODY

Ecaterina ERHAN

Achievements and Perspectives in Biomedicine

At the actual stage, when the sport results in swimming, are improving constantly a complex monitorization of the functional state of sportsmen swimmers body is very important. The evolution of national and international performances in swimming creates the need of developing the existing methods of training and creating new informative techniques for guiding the process of sports training.

The goal of the research consist in the experimental foundation and complex monitorization of sportsmen swimmers based on morpho-functional, physiological and biochemical indexes, so as to improve the efficiency of sportive activity and perfection of sportive training. In order to achieve this goal we established the following objectives: accomplishment of morpho-functional test before and after physical training; determination and analysis of particularities of physiological indexes, in order to develop the performance of elite swimmers; identification of particularities of biochemical indexes at sportsmen swimmers; and recommendations of some prophylactic physiological, biochemical norms during the training of the sportsmen swimmers with the aim of preventing pathologic states.

Elaboration and implementation, in premiere of the complex model–algorithm for researching the functional state of the sportsmen swimmers body. Identification, for the first time, of the correlations between anthropometrical, physiological and biochemical indexes, as a result of the complex testing of the sportsmen swimmers' body. Also, for the first time it was established a new approach of supporting sports training, that have been adjusted, based on the results obtained from the implementation of the complex model–algorithm for researching. Elucidation and recommendation of the proposals for the swimming trainers, in order to increase the efficiency of the trainings and the sportsmen performance.

The obtained results, duet to a complex test of the functional state of the body at sportsmen swimmers completing fundamental knowledge concerning functional particularities in accordance with the anthropometric, physiologic and biochemical indexes. The obtained data permit to establish some physiologic-biochemical models specific to swimming in the conditions of performing physical efforts, and also denote a multilateral appreciation of the test parameters, in order to ameliorate the functional state of the body at sportsmen swimmers.

After monitorization, in accordance with the obtained clinic picture, it is possible for physical education teachers to reflect and conduct correctly the training process, having its aim to perfect the skills of the sportsmen swimmers. As a result of the carried on tests it is possible to point out differences from the norm of the examined indexes.

Generalizing the obtained results, we can conclude that the implementation of the complex model–algorithm for researching the functional state of the sportsmen swimmers body, lead to an improvement of anthropometrical, physiological and biochemical indexes. We are firmly convinced that complex model–algorithm for researching the functional state of the sportsmen swimmers body is a solution in the development of swimming performances in the Republic of Moldova.

THE GENUS *KLEBSIELLA* AS OPPORTUNISTIC PATHOGENS A PUBLIC HEALTH PROBLEM

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Analyzing the distribution of strains of *Klebsiella* recorded during the years 2012-2014 in all age groups was found predominantly affecting people age 0-6 years (children). Their share is 36,60% of all registered strains. *Klebsiella* strains proves as an increased number aged between 18-29 years with share of 17,75% and the age group > 65 years (the elderly) - 12,24%. The share of people in other age contingent involved in the epidemic is respectively lower values of all recorded strains.

During the years 2012-2014 were collected biological substrates depending on the pathology, following which there were isolated 817 strains of *Klebsiella*. Detection rate prevalent among biological substrates which were isolated strains of *Klebsiella* most coprologic are samples with 50,18%. Second place is held by urine samples with 22,64% and third place respectively shall be assigned exudates from the wound with 6,98%, followed by: nasopharyngeal exudates (6,98%), exudates from the vagina (4,65%), sputum (1,59%), nasal exudates (0,98%), ear exudates (0,61%), prostate secret (0,37%), venous blood (0,25%) and exudates from eyes (0,12%) (tab. 8.5 in anexes).

Klebsiella pneumoniae in a wide range of biosubstrate submitted attesting increased by 42,24% with coprologic samples and urine samples with 29,36%.

Klebsiella oxytoca shows a preponderance of the evidence against coprologic with 61,52% and 15,17% of isolates from urine.

Klebsiella ozaenae of total dominance biosubstrate samples is observed also by coprologic but the second one is 33,33% owned by pharyngeal isolates from urine and exudates with share of 19,05%, followed by exudates from wounds cu 16,67%.

It was observed that among the analysis of biological biosubstratele dominates among *Klebsiella pneumoniae* isolates from urine, *Klebsiella oxytoca* and *Klebsiella ozaenae* coprologic hold the majority among samples.

Analyzing pathologies detected after isolation strains of *Klebsiella* infections observed that the level of the gastrointestinal system intestinal (cholecystitis, pancreatitis, enteritis, food poisoning, intestinal dysbiosis, acute gastroenteritis) constitute more than half of the total 52,02% of samples. Second place is occupied by urinary tract infections (cystitis, pyelonephritis, urolithiasis) with 21,79%. Third place respiratory infections are found with the percentage of 9,30% at the same distance lies and surgical emergencies (peritonitis, phlegmon, abscess, apedicită, sepsis) with 9,06%. Urogenital system infections with 4,53%. The lowest share of 3,30% is found pregnancy as a natural and physiological condition of the female sex. [1,2,3,4].

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COMPARISON OF THE SENSITIVITY AND EFFICIENCY OF MICROBIOLOGICAL DIAGNOSTIC METHODS KNOWN AND USED IN THE INFECTIONS WITH ROTAVIRUS

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Each year, rotavirus causes approximately 125 million episodes of gastroenteritis requiring only home care. Rotavirus is the most common cause of severe diarrhea in infants and toddlers. In the world it reported 527,000 to 600,000 deaths annually.

Rotavirus is the leading cause of morbidity (70%) and deaths from acute intestinal infections worldwide. The main mechanism of transmission of rotavirus is fecal-oral contact with the consumer. Often infection occurs when consuming contaminated food and water. The main source of rotavirus gastroenteritis is a sick man, excreted in feces significant amount of viral particles. Virus detected in copro filtrates 48 hours prior to the first clinical symptoms its maximum allocation indicated in the first 3-6 days of onset. Most children (70%) excretion of rotavirus lasts from 4 to 20-30 days from the onset of clinical manifestations of disease. Rotavirus gastroenteritis with a distinct clinical suffers mostly children between the ages of 6 months. up to 2-3 years. The discovery of different serotypes also depends on the geographic location. Detection of specific antibodies and their titer rise in the serum of patients with and recover from rotavirus gastroenteritis using serological tests for the purpose of the current diagnostic practice is currently not widely used and mainly for retrospective analysis of different epidemiological situations. In addition, there is the periodic replacement of epidemiologically significant strains on the other, within one year, and the return of the previously circulating viruses in 3-4 years. For diagnosis using three groups of methods: 1. Methods based on the detection of the virus and its antigens (electron and immune electron microscopy of fecal ELISA, RIA, and the reaction of the MFA latex agglutination (RLA). 2. Methods for detection of viral RNA, such as PCR. 3. Methods for detection of antibodies to rotavirus (ELISA, PCR, PHAR, and so on.) [1].

Analyzing the data of literature in the laboratory diagnosis of rotavirus infection, and comparison sensitivity of used methods we have ascertained: Polymerase chain reaction-96%, Enzyme-linked immune sorbent assay-91%, Polyacrylamide gel electrophoresis-90%, Latex agglutination Reaction-79%, Passive Agglutinations Reaction-74%. The most sensitive proved to be 96% PCR methods and ELISA by 91% [2,3,4,5].

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PROPERTIES OF THE METABOLISM IN DEPENDENCE OF THE SOMATOTYPE

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The constitution of an organism can be considered as a totality of genotypic, genetic and phenotypic markers which characterizes reactivity and specificity of individual development. The somatotype as a manifestation of the human general constitution is modified during ontogenetic process under influence of environment factors in the limits of heritable program. Therefore, the somatotype can be determined as a totality of relative stable morphologic, functional properties and features of human organism formed as a result of genetic program accomplishment under definite environmental factors influence which mirror main peculiarities of metabolism and organism reactivity (Струтинский Ф.А., 2007).

In pure form somatotypes rarely exist, mixed types predominate and somatotypes are formed for a long time via modification of the growth gradient of different morphologic criteria during ontogenesis. The somatotype are becoming more stable with age, its formation has gender features. The somatotype mirrors general character of metabolic, morphological, physiological, psychic, biochemical, and homeostatic properties (Струтинский Ф.А., 2007).

The degree of assimilation of proteins and amino acids from nutriment also depends on quantitative and qualitative component of carbohydrates and lipids which abruptly reduces energetic demand of organism at the expense of proteins. Experimental and clinic materials manifest that the diet with fat reduced content and hypocaloric feeding contributes to the excretion urinaire of amino acids and their decomposition products. The fat ration in organism lower than its necessity limits the absorption of liposoluble vitamins and can cause avitaminosis. Insufficient ratio in organism of indispensable fatty acids (linoleic and arachidonic) is especially unfavorable case for plastic processes. The specificity of sanguine plasma amino acids content is characterized by the strong individual stability and is formed as a result of dynamic equilibrium between amino acids releasing processes from different tissues (muscular and hepatic) and consummation by another tissues (nervous, hepatic, and renal). The feed ration, the degree of assimilation of nutrient substances, and the disorder of amino acids metabolism either hereditary or acquired are the factors of essential influence. The analysis of bibliography denotes numerous evidences of the genetic conditioning of metabolism and body structure. At the same time, geographic variability of these criteria is observed. Racial and adaptive types of constitution were formed under influence of different climate geographical habitat conditions and geochemical medium in human populations which mirror anatomical, metabolic, and psychic individual properties. The height/weight ratio, blood supply of tissues, percent of body adipose tissue, and basal metabolism level are increased in arctic latitude inhabitants. Properties of organism structure and functions are similar in the same latitude inhabitants. High height, increased body surface, reduced basal metabolism, endogen fats synthesis, and ATP concentration are specific features of individuals in tropical population. A generalized somatotype, metabolism and functions moderate are typical for individuals in temperate zone population (Щанкин А.А., Кошелева О.А., 2012).

Thus, we can conclude that the sanogenic alimentation is individual, it is necessary to take into consideration the somatotype, climate geographic zone conditions where individual was born and grown. These parameters must be taken into consideration in developing and describing of alimentation scheme.

AMINO ACIDS AS MARKERS OF THE INTOXICATION

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The endogenous intoxication is the complex multifactorial autocatalytic process acquiring a universal character in the course the time. The diagnostics of endogen intoxication is based on complex estimation of the toxic factor expression, the detoxification system state, the degree of tissues damage, the peroxide status, and the antioxidant defense. Modern ideas on endotoxins mechanism of action at the cellular level of entire organism are based on the leading role of membrane destructive phenomena (Беляков Н.А., Малахова М.Я., 1994).

On the base of bibliography data (Крыф М. и др., 1987) septic states associated with intoxications could be evaluated by means of the S index which determined as a ratio of phenylalanine and methionine molar concentrations. This index is elevating (over 4,0) in the case of sepsis in connection with phenylalanine concentration. It is suggested (Владимиров Ю.А., 2000) that tissue breakdown represents an adaptive reaction coming to releasing of amino acids which are necessary for recovery of damaged tissues. Products of oxidation processes possesses direct membrane-toxic action, initiates appearance of proteins similar with bioregulators, and is involved in the process of pseudo neurotransmitters formation. Furthermore, Fischer index (Жадкевич М.М. 1989) also mirrors changes of the hepatic functional state and consequently metabolic processes character. Sulfur containing amino acids (methionine and its derivatives) could be markers of the endogenous intoxication because of quantitative changes of their blood content largely determines the living organism status. It is suggested that cysteine plays especial role in the intoxication process since cysteine limits peptide and protein synthesis in the course of this process (Breuille D. et al., 2006). The increase of tryptophan amount and disorder of its metabolism via serotonin pathway in consequence of hepatocytes activity attenuation lead to accumulation of the toxic metabolite (5-hydroxyindoleacetic acid, 5-HIAA) in tissues and organs. Therefore, the increase of blood serum tryptophan amount in the case of intoxication allows us to considerate this amino acid as informatory marker of endogenous intoxication (Малахов М.Я., 2002). Finally, the ratio between total amount of amino acids nitrogen in erythrocytes and sanguine plasma nitrogen content varying from 1,52 up to 1,82 is a very essential index of the organism status. Erythrocytes being amino acids carriers participate in the interstitial metabolism of proteins. Falling down less than 1 of the coefficient of amino nitrogen distribution in blood represents a pathological syndrome which is a consequence of uncompensated disorder of normal conditions in organism (Комаров Ф.И. и др., 1999).

Analyzing all data mentioned above we can conclude that endogenous and/or exogenous intoxications resemble common mechanisms of action on cells, tissues, and organs of living organism. Intoxications represent nonspecific reaction of organism to the influence of environmental factors in antenatal and postnatal periods. It is suggested that the level of intoxication could be the measure of the sanogenic physiological status of living organism including the human mental health. Pathological processes in liver and kidney play the leading role in the development of abnormalities of amino acids metabolism final stage in the case of endogenous intoxication. Those nonspecific indices as S index and Fischer coefficient as well as the ration between plasma and erythrocytes amino nitrogen amounts could serve as markers of intoxications, the amount of sulfur containing amino acids in particular those of methionine and glutathione derivatives could be considered informatory marker of endogenous intoxication.

CARRIER AND PRENATAL DIAGNOSIS IN FAMILIES WITH DMD DISEASE DURING 2013-2015 IN REPUBLIC OF MOLDOVA. REFERENCES AND PURPOSES.

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Key words: prenatal diagnosis, PCR/RFLP, MPCR, linkage, muscular dystrophy Duchenne/Becker, carrier, pregnancy, strategies, methods

Introduction. Muscular dystrophy Duchene/Becker (DMD/B) is neuromuscular X-linked hereditary disorder affecting 1 in 3500 males live birth. Prenatal diagnosis (PD) is one of the methods proposed to prevent the birth of children with congenital malformations incorrigible, monogenic and chromosomal pathologies. Carrier testing is used to identify people who carry one copy of a gene mutation that, when present in two copies, causes a genetic disorder. This type of testing is offered to individuals who have a family history of a genetic disorder like MDD and also to people in ethnic groups with an increased risk of specific genetic conditions. If both parents are tested, the test can provide information about a couple's risk of having a child with a genetic condition

Objective. Our goal as a genetics involved in Duchenne/Becker muscular dystrophy are to determine which females are at risk of having an affected child and to be able to offer them prenatal diagnosis (PD) testing of male fetuses.

Materials and methods. The research was held in the scientific department of the Centre for Reproductive Health and Medical Genetics, Laboratory of Human Molecular Genetics. We report the results obtained from 40 families where was performed analysis for carrier identification of DMD in Moldova Republic of, in last 3 years. All families passed clinical, biochemical and molecular investigations which were made by DNA analysis through methods MPCR for direct diagnosis and PCR/RFLP for indirect diagnosis using polymorphic loci (PERT 87-8 and 16 intron) and amniocentesis for PD.

Results showed that informative families for both polymorphic loci were 25%, but for 16 intron polymorphic locus -37,5%, for PERT 87-8 polymorphic locus were 17.5%. Non-informative families for both polymorphic loci were 20%. Considering this, 7 families were directed for PD. Two pregnant women had miscarried up to achieving DP. For 5 females PD was performed, from which, 60% in families informative for 16 intron polymorphic locus. 20% PD - in family informative for both polymorphic loci. PD was impossible in 20%-with non-informative status for indirect diagnosis and non-deletions identified in direct diagnosis, and in this case we performed amniocentesis for determine the gender of fetus by AZF locus. During this period were born 4 healthy children.

Conclusion. The indirect diagnosis aspect in families with risk give the opportunity to determine which female is carrier, and to achieve a specific PD. Like a progressive option in direction to increase efficiency and make a correct prediction in prenatal diagnosis and diagnosis of carrier women for MDD we aim to implement the MLPA and qPCR methods in our country.

THE ROLE OF ARTERIAL HYPERTENSION IN MYOCARDIUM CHRONIC DISORDERS DIAGNOSIS IN CHILDREN AND ADOLESCENTS

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Chronic dysfunctions of the myocardium is the final event of the development of any cardiovascular diseases and maintain constantly at a high incidence morbidity due to cardiovascular diseases. Arterial hypertension is currently considered one of the most common pathologies of the cardiovascular system and one of the risk factors of atherosclerosis and chronic myocardial dysfunctions.

Objectives: estimating changes in hemodynamic parameters in the evolution of chronic myocardial dysfunction in children and adolescents.

Results: the study included 52 patients with chronic heart failure secondary to arterial hypertension aged 9-17 years. During the research LV myocardium mass index control was calculated in the control group having the value of $39,5 \pm 1,3$, and the relative thickness of the wall of the left ventricle was noted in the amount of $0,37 \pm 0,02$. In patients with arterial hypertension were assessed the concentric hypertrophy types IMMVS – $56,6 \pm 12,4$ and GRPVS – $0,41 \pm 0,25$. It is important to note that during the study the type of eccentric hypertrophy with IMMVS have been assessed $62,4 \pm 8,6$ and $0,42 \pm 0,15$ GRPVS. Concentric remodeling geometric variant noted IMMVS average value of $42,4 \pm 6,2$ and GRPVS – $0,44 \pm 0,2$.

Conclusions. Early identification of changes of cardiac performance parameters (MMV, IMMVS, GRPVS, HVS) under the conditions of the persistent tensional overestimation, reveals the early development of types of early myocardial pathological left ventricular remodeling and facilitates the options and diagnostic criteria of the heart remodeling in children with CMD secondary arterial hypertension in order to choose a selected pathogenetic treatment.

INCIDENCE OF ROTAVIRUS INFECTION IN CHILDREN WITH GASTROENTERITIS

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Diarrheal disease has been recognized in humans since antiquity. Until the early 1970s, a bacterial, viral, or parasitic etiology of diarrheal disease in children could be detected in fewer than 30% of cases. In 1973, Bishop and colleagues observed a virus particle in the intestinal tissue of children with diarrhea by using electron micrography. This virus was subsequently called “rotavirus” because of its similarity in appearance to a wheel (*rota* is Latin for wheel). By 1980, rotavirus was recognized as the most common cause of severe gastroenteritis in infants and young children in the United States. It is now known that infection with rotavirus is nearly universal, with almost all children infected by 5 years of age. Rotavirus is the leading cause of severe diarrhea among children worldwide, killing ~600,000 children annually. The range of rotavirus strains co-circulating in the world is diverse, with emerging and predominant strains varying between regions and from year to year. Over the last decade, rotavirus G1 has represented the most common genotype worldwide. Until recently, G serotypes 1-4 associated with P[8] and P[4] genotypes were the major circulating rotavirus strains globally.

However, interventions that prevent diarrhea associated with some bacterial and parasitic agents are less effective against rotavirus diarrhea. Consequently, the World Health Organization and others have recommended rotavirus vaccines as the most effective strategy to prevent rotavirus-related morbidity and mortality.

The aim of this study was to determine the incidence of rotavirus infection and types of rotavirus strains co-circulating in Republic of Moldova.

The research work was conducted at National Center for Public Health and Municipal hospital for contagious diseases of children. Children aged 0-5 years with gastroenteritis attending the hospital were chosen as the study population. Stool samples were obtained from recruited children and tested for rotavirus antigen using the Oxoid Prospect ELISA Kit (Basingstoke, United Kingdom).

A total of 2643 children with acute diarrhea were selected by random sampling. Stool samples were obtained and assayed for rotavirus antigens by enzyme linked immunosorbent assay technique using standard diagnostic Rotavirus kit. Rotavirus were detected in faeces of 383 (14,5%) children with acute diarrhea, 38,8% of positive cases of rotavirus gastroenteritis were under 2 years of age with highest prevalence in children 8-12 months of age. Males excreted rotavirus at a significant higher rate than females ($p < 0,05$). Identification of isolates demonstrated the circulation of G and P types in our country, with predominance G1P[8]-31% și G4P[8]-25%, G3P[8]-13%.

The overall findings of this study showed that rotavirus is one of the major etiological agents of diarrhea seen in infants and younger children. Rotavirus infection was prevalent in 8-12 months old children with males more susceptible to rotavirus infection than females. The range of rotavirus strains co-circulating in our country is rotavirus G and P types. The strategies for rotavirus control include identifying the target population for rotavirus vaccination, educating parents on how to identify and recognize the signs of dehydration and also to know that rotavirus infection in children is unavoidable and should be looked out for.

PECULIARITIES OF THE SANOGENIC FORMATION OF DISTINCT COMPONENTS OF PSYCHIC HEALTH IN PRESCHOOLERS

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With the purpose to resolve the most important objective of the sanocreatology – to develop methods and manners of the targeted creation of the psychic health it is necessary to establish peculiarities of the formation in early postnatal ontogenesis psychic components formatting the psychic health.

The revealing of legislations of the formation of psychic health components in early postnatal ontogenesis, in particular, cognitive and communicative playing determinative role in the development of psyche, especially, of the attention, memory, and thinking is possible to implement on the base of study of the accuracy and adequacy of the child's reflection of internal and external medium factors, events and their relationships, memorization and reproduction of the information. Although, elements of the neurophysiologic component of psyche (non-conditioning and conditioning reflexes) are manifested at first weeks and months after child birth, however, the formation of psyche per se and psychic health as essentially are realizing at 2.5-6 years of age, when different types of long-term memory begin manifest and develop, the intensive mental development and the emotionally significant information capturing take place, when the speech development is realized, their social circle is extended and the playing game activity is enhanced [Фурдуй Ф.И. и др., 1994]. The sanogenic psychic development of child is conditioned by adequate timely evolving of all components of psychic health. The formation of its cognitive component – thinking is strongly related with the evolution of memory (between the ages of 4 and 5 years), which in turn is associated with the state of speech development (more intensive at the age of 3 years). The cognitive component of child psychic health is undergoing progressive changes, in particular, the transformation of memory (from imaginative involuntary to verbal logic), of perception and thinking, the main form of that is the descriptive effective egocentric form between the age of 2,5 and 4 years, whereas the descriptive imaginative thinking – between the age of 4 and 6 years. It is characteristic that the memory is formed selectively and the memory of objects of interest for child is firstly consolidated. The verbal memory in contrast to the imaginative memory begins to manifest in association with consciousness development and forms in conjunction with quickly development of speech (child are learning daily up to 100 new words). It should be emphasized that the period up to 6 years old, especially, at the beginning of imaginative and logic memory development is very essential for the psychic health formation, since the child is perceives circa 70 % of information for this period which will be assimilated during lifetime, formation of the completely full psychic health is impossible in the case of deprivation at this stage of development.

Thus, it is necessary to mention that the preschooler age range plays an essential role in the formation of psyche itself and, especially, the psychic health in spite of gradual and asynchronous character of the development of its composite components.

THE BEHAVIOR OF SERUM TRANSAMINASES AFTER THE ADMINISTRATION OF THE LOCAL PRODUCT BIOR ON RABBITS

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It is widely accepted that biologically active substances are largely used in animal and birds breeding technologies as they are essential for the growth and development of the organism, which also have an impact on various physiological metabolic processes, and obviously have an influence on biologically productive indices on animals.

National and international researches focused on testing new biologically active products are widely increasing. The making of researches is influenced by the complete prohibition of feed antibiotics in the European Union from January 1. Literature review allowed us to point out that within the wide range of bio active preparations, algae and especially algal remedies deserve special attention.

The investigations were carried out on rabbits divided into 3 groups; two experimental groups to which was administered the remedy BioR at 1,5 ml/capita and 2,5 ml /capita, and one control group to which was administered NaCl 0,9 % 1 ml/capita solution, the number of animals being 7 in each group. During the study, animals were clinically examined in order to highlight various deviations from the actual physiological state.

Analyzing the obtained results, we note that the ALT level in the control group, both from the first and the second collection slightly differs from the value of this index at the study onset. On the experimental group, the first collection which was carried out at the 14 - day of gestation, the ALT level is 35,26 IU/l meaning 34% lower than the baseline and 30% lower compared to the control group and the second collection which was carried out at 30 - day of lactation the ALT level is 69,28 IU/l increased by 30% from the baseline and 27,6% compared to the control group, this can be explained by the fact that this dose leads to enhanced metabolic processes, matter certified by other authors who after the administration of a hepatoprotective on foxes reported an increase of transaminases by 12% in serum.

From the data obtained, the AST level on the control group is slightly increased compared to the value of this index at the study onset, 5,6% from the first collection and 16,6% from the second collection. On the first experimental group, the AST level is 29,54 IU/l in first collection is lower by 22,5% from the baseline and 26,6% compared to the control group, on the second experimental group, which was carried out on the 30th day of lactation, the AST level is 39,56 IU/l, slightly increased by 3,8% from the baseline and lower by 11% compared to the control group, this fact denotes the presence of a lower degree of cell damage and changes in trans membrane permeability of hepatocytes.

According to the results we conclude that changes in serum transaminases allows the use of the local remedy, BioR, attribute of chemotherapeutic potential of low toxicity on the functionality of the liver, allowing the normal biochemical processes in the liver.

ORIGANUM - PLANTS WITH MULTIPLE NUTRITIVE AND PHYTOTERAPEUTICAL USES

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Origanum is one of the most widespread genus with a vast taxonomic and chemical diversity from the family *Lamiaceae*. The taxonomy of *Origanum* is rather complicated and is characterised by a large morphological diversity resulting of 49 taxa and 42 species. The species with a high popularity is *Origanum vulgare* L. which has six subspecies with differences in the indumentum, the number of sessile glands on the leaves, bracts, and calyces, and the size and colour of the bracts and flowers.

The leaves of species commercially known as oregano are widely used as a very popular spice for food industry. Oregano is an essential ingredient in Greek, Italian and French cuisine.

Origanum has been a valuable source of natural products for maintaining human health for a long period of time, especially in last decade, with more intensive studies for natural therapies. Many of the studies confirmed the medicinal effects of the oregano for human health. The volatile oil of oregano is used internally (as tea) or externally (as ointment) for the treatment of respiratory disorders, indigestion, dental caries, rheumatoid arthritis and urinary tract disorders. As a medicinal plant, oregano is used as antifungal, antispasmodic, antibacterial, antioxidant, antiaggregant and anti-inflammatory agent. In addition, it has stimulating effect of digestion and antiseptic.

The use of the plants of *Origanum* in traditional medicine, food industry, cosmetology etc. is attributed to biological properties of a large number of chemically compounds (*p*-cymene, γ -terpinene, carvacrol methyl ethers, thymol methyl ethers, carvacrol acetates, thymol acetates) contained in oregano oil.

The polyvalent application of these plants serves as an argument of opportunity and importance of studies focused on genetic and chemotypical variability characterization of *Origanum vulgare* L. from the Republic of Moldova. This would allow resource management through improved plant seedlings, which will be selected according to the medicine needs and properties of plants and will contribute to the country's vegetable heritage revaluation and its use for medical purposes.

**DYNAMICS OF REFLEX AND HUMORAL COMPONENTS OF THE
REGULATION OF ACID FORMATION PROCESS AT HEALTHY
INDIVIDUALS AND AT PATIENTS WITH
GASTRODUODENAL PATHOLOGY**

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The aim of the research was to study the intensity of basal acid production in the body of the stomach and the dynamics of the ratio of reflex and humoral components of the regulation of acid formation process at healthy individuals and at patients with gastroduodenal pathology.

The study involved 12 healthy people and 75 patients with the following pathologies: superficial gastritis, superficial gastroduodenitis, erosive gastroduodenitis, duodenal ulcer and complicated duodenal ulcer (bulb deformation, stenosis). The sequence of the abovementioned pathologies was made depending on the rise of the intensity of the acid formation process in the body of the stomach.

For all patients were performed fibrogastrosocopy, pH-metry of the stomach with using AГM-10-01 and orogastric tube, atropine test (0,1 mg / 10 mg).

Atropine test is a combination of intragastric pH-metry with parenteral administration of atropine sulfate (0,1 mg/10 mg), i.e. clinically simple study of tolerance gastric secretory apparatus to anticholinergic agent. Atropine eliminates the effects of excitation of the parasympathetic nerves, including reflex secretion of gastric juice.

The results of the gastric pH-metry during the action of atropine allow differentiate the gastric acid formation of the reflex and humoral origin.

The conducted researches have allowed revealing the following regularities:

1. At healthy people the basal pH of the gastric body was $1,44 \pm 0,07$, after the administration of atropine – $1,84 \pm 0,20$ ($p < 0,05$). Atropine positive test was observed in 42,9% of cases, respectively atropine negative test was in 57,1% of cases. There is a slight predominance of a humoral component.
2. In the result was observed the dependent amplification ($p < 0,05$) of intensity of the acid formation process in the body of the stomach from the pH of $1,26 \pm 0,05$ at superficial gastritis to $1,06 \pm 0,07$ at erosive gastroduodenitis and $1,12 \pm 0,06$ – in complicated ulcer.
3. The more expressive is intensity of acid formation, the more significant is the predominance of a humoral component. In superficial gastritis, the ratio of reflex and humoral components were 48,1% and 51,9%, respectively, in erosive gastroduodenitis and complicated ulcer – 25% and 75%, respectively. At the predominance of humoral component above reflex on 50% or more - leads to the damage of gastric mucosa in the form of erosions and ulcers.

ANTIFUNGAL ACTIVITY OF JUGLANS REGIA (L.) EXTRACTS AGAINST CANDIDA ALBICANS

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Candida albicans is a pleomorphic fungus, which is part of the normal microbial community of most healthy individuals. In certain circumstances, there may be a switch from commensalism to parasitism. The same can occur under conditions of rapid transcriptional reprogramming of fungal culture. In these circumstances, *Candida* strains pass into the category of opportunistic pathogens causing local infections or systemic disorders, from mild skin infections and *candida urinary tract infections* to *candidemia*. *Candida* is the most common human fungal pathogen, the fourth leading cause of *nosocomial blood stream infections*. In the USA, for example, damages produced by these infections are estimated at 2 billion US \$ and the mortality caused by them is higher than 40%, even when administered antifungal therapy and the facilities of modern units of intensive care [1]. Effective antifungal preparations are few, and their involvement in antifungal therapy presents a hematological risk factor, hepatic and renal toxicity.

Plants are an inexhaustible source of new preparations with different action, including antimicrobial action. The compounds with antifungal activity from plant biomass are characterized by their mode of action, different than one known for traditional antifungal preparations. A special emphasis deserves to be placed on the combined and synergistic action of different compounds of plant biomass, which greatly enhances the harmful effect of isolated compounds on fungi pathogens. It was demonstrated the antifungal activity of water extracts from green walnut fruit, methanol extracts, ethyl acetate and acetone extracts from bark on pathogenic strains (*Candida albicans* CECT 1394, *Candida albicans* ATCC 90029) [2].

Walnut leaves present a precious biological material, but inexpensive, from that can be obtained the bioactive compounds, including compounds with antifungal properties. Thus, there were performed extractions with methanol, ethyl acetate and acetone from walnut leaves (*Juglans regia* L.) These standardized extracts were tested against strain *Candida albicans* ATCC 10231. Using diffusion in agar with application of disks impregnated with extracts of walnut leaves (300-500 mg/disc) allowed to establish that all extracts have antifungal activity against the tested strain, the size of inhibitions areas being 9,0-16,2 mm in diameter. The most active were found to be the ethyl acetate extracts, for which the minimum inhibitory concentration was between 0,01 and 0,10 mg dry weight/ml and the minimum fungicidal concentration was 0,18-0,41 mg /l towards 0,85 mg /l of amphotericine B, which was used as a control. Thus, walnut leaves may be a suitable source for obtaining preparations with antifungal effect.

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ANTIBIOTIC RESISTANCE OF *PSEUDOMONAS AERUGINOSA* STRAINS

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Infectious diseases have been an important cause of morbidity and mortality throughout our history. With the expansion of the antibiotic era during the 20th century, there was a growing confidence that the need for infectious disease specialists would all but disappear. We are now faced with a growing population of pan-resistant bacteria that threaten to move us into what some consider the “postantibiotic era” of infectious diseases.

Some of the more problematic drug-resistant pathogens encountered today include methicillin-resistant *Staphylococcus aureus*, multidrug-resistant *Streptococcus pneumoniae*, and vancomycin-resistant *Enterococcus* spp. among the gram-positive bacteria and multidrug-resistant *Acinetobacter baumannii*, *Klebsiella pneumoniae*, *Escherichia coli*, and *Pseudomonas aeruginosa* among the gram-negative bacteria.

P. aeruginosa is a type of bacterium that has the ability to develop resistance to antibiotics rather rapidly over several generations. The increasing resistance of *P. aeruginosa* to numerous antibiotics, as a result of excessive antibiotic administration, is now leading to the accumulation of antibiotic resistance and cross-resistance between antibiotics and the appearance of multidrug-resistant (MDR) forms of *P. aeruginosa*. The treatment of MDR *P. aeruginosa* pneumonia in critical patients is therefore becoming more of a challenge. These findings stress the importance of microbiologists providing clinicians with accurate information regarding the sensitivity patterns of antibiotics, so that clinicians can select an appropriate antibiotic for the timely treatment of infectious diseases while still helping to prevent the occurrence of resistance of *P. aeruginosa* to antibiotics.

The aim of this study was to determine antimicrobial susceptibility of *Pseudomonas aeruginosa* strains.

Between January 2014 - December 2015 was carried out isolation and antibiotic susceptibility testing of 109 strains of *P. aeruginosa* isolated from various pathological products: blood cultures, trache-bronchial secretions, bronchial aspirations, secretions of surgical wounds, urocultures, other secretions. Isolation and identification of the strains was made by conventional methods. The sensitivity to antibiotics has been tested using antimicrobial disk susceptibility method. This study was conducted in the Bacteriological Laboratory of the National Center for Public Health.

From 109 *P. aeruginosa* strains isolated, 12 were multiple resistant to antibiotics. Testing strains to chinolones showed that, of the *P. aeruginosa* tested strains 74,2% were resistant to nalidixic acid, 27,8% to oxacillin. The study of the resistance to aminoglycosides showed that 30,6% of all strains were resistant to tobramycin and 26,6% to amikacin. Moderately increased percentages of resistance were found by testing the strains to ciprofloxacin (20,1%) and gentamicin (21,7%). Resistance to ceftazidime was 63,1%. Low levels of resistance were observed by testing the strains to imipenem (13,5%) and meropenem (15,7%).

The *P. aeruginosa* strains isolated presented multiple resistance to antibiotics. The appearance of panresistant strains create serious treatment difficulties. To prevent the emergence and the spreading of the multiple resistant *P. aeruginosa* strains in hospital environment, must be taken infections control measures: rational administration of those antibiotics proven to be involved in resistance selection, adequate dosage, periodic rotation of the antibiotics.

THE INFLUENCE OF DIET ON VITAL POTENTIAL AND BODY WEIGHT OF RATS IN DIFFERENT AGE PERIODS

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With the development of sanocreatology, the distinctness of food according with age periods is extremely topical. According to sanocreatology, only those food systems will be successful, which take into account not only physiological, operational, metabolic, but also and sanogenic needs, that have different connotations in several periods of age. Therefore, one of the tasks of the investigations was to estimate the influence of different diets on the vital potential, which is determined by the maximum bearing during maximal physical effort and by the intensity excess of body weight at mature and old rats. The experiments were performed on white rats: mature (5-6 months) and old (24-26 months) male rats. Three groups were formed from mature animals and three groups from old animals. The first group (control) was fed with standard food of ration (15% - proteins, 60% - carbohydrates, 25% - lipids); group 2 - with high-protein food ration (25% - proteins, 55% - carbohydrates, 20% - lipids); group 3 - with ration rich in carbohydrates (10% - proteins, 70% - carbohydrates, 20% - lipids). All animals in these groups were subjected to the maximum dynamic exercise by every day swimming during 31 days at water temperature +27° C.

It was found that the food ration rich in protein do not show the stable influence on vital potential of the mature animals. In the most of days for estimation (21 days from the 31 days), which constituted the study period, the excess of proteins does not influence the vital potential, only during the first 10 days it was establish a decrease of this potential. The comparison of the change of maximum swimming time of senile rats fed with standard ration and with protein rich ration, denotes that vital potential of animals fed with protein rich diet, is inferior unlike to animals fed with standard food, although it can be noted the trend of increase. Namely proteins in senile period of age, although contributes to the increase of vital potential in comparison to the initial time, however, this contribution is much smaller comparing with standard food. Alimentation of mature rats with relatively rich carbohydrate diet in association with daily dynamic exercise did not cause also the significant changes in exteriorization of the vital potential. In the same time, it was observed the increase of vital potential of old rats fed with carbohydrate rich ration in comparison with to animals fed with standard food.

Simultaneous with the vital potential it was studied the impact of ration on the dynamics of body weight change during the period of investigation. The analysis the body weight depending on ration denotes that body weight of mature and old rats tends to increase at the end of the experiment. Both at animals fed with standard ration, as well as at those fed with diet rich in proteins and with diet rich in carbohydrates it was established relatively uneven growth of body weight, respectively with 104, 110 and 89,8 g. The analysis of old rats body weight, denotes that regardless of ration, the rat body weight tended to increase at the end of the experiment, but to a greater extent of those fed with carbohydrate rich ration (standard ration with 11,5g, and high carbohydrate ration with 13,18g).

Therefore, alimentation of mature rats with the protein rich ration and with carbohydrate rich ration in association with maximal physical exertion not exert relevant influence on the manifestation of vital potential, while at old rats, the carbohydrate rich ration enhances the vital potential of organism.

INTERACTION BETWEEN MORPHO-FUNCTIONAL STATE OF THE COCK GAMETES AND VITAMINS CONTENT DURING CRYOPRESERVATION

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Vitamins possess antioxiative endogenous properties in the performance of the peroxidation processes in biological objects, which in unfavorable conditions can be disordered. The application of varieties of defence mechanisms and the maintenance of the evolution processes, which include vitamins, available and beneficial to maintain specific metabolic reactions could serve as one of the priority solutions for the physiological survival and functioning of the spermatozoa.

Therefore, our researches aimed studying the influence of the α -tocopherol acetate, ascorbic acid and vicasol as antioxidants, on the rooster sperm sanogenity in its cryoconservation process.

Rooster sperm was gathered, appreciated and manipulated by using the general accepted methods. Sperm cryoconservation was realized according to the classical schemata of cryoconservation in form of pastille at the liquid nitrogen temperature. The methods of assessing the physiological indexes aimed to determine the concentration, mobility and longevity of spermatozoa. The estimation of the pathological forms in sperm is to determine the number of spermatozoa with abnormal aspect in the result of their morphological examination.

The obtained results established the optimal concentration of the vitamin E (the α -tocopherol acetate) in the composition of the synthetic medium for rooster sperm cryoconservation, which can be used in the composition of the synthetic medium as a stabilizer of the functional state and spermatozoa morphological structures, even in vulnerable conditions of the congealing-defrosting of the sperm.

The antioxidative and membranotrop effect of the researched vitamins can be achieved by maintaining and consolidation of the structural-functional status of the spermatozoa biological membrane, in the result occurs the increase of mobility and decrease of the level of gamete pathologies. In the same time, it was found that the action of the ascorbic acid and vicasol at hypothermal cryoconservation and rooster sperm cryoconservation don't determine the maintenance of spermatozoa functional activity at a high level, but the empirical research, which was used by us to initiate this experiments is less efficient than that planned.

In this way the programming of using the membranotrop products and of other nature is necessary to take in account the priority properties of the substances and the possibilities of manifestation of these properties.

PROTEIN DYNAMICS IN SPIRULINA DURING CULTIVATION IN STANDARD LABORATORY AND INDUSTRIAL CONDITIONS

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Spirulina is cultivated mainly for nutritional and therapeutic value of its biomass. Therefore, the monitoring of quantitative changes of the main components, already used in various fields, can facilitate the development of recommendations for increasing the efficiency of applied technologies. In this case, the recommendations may concern the implementation of technologies developed in laboratory conditions to industrial conditions.

Experiments were performed in the laboratory of Phycobiotechnology of the Institute of Microbiology and Biotechnology (standard laboratory conditions) and Ficotehfarm Ltd. (industrial conditions). In this research was involved a biotechnological strain adapted to laboratory and industrial growing conditions. An optimized nutrient medium was used to provide a maximal production of biochemically balanced biomass. Cultivation in laboratory conditions was carried out in Erlenmeyer flasks (2L cultural medium) maintaining the following parameters: temperature 25-28°C, pH 8-9, light intensity of 4000 lx. During the 10 day cultivation cycle, the culture was periodically (2h/day) stirred in the universal laboratory shaker WU-4 (oscillation frequency - 25 Hz). The amount of inoculum was 0,4-0,45g/L of absolutely dry biomass. Cultivation in industrial conditions was carried out in stainless steel cultivators (50 L) with continuous stirring, maintaining Ficotehfarm Ltd. parameters.

The protein is the major biomass component, representing up to 75% of the absolutely dry biomass (ADB). The decreasing of protein content in spirulina biomass was observed in the first cultivation day for both experimental variants: by 7% under laboratory conditions and by 15% under industrial conditions. Subsequently, was noted the increase of protein content in the biomass, reaching the amount of 73,5% ADB at the 6th cultivation day in laboratory conditions, followed by the decrease of protein content at the 7th day (65% ADB) and stabilization of the amount of protein at 64-70% ADB in the last 3 days of cultivation.

The protein content in spirulina biomass grown under industrial conditions, reached 69.7% ADB at the 3rd day of cultivation and this value was maintained over 4 days. The maximal accumulation of proteins in biomass - 78% ADB, was reported at the 10th day.

Therefore, the industrial conditions are favorable for the protein accumulation in spirulina biomass, which is a continuous process beginning the 3rd day of the cultivation and reaching the maximum of 78% ADB at the 10th day. The protein accumulation in laboratory conditions has similar dynamics, but it is a slower process with lower protein content: 73,5% ADB at the 6th day of cultivation.

GENERAL AND PRACTICAL ASPECTS OF THE ULTRADIAN METABOLIC BYORHYTMS

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Ultradian metabolic biorhythms were discovered in the late 1950s, lasting for 20-90 minutes, they determine a large number of processes in the animal body such as hormone secretion, sleeping periods, intracellular and extracellular interactions. They may also have importance in receiving some medicines.

In order to get more information about them (Ultradian metabolic biorhythms), an extensive bibliographical study over different aspects of ultradian metabolic biorhythms was required, more detailed was revealed the information which regards the practical aspects about their medical importance.

The obtained data shows that in each investigated organism, the dry cell mass differs in pre-set intervals of time, 20-90 minutes, this information was certified by divers methods of scientific research. The 90 minutes intervals are more relevant in practice because they dictate the vital activity of human organism in both of periods, wakefulness and sleep. Although the most known example is the synthesis and secretion of the cortisol over day, lots of other biological active substances has a similar mechanism of synthesis. Ultradian metabolic biorhythms are considered being involved in cellular respiration, the activity of enzymes, cytoplasmic pH, the amount of nucleic acids and even cell dimensions. Moreover, the synthesis of different substances controls the synthesis and rhythms of others, so these biorhythms adjustment and synchronization occurs as follows: endogenously (interstitial fluid) which involves the following reactions: gangliosides, attach to specific receptors and release Ca^{2+} depots, calcium activates protein kinase, so the phosphorylation of specific proteins occurs and thus sets the stage of biorhythms of synthesis; Exogenously (blood) in the same way, the only difference is that protein kinasis is activated by cAMP which is activated by the adenylate cyclase, the last one (adenylate cyclase) is activated by adrenaline, serotonin ,melatonin,etc. It is also found that the frequency and synchronization of biorhythms at the cellular level, is affected by the process of aging in organism.

Researched phenomenon has important application in several aspects: 1)In this way it adjusts the functions of the entire body; 2)The mechanism affects the ability of the body to work well with a determined frequency; 3)The quantitative difference of some substances at different periods of time, is important in the effectiveness of drugs introduced in different phases of ultradian cycles; 4)The perspective to compensate aging effects by introducing certain substances in the intercellular space.

TEENAGER BEHAVIOR DURING THE SEXUAL MATURATION AND PSYCHO-EMOTIONAL INSTABILITY

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The Modern problems studying in the nowadays society gives global priority on mental health. According to the definition proposed by acad. Furdui, mental health is a relatively stable integrative multidimensional complex status (neurophysiological, cognitive, emotional sentimental, social behavioral and individual semantic) of the activity of higher nervous system with individual characteristics. Also, the proposed concept provides: perception and adequate behavior in special circumstances; rendering resistance to its own and foreign intentions, that can bring damage sustained personally, to society or to the nature etc.

It is known that the study of behavior is based on the new adaptive conducts and attitudes, and involves balance changing of the mental health of the individuals. The Social and psychological factors (micro-social factors (family, school, friends), the macro-social factors (social economic, cultural, moral) are strongly associated with the development and manifestation of the socio-behavioral block. The assembly of reactions performed in response to certain situations, depending on the environmental stimuli and internal tensions of the organism, that have a specific direction, a certain goal and are performed in a unit of time determine sanogenic or dissanogenic behavioral peculiarities.

According to Neveanu (1978), the deviant behavior is opposite to the conformist behavior, which has a significance of inadaptation. Quite vulnerable to the environmental and social conditions are children and teenagers, and each age period has its mechanisms of adaptation to the new environment. Debes (1981) argues that adolescence is one of the sensitive periods of personality conquest, and in the vision of the co-workers from the Institute of Physiology and Sanocreatology of the ASM (Furdui et al., 1999) the teenage is a period with deep biological changes, with mental and emotional instability. In this stage extensive ongoing growth process takes place, which is presented in two forms: physical growth and maturation. This is the period when childhood traits disappear, giving way to the complex particularities in appearance of sexual maturation. In a relatively short time, new elements occur, that print a deep reorganization of the whole organism, a period of rapid changes and explosive growth in weight and height. Also, it is the period of excitement, affection and of the highlighted emotions. The crisis of the own originality is explained by the manifestation of puberty stage in the society, when the individual is not considered neither child nor adult; he does not have a well-defined status and its role remains uncertain.

Schiopu (1997) considers that an important role in the adaptation process has the balance between the reality assimilation and the accommodation to the subjective conditions and to the concrete circumstances of life. In the period of adaptation complex bio-psycho-social changes occur. The crisis of the teenager's adaptation is based on the searches for a new emotional equilibrium, which would overcome the "child of yesterday" and "ego" from the reality. The conduct of these stages leads to the behavior change, resulting the manifestation of an inadaptable behavior, which sometimes can reach up to conflicts with cultural values.

The responsibility accepted by the teenager as a fundament of their own moral positions, forms the basis of the intrinsic motivation of the behavior and of its actions, and the coordinator of such a behavior is the conscience. The best alternative is to give the teenagers self-confidence, independence, sense of value and competence.

THE MICROBIOCENOSIS OF VAGINA AND ITS DEREGLATION WHICH IS DANGEROUS IN THE POSTNATAL PERIOD

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Changes of normal microflora are particularly dangerous for pregnant women. It is especially important to examine the vaginal microflora during pregnancy. The pathological changes of the microbiocenosis of a pregnant woman is caused by *Streptococcus agalactiae* (S. agalactiae). This pathogen is the cause of diseases of the perinatal period. S. agalactiae infection of newborns often targets in the form of bacteremia, the respiratory sistem, meninges, especially in premature and underweight newborns sepsis develops in 77-88% of all the cases of infection.

We carried out an experiment - studying the protective role of *L. acidophilus* and the influence to *S. agalactiae* in vitro, confirming the important protective role of normal vaginal microflora against dysbiosis. The material as a vaginal secretion was collected from the pregnant women and healthy women of reproductive age. 23 cultures of *S. agalactiae* were isolated and cultivated in the laboratory of SYNEVO. The bacterial inoculation was done using the solid nutrient media: blood agar with 20% red blood cells of sheep for the cultivation of streptococci. And lactobacagar for cultivation of the acid lactic bacteria. The experiment was conducted by the inverted units. On the last day of the experiment it was clearly visible the lack of clear zone around the inverted blocks agar with lactobacilli, which in the different sectors ranged from 14 to 17 mm in diameter. All 23 cultures of *Streptococcus agalactiae* showed a clear growth retardation around the inverted units, indicating the antagonistic opportunities of *L.acidophilus* in relation with *Streptococcus agalactiae* in vitro conditions.

The antagonistic properties of lactobacilli are important for the mechanisms of the formation and functioning of microbiocenosis. In case of the deregulation of microbiocenosis vagina tract, you should do its correction using the probiotics, containing the *L. acidophilus* which has demonstrated the antagonistic activity in relation to *S. agalactiae* in vitro conditions. It's important to examine the pregnant women in time. To our mind, it's very important to develop the methods directed to the improvement of the state of obligate microflora of vagina. [1,2,3,4]

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EVOLUTION OF INSTRUMENTS FOR THE ANALYSIS OF QUANTITATIVE POLYMERASE CHAIN REACTION (Q-PCR)

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Since its commercial introduction two decades ago, real-time quantitative polymerase-chain-reaction (Q-PCR) has come to play a prominent role in the biomedical sciences.

The quantification of target DNA in each cycle of a qPCR experiment is based on measuring the emission of a fluorescent reporter dye. Dyes that bind to double-stranded DNA and upon excitation emit light, such as SYBR Green, which is the most widely used DNA dyes due to ease of use and cost efficiency. His disadvantage is that they bind to any doublestranded DNA, including non-specific reaction products, which might result in an overestimation of the target concentration. Subsequently, they were developed probe-based methods, such as TaqMan probes, molecular beacons, or scorpion primers, which rely on the sequence-specific detection of a desired PCR product resulting in increased specificity and sensitivity Q-PCR metho using general principles of PCR, so it includes all stages of reaction denaturation, attaching primers and elongation. Q-PCR method uses general principles of PCR, so it includes all stages of reaction: denaturation, annealing and elongation.

The fluorescence signal over a wide frequency range is directly proportional to the concentration of DNA, and to calculate the matrix value, which was used in the beginning of the reaction, is use the linear ratio between the PCR product and the fluorescence intensity. The quantification cycle (C_q) value, previously known as the threshold cycle (C_t), crossing point (C_p), or take-off point (TOP) means the number of cycles needed to reach the threshold level of fluorescence signal. Using the determined C_q value, quantification of nucleic acids can be performed by absolute quantification or relative quantification (delta C_q). The absolute quantification uses a standart calibration curve or recently, digital PCR method. Currently available commercial systems can amplify a single DNA molecule ten thousand times (Bio-Rad, Life Technologies), fifty thousand (Fluidigm), and ten million (RainDance) in each experiment. Relative quantification is based on internal reference genes to determine fold-differences in expression of the target gene. Thereby, to calculate the C_q value are used software packages and tools for the analysis of Q-PCR data. The first quantifying tools for analysis were based on the Windows operating system and included applications and tools based on Microsoft Excel as DART-PCR, LinRegPCR, qBASE, qCalculator, qPCR-DAMS. Further, Web tools were created as CampER, Cy0 Method, PCR-Miner, which offers the most comprehensive functionality and supports, in addition to storing and sharing of raw and processed data, relative quantification of Q-PCR data. Another generation of software tools include R-packages, which represents a free, open source cross-platform software for statistical computing, visualization and graphical representation. Packages currently available as ddCT, dpcR, EasyqpcrR, FPK-PCR allow a transparent analysis and customization.

In the Republic of Moldova Q-PCR is an irrefutable basis for scientific research, detection of pathogens and biomedical diagnosis.

THE ACTION OF SOME FOOD RATIONS ON THE NUMERICAL VALUE OF CONDITIONING PATHOGENIC MICROORGANISMS

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Currently it is known that the category of conditioning pathogenic microorganisms is permanent around of organism and reflects the pathogenic properties only under certain conditions. A representative of these microorganisms in the human and animal digestive tract is the genus *Escherichia* which presented interest for the investigation.

In our previous research it was established that the action of unfavorable factors of the environment induces different negative changes in the quantity of these microorganisms, which often contributed to the emergence and development of intestinal pathologies, such as dismicrobism and diarrhoea bowel dysfunction.

Because in the various conditions it is required differentiation of food rations, the purpose of this paper was to elucidate the degree of effectiveness of food rations on the numerical value of conditioning pathogenic microorganisms of the genus *Escherichia*.

The studies were done under *in vitro* conditions, in two series of experiments with seven groups each. In the first series of study it was studied the quantitative indices of *Escherichia* in monoculture under the action of the six variants of food rations, elaborated in the laboratory of "Food and Digestion of Sanocreatology" of the Institute of Physiology and Sanocreatology of ASM. The variants differ by the percentage ratio of carbohydrates, lipids and proteins (I - 57, 35, 8; II - 58, 33, 9; III - 59, 31, 10; IV - 60, 29, 11; V - 61, 27, 12; VI - 61, 25, 14% respectively).

The obtained results in the first series of experiments showed that the highest degree of action was revealed in group IV, where was tested the third food ration, because it contributed to the inhibition of the multiplication process of bacteria *E. coli* with 23.39%.

In the second series of research we studied the influence of elaborated rations on the *Escherichia* in association with other representatives of intestinal microflora (*Bifidobacterium*, *Lactobacillus* and *Enterococcus* genus).

The obtained data in this series of experiments denote that all variants of experimented food rations contributed to diminishing of the numerical value of *Escherichia* quite differently, but more pronounced were variants IV, V and VI. So, the quantitative composition of these ratios showed positive action confirmed by the fact that they have contributed to the decrease of the number of *Escherichia*, with 29,70, 31,08 and 26,64% respectively.

Therefore, the obtained results demonstrated that the variants VI, V and VI of the newly elaborated and experimented food rations showed the high level of action on numerical value of conditioning pathogenic microorganisms on the example of genus *Escherichia* and can be recommended for this purpose.

**MICROALGA VERDE *DUNALIELLA SALINA* - SURSĂ
PROMIȚĂTOARE DE GERMANIU ORGANIC**

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Convertirea germaniului din compuși chimici toxici în germaniu metabolizat în compuși ușor asimilabili de organismul uman cu utilizarea microorganismelor în calitate de biotransformatori este o cale de alternativă în obținerea unor remedii eficiente cu efect anticancer. Rezultatele cercetărilor efectuate anterior întreprinse de către cercetătorii laboratorului „Ficobiotehnologie” au scos în evidență capacitatea spirulinei de a acumula germaniu în biomasă la cultivarea ei în prezența unor compuși ai Ge(IV). În literatura de specialitate practic lipsesc careva studii privind influența unor compuși organici ai germaniului asupra acumulării acestuia în biomasă microalgei verzi *Dunaliella salina*. Astfel, prezintă interes cultivarea dunaliei în prezența unor compuși organici noi ai germaniului pentru obținerea biomasei îmbogățite cu acest microelement și alte substanțe bioactive.

În calitate de obiect de studiu a servit tulpina de microalge *Dunaliella salina* CNM-AV-02, depozitată în Colecția Națională de Microorganisme Neapatogene a Institutului de Microbiologie și Biotehnologie al AȘM. Au fost aplicați următorii parametri de cultivare: temperatura de 27-29°C, și 2 regimuri de iluminare de 3500lx și 5000lx. Drept sursă de germaniu la mediul de cultivare a dunaliei a fost utilizat compusul ne origine anorganică GeO₂ și compusul coordinativ cifrat al Ge(IV)-FM-30 în concentrații de 15-30mg/l.

Rezultatele cercetărilor au demonstrat că în cazul tuturor variantelor experimentale (cultivare în regim de iluminare normală (3500lx) și iluminare intensă (5000lx)), pentru toți compușii cercetați, conținutul de germaniu în biomasă crește odată cu majorarea concentrației compusului în mediul de cultivare a dunaliei, atingând valoarea maximă la concentrația de 30mg/l. Cel mai înalt conținut de germaniu a fost obținut în biomasă de dunalielă rezultată la cultivare în prezența compusului FM-30, valorile cantitative fiind cuprinse între 34mg/%-75mg/% în cazul cultivării dunaliei în regim de iluminare normal și între 40mg/%-100mg/% în caz de iluminare intensă.

Astfel, putem concluziona, că compușii cercetați ai germaniului pot fi utilizați în biotehnologie în calitate de reglatori de creștere și obținere a biomasei de dunalielă cu conținut înalt de germaniu și alte substanțe bioactive – sursă de produse germanocomponente cu efect anticancerigen și imunostimulator.

CURRENT ASPECTS AND PROSPECTS IN BIOINFORMATICS

LIFE SCIENCES IN THE DIALOGUE OF
GENERATIONS:
*CONNECTIONS BETWEEN UNIVERSITIES,
ACADEMIA AND BUSINESS COMMUNITY*

IMPACT OF THE EURASIAN MINERAL WATER ON THE BIOCHEMICAL COMPOSITION OF BLOOD

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Aim of study: To establish quantitative relationships linking composition and properties of human venous blood with a water-salt composition of the Eurasian hydro-mineral resources (mineral waters and therapeutic mud)

Materials and Methods: To identify the composition and properties of human venous blood and of natural mineral waters and therapeutic mud we introduced the concept of "characteristic indicator" of water-salt solutions, Φ , connecting a total mineralization, ion composition and physiological parameters of human blood [1]. Mathematical model, allowing to perform the comparative assessment of the effects of hydro-mineral resources on the physiological state of the human body, was implemented as a universal computer program for calculation of analytical dependencies of the characteristic indicator composition of blood φ , as a function: $\varphi_i = \alpha \cdot B_i^\delta$, where: φ_i - characteristic indicator of blood calculated at i -th blood biochemistry index; B_i - laboratory biochemical indicator of a certain i -th sample of blood; α and δ - constants [2].

Conclusions: 1. Characteristic indicators of composition and properties of hydro resources (Φ) and venous human blood (φ) allow a high degree of accuracy to assess the effectiveness of the impact of mineral water and mud on the human body according to the biochemical blood test; 2. Characteristic indicators allow the assessment of the physiological condition of the body and can be used for the organization of national and European monitoring systems of social health; 3. Analytical dependence function $\ln \varphi(Hb) = -7,0462 \ln \left(\frac{pCO_2}{pO_2} \right) - 627,22$

allow a quantitative assessment of laboratory data on the content of hemoglobin, carbon dioxide and oxygen in the blood before taking treatments.

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BIOINFORMATICS PROSPECTS IN PLANT RESEARCH: A BRIEF INTRODUCTION

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Bioinformatics refers to the study of biological information using concepts and methods in computer science, statistics, and engineering. It can be divided into two categories: *biological information management* and *computational biology*, and plays an essential role in current plant science.

To increase the understanding of cellular processes associated with plants, an depth analysis of genomic, proteomic and metabolomic information is required. Thus nowadays is possible a suite of essential techniques for analyzing and interpreting huge volumes of information generated using molecular biology-based techniques. Important advances are obtained in the basic areas of sequence, gene expression, protein, and metabolite analysis, databases, and ontologies. The modern approaches offer essential tools for the identification of genes and pathways that may be associated with important bioactive secondary metabolites of plants.

The volume of information related to plant biology accumulated over the ages and those being generating by contemporary methodologies require a common platform for consolidated and integrated access. Several databases have been developed for information related to one or more aspects of plants: **AgBase** (agbase.msstate.edu/), **Plantgdb** (plantgdb.org/), **CropNet** (ukcrop.net/), **PLEXdb** (plexdb.org/), etc., and specific databases: **SGN** (solgenomics.net/), **CerealsDB** (cerealsdb.uk.net/), **Gramene** (gramene.org/), **MaizeGDB** (maizegdb.org/), **CotthonDB** (cottondb.org/), etc.

A number of unsolved problems exists in bioinformatics nowadays, including data and database integration, automated knowledge extraction, robust inference of phenotype from genotype, and training, also retraining of students and prominent researchers.

In the next years, we will see integration of basic research with applied research in which plant biotechnology will play an essential role in solving urgent problems in our society such as developing renewable energy, reducing world hunger and poverty, and conservation the environment. It is expected an integration of disparate, specialized areas of plant research into more comparative, connected, holistic views and approaches in plant biology. Bioinformatics will provide the integration through which all of these types of integration will occur.

Bioinformatics is an approach that will be an essential part of plant research and we hope that every plant researcher will use more bioinformatics tools and approaches in their research projects.

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**MORPHOLOGICAL VARIABILITY OF *IXODES RICINUS*
(Acari, Ixodidae)**

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Introduction. Adaptation of living organisms to environmental changes is accompanied by formation of adaptations, one of the manifestations of which is morphological variability. Morphological changes in the populations of litter groups of invertebrates allow evaluating condition of the habitat. *Ixodes ricinus* tick species are convenient objects for bioindicative research, since they usually reach high enough numbers in a small area with a certain level of pollution and have low migration activity. The aim of the present work was to evaluate the morphological variability of *Ixodes ricinus* tick populations in the urbanized environment. For better comparison, we took two samples of ticks, collected in the same area but with a difference of 50 years.

Material and methods. We compared two tick populations collected in 1960s and 2011, respectively, on the territories of Chisinau city. Males were not used in the study. Altogether, 100 unengorged adult individuals for each of the two groups were studied. Morphological characters have been collected with Meiji EMZ-8TR trinocular assistance (Meiji Labax Co., Tokyo, Japan). In total 6 of morphological characters have been used, among which are length, width and total area of conscutum and alloscutum. All measurements were carried out from photographs. Significances were measured at the 1% level. The evaluation was conducted on the significance of differences in the average unbound samples by Student t-test. Based on the morphological measurements, 3 indices were calculated.

The results. Without exception, all morphological characteristics had high degree of variability. Ratios were characterized by a low degree of variability. Intergroup variability of *Ixodes ricinus* was registered in length of alloscutum and conscutum which was reflected in increasing by 5,39% and +4,61% respectively, in width which was reflected in increasing by +4,29% and +4,57% respectively in the sample group collected nowadays ($t > t_{0,01}$). After morphometric analysis, it was noted that the ticks that inhabited this area 50 years ago were a little smaller than today's representatives. While the overall proportions of the body remained at the same level as 50 years ago (changes are within the standard deviation, and may be the result of variations in measurements) it should be noted that in almost all cases, the maximum values of the parameters were similar for both samples, but in ticks collected in the 1960s, minimum and average values differed significantly. Ticks collected in our time, minimum and average values were higher by 4,5-5,5%.

Conclusions. *Ixodes ricinus* is a convenient object for bioindicative research. Its body reflects the direct impact of anthropogenic factors and mediated through the transformation of vegetation.

NWA A DISCRETE STOCHASTIC SIMULATION TECHNIQUE: A REVIEW

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We give the description for the Nondeterministic Waiting Time (NWT) algorithm, a biochemical modeling approach based on the Membrane Systems paradigm of computation. This simulation technique provides a unique perspective on the biochemical evolution of the cell different from Gillespie's algorithm and different from ODE-based simulations. That is, depending on the reactions and molecular multiplicities of a given model, our simulator is capable of producing results comparable to the alternative techniques -- continuous and deterministic or discrete and stochastic. Some results for a few models are given, illustrating the differences between the NWT algorithm, the Gillespie algorithm, and the solutions to systems of ordinary differential equations. We are able to show that in some cases the NWT technique yields results closer to Gillespie, while for other models the results of the NWT simulator are much closer to the results of the ODE simulator.

We have previously used this simulation technique to address issues surrounding Fas-induced apoptosis in cancerous cells and so-called latent HIV-infected cells.

For the design of the NWT algorithm (Jack et al. 2007), we have chosen a biologically inspired underlying framework: Membrane Systems (or P Systems). The essential design goal was to create a new simulation technique capable of exhibiting qualities comparable to the stochastic methods - e.g., the Gillespie algorithm (Gillespie 1976), (Gillespie 1977) -- but also systems of ordinary differential equations, depending on the particular configurations of the systems being modeled. Moreover, the NWT algorithm is designed to be less computationally intensive than the Gillespie algorithm; however, NWT maintains a level of nondeterminism that allows divergent solutions compared with systems of ordinary differential equations.

The work of Besozzi is in the area of applying variations of Gillespie's algorithm (with τ -leaping) to bacterial chemotaxis or mechanosensitive channels. The main idea of the current paper is to consider a trade-off between speed and sensitivity of the simulation method to be able to reach whole cell simulations. One of the models/examples that we consider in this paper was previously considered in the area of Membrane Systems (but in another setting/framework) in (Fontana and Manca 2008) considering metabolic networks, which yielded surprising results. We applied our modelling technique to study the latency of the HIV virus.

Based on the biological evidence in the literature, we were able to construct a simulation of the effects of HIV-1 proteins on the Fas-mediated apoptosis pathway. This is the first computational model of Fas-induced apoptosis in reactivated latently infected CD4+ T cells. With this model, we have attempted to understand CD4+ T cell latency. Interestingly, we have found cooperation between the type I and type II pathways. We have not been able to verify an explanation for this in the current literature.

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CURRENT ASPECTS AND PROSPECTS IN CLIMATIC CHANGE

LIFE SCIENCES IN THE DIALOGUE OF
GENERATIONS:
*CONNECTIONS BETWEEN UNIVERSITIES,
ACADEMIA AND BUSINESS COMMUNITY*

COMPARATIVE ANALYSIS OF THE PRESENT CLIMATE IN THE EAST OF THE EASTERN CARPATHIANS

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The eastern part of Romania together with Republic of Moldova, compose a geographical region located eastward from the Eastern Carpathians, widely open to the eastern part of Europe and the Black Sea, factor that generates significant local changes in the atmospherical dynamics.

Moldova has a temperate-continental transition climate. The influence of the Carpathians on the atmospheric circulation processes is felt at a very large extent. Under the mountains influence, the cyclones trajectories are changed, the atmospheric fronts are deformed, and as a result, significant changes occur, regarding weather and climate.

Certain of the problems recently discussed, in international and national investigations regarding the Western direction and the shelter character associated to the Carpathians, conclude that Western direction frequency appears to be below 35%, in the lower troposphere (850 hPa, approximately 1500m) in Romanian Moldova. These values increase towards East, due to the diminishing influence of the Carpathians orographic barrier.

On the other hand, the high frequency of the NW direction is given by the shape of the Carpathian Mountains, together with the orientation of the major river valleys. Towards the eastern part of the area, the frequency of the Northern circulation increase, due to the reduced influence of these variables. Also very high values of the atmospheric calm, registered at stations located near the Carpathians, confirm the shelter character given by the mountains.

In Romania, the percentage of the precipitation generated by the Atlantic and Mediterranean cyclones, reaches 80%, and the rest of 20% are produced in local circuits (Ujvari, 1972). Due to the obstacle created by the Eastern Carpathians, in Moldova the pluvio-genetic potential of the West and North-West circulation is very much diminished mostly in the eastern and south-eastern part of the region. The southern part of the study region, is defined by a lack of rainfall with Atlantic origin, being complemented by the mediterranean cyclones, which ensure an important percentage of the total amount of rainfall.

The average air temperature for the past years, arose from 9,5°C as it was the middle of the twentieth century, to 10°C. Significant changes regarding the warming trend, could be easily observed in the first decade of the 21st-century, when the average annual temperature rise by 0.9°C more than the rate recorded in the last decade of the twentieth century. This heating phenomenon is identified over the whole area East of the Eastern Carpathians.

The multiannual evolution of the absolute maximum temperature, highlights contrasting character of the climatic conditions induced by atmospheric circulation, with warm air mass advection in anticyclonic regime, especially in the Summer, and in the cyclonic regime, during the Winter. Absolute annual maximum temperature, exceed 40°C at most of the stations located below 100 meters in altitude, and 39° C at the ones situated above 100 meters. These absolute maximum temperatures over 39-40°C occur between May and September at the weather stations located in the southern part of the researched area, while in the northern part and to those situated at higher altitude, is restricted to the summer months. However, absolute temperature amplitude value is much higher in the northern areas, due to the lower values of the absolute minimum temperature registered in winter, compared to those from the stations located in the South.

GENERALITIES REGARDING NATIONAL HAIL SUPPRESSION AND RAINFALL ENHANCEMENT SYSTEM IN EASTERN ROMANIA

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In assessing the agriculture situation in the eight Moldavian counties (located in eastern Romania), with special reference to damage caused by hail and lack of rain, the following aspects:

- Hail is a frequently encountered phenomenon that affects annually over 2% of the agricultural area of Moldova;
- Fruit-wine areas are affected at a rate of 3,6%;
- Damage by calamities are important (an average of over 38,000 ha, of which 4000 ha-growing tree plantations);
- Hail is usually associated with thunderstorms and torrential rain which amplifies the destructive effect of hail;
- Another very serious phenomenon, is the lack of rain in Moldova, with adverse effects, over long periods of time. Average annual losses in this case, are about four times greater than those generated by hail;
- On average approximately 19% of the total land area of Moldova is affected annually;

The above considerations highlight the need to find a viable solution to reduce hail risk and stimulate rain precipitation.

For this purpose, the National hail suppression and rainfall enhancement system (Sistemului Național Antigrintină și de Creștere a Precipitațiilor SNACP) was created. Implementation of this system in our country provides a wide range of benefits to society; of them:

- Reduction of losses in agriculture and households, by combating hail;
- Developing a complementary system for the irrigation system, This complementary system should artificially stimulate rainfall, delivering water at a cheaper and faster rate than the irrigation system (3-4 times cheaper)
- Conversion of defense industry's capacity and personnel of research and production departments to civil activities
- Setting the stage for export of technical means of control.

As part of the national hail suppression and rainfall enhancement system for the area of Moldova, conditions have led to the creation of three local commanding units for the hail suppression system (UCCG):

UCCG Moldova 1 -Iasi, Iasi and Vaslui counties in the area;-

UCCG Moldova 2-Vrancea, Galati and Vrancea counties in the area;

UCCG Moldova 3, in the counties of Bacau, Neamt, Botosani and Suceava

THE CLIMATIC VARIABILITY OF SPRINGS IN THE CONTEXT OF CLIMATE CHANGE

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Climate change, regionally certified, determines the estimation of springs' climate variability. Therefore this season of transition has been classified over the territory of the Republic of Moldova referring to recent years, a period having an accelerating pace of these changes.

Therefore, in highlighting the limits of variability, the standard deviation from the climate norm concerning average temperature of the season was used, following the methodology of winters' classification in the Republic of Moldova [1, 2, 3]. So, the values expressions $\pm 0,5\sigma$, $\pm \sigma$, $\pm 1,5\sigma$, $\pm 2\sigma$, formed the basis of spring season classification and were background in highlighting the following types of spring:

Moderate cold springs $-0,5\sigma$

Relative cold springs $-\sigma$

Cold springs $-1,5\sigma$

Very cold springs $-2,0\sigma$

Moderate warm springs $+0,5\sigma$

Relative warm springs $+\sigma$

Warm springs $+1,5\sigma$

Very warm springs $+2,0\sigma$

Thus, if the average temperature of the spring-season of for the above mentioned period is $9,9^{\circ}\text{C}$ for the aforementioned types of warm springs seasonal average will constitute appropriately: $+10,6^{\circ}\text{C}$, $+11,3^{\circ}\text{C}$, $+12,0^{\circ}\text{C}$, $+12,7^{\circ}\text{C}$. Regarding cold springs, the seasonal average temperature is: $9,2^{\circ}\text{C}$, $8,5^{\circ}\text{C}$, $7,8^{\circ}\text{C}$ and $7,1^{\circ}\text{C}$, accordingly.

Current climate change also influences the manifestation in time of different types of springs. The elaboration of springs register reveals that over the territory of Moldova, during the last time period there is an increase in frequency of warm springs. Thus, in the case of moderate warm springs manifestation (24 cases), 9 cases are registered after the year 2000. As for relative warm springs, from 9 cases registered, 7 are registered after the year 2000. During this period, warm and very warm springs; 3 cases were registered, especially in recent years: 2007, 2012 and 2014, which indicates that the spring season in the Republic of Moldova attests a substantial increase in terms of temperature

In conclusion we notice, that this research are very much needed in carrying out prognostic researches.

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THE CLASSIFICATION OF AUTUMN SEASON OVER THE REPUBLIC OF MOLDOVA TERRITORY

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As in the case of springs, concerning the second season of transition, the autumn, in the context of climate warming trend over the territory of Moldova it is extremely important to know the level of thermal anomalies that characterize this season. Thus, based on the value sigma [1] were classified the autumns in the next succession:

Moderate cold autumns $-0,5\sigma$	Moderate warm autumns $+0,5\sigma$
Relative cold autumns $-\sigma$	Relative warm autumns $+\sigma$
Cold autumns $-1,5\sigma$	Warm autumns $+1,5\sigma$
Very cold autumns $-2,0\sigma$	Very warm autumns $+2,0\sigma$

According to the data shown in Tab. 1., the values 0.5σ , σ , 1.5σ , 2σ , indicate seasonal temperatures with different types of positive or negative deviations. Thus, abnormal positive amplitudes from the annual average of $10,3^{\circ}\text{C}$ is: $10,8^{\circ}\text{C}$, $11,4^{\circ}\text{C}$, $11,9^{\circ}\text{C}$, and $12,5^{\circ}\text{C}$, correspond to mean values of season that are established during warm autumns and abnormal negative amplitudes $-0,5 \sigma$, $-\sigma$, $-1,5 \sigma$, -2σ , correspond to seasonal average temperatures during cold autumns: $9,8^{\circ}\text{C}$; $9,2^{\circ}\text{C}$; $8,7^{\circ}\text{C}$; $8,1^{\circ}\text{C}$, from the annual average of $10,3^{\circ}\text{C}$.

Tab.1: Abnormalities that characterize autumns the Republic of Moldova

The characteristics	Warm autumns $y > x + \sigma$	The abnormal amplitude, $^{\circ}\text{C}$	Cold autumns $y < x - \sigma$	The abnormal amplitude, $^{\circ}\text{C}$
0,5 σ	$y > 10,3 + 0,5$	10,8	$y < 10,3 - 0,5$	9,8
σ	$y > 10,3 + 1,1$	11,4	$y < 10,3 - 1,1$	9,2
1,5 σ	$y > 10,3 + 1,6$	11,9	$y < 10,3 - 1,6$	8,7
2,0 σ	$y > 10,3 + 2,2$	12,5	$y < 10,3 - 2,2$	8,1

As in the case springs we notice, that lately there is a higher frequency of moderate warm autumns, which of the 25 cases - 10 cases occurred after 2000. We mention that moderate cold autumns occurred in 18 cases, and all had been recorded until 2000.

Therefore, knowledge of autumns climate variability over the country is extremely important at this stage, because it largely determine the agricultural production and supply.

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SOME WATER'S RESOURCES MEASURES IN THE CONTEXT OF CLIMATE CHANGE

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In order to ensure implementation of the assignments of The Framework Convention of the United Nations referring to climate change, approved by Parliament Decision no. 404-XIII of 16 March 1995(Official Monitor of the Republic of Moldova, 1995, no. 23, art. 239), as well as mechanisms and assignments of Kyoto Protocol to the Framework Convention of the United Nations about climate changes, to which Moldova joined by Law no.29-XV of 13 February 2003 (Official Monitor of the Republic of Moldova, 2003, no. 48, art. 193).

According to the Government Decision no. 1009, December 10, 2014 was approving: The Republic of Moldova Strategy adaptation to the climate change until 2020 and, according to Annex no. 2. The plan of action for implementation of the Republic of Moldova Strategy of adaptation to climate change until 2020.

In order to establish some measures about adapting to climate change were provide (accomplished) following actions relating to the adaptation managing waters to climate change:

a) adaptation measures at local and regional level:

- The intensifying of the expansion process of the covered territories with forestry vegetation and ecological restoration of the forests, creating of interconnection corridors between wooded massifs.

- The reassessment of water resources at the basins and hydrographical sub-basins level in climate changes conditions.

- The use in agriculture of some species/varieties resistant to intense and persisting droughts.

- The reviewing and completing the school curriculum for primary and secondary education, for including the topic "Climate Change" in the objects of the baseline studies.

- The developing and implementing of the programs and accessible training materials regarding to climate change adaptation, with the purpose to improving of the ability of the farmers, specialists in medicine, of civil protection and emergencies situations, engineers from the energy sector, transports and constructions, other specialists;

- The ensuring of a suitable management on floods risk.

b) the development measures of the scientific research:

The development measures stipulated in The actions plan for the implementation of the Republic of Moldova Strategy for adaptation to climate change until 2020 are included more several activities.

- The mapping of regional climate risks (for northern, central and southern part of the country) and sectorial (agriculture, forestry sector, energetic, transports, human health etc.);

- The developing of climate scenarios for Republic of Moldova, for medium and long term, based on general patterns of global circulation and regional climate patterns;

- The temporal and spatial evaluation of the climate change impact on waters surface and underground waters;

- The evaluation of available water resources in the conditions of climate change;

- The undertaking measures to rebut the drought / water scarcity.

RISKS AND METEO-CLIMATIC HAZARDS OF SUCEAVA PLATEAU

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Suceava Plateau, both the physical and geographical subunit of the Moldova Plateau is located in north-eastern Romania, temperate climate transition (Apostol, 2004). Situated at the eastern side of Eastern Carpathians, it contains the Plateau in the influenced aridity sector and the position in the northern extra-Carpathian area, it exposes it to oceanic circulation of air masses, permeated through northern side of Carpathian Chain (Apostol, 2000), well known phenomena in Romanian climatology as “baltic influence” (Neamu et al, 1970). Due to northern position, high altitude (about 300 m) presence of a large depression at the contact with the eastern side of Eastern Carpathians (Radauti Depression), which are conducive to thermic inversions. As an opening to the north-eastern European area, it makes it the main natural risks to be generated by low temperatures. Withal, among the prerequisites listed, as well for the reasons that are frequent in this area, this is the meeting of different kind of air circulation masses (tropical maritime and continental air masses, polar maritime and continental air masses or arctic maritime and continental air masses), with different physical proprieties, that will generate big varieties, frequency and intensity of dangerous phenomena. The eastern and northwestern influences cause harsh, long and cold winters, shorts springs accompanied by late frosts, and hoar-frosts, cool and humid summers, short autumns, with frequent winter characteristic weather conditions.

The study complements existing climatological information of scientific nature, using daily meteorological data provided by National Meteorological Agency from weather stations and rainfall stations (Suceava, Radauti, Falticeni, Cotnari and Roman) for a common observation period (1961-2010). The main processes used, were statistical analyses, comparison and graphical methods, which were extracted and processed statistically. Selection of torrential rains was based on Hellman criterion, the most rainfall suggestive criterion, characteristic to Romania climate. Interruptions due to rows of data, observations, change of location, created various difficulties processing fund data. Each element or climatic phenomenon was summarized in tables using Microsoft Excel, and for specific features, graphics were used together with various methods and programs for GIS spatial modeling (TNTmips, ArcGIS). Results based on the analysis of climatic factors, the risk phenomena and weather-related hazards, highlighted the regime and distribution of spatial-temporal, as well, special weather phenomena and related hazards in Suceava Plateau.

Predominant climatic risk phenomena and the most representative for Suceava Plateau are those in the cold season: early frosts in autumn or late frosts in spring (which are harmful to agricultural crop and plants), blizzards, heavy snowfalls and thick layers of snow, intense storms accompanied by hail, glazed frost, persistent fogs especially in lowland areas (Radauti and Liteni Depression), temperature inversions especially in low areas, valleys and depressions, cold waves. Territory of Suceava Plateau is also exposed to specific risks during warm season: thunderstorms accompanied by hail storms, excess moisture, torrential rains, heat waves, droughts and dryness period, all causing important damages.

Data analysis for the period 1961-2010, found that average air temperatures, for different periods have a geographical distribution relatively in order, with the highest values in the south and southeast and the lowest in northwest of Suceava Plateau. The dynamic factors, as the general circulation of atmosphere and radiating energy are the ones which are

contributing the most in the non-periodical variation. This aspect is determined by the position of the baric centers in relation to the studied habitat (the existing dorsal of the two anticyclones, Azoric and Eurasian, cause in the North of the country the change in cold air in North and North-East). The Suceava Plateau has a lower thermal potential with frequent temperature inversions. The most of the temperature inversions are registered in Radauti Depression, with a bigger frequency in the first part of the night and in early morning in the cold season, with massive cooling causing a real "pole of cold" in Suceava Plateau (Slavic, 1977), with the most days of ground frost and air frost (139 and 137 days), winter days (46 days), frosty nights (33 days). About 90% of days with frost are produced during the winter, being considered climatic risks just during the transition season.

The annual average sum of atmospheric precipitations from Suceava's Plateau is approximately 600 mm with meaningful differences, of over 100mm between the Southern habitat and the Northern one. The atmospheric precipitations gradually decrease from North-West to South-East, once the relief loses altitude and once the masses of humid air, of oceanic and Atlantic origin, are less frequent (including a slight appearance of the foehn phenomenon). Also, the relief is largely available in the East, which facilitates the entrance of continental dryer and warmer masses of air (of lower humidity). The higher values of global radiation (119 Kcal/cm²/annul), air temperature (9,4 °C), and the low values of water vapor tension, relative humidity, high levels of saturation deficit, low levels of cloudiness, duration of sunshine, low amount of precipitation, and high evapotranspiration in eastern of Suceava Plateau outlines an arid area, but the suitability of this topoclimate for viticulture made the eastern area of Suceava Plateau the most important agricultural area.

In Suceava Plateau the periods of drought and dryness period phenomena are manifested during all the seasons, with a predominance in the end of the summer, and in autumn, due to north-western and Eurasian weather influences, which causes very cold, long and snowy winters and cold, short springs (accompanied by typical winter characteristics and phenomena). But in comparison, the rainy periods of Suceava Plateau are more frequent than the droughty ones with differences.

Most of the Suceava Plateau is characterized by frequent advections of polar or arctic and temperate continental air, a rare temperate maritime which cause small annual average temperatures, higher atmospheric humidity and heavy precipitations (Slavic Gh., 1977). Also, cold arctic or polar waves are causing outstanding thermal declines, sometimes below -30,0°C, intense winter weather phenomena, frost, and snow storms. We concluded that predominant climatic risk phenomena and the most representative for Suceava Plateau are those in the cold season: early frosts in autumn or late frosts in spring (harmful to agricultural crop and plants), blizzards, heavy snowfalls and thick layers of snow, intense storms accompanied by hail, glazed frost, persistent fogs especially in lowland areas (Radauti and Liteni Depression), temperature inversions, cold waves. Territory of Suceava Plateau is exposed also to specific risks during warm season: thunderstorms accompanied by hail storms, excess moisture, torrential rains, heat waves, droughts all causing important damages. The results can be used for implementation of prevention and control systems for these phenomena.

THE EVOLUTION OF DROUGHT IN THE SUMMER OF 2015 AND ITS IMPACT ON THE AGRICULTURAL SECTOR OF THE REPUBLIC OF MOLDOVA

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Our country faces severe droughts on average every five years in the north and every three years in the southern and central districts. The latest severe droughts occurred in 2003, 2007, 2011, 2012 and 2015, being an obvious consequence of climate change.

The summer of 2015 is characterised by very hot weather and lack of regional rainfall, the precipitations having predominantly a local character.

The average air temperature of that season was 21,6.. + 23,8°C, by 2,2-3,3°C higher than the norm, that is recorded on average once in 15-30 years during the period of observations.

The number of days in which air temperature in the republic was $\geq + 35^{\circ}\text{C}$ actually is 8-21 days, the norm being 1-2 days, which is recorded on average once in 15-25 years.

The amount of precipitations during the summer in 60% of the country territory was 80-160 mm (40-70% of the norm). Only 50-70 mm (20-30% of the norm) fell isolated in the northern and central districts of the country, being recorded in these regions for the first time during the entire period of observations or on average once in 25-30 years.

Similar years in line with thermal regime and amount of rainfalls are 2007 and 2012.

The drought of 2015 has partially reduced the harvest of the Ist group cereals (by about 25% compared to the average harvest in 2014) and contributed to a significant decrease of the IInd group cereals (by about 30-40%).

Thus the direct losses in the agricultural sector regarding these 2 groups were over 3 bln.

According to the official information of the Ministry of Agriculture and Food Industry in 2015 in the country the average yield of winter wheat was 2,9 t / ha, winter barley – 2,5 t / ha, spring barley – 2,2 t / ha, rapeseed – 1,8 t / ha and peas – 1,5 t / ha.

The 2015 drought confirms once again the insufficient adaptation of Moldovan agriculture to drought conditions, which affect more frequently and with greater intensity the agricultural sector in recent years.

The mitigation of the consequences that the drought had on the growth and development of crops during the growing period of plants determines a strong need of implementation and enforcement of a broad and complex spectrum of measures:

1. Identification of the zones exposed to drought risk and the vulnerability of human communities related to economic, social and environmental criteria.
2. Extending of agricultural areas protected against natural risks, including the drought.
3. Establishment and continuous development of the irrigation areas.
4. Introduction of species, varieties and hybrids of plants with a higher tolerance and a high degree of adaptation to drought and extreme temperatures.
5. Implementation of advanced agricultural systems of cultivation: sustainable agriculture, ecological agriculture, conservative agriculture, including the No-till and Mini-till technologies.
6. Strengthening the consolidation of parceled agricultural lands, implementation of ecological crop rotations, compliance with placement requirements of crops on lands with uneven relief, application of the procedures for combating soil erosion.
7. Institutional Strengthening of the agricultural risk management system at national level and improvement of the methodology for assessing the impact of natural disasters on the agricultural sector.

THE RISK OF WHIRLWINDS IN THE REPUBLIC OF MOLDOVA

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In Europe, such phenomena as American tornadoes are called *whirlwinds*. In recent years, due to global warming, on the territory of European countries whirlpools occur more and more frequently. These whirlwinds formation mechanism is similar to that of American tornadoes, but have a lower intensity and amplitude.

The necessary conditions for the formation of tornadoes occur when a current of cold air meets a warm and moist air mass, forming enormous black cumulonimbus clouds. These clouds generates a storm with thunderstorms, in which the warm air rises, creating a strong current. At the top of the storm, strong winds begin to whirl faster and faster, forming a whirlwind. It is rotating in spirals very closer and closer to each other, increasing its speed and rising to the clouds. Then the tornado descends from the clouds and touches the ground with great violence.

Cloud funnel (composed of water droplets) has an average diameter of 150 m and retains its destructive force over a length of about 10 km. It can destroy solid constructions, can uproot large trees, can lift and carry objects at great distances.

On the territory of the Republic of Moldova whirlwind (tornado) is a relatively rare phenomenon. Usually, it is noticed during the warm season. In the past 50 years there have been recorded several cases of whirlwinds as follows: July 1, 1975 (Chisinau); April 27, 1976 (v. Berezlogi, d. Orhei); June 27, 1980 (d. Slobozia and Causeni); May 22, 1984 (v. Pride, d. Calarasi r); August 11, 1994 (v. Varatic, d. Riscani; v. Tatarovca Old, d. Soroca); September 14, 1998 (v. Vadul lui Voda, d. Criuleni); 8 and 9 July, 2000 (d. Singerei and Straseni); August 7, 2005 v. Cobusca, d. Anenii-Noi); April 17, 2012 (v. Băcioi, mun. Chisinau); May 20, 2012 (Chisinau).

The most powerful whirlwind, according to the action area and damages caused was recorded on August 11, 1994. The whirlwind mentioned crossed from west to east over the country, constituting about 10-25 km width and 80 length.

The crossing of the territory by whirlwinds was accompanied by intensifications of wind speed up to 120 km / h (measurements visual), rain and hail with a diameter of 30 mm, which caused human loses, injuries, and considerable damages of farms. Many agricultural properties were affected in Riscani Drochia, Donduseni and Soroca districts. The whirlwind caused great damage to housing fund (roofs were demolished and destroyed, glass doors and windows were broken communication and electricity were deteriorated).

According to the criterion of speed, the strongest wind (instrumental measurements) was the whirlwind recorded on July 8, 2000 in SM Codrii (v. Lozova, d. Straseni). The wind speed was 158 km / h (44 m / s). In the other cases listed above, whirlpools had a local character (width of 3 km), but also caused serious damages to the farms.

An efficient organization of preparations can substantially reduce human loses and material damages caused by the tornado. Of great importance is the idea that the alerts should be accurate and determine the competent authorities and the public to react promptly. To assure this are required rapid systems of broadcasting alerts to the people concerned.

Supervision of tornadoes is achieved both through networks using conventional weather radars and modern techniques. For their provision it is essential to first define areas where weather conditions are very unstable, making possible the emergence of violent thunderstorms or tornadoes.

THE IMPACT OF REGIONAL CLIMATE CHANGE ON AUTUMN WHEAT PRODUCTIVITY

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The purpose of the scientific work is to estimate the regional climate change and its impact on autumn wheat productivity, in order to estimate rainfall deficit, through new assessment indexes used at regional level: Climatic Water Index DEF, Evaporation Index E0, Index of Dry Periods Izu; to highlight moisture resources in the soil at a depth of 20cm during sowing and at a depth of 100cm during the most sensitive phases of development; wheat tillering-flowering-grain formation; intensity and frequency study of low and high critical temperatures manifestation during the development phase of autumn wheat, as well were developed simulations on climate change and productivity of autumn wheat in order to improve its adaptation the climate change.

Scientific research methodology has consisted a set of climate parameters, including indexes, which were firstly used in the Republic of Moldova, in order to properly reflect the impact of climate change on autumn wheat productivity. Firstly were taken into account indexes which adequate characterizing moisture resources over the Republic of Moldova territory, such as Climatic Water Index DEF, Evaporation Index E0, Index of Dry Periods Izu. For the first time were estimated soil moisture reserves during the most sensitive phases of development of autumn wheat; were analysed the intensity and frequency of climate risk factors manifestation during the autumn wheat growth and development, at the same time were conducted evaluations of autumn wheat future yield prediction, due to potential climate change.

For the first time has been highlighted change tendencies for autumn wheat vegetation phases as a result of climate change in recent decades, was estimated impact of climate change on different varieties of autumn wheat which are to be grown in the Republic of Moldova, therefore were evaluated thermal and hydrological risks during the most sensitive phases of development, being used on new climatic indices, including Climatic Water Index DEF, Evaporation Index E0, Index of Dry Periods Izu and has been demonstrated its usefulness in predicting adverse weather conditions for growth and development of autumn wheat; were carried out simulations regarding the impact of climate change on growth and development of autumn wheat.

The results will contribute a correct territorial location for autumn wheat, in the new given climate conditions; will be used in higher education institutions in order to teach specialized courses; will provide state bodies and individuals updated climate information in order to adapt autumn wheat crop to climate change.

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THE CLIMATIC VARIABILITY OF SUNFLOWER CROP HARVEST IN THE CONTEXT OF CLIMATE CHANGE

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In the current climate conditions, concerning the Republic of Moldova territory, which is characterized by is a high variability in time of climatic elements; particularly rainfall, is necessary to assess crops' climate variability, the sunflower especially. Despite the fact that this crop is characterized by a high ecological plasticity, however, during complicated years in terms agro-meteorological conditions, it can essentially differ from year to year. Thus, during the years with seasonal rainfall deficits, which are generally warmer, are formed a certain productive potential of this crop comparing to wet years, which are generally colder [1].

Therefore, it can be reported that, the variability from year to year of agro-climatic suitability can be quite emphasized, which justifies the utility and necessity of completing the favourability analysis at the annual average level along with an inter-annual variability analysis, to have a real idea of the agro-climatic potential. Related to the sunflower crop, as for other crops, this variability is largely determined by hybrid variety which is gained during improving its adaptability. In this context, we mention that, achieving a high and stable productivity of agricultural crops, including for sunflower, has been an important prerogative in agriculture.

In recent decades, due to the introduction of new varieties and use a new - more intensive technology of cultivation, the average productivity of sunflower crop has increased, however the tempo of growth in spatial aspect and at certain stages differs.

As a result result, climatic zones of the harvest's average value variability of per hectare were demarcated in the following sequence:

1. $C_m \leq 0,19$ – areas with high values of harvest
2. $C_m = 0,20-0,24$ – areas with stable harvest
3. $C_m = 0,25-0,29$ – areas with stable average values
4. $C_m = 0,30-0,34$ – areas with relatively unstable values
5. $C_m = 0,35-0,39$ – unstable harvests
6. $C_m \geq 0,40$ – areas with the most unstable harvest values

Favourable areas in sunflower cultivation over the Republic of Moldova territory, are registered; in the north as optimal, stable in the centre and unstable in the south of the country. In our opinion, optimal areas from the north of the country are determined by the optimal conditions of humidity and thermal regime that have an upward trend. In the southern part of the country, on the contrary, temperature increase and limited moisture conditions have contributed to significant harvest variability from year to year.

In conclusion we notice, that in conditions of adaptation to new climate conditions, the knowledge of favourable and stress areas regarding sunflower crop harvest climate variability, could significantly contribute to increase the yield and to obtain a more stable harvest of this crop.

DUCA MARIA, NEDEALCOV, MARIA, COJOCARI RODICA, GĂMUREAC ANA
Plasticitatea ecologică a culturii de floarea soarelui pe teritoriul Republicii Moldova, în condițiile climatei actuale. Lucrările Simpozionului Sisteme Informaționale Geografice Ediția XXII-a. 2015, Chișinău, Republica Moldova. p. 34-38. ISBN 978-9975-97744-9-4.

CLIMATE CHANGE IMPACT ON SUNFLOWER GROWTH AND DEVELOPMENT

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The impact of climate change on the sunflower productivity in dry periods; currently they have become more frequent and more intensive, are of particular interest. Drought phenomenon is conditioned primarily by the lack of rainfall and in this context, sunflower it can be affected by water stress.

In the present paper, the study of dryness and drought was carried out under current indices used in assigning qualifications: deficient, normal or excess periods, namely SPI, SPEI - WMO recommended indices.

Therefore, floral button emergence (3 cm diameter) stage, marks the beginning of the period when the sunflower is very sensitive to water stress. The sensitivity to drought of sunflower takes around 44-60 days, beginning with 20 days before blooming and continued to 15-20 days after blooming.

The most critical phase for water, during of which drought have a negative influence both seed production as well as oil content, is the first decade after petals withering.

The period from the start of formation until flowering is a critical period affecting the seed production, and the period from flowering until the seed filling is a critical period affecting the percentage of oil. Also, drought, during seed formation cuts seed production and the oil content thereof.

The results obtained after running the program of calculation: SPI and SPEI allow to emphasize the phenomenon of dryness and drought. According to the data included in Table 1, in the case of extreme droughts manifestation over the Moldovan territory, there are registered the biggest losses in the sunflowers harvest. If moderate wet conditions, manifestation when the thermal regime is high, compared to the one established under conditions of excess moisture, the crop yield is low.

We consider that these agro-climatic conditions favour the occurrence and development of diseases, which ultimately negatively affect the crop.

Table 1. The impact analysis of moisture conditions on sunflower harvest

Moisture categories	SPEI	The quantification of productivity levels	Standardized categories
Extremely wet	≥ 2.00	High productivity	≥ 1.50
Severely wet	1,50-1,99	Moderate productivity	1,00-1,49
Moderately moist	1,49-1,00	Low productivity	0,51-0,99
Normal	0,99 - -0,99	Normal	0,50- -0,50
Moderate drought	-1,00 - -1,49	Low losses in productivity	-0,51 - - 0,99
Severe drought	-1,50 - -1,99	Moderate losses in productivity	- 1,00 - -1,49
Extreme drought	≤ 2.00	High losses in productivity	$\leq - 1,50$

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SOME CONSIDERATION IN ESTIMATION ON URBAN HEAT ISLAND

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The Urban Heat Island occupies an important part of climatic studies especially since the global urbanization still has increasing tendencies and climate change intensifies meteorological extremes manifestation. There are however various types of Urban Heat Islands, differing not only in characteristics, but also controlled by different assemblages of energy exchange processes. Oke's (1976) original distinction between the Urban Heat Island in the Urban Boundary Layer and that in the Urban Canopy Layer is fundamental to the issue of scale. This distinction has been a basic notion in investigation of city's climate. In the Urban Canopy Layer (roughly from ground to roof level), processes of airflow and energy exchange are controlled by microscale, site-specific characteristics and processes. The Urban Boundary Layer, above roof level, in contrast, is that part of the planetary boundary layer whose characteristics are affected by the presence of the urban surface (or its land-use zones) below and is a local- to meso-scale phenomenon controlled by processes operating at larger spatial and temporal scales. Though these possess different scale manifestations and are thought to result from different processes, both have historically found expression in an air temperature excess over that in the rural environs. Ground-based thermal remote sensing (and aircraft-based thermography at a low enough elevation to resolve streets, roofs and walls) permits definition of yet another Urban Heat Island, namely that for the ground surface.

Though surface temperatures show some similar spatial and temporal patterns to those for air temperatures, this correspondence is not exact. In particular, under calm, clear, nocturnal conditions, they generally display a much stronger dependence on microscale site characteristics, especially sky view factor reduction brought about by street geometry, than do simultaneously evaluated air temperatures. These results suggest that street temperature possesses a simpler causality than air temperature, which is coupled to the thermal state of the adjacent surfaces but is also subject to advective influences. It is perhaps this simplicity that has permitted successful hardware and numerical simulation modelling of the street surface Urban Heat Island under calm, night-time conditions, when solar shading is absent and turbulent interactions between street and air and advective fluxes are minimal.

Urban Heat Islands are more diverse than originally suspected. We may define a variety of such features based on the medium sensed (air, surface, even subsurface) and the sensing system employed. Each will possess its own climatology and will be subject to varying causal influences, but it is essential that the nature of the measurements used to define the heat island be presented in reporting results in a manner that is interpretable to the urban climate community. Likewise, great care must be exercised in comparing Urban Heat Islands if the medium sensed and the methods employed in sensing it differ.

THE CHALLENGES OF URBAN CLIMATE'S ASSESSMENT

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In conditions of changing climate a special attention should be paid to urban climatology, and namely urban heat islands analysis. It is executed in fine scale, which in itself presents several challenges. At present GIS is used in climatology in general to estimate climatological values at global and regional scale, and these values are presented by spatial interpolation in order to assess climate changes and impact. In its turn their spatial distribution is based on homogenous statistical series obtained from State Hydrometeorological Service and normalized according to unified regulations for meteorological posts and stations. Digital Elevation Model and its derivatives are also commonly used in spatial interpolation methods.

As of estimating climatological values as it is needed for urban climatology on fine scale there are several challenges that one faces.

First of all, there is a challenge of handling, and geo-referencing of various types of generally non-homogenized data: both standard meteorological data obtained from national network and data obtained from more specific locations (agrometeorological data, for instance), not to mention data from field measurements and images obtained from satellite remote-sensing (if they are available at a resolution that can be used).

Secondly, we have challenge of handling and preparing the part of data that is requested for spatializing and modeling of climatological values at fine scales. This data includes not only Digital Elevation Model and its derivatives (slope, aspect, vertical and horizontal fragmentation) but also surface parameters interacting with atmosphere: vegetation, soil properties, land cover and land-use. At finer scale at which urban climatology is estimated these surface parameters become more significant and cannot be underestimated.

The third challenge is spatial interpolation of climatological data. It appears mainly due to irregular distribution and insufficient density of field measurements. Spatial interpolation in fine scale applications frequently applies to individual or extreme situations rather than time-averaged climatological fields.

Therefore, geostatistical procedures (kriging) often fail in providing accurate climatological or air quality fields. GIS methodologies using independent predictors have to deal with the aforementioned weight of air-surface interactions and with the complexity of surface descriptors.

Spatial interpolation procedures often have to *be adapted to each case*, lacking reproducibility.

Therefore the forth challenge is to adapt interpolation procedures to such physical processes that act on different time-scales and spatial scales such as:

- “fluid” processes including air mass advection, vertical mixing (convection), local breezes;
- air-surface interactions including surface radiative and heat budget, mass and dynamical energy exchanges.

The weight of these different processes may vary significantly for different meteorological situations. The weight of air-surface interactions at local scale through the radiative and heat budget is emphasized during “radiative” situations (clear sky, weak wind or lack of it). A special interest is devoted to frost hazard and urban heat island.

THE CHARACTERIZATION OF JANUARY 2016 AND ITS PLACE WITHIN MULTI-ANNUAL DATA SERIES

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There are known a number of papers at regional level, concerning the thermal regime multiannual variability in January. As of this month, largely depends the multiannual crops' favourable or on the contrary unfavourable wintering, in our opinion knowledge of weather conditions of this month is of particular interest. In this context, we mention that in the Atlas of Climatic Resources of the Republic of Moldova there are listed the top of the warmest and the coldest months. Therefore in the warmest January months; the thermal regime represented values of 1,3... 3,9⁰C, and in the coldest months; average monthly temperature amounted – 11,7...– 8,0⁰C □1□. According to the State Hydrometeorological Service during the January 2016 over the country's territory had been reported inhomogeneous weather conditions in terms of the thermal regime. The average monthly air temperature was generally close to normal, in some districts of south-east - lower by 0,5-1,0 °C and constituted -2,3...– 4,0 °C. Maximum air temperature rose to + 12°C (SM Ceadr-Lunga). Minimum air temperature decreased to - 22°C (Rîbnița, Codrii, Baltata) a fact that in January is recorded in average once in 3-5 years. Rainfall during the month fell as snow, sleet and rain. Winter crops and multiannual plantations in January were in dormant state. During January the snow thickness over the fields with winter crops amounted basically; 5-18 cm, on some isolated areas - 1-4 cm. Towards the end of the month snow cover on the lands with winter crops missed.

The minimum soil temperature at the depth of winter crops (3 cm) decreased to -5...– 10 °C, much higher compared to the critical values (-15 °C). Although had persisted alternation of cold and heat waves, however, agro-meteorological conditions for winter crops wintering and multiannual plantations have been characterized as satisfactory.

Since, according to data included in the Atlas the average temperature of January on the Republic of Moldova territory records an increase by 0,0147 °C/year over years 1887-2010, we consider that such a feature of the air temperature in January, it will maintain also in the future. Moreover in the last two decades, positive thermal deviations prevail over negative anomalies, which denote that at the current stage of thermal regime in January is increasing. The warmest month during the instrumental observations series is January of 2007, in this year the average air temperature was +3,9 °C. The coldest month is January of 1963, when the average temperature reached values of -11,7°C .

In spatial aspect within lower courses of small rivers from southern part of the Republic of Moldova and Prut River are characterized by highest thermal values, which are within the limits of -1,4 °C.–-1,3 °C. The lowest values are recorded in the extreme north of the country and at altitude (in the north-east and central regions), there the values are -3,4 °C.–-3,6 °C. The spatial range of the average temperature in January is equal to 2,3 °C.

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CANTITĂȚILE MEDII ANUALE DE PRECIPITAȚII. VARIAȚIA ȘI REPARTIȚIA PE TERITORIUL REPUBLICII MOLDOVA

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Precipitațiile sunt un element esențial al climei și, alături de temperatură, configurează zonalitatea, etajarea și diferențierea regională a resurselor de apă, a solurilor, vegetației și faunei. Cantitățile excedentare pot produce pagube materiale, victime umane, disfuncționalități ale sistemelor socioeconomice și ale mediului înconjurător, căpătând caracter de hazard natural.

Oscilațiile anuale ale precipitațiilor atmosferice reprezintă o caracteristică importantă a regimului pluviometric și diferă în funcție de zona geografică și condițiile locale de relief. Pe teritoriul Republicii Moldova se înregistrează un maximum de precipitații vara și un minimum iarna.

Principala trăsătură a regimului precipitațiilor atmosferice pe teritoriul Republicii Moldova o reprezintă variabilitatea și discontinuitatea mare a lui în timp și în spațiu. Această trăsătură decurge din cauza interacțiunii factorilor genetici de bază (la scară continentală) cu factorii locali.

În repartitia precipitațiilor pe teritorii Republicii Moldova se observă o diminuare a valorilor anuale de la 620 mm în nord-vest până la 470 mm în sud-est, fenomen determinat de situația geografică a Republicii Moldova față de direcțiile de mișcare a maselor de aer maritime.

Din cauza influenței înălțimilor (Podișul Moldovei Centrale, Podișul Nistrului, Colinele Tigheci și altele) are loc redistribuirea precipitațiilor pe teritoriul țării - creșterea cantității lor pe versanții din calea vânturilor și scăderea acestora pe versanții protejați de vânt.

Creșterea cantității de precipitații (peste 550 mm) în regiunea Podișului Moldovei Centrale este determinată nu numai de mărirea altitudinii, dar și de prezența în această regiune a celor mai mari masive forestiere.

Cantitatea precipitațiilor este un parametru climatic foarte variabil, chiar pe teritoriul comparativ mic al Republicii Moldova el variază în limite semnificative.

Însă și mai mare este variabilitatea sumei de precipitații de la an la an. În unii ani cantitatea precipitațiilor se poate abate de la valoarea medie multianuală cu $\pm 200-300$ mm și mai mult pe an. În 30-40% ani de observații (din 1891 și până în anul 2010) abaterea de la norma anuală întrece ± 100 mm.

Pentru Moldova cel mai umed a fost anul 1912, când cantitatea maximă a precipitațiilor căzute a constituit 915 mm, sau cu 75% mai mult față de normă. La Chișinău, de asemenea, în anul 1912 a fost înregistrată cantitatea anuală maximă. Anul cu cel mai mare deficit de precipitații pentru teritoriul republicii a fost 1896, când au căzut doar 301 mm, sau 58% din normă. Cea mai mică cantitatea anuală de precipitații a fost înregistrată la Comrat în anul 1928 - 208 mm de precipitații - 853 mm.

CHARACTERISTICS OF THE AIR TEMPERATURE IN RARĂU MASSIVE AREA

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The purpose of this paper is to analyze how air temperatures changes occur in time in the Rarău area, the importance in terms of tourism, but also environmentally friendly. We used for this purpose meteorological data from the meteorological station Rarău belonging to UAIC Faculty of Geography, Iasi since 2006. For the study were considered data from 1958-2015, 58 years.

We analyzed the average annual temperature and its deviation from the multi annual average, the monthly air temperature and its deviation from the multi annual average, days with different temperature ranges and temperature extremes.

The annual average at Rarău is 2,4°C (1958-2013) or 2,5°C (1958-2015). We note that this minimum average varies from 1,2°C recorded in 1980 to 4,4° in 2014 or 4,2°C in 2015. The monthly minimum temperatures is recorded in January, - 6,7° C, and the maximum in July 11.8°C.

In 51,72% of the analyzed years, the annual average was lower than the annual average (2,5°C), in 44,83% of the cases, the annual average was higher and in only 3,45% of the cases the averages were equal. Regarding the monthly average, it follows during the year the normal course, with an increase in the spring and an early autumn decline, the biggest differences existing between the months of transitional seasons.

THE EXPOSURE OF THE TERRITORY OF THE REPUBLIC OF MOLDOVA TO THE OCCURANCE OF PLUVIAL FLOODS

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Climate change is truly an unique and unprecedented challenge that humanity is facing. The main consequence of the global phenomenon of climate change is the increase of frequency and intensity of natural hazards.

Pluvial floodings on the territory of the Republic of Moldova are more and more frequent and intensive in the last three decades from the large spectrum of natural risks, being caused by strong and very strong torrential rains at local and regional scales.

In the last 70 years, on the course of the large rivers of Moldova (the Dniester and the Prut) were reported about 10 massive floods, the most destructive being recorded in 1941, 1955, 1969, 1974, 1980, 2006, 2008 and the last one - in the summer of 2010. But the large-scale floods of small rivers in the country are much more common (1948, 1956, 1963 1973, 1984, 1989, 1991, 1994, 1998, 1999, 2005).

The total surface area of the Moldova's territories exposed periodically to flooding, constitutes about 20% of all the surface area of the country, or more than 600 thousand hectares. About 10% of embankments and hydraulic structures existing in the country are damaged, presenting enormous danger for the surrounding villages. 168 localities with the surface of 1,300 km² and about 160 thousand inhabitants are under threat of flooding, as well. Overall, 659 localities are located in the potential floodable zones, of which 625 are rural localities, 31 are cities, and 3 are municipalities.

The raising of the water level in the large rivers Dniester and Prut in Moldova occurs due to penetration in their beds of a surplus of water belonging from rain, snow melting in the basins of superior courses (the territories of Ukraine and Romania).

It is known that 90 percent of the flows of these two rivers form outside the country. The main destructive factor of floods is torrent of water, which is characterized by a high level and a high stream speed when the dams break and the flood occurs.

The proportions of flood consequences depend on the duration of maintenance of the dangerous levels of water, the torrent speed, the area flooded, the season, the population density and intensity of economic activity, the presence of hydraulic structures for protection and concrete preparedness measures for flood, the preparation level and organization of actions during flooding etc.

In the summers of 2008 and 2010, Ukraine, Romania and Moldova faced the worst pluvial floods in the last two centuries.

A comparative analysis of 2008 and 2010 floods of Dniester and Prut rivers is a matter to make the following conclusions:

1. The flood of 2008 recorded maximum flows, but small volumes of flooding because the short period of occurrence of the phenomenon.
2. The flood of 2010 recorded lower maximum flows, but had much higher volumes of flooding due to the more extensive phenomenon.

As a result a large number of localities in the Nistru and Prut rivers valleys were flooded and partially destroyed. Costs of damage caused by these floods were 120 and 42 bln. US dollars.

MANIFESTATION OF NATURAL PHENOMENA RELATED TO WIND WITH VELOCITY 15M/S ON THE REPUBLIC OF MOLDOVA'S TERRITORY

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The strong winds occupy the special place in the class of violent weather because by the value, intensities or durations they present the threat of people's safety and are the basic meteorological source of naturally calamities and catastrophes. Therefore, the specialized researches of dangerous winds mode with taking into account the regional features and risks of damage, are actual for the Republic of Moldova.

The direct observations of the number of days with the wind's speed 15 m/s registered at the State Hydro-meteorological Service of the Republic of Moldova was used as reference source for the research. The electronic bank of data was formed for 14 weather-stations by the period of 1945 - 2010 years. Analysis of data for investigated period points out the fact that the strengthening of wind speed to 15 m/s is marked annually ($P=100\%$) practically on the whole of the Republic of Moldova's territory. The annual number of days with high wind hesitates from 10 to 31 day. Their maximum is observed over the open sublimities, watersheds, overhead parts of slopes, along the valleys oriented to direction of prevailing winds (Cornesti-31,4 days, Cahul -29,4 days).

During the annual motion for spring season it is characteristic the maximal numbers of strong wind days, from 3,9 to 4,1 in March and April. In the period from August for October the frequency of high wind is declined, with a minimum 0,4 -0,6 days in September.

The assessment of middle indexes of annual amount of days on decades during the 1945-2010 years has enabled to establish the temporal change in strong wind mode. An analysis showed that a most number of days in the north of republic were noted on 1945-1960 years, in the central geographic area - on 1970-1980 and in the south of republic - on 1971-1990 years. The lowest frequency of high winds on the whole territory of the Republic of Moldova was marked in the 1961-1970 decade. Period 1971 -1990 years can be noticed as a recording of the wind activity. The tendency of reducing the intensity of strong winds observed in the end of XXth century is preserved and at the beginning of the XXst century.

The strong winds' spatial - temporal characteristics' evident representation is given by the series of maps, elaborated by the author. Districting of the republic's territory by the degree of vulnerability to natural phenomena related to wind with velocity 15m/s was executed. The impact of strong winds on crops during the growing season was also evaluated, because they are one of the climatic risks factor brave for agriculture. It blows crops, damages seedlings, washes off the fertile layer of soil in vegetation period, which leads to the plants' destruction. In this connection the research of strong winds is necessary in order to avoid arising stressful situations. The submitted information is useful for agriculture's practices and experts in other areas, whose activity depends on hydro meteorological conditions.

RESEARCHES OF THE CURRENT WIND MODE ON THE REPUBLIC OF MOLDOVA'S TERRITORY

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Wind is the most dynamic of the entire climatic element. It plays an important role in many climatic processes. Changes in the wind parameters may be an indicator of larger changes in the overall climate system. But there are some local factors that have a major contribution to the wind regime. Therefore, taking into account the changes in regional climate patterns is of specific scientific interest the evaluation of spatial-temporal variability in the wind regime in the current period of time on the Republic of Moldova's territory. Original results were obtained by applying up-to-date research methods and GIS-technologies.

The wind mode may be characterized by such parameters as the direction, force and speed of wind. A data base of monthly and annual wind speed for the period of 1945-2010 years, wind velocity on directions, frequency of the cases with wind velocities between 0-1, 2-3, 4-5, 6-7...14-15, >15 (m/s) was created by using the original information from 14 meteorological stations of the State Hydro- meteorological Service of the Republic of Moldova. A long time analysis of wind direction and speed dates (1980-2000 years) allow concluding that the predominant winds at the Republic of Moldova's territory are those from north-west and south-east directions. The northern and central parts of the country are affected by north-west winds, while the south – by the south and north winds. This is in accordance with general orientation of landforms. Due to the changes of the general air circulation, wind direction and frequency has changes during the year. The north-westerly and northerly winds are dominated during the warm seasons and the increase in the frequency of the south-easterly and southerly winds is observed in the cold period of the year. The analysis of mean monthly wind direction and velocity fields showed the changes from 1,6 m/s (NE) till 5,1m/s (SE). The highest average values of speeds 5,0-5,1m/s was marked for north-western and south-eastern directions in April, and minimum - 1,6 – 1,7 m/s in October for north-eastern and south-western directions.

To identify changing trends in the wind mode there were used: average monthly and annual mean, minimum and maximum wind velocity for the 1957-2010 years. The analysis for decades was conducted in order to specify how the average annual wind speed changes in time. The recording of the highest wind velocities was observed in the interval 1957-1970 years, when the average annual wind speed had the value of 3,3 m/s, then it decrease to 2,8 m/s in 1971-1990 and to 2,5 m/s in 1991-2000 period. The lowest index of 2,4 m/s is characteristic to 2001-2010 years. The middle long-term average of wind velocity during the assessed period makes 2,8 m/s, varying from 1,9 to 3,8 m/s. The assessment of the long-term variability of wind speed indices helped to identify high values (3,5-4,5 m/s) during the winter and spring seasons with the maximum in the February and March. It is interesting to note, that the highest monthly wind speed means have been found in the South of the country in March (4,5 m/s). The lowest values (2,3-2,0 m/s) are characteristic to August and September. A tendency of decrease in the wind patterns is noted during the current period, so the speed of 3 m/s is revealed in the North and South of the country. Reliable knowledge on current pattern of wind mode is important specifically to those involved in agriculture and environment protection sectors. The indicated researches may be also particularly interested in promoting and developing the renewable energy sources in the Republic of Moldova.

REGIONAL RESEARCHES IN THE FIELD OF CLIMATE CHANGES: CURRENT ASPECTS AND PROSPECTS

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Regional climate change is one of the main threats to sustainable development and is one of the biggest environmental problems, with negative consequences on the national economy, which remains the main branch of agriculture. The accelerating pace of climate change, the lack of complex and updated information, have determined the inability to adapt adequately to these changes. In this context, the role of regional research, in our opinion, it is extremely necessary and quite important, as only updated and complex researches, are able to develop a basic scientific-methodological and motivated background in developing applicative adaptation decisions.

Climate change associated with the climate risks manifestation require the development of large-scale indices, that would allow estimation of the impact of climate fluctuations, both globally as well as regionally. Despite its agrarian orientation, Republic of Moldova, bear significant material losses after manifestation of droughts, torrential rains, etc. Hence, frequent alternations of dry and rainy periods, have conditioned the development Dry Periods Index (Izu) and Rainfall Excesses Index (Ip), which are currently used for the neighbouring territories to the Republic of Moldova □1□.

The Dry Periods Index (Izu) represents the sum of dry days recorded between May and August in some concrete years, reported to their multi-annual average:

$$Izu = \frac{\sum z_{u(v-viii)}}{\bar{X} z_{u(v-viii)}} \quad (1)$$

where □ $z_{u(v-viii)}$ – the amount of dry days recorded during the period (May-August) when there is intensive growth and development of crops, $\bar{X} z_{u(v-viii)}$ – annual average of dry days (May-August). "Dry days" are considered when the air temperature is high ($T \geq 25^{\circ}\text{C}$), and the relative air humidity is low ($Ur \leq 30\%$). *Izu* qualifications allow to highlight significant dry, dangerous and exceptional periods in above-mentioned terms of time. As a critical limit in estimating dry periods with negative impacts is when the *Izu* values are □ 2.1, ie the sum of dry days exceed double their annual average. In this case, there is established a significant dry period.

While for rainfall excess periods estimation Rainfall Excess Index (*Ip*) was developed:

$$Ip = \frac{\sum P_{\max} - P_{med}}{\sum P_{\max}} * 100\%, \quad (2)$$

where □ P_{\max} – represents the maximum diurnal precipitation, P_{med} – the average monthly precipitation. This index including values up to 50% denotes that there are pronounced rainfall excesses; *Ip* with values - 51-89% show the severe rainfall excesses, and those higher than 90% - reveals that rainfall excesses have a devastating feature.

Considering the fact that for August it is characteristic a trend of increasing thermal values, especially in recent decades, and this month being extremely important in the accumulation of sugar in grapes, in collaboration with the domain experts was

developed by Nedelcov-Rapcea) the Climate Suitability for Grape Quality Coefficient:

$$CNR_{vm} = \frac{Ur}{T_{max} + T_{min}},$$

(3)

where CNR_{vm} is the Climate Suitability for Grape Quality Coefficient (Nedelcov Rapcea); Ur - relative air humidity, T_{max} and T_{min} - are respectively, absolute monthly minimums and maximum. According to CNR quantification, if values are 7-9,9 - unfavourable conditions are established in getting high quality of grapes. When CNR ranges within 10,0-12,9 - the climate is favourable to obtain quality grapes, if values are 13,0-14,9- climatic conditions are very favourable, and when CNR values exceed the limit of 15,0- climatic conditions are extremely favourable to accumulation of sugar in grapes.

In conclusion, we find that some of these indices are used successfully and abroad of the Republic of Moldova. Thus, under climate change the knowledge of vulnerable and less vulnerable areas to these changes, evaluation of possible climate changes in the near future- are priorities, where the role of research it is no less important.

Maria Nedelcov Resursele agroclimatice în contextul schimbărilor de climă. Chişinău, Tipografia "Alina Scorohodova", 2012, 306 p.

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CLIMATE CHANGE WITHIN THE PRUT RIVER BASIN IN THE REPUBLIC OF MOLDOVA

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Climate change within the Prut River basin through its accelerated pace of manifestation, has been one of the main threats to sustainable development in this area and is one of the biggest environmental problems having consequences and negative impact in terms of ensuring water resources. Thus, in the first decade (2000-2010) of the XXIst century, within the lower Prut River Basin, the average annual temperature constituted 11.1°C, compared to 10.2°C for the last decade (1989-1999) of the XXth century, which until recently was considered the warmest decade during the instrumental observations series. The difference of 0.9°C between these two decades is the most significant throughout the country. In the upper basin, the difference is 0.7°C and the annual average temperature in the period 2000-2010 constituted 9.1°C compared to 8.4°C recorded during the years 1989-1999. It is important to know the annual average air temperature change - an indicator of the warming process in coming years. Moreover, according to the Fifth Assessment Report (IPCC, 2014), climate change not only have already occurring but will continue to happen, even if emissions of greenhouse will be reduced. Currently, according to this Assessment Report, there is concern that global warming has the potential to affect climate patterns in all geographical regions (IPCC, 2014). Given the accelerated pace attested in this area, emerges that the climate within the Prut basin does not make an exception.

In this context, the simulated thermal regime of the Prut basin and cartographic models developed in accordance with the requirements included in the most recent Global and Regional Climate Atlas of Projections (AR5), which reveals that in the coming years (2016-2035) annual average temperature could rise by 2°C, according to the most drastic climatic scenario (RCP4.5) and being in the upper course 10.5... 11.1°C and 12.3... 12.9°C - in the lower course. These projections were developed in accordance with the reference period 1986-2005. At this time, in the upper part of the Basin, annual average temperature had varied within 8.6... 9.1°C and 10.3... 10.9°C in the lower part. But as previously mentioned, within the lower Prut River basin average annual temperature currently (2000-2010) has went beyond the 11°C and cartographic models developed for this period show that in some areas, it exceeds 11.5°C, which undoubtedly once again confirms the fact that in this area is registered significant climate change.

In the case of atmospheric precipitation, cartographic models developed in accordance with requirements included in the same Atlas of Global and Regional Climate Projections (AR5). It reveals that in the coming years (2016-2035) the annual amount of atmospheric precipitation will decrease by 10% in the lower course of Prut River basin and in the upper course annual atmospheric precipitation amounts will increase by 10%, according to the most drastic climate scenario (RCP4.5). In terms of value, they will decrease by 50 mm and will constitute 450 mm in the lower course, at the same time will increase by 60 mm and will constitute 680 mm in the middle and upper course. As concerning the mean annual temperature, values indicating the annual amount of atmospheric precipitation recorded in this basin were developed in accordance with the reference period 1986-2005. Currently (2000-2010), in the upper course are recorded annual amounts of 648 mm, which is by 20 mm more than the annual average calculated for the last 50 years (1961-2000), and the within the lower course the annual amount of atmospheric precipitation is 475 mm, already with 64 mm less (compared to 539 mm) than the annual average for mentioned above period.

In conclusion we notice that in the lower course of Prut River basin will be recorded an aridization of the territory compared with the rest of the basin's territory, but at the same time, with a more frequent alternation of dry and rainy periods, confirmed by climate and hydrological risks manifested within this basin in recent years.

CLIMATE CHANGE IN THE SOUTHERN PART OF THE REPUBLIC OF MOLDOVA AND EUTROPHIZATION OF WATER ECOSYSTEMS

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Fast tempo of global warming during the XXth century and especially in the early XXIst largely determines the formulation and implementation of national policies related to climate change and its consequences, taking into account national interests. Previous investigations show that adjacent territory from the Danube basin is located “under the influence of maximum global warming”. Current pace of warming contributes to establish favourable conditions for the emergence of many invasive species within this area, also there are frequent manifestation of droughts- especially intensive ones, and to essential eutrophication in water basins within the region. All these changes in the climate system in the Danube basin can have a significant influence in maintaining ecological security in the region.

Information Data Base concerning temperature and atmospheric precipitation regime in the Danube Basin were statistically processed in the Statgraphics Centurion XV program, Excel (a component of Microsoft Office Professional). Spatial interpretation of the data was conducted through several interpolation methods available in the SURFER 8 and ArcGIS software.

The analysis of mean annual temperature – an indicator of warming process, shows that it increases to 0,0206⁰C /year, which represents two times more than in the central part of the country.

Analysis of deviations from the climatic norm calculated for the period 1980-1999; reveal that during the last 14 years the average annual temperature in the Danube basin has recorded the most significant positive deviations.

The analysis of atmospheric precipitation manifestation tendency over the Danube Basin indicates a regional contrary tendency of manifestation, namely by reduction. Thus, for the last 50 years, the Danube basin located within the country territory there is a declining trend in precipitation with the 1.8651mm /year. Analysis of precipitation deviations shows that in the XXI century; 8 from 10 years have significantly deviated from climatic norm - calculated for the period 1980-1999.

Eventually they have led to the increase of thermal regime of water basins. Comparative analysis of the thermal regime in the Ialpuș river and for the lakes located on the Ialpuș river basin show its growth in the period 1990-2000 for 0,7 and 1,5 degrees respectively in comparison with the period 1980-1990. In the period 2000-2013 further growing of temperature for 1,0 and 2,0 degrees. The temperature increasing for last decade has contributed to the intensification of algae blooming and together with other factors led to higher content of nitrogen in water for around 20% for the period of last 10 years. Actually siltation covers around 50% of water bodies' volume.

In conclusion we notice that changes in the thermal and atmospheric precipitation, contribute to the aridization process intensification and eutrophication of water ecosystems in the Southern Part of the Republic of Moldova.

**THE IDENTIFICATION OF THE REPUBLIC OF MOLDOVA
TERRITORY EXPOSURE TO MANIFESTATION OF CLIMATE
CHANGE - RELATED RISKS**

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The exposure estimation of a territory to climate risks is highly needed in the context of rising intensity and frequency of their manifestations at present. That in his turn can be mathematical expressed and interpreted.

Thus, according to Hahn's formula [1] the territory exposure to climate risk manifestation reads as follow:

$$E = ((sdT1 + ... + sdT12) / 12 + (sdP1 + .. sdP12) / 12 + (RT1 + .. rT12) / 12 + (N_{fierbinte} + N_{cold}) / 2 + N + uscat N_{disaster}) / 6,$$

sdTi - standard deviation of the mean monthly temperature.

sdPi - standard deviation of monthly average rainfall amount

R Ti – monthly thermal amplitude.

N hot- the frequency of extremely hot months, when the average temperature was higher than 30 °C

N cold – the frequency of extremely cold months, when the average temperature was lower than - 10 C

N dry - the frequency of extremely dry in the spring and in the summer months

Ndisasters- the frequency of manifested weather disasters between 1998- 2014

Based on specific regional peculiarities concerning the manifestation frequency and intensity of climate anomalies, in our opinion is important to establish the boundaries of climate variability, through variables mentioned in its calculations. Therefore, at regional level have been identified thresholds of extreme hot and cold periods. Given the regional particularities as hot months are considered months included with average temperatures over 22 °C, and in calculating the frequency extremes cold was formed thermal threshold below -5 °C. In the case of dry periods, it has considered insurance with 10% of the seasonal rainfall in the spring - summer.

The calculation of territory exposure (Republic of Moldova) based on updated data (1980-2014), allowed the digital map elaboration, which was overlapped on the administrative districts map, highlighting in this way the indicator's values at the district level. Si, it was found out that in recent years, the areas most exposed to risk manifestation are located in central and north-west, where the frequency of disasters has become greater.

In conclusion we find, that this index is directly influenced by the number of disasters that are recorded on a given time-scale, it highlights the variability of territory to the manifestation of certain climate risks, so it is necessary to continue its developing with the purpose of monitoring the country's territory exposure to manifestation meteo-climatic risks.

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THE CLIMATE CHANGE IMPACT ANALYSIS AND THEIR TENDENCIES IN THE REPUBLIC OF MOLDOVA

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Climate monitoring is vital in order to deepen our understanding of the complexity of the climate system and its predictability.

Economic activities depend on weather phenomena as well on climate change. Without knowledge about climate, cannot be chosen cities location, infrastructure, roads, the construction of dams and water reservoirs and the aviation routes determination.

The knowledge of these conditions on both a retrospective and in terms of their development, it is necessary for rational use of resources and to reduce climate impact of natural disasters (droughts, floods, cold waves etc.).

To extend the existing climate information and gradually strengthening the capacity to deliver services climate, WMO members and partner agencies of the United Nations, initiated the establishment of the Global Framework for Climate Services. The disaster risk reduction of is one of the initial priority areas, in order to provide climate services, along with health, food, agriculture, and water resources security.

Irrational use of energy resources has highlighted the environmental issues, so that, together with the necessity of energy conservation, has become actual the use of alternative energy sources - wind, solar, geothermal, etc.

In these circumstances, application of traditional climate information, as well as developing climate scenarios, it has turned into a way of long-term planning and administration of all sectors socio-economic activity.

In recent years, in the Republic of Moldova a particular attention is given to the study of climate change. The data analysis indicates that the last 20 years (1994-2014) were the warmest from the entire period of observation. The average annual air temperature in Chisinau for these decades was 10,6 °C, exceeding the norm by 1.1 °C. Winter-spring-summer period was significantly "warmer" (almost by 1 °C). However, in summer was reported weather with significant precipitation deficit, about 2 times more often than during the previous 20 years (1974-1993).

The impact of climate change on agriculture

The negative effects:

- Agricultural production and harvests decreasing as a result of the increasing issues linked to pests and plant diseases could lead in its turn to fluctuations in market prices crops replacing;
- The combined effect of water regime changes could lead to shortage of water for irrigation and high competition for water;
- Drought will lead to degradation of soil, which is a major threat to the sustainability of land resources and could be detrimental to agriculture.

The positive effects:

- A longer growing season will increase the productivity potential of herbs, while high temperatures will increase the potential for increasing fodder vegetables;

- A longer season of growth should also reduce the maintenance costs of the animals indoors;
- There are benefits to horticulture, both in connection with the reduction in production costs for covered areas, and also because a greater range of horticultural crops which can be grown in the open air;
- Introduction of new varieties of crops.

The impact of climate change on health

The negative effects:

- Drought effects on health could, for example, cause a decrease in food production and lead to nutritional problems among the population, making them more vulnerable to disease;
- Increasing the number deaths caused by heatwaves;
- Increasing the number of diseases caused by air pollution;
- Increasing the cases of diseases transmitted through water and food.

The positive effects:

- The reduction in mortality due to cold during winter.

The impact of climate change on the transport sector

The negative effects:

- Long-lasting heatwaves can worsen or even destroy the asphalt pavement of national roads;
- High prices concerning the construction, maintenance and operation of transport infrastructure and vehicles;
- The need for a greater length of airports' runways and more fuel for planes to take off because of the air less dense;
- curved section of a the railways, paths;
- Flooding roads, railways, airfield, pipeline systems, bicycle paths and pavements (frequency and size will increase).

The positive effects:

- Low risk of landslides and soil erosion;
- Lower expenses for measures to control snow and ice on some roads.

Conclusions: The climate from the past 20 years have a beneficial impact on winter system, orchards and vineyards wintering, but, in summer, there are negative influences in the development and crops yield. One of the objectives of weather-monitoring system for the next period, it is the modernization of climate data management to develop informative data very necessary for decision makers in order to asses the climatic risk factors, national economy adaptation to climate change, ensuring sustainable socio-climatic and environmental protection.

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THE INFLUENCE OF AGRO-METEOROLOGICAL CONDITIONS ON GRAPEVINE PRODUCTIVITY FORMATION OVER THE TERRITORY OF THE REPUBLIC OF MOLDOVA

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The purpose of the research was to highlight the spatio-temporal variability of agroclimatic potential for vine productivity over the territory of the Republic of Moldova and its trend in the context of regional climate change.

Objectives of the research were to estimate tendencies of active development phases, the Winters Register elaboration and wintering conditions analysis that determine the degree of buds damage, as well to determine climate variability of vine harvest and delimitation of favorable and unfavorable areas to its cultivation.

Novelty and scientific originality has consisted in digital maps elaboration representing the spatial distribution of the main phenological stages of grapevine and highlighted their trends concerning change over time were, viticultural climates classes were determined based on international indices (Huglin Heliothermal Index, Cold Night Index), reflecting the current climate suitability for the viticulture development in the Republic of Moldova; the intensity and frequency of (Nedealcov-Rapcea) Coefficient manifestation concerning climate suitability for the grape quality was estimated, and it denotes that grape quality is high due to the warming of thermal regime in August; for the the first time vine climate variability distribution map regarding grapes harvest was developed.

Classes of viticultural climate for the Republic of Moldova territory were quantified; as well grapes quality estimation using various indicators developed both at international and local levels. Digital map on climate variability of vine harvest was developed outlining favorable and unfavorable areas. Spatio-temporal patterns of vine development phases' manifestation in the current context of climate change were elaborated.

Important scientific problem solved in the field of research is the rationale to implement scientific- methodological bases on regional trends of climate change and the influence of these changes on the vines cultivation, with the aim of optimize new vineyards plantings. The results will help to develop appropriate adaptation measures of vine to new climatic conditions.

The results will help to a correct territorial location of new vines plantations, taking into account the current climate conditions; and teaching specialized courses in higher education institutions. Digital maps regarding vine development phases manifestation over the Republic of Moldova territory were implemented and certified at the Scientific-Practical Institute of Horticulture and Food Technologies.

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THE CLIMATE CHANGE IMPACT ON GRAPEVINE PRODUCTIVITY

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The viticulture, a traditional branch of the national economy, is closely related to climatic conditions because the Republic of Moldova territory represents the northern border of its territorial location. Therefore the knowledge of regional particularities of grapevine productivity formation in dependence of current agro-climatic conditions is of particular interest. Along with accelerated climate change in recent decades over the Republic of Moldova territory, we find that are essential changes concerning agro-meteorological conditions, at the same time comprehensive researches that would reflect the actual impact of climate change on grapevine are limited.

Research methodology is based on the inclusion of complex climatic parameters, including indices, which were used for the first time in the Republic of Moldova; the aim was to appropriate highlight the impact of climate change on grapevine productivity and to estimate spatio-temporal extreme weather events. Thus, in order to align national research to the international one, climates indices were calculated (Heliothermal-Huglin Index and Cold Night Index-September). So, in determining climate favorability of the Republic of Moldova territory for grapevine, these three indices were used as part of the climate system of multi-criterial classification of Geo-Viticulture.

Heliothermal-Huglin Index is a viticultural climate index developed by Huglin (1978), which estimates the heliothermal potential of a specific climatic condition; temperature calculations consider the period of the day in which grapevine metabolism is more active; the index also includes a correction factor for the length of the day in higher latitudes.

$$HI = \sum_{i=1}^{183} \frac{[(T_{med} - 10) + (T_{max} - 10)]}{2} * k \quad (1)$$

Cool night Index (CI) was developed to estimate the thermal conditions of nights during the period of maturation of the vine [1, 2, 3]. Using data concerning minimum temperatures, this index characterizes the region's potential for colour and flavour formation in grapes having the following expression:

$$CI = Tn_9; \quad (2)$$

where: Tn_9 = Minimum average daytime air temperature (°C) in September.

In order to determine the intensity and frequency of the climate favourability for grape quality, the coefficient (CNR) of climate suitability, was used, recently developed at national level.

We note that results are required within the framework of adequate adaptation measures development of grape-vine to new climate conditions.

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QUALITY AND IMPACT OF WATERS FROM RAINFALL IN FUNCTION OF CLIMATE CHANGE

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Rainfalls comprise the totality of the products of condensation and the crystallization of water vapors in the atmosphere, that fall from clouds and reach the Earth's surface in liquid form (rain and rain showers, drizzle, etc.), solid (snow and snow showers, hail, sleet, etc.) or under both forms at the same time (sleet and sleet showers).

Pollution of water from precipitation is due, in particular, through the interaction of the atmosphere with dust particles, gases, soot, etc. existing in it. Solid or liquid particles suspended in the air, are classic causes air pollution. That is why qualitative and quantitative monitoring of precipitation; establishing legalities of formation of chemical composition of water from precipitation and estimates of annual and periodic flow of mineral ions on the ground with waters from rainfall is very important.

Researches conducted by the "Anthropic and Natural Ecosystems" laboratory within IEG, in forest ecosystem "Hâncești Forest" on atmospheric deposition, have provided quantification of the influence of atmospheric pollutant inputs under the environment factors-constituents of the ecosystem. It has been established that the impact of pollutants on the forest and the soil directly correlates with the quantity and quality of rainfalls.

Comparative analysis of the results obtained (2011-2014), showed great variability in the amount of rainfall and mineral ions concentration of atmospheric depositions, this one between 422 and 604 mm. 2015 amount of rainfall fell over the summer was the only 70 mm or 30% of the norm, and their average values of pH evolved between 5,8-6,7. As a rule, the waters prevailed with weak acid and neutral ($\text{pH} = 5,61-7,5$), which quote reaches 56% of total rainfall dropped, but it is alarming that "acid" rain ($\text{pH} < 5,6$) accounted for 20 percent.

Quantitative assessment of rainfall and the determination of their chemical composition allow the estimation of annual and periodic flow of mineral ions in the atmosphere with waters from rainfall. Mineralization of water from precipitation variation during the year 2015 has shown an increase of the content of mineral ions in comparison with previous years, with monthly averages ranging between 29,0 and 67,0 mg/dm^3 . Total mineral ions flow with waters from rainfall amounted to 149,8 kg/ha/year , based on the amount of precipitation fallen and uploading them.

It was found, that in terms of the effects of pollutants and pollutant dispersion in the atmosphere, the important role lies with the movement of air masses. There is a correlation between the direction (component) of air masses and the evolution of the ion content of the waters from rainfall. In the case of the Western component, the pH of water from precipitation is between 5,6-6,7, South between 6,65-6,85, North-North-East-5,8-5,9. These results indicate that transfrontier pollution has impacts in polluting the atmosphere within the territory of the republic. Dominant transboundary human impact on the Republic's territory is due to stationary and mobile sources originating mainly from emissions of neighbor countries - Poland, Turkey, Romania, and Ukraine.

It should be noted, that the dynamics of emissions of SO₂, NO_x (pollutants with acidifying and eutrophication impact) from stationary and mobile sources at both Europe and for the Republic of Moldova, indicate a growing impact over time in emissions of NO_x. This increase is due to the intake of auto transport (from 12,5 kilo tones (2007) until 21.1 in 2014). However, estimating the impact of air pollution on the forest ecosystem "Hancesti Forest" by wet and dry precipitation indicates an *acidifying effect with low risk* being at the level 3,1 kg N/ha and 4,9 kg S/ha.

Primary air pollutants, such as sulphur and nitrogen oxides, are given off directly into the atmosphere and in this way having a significant impact under air pollution. Analytical determinations of SO₂ and NO_x concentration in atmospheric air allowed the assessment of monthly average values of these gases. Thus, monthly average concentrations of SO₂ reached a peak 6,82 µg/m³ and for NO₂ 5,75 µg/m³ - values below the alert threshold (0,05 mg/m³).

Let us mention, that "acid" rain can affect even plant roots, which means nutrients cannot be absorbed. Thus, the plants become vulnerable to diseases, which lead, in the end in their deaths.

Data obtained in the frame of the national forest monitoring show that the trees are virtually equal in proportion to the injured according to the types of injury, falling at the rate of 62-99% in grades 1-4 of defoliation for all types of injury. Stand within the network monitored national forest monitoring records in multiple injury 99%-94% defoliation and discoloration, and stand without physical injury constitutes 41-63% (after defoliation and discoloration). The intensity of damage for the main tree species is higher for acacias, where, after defoliation parameter, over 80% of the acacias are assigned to classes of trees moderate physical injury-dead trees (class 2-4). After discoloration and defoliation of foliar surface, oak, ash and maple forests record the best state of health (0-1 classes).

The results of the chemical analysis shows that the flows of S-SO₄²⁻ ions, determined under canopy can be considered as *very large deposits*. Deposition of N-NO₃⁻ was employed in the majority of cases, in the category of *small deposits*. The flow of N-NO₃⁻ ions under canopy, in 6 cases, fall into the category of *large deposits*, in three cases in the category of *very large deposits* and one case – *middle deposition*. Pollution with N-NH₄⁺ from transboundary and local sources is practically equal.

Based on the results concerning the health of the trees in the "Hâncești-Silva" ecosystem, after defoliation parameter, was observed that species of ash recorded the lowest degree of injury. The extent of the injury, the proportion of trees falling in classes 1-4, is strong (51-75%) for most of the species studied, while for hornbeam, acacia and elm the injury was very high (76-100%). After foliar discoloration parameter, major monitored species recorded injury very strong, where the proportion of trees falling in classes 1-4 is over 40%.

Age classes of defoliation shall highlight some small random fluctuations from one age to another class of defoliated trees, where proportions only age category 41-60 years falls more than 45% in class 0 of defoliation. A better situation for the trees from "Hâncești-Silva", is observed after fading parameter, where is evident the dominance of healthy trees (0-50-96%), with the exception of category 0-20 years, for which the extent of injury (1-4 classes) is very high-82%.

CURRENT ASPECTS AND PROSPECTS IN FOOD SAFETY

LIFE SCIENCES IN THE DIALOGUE OF
GENERATIONS:
*CONNECTIONS BETWEEN UNIVERSITIES,
ACADEMIA AND BUSINESS COMMUNITY*

THE TECHNOLOGICAL QUALITY AND NUTRITIVE POTENTIAL OF FOOD PRODUCTS (BAKERY PRODUCTS)

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***Summary** The purpose of this work presents the scientific study of the problem of insurance of the nutritive value and drawing up an adequate technology for manufacturing bakery products with the addition of walnut grits, which would be based on the use of natural additives, taking into account the requirements and norms of the normative-technical documents.*

Foods are distinguished by the ability to simultaneously satisfy, more or less, 3 conditions: to possess the nutritional value (NV), to present the sensory qualities (SQ) and to be salubrious (innocuity, I).

To resolve the problem of ensuring the nutritional value of food, is necessary to include raw materials/ ingredients with high nutritional value/ rich in bioactive compounds which are essential for normal metabolism, growth and development, the protection against diseases and harmful environmental factors etc. Such materials itself combine a full range of vitamins and minerals, and other important components: dietary fibers, phospholipids, different biologically active additives of natural origin, which have protective or stimulation action for the physiological systems and functions of the body.

In the bakery industry is extensively used products derived from oil industry in order to increase the nutritional value of bread, improving the organoleptic and physical and chemical parameters of bread, creating new products with effect of treatment and prophylaxis, intensification of the technological process for production of bread, as flour quality improver and components which act negatively on the quality of the finished product. Nuts' groats is the product remaining after pressing nuts and nut oil extraction, rich in protein (50 %), essential amino acids, especially the lysine.

The purpose of this work was the scientific study of this problem and drawing up of adequate technology manufacturing bakery products with added nuts' groats, which would be based on the use of natural additives, taking into account the requirements and technical standards and normative documents.

One obtained experimentally nuts' groats from walnut kernel and was performed organoleptic and physical and chemical analysis of the sample. Humidity of nuts' groats is 9 %, the content of ash is 7 %.

Also were analyzed sensory and physical and chemical indexes of studied raw materials. Based on analysis of wheat flour was determined correspondence to quality indicators for wheat flour of first quality (HG nr. 68 din 29.01.2009, ГОСТ P 52189-2003). The humidity of wheat flour is 14,4 %, the acidity – 2,2 degrees, the content of ash – 0,75 %, the quality of wet gluten – 24,4 %, wet gluten quality at appliance ИДК – 1 60 conv. un. which demonstrates a high quality of gluten.

In the research about using nuts' groats in bakery industry was established the technological process and was elaborated technological recipes of bakery products with addition of nuts' groats.

After baking in laboratory conditions, was observed that using this technology ensures improvement of the bread's quality, in comparison with control sample, especially the porosity showed increased values from 0,83% (2% nuts' groats) to 2,5% (6% nuts' groats).

Thus, the products obtained after processing the raw materials from food industry, prove to be useful in bakery industry. In this way, decreases the quantity of derived products from oleaginous products industry, increases the economic efficiency of the production process, and on the market appear new products with pleasant aspect and increased nutritive value, at an accessible price for customers.

NOVEL FUNCTIONAL FILLINGS FOR BAKERY PRODUCTS

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Nowadays, heat-stable fillings made up from fruit-based raw material with addition of sugar and stabilizing agents are among the fastest growing segments of the food industry due to various applications in bakery and confectionery. If these products are produced from natural fruit stuff with low amounts of sugar, they represent a rich source of dietary fiber (mainly pectin and cellulose) and biologically active compounds (vitamins, polyphenols, macro- and microelements, etc.), which are quite important for healthy diet. Moreover, the detrimental changes in sensory quality due to caramelization and non-enzymatic browning reactions are significantly reduced in low-sugar fillings made up from natural raw material.

In order to produce heat-stable fruit fillings, a certain group of stabilizing agents should be used depending on soluble solids content and fruit type. Fruit fillings developed for bakery applications are expected to resist high oven temperatures and to be stable under different storage conditions without tendency to syneresis. The both melting behavior and water-holding capacity of fruit fillings depend on amount and type of added stabilizing ingredients. A lot of plant-based polysaccharides increase thermal stability of fruit fillings, while keeping their initial structure unmodified under elevated temperatures.

The main aim of the research was to develop heat-stable fruit fillings with high nutritional properties, by using a mix of pectin and inulin as a stabilizing system. From a technological point of view, the addition of pectin and inulin into filling formulations may prevent water release, because these dietary fibers possess good water-binding capacity and may act in synergy as a bulking agent. Their application may prevent thermal degradation of fruit fillings during baking, as well as to eliminate water migration from filling compositions to the dough inside bakery products. Another important benefit of inulin and pectin consists in their prebiotic properties helping to regulate the composition of colonic microflora.

Development of heat-stable fruit filling on the basis of inulin and pectin was conducted with the aim to satisfy more than 15% of the adult daily requirement of dietary fibers from the consumption of 100 kcal of the product with respect to the Regulation (EC) No 1924/2006 of the European Parliament and of the Council of 20 December 2006 on nutrition and health claims made on foods. After a big number of physicochemical, rheological and microbiological assays, the best formulations of heat-stable fruit fillings with high quality characteristics were established and the product was patented (patent MD 771 Z from 2014.12.31 "Thermostable filling for bakery and confectionery"). The results of the carried investigations have been industrially implemented at the bakery plant Ltd. "ODIUS" in Chisinau by manufacturing a batch of pastries with the fillings produced according to the best formulations. The patented invention was awarded 2 silver medals in 2015 at the following International Research and Innovation Exhibitions: "UGAL INVENT" and "INFOINVENT".

ALLERGENIC PROPERTIES OF DIFFERENT APPLE VARIETIES CULTIVATED IN RM

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Apple (*Malus domestica* L. Borkh) is the most commonly grown and consumed fruit throughout the world due to its health benefits and the high content of vitamins, polyphenols and fiber. However, the apple, similarly to the other representatives of the Rosaceae family, frequently causes allergic reactions in some individuals.

Two types of apple allergy were described to be frequent in Europe. In the Northern and Central Europe apple allergy occurs mainly due to IgE cross-reactivity to Bet v 1 – main allergen in birch pollen, which has a high degree of homology with Mal d 1 allergen in apple. This class of allergy causes common food allergy with mild local symptoms in patients sensitized to birch pollen. Unlike this type of allergies, other type of allergy to apple is frequently diagnosed in patients from Mediterranean region with no sensitization to pollen. This form of allergy causes more severe symptoms and is determined mainly by allergen Mal d 3.

Four major types of apple proteins that can cause allergy are described and characterized: Mal d 1 (PR-10), birch pollen Bet v 1 homologue protein with molecular weight 17.5 kD; Mal d 2 (PR-5), similar to the thaumatin-like protein (TLP) with molecular weight 23 kD; Mal d 3 (PR-14), the lipid transfer protein (LTP) with 9 kD molecular weight; Mal d 4 (profilin), birch pollen Bet v 2 homologue protein with molecular weight 14 kD.

Although food allergy appears due to the limited number of protein families, each family of proteins is encoded by several genes or gene clusters.

The aim of our study is to determine expression levels of allergen gene transcripts in different apple varieties cultivated in RM and Belarus. Four primer pairs were selected for Mal d1 gene cluster, three – for Mal d 2, two – for Mal d 3 and three – for Mal d 4. Expression of these genes will be estimated using qRT-PCR.

Obtained data will contribute to establishment of allergenicity level of investigated varieties. Results about content of allergen transcripts in peel and pulp will allow development of recommendations regarding consumption of less allergenic parts of apple fruits.

MICROBIOTA OF MEAT SEMI-PRODUCTS WITH ADDED UTGROATS

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Bioconversion of raw animal and vegetal materials with further technological treatment and use of different methods of conservation permit the production of new functional products. The meat semi-products preserved by cold - refrigeration method represents a highly effective product group demanded by the consumer.

The paper presents the study on modifying microbiota of sheep meat semi-products „mici” with added nutgroats subjected keeping chilled at 0 ... + 4 °C for 48 hours.

The purpose of the study was to investigate safety of sheep meat semi-products „mici” with added nut groats. The „mici” recipe: sheep meat, food salt, black pepper, garlic, water, sodium bicarbonate, nut groats (5, 10, 15%).

Table 1 Microbiological semi-products - „mici” of meat sheep and nutgroats

№	Product name	Term of storage, hours	QMAFAnM (CFU/ 1g)	BGCB (coliform in 0,001g)	Pathogenic microorganisms, including salmonella in 25g	Yeasts, (CFU/ 1g)	Micettes (CFU/ 1g)
I	Sheep meat	0	1x10 ³	was not found	was not found	was not found	1,5x10 ²
		36	2x10 ⁵	was not found	was not found	was not found	2,0x10 ³
II	Nutgroats	0	2,7x10 ³	was not found	was not found	was not found	1,0x10 ³
1	„Mici” of meat sheep	0	1,4x10 ³	was not found	was not found	was not found	was not found
		48	2,0x10 ³	was not found	was not found	was not found	1,5x10 ³
2	„Mici” of meat sheep +5 % nutgroats)	0	1,8x10 ³	was not found	was not found	was not found	was not found
		48	3,0x10 ³	was not found	was not found	was not found	was not found
3	„Mici” of meat sheep +10 % nutgroats)	0	1,5 x10 ³	was not found	was not found	was not found	1,0 x10 ³
		48	1,0 x10 ³	was not found	was not found	was not found	1,5 x10 ⁴
4	„Mici” of meat sheep + 15 % nutgroats)	0	2,0 x10 ³	was not found	was not found	1,0x10 ³	1,4x10 ³
		48	1,0 x10 ³	was not found	was not found	was not found	2,2x10 ⁴

The research results enable to draw the following conclusions:

-QMAFAnM for samples of „mici” immediately after manufacture is from 1,4 to 2,0 × 10³ CFU / 1 g which is according to the admissible veterinary norms (5 × 10³ CFU / 1g);

-after 48 hours refrigerated storage QMAFAnM is from 1 to 3 × 10³ CFU / 1g;

-pathogenic microflora and yeasts were not detected during preservation;

-in some samples was found a few micettes;

-sheep meat semi-products „mici” with added nut groats (5, 10, 15%) are harmless during preservation for 48 hours at 0 ... + 4 °C.

ANTIOXIDANT ACTIVITY OF LIPOPHILIC CO₂-EXTRACTS FROM VEGETABLE RAW MATERIAL

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Fats, oils and lipid-based foods deteriorate through several degradation reactions both on heating and on long term storage. The main deterioration processes are oxidation reactions and the decomposition of oxidation products which result in decreased nutritional value and sensory quality. The retardation of these oxidation processes is important for the food producer and, indeed, for all persons involved in the entire food chain from the factory to the consumer. [1]

From vegetable raw materials: tomato wastes, grape seeds, walnut kernel meal and wheat germ were extracted liposoluble substances by the method of supercritical CO₂-extraction using carbon dioxide and carbon dioxide and ethanol - as co-solvent.

It was determined the antioxidant capacity in the CO₂ extracts samples by DPPH and ABTS methods. Through the DPPH method was established that the CO₂-extract from wheat germ possesses an increased antioxidant capacity, namely 7736,72 μg/ml trolox. Also, a high antioxidant capacity presents the oil extracted with CO₂ and azeotropes from tomato wastes and the CO₂-extract from grape seeds, their values being respectively 3144,67 and 2112,33 μg/ml trolox. For the CO₂-extract from walnut kernel meal with azeotropes the antioxidant capacity was 1331,02 and the CO₂-extract from walnut kernel meal – 961,95 μg/ml trolox, being close to that of CO₂ extract from tomato wastes – 995,04 μg/ml trolox.

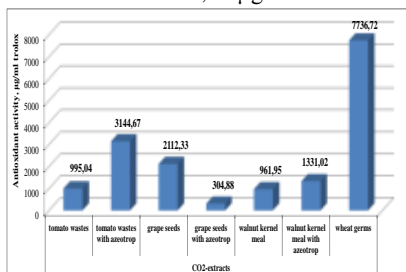


Fig. 1. Antioxidant activity of CO₂-extracts from vegetable raw material, μg/ml trolox

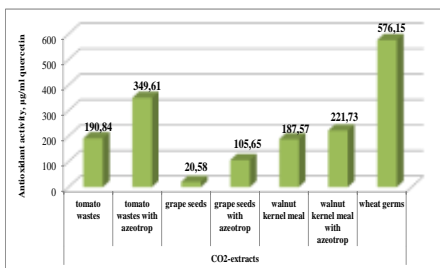


Fig. 2. Antioxidant activity of CO₂-extracts from vegetable raw material, μg/ml quercetin

As shown in Fig. 2, the same dynamic of antioxidant capacity is observed for the ABTS method, but its values are smaller and expressed in μg/ml quercetin. As in the case of DPPH method, through ABTS method the CO₂-extract from wheat germ shows the highest antioxidant capacity, this being 576,15 μg/ml quercetin. Unlike the first method, in the second, the lowest antioxidant capacity was traced up for the CO₂ extract from grape seeds, only 20,58 μg/ml quercetin.

[1] Pokorny, J.; Yanishlieva, N.; Gordon, M. Antioxidants in food - Practical applications, Woodhead Publishing Ltd and CRC Press LLC, 2001, 380 p. ISBN 0-8493-1222-1.

INFLUENCE OF EXTRACTION TIME ON THE CO₂ EXTRACT YIELD FROM TOMATO WASTES

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The tomato wastes are by-products obtained in the manufacture of tomato juice, puree, paste, ketchup and other tomato-based products. These wastes, resulting in large amounts, contain up to 10,5% fat. The lipid-soluble substances can be extracted by means of carbon dioxide in supercritical state.

Five extraction regimes were established at constant pressure and temperature values and at variable duration of the process. The pressure was set at 40 MPa, considering the fact that this is the maximum pressure that the installation allows; the temperature of 50 °C was selected so that it doesn't negatively influence on the biological active compounds, antioxidants and other nutrients. The range of time variation of the extraction process was from 30 to 150 minutes, with variation step of 30 minutes.

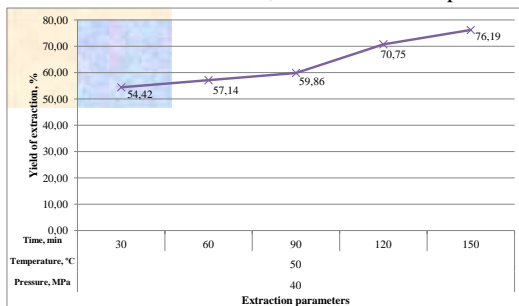


Fig. 1. The yield of supercritical CO₂-extract related to time

Thus, for the 5 extraction regimes were obtained various extraction yields reported to the lipid content of the raw material mass. The extraction yield ranged from 54,42% to 76,19% of lipids extracted by means of supercritical CO₂ extraction. The lowest yield was recorded at 30 minutes of extraction, and the highest – at 150 min extraction.

The extraction yield at 60 minutes was 57,14%, at 90 minutes – 59,86%, and at 120 minutes was established a greater increase of the yield, it reached the value of 70.75%.

Along with the increasing of the time extraction, the percentage of the extracted lipid substances using carbon dioxide in supercritical state raises as well. Therefore, the longer the duration of the process is, the greater is the extraction yield.

The research was conducted within the Project of fundamental and applied scientific researches 15.817.05.03 A "Development of indigenous raw material processing technologies for food quality assurance and food safety" 2015-2018, and the Scholarship Program of Excellence granted by the World Federation of Scientists, planetary emergency: Food, 2015-2016.

CAROTENOID CONTENT IN CO₂ EXTRACTS FROM TOMATO WASTES

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The tomato wastes resulted after the tomato processing on industrial scale ("Orhei-Vit" SA) in order to obtain tomato juice contain up to 10.5% lipids. Lipophilic substances, including biologically active compounds and lipid-soluble antioxidants, can be extracted by means of supercritical CO₂ extraction.

Among the lipophilic substances which are found in tomato wastes are the carotenoids, phytochemical antioxidants that reduce the negative effects of oxidative stress. The carotenoids play a major role in maintaining health and preventing certain diseases.

It was determined the carotenoids content in seven samples of CO₂ extracts obtained by five different regimes from tomato wastes collected in different years (2013, 2014, 2015). The ranges of extraction parameters were for the pressure 20-40 MPa, the temperature 40-73 °C and the time 30-150 minutes.

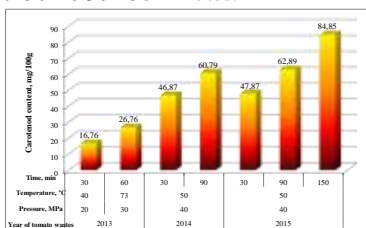


Fig. 1. Carotenoid content in CO₂ extract from tomato wastes

For the CO₂ extracts obtained from tomato wastes collected in 2015, it was found that at 40 MPa and 50 °C, the content of carotenoids is 47,87 mg/100 g at 30 min of CO₂ extraction. Increasing the time of extraction process 5 folders (until 150 min), carotenoid content is 1.77 times higher, reaching the value of 84,85 mg/100 g.

The difference between the carotenoid content in the CO₂ extracts obtained at the same parameters of extraction (40 MPa, 50 °C, 30 min and 90 min) from tomato wastes collected in 2014 and those gathered in 2015 is minor (only 1 mg/100 g) 46,87 mg/100 g against to 47,87 mg/100 g for 30 minutes of extraction time and (2,1 mg / 100 g) 60,79 mg/100 g compared to 62,89 mg/100 g for 90 min of extraction.

Into the CO₂ extracts from tomato wastes collected in 2013, obtained at the minimum values of the extraction parameters 20 MPa, 40 °C and 30 min, the carotenoid content is 16,76 mg/100 g, the lowest concentration of the analyzed extracts. At the maximum temperature of 73 °C, and 30 MPa, 60 min, the content of carotenoids is equal to 26,76 mg/100 g.

The research was conducted within the Project of fundamental and applied scientific researches 15.817.05.03 A "Development of indigenous raw material processing technologies for food quality assurance and food safety" 2015-2018, and the Scholarship Program of Excellence granted by the World Federation of Scientists, planetary emergency: Food, 2015-2016.

INFLUENȚA PREPARATULUI «FITOMAG» ASUPRA FRUCTELOR DE MĂR PE DURATA PERIOADEI POSTRECOLTE

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Problema păstrării îndelungate a fructelor este de mai mult timp în atenția savanților și producătorilor, fiind determinată de cererea sporită de fructe din partea populației. În Republica Moldova pomicultura în ultimii ani a înregistrat o dezvoltare semnificativă, primul loc în acest sens revenindu-i sectorului de producere a merelor, care ocupă cele mai mari suprafețe.

Astfel, extinderea plantațiilor pomicole și omologarea soiurilor noi a contribuit la elaborarea tehnologiilor performante de păstrare a producției agricole. Una din aceste tehnologii este tratarea fructelor la inițierea păstrării cu preparatul «Fitomag», a cărui substanță activă este 1-Metilciclopropan, în urma căreia are loc încetinirea proceselor de maturare-senescentă a fructelor, astfel menținându-se calitatea fructelor la un nivel înalt și durata perioadei de păstrare.

Ca obiect de cercetare au servit fructele soiurilor tardive de măr: Golden Delicious, Florina, Idared și Renet Simirenko. Experiențele au fost efectuate în condițiile celulelor frigorifice ale bazei experimentale «Carpotron» a Institutului de Genetică, Fiziologie și Protecție a Plantelor a AȘM. Fructele au fost tratate-fumegate cu preparatul «Fitomag» în doza de 0,44 g/m³ și păstrate ulterior o perioadă de 150 zile la temperatura de 1°C și umiditatea relativă a aerului de 85-90 %. Pe parcursul perioadei de păstrare în dinamică s-a cercetat: *perisabilitatea naturală, fermitatea miezului, bolile fungice, dereglările funcționale și fructele standard.*

Rezultatele obținute au demonstrat eficacitatea preparatului «Fitomag» în urma tratării fructelor soiurilor tardive de măr. Astfel, pierderile produse de bolile fungice în varianta martor s-au depistat la soiul Florina (1,78%), urmat de R.Simirenko (2,31%), Idared (2,74 %) și G.Delicious (5,75%). Boli fungice nu s-au depistat la fructele tratate. Dintre dereglările funcționale care au afectat fructele de măr pe durata perioadei de păstrare au fost *pătarea amară și brunificarea miezului*, care s-a depistat numai la fructele soiului R. Simirenko. În varianta aplicării preparatului «Fitomag» cantitatea fructelor afectate cu *pătarea amară și cu brunificarea miezului* a constituit cu 3,57- 6,61% mai puțin față de varianta martor. Fructele cercetate pe durata păstrării au înregistrat și pierderi în greutate, cele mai nesemnificative înregistrându-se la fructele păstrate în varianta aplicării preparatului «Fitomag». Astfel, cele mai mici pierderi au înregistrat fructele soiului Idared (2,42 %). Aceeași legitate la soiul Idared a fost observată și în varianta martor (2,91%). De rând cu indicii menționați anterior, a fost determinată și *fermitatea miezului*. Cele mai bune rezultate după aplicarea preparatului Fitomag au fost înregistrate la fructele soiului R. Simirenko- 5,33 kg/cm². Eficacitatea preparatului a fost determinată și în cazul fructelor standard, cantitatea cărora la externarea soiurilor G. Delicious, Florina și Idared tratate cu «Fitomag» au constituit 100 %, iar în cazul soiului R.Simirenko 71,67 %. În varianta martor cantitatea fructelor standard a fost cu mult mai redusă, constituind cu 1,78-12,49 % față de varianta aplicării preparatului «Fitomag».

La momentul externării de la păstrare fructele tratate cu preparatul «Fitomag» s-au evidențiat prin aromă, prospețime, gust mai pronunțat, grad mai redus a perisabilității naturale, precum și prin afectări nesemnificative cu boli față de fructele martor.

MODELAREA MATEMATICĂ A PROCESULUI DE USCARE PRIN UTILIZAREA REȚELOR NEURONALE ARTIFICIALE

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Uscarea este un proces termic complex care se desfășoară cu transfer simultan de căldură și masă, și implică un număr mare de variabile, ceea ce face dificilă caracterizarea procesului și/sau a produselor supuse uscării.

De multe ori, transformările suferite de produse în timpul uscării și modul în care acestea influențează procesul nu pot fi cuantificate suficient prin metode clasice de analiză. Una dintre metodele de modelare matematică, simulare și predicție utilizate sunt rețelele neuronale artificiale.

Lucrarea prezintă modelarea matematică a procesului de uscare prin utilizarea Rețelilor Neuronale Artificiale (RNA). Pentru realizarea acestui studiu, s-au uscat probe de dovlecel (*Cucurbita pepo* var. *giromontina*) prin convecție liberă la temperatura de 50, 60 și 70°C.

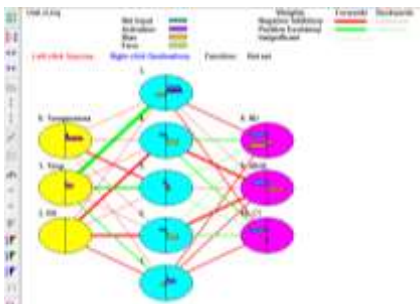


Fig.1. Rețea neuronală cu o serie de 5 neuroni.

Pentru modelarea cineticii de uscare cu ajutorul RNA s-a utilizat programul Easy NN-plus 2013.

Materialele utilizate au vizat tipul produsului uscat și valorile parametrilor de proces: variabilele de intrare – valori cunoscute (temperatură, timp, umiditatea relativă a aerului în camera de uscare); variabilele de ieșire – valori determinate (umiditate, viteză de uscare, contracție tisulară).

La modelarea datelor s-a utilizat o Rețea Neuronală Artificială tip Perceptron Multi Strat (PMS), cu algoritm de învățare BackPropagation (BP).

Programul a stabilit erori nesemnificative, ceea ce denotă faptul că datele obținute experimental pot fi utilizate cu succes la simularea procesului de uscare.

Cuvinte cheie: Rețele Neuronale Artificiale, modelare matematică, uscare

FOOD AND THE TYPE OF THE CONSTITUTION

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Nutritional science has achieved considerable success, but despite it the sanogenic potential of this direction isn't settled. Nutritiology, concentrating the attention to organism supply high structural, plastic, energy and biologically active substances, and, insufficiently, pay attention to constitution type of the organism.

In the constitutional anthropology the constitution is understood as synonym of the word "physique". However, the body itself is just one side of the human constitution – its external morphological manifestation, which the most obvious and convenient perception of manifestations the morpho-physiological, biochemical and psychological characteristics of the individual.

Each type of the constitution united persons with initial individual characteristics. For reasonable association of people in the union types of the constitution, serves their general nature and characteristics of metabolism, morphology, physiology, mentality, and, very importantly, the type of digestion and the functional activity of gastrointestinal tract.

Similar signs of people within single type of constitution will provide for them to more effective system of power, taking into account the wider range of individual data and provide similar preventive measures, because they have predisposition to similar dysfunctions.

Now it is accepted to distinct three types of constitution: asthenic, normosthenic and hypersthenic.

Food taking into account of the constitution of individual should take into account their special trophological status. The trophological status - arising from the constitution of the totality of human adequate structurally-functional and metabolic relationships in the organism, to ensure the maintenance of optimal homeostasis and broad adaptation reserves that depends on actual supply.

In the diet representatives of asthenic type should dominate the foods with the high content in carbohydrates and fats, and the minimum quantity of proteins. Food rations should be built on principle to support the high metabolism, but does not stimulate it.

The hypersthenic types of persons must to form the diet of foods which would keep their natural metabolism with the tendency to its stimulation, i.e. with high content of proteins and the minimum quantity of carbohydrates and fats.

Normosthenic type by nature endowed with strong and the steady digestion of metabolism. They can consume all products, but never to overdose, avoid untimely meal and prolonged consumption of monodiets.

Food in accordance with the type of the constitution is aimed at providing optimal metabolism, the morpho-functional status of the individual and promotes the health.

FOOD SAFETY CRITERIA IN THE THIRD MILLENNIUM

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Technical University of Moldova

A brief analysis of the global economic picture at the beginning of this millennium allows us to highlight some indisputable defining features:

- The rapid diversification and the renewing of the supply of goods;
- The globalization of markets;
- The increasing requirements of the consumers and society

There is a global trend of increasing requirements regarding the product quality. The complex meaning of the concept of quality is specific for foodstuffs because, unlike other industrial products, food quality has a much wider cover, with profound implications since nutrition is the basis of life and a factor with permanent action and decisive influence on the development of organisms. In the case of a food product, all the constituent elements represent quality factors.

The quality of food products has the following meanings: legal, nutritional (biological, energy, protection and sanogenesis, therapeutic), hygienic-sanitary, technological, sensory, social and ecological. The legal meaning of food quality refers to the fact that it must comply with all legal requirements for that specific product. The legal aspects are related in particular to food hygiene; used food additives; toxic residues; contaminants, and to a lesser extent to the composition. In addition to the legal requirements of the product itself, there are some regulations related to packaging and labeling which should also be respected.

This work is focused on highlighting the main risks related to food, the analysis of the causes of these risks, as well as food safety criteria. For example, the organization of food trade in supermarkets imposes additional requirements regarding the validity of the products, which involves the propagation of food additives – harmless at first, but which can show a cumulative effect.

The main chemical risks related to anthropogenic factors, environmental pollution, use of specific plastic packaging i.e. bisphenol A, dioxins and polychlorodibenzofurans (PCDF), benzo(a)pyrene and polycyclic aromatic hydrocarbons, pesticide residues, antibiotics, phthalates are highlighted. Furthermore, the impact of these factors on the human body, their place in the food chain and the used analysis methods are identified.

ИЗМЕНЕНИЕ БИОХИМИЧЕСКОГО СОСТАВА В ПЛОДАХ ЯБЛОНИ ПРИ ДЛИТЕЛЬНОМ ХРАНЕНИИ ПОД ВЛИЯНИЕМ ПЛЕНКООБРАЗУЮЩЕГО ПРЕПАРАТА «PELECOL».

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Плоды яблони, характеризующиеся высокими вкусовыми достоинствами в сочетании с биологической ценностью, являются важным компонентом сбалансированного питания человека. Питательные их достоинства обусловлены содержанием углеводов, кислот, витаминов, ферментов и др. Все ценные свойства яблок наиболее выражены в свежих плодах. В период хранения они могут ослабляться и совсем теряться. В связи с этим первостепенное значение приобретает применение рациональных методов хранения, позволяющих сохранить высокие качества свежих плодов. Одним из эффективных методов является обработка плодов пленкообразующим покрытием «Pelecol», который служит как регулятор проницаемости кожицы. В результате изменяется количество поступающего O_2 и выделяющегося CO_2 , образуется пароизоляционный барьер, снижающий скорость транспирации воды из тканей, что непосредственно влияет на интенсивность процессов послеуборочного созревания.

Материалом исследований являлись плоды яблони зимних сортов: Айдаред, Голденспур, Мантуанское и состав «Pelecol». Перед закладкой на хранение плоды вышеуказанных сортов были погружены в 0,5 и 1,0 %- ном растворе пленкообразующего состава. После высухания на поверхности эпидермиса плодов образовалась пленка толщиной 35-45 мкм. Обработанные и контрольные плоды укладывали в деревянные ящики и хранили в холодильной камере при температуре $+1^{\circ}C$ и относительной влажности воздуха 85-90% в течение 150 дней.

Исследования показали, что уровень интенсивности дыхания в контрольных яблоках был выше по сравнению с плодами обработанными пленкообразующим составом «Pelecol», следовательно, также имел место и больший расход пластических веществ на поддержание этого процесса. В обработанных плодах (в зависимости от концентрации пленкообразующего состава и изученных сортов) отмечалось большее содержание титруемых кислот на 0,04-0,07%, аскорбиновой кислоты на 0,68-0,97 %, общих сахаров на 0,58-0,98 % и сухих веществ на 0,55-0,68 % по сравнению с контролем. Выявлено, что в тканях исследуемых плодов обработанных составом «Pelecol», существенно снизился расход воды на 0,56%.

В связи с проведенными исследованиями следует отметить, что пленкообразующий состав «Pelecol» оказывал существенное влияние на интенсивность процесса дыхания и, соответственно на динамику биохимических веществ в плодах яблони при длительном хранении. В опытных плодах в процессе хранения наблюдалось снижение расхода кислот, сахаров, аскорбиновой кислоты, сухих веществ и др. по сравнению с контрольными плодами. Более эффективным был состав с концентрацией 1,0%.

TESTING OF THE PRESENCE OF CaMV 35S PROMOTER IN CROPS CULTIVATED IN REPUBLIC OF MOLDOVA

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Genetically modified organisms (GMOs) offer considerable benefits for agricultural sector, human and animal nutrition and health, but these need severe control, regulated by legislation, and further investigation of their effects on living organisms.

In Republic of Moldova according to the Law on Biosafety every person before introduction into the environment of GMOs for research, testing, development or any other purpose except for market production, must submit a notification to the National Commission for Biosafety. The marketing of genetically modified products is also based only on authorization issued by the National Commission for Biosafety. Food security and biodiversity protection are essential problems generated in the area of transgenic plants, which requires the implementation of methods for testing food products. Although in Moldova GMOs aren't grown they can reach the consumer by importing of food, fruits and vegetables from other countries.

Actually, molecular testing become an important tool, which serving to increase transparency, facilitate decision making at different levels and ensure biosafety in control of GMOs.

The aim of this work was screening of different crops cultivated in RM for presence of CaMV 35S promoter sequence, frequently used in genetic modification.

For analysis samples of potato, corn, rapeseed and soybean from fields of RM were collected. DNA isolation was performed with the GeneJET Plant Genomic DNA Purification Mini Kit (Thermo Scientific). Testing of the samples was performed according to the standard protocol used for screening of genetically modified plants with specific primers for the identification of CaMV 35S promoter. DNA from transgenic tobacco, containing 35s-P sequence, served as a positive test. The presence of CaMV 35s-P sequence in soybean samples was confirmed by Real-Time PCR performed with kit "СОЯ-СКАН".

The results of the screening by simple PCR and real-time PCR show the presence of the allogenetic sequence CaMV 35S-promoter in two soybean samples. Obtained data require supplementary verification and increase of collected sample number for precise confirmation of presence of genetically modified soybean on fields in our country.

**BIOTECHNOLOGICAL ASPECTS OF *PHYSIOLOGICALLY ACTIVE*
MANNOPROTEINS AND β -GLUCANS OBTAINING
FROM YEASTS**

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An innovative solution for these components obtaining is the identification of new procedures of regulation of polysaccharides biosynthesis, the results that can serve like the base for the elaboration of microbial technologies for production of preparations with polyvalent utilization.

The research ended with the selection of two yeast strains as producers of polysaccharides - *Saccharomyces cerevisiae* CNMN-Y-18 that contains 11,6% of mannoproteins and *Saccharomyces cerevisiae* CNMN-Y-20 that contains 22,5% of β - glucans (Patent MD 4216, MD 4048).

The investigation of the effect of carbon, nitrogen, acetates on the growth and biosynthetic activity of *Saccharomyces cerevisiae* CNMN-Y-18 and *Saccharomyces cerevisiae* CNMN-Y-20, allowed the optimization of two culture medium with the aim to improve biosynthesis of mannoproteins and β - glucans. *The effect of each factor was established and optimal conditions such as temperature, aeration, pH, cultivation duration for yeast cultivation have been selected. Optimization of nutritive medium and culture conditions research effectuated in compliance with mathematical experiment planning methods allowed to elaborate new procedures which assure the efficiency of cultivation and directed synthesis of polysaccharides of yeasts.*

A new approach in the arrangement of the efficiency of microbial technologies for polysaccharides production is the utilization of extremely high frequency waves. The evaluation of the opportunity of millimeter waves application has demonstrated different models of adaptive response in dependence on frequency and treatment duration. This way, new data referring to the modifications initiated by the influence of millimeter waves with frequency of 60.12 GHz, 53.33 GHz, 42.19 GHz on morpho-cultural characteristics, cell proliferation and viability, biosynthesis of mannoproteins, β -glucans, carbohydrates, proteins, catalase activity at yeast strains selected as important biotechnological objects. *It was established that 53.33 GHz had beneficial effect on yeasts.*

There are important investigations of efficiency of methods of extraction of polysaccharides. The procedures of mannoproteins and β -glucans extraction based on the specification of optimal conditions in view of the insurance of maximum extraction of polysaccharides have been adapted for yeasts. The laboratory reglament for mannoproteins and β -glucans obtaining has been elaborated as the major result, which can be used for industrial production of polyfunctional polysaccharides.

AGRICULTURA ECOLOGICĂ ÎN SOLUȚIONAREA PROBLEMELOR SIGURANȚEI ALIMENTELOR

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Agricultura, ca cea mai veche și mai remarcabilă activitate economică a omului, a înregistrat succese impunătoare, care au stat la baza mișcării ascendente a civilizației umane. Totodată, tendința neabătută a agriculturii spre obținerea unor volume maxime de produse agricole pe calea intensificării, chimizării și mecanizării excesive a înregistrat fenomene evidente de dereglare a echilibrului dinamic din natură. Pe această cale agricultura a devenit o sursă permanentă de poluare a mediului înconjurător, având un serios impact negativ asupra calității mediului, cauzând atât degradarea unor ecosisteme, cât și periclitând sănătatea omului.

Factorul principal care cauzează impactul maximal asupra resurselor naturale, transformându-le din resurse regenerabile în resurse neregenerabile, este poluarea. E necesar de recunoscut că afectarea resurselor naturale regenerabile reprezintă manifestări concrete ale degradării mediului înconjurător.

Practica mondială de promovare a produselor ecologice a demonstrat, că acest gen de activitate poate conviețui cu agricultura intensivă, urmărind scopuri diferite. Aceasta se referă atât la ramira fitotehnică, cât și la cea zootehnică. Deja pe parcursul a mai bine de 8 ani, din anul 2000, după aprobarea Concepției dezvoltării agriculturii ecologice, în Republica Moldova se fac încercări de implementare a acestui gen de activitate. Au fost întreprinse măsuri consistente în toate direcțiile pentru ca agricultura ecologică să devină nu numai o activitate de producere și cercetare, dar și pentru schimbarea modului de viață și a mentalității producătorilor agricoli.

Planul Național de Acțiuni în domeniul agriculturii ecologice elaborat cu concursul colaboratorilor institutului nostru și aprobat prin Hotărârea Guvernului nr.149 din 10.02. 2006 promovează acest gen de activitate, dar necesită soluționarea problemelor chee:

- Perfecționarea cadrului legislativ: elaborarea strategiei naționale privind producția agroalimentară ecologică, supravegherea respectării actelor normative din acest domeniu, formarea și asigurarea funcționalității fondului național pentru susținerea participanților la producerea și procesarea produselor ecologice.

- Formarea și asigurarea funcționalității cadrului instituțional (fortificarea Direcției respective a MAIA, elaborarea sistemului de coordonare a activităților din complexul „producția ecologică” și cointeressarea participanților la acest gen de activitate, fortificarea organului național de evaluare, inspectare și acreditare a operatorilor din domeniul agriculturii ecologice.

- Fortificarea funcționalității strategiei tehnologice și de cercetare pentru acoperirea necesităților de efectuare a tuturor procedeeleor tehnologice, adică dispunem noi de mijloacele necesare pentru efectuarea operațiunilor tehnologice admise pentru obținerea și procesarea produselor ecologice.

- Intensificarea activităților educaționale și de extensiune pentru a asigura atât școlarizarea, cât și perfecționarea cadrelor de diferite niveluri, antrenate în obținerea și procesarea produselor ecologice. În acest sens e binevenită organizarea pe lângă institutul nostru a unui centru de extensiune pentru coordonarea tuturor activităților din acest domeniu.

- Alocarea subvențiilor de stat și atragerea granturilor locale și internaționale pentru susținerea producției agro-alimentare ecologice devine o oportunitate foarte importantă pentru inițierea și susținerea agriculturii ecologice la fazele incipiente de dezvoltare a ei.

CURRENT ASPECTS AND PROSPECTS IN GENOFOND PROTECTION

**LIFE SCIENCES IN THE DIALOGUE OF
GENERATIONS:
*CONNECTIONS BETWEEN UNIVERSITIES,
ACADEMIA AND BUSINESS COMMUNITY***

ASPECTS REGARDING ECOLOGICAL FARM BALANCE

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The evolution of life, the gradual emergence of all elements of fauna and flora, improving their information through new releases and adaptation by forming structures, the causal link between the living elements, which have multiplied in geometric progression over time, all these contributed and contribute to soil apparition (edaphic environment), diversification and evolution toward climax soils, to favorable climate planetary change.

The environment has allowed the emergence of life, of different species in different conditions by diversifying its and increased favorability on areas wider, and its present or at one time, considered according to the requirements of different organisms, or life in general, can serve forecasting - prediction - the chances of life while living, the quality of life caused by the environment.

The environment is creator of biodiversity and selection factor.

At the level of populations and communities (biocenosis), occupying a well-defined territory, the environment decides their fate more by the natural resources of that territory (land, water, air, heat, light, nutrients). The environmental factors and concentrations tend towards equilibrium and weighting, but on an individual basis have concentrations importance of ecological factors (environment) - the quantity and quality of each of them.

Each environmental factor is or may become a limiting factor for a species or community of species, allowing the installation of the species in the space of event or promoting it, when concentration levels are optimal and enable the growth and biomass accumulation.

Differences between species in an ecosystem regarding the requirements made possible the ecosystem functioning between wide ranges of concentrations of ecological factors and training biomass even when environmental factors vary.

Spread of certain plants is followed by animals spread, forming certain biocenosis, so that the whole typology of ecosystems depends on one or other limiting factors.

In view of this and following the full, top of all the local resources, organic farm will have a structure and those components will achieve this goal and be able to solve the problem of feeding the local population and other social components of outside interdependent through product sales, as bigger and with as quality as possible.

The farm must be so designed, organized in a way that the operation does not deplete natural resources or damage, allowing water and clean soil regeneration and environmental parameters does not worsen regional / local / global area.

Its "behavior" must ensure its sustainability over time, that neither the environment, aggressiveness and its changes, not to be able to eliminate or not cause such impoverishment and deterioration of the environment that they cannot work, to bankrupt herself.

The fundamental principle of integrated management environment - agricultural farm is based on the function of soil as formation complex biosphere, to constitute a border active by themselves, crossing environmental component mineral in the living world and allowing recycling material in dead organic mineral components, depending on the balance of water / air and edaphical life (soil life).

STUDY OF WOODY PLANT MANAGEMENT AND ENVIRONMENTAL IMPACT

Ion AGAPI

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Woody plants have undoubtedly been transported by humans for millennia and were an essential component of early agricultural societies. In these early societies woody plants were a source of a wide array of basic materials as well as food. In more recent centuries the type of species translocated has shifted with an ever-increasing proportion being ornamental plants.

Plant adaptations are useful in explaining the dominance of woody plant on rangelands today, but many of these areas were historically, more open grasslands or savannas. This suggests that environmental conditions have likely changed, resulting in a more suitable environment for establishment and growth of woody plants. Species introduced to areas outside their natural dispersal ranges need to overcome various barriers to establish, persist, proliferate and spread. Because some invasive species present a major threat to global biodiversity it is important to study the full suite of drivers of invasion to mitigate species impacts and prioritize management efforts.

A combination of plant traits enable woody species to invade into a relatively open environment and limit the success of management practices. By identifying these adaptations and understanding some basic ecological generalizations a land manager can more efficiently evaluate the need for management and accurately focus on critical phases of vegetation change. The effect of an invasive species on ecosystem processes is expected to depend on whether it differs functionally from native species. But just how large these functional differences must be to have an effect is likely to depend upon both the ecosystem and the invading species. For example, an ecosystem may be resilient enough to absorb the changes induced by a new species, while the invading species may adjust its characteristics to those of the native vegetation either through phenotypic plasticity or through the formation of new ecotypes.

Especially, when invaded habitats are characterised by high abiotic stress or low anthropogenic disturbances an adjustment of the invader's properties can be expected. In stressed habitats or in the long term after removal of a disturbance, the impacts of invasive species on ecosystems might thus be lower. Alternatively, after initial establishment invasive species may initiate a positive feedback that drives the ecosystem from one stable state into a new one that is more favourable to them, for instance by increasing nutrient availability.

The introduction of alien woody plants has been essential to the development of modern societies, but not enough care has been shown in identifying key positive impacts to justify many introductions. Furthermore, negative impacts have been largely ignored and these need to be addressed in order to avoid the disastrous impacts often observed, if future introductions are to have long-lasting beneficial effects on human societies. Instead of introducing alien species, whose long-term effects on humans are largely unknown, emphasis should be placed on enhancing the potential value of native species and plant communities. Integrative ecological research has the potential to build a bridge between ecological science and concrete management problems and thereby facilitates the production of case-specific and validated ecological knowledge that is particularly suited to assist environmental decision making.

REZULTATELE MONITORINGULUI FITOSANITAR LA PLANTELE LEGUMICOLE, DIN TEREN PROTEJAT ASUPRA NEMATOFANEI PARAZITARE COMBINATE CU ALTE MALADII FITOPATOGENE

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Avantajele pe care le prezintă legumicultura în teren protejat cum ar fi: producții de calitate, posibilitatea obținerii și eșalonării producției indiferent de sezon, utilizarea hibrizilor performanți, implică crearea unor aspecte contradictorii privind geneza invazivă a organismelor nocive, inclusiv și a complexelor de fitonematode parazite, combinate cu maladiile specifice fitopatogene, care provoacă mari daune plantelor legumicole și calității producției agricole, reeșind din eficiența factorilor favorabili în teren protejat.

Prin modul specific de investigații, scopul și obiectivele propuse au evidențiat eficiența monitoringului fitosanitar realizat la plantele legumicole din teren protejat, în elucidarea impactului fitoparazitar helmintologic, în stabilirea nematofaunei invazive, combinate cu maladiile specifice la tomate, castraveți, ardei, cu determinarea gradului de afecțiune, diversitate taxonomică, componență etiologică, pentru adaptarea unor remedieri în reglarea efectivului numeric și argumentarea unor măsuri de protecție integrată. S-au realizat evidențe fitosanitare, cu prelevarea probelor de sol și plante afectate, în asociațiile de producție legumicole, ce dispun de complexe de sere, specializate prin rotații sezoniere în dinamica procesului de cultivare a plantelor, în perioada anilor 2013-2015, din raioanele: Soroca, Criuleni, Ialoveni, Anenii-Noi, dispuse cu suprafețe considerabile în mediu peste 20 ha individual de teren protejat, înzestrate cu tehnologii avantajoase de cultivare eficientă a legumelor, prin crearea unor microclime artificiale dirijabile. Sezonier se efectuau sondaje de rută, unde se prelevau peste 50 probe de sol și plante, din fiecare eșantion analize fitohelmintologice și fitopatologice în teren, care urmau să fie analizate în laborator, cu aplicarea metodelor specifice, adaptate prin extracții, fixări, camere umede, montări de preparate, determinări ulterioare microscopice, a stabilirii parametrilor morfo-taxonomici, specializare trofică, diagnostic fitopatologic, grad de afecțiune etc.

Rezultatele și analizele sumare obținute, atestă faptul că, a fost stabilită structura nematofaunei la plantele legumicole investigate în teren protejat, în număr de 43 specii, diversificate după specializarea trofică, cu predominanța speciilor parazitare (19 specii), urmate de bacteriofage (13 specii), micofage (6 specii), ominove-prădătoare (5 specii), iar valorile efectivului numeric au variat în funcție de cultură, biotop, sezon, faze de creștere dimensionate în 580-1860 indivizi/100cm³/sol, cu un grad de afecțiune fitohelmintotic la plante, în valori de 5-20%, cauzate preponderent de speciile invazive galicole din genul *Meloidogyne* în asociație cu speciile din genurile *Pratylenchus*, *Rotylenchus*, *Ditylenchus*, *Paratylenchus*, *Bitylenchus*, *Tylenchorhynchus*, care sunt și vectori ai infecțiilor fitopatogene.

Rezultatele controlului fitopatologic, atestă o componență etiologică semnificativă de 22 maladii cheie, specifice sistemului radicular și organelor aeriene, unde mai sensibile s-au dovedit a fi plantulele de răsad, afectate de un complex de agenți saprofizi facultativi din sol, facilitați de nematodele vectori în valori de 15-25%, urmate de maladiile foliare pe plante adulte, cum sunt: alternarioza, macrosporioza, fitoftoroza, peronosporoza, cu predominanța fitoftorozei la tomate, peronosporozei la castraveți și alternariozei la ardei, în valori de 25-70% gradul de afecțiune. În așa caz cercetările fitosanitare realizate, sunt necesare și contribuie la elucidarea gradului fitoparazitar pentru argumentare în remediere și aplicarea măsurilor de prevenire și protecție a plantelor legumicole în teren protejat.

THE CONTENT OF PHOSPHOLIPID FRACTIONS AND THE ANALYSE OF POSSIBILITY OF THEIR STABILIZATION DURING HYPOTHERMIC STORAGE OF BOAR SEMEN

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Lipids are integral and essential components of the membranes that perform multiple functions in the life of germ cells. They provide the energy reserve, the solubility of various vitamins, the physical thermoregulation of activity of membrane-bound enzymes and other. In accordance with modern data about the molecular organization of biological membranes, the lipids represented mainly by amphiphile connections: phospholipids, glycolipids and cholesterol. At the same time phospholipids make up more than 60% of the total number of membrane lipids. In combination with cholesterol they provide fluidity and plastic properties of biological membranes. Based on the above, the aim of the conducted research was to study the content of phospholipids, their fractions and to determine the possibility of their regulation during hypothermic storage of boar semen at 16-18°C.

In our experiments we used the sperm of boars breeders of Landrace breed which contained in the conditions of relevant veterinary requirements of the breeding enterprise "Moldsuinhibrid". Analysis of the chromatograms shows that as a result of the fractionation of lipids were found 7 fractions: 1. sphingomyelin (SPH); 2. phosphatidylcholine (PC); 3. phosphatidylethanolamine (PE); 4. phosphatidylserine (PS); 5. cardiolipin (CL); 6. cholesterol (Chol) and 7. phosphatidic acid (PA). The most expressed content of such phospholipid fractions as the SPH, PC which represent saturated phospholipids and PE. It turns out that the predominant fractions perform an essential role in the activity of biological membranes. So, the phosphatidylcholine is the basic, most versatile phospholipid, which is great represented in membranes and lipoproteins of different cells and tissues.

When the temperature is lowering to 16-18°C the content of phospholipid fractions varies depending on the composition of mediums used for dilution and storage of semen of the boar.

Change of phospholipid spectrum demonstrates corresponding reconstructions of biological membranes, which have an affect the functional activity of spermatozoa.

It is established that targeted stabilization of the content of phospholipid fractions at the level of native spermatozoa is possible by improving of synthetic mediums.

The researches allow making the following conclusions:

1. Phospholipid spectrum of boar semen is mainly represented by sphingomyelin, phosphatidylethanolamine and phosphatidylcholine, whereas cardiolipin and phosphatidylserine are minor factions.

2. The content of phospholipid fractions is changed under the influence of hypothermal factor.

3. Stabilization of phospholipid is possible through targeted regulatory activity of redox processes at the dilution and storage of boar semen.

4. The ingredients of synthetic mediums can have a positive (or negative) impact on the biochemical status of boar spermatozoa by changing the chromatographic mobility of the phospholipid molecules.

TOTAL POLYPHENOLS CONTENT AND ANTIOXIDANT CAPACITY OF *RHODIOLA ROSEA* L. CALLUS BIOMASS IN THE PRESENCE OF PLANT GROWTH REGULATOR *REGLALG* IN CULTURE MEDIUM

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Rhodiola rosea L. represents a very important valuable plant, due to the contents of secondary compounds (SCs) in its roots and rhizomes, utilized in medicine and pharmacy since ancient times. SCs from *R. rosea* are mainly phenolic compounds that manifest high biological activity, determined by their adaptogenic, antitoxic and antihypoxic properties. Because of the large-scale exploration of natural resources during the last decades, successful attempts were undertaken to obtain SCs with high antioxidant activity by developing biotechnological methods of *in vitro* *R. rosea* culture. Application of plant growth regulators (PGR) is with important perspectives for enhancing the biomass production under *in vitro* conditions. PGR can be synthesized in artificial conditions, or extracted from plants. *Reglalg* is a plant growth regulator extracted from *Spirigira* spp. alga in the laboratory of Plant Biochemistry of the Institute of Genetics, Physiology and Plant Protection, Academy of Sciences of Moldova.

Present study was focused on the investigation of the influence of PGR *Reglalg*, introduced at different dilutions with Murashige and Skoog (MS) cultural medium for *in vitro* cultivation of the *R. rosea* callus. The total polyphenols content (TPC) and their total antioxidant capacity (TAC) of extracts from callus biomass was determined.

The results showed that TPC and TAC values of *R. rosea* callus biomass at 32 days of cultivation were dependent on the *Reglalg* dilution rate with MS cultural medium. Comparing the control data with those of *Reglalg* for the dilutions 1/800, 1/1000, 1/1200, and 1/1400, demonstrated the highest level of biomass and TPC accumulation in variant with *Reglalg* dilution in ratio 1/1000. In this variant the increasing in biomass and TPC achieved 38% and respectively 13%, compared to the control variant. Our data showed that supplementation of the culture medium with *Reglalg* is beneficial for TPC and TAC of callus biomass. The results obtained with phosphomolybdenum method of quantitative determination of TAC indicated the linear relationship between TPC and TAC in all experimental variants (the correlation coefficient was $R^2=0,94$). It suggests on proportional contribution of phenol compounds in antioxidant capacity of *R. rosea* callus cells, independent of biomass growth rate.

In conclusion, our results showed that for the *in vitro* production of *R. rosea* callus biomass, the best medium to increase the levels of biomass, TPC and TAC was that of MS diluted with *Reglalg* in ratio 1/1000. They also show that introducing in cultural medium of *Reglalg* improves the medium capacity to maintain the homeostasis capacity of *R. rosea* callus cells.

METAL IONS REMOVAL FROM WASTEWATER USING THE CYANOBACTERIUM *SPIRULINA PLATENSIS*

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In the process of evolution, microorganisms and especially cyanobacteria have developed the ability to accumulate metals from various environments, to use them in biosynthetic processes or to neutralize active forms in order to survive. The metals used for biosynthetic purposes are not accumulated in excess, thus *not showing* toxic effects. Currently, phytoremediation is an effective technological solution used to remove metal pollutants from water. But the main problem of this technology is the absence of auto purification ability of the higher plants. Despite the fact that mechanical and physicochemical treatment minimizes their content, the processed waters present an environmental hazard because of metal residues.

In this context, a possible solution would be to apply eco-friendly water purification technologies using microalgae and cyanobacteria. The cyanobacterium *Spirulina platensis* has developed highly specific and very efficient metal uptake mechanisms. One of the ways to reduce the toxicity of xenobiotics in cyanobacteria is to fix these substances by structural cell elements. Thus, metals are incorporated into various biologically active compounds of spirulina biomass. The incorporation of these metals in organic fractions of cyanobacterial biomass would allow their use in the composition of feed premixes due to their low toxicity and high bioavailability.

The capacity of bioaccumulation of remaining metals by *Spirulina* biomass was studied in two samples of wastewater collected from Thermal Power Plant CET 2 of Chisinau municipality. The water composition of these two samples is varied, both contain considerable amounts of metal components such as Fe (III), Zn (II), Cr (III), Cu (II), Mn (II), Ni (II) - metals presenting great interest as bioelements.

The experiment was conducted using 1g of spirulina biomass to 100 ml of wastewater and the contact time of 5min, 15min, 30min and 60min. The reaction mixture (wastewater + biomass) was filtered through cotton and the resultant spirulina biomass was dried at 105 ± 10°C. The *Roentgen fluorescence analysis* (Yanka Kupala State Ecological University of Grodno, Belarus) and neutron activation (Joint Institute for Nuclear Research, Dubna, Russia) were used to determine the metal amount in wastewater and in spirulina biomass after each contact time. *Spirulina's* capacity to accumulate the remaining quantities of metals from wastewater was evaluated according to the percentage of their recovery from analyzed solutions (water).

According to the results of the experiment, the native spirulina biomass, obtained by standard cultivation technology, has a low capacity for recovery chromium, manganese and iron from both samples of wastewater. However, accumulation level for these metals does not differ between the two samples of wastewater, reaching in both cases about 10-39%. The lowest recovery of 10-12% was recorded for iron.

FLORISTIC DIVERSITY OF THE EXHAUSTED PETROPHYTE ECOSYSTEM OF “LAFARGE CEMENT” LIMESTONE QUARRY

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The object of the research was the flora from the “Lafarge Cement” stone quarry from Rezina. By the analysis of floristic composition were taken into account, first of all, the number of component species, which give the information about the level of homeostasis of the system. Floristic diversity of the petrophyte ecosystem was studied by linear transect method, which consist of noting the phyto individuals alongside a line or a band, whose length is established depending on the investigated vegetation type.

Within the floristic research focused on the study of the floristic biodiversity and elaboration of a management plan in order to recover the flora of the “Lafarge Cement” quarry ecosystem, we focused our research on the taxonomic investigation of the floristic diversity in the neighboring regions of the quarry and in the proper quarry. There were identified 117 species of magnoliophyta from 43 families, the most diverse being Asteraceae family with 29 species and fam. Fabaceae - 7 species, fam. Lamiaceae - 7 species and fam. Poaceae with 6 species. According to the abundance of the species the first rank is given to Asteraceae, then it follows the Poaceae, Fabaceae and Scrophulariaceae. The quarry dendroflora is represented by 20 species of arbors and shrubs.

The quarry ecosystem is exhausted, because its flora is dominated by invasive species, the species from the natural ecosystems are represented here in reduced ratio and hardly withstand the conditions even in the recovered territory of the quarry.

According to the obtained results, in order to ameliorate the quarry vegetation from the recovered territory, supplementary investigations are needed for elaborating the methods of fortifying of the slopes by planting certain arbor and shrub species which have resistance to impact conditions. Because of this, there are needed researches to evidenciate the zones where arbors and shrubs does not grow, selection of the perspective species to place them within this exhausted ecosystem.

INFLUENCE OF VARIOUS REGIMES OF FREEZING ON VIABILITY AND VARIABILITY OF STREPTOMYCETES AFTER LYOPHILIZATION

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Streptomycetes are a rich source of antibiotics and other biologically active substances, so stability of taxonomic characters and their biotechnological properties interest both theoretically and practically. Bioactive substances from actinomycetes are widely used in pharmaceutical and agrochemical industries.

Currently, lyophilization and cryopreservation methods are considered the most optimal methods of storage of microorganisms. Preservation methods of microorganisms are selected taking into account the viability and genetic stability of strain.

The success lyophilization of microorganisms depends on several factors such as: the variety of taxonomy and development phase of the microorganism, composition of protector and rehydration medium used, initial titer suspension and time of lyophilization, but one of the basic factors that influence significantly the viability of microorganisms after lyophilization, is the freezing temperature.

Proceeding from the above purposes of the investigation was to study the viability and variability of strains of streptomycetes kept in NCNM (National Collection of Non-pathogenic Microorganisms) 1 year after lyophilization and storage depending on freezing regime.

Lyophilization of streptomycete strains was performed using different thermal regimes -20°C, -50°C and -80°C. Cryoprotector served as gelatin 2,5% + glucose 7,5%. Rehydration of strains was carried out with distilled water. The viability of the strains before and after freeze-drying was determined using the method of successive dilutions; suspension was subcultured on the agarized medium, counted by UFC. The number of surviving cells was presented as \log_{10} UFC in 1 ml of suspension and expressed as a percentage of the original number of UFC.

In result was determined that all strains survive after the lyophilization process, irrespective of the regime of the freezing used, but their viability differs significantly. Thus, the viability strains frozen at -80°C regime is on average lower (53,1 to 96,3%) compared to the established regime -20°C (75,2 to 99,4%) and -50°C (75,7- 90,7%). At the same time, we can mention that strains of the same species tolerate different lyophilization, their viability differing essentially in equal conditions of lyophilization. It has also been established morphological variability of strains of streptomycetes lower with the use of the freezing lyophilized at -50°C. Assessing the viability of the strains for the first year of storage showed a more pronounced morbidity in most strains, lyophilized use of the freezing -80°C compared to the other two regimes. Titer and viability of strains frozen at -20 and -50°C equals in percentage viability oscillating between 74,9 – 97,2 and from 74,6 to 98,1% respectively, depending on the taxonomy. Thus, taking into account the minimum variability and high viability during storage, for lyophilization of streptomycetes from NCNM is recommended freezing regime -50°C. Considering sensitivity of different strains of the same species to lyophilization, selecting parameters for lyophilization, for them it is individually.

HEAVY METAL CONTENT IN SOILS OF SEVERAL HISTORIC GARDENS FROM THE REPUBLIC OF MOLDOVA

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This paper presents the results of analysis of heavy metal content in soils of several historic gardens from the Republic of Moldova. For analysis were selected representatives historic gardens from Center Development Region: Balabanesti, village Balabanesti, district Criuleni, Ivancea, village Ivancea, district Orhei, Milesti, village Milesti, district Nisporeni and Manuc-Bei from town Hincesti.

The soil for analysis was collected via „envelop method”, depth 0-10 cm. The content of heavy metals was determined via X-ray fluorescence method using the device Spectroscan MAX – G in the laboratory Natural and Anthropogenic Ecosystems at Institute of Ecology and Geography.

During the analyse was determined the content of the following heavy metals: chromium (Cr), cobalt (Co), copper (Cu), Nickel (Ni) and zinc (Zn). The obtained data were compared with the limits of heavy metals for soils of Republic of Moldova [1]. The results are: *historic garden Balabanesti*: Cr-73,8 mg/kg, Co-7,9 mg/kg, Cu-13,1 mg/kg, Ni-14, 3 mg/kg and Zn-36,9 mg/kg; *historic garden Ivancea*: Cr-75,6 mg/kg, Co-2,1 mg/kg, Cu-11,3 mg/kg, Ni-8,1mg/kg and Zn-38,4 mg/kg; *historic garden Manuc-Bei*: Cr-88,4 mg/kg, Co-12,2 mg/kg, Cu-19 mg/kg, Ni-11,4 mg/kg and Zn-46,1 mg/kg; *historic garden Milesti*: Cr-70,5 mg/kg, Co-1,9 mg/kg, Cu-16, 8 mg/kg, Ni-8,7mg/kg and Zn-42,5 mg/kg (fig. 1).

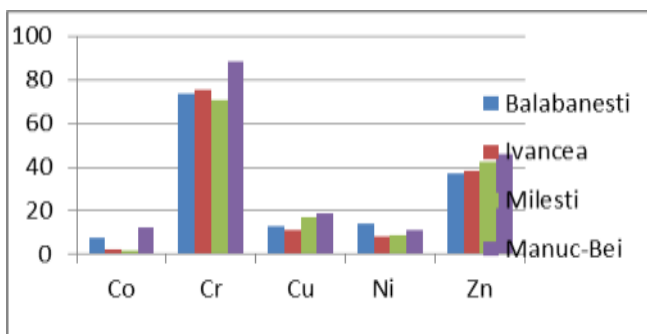


Figure 1 The content of heavy metals in soils of historic gardens (mg/kg)

None of the obtained results indicates pollution with the determined heavy metals. The level of pollution starts with 251 mg/kg for Cr, 51 mg/kg for Co, 151 mg/kg for Cu and Ni and 1201 mg/kg for Zn. In conclusion, we can say that soils from historic gardens Balabanesti, Ivancea, Milesti and Manuc-Bei aren't polluted with chromium, cobalt, copper, nickel or zinc.

Кирилук В. Микроэлементы в компонентах биосферы Молдовы. Ч.: Pontos, 2006. 156 с.

CHANGES IN URBAN ETHNIC LANDSCAPE IN THE REPUBLIC OF MOLDOVA AND ITS INFLUENCE ON TERRITORIAL ADMINISTRATIVE ORGANIZATION

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Though much of the “new” cultural geography remains wedded to the idea of landscape, the approach adopted here emphasizes the plurality of cultures and the multiplicity of landscapes with which those cultures are associated.

Peter Jackson, “Maps of Meaning”, 1989

The cultural landscape is from a natural landscape by a culture group. Culture is the agent, the natural area is the medium, the cultural landscape the result.

Carl Sauer, “Morphology of Landscape”, 1925

As we know, a rising tide of multiculturalism encouraged geographical studies of nationalism, class, gender, race, ethnicity, etc. The ethnic structure of the Republic of Moldova population is the result of a long historical process with some complicated periods, which have generated rather complex situations concerning demography, social, economic and political issues. The occupation by the Russian Empire in 1812, of the territory between the Prut and Dniester was preceded by a serious policy of colonization, strongly promoted by the Tsarist authorities, which caused radical change in the ethnic structure of the population of Bessarabia. For the reasons because Bessarabia at the beginning of the XIXth was a *rural area*, and the *city* was in a sustained process of transformation, it deserve a particular attention presentation of temporal and spatial changes that have occurred in the ethnic structure of the urban population.

With the formation of Moldovan Soviet Socialist Republic, August 2, 1940, allogeneic population flow preponderant russian or russified, greatly influenced national composition of cities. Therefore, cities have turned into; centres of foreign population concentration; promotion centres of Russian colonial policy; promoting centers for russification of the native population. Thus, it is to be noted that for over 200 years the distribution of ethnic groups in Republic of Moldova has remained virtually unchanged with a high titular population concentration in the Center and a dispersion of ethnic minorities to the periphery (North, South, East). This situation creates some opportunities for the base population of this territory (Moldovans) related to the preservation of their ethnic, cultural and linguistic identity but there are and some risks concerning the emergence of divisive ethnic and territorial disorganization by the ethnic minority groups.

However, the ethnic problem has emerged, especially after 1991, with the release of the Republic of Moldova from the USSR, declaring independence, sovereignty, to promote national values that have triggered conflict situations especially in regions populated by ethnic minorities pro-russian (territories from Transnistria, Gagauzia and Taraclia raion). In this connection over the country, under different administrative and political forms (country, region, district) there have been outlined three geographical areas of ethno-political instability. An important role in the formation and maintenance of these structures, have cities, appearing as political and economic centres, and, *most recently and cultural centres* (Comrat and Taraclia).

Hachi M., Grosu M., Aspecte privind evoluția structurii etnice din mediul urban al Republicii Moldova. În: Conferința Științifică Internațională „Competitivitate și inovare în economia cunoașterii: Probleme și soluții pentru România și Republica Moldova”, p.97-101.

Бабилунга Н. В., Население Молдавии в прошлом веке: миграция? Ассимиляция? Русификация?, Кишинев, „Штиинца”, 1990, 112 p.

THE EVOLUTION OF SMALL AND MEDIUM-SIZED CITIES FROM THE REPUBLIC OF MOLDOVA

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The purpose of the paper consists in identifying the particularities of small and medium-sized cities development, through geo-demographical, social and economic transformation conditions, in order to improve regional development policies and strategies.

Objectives: 1.To identify the directions and scientific studies, concepts and methodological criteria of small and medium-sized cities individualization, through the tools of economic geography; 2. The analysis of evolution urban settlements network specific, in the spatial and temporal context, and current territorial development of the republic; 3.To identify natural, socio-economic and demographic development factors of small and medium urban settlements network; 4.To determine the place and role of small and medium-sized cities for the territorial polarization in the context of regional development; 5. Elaboration of recommendations regarding the small and medium-sized cities efficient management within the urban settlements system.

The research methodology was carried out through the following methods: analytical, comparative, historical, hierarchical, statistical and mathematical, cartographic, expeditionary, observation and geographical description, which have allowed a complex socio-economic study of small and medium-sized cities and their role in the system of human settlements from the republic, in the context of current and prospective administrative-territorial reorganization.

The important scientific problem solved in the field concerned; based on a complex analysis of socio-economic and geo-demographic factors impact on the development of small and medium-sized, the main directions were determined in order to improve the urban settlements system in the context of regional development.

Theoretical significance: a complex approach of the small and medium-sized cities evolution through combining theoretical and methodological framework in the fields of geography, demography and economy, which ensured the interdisciplinary character of the research study.

The conclusions and recommendations serve as a basis for the central authorities and experts, in developing plans and development strategies of the country, including the improvement of urban and regional development policies. Implementation of scientific results: The results are used to elaboration university courses at the disciplines of Human Geography of the Republic of Moldova, Population and Human Settlements Geography as well Urban and Rural Geography.

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150 YEARS OF ECOLOGY AS A BIOLOGICAL SCIENCE

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The first ecological paradigms (dominant visions) are identified and analysed. Their evolution logically came close to the modern approach dealing with the organization and functioning of the natural (ecologic) systems. It is obvious that from the very beginning, the knowledge, as far as 2500 years age, were just facts and accomplishments compendiously and summarily collected, naive, artless and even erroneous, sometimes rudimentally mistaken.

In a way we are using the notion of paradigm conventionally, because the philosophical thinking as a dominant approach didn't exist about that time: the empirical knowledge about the environment were conveyed through generations according to the *memetics laws*.

The philosophy and science appeared simultaneously, as it was mentioned above, back with 2500 years, in ancient Greece due to the founder Thales from Milet (625-546 B. C.), affirming that everything around us is made up of water, while the other Miletian scientist – Anaximandros, (610-546 B.C.) carried out the first map of the Earth, as naive and primitive, an imaginary one, as one could concept. His fellow countryman Anaximenes (528-525 B.C.) produced the greatest “discovery”, although it was also imaginary it read: all the world represents an entire organism, which breathes air. Hence, the first imagination of the biosphere in modern understanding came out.

The other two Greek thinkers made their appearance: Heraclit from Efes (540-475 B.C.) and Empedocle from Acragas, Sicily (490-430 B.C.). The former one considered fire as the basis of all things happening around, the latter considered that all four elements, the perennial ones as water, the earth, air and fire to be the essential elements (about all these element Empedocle wrote in his poem *About nature*”).

The great number of outstanding Greeks is crowned by Platon from the Athens (427-347 B.C.), the father of the idealistic philosophy and of the concept about the system, as well as Aristotel from Stagira (384-322 B.C.) – the pupil of Platon, a brilliant philosopher and the founder of the sciences of nature (as well as of biosphere... biosphere with ecological connotation).

Since the beginning of sciences, the environment was considered by the ancient Greeks, the thinkers and philosophers (in a positivist manner) as something eternal, everlasting. Thus, the first Hellenic naturalist paradigm stood out, a paradigm of ancient materialism undertaken later on by the ancient Romans (for example, by Titus Lurcetius Carus and by Publius Ovidius Naso).

The theological dogmatism of the Middle Ages (that dominated approximately 1000 years) left tooing positive landmarks in the history of the sciences of nature. However, mankind's thinking didn't cease.

It was followed by the Renaissance – the wake up of man's interest about the ancient period – history, culture, philosophy, science and particularly, about the man, etc. Thus, such a fruitful epoch brought new knowledge and points of view about nature; the truth about the environment – an era hardly contested (only by dogmatics): the ideas being positively consolidated into convictions, into new, more conclusive paradigms.

Renaissance favoured and supported the anxiety for knowledge of the reality, brought new attainments and gave birth to new paradigms, one of which is the experimental paradigm founded by the English Scientist Francis Bacon (1561-1626) who is associated with the philosophical aphorism “the criterion of truth is the experiment, the practice”. The other import spokesman, a man of genius of Renaissance, a man of fine arts, a thinker, a scientist and an engineer – inventor was Leonardo da Vince (1452-1519) who affirmed that thinking, reasoning and decision without experimental proof are fruitless and lack any authenticity.

After the Renaissance, the 18th and the 19th centuries proved the record of the most spectacular discoveries dealing with live nature and its functioning: the scientific basis of systematics (binominal principle) and the concept paradigm of the economy of nature set up by C. Linné, the first theory of evolution (naive and mistaken ever and anon) belonging to J. B. Lamarck, the epochal discovery of mechanism of the organic world evolution created by two British// Darwin and A. Wallace, the coming into sight of Gr. Mendel with his heredity laws and, naturally, the appearance of the new biology of the German scientist E. Haeckel – a special area where the future ecology found its place, a biological science which continues to be considered an amazing evolution.

LANDRACES GENE POOL IN THE REPUBLIC OF MOLDOVA: COLLECTING, STUDY AND CONSERVATION

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In the context of current civilization development that is accompanied by dramatic degradation of natural resources, global climate change and food shortage experienced by a considerable part of the world population, the problem of secured conservation of plant genetic resources as the base for existence of intelligent life becomes increasingly more pressing. Availability of the main components of human nutrition in the nearest and distant future depends on conservation of plant agrobiodiversity.

An important part of plant genetic resources for food and agriculture includes traditional crop varieties (landraces) also known as *local varieties* or *forms*, *primitive varieties*, *farmer varieties*, that are cultivated by farmers on individual (farm) enterprises. Landraces reproduced by seeds of crop plants are commonly defined as variable population, they can be identified and have their local name. They are characterized by specific level of adaptation to limiting environmental factors of growing area and are closely associated with food traditions, knowledge, habits, and behavior of local people who maintain and develop them.

Landraces played an important role in Moldavian agriculture in the beginning of the past century when the majority of people lived in rural areas and crop plants were cultivated within traditional systems, i.e. the considerable part of production factors (including seed material) was closely connected with a certain farm. In the 50s-80s, the agricultural production systems passed the periods of collectivization, concentration and specialization of agricultural lands, creation of giant agroecosystems, that significantly damaged not only national elements of agricultural management but also negatively affected natural ecosystems. A lot of mistakes were also made in the 80s-90s in the process of return of lands to the farmers and their privatization.

Said trends negatively affected local gene pool of cultivated plants and led to their significant genetic erosion. Many varieties that were cultivated traditionally in the past have been lost. At present, part of landraces are still cultivated by farmers on the small individual sites to satisfy their nutritional needs and for other purposes. This gene pool is of great value (mainly due to high resistance to unfavorable environmental conditions and quality of resulting products). The most important task in this context includes collecting and secured long-term *ex situ* conservation of landraces, along with the maintenance of dynamic systems of *on farm* conservation (i.e. conservation of valuable local accessions of agricultural crops directly on farms).

Laboratory of Plant Genetic Resources conducts the investigations on GPS-positioning of farms, identification of current cultivation status of different species of crop plants, registration and collection of seed and planting materials, their further analysis both in the field and laboratory, and also *ex situ* conservation. As a result of expeditions, over 700 accessions of landraces have been collected during the last years in all ecological zones of the country. Many of them are of the outmost interest for the researches and plant breeders. Works in this direction will be continued with the purpose to cover the majority of communities.

**STUDIES OF THE FAUNA OF THE CICADAS (HEMIPTERA:
CICADOMORPHA ET FULGOROMORPHA) IN THE REPUBLIC OF
MOLDOVA**

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Cicadas (within the order *Hemiptera*) is an important component of fauna and play a significant role in ecosystems.

At present, 30 thousand species are described in the world fauna, from which more than 2000 species are in Europe. According to the Fauna Europea source, 252 species from 13 families are recorded in the Republic of Moldova: *Aphrophoridae*, *Cercopidae*, *Cicadidae*, *Tibicinidae*, *Cicadellidae*, *Membracidae*, *Ulopidae*, *Caliscelidae*, *Cixiidae*, *Delphacidae*, *Dictyopharidae*, *Issidae* and *Tettigometridae*, that are included in suborders – *Cicadomorpha* and *Fulgoromorpha*. The number of species is greater in the countries bordering with the Republic of Moldova: in Ukraine - 609 and in Romania - 430 species.

The studies published by Hovarth G. in 1894 provide the first information about cicadas belonging to the territory of Republic of Moldova: 15 species. Article of Plughari S.G. (1963), published almost 70 years after the first article, notes 34 species of cicadas, occurring in Moldova on oak trees and Tereshko L.I. (1965) – 33 species. One of the most important works on cicadas fauna was done by Talitsky V.I. and Logvinenko V.N. (1966) who gave information about 259 species, of which 195 species are listed for the first time.

These insects are diverse and abundant in many plant associations, especially in the grass layer. They are phytophagous and cause very damage to various crops. It was published a large number of works devoted to the cicadas e.g. *Ceresa bubalus* L. harming fruit crops in R. Moldova (Vereshchagin and Vreschagina, 1955, 1956; and Bichina, Vreschagin 1957, Vereshchagin, 1957, 1959, 1960, etc.), red cicada - *Tibicen haematodes* Scop. (Talitsky, 1966; Vereshchagin and Nikolaev, 1961; Zhigaltseva and Tereshko 1962, Vereshchagin, Nikolaiv and Vitko, 1963, etc.) and the rose leafhopper - *Typhlocyba* (= *Edwardsiana*) *rosae* L. (Vereshchagin and Mikhailyuk, 1961). Moreover, Lazarev (1975) draws attention to the fact that cicadas including such species as *T. haematodes* Scop., *Stictocephala bubalus* Fab. and *Edwardsiana rosae* L. cause heavy damage to the harvest of autumn and winter varieties of pears. There was a great interest to development and implementation of various measures for reducing the numbers of cicadas populations. For example, Talitsky V. (1966) studied the effectiveness of *Eupelmus tibiae* Bck. (*Eupelmidae*) to reduce the number of *T. haematodes* Scop.

Since that time a large focus of cicadas was found mainly in well-lit and warm plantations of ash and oak; breeding restrictions for cicadas are mentioned in the studies of Kovtun M. (1970). L. Tereshko and L.Sinyavskaya (1970) published the study on the protective reaction of woody plants when cicada egg laying. In addition to the direct harm caused to plants by cicadas, harmfulness is greatly enhanced by the fact that many of them are vectors of viral diseases (Potato spindle tuber viroid, tobacco and beet mosaic, etc.). The main vector of *Tomato stolbur phytoplasma* is *Hyalesthes obsoletus* Sign. List of quarantine insects for R. Moldova includes 5 species of cicada: *Carneiocephala fulgida* Notting., *Draeculacephala minerva* Ball, *Graphocephala atropunctata* Sign. - these types are known as vectors of Pierce's disease, *Myndus crudus* V. Duz., *Schaphoideus luteolus* V. Duz. Furthermore, the positive role of cicadas species is that they are feed for other animals, mostly birds.

ECOLOGICAL RECONSTRUCTION OF HORNBEAM OAK STANDS

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In the present abstract proposes to elaborate methods for the reconstructions of hornbeam oak stands to bring to an optimal structure under both in relation ecologically and economically.

Return partially derived hornbeam stands into natural fundamental forest typest will be done by natural regeneration and apply progressive and successive silvicultural treatments but where stands are totally derived, regeneration of these stands has the appearance of an ecological reconstruction (substitution) and apply clear cutting silvicultural treatments.

For restoring partially derived stands will be done a comparative analysis of the influence of progressive cutting treatments and successive cutting treatments on the natural regeneration of seedlings.

For restoring totally derived stands by applying clear cutting, afforestation will be executed through direct sowing and the platantions of seedlings there after will be make comparisons between qualitative and quantitative characteristics obtained from seedling.

The research works will be carried out in stand from central area of Moldova.

EXPLORING THE WAYS TO INCREASE THE MICROALGAE EFFICIENCY AS BIOFUELS SOURCE

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Lipids are the alternative energy sources in biomass of living organisms, especially in the photobionts: higher plants, algae and photobacteria. Currently more attention is paid to the microalgae, which have higher fat content and growth rate compared to terrestrial plants. The algae cells usually contain 4-12% of lipids (ADB). However these values can be much higher and reach up to 75%, depending on species and growing conditions. Therefore microalgae can be considered as an alternative source of renewable energy for various kinds of biofuel production: biogas, alcohol, biodiesel etc. Microalgal biomass can be converted into biofuel via various biological methods including fermentation. As a result, hydrogen, ethanol and biogas could be produced. The same method includes extracting lipids from biomass for biodiesel production.

Biodiesel obtaining from microalgae biomass still requires much research and investments. One of the areas to be studied is to increase production of lipids in the microalgae cells by applying simple and inexpensive methods. Our studies demonstrated a significant increasing of lipids amount in the biomass of *Dunaliella salina* by inducing hyper saline stress. The optimal combination of initial nutrient medium salinity and stage of development of microalgae culture can increase total lipid content in *Dunaliella* up to 50%. A further increase in the content of lipids in *Dunaliella* culture is possible using the compounds of Iron (III) and Zinc (II). These metals have the positive effect also for *Haematococcus pluvialis*. Its biomass after extraction of astaxanthin can be successfully used as raw material for biofuel production.

Researchers at the Institute of Microbiology and Biotechnology of the Academy of Sciences of Moldova have shown that the activation of the desaturases expression leads to high yield of polyunsaturated fatty acids. Thus, the activity of Δ^6 desaturase (enzyme involved in the synthesis of eicosapentaenoic acid in *Porphyridium cruentum*) can be changed by applying different thermal regimes at different stages of microalgae growth. Decrease of the temperature at the end of exponential growth accelerates the accumulation of this valuable fatty acid in biomass.

Phylogenetic approach recently became a useful tool in the search of new phycological objects as energy sources. Advances in molecular and genomic studies have revealed the genes involved in different stages of secondary metabolites production. Several genes have been identified in *de novo* triacylglycerol (TAG) biosynthesis pathway: *rbsL*, *me g6562*, *accA*, *accD*, *dgat g2354*, *dgat g3280*, *gat g7063*; and production of malic enzyme subunits: ACCase and diacylglycerol acyl transferase. Involved in lipid synthesis genes are well studied in relation to biofuel production. Phylogenetic analysis of these genes essentially simplifies screening of microalgae for similar physiological response to various external actions aimed at increasing their energy efficiency. Thus, the methods of traditional biotechnology and modern bioinformatics can significantly shorten the way to the large scale application of microalgae as a source of clean energy.

POPs AND THEIR MIGRATION INTO THE ENVIRONMENT

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Persistent organic pollutants (POPs) are known as highly toxic chemical substances that remain stable in the environment for a long time. Having a volatile nature and globally circulating in the atmosphere and rivers, seas and oceans, they may have a harmful effect on human and animal health. Bioaccumulation is typical for POPs within such environmental compartments as soil, natural waters, living matter. In living organisms, in most cases, the process of accumulation takes place in adipose tissue cells.

During 2001 the Stockholm Convention on Persistent Organic Pollutants conference included 12 compounds that were pesticides, industrial and unwanted secondary products in the list of toxic substances. Later in 2009 another 9 were added to the list of hazardous substances. Among these substances were such well known compounds as DDT, chlordane, aldrin, lindane, PCBs, PAHs and dioxins. Convention was focused on risks reduction and eliminating possible danger that these mentioned chemicals are able by cause. Moldova has signed the Convention in 2001.

In Moldova during 70-80ies, there was a period of intensification of agricultural production and increased application of mineral fertilizers and pest control substances, the total amount of pesticides applied being approximately of 20 kg/ha. Since the 90s the amount of pesticides used in agriculture in the country was significantly reduced, however, due to lack of strict control over the import, transportation, storage and use of pesticides there was an accumulation of large quantities of expired or prohibited pesticides. Overtime these chemicals became noticeable threat to the environment and human health. The national inventory showed that the total quantity of expired or prohibited pesticides in the country is about 6,600 tons. Currently Republic of Moldova has no pesticide production enterprises, all permitted plant protection products for agriculture are imported.

Pesticides are one of the causes of water pollution, but some of them can be transformed into a benign substance that is environmentally compatible. The duration of the breakdown of POPs (including metabolites and isomers) can be up to 142 years (DDT). Aquatic currents play one of the main roles in the migration of pesticides. Benthic sediments as well as soil for terrestrial organisms, are basic reservoirs for POPs accumulation, providing long circulation of these substances in aquatic ecosystems. Along the trophic chains POPs concentration increases manifold. Concentration of POPs in the trophical chains increases manifold. Particularly this is characteristic for pesticides with low solubility in water. Therefore, comparing the content in sludge, concentration of DDT in algae grew by 10 times, in small crustaceans - by 100 times, in fish - by 1000 times. According to the results of researches, in 2009-2014 on the territory of the Republic of Moldova the concentration of organochlorine pesticides in the main rivers not exceeded the MPC (0.01 mg/l).

Inventarul Național al Poluanților Organici Persistenți al republicii Moldova. Ministerul Ecologiei, Construcțiilor și Dezvoltării Teritoriului, Chișinău, 2003.

Planul Național de Implementare a Convenției de la Stockholm privind Poluanții Organici Persistenți, Chișinău, 2004.

Anuar. Starea calității apelor de suprafață conform indicilor hidrochimici pe teritoriul Republicii Moldova în anul 2014. Serviciul hidrometeorologic de Stat.

**APRECIEREA INFLUENȚEI *REGLALGULUI* ASUPRA
PARAMETRILOR DE CREȘTERE ȘI RESTABILIRE A
DETERIORĂRILOR PROVOCATE DE TEMPERATURI EXTREME
SEMINȚELOR GERMINATE DE GRÂU**

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Încolțirea plantulelor reprezintă o fază specifică din ciclul vital al plantelor de grâu. Ea demarează de la etapele inițiale de germinare, până la ieșirea din interiorul coleoptilului a primei frunze. Derularea acestor procese are loc în prezența apei și a temperaturilor pozitive între 1-35°C. Temperaturile mai înalte de maximul menționat induc starea de stres la plantele de grâu. Scopul cercetărilor noastre a fost de a determina specificul influenței *șocului termic* (*ȘT*) asupra proceselor de creștere a coleoptilului și rădăcinilor embrionare, precum și a posibilității de a modifica aceste procese cu ajutorul regulatorului natural de creștere *Reglalg*. Inițial noi am determinat influența diferitor concentrații a preparatului *Reglalg* asupra vitezei de creștere a coleoptilului și rădăcinilor, imersând semințele germinate pe parcursul a 2 minute în apă (martor), soluții a preparatului *Reglalg* diluat cu apă în raportul 1/1000, 1/800, 1/600, 1/400, 1/200 și 1/100 (experiment). Datele obținute au demonstrat că preparatul *Reglalg* în toate concentrațiile a influențat benefic creșterea plantulelor, efectul stimulator fiind maxim în varianta diluției preparatului *Reglalg* în raportul 1/200. Anume această concentrație a fost utilizată pentru a determina influența *Regalului* asupra răspunsului plantulelor de grâu la acțiunea *ȘT* cu diferite temperaturi (38 - 53 °C) pe parcursul a 10 minute. La plantulele martor și experimentale a fost determinată *viteza de creștere zilnică* (*VCZ*) a lungimii rădăcinilor și a coleoptilului plantulelor în normă și după expunerea la *ȘT*. Rezultatele obținute au demonstrat că sub influența *ȘT* *VCZ* a rădăcinilor și coleoptilului plantulelor martor și experimentale diminuează proporțional cu majorarea valorii temperaturii *ȘT*. Totodată acest efect a *ȘT* a fost mai puțin pronunțat la plantulele obținute din semințele care prealabil au fost tratate cu preparatul *Reglalg*. Reinițierea creșterii rădăcinilor, care are loc în ziua a doua după aplicarea *ȘT*, se manifestă mai pronunțat la plantele experimentale, iar lungimea rădăcinilor și a coleoptilului depășea esențial la plantele din varianta martor. Valorile mai ridicate a *VCZ* la plantele martor în ziua I după aplicarea *ȘT* sugerează despre influența benefică a *Reglalgului* asupra rezistenței primare a plantulelor, iar sporirea lor ziua a cincea demonstrează că sub influența *Reglalgului* sporesc și procesele de restabilire a creșterii plantulelor de grâu în perioada după aplicarea *ȘT*. *VCZ* a coleoptilului la plantulele obținute din semințele tratate cu *Reglalg* atinge valorile maxime în ziua 2-3 și diminuează până la zero în ziua a patra. La plantele din varianta martor *VCZ* atinge valoare zero în ziua a cincea. Aplicarea *ȘT* a dus la diminuarea lungimii coleoptilului la toate variantele. Totuși la plantulele obținute din semințe tratate cu preparatul *Reglalg* lungimea coleoptilului după aplicarea tuturor dozelor de expunere la *ȘT*, lungimea finală a coleoptilului era mai mare în comparație cu plantulele din varianta respectivă a *ȘT*, dar obținute din semințele netratate cu preparatul *Reglalg*. Aceste date au demonstrat preparatul *Reglalg* are efecte benefice asupra rezistenței primare și capacității de restabilire a plantulelor de grâu, iar procesele de creștere a coleoptilului plantelor, poate servi ca un indice important în elucidarea influenței regulatorilor naturali de creștere asupra rezistenței grâului la temperaturi extreme.

MICROPROPAGATION OF ENDANGERED SPECIES OF AMARYLLIDACEAE IN THE BOTANICAL GARDEN (I) OF THE ASM

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Botanical Garden (Institute) of the ASM

In Republic of Moldova, one of the most pressing environmental concerns is the rapid population decline of rare species of the spontaneous flora. Their number is more than 500 species and is constantly growing. In this regard, Fam. Amaryllidaceae, represented by perennial plants with rhizomes or bulbs, comprising about 60 genera and 800 species, widespread in warm and temperate zones of Earth, needs particular attention. The following species have been proposed for research: *Galanthus nivalis* L., *Galanthus plicatus* Bieb., *Leucojum aestivum* L., *Sternbergia colchiciflora* Waldst. & Kit., *Galanthus elwesii* Hook.f. In our country, these species are found in one or several areas, one of them (*Galanthus elwesii* Hook.f.) is even extinct here and is found in Ukraine at the border with Moldova. *Galanthus nivalis* – vulnerable species (VU). It is found in sessile oak forests, primarily those with lime and ash, rarely – English oak, and in scrublands. It is a perennial, bulbous, ephemeral plant. *Galanthus plicatus* – critically endangered species (CR). It is found in oak forests with ash and lime. It is a perennial, bulbous, ephemeral plant. *Leucojum aestivum* – critically endangered species (CR). It is found in floodplain forests of white poplar, in the humid lowlands. It is a perennial, bulbous, ephemeral plant. *Sternbergia colchiciflora* – critically endangered species (CR). It grows in oak forests with downy of oak and on steppe hills. It is a perennial, geophyte, ephemeral plant. *Galanthus elwesii* – extinct species (EX). It is a perennial, bulbous, ephemeral plant. It grows in dryland forests with downy oak, with medium and low humidity and on well-drained soils.

The limiting factors are represented by the extreme conditions at the habitat limit, desiccation and reduction of natural forest areas, intensive grazing, ruderalisation of habitats, grubbing of steppe sectors in spring, picking flowering plants, removal of bulbs to be used for medicinal and decorative purposes.

Being endangered species included in the Red Book of Moldova (3rd edition), they need abidance by the rules of the protection regime in the areas for research, taken under state protection; an increase in the number of such areas; monitoring of the existing populations; propagation of species in *ex-situ* conditions including microcloning and micropropagation through *in vitro* culture, with subsequent repatriation to their natural habitats and determination of new areas for research, taking them under state protection.

EFICACITATEA VIRUSULUI POLIEDROZEI NUCLEARE ÎN COMBATAREA OMIZII PĂROASE-A-STEJARULUI (LYMANTRIA DISPAR L)

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La moment cea mai utilizată este agricultura intensivă, o ramură importantă este cea silvică care asigură populația cu material de construcție, celuloză, combustibil. Însă o astfel de abordare nu eliberează agroecosistemele de boli și dăunători, ceea ce duce în fiecare an la pierderea a o treime din roada preconizată. Numai în Republica Moldova din cele 419 mii de hectare împădurite circa 94 mii de hectare sunt afectate de dăunători forestieri și boli. Unul din cei mai feroci dăunători este larva de *Lymantria dispar* L., este polifagă poate defolia complet arborii, ce duce la o scădere a calității lemnului considerabil, dăunând astfel circa trei sute de specii de plante. Pentru zona noastră este actual deoarece una din cele mai atacate specii este stejarul, care este o specie prețioasă atât din punct de vedere economic cât și floristic. Dăunătorul are și el patogeni care pot să ne fie nouă de folos, unul din ei este virusul poliedrozei nucleare (VPN).

Pentru a vedea cât de eficientă este metoda dată sau montat experimente în laborator și anume: au fost crescute larve de omida- păroasă-a-stejarului, apoi la vârsta II ele au fost împărțite în trei variante și martorul, fiecare având câte trei repetiții. În fiecare repetiție sau utilizat câte 40 larve. Apoi acestea au fost infectate cu suspensie virală de diferite diluții: 10-1, 10-2, 10-3, soluția inițială având un Titru total = 5.7366×10^8 . După ziua a treia de la infectare se începe evidența mortalității larvelor pe variante, evidența mortalității larvelor *Lymantria dispar* se efectuează până la a 15-a zi. Determinarea titrului VPN se efectuează după metodologie (1). Eficiența suspensiilor virale se determină după formula lui Abbot (1)

În baza cercetărilor au fost obținute următoarele rezultate: Eficacitatea suspensiilor virale este foarte înaltă atinge valori după 90% ceea ce dă posibilitatea de a lucra mai departe asupra acestui obiect și elaborarea în final a unui preparat biologic.

1. Ciuhrii M. G., Voloșciuc L. T., Catană D. V., și al. Систематика методов идентификации вирусов ядерного полиедроза. Chișinău: Știința 1991.
2. VOLOȘCIUC L.T. Biotehnologia producerii și aplicării preparatelor baculovirale în agricultura ecologică. Chișinău 2009.

CURRENT ASPECTS OF MOLDOVAN WALNUT GENOFOND EVALUATION FOR SUSTAINABLE USE AND CONSERVATION

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Among dried fruits, *Juglans regia* is one of the most important species from an economic and botanical point of view, and in many countries it has a rich cultural heritage. Today walnut is grown in over 60 countries around the globe, and is harvested from cultivated orchards and wild populations. Moreover, improved and selected varieties are cultivated with advanced modern orchard management in order to obtain quality fruits and new processed products. In the past, the highest demand of nuts particularly occurred during the Christmas period, but nowadays nut consumption is extended also in other months.

Walnuts in Rep. of Moldova are traditional local domestic trees with highest socio economic impacts. Local varieties and selected biotypes are characterized by high resistance to biotic and abiotic factors. Researches are directed to valorization/conservation of important biotypes. Now a day the researches are needed due either to the limits of natural resources and of the dependence on natural factors during climatic changes within varied local relief.

The items of the cooperation project are the creation and organization of a data-base on genetic resources for either gene conservation and fruit production. Data-base including information on geographical location, ecophysiological, phenotypic characteristics, molecular genetics, biochemical and nutritional descriptions, will be important to drive actions to support and enhance agriculture and to support manufacturing processes and social and economic development.

In Rep. of Moldova, valued and interested walnut trees has been present in all the typical walnut growing areas. Each individual tree has been characterized by its GPS localization, ecophysiological area and phenotypic characteristics of tree, leaves and nuts. Samples of nuts or leaves from selected trees were collected for biochemical and molecular marker analyses. Kernels of nuts were analyzed for proximate contents and oil composition and vitamin E level were determined. For molecular marker analysis genomic DNA was extracted and purified from leaf tissue or defatted kernels. All samples were genotyped using 10 unlinked nSSR loci already used for characterization of Persian walnut. PCR amplification fragments were collected and genotype profiles were assigned with GeneMapper v. 4. Statistical analysis was carried out by the GenALEX version 6 software.

All together, our 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. This is particularly interesting because all the Moldovian territory appears to be a large reserve of useful genes. 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 investigate on the origin of walnut in Europe.

The research was done in the frame of cooperation agreement between CNR (Italy) and ASM (Rep. Moldova).

COMPOSTAREA NĂMOLULUI DE EPURARE DE LA STAȚIA DE EPURARE (SE) A APELOR UZATE MENAJERE CHIȘINĂU CU ALTE DEȘEURI BIODEGRADABILE.

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Tehnologia de compostare elaborată include elemente originale de intensificare a procesului de compostare, dirijare și menținere a temperaturii prin activitatea microflorei termofile, astfel încât se obține un fertilizant cu calități fizico-chimice performante și liber de helminți și microorganisme patogene. Tehnologia de compostare include etapele:

-Faza de fermentare mezofilă. Deșeurile avicole cu așternut sunt stocate pe terenul de compostare într-un strat cu grosimea de 0,80-0,90 m peste care se toarnă nămol brut (umiditatea 95-98%) în cantitate de 2,0-3,0 m³ la 1 t de gunoi avicol. După umectarea completă ($W = 70 - 75\%$) se lasă 3-4 zile pentru dezvoltarea bacteriilor. În acest interval temperatura amestecului crește până la 35 - 40°C.

- Faza termofilă începe în ziua a 5-a când peste stratul de gunoi de grajd avicol se adaugă nămol deshidratat din Geotuburi în raportul calculat după masa uscată gunoi de grajd avicol: nămol de 1:1. În aceeași zi cu ajutorul unui încărcător frontal componentele se amestecă și se așază într-o șiră de compostare cu lățimea la baza de la sol 2-3 m și înălțimea 2m. Datorită proceselor microbiologice intensive temperatura în interiorul platformei crește până la 60 – 70°C. Această temperatură se automenține 20 – 25 zile. Aerarea poate fi efectuată prin remanieri repetate sau forțată (Fig.1).

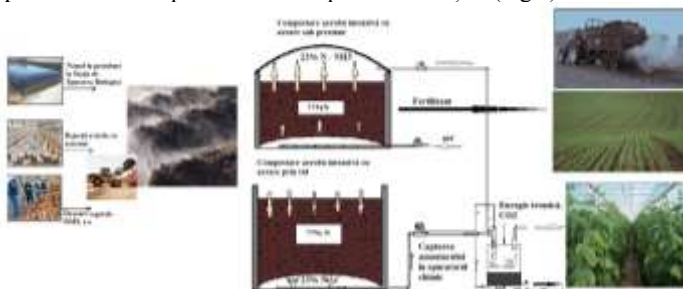


Fig. 1. Procedee de compostare a nămolului de la SE cu alte deșeuri biodegradabile

Tehnologia propusă spre implementare are următoarele avantaje:

- Durata medie de compostare este de 2-3 ori mai mică;
- Compostarea în comun a nămolului și gunoierului de grajd avicol cu așternut reduce riscurile poluării solului cu metale grele;
- Îmbunătățește condițiile de transportare și introducere a fertilizantului în sol;
- Este un îngrășământ organic concentrat, fără miros și liber de agenți patogeni, capabil să amelioreze caracteristicile fizico-chimice și biologice a solului.
- Efectuarea compostării în regim dirijat permite captarea amoniacului, bioxidului de carbon, energiei termice și utilizarea acestora în gospodăriile de sere, diminuând toată efectul poluant asupra mediului.

THE IMPACT OF HYPERTHERMAL STRESS ON THE SPECTRUM OF PROTEIN FRACTIONS OF BULL SEMEN

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Among of organic substances included in the composition of living cells, from the viewpoint of structural and biological roles, the most important are the proteins. The specificity of biological processes mainly depends on the composition of proteins with different structure and function. It is known that the chemical activity of proteins determines the physiological properties of cells. Since the specific capabilities of spermatozoa depend on the composition of proteins and the influence of external factors, the aim of the research was to study the characteristics of changes of the spectrum of protein fractions of sperm in depending on the ambient temperature.

As the subject of research was used sperm from 5 bulls of Black and White breed at the age of 3 years. As a stress factor has been used the hyperthermia (45 °C). We studied the effects of short-term (1 minute) and long-term stress (10 minutes) at changes in protein fractions of sperm of the bull. To each experimental sample matched control sample (35°C).

From the data of the conducted research it is observed that when sperm of bull was exposed to a temperature of 45°C for 1 minute, has been a trend of increasing the quantity of albumin up to 4,2% and at 10 minutes - up to 13,3% of the total volume. When exposed to a temperature of 45°C for 1 minute the total amount of globulins, typically does not significantly change. Of them, the content of α -globulins tends to decrease, while the β - and γ -globulins do not support the changes. After 10 minutes of stress, the amount of total globulins has a tendency to reduce, especially α -globulins, while the content of β -globulins and γ -globulins does not change significantly. Thus, the hyperthermic stress of bull semen for 1 minute is reflected only on the quantity of albumin, which has a tendency to increase. The influence of hyperthermic stress for 10 min is manifested by the tendency of growth of the percentage content of albumin and insignificant decrease in the concentration of total globulins, especially α -globulins. Process of the protein fractions variability, apparently, is aimed at increasing the adaptability of the whole cellular system of gametes to the action of unfavorable factors of hypothermia and, obviously, can be regarded as a manifestation of cell adaptation to the stress effect of cold, and therefore can provide a higher level of survival of gametes. It should be assumed that gametes must possess a variety of regulatory mechanisms that are, to a certain extent, can compensate for these changes. In the case where environmental factors on the strength and duration, prevail over the capabilities of these mechanisms, conformational mobility of protein molecules can be changed, and then in the cell at different levels of its organization, may occur destructive changes.

The researches allow making the following conclusions:

1. The increase in the content of albumin fractions after thermal exposure of semen of the bull takes place by reducing the amount of globular proteins.

2. When creating temperature-protective mediums for sperm of the bull is necessary to consider the ability of their components to stabilize the adaptive-compensatory reactions and the preservation of proteins in particularly their albumin fraction.

PERIPHYTONIC ALGOFLOTA OF THE RIVER ICHEL

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As a result of investigations on periphyton algae communities (on the surface of various substrates) in the low reach of Ichel river, 234 species and varieties of algae belonging to 6 phylum have been highlighted (*Cyanophyta* – 49, *Bacillariophyta* – 97, *Xanthophyta* – 2, *Dinophyta* – 5, *Chlorophyta* – 58 and *Euglenophyta* – 23).

The periphyton algal flora of the river Ichel grows abundantly on various types of substrates, both animate and inanimate, forming a biomass of 10 g/m² up to 1-2 kg/m², with the predominance of chlorophyta, cyanophyta, diatoms and euglenophyta. Algae development achieves its maximum intensity in autumn and reduces during the cold season, when the water temperature is below 10°C.

Thus, in winter samples, collected from the wood and submerged rocks, an intensive development of bacillariophyta with a number of 70-80 species and varieties, with a biomass of 46 - 60 g/m² was established. The species: *Rhoicosphenia curvata*, *Cocconeis pediculus*, *Melosira varians*, *Synedra ulna*, *Navicula rhynchocephala*, *Cymbella tumida*, *Gomphonema olivaceum*, *G. augur*, *G. constrictum* var. *capitatum*, *Nitzschia dissipata*, *N. kuetzingiana*, *N. paleacea* etc. were frequent encountered in periphyton. In winter samples some cyanophyta were also highlighted: *Merismopedia tenuissima*, *Oscillatoria lacustris*, *Oscillatoria chalybea*, *Phormidium foveolarum* etc., which formed a biomass up to 1,3 g/m².

In spring, as the temperature increases, on the submerged stones and wooden objects in the periphyton intensifies the development of cyanophyta belonging to the class *Hormogoniophyceae* and chlorophyta belonging to the classes *Chlorococcophyceae* and *Ulotrichophyceae*, producing a biomass of 20-50 g/m². During this period decreases the number of diatoms. This is conditioned by the increase of the temperature of the water and the intensive development of the cyanophyta as well.

In summer, on the stems and submerged leaves of aquatic higher plants, chlorophyta predominates in the complex: chlorophyta-diatoms-cyanophyta or chlorophyta-cyanophyta-diatoms. Sometimes, the periphyton algae forms a biomass up to 1-2 kg/m². The filamentous green algae: *Cladophora glomerata*, *Mougeotia* sp., *Oedogonium* sp., *Stigeoclonium tenue* were predominant together with cyanophyta: *Phormidium foveolarum*, *Anabaena variabilis*, *Oscillatoria chalybea*, *O. tenuis*, *Calothrix brevissima* etc.

In spring the diatoms are less numerous on the inanimate substrates, with a biomass of 15-18 g/m². *Navicula cryptocephala*, *Cymbella prostrata*, *C. turgida*, *Gomphonema olivaceum*, *Surirella ovata* and others were most frequent encountered in periphyton.

In autumn, in the periphyton of the Ichel river an intense development of cyanophyta can be observed (species of the genera *Microcystis*, *Anabaena*, *Oscillatoria*, *Phormidium*, etc.). In this period, among the filaments of cyanophyta *Oscillatoria chalybea* and *O. terebriformis*, were observed some euglenophyta, such as: *Trachelomonas verrucosa*, *Euglena viridis*, *E. gracilis*, *E. polymorpha*, *E. oxyuris*, *Phacus caudatus* etc.

Cyanophyta and euglenophyta (sometimes, small amounts of diatoms and chlorophyta) form on the surface of the mud (120-200 cm², and in some places with a slow flow - 1 to 3 m²) blue-green mucilaginous colonies of 0,2 – 0,8 cm thick. Fragments of such colonies, removed by the water currents from the surface of the mud, were met among some thickets of aquatic higher plants.

TECHNOLOGIES FOR DEVELOPMENT AND GROWTH OF GIANT FRESHWATER PRAWNS (*MACROBRACHIUM ROSENBERGII*) AND MOLA (*AMBLYPHARYNGODON MOLA*)

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The effects of addition of silver carp (*Hypophthalmichthys molitrix*) and catla (*Catla catla*) on small indigenous species mola (*Amblypharyngodon mola*) and freshwater giant prawn (*Macrobrachium rosenbergii*) in polyculture system was evaluated at the Fisheries Field Laboratory, Bangladesh Agricultural University, Mymensingh.

The experiment had five treatments viz. T₁ (prawn and mola), T₂ (prawn, mola and catla), T₃ (prawn, mola and silver carp), T₄ (prawn, mola, catla and silver carp), and T₅ (only mola) was treated as T₁, T₂, T₃, T₄ and T₅, respectively each with three replications. Stocking density of mola varied considering same biomass in all the treatments. Prawn stocking densities were 120 juvenile dm⁻¹ (dm=decimal =40m²) and 6 carps dm⁻¹. Feeds were supplied twice daily for prawn and feeding rates were 10% of body weight at the beginning of study (more than one month), and assuming 80% survival feed application was gradually reduced to 5% at the last month.

Parameters of water quality (except transparency) did not vary significantly ($P>0.05$) among the treatments. Survival of freshwater prawn in prawn-mola-carps polyculture system were relatively higher where prawn and mola were stocked with silver carp and catla, and with silver carp, respectively than with only mola or with mola and catla. Average weight gain, survival, and SGR of prawn did not differ significantly among the treatments.

Net and gross production of prawn were significantly higher with silver carp and with silver carp-catla but not with only mola or mola-catla. Average weight gains, SGR, net and gross production were significantly lower for silver carps than in catla or in catla-silver carp. The balanced stocking densities of prawn-mola with catla - silver carp developed a synergistic interaction resulting higher net and gross productions. Average final weight, survival and average weight gain of mola did not differ significantly among treatments. Net and gross productions were significantly higher in treatment T₅, where only mola was stocked at higher densities.

Obtained data did not show significant difference in mola production with prawn, prawn-catla, prawn-silver carp, and prawn-catla-silver carp which elicits that inclusion of carp did not influence mola production. Consequently, carps can be added with prawn and mola to enhance total production, which would play a significant role in providing family nutrition as well as generating additional income.

THERMAL CHARACTERISTICS IN THE LOWER BASIN OF THE PRUT RIVER

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Basic thermal characteristics of the lower basin of the Prut river derive from its geographical location in latitude and longitude and expansion of morphometric and morphologic properties of order.

Due to the latitudinal extension of approximately 2°, the average of the annual temperature of the ground surface has a difference of 1,3°C, southern having higher heat values than the northern and high regions. The same happens with the other ground thermal parameters. Compared to other basins located on the same latitude east of the Carpathians, due to the increase of continentalism and western influences decrease with advancing eastward, the annual average temperature of the ground surface, 11-13°C lower Prut River Basin is higher by 0,5-1 ° C the values of Siret corridor and lowered by around 0,5°C from the values in the lower basin of Nistru river.

The annual temperature's average of air is characterized by values of 10°C in most part of the region of study, with values below this average in the northern region and on slopes with heights above 150 m and higher values in the southern half of Prut corridor, on inferior valleys of Chineja, Horincea, Elanul, Lărguța and even in Huși depression. The same spatial distribution is specific to the other thermic values.

At the level of monthly average of the air's temperature, the thermic dates which were analyzed at the weather stations in the region of this study and its vicinity, failed to capture thermic inversions in the region of study, although those inversions make their presence to be felt in the cold season at the level of daily averages.

As respects to the extreme air temperature there is a high percentage of positive singularities during the last 30 years and a dissipated distribution over the analysed period for the negative outliers.

The evolution of the number of days with different characteristic temperatures emphasizes the same phenomenon of reduction in the number of days with negative characteristic temperatures and, instead a clear increase in the number of days with positive characteristic temperatures.

Comparing the mean values of the ground temperature with the air temperature can be seen that the difference in temperature between the north and the south of the region of study is 1°C in the case of mean annual temperature of the air and 1.3°C for the mean annual temperature of the ground surface. Smaller thermal differences from the air are due to moderating influences of general circulation of air masses over the region of study.

Regarding the ground and the air temperature, in the region of study, it can be seen an increasing tendency of mean annual temperature, in all time periods analyzed.

Between 1894-2014, in Iași, the mean annual temperature has increased by 0,4°C, instead if the reporting period is between 1951-2014, the mean annual temperature increasing is by 1°C. In conclusion, depends very much in which period the analysis starts and finishes, colder or warmer.

THE STUDYING OF ORTHOPTERA WILDLIFE (INSECT: ORTHOPTERA) AS AN IMPORTANT PART OF THE REGIONAL BIODIVERSITY

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With the actual conditions, when our society suffers plenty of changes that are closely linked with the fast science and technique development which has a more strong impact toward the environment, we need to pay a greater attention to the knowledge of different species of animals as well as their role upon the nature, especially in the process of improvement of ecological disadvantageous situations that we have nowadays.

Orthoptera is the most numerous order of animals, including over 20000 species, in the Republic of Moldova we can find just 113 species. These species creates one of the most beautiful and amazing sound transmission in the insect world. These insects represents a great importance in the economy of terrestrial ecosystems, being one of the most dominant group.

The studies were carried between 2012 – 2015 in the area of the inferior part of the basin of Ichel river, and had as main to identify, to investigate and to undertake measures for the preserving the fauna biodiversity of orthoptera. Studies of orthoptera begin in spring (April – May) and last until the temperature is below zero. The general techniques of collection of orthoptera are the gathering by the means of entomological net, the setting of a web above branches of trees and bushes and finally the manual collection. The studies has shown that the investigated areal includes 20 species of orthoptera that belongs to 5 subgroups. The most widespread is Acrididae – 45 %, Tettigoniidae – 20 %, Gryllidae and Tetrigidae – 15% and the lost one Tridactylidae – 5%. Out of these 20 species of orthoptera, 7 are omnivore (35%) and the rest 13 are phytophagous (65%). Regarding the ecological preferences and namely the habitat, the majority of them like mesophilic, hygromesophilic and hydrophilic biotopes. According to the vital forms the majority are holo-bionts that belong to the superfamily Acrididae. The Tetrigidae representatives are hemibionts, the species from the Gryllidae are mesobionts and the Tettigoniidae are from superfamily Tettigoniidae. As a result of the analysis of the geographical spreading or the areal type it was established that the orthoptera fauna is formed by faunal elements which belong to 4 groups: Palearctic, Centralasiatic, Mediterranean and European. The Palearctic elements are predominant (10 species - 50%), the centralasiatic elements have 3 species – 15%, followed by Mediterranean elements – 15% and 20% belong to European ones.

Orthoptera happen to be good indicators of biodiversity of the meadows. Withal, they represent an important family that adjust the harmful species of insects within the ecosystem. The carried investigations emphasize the taxons composition and their dynamics for the preservation and reproduction. The orthoptera's functional estate can serve as an index of environment quality and focuses on the researching of new solutions for protection, rational using and exploitation of the biological resources.

**CLIMATIC CONDITIONS AND SPECIFICITY OF INTRODUCTIONS
OF *POLYGONUM SACHALINENSE* F. SCHMIDT SPECIES
IN REPUBLIC OF MOLDOVA**

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Grădina Botanică (I) AȘM.

Polygonum sachalinense F.Schmidt syn. *Fallopia sachalinensis* Ronse Dect., *Reynoutria sachalinense* Nakai, is herbaceous, valuable plant, can be grown in various climatic conditions, with high biological productivity and longevity, high growth rate. The introduction prospects into the culture of this species is very advantageous because *Polygonum sachalinense* can be used in different directions. Widely distributed in northern Japan and has spread to North American and European countries. Their younger buds and stems have been cooked as a green vegetable, the rhizomes have been used in traditional medicine, biomass productivity and value indicates the possibility of using the species as fuel for combustion and energy production.

All biological and physiological processes of plants (photosynthesis, respiration, absorption of water and nutrients from the soil, growth, development) takes place in conditions of temperature, humidity, light, being in close relationship with each other. In Republic of Moldova is moderate continental climate characterized by gentle winters and short with little snow, warm autumns, late, rainy, late spring with significant diurnal oscillations and monthly arid summers long, and low amounts of rainfall, all these conditions lead to intensive development of the aerial parts of the plant, while passing all phases of development over a period of vegetation: flowering, fruit set, ripening seeds.

Polygonum sachalinense is characterized by a vegetation period early, registration with positive spring temperatures, ranging from 6 to 10°C at night and 8-14°C day. But negative spring temperatures negatively influence the shoots and young leaves, even in this case the plants do not freeze completely, but recover quickly. Autumn temperatures negative spontaneous, influence on the aerial parts of the plant, the leaves fall, shoots dehydrate, become brown in color, and dry completely. For normal development, favorable temperatures range from +15 ... + 40 °C. The optimum temperature for flowering plants is +25 ... 30 °C.

Plants grows in places with direct sunlight and in shady places, but when it reaches the maximum height a well-lit, and those that are shaded have a slower development and that their fruit is smaller. Air and soil humidity does not influence much plant growth, even if other countries given species, grows on riverbanks, which means that it has sufficient humidity for development. In terms of Republic of Moldova in drought conditions, some shoots can reach 6 m in height, but form smaller seeds. The average vegetation period lasts 250 days, including reproduction phase with about 60 days, which offers an impressive amount of fresh mass, with well-developed foliar device. The productivity of the harvested biomass of *Polygonum sachalinense*, in Botanical Garden (Institute) of the ASM, constitutes 55-75 t/ha.

ASPECTUL DE CERCETARE A COMPLEXELOR DE NEMATODE FITOPARAZITARE LA CULTURA SFECELEI DE ZAHĂR, ZONA NORD, R.MOLDOVA.

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Un obiectiv esențial în valorificarea sfecelei de zahăr în R. Moldova este, influența factorilor de mediu biotici stresogeni, în special gama de organisme nocive, ca agenți fitoparaziți ce merită o deosebită atenție și cercetare particulară al consecințelor de impact, parametrilor structurilor spațiale, maladiile provocate cu eficiențe specifice și ne specifice, patogene etc. Printre aceste organisme nocive la cultura sfecelei de zahăr, cu rol semnificativ îl ocupă complexele de fitonematode parazite, capabile să provoace fitohelmintoze însoțite de pagube grave plantelor în mod cronic pe parcursul întregii perioade de vegetație. Actualitatea cercetărilor impune scopul și obiectivele investigațiilor, ce constituie relevarea diversității și densității efectivului numeric al populațiilor de fitonematode parazite la sfecla de zahăr, cu stabilirea impactului fitoparazitar, pentru argumentare utilizării măsurilor de remediere în monitoringul fitosanitar integrat în agroecozozze fitotehnice.

Eșantioanele fitonematologice au fost colectate sezonier din sectoare productive de sfeclă de zahăr, în perioada anilor 2011-2015, în cadrul ICȘCC (mun. Bălți), raioanele mejeșe Glodeni și Sângerei, iar analizele orientate în sensul evaluării diversității structurii cantitative, specializării trofice, au fost realizate în Laboratorul Parazitologie și Helmintologie IZ, AȘM. S-au realizat sondaje de evidențe fitosanitară helmintologică, anual peste 500 ha de sfeclă de zahăr, cu prelevare și analize a peste 300 probe sol și plante afectate, cu aplicarea metodelor aprobate și protocoale specific pentru investigațiile fitohelminologice, prin extracții, fixări, montări de preparate, cu determinarea ulterioară a parametrilor morfotaxonomici, specializare trofică, și constatarea frecvenței și abundenței efectivului numeric.

Rezultatele investigațiilor anuale ale nematofaunei fitoparazitare la cultura sfecelei de zahăr au pus în evidență 44 specii ce se referă la 23 de genuri, 12 familii, 7 ordine, ce formează complexe asociate de proveniență diversă și specializare trofică variată de tip ecto- semiendo-, endoparazitare, cu predominanța speciilor endoparazitare și celor formatoare de chisturi, ce provoacă grave malformații aparatului foliar și rizocarpilor. Această diversitate este favorizată de gradul de fertilizare a biotopului, starea fitosanitară, întreținerea agrotehnică în impact cu complexul de factori de mediu, agroecozoză, microrelief, unde se facilitează și abundența indivizilor prin valori excesive al unor specii invazive cu variații comparative, anuale și sezoniere, (500 – 3500 indivizi/100gr.sol), în dependență de sector, fază de creștere, asolament, cantitatea de fertilizanti minerali, organici introduși și cei de uz fitosanitar, care modifică oscilațiile efectivului numeric, gradul de reproducere și de adaptare în impact cu cultura sfecelei de zahăr. Totodată s-au semnalat afecțiuni helmintologice pe întreaga perioadă de vegetație, cu simptome specifice de heteroderoză, pratenhoze, ditilenhoze la nivel de aparat foliar și rădăcini tuberizate în formare de la 5-25%, cu predominanța heteroderozelor și ditilenhozelor provocate de fitonematodele parazite, invazive din genurile: *Heterodera*, *Ditylenchus*, *Pratylenchus*, *Helicotilencus*, *Rotylenchus*, *Aporcelaimellus*, *Paratylenchus*, *Merlinius*, ca agenți fitoparaziți evidențiați cantitativ, ce formează complexe specializate la cultura sfecelei de zahăr. Investigațiile respective au semnificație majoră în monitorizarea stării ecologice în agroecozozzele sfecelei de zahăr pentru remedierea impactului fitoparazitar și protecția mediului.

THE IMPACT OF CARPATHIAN EARTHQUAKES ON THE ENVIRONMENT AND THE BUILDING STOCK OF THE REPUBLIC OF MOLDOVA

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The territory of the Republic of Moldova has always been exposed to the activity of Carpathian Earthquakes. This activity often results in heavy physical damages and heavy losses, which directly affect the country's economy and infrastructure, and most importantly - the country's citizens. Thus, it is crucial to realize what are the potential consequences of an earthquake and how these consequences can be prevented, or at least have their negative effects reduced.

The most important and severe effects of Carpathian earthquakes are directed towards Moldova's infrastructure. The Moldovan building stock is mostly formed of old structures severely affected by time or previous earthquakes, which still host inhabitants. Most of the bridges and engineering structures have been built in the soviet era and are certainly outdated. The building codes used in the modern structural design are still based on the ones developed by the Soviet Union. All the above mentioned elements combined with a an obvious lack of strategy and will to change, put at risk not only the country's economy, but every citizen of the Republic of Moldova. Analyzing the consequences of the three major earthquakes which occurred in Moldova in the XXth century (1940, 1977, 1986), it can be firmly stated that an earthquake with a magnitude greater than 7.0 can result in serious damages. The 7.4 magnitude earthquake from 1940 resulted in 172 completely destroyed buildings and 501 heavily damaged. The 1977 earthquake ($M=7.2$) damaged heavily 8914 buildings. In 1886, after a 7.0 magnitude earthquake, a total number of 7015 severely damaged buildings was counted [1]. A recent research showed that if today an earthquake analogous to the 1940 one occurs again, it will result in 31000 heavily damaged buildings [2]. Thus, there is a strong need in implementing important measures to ensure social safety and welfare for the citizens of the Republic of Moldova.

Apart from the certain effects that the Carpathian earthquakes can have on the moldovan building stock, it is imperative to consider the environmental consequences the seismic activity can have. Earthquakes can create surface faulting, tectonic uplift, soil liquefactions and even mud volcanos, which can severely affect building structures or fields used for agricultural processes. One of the most detailed record of observations ever performed on earthquake environmental consequences in Moldova was realized by V.S. Saianov [3]. After the major earthquake in 1977, he performed numerous field investigations in which he noted every physical deformation and phenomenon which he assumed were caused by the seismic activity. The 1977 earthquake resulted in numerous terrestrial modifications, such as landslides or land fissures and cracks. In many regions he observed that water levels in wells had changed, and in some spots small mud volcanoes were formed as a result of soil liquefaction. All these observations were logged by the author in the physical map of Moldova [3]. Even if the terrestrial deformations he documented can be influenced by many factors such as tectonical distribution, soil characteristics, internal geological forces and tensions, seismic activity certainly has an important role in creating these types of deformations.

Since the Republic of Moldova is located in close range to the Carpathian mountains and is directly under the influence of Carpathian earthquakes, it is of utmost importance to implement measures that would prevent potential hazard risks and ensure social safety.

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REMARKS CONCERNING AUTO EMISSIONS QUANTITY WITHIN HIGH-TRAFFIC AREAS OF CHISINAU CITY

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Urban traffic is the largest source of atmospheric pollution, it constitutes about 90-95% of the total amount of pollutants that are discharged into the atmosphere.

Therefore, there is a need to study the main traffic arteries regarding the number of transport units and the concentration of pollutants emitted by them.

Analyzing the Fig. 1, we notice that the highest concentration of pollutants caused by car traffic is in the area of North Bus Station. Thus the highest concentration of the amount of pollutants (CO, VOC, NO_x, PM, N₂O, NH₃) was detected at Izmail street in the region of near the CHPs 1; with 420g / s, followed by Calea Mosilor street, Michai Viteazul, Izmail street with 385 g / s. With about 330 - 350g / s are boulevards Stefan cel Mare and Gagarin, followed by Calea Ieșilor; 310 g / s.

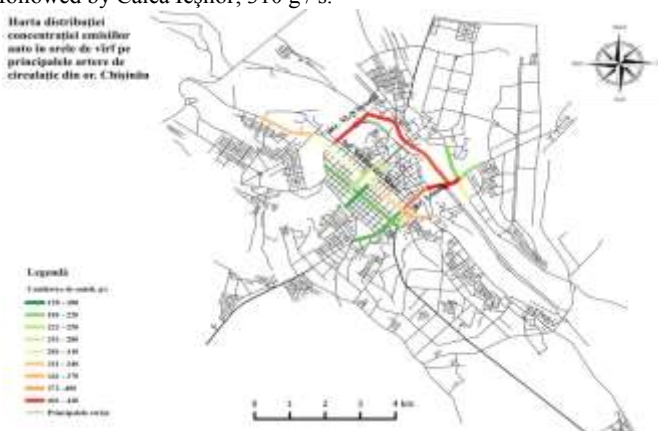


Fig. 1 The map of auto emissions concentration distribution in rush hours on major traffic arteries in the Chisinau city

Pollutants concentration correlates with the number of car units on these traffic arteries. Therefore Izmail street (in the area of CHPs 1) is more intense circulated - with 5940 units of transport per hour (in rush hours) of which 54% assigned of automobiles, 32% minibuses and 14% heavy units - including buses. This is followed by Mihai Viteazul and Calea Moșilor streets; about 5600 units / hour.

As shown in the Fig. 1, the lowest concentration of emissions is on Pushkin street; about 150g / s, with a 1900 traffic units / hour, rather than Vladimir Tudor street; 1700 units / hour where there has been a concentration of 180g / s. This difference is determined by the type of transport units. Therefore on Pushkin street there are mostly automobiles, but on Tudor Vladimirescu; 77% - automobiles, 12% - minibuses and heavy units -11%.

The concentration of emitted pollutants by road transportation is determined both by the number and the type of transport units.

DIVERSITY AND STRUCTURE OF PHYTOBENTHOS IN THE NISTRU RIVER BASIN

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Phytobenthos is a very good biological indicator for aquatic ecosystem biocoenosis, it is considered to be a suitable parameter to determine the impact of nutrient pollution because, usually, these organisms are sessile and therefore indicate the status of released nutrients at the sampled location. Also, it is an important source of oxygen, serves as food for aquatic organisms and purifies water. This ecological group is especially suitable to be used as a bioindicator for monitoring long-term changes in aquatic ecosystems.

The water quality of Nistru River Basin and seasonal dynamic for phytobenthos were studied more detailed during the vegetative period of 2015. During field surveys there were taken 17 phytobenthos samples from 8 monitoring points. In the analyzed samples were identified 113 indicator species and varieties of different taxonomic groups of which: Bacillariophyta-73, Chlorophyta-27, Cyanophyta-10 and Euglenophyta-3.

Along Nistru River in the higher, middle and lower sector, diversity and abundance of species is very various due to the environmental conditions and nature of the substrate. However, benthic algae have a bigger abundance in the upper river section. Diatom algae prevailed both in the number of species and in the abundance. From the totality identified taxa only 84 had saprobic index. After analysis of the samples collected were observed predominance of diatom species characteristic to the following saprobic zone: *Cymbella helvetica* – xeno-oligomesosaprobic; *Nitzschia dissipata*, *Amphora ovalis*, *Fragilaria capucina* – oligo-betamesosaprobic; *Diatoma vulgare*, *Rhoicosphenia curvata*, *Cocconeis pediculus*, *Synedra ulna*, *Gomphonema olivaceum*, *Surirella ovata*, *Melosira granulata*, *Navicula capitatoradiata* – betamesosaprobic; *Cymatopleura solea*, *Navicula menisculus* – beta-alfamesosaprobic; *Nitzschia palea*, *N. acicularis*, *Navicula cryptocephala* – alfamesosaprobic. Also there were frequently found the following Chlorophyta algae: oligo-beta – *Spirogyra porticales*, *Rhizoclonium hieroglyphicum*; beta – *Cladophora fracta*, *Scenedesmus abundans*, *S. quadricauda*, beta-alfa – *Spirogyra varians* and alfa – *Ulothrix zonata*. Euglenophyta Phylum has had fewer representatives as in previous year being composed of the following betasaprobic species *Euglena texta* and *Merismopedia glauca*. Cyanophyta Phylum was represented by *Phormidium favosum* - betamezosaprobic and *Oscillatoria limosa* – beta-alfamesosaprobic.

The water quality dynamic varied depending on sector and the human pollution degree. Saprobic index ranged from 1,72 (Olănești Village) and 2,43 (Cremenciug Village). The cleanest sections were identified in April in Dubasari Lake (Dubăsari Town) and near Olanesti Village, where the water quality was classified to the first class as “very good”. The most polluted sector is near Cremenciug Village in summer, where the water quality corresponds to the III-rd class and is considered “moderately polluted”. But in general, in other Nistru River monitoring sections the water quality according to phytobenthos was attributed to the II-nd water quality class (“good”).

PHYTOPLANKTON DIVERSITY AND PRIMARY PRODUCTION IN THE DUBASARI WATER ACCUMULATION RESERVOIR

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During the 2015 year there were assessed the diversity and seasonal dynamics of quantitative parameters of phytoplankton, its production capacity, as well as the trophic level and water quality in the Dubasari lake, using algae species as indicators of saprobity.

The Dubasari lake phytoplankton was represented by a total of 62 species and intraspecific taxa distributed in the following taxonomic groups of algae Cyanophyta-3, Bacillariophyta -33, Chlorophyta-18, Euglenophyta-6, Chrisophyta-1, Pyrrophyta-1, where Bacillariophyta and Chlorophyta species are prevailing. The lake phytoplankton was more diverse in the summer.

The numbers of phytoplankton changed within the limits 5,12 to 13,66 mln.cel/l with biomass from 1,77 to 9,59 g/m³ in the spring, from 6,23 to 22,96 mln.cel/l with biomass from 3,43 to 15,33 g/m³ in the summer, and from 6,16 to 11,29 mln. cel/l with biomass from 1,88 to 5,01 g/m³ during autumn. Share in the phytoplankton numbers belongs to cianofite algae, and in the algal biomass to bacilariofite algae.

The maximum intensity of production processes was recorded in the autumn, primary production values being located within 5,44 to 7,7 gO₂/m⁻² 24 h. In the spring (1,68-3,54 g O₂/m⁻² 24h) and summer (1,74 - 2,24g O₂/m⁻² 24h) the phytoplankton primary production was lower in all sectors of the lake. Seasonal and spatial fluctuations in lake primary production are accompanied by fluctuations in phytoplankton biomass, community structure of plankton algae succession, changes in nutrient elements concentrations and water transparency values oscillations.

The destruction processes intensity was quite high, destructions values changing from 3,45 to 29,9 gO₂ /m⁻².24 h. The ratio A/R is less than 1, reflecting a negative balance of organic matter formation in lake and shows a high content of allochthonous substances.

There were established variations of the saprobe index values within 1,74 to 2,01. Most saprobe index values were within limits of the β-mezosaprobe zone and indicate attribution to the water the quality classes II (good).

Keywords: phytoplankton, primary production, destruction, trophicity, water quality

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REALITIES AND PERSPECTIVES ON QUALITY AND SAFETY OF DIETETIC PRODUCTS (GLUTEN-FREE PRODUCTS)

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Abstract: This research is aimed at the manufacture of bakery products for people suffering from gluten intolerance, and correspond to the following requirements: to be gluten-free, absence of allergic factors, characterised by nutritional principles necessary for correction of metabolism disorders caused by the disease, accessible price and high quality. For the manufacture of gluten-free read were performed the following: use of rice and soriz flours, which are gluten-free; determining the optimal dose of the flour used for development of the manufacture network; describing technological stages and parameters examining the properties of dough and bread.

Keywords: gluten-free flours, soriz, rice, celiac disease, effects, quality indicators.

Nowadays more and more people are suffering from gluten intolerance. Gluten comprises the proteins contained in wheat, oats, barley and rye. The proteins contained in these cereals are toxic for the people suffering from gluten intolerance [1]. The treatment includes complete exclusion of gluten from the diet and replacement of the cereals containing this element with products obtained from gluten-free cereals.

The recipe of gluten-free products may include corn flour, potato flour and starch, buckwheat flour, rice flour and flour from other vegetables and pseudo-cereals like soriz. These raw materials do not have a gluten fraction to provide the essential protein network, that is why several problems may appear when processing the dough.

In order to avoid such problems, several treatments applied to raw materials may be used in order to modify the proteins by use of enzymes or other linkage products.

The aim of this study is to obtain bread from rice and soriz without gluten for the consumers suffering from celiac disease. In order to create a uniform matrix for the starch granules, gelatinization of at least a part of the rice and soriz flour is applied, to obtain a chain for the flour left. In this study a part of the rice flour is gelatinized and some protein substances are added to improve the dough forming capacity of rice flour, which in its turn is transformed into bread.

These flours, due to the absence of gluten proteins or mucilaginous substances, as for the rye flour, do not possess panification qualities.

Because these flours do not contain gluten, gluten replacements are used. The replacements include: potato starch gel, carob flour, pectin, alginations.

In order to ensure glucides necessary for fermentation, sugar is added for the production of these products (containing yeast).

The recipes of the test samples are calculated depending on dry substances for a kilogram of flour. The dough is prepared by means of monophasic procedure, using rye flour for the witness sample and rice and soriz flours for the other samples. The products are baked in a shaped tray.

The following materials were used: rye flour, soriz flour, potato starch compressed yeast, sugar, pectine, refined sunflower oil, melase, baking soda (in some cases).

The limits for usage of soriz and rice flours were determined through many tests and only the intervals having positive effects on dough formation were chosen, optimal doses being chosed later. There were studied and researched the following samples:

The baking of bread was performed in laboratory conditions in a rotating oven, further the products were cooled at room temperature.

Bread and bakery products have important physical, chemical and organoleptic properties which result in their high nutritional value [5].

According to the results, the reduction of the fermentation duration lead to formation of bread with uniform crumb porosity, reduced friability, exterior surface with less cracks, and due to the addition of nuts and sunflower seeds the products have a more pleasant aroma and taste, reducing the smell of baking soda and pectine.

Rice and soriz flour have a considerable influence on the quality of final bakery products. The effect is favourable in all cases due to the increase of porosity and elasticity of products.

These kinds of flour cause an increase of stability of the texture characteristics of the products. During the first hours the stability is caused by malto-dextrines and later on it is caused mixtures of glucose and fructose.

Analysing the global characteristics of products, the best effect on the quality of products is denoted by samples without baking soda with a duration of fermentation of one hour.

As a result of the research carried, the proposed goal was achieved – to develop recipes and technological patterns for ecological gluten-free bakery products with soriz and rice flour, for the people suffering from celiac disease.

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